



NATIONAL IRRIGATION AUTHORITY

TENDER DOCUMENT

SECTION I- INVITATION TO TENDER
SECTION II: INSTRUCTIONS TO TENDERERS
SECTION III – CONDITIONS OF CONTRACT-PART I
SECTION IV – CONDITIONS OF CONTRACT –PART II
SECTION V – SPECIFICATIONS
SECTION VI – DRAWINGS
SECTION VII – BILLS OF QUANTITIES
SECTION VIII – STANDARD FORMS

TENDER NUMBER: NIA/T/225/2020-2021

TENDER NAME: TENDER FOR REHABILITATION WORKS OF
KIRINYAGA CLUSTERS IRRIGATION
DEVELOPMENT PROJECT IN KIRINYAGA
COUNTY

PUBLISHED ON: 17TH NOVEMBER 2020

ISSUED ON: 20TH NOVEMBER 2020

SUBMISSION DEADLINE: 27TH NOVEMBER 2020 AT 1200 NOON HOURS
LOCAL TIME

PROCURING ENTITY:
National Irrigation Authority (NIA)
Lenana Road, Hurlingham
P.O. Box 30372-00100
Nairobi, Kenya
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CONTENTS

| | |
|--|------------|
| SECTION I. INVITATION TO TENDER..... | 3 |
| SECTION II. INSTRUCTIONS TO TENDERERS..... | 5 |
| SECTION III. CONDITIONS OF CONTRACT, PART I – GENERAL CONDITIONS..... | 29 |
| SECTION IV. CONDITIONS OF CONTRACT, PART II – (CONDITIONS OF PARTICULAR APPLICATION)..... | 31 |
| SECTION V: SPECIFICATIONS | 57 |
| SECTION VI: DRAWINGS..... | 190 |
| SECTION VII – BILLS OF QUANTITIES | 191 |
| SECTION VIII – STANDARD FORMS | 194 |

SECTION I. INVITATION TO TENDER



NATIONAL IRRIGATION AUTHORITY (NIA)

NATIONAL OPEN TENDER

The National Irrigation Authority wishes to invite sealed tender for the following projects.

| S. No. | Tender No. | Tender Name | Tender Submission Deadline | Target Group |
|--------|---------------------|--|---|--------------|
| 1. | NIA/T/225/2020-2021 | Tender for Rehabilitation works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County | 27 th November 2020 at 12.00 noon local time | ALL |
| 2. | NIA/T/226/2020-2021 | Tender for Construction of Tharaka Nithi Clusters Irrigation Projects LOT 2 in Tharaka Nithi County | 27 th November 2020 at 12.00 noon local time | ALL |
| 3. | NIA/T/227/2020-2021 | Tender for Construction Works of Chagachicha Irrigation Development Project in Othaya Constituency, Nyeri County | 27 th November 2020 at 12.00 noon local time | AGPO |

Detailed tender document may be viewed and obtained by interested and eligible tenderers **free of charge** from the Authority's website: <http://www.nib.or.ke/tenders> or GoK's **Public Procurement Information Portal**, <https://www.tenders.go.ke> from 20th November 2020. Tenderers who intend to submit their tenders MUST promptly submit their names and contact details to: purchasing@nib.or.ke for communication of any clarification(s) and addendum (s) during the tendering process.

INTERNATIONAL OPEN TENDER

INVITATION FOR EXPRESSION OF INTEREST (EOI)

| S.No | Amendment | Tender No. | Tender Name |
|------|-----------|------------|-------------|
|------|-----------|------------|-------------|

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No: NIA/T/225/2020-2021

| | | | |
|---|----------------------------|---------------------|---|
| 1 | Addendum No.01 | NIA/T/271/2020-2021 | Design review/update, preparation of tender document and Supervision of Construction works for Bura Irrigation and Settlement Scheme Rehabilitation Project |
| | Clarification No.01 | | |

Further to the publication of **Expression of Interest (EOI)** for the above tenders in the local dailies ‘The Daily Nation’ newspaper of national circulation, National Irrigation Authority’s (Authority) website: <https://irrigation.go.ke/tenders/> and GoK’s Public Procurement Information Portal, <http://www.tenders.go.ke> on 5th November 2020.

In response to the clarification(s) sought by participating firms, the list of specialized Kuwait firms along with their contacts have been place in the National Irrigation Authority’s (Authority) website: <https://irrigation.go.ke/tenders>. Further the Application submission deadline has further been extended from 1200 hours local time on Thursday 19th November 2020 to **a new date of 1200 hours local time on Thursday 3rd December 2020.**

Please incorporate the changes in preparation and submission of your tenders. The other details, terms and conditions remain the same.

The address referred to above is:

Physical Address
Chief Executive Officer/CEO
National Irrigation Authority (NIA)
Unyunyizi House, First Floor, Room 309
Lenana Road, Hurlingham, Nairobi, Kenya
Tel: +254-20-2711380/468
Fax: +254-20-2722821/2711347
E-mail purchasing@irrigation.go.ke

CHIEF EXECUTIVE OFFICER/CEO
NATIONAL IRRIGATION AUTHORITY.

Section II. Instructions to Tenderers

Table of Contents

CONTENTS

| | |
|--|-----------|
| A. GENERAL..... | 8 |
| 1. Definitions..... | 8 |
| 2. Eligibility and Qualification Requirements..... | 8 |
| 3. Cost of Tendering..... | 9 |
| 4. Site Visit | 10 |
| B: TENDER DOCUMENTS..... | 10 |
| 5. Tender Documents | 10 |
| 6. Inquiries by Tenderers | 11 |
| 7. Amendment of Tender Documents..... | 11 |
| C. PREPARATION OF TENDERS..... | 11 |
| 8. Language of Tender | 11 |
| 9 Documents Comprising the Bid | 11 |
| 10. Tender Prices..... | 12 |
| 11 Currencies of Tender and Payment | 13 |
| 12 Tender Validity | 13 |
| 13 Tender Security | 14 |
| 14 No alternative offers | 14 |
| 15. Pre-tender Meeting | 14 |
| 16 Format and Signing of Tenders | 15 |
| D. SUBMISSION OF BIDS | 15 |
| 17 Sealing and Marking of Bids..... | 15 |
| 18 Deadline for Sub-mission of Bids..... | 16 |
| 19 Modification and Withdrawal of Bids..... | 16 |

| | |
|--|-----------|
| E. TENDER OPENING AND EVALUATION | 16 |
| 20 Tender Opening | 17 |
| 21. Process to Be Confidential..... | 17 |
| 22 Clarification of Tenders | 17 |
| 23 Determination of Responsiveness | 18 |
| 24 Correction of Errors | 18 |
| 25 Conversion to Single Currency | 19 |
| 26 Evaluation and Comparison of Bids | 19 |
| F. AWARD OF CONTRACT..... | 20 |
| 27 Award Criteria | 20 |
| 28 Notification of Award | 20 |
| 29 Performance Guarantee | 21 |
| 30 Advance Payment..... | 21 |
| APPENDIX TO INSTRUCTIONS TO TENDERERS | 22 |

Instructions to Tenderers

A. GENERAL

1. Definitions

- a. “Tenderer” means any persons, partnership firm or company submitting a sum or sums in the Bills of Quantities in accordance with the Instructions to Tenderers, Conditions of Contract Parts I and II, Specifications, Drawings and Bills of Quantities for the work contemplated, acting directly or through a legally appointed representative.
- b. “Approved tenderer” means the tenderer who is approved by the Employer.
- c. Any noun or adjective derived from the word “tender” shall be read and construed to mean the corresponding form of the noun or adjective “bid”. Any conjugation of the verb “tender” shall be read and construed to mean the corresponding form of the verb “bid.”
- d. “Employer” means a Central Government Ministry, Local Authority, State Corporation or any other Public Institution.

2. Eligibility and Qualification Requirements

2.1 Eligibility requirements

This invitation to tender is open to all tenderers who are qualified as stated in the appendix.

2.2 Qualifications Requirements

To be qualified for award of Contract, the tenderer shall provide evidence satisfactory to the Employer of their eligibility under Sub clause 2.1. above and of their capability and adequacy of resources to effectively carry out the subject Contract. To this end, the tenderer shall be required to update the following information already submitted during prequalification: -

- (a) Details of experience and past performance of the tenderer on the works of a similar nature and details of current work on hand and other contractual commitments.
- (b) The qualifications and experience of key personnel proposed for administration and execution of the contract, both on and off site.
- (c) Major items of construction plant and equipment proposed for use in carrying out the Contract. Only reliable plant in good working order and suitable for the work required of it shall be shown on this schedule. The tenderer will also indicate on this schedule when each item will be available on the Works. Included also should be a schedule of plant, equipment and material to be

imported for the purpose of the Contract, giving details of make, type, origin and CIF value as appropriate.

- (d) Details of sub-contractors to whom it is proposed to sublet any portion of the Contract and for whom authority will be requested for such subletting in accordance with clause 4 of the Condition of Contract.
- (e) A draft Program of Works in the form of a bar chart and Schedule of Payment which shall form part of the Contract if the tender is accepted. Any change in the Program or Schedule shall be subjected to the approval of the Engineer.
- (f) Details of any current litigation or arbitration proceedings in which the tenderer is involved as one of the parties.

2.3 Joint Ventures

Tenders submitted by a joint venture of two or more firms as partners shall comply with the following requirements:-

- (a) The tender, and in case of a successful tender, the Form of Agreement, shall be signed so as to be legally binding on all partners
- (b) One of the partners shall 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
- (c) The partner in charge shall be authorized to incur liabilities and receive instructions for an on behalf of any and all partners of the joint venture and the entire execution of the Contract including payment shall be done exclusively with the partner in charge.
- (d) 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 relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Form of Tender and the Form of Agreement (in case of a successful tender)
- (e) A copy of the agreement entered into by the joint venture partners shall be submitted with the tender.

3. Cost of Tendering

- 3.1 The Tenderer shall bear all costs associated with the preparation and submission of his tender and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the tendering process.
- 3.2 The price to be charged for the tender document shall not exceed Kshs.5,000/=
- 3.3 The procuring entity shall allow the tenderer to view the tender document free of charge before purchase.

4. Site Visit

- 4.1 The tenderer is advised to visit and examine the Site and its surroundings and obtain for himself on his own responsibility, all information that may be necessary for preparing the tender and entering into a contract. The costs of visiting the Site shall be the tenderer's own responsibility
- 4.2 The tenderer and any of his personnel or agents will be granted permission by the Employer to enter upon premises and lands for the purpose of such inspection, but only upon the express condition that the tenderer, his personnel or agents, will release and indemnify the Employer from and against all liability in respect of, and will be responsible for personal injury (whether fatal or otherwise), loss of or damage to property and any other loss, damage, costs and expenses however caused, which but for the exercise of such permission, would not have arisen.
- 4.3 The Employer shall organize a site visit at a date to be notified. A representative of the Employer will be available to meet the intending tenderers at the Site.

Tenderers must provide their own transport. The representative will not be available at any other time for site inspection visits.

Each tenderer shall complete the Certificate of Tenderer's Visit to the Site, whether he in fact visits the Site at the time of the organized site visit or by himself at some other time.

B: TENDER DOCUMENTS

5. Tender Documents

- 5.1 The Tender documents comprise the documents listed here below and should be read together with any Addenda issued in accordance with Clause 7 of these instructions to tenderers.
- a. Form of Invitation for Tenders
 - b. Instructions to Tenderers
 - c. Form of Tender
 - d. Appendix to Form of Tender
 - e. Form of Tender Surety
 - f. Statement of Foreign Currency Requirements
 - g. Tender and Confidential Business Questionnaires
 - h. Details of Sub contractors
 - i. Schedules of Supplementary Information
 - j. General Conditions of Contract – Part I
 - k. Conditions of Particular Application – Part II
 - l. Specifications
 - m. Bills of Quantities
 - n. Drawings
 - o. Declaration Form

5.2 The tenderer is expected to examine carefully all instructions, conditions, forms, terms, specifications and drawings in the tender documents. Failure to comply with the requirements for tender submission will be at the tenderer's own risk. Pursuant to clause 22 of Instructions to Tenderers, tenders which are not substantially responsive to the requirements of the tender documents will be rejected.

5.3 All recipients of the documents for the proposed Contract for the purpose of submitting a tender (whether they submit a tender or not) shall treat the details of the documents as "private and confidential".

6. Inquiries by Tenderers

6.1 A tenderer making an inquiry relating to the tender document may notify the Employer in writing or by telex, cable or facsimile at the Employer's mailing address indicated in the Invitation to Tender. The Employer will respond in writing to any request for clarification which he receives earlier than 7 days prior to the deadline for the submission of tenders. Written copies of the Employer's response (including the query but without identifying the source of the inquiry) will be sent to all prospective tenderers who have purchased the tender documents.

6.2 The procuring entity shall reply to any clarifications sought by the tenderer within 3 days of receiving the request to enable the tenderer to make timely submission of its tender.

7. Amendment of Tender Documents

7.1 At any time prior to the deadline for submission of tenders the Employer may, for any reason, whether at his own initiative or in response to a clarification requested by a prospective tenderer, modify the tender documents by issuing Addenda.

7.2 Any Addendum will be notified in writing or by cable, telex or facsimile to all prospective tenderers who have purchased the tender documents and will be binding upon them.

7.3 In order to allow prospective tenderers reasonable time in which to take the Addendum into account in preparing their tenders, the Employer may, at his discretion, extend the deadline for the submission of tenders.

C. PREPARATION OF TENDERS

8. Language of Tender

8.1 The tender and all correspondence and documents relating to the tender exchanged between the tenderer and the Employer shall be written in the English language. Supporting documents and printed literature furnished by the tenderer with the tender may be in another language provided they are accompanied by an appropriate translation of pertinent passages in the above stated language. For the purpose of interpretation of the tender, the English language shall prevail.

9 Documents Comprising the Bid

9.1 The tender to be prepared by the tenderer shall comprise:

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021,

- i. the Form of Tender and Appendix thereto,
- ii. a Tender Security
- iii. the Priced Bills of Quantities and Schedules
- iv. the information on eligibility and qualification
- v. any other materials required to be completed and submitted in accordance with the Instructions to Tenderers.

The Forms, Bills of Quantities and Schedules provided in the tender documents shall be used without exception (subject to extensions of the schedules in the same format and to the provisions of clause 13.2 regarding the alternative forms of Tender Surety).

10. Tender Prices

- 10.1 All the insertions made by the tenderer shall be made in INK and the tenderer shall clearly form the figures. The relevant space in the Form of Tender and Bills of Quantities shall be completed accordingly without interlineations or erasures except those necessary to correct errors made by the tenderer in which case the erasures and interlineations shall be initialled by the person or persons signing the tender.
- 10.2 A price or rate shall be inserted by the tenderer for every item in the Bills of Quantities whether the quantities are stated or not. Items against which no rate or price is entered by the tenderer will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bills of Quantities.

The prices and unit rates in the Bills of Quantities are to be the full [all-inclusive] value of the Work described under the items, including all costs and expenses which may be necessary and all general risks, liabilities and obligations set forth or implied in the documents on which the tender is based. All duties, taxes and other levies payable by the Contractor under the Contract, or for any other cause prior to the deadline for submission of tenders, shall be included in the rates and prices and the total Tender Price submitted by the tenderer.

Each price or unit rate inserted in the Bills of Quantities should be a realistic estimate for completing the activity or activities described under that particular item and the tenderer is advised against inserting a price or rate against any item contrary to this instruction.

Every rate entered in the Bills of Quantities, whether or not such rate be associated with a quantity, shall form part of the Contract. The Employer shall have the right to call for any item of work contained in the Bills of Quantities, and such items of work to be paid for at the rate entered by the tenderer and it is the intention of the Employer to take full advantage of unbalanced low rates.

- 10.3 Unless otherwise specified the tenderer must enter the amounts representing 10% of the sub-total of the summary of the Bills of Quantities for Contingencies and Variation of Prices [V.O.P.] payments in the summary sheet and add them to the sub-total to arrive at the tender amount.

- 10.4 The tenderer shall furnish with his tender written confirmation from his suppliers or manufacturers of basic unit rates for the supply of items listed in the Conditions of Contract clause 70 where appropriate. The Employer may require the tenderer to justify such rates so obtained from the suppliers or manufacturers.
- 10.5 The rates and prices quoted by the tenderer are subject to adjustment during the performance of the Contract only in accordance with the Provisions of the Conditions of Contract. The tenderer shall complete the schedule of basic rates and shall submit with his tender such other supporting information as required under clause 70 of the Conditions of Contract Part II.
- 10.6 Contract price variations shall not be allowed within the first 12 months of the contract.
- 10.7 Where quantity contract variation is allowed, the variation shall not exceed 15% of the original contract quantity.
- 10.8 Price variation requests shall be processed by the procuring entity within 30 days of receiving the request.

11 Currencies of Tender and Payment

- 11.1 Tenders shall be priced in Kenya Shillings and the tender sum shall be in Kenya Shillings.
- 11.2 Tenderers are required to indicate in the Statement of Foreign Currency Requirements, which forms part of the tender, the foreign currency required by them. Such currency should generally be the currency of the country of the tenderer's main office. However, if a substantial portion of the tenderer's expenditure under the Contract is expected to be in countries other than his country of origin, then he may state a corresponding portion of the contract price in the currency of those other countries. However, the foreign currency element is to be limited to two (2) different currencies and a maximum of 30% (thirty percent) of the Contract Price.
- 11.3 The rate or the rates of exchange used for pricing the tender shall be the selling rate or rates of the Central Bank ruling on the date thirty (30) days before the final date for the submission of tenders.
- 11.4 Tenderers must enclose with their tenders, a brief justification of the foreign currency requirements stated in their tenders.

12 Tender Validity

- 12.1 The tender shall remain valid and open for acceptance for a period of sixty (60) days from the specified date of tender opening or from the extended date of tender opening (in accordance with clause 7.4 here above) whichever is the later.
- 12.2 In exceptional circumstances prior to expiry of the original tender validity period, the Employer may request the tenderer for a specified extension of the period of validity. The request and the responses thereto shall be made in writing or by cable, telex or facsimile. A tenderer may refuse the request without forfeiting his Tender Surety. A

tenderer agreeing to the request will not be required nor permitted to modify his tender, but will be required to extend the validity of his Tender Surety correspondingly.

13 Tender Security

- 13.1 The tenderer shall furnish as part of his tender, a Tender Security in the amount and form stated in the Appendix to Instructions to Tenderers.
- 13.2 The tender security shall not exceed 2 percent of the tender price.
- 13.3 The Tender Security shall be valid at least thirty (30) days beyond the tender validity period.
- 13.4 Any tender not accompanied by an acceptable Tender Surety will be rejected by the Employer as non-responsive.
- 13.5 The Tender Sureties of unsuccessful tenderers will be returned as promptly as possible as but not later than twenty eight (28) days after expiration of the tender validity period. The Tender Surety of the successful tenderer will be returned upon the tenderer executing the Contract and furnishing the required Performance Security.
- 13.6 The Tender Surety may be forfeited:
 - a) if a tenderer withdraws his tender during the period of tender validity; or
 - b) in the case of a successful tenderer, if he fails, within the specified time limit
 - i. to sign the Agreement, or
 - ii. to furnish the necessary Performance Security
 - c) if a tenderer does not accept the correction of his tender price pursuant to clause 24.

14 No alternative offers

- 14.1 The tenderer shall submit an offer which complies fully with the requirements of the tender documents unless otherwise provided for in the appendix.

Only one tender may be submitted by each tenderer either by himself or as partner in a joint venture. A tenderer who submits or participates in more than one tender will be disqualified.

- 14.2 The tenderer shall not attach any conditions of his own to his tender. The tender price must be based on the tender documents. The tenderer is not required to present alternative construction options and he shall use without exception, the Bills of Quantities as provided, with the amendments as notified in tender notices, if any, for the calculation of his tender price. Any tenderer who fails to comply with this clause will be disqualified.

15. Pre-tender Meeting

- 15.1 If a pre-tender meeting is convened, the tenderer's designated representative is invited to attend at the venue and time in the Invitation to Tender. The purpose of the meeting

will be to clarify issues and to answer questions on any matter that may be raised at that stage.

15.2 The tenderer is requested as far as possible to submit any questions in writing or by cable, to reach the Employer not later than seven (7) days before the meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted in accordance with the following:

- (a) Minutes of the meeting, including the text of the questions raised and the responses given together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the tender documents. Any modification of the tender documents listed in – Clause 9 which may become necessary as a result of the pre-tender meeting shall be made by the Employer exclusively through the issue of a tender notice pursuant to Clause 7 and not through the minutes of the pre-tender meeting.
- (b) Nonattendance at the pre-bid meeting will not be cause for disqualification of a bidder.

16 Format and Signing of Tenders

- 16.1 The tenderer shall prepare his tender as outlined in clause 9 above and mark appropriately one set “ORIGINAL” and the other “COPY”.
- 16.2 The copy of the tender and Bills of Quantities 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. All pages of the tender where amendments have been made shall be initialed by the person or persons signing the tender.
- 16.3 The complete tender shall be without alterations, interlineations or erasures, except as necessary to correct errors made by the tenderer, in which case such corrections shall be initialed by the person or persons signing the tender.

D. SUBMISSION OF BIDS

17 Sealing and Marking of Bids

- 17.1 The tenderer shall seal the original and copy of the tender in separate envelopes, duly marking the envelopes as “ORIGINAL” and “COPY”. The envelopes shall then be sealed in an outer separate envelope.
- 17.2 The inner and outer envelopes shall be addressed to the Employer at the address stated in the Appendix to Instructions to Tenderers and bear the name and identification of the Contract stated in the said Appendix with a warning not to open before the date and time for opening of tenders stated in the said Appendix.
- 17.3 The inner envelopes shall each indicate the name and address of the tenderer to enable the tender to be returned unopened in case it is declared “late”, while the outer envelope shall bear no mark indicating the identity of the tenderer.

- 17.4 If the outer envelope is not sealed and marked as instructed above, the Employer will assume no responsibility for the misplacement or premature opening of the tender. A tender opened prematurely for this cause will be rejected by the Employer and returned to the tenderer.

18 Deadline for Sub-mission of Bids

- 18.1 Tenders must be received by the Employer at the address specified in clause 17.2 and on the date and time specified in the Letter of Invitation, subject to the provisions of clause 7.4, 18.2 and 18.3.

Tenders delivered by hand must be placed in the “tender box” provided in the office of the Employer.

Proof of posting will not be accepted as proof of delivery and any tender delivered after the above stipulated time, from whatever cause arising will not be considered.

- 18.2 The Employer may, at his discretion, extend the deadline for the submission of tenders through the issue of an Addendum in accordance with clause 7, in which case all rights and obligations of the Employer and the tenderers previously subject to the original deadline shall thereafter be subject to the new deadline as extended.
- 18.3 Any tender received by the Employer after the prescribed deadline for submission of tender will be returned unopened to the tenderer.

19 Modification and Withdrawal of Bids

- 19.1 The tenderer may modify or withdraw his tender after tender submission, provided that the Employer prior to prescribe deadline for submission of tenders receives written notice of the modification or withdrawal.
- 19.2 The tenderer’s modification or withdrawal notice shall be prepared, sealed, marked and dispatched in accordance with the provisions for the submission of tenders, with the inner and outer envelopes additionally marked “MODIFICATION” or “WITHDRAWAL” as appropriate.
- 19.3 No tender may be modified subsequent to the deadline for submission of tenders.
- 19.4 No tender may be withdrawn in the interval between the deadline for submission of tenders and the period of tender validity specified on the tender form. Withdrawal of a tender during this interval will result in the forfeiture of the Tender Surety.
- 19.5 Subsequent to the expiration of the period of tender validity prescribed by the Employer, and the tenderer having not been notified by the Employer of the award of the Contract or the tenderer does not intend to conform with the request of the Employer to extend the period of tender validity, the tenderer may withdraw his tender without risk of forfeiture of the Tender Surety.

E. TENDER OPENING AND EVALUATION

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021,

20 Tender Opening

- 20.1 The Employer will open the tenders in the presence of the tenderers' representatives who choose to attend at the time and location indicated in the Letter of Invitation to Tender. The tenderers' representatives who are present shall sign a register evidencing their attendance.
- 20.2 Tenders for which an acceptable notice of withdrawal has been submitted, pursuant to clause 19, will not be opened. The Employer will examine the tenders to determine whether they are complete, whether the requisite Tender Sureties have been furnished, whether the documents have been properly signed and whether the tenders are generally in order.
- 20.3 At the tender opening, the Employer will announce the tenderer's names, total tender price, tender price modifications and tender withdrawals, if any, the presence of the requisite Tender Surety and such other details as the Employer, at his discretion, may consider appropriate. No tender shall be rejected at the tender opening except for late tenders.
- 20.4 The Employer shall prepare minutes of the tender opening including the information disclosed to those present.
- 20.5 Tenders not opened and read out at the tender opening shall not be considered further for evaluation, irrespective of the circumstances.

21. Process to Be Confidential

- 21.1 After the public opening of tenders, information relating to the examination, clarification, evaluation and comparisons of tenders and recommendations concerning the award of Contract shall not be disclosed to tenderers or other persons not officially concerned with such process until the award of Contract is announced.
- 21.2 Any effort by a tenderer to influence the Employer in the process of examination, evaluation and comparison of tenders and decisions concerning award of Contract may result in the rejection of the tenderer's tender.

22 Clarification of Tenders

- 22.1 To assist in the examination, evaluation and comparison of tenders, the Employer may ask tenderers individually for clarification of their tenders, including breakdown of unit prices. The request for clarification and the response shall be in writing or by cable, facsimile or telex, but no change in the price or substance of the tender shall be sought, offered or permitted except as required to confirm the correction of arithmetical errors discovered by the employer during the evaluation of the tenders in accordance with clause 24.
- 22.2 No tenderer shall contact the Employer on any matter relating to his tender from the time of the tender opening to the time the Contract is awarded. If the tenderer wishes to bring additional information to the notice of the Employer, he shall do so in writing.

23 Determination of Responsiveness

- 23.1 Prior to the detailed evaluation of tenders, the Employer will determine whether each tender is substantially responsive to the requirements of the tender documents.
- 23.2 For the purpose of this clause, a substantially responsive tender is one which conforms to all the terms, conditions and specifications of the tender documents without material deviation or reservation. A material deviation or reservation is one which affects in any substantial way the scope, quality, completion timing or administration of the Works to be undertaken by the tenderer under the Contract, or which limits in any substantial way, inconsistent with the tender documents, the Employer's rights or the tenderers obligations under the Contract and the rectification of which would affect unfairly the competitive position of other tenderers who have presented substantially responsive tenders.
- 23.3 Each price or unit rate inserted in the Bills of Quantities shall be a realistic estimate of the cost of completing the works described under the particular item including allowance for overheads, profits and the like. Should a tender be seriously unbalanced in relation to the Employer's estimate of the works to be performed under any item or groups of items, the tender shall be deemed not responsive.
- 23.4 A tender determined to be not substantially responsive will be rejected by the Employer and may not subsequently be made responsive by the tenderer by correction of the non-conforming deviation or reservation.

24 Correction of Errors

Tenders determined to be substantially responsive shall be checked by the Employer for any arithmetic errors in the computations and summations. Errors will be corrected by the Employer as follows:

- (a) Where there is a discrepancy between the amount in figures and the amount in words, the amount in words will govern.
- (b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will prevail, unless in the opinion of the Employer, there is an obvious typographical error, in which case adjustment will be made to the entry containing that error.
- (c) In the event of a discrepancy between the tender amount as stated in the Form of Tender and the corrected tender figure in the main summary of the Bills of Quantities, the amount as stated in the Form of Tender shall prevail.
- (d) The Error Correction Factor shall be computed by expressing the difference between the tender amount and the corrected tender sum as a percentage of the corrected builder's work (i.e. corrected tender sum less Prime Cost and Provisional Sums).

- (e) The Error Correction Factor shall be applied to all builder's work (as a rebate or addition as the case may be) for the purposes of valuations for Interim Certificates and valuations of variations.
- (f) The amount stated in the tender will be adjusted in accordance with the above procedure for the correction of errors and, with concurrence of the tenderer, shall be considered as binding upon the tenderer. If the tenderer does not accept the corrected amount, the tender may be rejected and the Tender Security may be forfeited in accordance with clause 13.

25 Conversion to Single Currency

- 25.1 For compensation of tenders, the tender price shall first be broken down into the respective amounts payable in various currencies by using the selling rate or rates of the Central Bank of Kenya ruling on the date twenty one (21) days before the final date for the submission of tenders.
- 25.2 The Employer will convert the amounts in various currencies in which the tender is payable (excluding provisional sums but including Day works where priced competitively) to Kenya Shillings at the selling rates stated in clause 25.1.

26 Evaluation and Comparison of Bids

- 26.1 The Employer will evaluate only tenders determined to be substantially responsive to the requirements of the tender documents in accordance with clause 23.
- 26.2 In evaluating tenders, the Employer will determine for each tender the evaluated tender price by adjusting the tender price as follows:
 - (a) Making any correction for errors pursuant to clause 24.
 - (b) Excluding Provisional Sums and provision, if any, for Contingencies in the Bills of Quantities, but including Day works where priced competitively.
- 26.3 The Employer reserves the right to accept any variation, deviation or alternative offer. Variations, deviations, alternative offers and other factors which are in excess of the requirements of the tender documents or otherwise result in the accrual of unsolicited benefits to the Employer, shall not be taken into account in tender evaluation.
- 26.4 Price adjustment provisions in the Conditions of Contract applied over the period of execution of the Contract shall not be taken into account in tender evaluation.
- 26.5 If the lowest evaluated tender is seriously unbalanced or front loaded in relation to the Employer's estimate of the items of work to be performed under the Contract, the Employer may require the tenderer to produce detailed price analyses for any or all items of the Bills of Quantities, to demonstrate the relationship between those prices, proposed construction methods and schedules. After evaluation of the price analyses, the Employer may require that the amount of the Performance Security set forth in

clause 29 be increased at the expense of the successful tenderer to a level sufficient to protect the Employer against financial loss in the event of subsequent default of the successful tenderer under the Contract.

- 26.6 Firms incorporated in Kenya where indigenous Kenyans own 51% or more of the share capital shall be allowed a 10% preferential bias provided that they do not sub-contract work valued at more than 50% of the Contract Price excluding provisional sums to a non-indigenous sub-contractor.
- 26.7 Preference where allowed in the evaluation of tenders shall not exceed 15%
- 26.8 The procuring entity may at any time terminate procurement proceedings before contract award and shall not be liable to any person for the termination.
- 26.9 The procuring entity shall give prompt notice of the termination to the tenderers and on request give its reasons for termination within 14 days of receiving the request from any tenderer.
- 26.10 A tenderer who gives false information in the tender document about its qualification or who refuses to enter into a contract after notification of contract award shall be considered for debarment from participating in future public procurement.
- 26.11 Poor past performance shall not be used as an evaluation criteria unless specifically provided for in the appendix.

F. AWARD OF CONTRACT

27 Award Criteria

- 27.1 Subject to Sub-clause 27.2, the Employer will award the Contract to the tenderer whose tender is determined to be substantially responsive to the tender documents and who has offered the lowest evaluated tender price subject to possessing the capability and resources to effectively carry out the Contract Works as required in Sub-clause 2.1 and 2.2 here above.
- 27.2 The Employer reserves the right to accept or reject any tender, and to annul the tendering process and reject all tenders, at any time prior to award of Contract, without thereby incurring any liability to the affected tenderers or any obligation to inform the affected tenderers of the grounds for the Employer's action.

28 Notification of Award

- 28.1 Prior to the expiration of the period of tender validity prescribed by the Employer, the Employer will notify the successful tenderer by cable, telefax or telex and confirmed in writing by registered letter that his tender has been accepted. This letter (hereinafter and in all Contract documents called "Letter of Acceptance") shall name the sum (hereinafter and in all Contract documents called "the Contract Price") which the Employer will pay to the Contractor in consideration of the execution and completion of the Works as prescribed by the Contract.

- 28.2 At the same time that the Employer notifies the successful tenderer that his tender has been accepted, the Employer shall notify the other tenderers that the tenders have been unsuccessful.
- 28.3 Within fourteen [14] days of receipt of the Form of Contract Agreement from the Employer, the successful tenderer shall sign the form and return it to the Employer together with the required Performance Security.
- 28.4 The parties to the contract shall have it signed within 30 days from the date of notification of contract award unless there is an administrative review request.

29 Performance Guarantee

- 29.1 Within twenty-eight [28] days of receipt of the notification of award from the Employer, the successful tenderer shall furnish the Employer with a Performance Security in the amount stated in the Appendix to Instructions to Tenderers and in the format stipulated in the Conditions of Contract.
- 29.2 The Performance Security to be provided by the successful tenderer shall be an unconditional Bank Guarantee issued at the tenderer's option by a reputable Bank approved by the Employer and located in the Republic of Kenya and shall be divided into two elements namely, a performance security payable in foreign currencies (based upon the exchange rates determined in accordance with clause 60(5) of the Conditions of Contract) and a performance security payable in Kenya Shillings. The value of the two securities shall be in the same proportions of foreign and local currencies as requested in the form of foreign currency requirements.
- 29.3 Failure of the successful tenderer to lodge the required Performance Security shall constitute a breach of Contract and sufficient grounds for the annulment of the award and forfeiture of the Tender Security and any other remedy under the Contract. The Employer may award the Contract to the next ranked tenderer.

30 Advance Payment

An advance payment, if approved by the Employer, shall be made under the Contract, if requested by the Contractor, in accordance with clause 60(1) of the Conditions of Contract. The Advance Payment Guarantee shall be denominated in the proportion and currencies named in the form of foreign currency requirements. For each currency, a separate guarantee shall be issued. The guarantee shall be issued by a Bank located in the Republic of Kenya, or a foreign Bank through a correspondent Bank located in the Republic of Kenya, in either case subject to the approval of the Employer.

31 Corrupt or Fraudulent Practices

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

APPENDIX TO INSTRUCTIONS TO TENDERERS

Notes on the Appendix to Instructions to Tenderers

The following appendix to instructions to tenderers shall complement or amend the provisions of the instructions to tenderers (Section II). Wherever there is a conflict between the provisions of the instructions to tenderers and the provisions of the appendix, the provisions of the appendix herein shall prevail over those of the instructions to tenderers.

| Instructions to Tenderers Reference | Particulars of appendix to instructions to tenderers |
|-------------------------------------|--|
| 1 (d) | The Employer is: NATIONAL IRRIGATION AUTHORITY |
| 2.1 | <p>ELIGIBILITY REQUIREMENTS</p> <p>This invitation to tender is open to tenderers registered/incorporated in Kenya,</p> <p>Prior to mandatory preliminary evaluation, the tenderers shall be subjected to eligibility requirements using the below listed criteria. The evaluation shall be on PASS/FAIL criteria and a tenderer must pass all below stated eligibility requirements in order to proceed to the next stage of mandatory preliminary evaluation. Any FAIL in any criteria shall result in overall FAIL:</p> <p>(i) VALID REGISTRATION AS A LEGAL ENTITY WITH EVIDENCE OF CERTIFIED COPY (BY COMMISSIONER OF OATHS) OF CERTIFICATE OF INCORPORATION/REGISTRATION AND CERTIFIED COPY CERTIFICATE FROM REGISTRAR OF COMPANIES SHOWING DIRECTORSHIP AND SHAREHOLDING (i.e. CR12 or whichever applicable) BEING SUBMITTED WITH THE TENDER, PURSUANT TO SECTION 55(1) (a) OF THE ACT</p> <p>(ii) A TENDERER MUST SUBMIT WITH HIS/HER TENDER A CERTIFIED COPY (BY COMMISSIONER OF OATHS) OF NCA CERTIFICATE OF REGISTRATION WITH A MINIMUM NCA 3 AND A CERTIFIED COPY (BY COMMISSIONER OF OATHS) OF VALID CONTRACTORS ANNUAL PRACTICING LICENSE ISSUED BY NCA TO DEMONSTRATE THEIR ELIGIBILITY. THE NCA CERTIFICATE WILL BE VERIFIED FROM THE NATIONAL CONSTRUCTION AUTHORITY (NCA) WEBSITE</p> <p>(iii) THE TENDERER MUST SUBMIT ONE ORIGINAL AND ONE COPY OF THE TENDER IN LEGIBLE WRITING/COPIES</p> |
| 2.2 | TECHNICAL EVALUATION |

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| The following qualification requirements MUST be FULLY met by the tenderers in order to proceed to the next stage of financial evaluation. Any FAIL in any criteria shall result in overall FAIL | | |
| | Criteria | Requirements |
| a) | <p>Experience as Main Contractor in the construction of at least TWO (2) IRRIGATION or WATER projects similar in nature and complexity over the last 8 years in Kenya. The average of the value of the two projects should be at least 200 million</p> <p>(Documentary evidence in form of Employer's reference or Certificate of Completion ONLY MUST be provided Certified by a Commissioner of Oaths)</p> | <p>i. 2 NO. WORKS</p> <p>ii. CERTIFICATE OF COMPLETION OF WORKS</p> |
| b) | <p>Key personnel (The qualifications and experience of key personnel proposed for specified roles in the administration and execution of the contract both on and off site in line with the tender requirements) (<i>CVs of proposed personnel , signed after 2ND November 2020 by both the tenderer's authorized representative and the personnel MUST be providedcertified By Acommisioner of Oaths</i>)</p> | <p>i) 1 No. Contract Manager, with at least HND in Engineering (Civil, Agric/Water) qualification, 10 years general experience and 7 years specific experience in water works</p> <p>ii) 1 No. Site Engineer with at least HND in Engineering (Civil, Agric/Water) qualification, 10 years' general experience and 7 years specific experience</p> <p>iii) 1 No. Survey Technicians with at least a diploma in surveying qualification, 5 years general experience and 3 years specific experience</p> <p>iv) 1 No. General Foreman, 5 years general experience and 4 years specific experience</p> |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021,

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| | c) | Ownership or hire of the essential equipment listed as required for the works; (documentary evidence through log books must be provided for owned equipment, agreements for hire must be provided and the source of the equipment must be supported by documentary evidence of logbooks certified by a commissioner of Oaths). | 1. 2 NO. Hydraulic excavators, atleast 90 HP 2. 4 NO. 7-25 Ton Tippers, 3. 1 NO. 1 TON Pick-UP Vehicle 4. Dewatering pump 5. Survey equipment (total station or quick sets) |
| | d) | Financial capacity in form of Liquid assets and/or credit facilities available for execution of this project (line of credit or commitment by a bank to lend the contractor on entering into a contract, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract. | Minimum KES.200 million |
| | e) | Average Annual volume of construction work in the last three years (2019, 2018 & 2017) (Documentary evidence in form of Employer's reference or Certificate of Completion ONLY MUST be provided Certified by a Commissioner of Oaths) | Minimum KES. 200 million |
| | f) | Proposed methodology/method statement, site organization, mobilization schedule, construction schedule or programme of entire assignment/works in form of bar chart, | Methodology Statement MUST be provided with the tender |
| 3.2 | The tender documents shall be FREE OF CHARGE. Detailed tender document may be viewed and obtained by interested and eligible tenderers free of charge from the Board's website: http://www.nib.or.ke/tenders from 5th April 2019. | | |
| 4.3 | A pre-tender briefing (not mandatory) will be held on 23 rd November 2020 at 10.00 a.m at MIAD CENTRE MWEA and thereafter a site visit of the project site. The costs of attending shall be the tenderer's own responsibility. Contact person: Eng MBLJIWE Mobile – +254 727024705 | | |
| 5.1 | The following documents shall not be part of the tender document: f) Statement of foreign currency requirements. | | |
| 6.1 | The Employer will respond in writing to any request for clarification which he receives earlier than SEVEN (7) days prior to the deadline for the submission of tenders | | |
| 7.2 | All Addendum shall be notified by e-mail using the e-mail addresses provided by the participating tenderers. Tenderers who intend to submit their tenders | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021,

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| | MUST promptly submit their names and contact details to: purchasing@irrigation.go.ke for communication of any clarification(s) and addendum (s) during the tendering process. |
| 10.1 | Five (5) percent of the Tender sum in the form of Unconditional Bank Guarantee from a local reputable bank |
| 10.4 | NOT APPLICABLE |
| 11.2 | All prices and requirements shall be in Kenya Shillings. |
| 11.3 & 11.4 | This will not be applicable, as tenders shall be priced in Kenya Shillings only. |
| 12.1 | Tenders shall remain valid for a period of 120 calendar days after date of opening. |
| 12.2 | The request for extension of tender validity shall be made by e-mail using the e-mail addresses provided by the participating tenderers in their tender submission letters/letter of bid |
| 13.1 | Tenders must be accompanied by tender security of an amount of Kes.2,000,000.00 in the form of a bank guarantee issued by a local reputable bank and addressed to the Chief Executive Officer, National Irrigation Authority. |
| 13.2 | Tenders must be accompanied by tender security of an amount of Kes.2,000,000.00 in the form of a bank guarantee issued by a local reputable bank and addressed to the Chief Executive Officer, National Irrigation Authority. |
| 13.3 | Tenders must be accompanied by tender security of an amount of Kes.2,000,000.00 in the form of a bank guarantee issued by a local reputable bank and addressed to the Chief Executive Officer, National Irrigation Authority. |
| 14.1 | Alternative offers shall not be permitted. |
| 15.1 | A pre-tender briefing (Not Mandatory) will be held on 23 rd November 2020 at 10.00 a.m at MIAD CENTRE MWEA and thereafter a site visit of the project site. The costs of attending shall be the tenderer's own responsibility. Contact person: Eng MBIJIWE Mobile – +254 727024705 |
| 16.1 | The tenderer shall prepare ONE ORIGINAL and ONE COPY of the Tenders |
| 16.2 | The power of attorney for person (s) signing the tender(s) must be provided. |
| 17.2 | <p>ADDRESS:</p> <p>Chief Executive Officer National Irrigation Authority (NIA) Unyonyizi House Lenana Road, Hurlingham Nairobi, Kenya Tel: +254-20-2711380/468 Fax: +254-20-2722821/2711347/2723392 E-mail: enquiries@irrigation.go.ke, purchasing@irrigation.go.ke</p> <p>TENDER NAME: TENDER FOR CONSTRUCTION WORKS FOR KIRINYANGA CLUSTERS IRRIGATION PROJECT</p> |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021,

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| | KIRINYANGA COUNTY TENDER NUMBER: NIB/T/225/2020-2020 |
| 18.1 | <p>ADDRESS: Chief Executive Officer National Irrigation Authority (NIA) Unyunyizi House Lenana Road, Hurlingham Nairobi, Kenya Tel. : +254-20-2711380/468 Fax : +254-20-2722821/2711347/2723392 E-mail : enquiries@nib.or.ke, purchasing@nib.or.ke</p> <p>DATE: 27TH NOVEMBER 2020</p> <p>TIME: 1200 HOURS LOCAL TIME</p> |
| 19.1 | The person having the power of attorney and power of attorney attached must sign notice of modification, withdrawal or substitution. |
| 20.1 | <p>OPENING DATE ,TIME AND VENUE:</p> <p>DATE: 27TH NOVEMBER 2020</p> <p>TIME: 1200 HOURS LOCAL TIME</p> <p>VENUE: NILE BASIN BOARDROOM, NIB HEAD OFFICE, LENANA ROAD, NAIROBI, KENYA</p> |
| 22.1 | The request for clarification and response shall be through e-mail |
| 23.1 & 23.2 | <p>MANDATORY PRELIMINARY REQUIREMENTS</p> <p>Prior to technical evaluation, the tenderers shall be subjected to mandatory preliminary evaluation using the below listed criteria. The evaluation shall be on PASS/FAIL criteria and a tenderer must pass all below stated mandatory preliminary requirements in order to proceed to the next stage of technical evaluation. Any FAIL in any criteria shall result in overall FAIL:</p> <ul style="list-style-type: none"> i. CERTIFIED (BY COMMISSIONER OF OATHS) AUDITED ACCOUNTS FOR THE LAST THREE YEARS (2017,2018 AND 2019)AND A SIGNED DECLARATION THAT THE TENDERER IS NOT INSOLVENT, IN RECEIVERSHIP, BANKRUPT OR IN THE PROCESS OF BEING WOUND UP PURSUANT TO SECTION 55 (1) (b) OF THE ACT ii. A TENDERER MUST SUBMIT WITH HIS/HER TENDER A SIGNED DECLARATION (BEFORE A COMMISSIONER OF OATHS) THAT THE PERSON/TENDERER IS NOT PRECLUDED FROM ENTERING |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021,

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| | <p>iii. INTO A CONTRACT WITH THE PROCURING ENTITY PURSUANT TO SECTION 55 (1) (d) OF THE ACT</p> <p>iv. A TENDERER MUST SUBMIT WITH HIS/HER TENDER A SIGNED (BEFORE COMMISSIONER OF OATHS) DECLARATION THAT THE TENDERER OR ASSOCIATE TENDERER OR SUB-CONTRACTOR (IF ANY) IS NOT DEBARRED FROM PARTICIPATING IN PROCUREMENT PROCEEDINGS UNDER PART XI OF THE ACT PURSUANT TO SECTION 55(1) (e) OF THE ACT.</p> <p>v. A TENDERER MUST SUBMIT WITH HIS/HER TENDER VALID TAX COMPLIANCE CERTIFICATE FROM KENYA REVENUE AUTHORITY (KRA) PURSUANT TO SECTION 55 (1) (f) OF THE ACT.THE PROCURING ENTITY SHALL VERIFY THE VALIDITY OF THE TAX COMPLIANCE CERTIFICATE ON THE KRA'S iTAX PORTAL USING TCC CHECKER.</p> <p>vii. A TENDERER MUST SUBMIT WITH HIS/HER TENDER A SIGNED DECLARATION (BEFORE A COMMISSIONER OF OATHS) THAT THE PERSON/TENDERER HAS NOT BEEN CONVICTED OF CORRUPT OR FRAUDULENT PRACTICES PURSUANT TO SECTION 55 (1) (g) OF THE ACT.</p> <p>ix. A TENDERER MUST SUBMIT WITH HIS/HER TENDER A SIGNED DECLARATION (BEFORE A COMMISSIONER OF OATHS) THAT THE PERSON/TENDERER IS NOT GUILTY OF ANY SERIOUS VIOLATION OF FAIR EMPLOYMENT LAWS AND PRACTICES PURSUANT TO SECTION 55 (1) (h) OF THE ACT</p> <p>xi. A TENDERER MUST SERIALIZE HIS/HER TENDER IN THE FORMAT, PAGE X OF Y. THE TENDERERS MUST INSERT THEIR OWN SERIAL NUMBERS EVEN IN CASES WHERE THEY SUBMIT PART OR WHOLE OF TENDER DOCUMENT ALREADY SERIALIZED BY THE PROCURING ENTITY OR OTHER PRINTED AND SERIALISED DOCUMENTS PURSUANT TO SECTION 74(1) (i) OF THE ACT.</p> <p>xiii. A TENDERER MUST SUBMIT WITH HIS/HER TENDER A POWER OF ATTORNEY TO DEMONSTRATE THAT THE TENDER HAS BEEN DULY SIGNED BY THE PERSON LAWFULLY AUTHORISED TO DO SO ON BEHALF OF THE TENDERER PURSUANT TO APPENDIX TO ITT 16.2 IN THE ISSUED TENDER DOCUMENT.</p> <p>xv. SUBMISSION OF TENDER SECURITY IN THE AMOUNT AND FORM AS SPECIFIED IN THE TENDER DOCUMENT, APPENDIX TO ITT 2.14.1. PARSUANT TO SEC 61 of the ACT</p> <p>xvi.</p> |
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| | <p>xvii.</p> <p>xviii. A TENDERER MUST SUBMIT WITH HIS/HER TENDER COMPLETED AND SIGNED FORM OF TENDER ON LETTER HEAD OF THE TENDERER, APPENDIX TO FORM OF TENDER, PRICED BILLS OF QUANTITIES AND OTHER SCHEDULES AND OTHER MATERIALS REQUIRED TO BE COMPLETED PURSUANT TO APPENDIX TO ITT 9.1 IN THE ISSUED TENDER DOCUMENT.</p> |
| 23.4 | Tenders not meeting the minimum qualification requirements specified in the Appendix to ITB 2.2 shall be declared non-responsive and REJECTED |
| 24 & 26 | <p>FINANCIAL EVALUATION</p> <p>Tenders will be checked of errors, values and shall be ranked according to their evaluated price. The tender sum as submitted and read out during the tender opening shall be absolute and final and shall not be the subject of correction, adjustment or amendment in any way.</p> |
| 25.1 | All tender prices shall be in Kenya Shillings (Ksh.) |
| 26.6 & 26.7 | NO PREFERENTIAL BIAS SHALL BE ALLOWED |
| 26.11 | NOT APPLICABLE |
| 28.4 | Signing of contract by parties shall take place after lapse of 14 days from date of notification of contract award |
| 29.1 | <p>Performance security must be submitted within 14 calendar days notification of contract award</p> <p>Performance security in an amount equivalent to 5% of the contract price in the form of an irrevocable and unconditional bank guarantee from a local bank. The currency shall be in Kenya Shillings.</p> |
| 30 | Advance payment of up to 20% of contract sum will be availed by the Employer upon request and submission of acceptable advance payment guarantee from a local bank of equivalent amount and valid for the period of the advance or a part of it would not have been recovered from the tenderer. The currency shall be in Kenya Shillings. |

**SECTION III. CONDITIONS OF CONTRACT, PART I – GENERAL
CONDITIONS**

CONDITIONS OF CONTRACT, PART I – GENERAL CONDITIONS

The Conditions of Contract, Part I – General Conditions, shall be those forming Part I of the “Conditions of Contract for works of Civil Engineering Construction, Fourth Edition 1987, re-printed in 1992 with further amendments, prepared by the Federation Internationale des Ingenieurs – conseils (FIDIC). The Conditions are subject to variations and additions set out in Part II hereof entitled “Conditions of Contract, Part II - Conditions of Particular Application”.

Note

- i. The standard text of the General Conditions of Contract must be retained intact to facilitate its reading and interpretation by tenderers. Any amendments and additions to the General Conditions, specific to a given Contract, should be introduced in the Conditions of Particular Application or in the Appendix to Form of Tender.
- ii. The Conditions of Particular Application take precedence over the General Conditions of Contract.
- iii. Copies of the FIDIC Conditions of Contract can be obtained from:
FIDIC Secretariat
P.O. Box 86
1000 Lausanne 12
Switzerland
Fax: 41 21 653 5432
Telephone: 41 21 653 5003

SECTION IV. CONDITIONS OF CONTRACT, PART II – (CONDITIONS OF PARTICULAR APPLICATION)

SECTION IV: CONDITIONS OF CONTRACT PART II – CONDITIONS OF PARTICULAR APPLICATION

GENERAL

The Conditions of Contract Part II – Conditions of Particular Application, modify and compliment like-numbered clauses in the Conditions of Contract Part I – General Conditions. Both Parts shall be read together, with the Conditions of Particular Application prevailing in case of conflict or discrepancy. Clauses of the General Conditions not specifically modified and supplemented shall remain in effect.

Clause No.

Definitions and Interpretation

- 1.1 (a) (i) The said “Employer” shall be NATIONAL IRRIGATION AUTHORITY
Represented by CHIEF EXECUTIVE OFFICER
- (iv) The said “Engineer” shall be DEPUTY CHIEF EXECUTIVE OFFICER (INFRASTRUCTURE AND IRRIGATION DEVELOPMENT SERVICES) OR APPOINTED REPRESENTATIVE or any other competent person appointed by the Employer, and notified to the Contractor, to act in replacement of the Engineer.
- (b)(i) Insert in line 2 after “the Bills of Quantities”, the following,” the rates entered by the Contractor (whether or not such rate be employed in computation of the Contract Price)”.

Add the following sub-clause;

Engineer’s Duties and Authority

- 2.1 (b) The Engineer shall obtain specific approval of the Employer before taking any of the following actions specified in Part I:
- (i) Consenting to the sub-letting of any part of the Works under clause 4.
 - (ii) Certifying additional cost determined under Clause 12
 - (iii) Determining an extension of time under Clause 44
 - (iv) Issuing a variation under Clause 51 except in an emergency situation as reasonably determined by the Engineer.
 - (v) Fixing rates or prices under clause 52

4 Assignment and Subcontracting

4.1 Delete the second and third sentence and substitute:

No single subcontract may be for more than 10 percent of the Contract Price nor shall the sum of all subcontracts exceed 25 percent of the Contract price. No one subcontractor may be awarded subcontracts to a total value greater than 10 percent of the Contract Price. All subcontracts greater than 2 percent of the Contract Price are to have the prior consent of the Engineer. The Contractor shall however, not required such consent for purchases of materials or to place contracts for minor details or for any part of the Works of which the manufacturer of supplier is named in the Contract. Any such consent shall not relieve the Contractor from any liability or obligation under the Contract and he shall be responsible for the acts, defaults and neglects of any subcontractor, his agents, servants or workmen as fully as if they were the acts, defaults or neglects of the Contractor, his agents, servants or workmen.

5 Contract Documents

5.1 (a) The language governing this Contract shall be English.

The “Ruling Language” which shall be used to interpret this Contract shall be English. Communication between the Contractor and Engineer or Engineer’s representative shall be in English.

(b) The law applicable to this Contract shall be the laws of the Republic of Kenya. Except to the extent otherwise provided by the Contract, the Kenyan courts shall have exclusive jurisdiction to hear and to determine all actions and proceedings in connection with and arising out of the Contract, and the Contractor shall submit to the jurisdiction of Kenyan courts for the purpose of any such actions and proceedings.

5.2 Delete the documents listed 1-6 and substitute:

- (1) The Contract Agreement;
- (2) The Notification of Award;
- (3) Tender and Appendix to Form of Tender;
- (4) The Conditions of Contract Part II;
- (5) The Conditions of Contract Part I (FIDIC);
- (6) The Special Specifications;
- (7) Clarifications and rectifications accepted by the Employer; and
- (8) The Drawings;
- (9) The priced Bills of Quantities; and
- (10) Schedules and other documents forming part of the Contract.

8.1 Add to sub clause 8.1 the following:

- (a) Within 21 calendar days after receipt of the Engineer's order to commence the Works, the Contractor shall establish an office at the Site duly equipped for the Contractor's representative and his supervisory personnel.

The Contractor shall maintain this office throughout the Contract period. The said office shall be the legal domicile of the Contractor, and all correspondence sent to this office shall be deemed to have been sent to the Contractor's head office.

- (b) A foreign Contractor or a Kenya-foreign joint venture, if not registered in Kenya under the applicable laws of Kenya, shall undertake registration upon receipt of the letter of acceptance and prior to signing of the Contract.

10.1 Performance Security

In lines 1,2 and 3 delete the words "If the Contract... within 28 days" and substitute "The Contractor shall obtain a Performance Security within 21 calendar days"

Add the following at the end of this Sub-Clause:-

The Performance Security shall be issued by a Bank incorporated in Kenya. The amount of guarantee shall be as stated in the Appendix to Form of Tender.

The bank guarantee shall be issued either (a) by an established and reputable bank approved by the Employer and located in Kenya. The performance security shall be in Kenya Shillings.

The performance security may, subject to the approval of the Engineer, be adjusted at the end of each period of 12 months to reflect the residual value of the Contract Works.

- 10.2 The performance guarantee shall be valid until a date 28 Days after the date of issue of the Taking-Over Certificate. The security shall be returned to the Contractor within 28 Days of the expiration.

- 10.3 Delete sub-clause 10.3

11.1 Inspection of Site

Add the words "and the Contractor shall be deemed to have based his tender on all the aforementioned" after the words "affect his tender".

Delete the last paragraph completely and replace with the following:
"The Employer in no way guarantees completeness nor accuracy of the soil, materials, subsurface and hydrological information made available to the Contractor at the time of tendering or at any other time during the period of the Contract, and the Contractor shall be responsible for ascertaining for himself all information as aforesaid for the execution of Works and his tender shall be deemed to have been priced accordingly.

14.1 Programme to be Submitted

The time within which the Programme shall be submitted shall be twenty one (21) days. This detailed Programme shall be based upon the programme submitted by the Contractor as part of his tender and shall, in no material manner, deviate from the said programme.

The Contractor shall allow in his Programme for the following 11 public holidays per calendar year in Kenya upon which the Contractor shall not be permitted to work

| | |
|----------------|-----------------------------|
| New Year's Day | (1st January) |
| Good Friday | April |
| Easter Monday | April |
| Labour Day | (1 st May) |
| Madaraka Day | (1 st June) |
| Mashujaa Day | (20 th October) |
| Jamhuri Day | (12 th December) |
| Christmas Day | (25 th December) |
| Boxing Day | (26 th December) |

14.2 Add the following at the end of this sub clause: -

The Employer shall have the right to withhold payment at any time if the Contractor fails to submit the contractual construction programmes in accordance with sub clause 14.1 above or revise construction programmes due to his negligence, failure or omission.

14.3 Cash Flow Estimate to be Submitted

The time limit within which a detailed cash flow estimate is to be submitted shall be twenty eight (28) days.

In preparing the estimates, the Contractor shall make provision for Advance payment, repayment of advance, retention, payment for services provided by the Employer and timing implications of sub clause 60 – Certificates and Payments.

15 Contractor's Superintendence

Add the following at the end of the first paragraph of sub-clause 15.1:

15.1

The Contractor shall, within seven (7) days of receipt of the Engineer's order to commence the Works, inform the Engineer in writing, the name of the Contractor's representative and the anticipated date of his arrival on Site.

Add the following sub-clause 15.2:

15.2

The Contractor's agent or representative on the Site shall be an Engineer registered by the Engineer's Registration Board of Kenya in accordance with the Laws of Kenya cap. 530 or have equivalent status approved by the Engineer and shall be able to read, write and speak English fluently.

16.2 Engineer at Liberty to object

At the end of this clause add “by a competent substitute approved by the Engineer at the Contractor’s own expense”.

The Contractor is encouraged to the extent practicable and reasonable, to employ staff and labour with appropriate qualifications who are Kenyan citizens.

Safety, Security and Protection of the Environment

19.1 Add at the end of sub clause 19.1 the following: -

The formulation and enforcement of an adequate safety program shall be the obligation of the Contractor with respect to all the Works under this Contract, regardless of whether performed by the Contractor or his subcontractors. The Contractor shall, within 14 days after commencement of the Works, meet the Engineer to present and discuss his plan for the establishment of such safety measures as may be necessary to provide against accidents, unsafe acts and so forth. Within 28 days after commencement of the Works, the Contractor shall submit a written safety program to the Engineer covering the overall Works and based on the laws and regulations of Kenya. In addition, he shall prepare special safety programs for blasting and handling of explosives as stipulated in the General and Special Specifications.

Notwithstanding the foregoing, the Contractor shall observe the following measures with a view to reducing or eliminating adverse environmental effects by the Site Works:

- (i) All queries and borrow pits shall be filled and landscaped to their original state after extraction of construction material
- (ii) Soil erosion due to surface runoff or water from culverts or other drainage structures should be avoided by putting in place proper erosion control measures that shall include, but not limited to grassing, planting of trees, gabions etc.
- (iii) Long traffic diversion roads shall be avoided so as to minimize the effect of dust on the surrounding environment. In any case all diversions shall be kept damp and dust free at the Contractor’s expense.
- (iv) Spillage of oils, fuels and lubricants shall be avoided and if spilt, shall be collected and disposed off in such a way as not to adversely affect the environment.
- (v) Rock blasting near settlement areas shall be properly coordinated with the relevant officers of the Government so as to minimize noise pollution and community interference.

- (vi) Dumping shall be done only at designated dumping areas and not haphazardly on surroundings.

Insurance of Works & Contractor's Equipment

- 21.1 (a) Delete the first sentence of this clause and replace with the following:
- “Prior to commencement of the Works the Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 20, insure to the satisfaction of the Employer.”
- (b) Add the following words at the end of sub - paragraph (a) and Immediately before the last word in (b)
- “it being understood the insurance shall provide for compensation to be payable in the types and proportions of the currencies required to rectify the loss or damage incurred.”

In sub clause 21.1(b), delete the words “or as may be specified in Part II of these Conditions”.

- 21.2 (a) Delete the words “from the start of Work at the Site” and substitute with the words “from the first working day after the commencement date”
- (c) Add the following sub-clause: “It shall be the responsibility of the Contractor to notify the insurance company of any change in the nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the period of the Contract”.

23.1 Third Party Insurance

Add the following at the beginning of this sub-clause: -

“Prior to commencement of the Works”

23.2 Minimum Amount of Insurance

Add the following at the end of this sub-clause:-

“ with no limits to the number of occurrences.”

- 25.1 Insert the words “as soon as practicable after the respective insurances have been taken out but in any case” before the words “Prior to the start of Work at the Site”

Add the following sub-clauses 25.5 to 25.7

25.5 Insurance Notices

Each policy of insurance effected by the Contractor for the purpose of the

Contract shall include a provision to the effect that the Insurer shall have a duty to give notice in writing to the Contractor and Employer of the date when a premium becomes payable not more than thirty (30) days after the giving of such notice.

25.6 Re-insurance in Kenya

The risks against which the Contractor is obliged to insure under the Contract shall be insured through established and reputable companies approved by the Employer and located in Kenya and any cover against risks which the Contractor may enjoy shall be reinsured in Kenya by an approved Kenyan Insurance Company In respect of the Contractor's obligations under the Contract.

- 25.7** It shall be the responsibility of the Contractor to notify the insurers under any of the insurances referred or event which by the terms of such insurances are required to be so notified and the Contractor shall indemnify and keep indemnified the Employer against all losses, claims, demands, proceedings, costs, charges and expenses whatsoever arising out of or in consequence of any default by the Contractor in complying with the requirements of this sub clause whether as a result of avoidance of such insurance or otherwise.

26. Compliance with Statutes, Regulations

Add the following sub-clause 26.2;-

The Employer will repay or allow to the Contractor all such sums as the Engineer shall certify to have been properly payable and paid by the Contractor in respect of such fees. Provided always that, without prejudice to sub clause, nothing contained in this clause shall be deemed to render the Employer liable to all claims which may be considered to fall within the provisions of clause 22.1.

Royalties

- 28.2** Add the following at the end of this sub-clause;

“The Contractor shall also be liable for all payments or compensation, if any, that are levied in connection with the dumping of part or all of any such material.”

Interference with Traffic and Adjoining Properties

- 29.2** Add new sub-clause 29.2;

The Contractor shall reinstate all properties whether public or private which Are damaged in consequence of the construction and maintenance of the Works to a condition at least equal to that prevailing before his first entry on them.

If in the opinion of the Engineer the Contractor shall have failed to take reasonable and prompt action to discharge his obligations in the matter of reinstatement, the Engineer will inform the Contractor in writing of his opinion, in which circumstances the

Employer reserves the right to employ others to do the necessary work of reinstatement and to deduct the cost thereof from any money due or to become due to the Contractor.

The Contractor shall promptly refer to the Employer all claims, which may be considered to fall within the provisions of Clause 22.1.

Labour

34.2 Conditions of Employment of Labour

The Contractor shall be responsible for making all arrangements for and shall bear all costs relating to recruitment, obtaining of all necessary visas, permits or other official permission for movements of staff and labour.

34.3 Fair Wages

The Contractor shall, in respect of all persons employed anywhere by him in the execution of the Contract, observe and fulfill the following conditions:

- (a) The Contractor shall pay the rates of wages, observe hours of labour and provide conditions, housing amenities and facilities not less favorable than those required by the Regulation of wages (Building and Construction Industry) Order 1998, and any subsequent amendments thereto, or in any ministry of labour or other government department in consultation with the district whose general circumstances in the trade or industry in which the Contractor is engaged are similar. The Contractor shall at all times during the continuation of the Contract display, for the information of his employees, a notice setting out the general rates of wages, hours and conditions of labour of his employees and a copy of this clause.
- (b) In the absence of any rates for wages, hours or conditions of labour so established, the Contractor shall pay rates or wages and observe hours and conditions for labour which are not less favourable than the general circumstances in the trade or industry in which the Contractor is engaged.
- (c) Where the absence of established rates of wages, hours and conditions of labour or the dissimilarity of the general circumstances in the trade or industry in which the Contractor is engaged prevent
The Contractor from observing rates of wages, hours and conditions of labour ascertained under sub-paragraph (a) or (b) above, the Contractor in fixing the rates of wages, hours and conditions of labour of his employees shall be guided by the advice of the labour department.
- (d) The Contractor shall recognize the freedom of his employees to be members of trade unions.
- (e) The Contractor shall maintain records of the times worked by, and the wages paid to his employees. The Contractor shall furnish to the Employer, if called

upon so to do, particulars of the rates of wages, hours and conditions of labour as the employer may direct.

- (f) The Contractor shall be responsible for observance by his sub-Contractors of the foregoing provisions.

34.4 Breach of Fair Wages Clause

Should a claim be made to the Employer alleging the Contractor's default in payment of fair wages to any workman employed on the Contract and if proof thereof satisfactory to the Employer is furnished by the labour department, the Employer may, failing payment by the Contractor, pay the claims out of any monies due or which may become due to the Contractor under the Contract.

34.5 Recruitment of Unskilled Labour

Any additional unskilled labour which may be required by the Contractor for the Works and which is not in his employ at the time of the acceptance of the tender shall be recruited by the Contractor from the labour office nearest to the Site of the Works.

34.6 Compensation for injury

The Contractor shall, in accordance with the Workman's Compensation Act Chapter 236 of the laws of Kenya and any other regulations in force from time to time in Kenya, pay compensation for loss or damage suffered in consequence of any accident or injury or disease resulting from his work to any workman or other person in the employment of the Contractor or any sub-contractor.

34.7 Labour Standards

- a) The Contractor shall comply with the existing local labour laws, regulations and labour standards.
- b) The Contractor shall formulate and enforce an adequate safety program with respect to all Work under this Contract, whether performed by the Contractor or his sub-contractors. The Contractor has assurance from the Employer of cooperation where the implementation of these safety measures requires joint cooperation.
- c) Upon written request of the Employer the Contractor will remove or replace any of his employees employed under this Contract.

34.8 Recruitment

The Contractor shall not induce personnel of the employer or the Engineer to leave their regular employment and shall not, without the prior consent in writing of the Employer, employ personnel who have resigned from such service within the preceding twelve months.

35 Add the following sub-clauses 35.2 and 35.3:-

35.2 The Contractor shall maintain such records and make such reports concerning safety, health and welfare of persons and damage to property as the Engineer may from time to time prescribe.

35.3 The Contractor shall report to the Engineer details of any accident as soon as possible after its occurrence. In the case of any fatality or serious accident, the Contractor shall, in addition, notify the Engineer immediately by the quickest available means. The Contractor shall also notify the relevant authority(s) whenever such report is required by the law.

41.1 **Commencement and Delays**

Insert immediately after the word Works----- “on Site within 28 days” and before the word -----after

41.2 **Definition of Commencement**

For the purposes of this clause, the Works shall be deemed to have commenced when all of the following conditions are satisfied;

- a) The approved competent and authorized agent or representative of the Contractor is resident in the project area and is giving his whole time to the superintendence of the Works.
- b) The provision by the Contractor of evidence that all insurances required by the Contract are in force.
- c) The Contractor has an established office in the project area with postal address for receipt of correspondence.
- d) The principal items of constructional plant have been brought to Site and put to work in the execution of the permanent Works.

42.4 **Possession of Site and Access Thereto**

Add the following to this clause 42.4;

The Contractor shall not enter any part of the Site until he has requested and received permission to do so from the Employer or the Engineer.

The Contractor shall not use any portion of the Site for any purpose not connected with the Works.

44.1 Add at the end of sub-clause 44.1 the following:

Neither rains falling between 1st November and 31st December (inclusive) and between 1st February and 31st May (inclusive) nor floods caused by such rains shall be deemed

exceptional weather conditions such as may fairly entitle the Contractor to an extension of time for the completion of the Work.

45 Working Hours

Delete sub-clause 45.1 and substitute:

“Subject to any provision to the contrary contained in the Contract, the Contractor shall have the option to work continuously by day and by night and on locally recognized days of rest.

If the Contractor requests for permission to work by day and night and if the Engineer shall grant such permission, the Contractor shall not be entitled to any additional payment for so doing. All such work at night shall be carried out without unreasonable noise or other disturbance and the Contractor shall indemnify the Employer from and against any liability for damages on account of noise or other disturbance created while or in carrying out night work and from and against all claims, demands, proceedings, costs, charges and expenses whatsoever in regard or in relation to such liability. In addition, the Contractor shall be required to provide, for any work carried out by night or recognized days of rest, adequate lighting and other facilities so that the Work is carried out safely and properly. In the event of the Engineer granting permission to the Contractor to work double or rotary shifts or on Sundays, the Contractor shall be required to meet any additional costs to the Employer in the administration and supervision of the Contract arising from the granting of this permission.

47.2 Reduction of Liquidated Damages

There shall be no reduction in the amount of liquidated damages in the event that a part or a section of the Works within the Contract is certified as completed before the whole of the Works comprising that Contract.

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

The sum stated in the Appendix to Form of Tender as liquidated damages shall be increased by a sum equivalent to any amount payable by the Employer to the Contractor under clause 70.1 in respect of an increase in costs in such period that would not have been incurred by the Contractor if the Works had been completed by the due date for completion prescribed by clause 43.

Defects Liability

49.2 Add at the end of this sub-clause the following sentence: -

Any work ordered to be executed under this clause shall be done at a time and in a manner as directed by the Engineer so as to interfere as little as possible with the operations of the Employer or of other contractors and no extension(s) of the defects liability period will be allowed for the execution of this Work.

Add the following sub-clause 49.5 to this Clause: -

52 **Variations**

52.1 Add the following final sentence to this sub clause: -

The agreement, fixing or determination of any rates or prices as aforesaid shall include any foreign currency and the proportion thereof.

52.4 **Day work**

Add the following at the end of this sub-clause:

The Work so ordered shall immediately become part of the Works under the Contract. The Contractor shall, as soon as practicable after receiving the Day work Order from the Engineer undertake the necessary steps for due execution of such Work. Prior to commencement of any work to be done on a Day work basis, the Contractor shall give a notice to the Engineer stating the exact time of such commencement.

54 **Plant, Temporary Works and Materials**

Delete Sub-Clauses 54.3 to 54.4 entirely.

For the purpose of these Clauses, the term “Equipment” shall be read as “Contractor’s Equipment” where the context so requires.

54.1 Line 5: - Add “written” between “the” and “consent”.

Quantities

55.1 Delete sub-clause 55.1 and substitute with the following;

The quality and quantity of the Work included in the Contract Price shall be deemed to be that which is set out in the Contract Bills. The Bills, unless otherwise expressly stated therein, shall be deemed to have been prepared
In accordance with the principles of the latest edition of the Civil Engineering Standard Method of Measurement.

Any error in description or in quantity or any omission of items from the Contract Bills or Specifications shall not vitiate this Contract but shall be corrected and deemed to be a variation required by the Engineer. Subject to the foregoing, any error whether arithmetical or not in the computation of the Contract Price shall be deemed to have been accepted by the parties hereto.

The Contract Price shall not be adjusted or altered in any way whatsoever otherwise than in accordance with the express provisions of these Conditions.

55.2 Add as a new sub-clause:

“Items of Work described in the Bills of Quantities for which no rate or price has been entered in the Contract shall be considered as included in other rates and prices in the

Contract and will not be paid for separately by the Employer.

Measurement

56.1 Delete sub clause 56.1 and replace with the following: -

The Contractor shall prepare and submit to the Engineer all necessary field notes and other records taken and computations made for the purpose of quantity measurements, of which the forms shall be approved by the Engineer, for the monthly progress payment under clause 60. The measurement of work quantities made by the Contractor shall be verified and certified by the Engineer based on the above-mentioned documents.

The Contractor shall furnish all personnel, equipment and materials to make such surveys and computations as necessary to determine the quantities of work performed. Unless otherwise prescribed in the specifications or the drawings, all measurements for payment shall be made by the dimensions, lines and grades as shown on the drawings or by direct survey of which the methods shall be approved by the Engineer.

The documents submitted for measurement and payment shall become the property of the Employer and shall be used to the extent necessary to

Determine the monthly progress payment to be made to the Contractor under the Contract. Direct survey, if done, shall be subject to checking and verification by the Engineer and all errors in the said survey work and related computations as found during such checking shall be immediately corrected by the Contractor.

57.1 Delete sub clause 57.1 and substitute with the following: -

The Works shall be measured net with deductions made in accordance with the principles of the latest edition of the Civil Engineering Standard Method of Measurement. All measurements shall be given in metric (SI) units.

Provisional Sums

58.4 **Prime Cost sum**

Wherever an item in the Bills of Quantities has been referred to as a “P.C. Sum” (Prime Cost Sum), that item shall be construed as a Provisional sum and the provisions of Sub-clauses 58.1 to 58.3 will apply.

59.5 Add the following paragraph at the end of sub clause 59.5: -

If the Engineer desires to secure final payment to any nominated sub-contractor before final payment is due to the Contractor and if such sub-contractor has satisfactorily indemnified the Contractor against any latent defects, the Engineer may, in an interim certificate, include an amount to cover the said final payment, and thereupon the Contractor shall pay to such nominated sub-contractor the amount so certified. Upon such final payment, the amount named in the Appendix to Form of Tender as Limit of Retention Money shall be reduced by the sum which bears the same ratio to the amount as does the subcontract and sub-contractor shall be discharged from all liability for the

Work, materials or goods executed or supplied by such subcontractor under the Contract to which the payment relates.

Certificates and Payment

Delete Sub-clauses 60.1 to 60.10 entirely and substitute with the following: -

60.1 Advance Payment

In the event that an advance payment is granted, the following shall apply: -

- a) On signature of the Contract, the Contractor shall at his request, and without furnishing proof of expenditure, be entitled to an advance of 20% (twenty percent) of the original amount of the Contract. The advance shall not be subject to retention money.
- b) No advance payment may be made before the Contractor has submitted proof of the establishment of deposit or of a directly liable guarantee satisfactory to the Employer in the amount of the advance payment. The guarantee shall be in the same currency as the advance.
- c) Reimbursement of the advance shall be effected by deductions from monthly interim payments.
- d) Reimbursement of the lump sum advance shall be made by deductions from the Interim payments and where applicable from the balance owing to the Contractor. Reimbursement shall begin when the amount of the sums due under the Contract reaches 20% of the original amount of the Contract. It shall have been completed by the time 80% of this amount is reached.

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

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

Where:

R = the amount to be reimbursed

A = the amount of the advance which has been granted

X¹ = the amount of proposed cumulative payments as a percentage of the original amount of the Contract. This figure will exceed 20% but not exceed 80%.

X¹¹ = The amount of the previous cumulative payments as a percentage of the original amount of the Contract. This figure will be below 80% but not less than 20%.

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

60.2 Interim Payment Certificate

The Contractor shall submit to the Engineer, in the manner required by the Engineer after the end of each month a statement showing the estimated total value of permanent Work properly executed and materials or goods for permanent works brought to Site up to the end of the previous month (if the value shall justify the issue of an interim certificate) together with any adjustments under clause 70 and any outstanding claims and sums the Contractor considers may be due to him. The Contractor shall amend or correct his estimate as directed by the Engineer and the latter shall not accept it until he is satisfied that it is fair and reasonable. With respect to the said materials and goods, no payment for them shall be made unless; -

- (i) The materials are in accordance with the specifications for the Works;
- (ii) The materials have been delivered to Site and are properly stored and protected against loss, damage or deterioration;
- (iii) The Contractor's record of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer, and such records are available for inspection by the Engineer;
- (iv) The Contractor has submitted a statement of his cost of acquiring and delivering the materials and goods to the Site, together with such documents as may be required for the purpose of evidencing such cost;
- (v) The materials are to be used within a reasonable time.

The Contractor will be paid on the certificate of the Engineer the amount due to him on account of the estimated total value of the permanent Work executed up to the end of the previous month together with such amount (not exceeding 75% of the value) as the Engineer may consider proper on account of materials and goods for permanent Work delivered by the Contractor on Site and in addition, such amount as the Engineer may consider fair and reasonable for any Temporary Works for which separate amounts are provided in the Bill of Quantities, all of which shall be subject to a retention of the percentage named in the Appendix to Form of Tender until the amount retained (hereinafter and in all Contract documents called the "Retention Money") shall reach the "Limit of Retention Money" named in the said Appendix. Provided always that no interim certificate shall be issued for a sum [such sum always being the net amount thereof after all deductions for retention etc) less than that named in the Appendix to Form of Tender as "Minimum Amount of Interim Certificate" at one time.

Within 14 days after receiving a statement from the Contractor as aforesaid, and subject to the Contractor having made such further amendments and corrections as the Engineer may require, the Engineer shall issue a Certificate of Payment to the Employer showing the amount due, with a copy to the Contractor.

The Engineer shall not unreasonably withhold certifying an Interim Payment Certificate

and where there is a dispute regarding an item for payment, the Engineer may delete this disputed item from the Interim Payment Certificate and certify the remainder for payment provided the said payment is in accordance with the preceding paragraph. In cases of difference in opinion as to the value of any item, the Engineer's view shall prevail.

60.3 Final Account and Final Payment Certificate

As soon as possible after the issue of Taking - Over Certificate or the termination of the Contract and not later than the time of issue of Defects Liability Certificate, the Contractor shall prepare and submit to the Engineer (with a copy to the Employer), a Statement of Final Account showing in detail the total value of work done in accordance with the Contract together with all sums paid in previous payments. Within thirty (30) after receipt of such further information as may be reasonably required from the Contractor for its verification, the Engineer shall check the said statement, prepare and submit a Final Payment Certificate to the Employer (with a copy to the Contractor).

The Final Payment Certificate shall state;

- (a) The (final) total value of all Work done in accordance with the Contract;
- (b) After giving credit to the Employer for all amounts previously paid to the Contractor, the balance, if any, due from the Employer to the Contractor or the Contractor to the Employer, as the case may be.

Unless the Contractor notifies the Engineer of his objection to the Final Payment Certificate within twenty-eight [28] days of delivery thereof, he shall be deemed to have agreed that he accepts the total Contract Price as set out in the Final Payment Certificate as full settlement for all work done under the Contract including any claims, variations and omissions thereof.

However, a Final Certificate of Payment shall not be conclusive:

- a) to the extent that fraud or dishonesty relates to or affects any matter dealt with in the Certificate, or
- b) if any arbitration or court proceedings under the Contract have been commenced by either party before the expiry of 84 days after the issue of the Final Certificate of Payment.

60.4 Payment of Certificates

Payment upon each of the Engineer's Certificates for Interim Payments shall be made by the Employer within the time stated in the Appendix to Form of Tender from the date of issue of each Certificate of Payment.

Payment upon the Engineer's Final Payment Certificate shall be made by the Employer within the time stated in the Appendix to Form of Tender from the date of issue of the Final Certificate of Payment signed by the Engineer and countersigned by the

Contractor or his authorised agent or representative.

Making of a payment by the Employer shall be considered to have been duly executed on the day that the Employer has issued a cheque.

60.5 Payment of Retention Money

One half of the retention money shall become due upon the issue of a Taking – Over Certificate and shall be paid to the Contractor when the Engineer shall certify in writing that the last section of the whole of the Works has been substantially completed and the other half shall be paid to the Contractor after the expiration of the Defects Liability Period and the issue of a Certificate under Clause 62. Provided always that if such time there shall remain to be executed by the Contractor any Works ordered during such period pursuant to Clauses 49 and 50 thereof, the Employer

shall be entitled to withhold payment [until the completion of such Works] of so much of the second half of the Retention Money as shall in the opinion of the Engineer represent the Costs of the Works so remaining to be executed. Provided further that in the event of different Defects Liability Periods having become applicable to different parts of the Works pursuant to clause 48 hereof the expression “expiration of the Defect Liability Period” shall for the purpose of this Sub-clause be deemed to mean the expiration of the latest of such periods.

60.6 Currency of Payment

The Contract price shall be stated in Kenya Shillings. All payments to the Contractor shall be made in Kenya shillings and foreign currency(s) in the proportion indicated in the tender, or agreed prior to the execution of the Contract Agreement and indicated therein. The rate[s] of exchange for the calculation of the amount of foreign currency payment[s] shall be the rate of exchange indicated in the Tender. If the Contractor indicated foreign currencies for payment other than the currencies of the countries of origin of related goods and services, the Employer reserves the right to pay the equivalent at the time of payment in the currencies of the countries of such goods and services. The Employer and the Engineer shall be notified promptly by the Contractor of any changes in the expected foreign currency requirements of the Contractor during the execution of the Works as indicated in the Statement of Foreign Currency Requirements and the foreign and local currency portions of the balance of the Contract Price shall then be amended by agreement between Employer and the Contractor in order to reflect appropriately such changes.

60.7 Overdue Payments

Unless otherwise stated in the appendix interest shall be paid on the overdue amounts and the interest to be paid shall be in accordance with prevailing commercial bank rates.

60.8 Correcting and With-holding

The Engineer may by any interim certificate or through the final account make any correction or modification to any previous certified sum and shall have authority, if any work or part thereof is not being carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate.

60.9 Completion by Sections.

If a Taking-Over Certificate shall be issued for any section or part of the Works separately, the payments herein provided for on or after issue of such a Certificate shall be made in respect of such section or part and references to the Contract Price shall mean such part of the Contract Price as shall in the absence of agreement be apportioned thereto by the Engineer.

60.10 Proportion of Foreign Currency

Subject to the provision of sub clause 60.5 the proportion of foreign currency in any amount due to the Contractor or Employer shall be determined in the following manner:

-

- a) For all measured Work, the percentages of foreign currency for the appropriate section of the Bill of Quantities as stated in the schedule of foreign currency requirements shall be applied.
- b) Variations in the cost of imported materials shall be paid in foreign currency.
- c) Variations in the cost of locally purchased materials and those due to changes of legislation shall be paid in local currency.
- d) For Day works labour and plant, the respective percentages of foreign currency stated in the schedule shall be applied.
- e) For Day works materials and materials on site, payment in foreign currency will only be made for imported materials.
- f) The provisions for the deduction and release of Retention Money and the payment of interest shall be applied similarly to both the local and foreign portions.
- g) The advance mobilization loan, its repayment thereof and liquidated damages shall all be apportioned on the basis of the ratio between local and foreign currency indicated in the Contract Price.
- h) In the event that the payment is for an item not covered in the foregoing paragraphs, the Engineer shall determine the proportion of foreign and local currency based on the information given in the Schedule of Foreign Currency Requirements, together with any additional information he may request the Contractor to provide.

60.11 Statement at Completion

Not later than 14 days after the issue of the Taking-Over Certificate in respect of the whole of the works, the Contractor shall submit to the Engineer a statement at completion showing in detail, in a form approved by the Engineer;

- (a) The final value of all work done in accordance with the Contract up to the date stated in such Taking-Over Certificate.
- (b) Any further sums which the Contractor considers to be due; and
- (c) An estimate of amounts, which the Contractor considers, will become due to him under the Contract.

Estimate amounts shall be shown separately in the Statement at Completion. The Contractor shall amend and correct the Statement as directed by the Engineer who shall issue a Certificate at Completion to be processed in accordance with sub-clause 60.4.

60.12 Final Statement

Not later than 56 days after the issue of the Defects Liability Certificate, the Contractor shall submit to the Engineer for consideration a draft final statement with supporting documents showing in detail, in the form approved by the Engineer;

- (a) The final value of all work done in accordance with the Contract;
- (b) Any further sums which the Contractor considers to be due to him.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonable require and shall make such changes in the draft as may be required.

60.13 Discharge

Upon submission of the Final Statement, the Contractor shall give to the Employer, with a copy to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all monies due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after payment under the Final Payment Certificate issued pursuant to Sub-clause 60.14 has been made and the Performance Security referred to in Sub-clause 10.1 has been returned to the Contractor.

60.14 Final Payment Certificate

Upon acceptance of the Final Statement as given in Sub-clause 60.12, the Engineer shall prepare a Final Payment Certificate which shall be delivered to the Contractor's authorized agent or representative for his signature. The Final Payment Certificate shall state:

- (a) The final value of all work done in accordance with the Contract;
 - (b) After giving credit to the Employer for all amounts previously paid by the Employer, the balance, if any, due from the Employer to the Contractor or the Contractor to the Employer as the case may be
- Final Certificate shall be issued for any sum due to the Contractor even if such is less than the sum said named in the Appendix to the Form of Tender.

60.15 Cessation of Employer's Liability

Unless the Contractor notifies the Engineer of his objection to the Final Certificate within fourteen days of delivery thereof he shall be deemed to have agreed that he accepts the total Contract Price as set out in the Final Certificate as full settlement for all work done under the Contract including any variations and omissions thereof.

62.1 Defects Liability Certificate

Delete the last sentence of this Sub-Clause beginning "Provided that the issue.....in Sub-Clause 60.3".

Remedies

63.4 Assignment of Benefit of Agreement

Add the following at the end of this sub-clause: -

"But on the terms that a supplier or sub-contractor shall be entitled to make any reasonable objection to any further assignment thereof by the Employer and the Employer may pay the supplier or sub-contractor for any such materials supplied or Works executed under such agreement, whether the same be assigned as aforesaid or not, before or after the said determination, the amount due by such arrangement in so far as it has not already been paid by the Contractor".

65 Special Risks

Add sub clause 65.9 as follows:

- (a) In the event of the Employer unilaterally ordering the final cessation of performance of the Contract for reasons not specified elsewhere in the Conditions of Contract the Contract shall be considered to be frustrated and the Contractor shall be indemnified as provided for under clause 65.1.
- (b) In the event of the Employer ordering the adjournment of the Contract before or after commencement of the Works for reasons not

specified elsewhere in the Conditions of Contract, the Contractor shall be entitled to indemnity for any injury which he may have suffered as a consequence of such adjournment. The Engineer shall award the Contractor payment of such sum as in his opinion shall be reasonable giving regard to all material and relevant factors including the Contractor's on costs and overheads, and the nature of the instruction to adjourn the Contract.

Settlement of Disputes

Arbitration

67.3

For the purposes of this Clause, the Arbitrator shall be a person to be agreed between the parties or failing agreement, the Arbitrator shall be appointed by the appointer designated in the Appendix to the Form of Tender.

Add the following paragraph after the last paragraph of sub-clause 67.3:

Arbitration shall take place in Nairobi, Kenya. The language of all arbitration proceedings shall be in English. The cost of arbitration shall be apportioned by the Arbitrator according to his findings.

Notices

68.1

Add the following at the end of this sub clause: -

Notwithstanding the foregoing, the Contractor shall either maintain an address close to the Works or appoint an agent residing close to the Works for the purpose of receiving notices to be given to the Contractor under the terms of the Contract. This obligation shall be terminated upon the issue of the Certificate of Completion.

68.2

Delete the words "nominated for that purpose in Part II of these Conditions" in this sub-clause.

Default of Employer

69.1

Default of Employer

In paragraph (a) of this Sub-Clause, delete the words "within 28 days of expiry of the time stated in Sub-clause 60.10" and insert "within 56 days after the expiry of the time stated in Sub-Clause 60.4".

69.4

Contractor's Entitlement to Suspend Work

Delete the first four lines of this Sub-Clause and replace with the following: -

"Without prejudice to the Contractor's entitlement to interest under Sub-clause 60.7 and to terminate his employment under Sub-Clause 69.1, the Contractor

may, if the Employer fails to pay the Contractor the amount due under any certificate of the Engineer within 56 days after the expiry of the time stated in Sub-Clause 60.4....”

Delete sub-clause 69.4 (b) and substitute with the following----“the amount of such cost, which shall be added to the Contract Price. However, the costs due to idle time for plant, equipment and labour shall not be included in the said costs and shall be borne by the Contractor.

69.5 **Resumption of Work**

In line 3 of this Sub-Clause delete the Words “Sub-Clause 60.10” and replace with “Sub-Clause 60.7”

Changes in Cost and Legislation (NOT APPLICABLE)

70.1 Delete the sub-clause 70.1 in its entirety and substitute with the following: -

“The Contract Price shall be deemed to have been calculated in the matter set below and shall be subject to the adjustment in the event specified hereunder:

- (a) The rates contained in the priced Bill of Quantities are based upon the rates of wages and other emoluments and expenses applicable at the site and the date of tender pricing (as defined in sub-clause 70.4 hereinafter);
- (b) If the said rates of wages and other emoluments and expenses shall be increased or decreased by act, statute, decree, regulation and the like after the said date of tender pricing then the net amount of increase the emoluments and expenses shall, as the case may be, paid to or allowed by Contractor;
- (c) The rates contained in the price Bill of Quantities are based upon the rates of the Contractor’s compulsory contributions payable at the date of tender under or by virtue of any Act, Statue, Regulations and the like applicable at the site;
- (d) If any of the said rates of contribution becomes payable after that date then the net amount of new statutory contribution becomes payable after that date then the net amount of increase or decrease of the emoluments and expenses shall, as the case may be, be paid to or allowed by the Contractor. Difference between what the Contractor actually pays in respect of work people engaged upon or in connection with the works and what he would have paid in respect of such person had any of the said rates not been increased or decreased or had a new contribution not become payable as aforesaid, shall as the case may be, be paid to or allowed by the Contractor. Provided always that the Engineer and the Contractor may agree a sum, which shall be deemed to be the net amount of the aforesaid difference, and such sum shall be deemed for the purpose of this Contract to be, that which is to be paid to or allowed by the Contractor by the virtue of this sub-paragraph;

- (e) If the market price or any materials or goods specified as aforesaid shall be increased or decreased after the said Date of Tender Pricing, then the net amount of difference between the basic price and the market price payable by the Contractor and current when any such goods and materials are bought shall, as the case may be, be paid to or allowed by the Contractor. Orders for materials and goods listed as aforesaid shall have been placed within a reasonable time after the date at which sufficient information is available for the placing of such orders, and the placing of orders at that time shall be a condition precedent to any payments being made to the Contractor in respect of increased market prices.”

Substitute and add the following sub-clauses:

- 70.2 (a) If the Contractor shall decide subject to Clause 4 thereof to sub-let any portion of the work he shall incorporate in the sub-contract provisions to the like effect as those contained in sub-clause (1) of this Clause;
- (c) If the price payable under a sub-contract as aforesaid is increased above or decreased below the price in such sub-contract by reason of the operation of the incorporated provisions of sub-clause (1) of this clause then the net amount of such increase or decrease shall as the case may be, be paid to or allowed by the Contractor under this Contract.
- 70.3 The expression “the date of tender pricing” as used in this Clause means the date 28 days prior to the final date for submission of Tenders as determined by the Employer in the Tender documents.
- 70.4 For imported materials, the supplier’s/manufacturer’s Prime costs shall be C.I.F. cost at point of entry by the same means of transport as determined by the Contractor’s Basic Rate.

For locally produced materials, the supplier’s or manufacturer’s prime costs shall be at their nearest depot or the nearest railway station relevant to the works.

For materials, which are subject to Government Price Control, payments for price variations will be determined from the difference between the control price in force at a date 28 days prior to date for submission of Tenders and the price in force on the date of purchase.

- 70.5 The materials to which this Variation Clause applies are:

- ◆ All bitumen material
- ◆ Fuels, oils and lubricant
- ◆ Cement
- ◆ Lime
- ◆ Flex beam guardrail
- ◆ Explosives
- ◆ Gabion mesh

◆ Reinforcing steel

- 70.6 The Contractor shall not change the supplier or manufacturer during the Contract without the approval of the Engineer.
- 70.7 No payments will be made for price variation related to expenses incurred by the Contractor in his Head Office in Kenya, or overseas.
- 70.8 All payments made pursuant to Clause 70 shall be in Kenya Shillings.
- 70.9 No payments will be made for the cost of preparing V.O.P. claims.
- 70.10 Add the following at the end of this clause.

“Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited as aforesaid if the same shall already have been taken into account in accordance with the provisions of sub-clause 70.1”.

ADDITIONAL CLAUSES

Clause 73 Declaration Against Waiver

The condoning by the Employer of any breach or breaches by the Contractor or any authorized sub-contractor of any of the stipulations and Conditions contained in the Contract shall in no way prejudice or affect or be construed as a waiver of the Employer's rights, powers and remedies under the Contract in respect of any breach or breaches as aforesaid.

Clause 74 Bribery and Collusion

The Employer shall be entitled to determine the Contract and recover from the Contractor the amount of any loss resulting from such determination if the Contractor shall have offered or given or agreed to give any person any gift or consideration of any kind as an inducement of regard for doing or fore bearing to do or for having done or fore borne to do any action in relation to obtaining or the execution of the Contract or any other contract with the Employer or if any of the like acts shall have been done by any person employed by the Contractor or acting on his behalf (whether with or without the Knowledge of the Contractor) or if the Contractor shall have come to any agreement with another contractor or number of contractors whereby an agreed quotation or estimate shall be tendered to the Employer by one or more contractors.

Clause 75 Contract Confidential

The Contractor shall treat the Contract and everything in connection therewith As private and confidential. In particular, the Contractor shall not publish any Information, drawings or photographs concerning the Works in any trade or Technical paper etc, and shall not use the Site for the purpose of advertising

Except with the written consent of the Engineer and subject to such conditions as the Engineer may prescribe.

Clause 76 Employer's Officials etc., Not Personally Liable

No official of the Employer or the Engineer or the Engineer's Representative or anyone of their respective staffs or their employees shall be in any way personally bound or liable for the acts or obligations of the Employer under the Contract or answerable for default or omission in the observance or performance of any of the acts, matters or things which are herein contained.

Clause 77 Taxes and Duties

- (1) The Contractor shall list in his tender the plant and vehicles which he intends to import for the execution of the Works. The Engineer will consider the list in the context of the program of the Works and will give his approval subject to any modifications that he may see fit to make. No appeal against the Engineer's decision shall be permitted.

All applicable taxes and duties shall be paid in the execution of this contract

Clause 78 Joint Ventures

- 78.1 If the Contractor is a joint venture, all partners of the joint venture shall be jointly and severally liable to the Employer for the execution of the entire Contract in accordance with its terms and Conditions.

SECTION V: SPECIFICATIONS

CONTENTS

| Chapter | Description | Page |
|----------|---|-----------|
| 1 | GENERAL | 69 |
| 1.1 | General Description of the Works | 69 |
| 1.2 | Location of the Works | 69 |
| 1.3 | Climatic Conditions | 71 |
| 1.4 | Drawings and Documents | 71 |
| 1.5 | Drawings Designed by the Contractor | 71 |
| 1.6 | “As Built” Drawings | 72 |
| 1.7 | Standard Specifications | 73 |
| 1.8 | Site Meetings | 73 |
| 1.9 | Progress Photographs | 73 |
| 1.10 | Level Datum | 74 |
| 1.11 | Setting Out | 74 |
| 1.12 | Construction and Checking of Work | 74 |
| 1.13 | Supervision and Labour | 75 |
| 1.14 | Works Executed by the Employer or by other Contractors | 75 |
| 1.15 | Contractor’s Site Offices, Workshops, Storage and Working Areas | 75 |
| 1.16 | Definition and Use of the Site | 75 |
| 1.16.1 | Definition of the Site | 75 |
| 1.16.2 | Use of the Site | 75 |
| 1.17 | Possession of the Site | 76 |
| 1.18 | Interference with the Works | 76 |
| 1.19 | Material for the Works | 76 |
| 1.20 | Rejected Materials and Defective Work | 77 |
| 1.21 | Existing Works and Services | 77 |
| 1.22 | Existing Access | 78 |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021,

| | | |
|------|---|------------------------------|
| 1.23 | Liaison with Police and other Officials | 78 |
| 1.24 | Water and Power for Use on the Works | 78 |
| 1.25 | Employer as a Supplier of Water and Power | 79 |
| 1.26 | Inspection by Engineer during Period of Maintenance | 79 |
| 1.27 | Site Offices for the Engineer | 79 |
| 1.28 | Accommodation for the Engineer | Error! Bookmark not defined. |
| 1.29 | Survey Instruments and Chainmen for the Engineer | 80 |
| 1.30 | Engineer's Material Laboratory | 81 |
| 1.31 | Transport for the Engineer | 81 |
| 1.32 | Sign Boards | 82 |
| 1.33 | Tracked Plant | 83 |
| 1.34 | Fuel Supplies | 83 |
| 1.35 | Telephone and Communications | 83 |
| 1.36 | Preservation of Trees | 84 |
| 1.37 | Protection from Water | 84 |
| 1.38 | Protection against Fires | 84 |
| 1.39 | Safety Precautions | 84 |
| 1.40 | Explosives and Fuels | 85 |
| 1.41 | Above Ground Fuel Storage Tanks | 85 |
| 1.42 | Watching, Fencing and Lighting | 86 |
| 1.43 | Soil Conservation | 87 |
| 1.44 | Dust Abatement | 87 |
| 1.45 | Noise Control | 87 |
| 1.46 | Sanitation | 88 |
| 1.47 | First Aid and Medical Services | 88 |
| 1.48 | HIV/AIDS Awareness | 89 |
| 1.49 | Pollution | 89 |
| 1.50 | Maintenance of Irrigation Water Supplies | 89 |
| 1.51 | Restoration of Drains, Streams, Canals etc. | 89 |

| | | | |
|----------|------|---------------------------------------|------------|
| | 1.52 | Site Clearance | 89 |
| | 1.53 | Weather Records | 89 |
| | 1.54 | Units and Abbreviations | 90 |
| 2 | | EARTHWORKS | 91 |
| | 2.1 | Site Clearance and Stripping | 91 |
| | 2.2 | Surface Levels | 92 |
| | 2.3 | Definition of Earthwork Materials | 92 |
| | 2.4 | Removal of Unsuitable Material | 93 |
| | 2.5 | Excavation General | 93 |
| | 2.6 | Blasting | 94 |
| | 2.7 | Excavation Beyond Line or Level | 94 |
| | 2.8 | Approval of Excavation | 94 |
| | 2.9 | Excavation for Structures | 94 |
| | 2.10 | Excavation for Fill Foundation | 95 |
| | 2.11 | Trench Excavation | 95 |
| | 2.12 | Channel Excavation | 96 |
| | 2.13 | Disposal of Excavated Material | 96 |
| | 2.14 | Spoil Tips | 97 |
| | 2.15 | Borrow Pits and Quarries | 97 |
| | 2.16 | Earth Filling | 98 |
| | 2.17 | Backfilling of Structural Excavations | 98 |
| | 2.18 | Filling under raised foundations | 99 |
| | 2.19 | Frequency of Testing | 99 |
| | 2.20 | Granular Bedding | 99 |
| | 2.21 | Slopes and Batters | 99 |
| | 2.22 | Trial Pits | 99 |
| | 2.23 | Sheet Piling | 100 |
| 3 | | CONCRETE | 101 |
| | 3.1 | Concrete General | 101 |

| | | |
|--------|--|-----|
| 3.2 | Cement | 101 |
| 3.3 | Supply of Cement | 101 |
| 3.4 | Storage of Cement | 102 |
| 3.5 | Testing of Cement | 102 |
| 3.6 | Aggregate for Concrete | 102 |
| 3.6.1 | General | 102 |
| 3.6.2 | Fine Aggregates | 103 |
| 3.6.3 | Coarse Aggregates | 104 |
| 3.6.4 | Test for Organic Impurities | 105 |
| 3.6.5 | Total Chloride and Sulphate Contents | 105 |
| 3.7 | Admixtures | 105 |
| 3.8 | Water for Concrete | 106 |
| 3.9 | Concrete Mixes | 106 |
| 3.10 | Trial Mixes | 106 |
| 3.11 | Testing of Concrete | 107 |
| 3.11.1 | General | 107 |
| 3.11.2 | Cement Content | 107 |
| 3.11.3 | Workability | 107 |
| 3.11.4 | Water/Cement Ratio | 108 |
| 3.11.5 | Compressive Strength | 108 |
| 3.12 | Failure to Comply with Specified Requirements | 108 |
| 3.13 | Concrete Returns and Records | 109 |
| 3.14 | Plant, Equipment and Construction Procedure | 109 |
| 3.15 | Batching | 109 |
| 3.16 | Mixing Concrete by Machine | 109 |
| 3.17 | Mixing Concrete by Hand | 109 |
| 3.18 | Preparation of Surface to Receive Concrete | 110 |
| 3.19 | Authority to Commence Placing of Concrete | 110 |
| 3.20 | Dimension of Concrete Pours and Programme of Placing | 110 |
| 3.21 | Transport and Deposition of Concrete | 110 |
| 3.22 | Distribution and Spreading of Concrete | 111 |
| 3.23 | Compaction of Concrete | 111 |
| 3.24 | Protection of Concrete | 112 |
| 3.25 | No Partially Set Concrete shall be used | 112 |

| | | |
|--------|---|-----|
| 3.26 | Plum Concrete | 112 |
| 3.27 | Concrete canal lining | 113 |
| 3.27.1 | Earth filling | 113 |
| 3.27.2 | Concrete works | 113 |
| 3.27.3 | Expansion and shrinkage joints | 113 |
| 3.28 | Concreting in Adverse Weather | 114 |
| 3.29 | Concreting at Night or in the Dark | 114 |
| 3.30 | Concreting in High or Low Ambient Temperature | 114 |
| 3.31 | Curing and Protection | 114 |
| 3.32 | Steel Reinforcement | 115 |
| 3.32.1 | Materials | 115 |
| 3.32.2 | Fabricating Reinforcement | 115 |
| 3.32.3 | Fixing Reinforcement | 115 |
| 3.32.4 | Splicing and Lapping | 116 |
| 3.33 | Cover to reinforcement | 116 |
| 3.34 | Formwork | 116 |
| 3.34.1 | Definitions | 116 |
| 3.34.2 | Materials | 116 |
| 3.34.3 | Forms | 116 |
| 3.34.4 | False work and Centering | 117 |
| 3.34.5 | Forms for Joints | 118 |
| 3.34.6 | Release Agents | 118 |
| 3.35 | Removal of Formwork | 118 |
| 3.36 | Surface Finishes | 119 |
| 3.36.1 | General | 119 |
| 3.36.2 | Formed Surfaces | 119 |
| 3.36.3 | Unformed Surfaces | 120 |
| 3.36.4 | Surface Tolerances | 120 |
| 3.37 | Conduits, Box-outs and Apertures | 121 |
| 3.38 | Construction joints | 121 |
| 3.39 | Movement joints | 122 |
| 3.40 | Pre-cast Concrete Units | 123 |
| 3.41 | Breaking out Existing Concrete or Block work | 124 |
| 3.42 | Cement Grout | 124 |
| 3.43 | Cement Mortar | 124 |
| 3.44 | Concrete Block and Bricks Masonry | 124 |
| 3.45 | Rendering Work | 125 |
| 3.45.1 | Material | 125 |

| | | | |
|----------|--------|---------------------------------------|------------|
| | 3.45.2 | Waterproof cement mortar | 125 |
| | 3.45.3 | Application | 125 |
| | 3.46 | In Situ Concrete Chambers | 126 |
| | 3.47 | Chamber Covers and Slabs | 126 |
| 4 | | STONWORK | 126 |
| | 4.1 | Stones | 126 |
| | 4.2 | Stone Masonry | 126 |
| | 4.3 | Types of Masonry | 127 |
| | 4.4 | Bedding of Stone Masonry | 127 |
| | 4.5 | Special Stonework | 128 |
| | 4.6 | Pointing of Joints in Masonry | 128 |
| | 4.7 | Hand Placed Rubble Filling | 128 |
| | 4.8 | Tipped Rock / Pitching | 128 |
| | 4.9 | Gabions | 129 |
| | 4.10 | Geotextile Filter Cloth | 130 |
| | 4.11 | Graded Filters | 130 |
| | 4.12 | Hardcore | 131 |
| 5 | | PIPEWORK | 132 |
| | 5.1 | General | 132 |
| | 5.2 | Storage and Protection of Materials | 132 |
| | 5.3 | Handling Pipes and Fittings | 132 |
| | 5.4 | Cutting Pipes | 133 |
| | 5.5 | Pipes and Fittings | 133 |
| | 5.5.1 | Concrete Pipes | 133 |
| | 5.5.2 | Steel pipes | 134 |
| | 5.5.3 | uPVC pipes | 134 |
| | 5.6 | Valves | 134 |
| | 5.6.1 | Gate valves | 134 |
| | 5.6.2 | Butterfly valves | 135 |
| | 5.6.3 | Check valves | 135 |
| | 5.6.4 | Float ball valves | 135 |
| | 5.6.5 | Painting of valves | 135 |
| | 5.7 | Laying Pipes in Trenches and Headings | 135 |

| | | |
|----------|--|------------|
| 5.8 | Pipes Laid on Natural Ground | 136 |
| 5.9 | Pipes laid on Granular Bedding | 136 |
| 5.10 | Pipes with Concrete Bedding and Surround | 136 |
| 5.11 | Joints in Pipelines | 137 |
| 5.11.1 | Concrete pipes | 137 |
| 5.11.2 | uPVC pipes | 137 |
| 5.11.3 | Steel pipes | 137 |
| 5.12 | Connections to Existing Pipelines | 138 |
| 5.13 | Pipes Through Structures | 138 |
| 5.14 | Pipelines within Concrete Structures | 138 |
| 5.15 | Pipes under Roads | 138 |
| 5.16 | Cleaning | 138 |
| 5.17 | Pressure Testing of Pipelines | 139 |
| 5.18 | Painting of Exposed Pipes and Fittings | 139 |
| 5.19 | Marker Posts | 139 |
| 5.20 | Water Tanks | 140 |
| 5.20.1 | Pressed Steel Tanks | 140 |
| 5.20.2 | Plastic Water Tank | 140 |
| 5.21 | Chemical Mixing and Dosing | 140 |
| 6 | STEELWORK | 141 |
| 6.1 | General | 141 |
| 6.2 | Bolts, nuts and fastenings | 141 |
| 6.3 | Electrodes | 141 |
| 6.4 | Contractor's Shop Drawings | 141 |
| 6.5 | Fabrication and Erection of Steelwork | 142 |
| 6.6 | Welding | 142 |
| 6.7 | Painting General | 143 |
| 6.8 | Painting Steelwork Immersed in Water | 143 |
| 6.9 | Painting other steelwork | 143 |
| 6.10 | Galvanising | 144 |
| 6.11 | Galvanised handrails | 144 |

| | | |
|----------|--|------------|
| 6.12 | Gates | 144 |
| 6.13 | Stop-logs | 145 |
| 7 | ROADWORKS | 146 |
| 7.1 | General | 146 |
| 7.1.1 | Earthworks | 146 |
| 7.1.2 | Formation Level | 146 |
| 7.1.3 | Preparation and Formation | 146 |
| 7.1.4 | Gravel Wearing Course | 146 |
| 7.1.5 | Compaction of Gravel Wearing Course | 147 |
| 7.2 | Rehabilitation of Existing Access Roads | 148 |
| 7.2.1 | General | 148 |
| 7.2.2 | Site clearing | 148 |
| 7.2.3 | Spoil of Unsuitable Material | 148 |
| 7.2.4 | Earthworks Fill | 148 |
| 7.2.5 | Light Grading | 148 |
| 7.2.6 | Heavy Grading | 148 |
| 7.2.7 | Gravel Stockpiling | 148 |
| 7.2.8 | Overburden Removal | 148 |
| 7.2.9 | Haulage | 148 |
| 7.3 | Drainage Works | 149 |
| 7.3.1 | Culvert installation | 149 |
| 7.3.2 | Mass Concrete, Beds and Surrounds | 149 |
| 7.3.3 | Mitre Drains and Catch Water Drains | 149 |
| 7.3.4 | Side Drains | 149 |
| 7.3.5 | Cleaning of Existing Drains | 149 |
| 7.3.6 | Repair of Existing Drains | 149 |
| 8 | BUILDINGS | 150 |
| 8.1 | Demolitions and Alterations | 150 |
| 8.1.1 | Demolition | 150 |
| 8.1.2 | Protection | 150 |
| 8.1.3 | Laying the dust | 150 |
| 8.1.4 | Making good | 150 |
| 8.1.5 | Credit for Materials | 150 |
| 8.1.6 | Definitions of Terms | 150 |
| (a) | Removal shall include: | 150 |
| (b) | Disposal shall include: | 150 |
| (c) | Making out shall include: | 151 |
| (d) | Making good shall include: | 151 |
| (e) | Form opening in brickwork or block work shall include: | 151 |
| (f) | Block in/Blank off/Fill in opening in brick work or block work shall include: | 151 |
| (g) | Remove partition shall include: | 151 |
| (h) | Repair roof covering shall include: | 152 |
| (i) | Renew roof covering shall include: | 152 |
| (j) | The term renew roof covering as applied to a sheet metal, felt or asphalt roof includes: | 152 |
| (k) | Renew flashings and the like shall include: | 152 |
| (l) | Ease and adjust shall include: | 152 |
| (m) | Overhaul shall include: | 153 |
| (n) | Strip existing installation shall include: | 153 |

| | | |
|--------|---|-----|
| (o) | Strip existing installations in relation to plumbing and Engineering installations shall include: | 153 |
| 8.2 | Materials | 153 |
| 8.2.1 | Submission of Samples | 153 |
| 8.2.2 | Cement | 154 |
| 8.2.3 | Aggregates for Concrete | 154 |
| 8.2.4 | Sand for Mortar | 154 |
| 8.2.5 | Stone Dust | 155 |
| 8.2.6 | Murram | 155 |
| 8.2.7 | Water for Cement Treated Materials | 155 |
| 8.2.8 | Cement Mortar | 155 |
| 8.2.9 | Hydrated Lime | 155 |
| 8.2.10 | Calcium Chloride | 156 |
| 8.2.11 | Lime Mortar | 156 |
| 8.2.12 | Cement-Lime Mortar | 156 |
| 8.2.13 | Cement Grout | 156 |
| 8.2.14 | Concrete Building Blocks | 156 |
| 8.2.15 | Building Stone | 156 |
| 8.2.16 | Steel Reinforcement | 156 |
| 8.2.17 | Granular Material for Pipe Beddings | 157 |
| 8.2.18 | Concrete Pipes and Specials | 157 |
| 8.2.19 | Concrete Porous Pipes | 157 |
| 8.2.20 | Concrete Drain Invert Blocks | 157 |
| 8.2.21 | Concrete Slabs for Open Drains | 157 |
| 8.2.22 | Drainage Ditch Warning Posts | 157 |
| 8.2.23 | Agricultural Tiles and Pipes | 157 |
| 8.2.24 | Manhole Covers and Frames | 157 |
| 8.2.25 | Gully Gratings and Frames | 157 |
| 8.2.26 | Pre-cast Concrete Manholes and Inspection Chambers | 158 |
| 8.2.27 | Pre-cast Concrete Gullies | 158 |
| 8.2.28 | Manhole Step-irons | 158 |
| 8.2.29 | Timber | 158 |
| 8.2.30 | PVC Pipes | 158 |
| 8.2.31 | Bitumen | 158 |
| 8.2.32 | Cut-Back Bitumen | 158 |
| 8.2.33 | Bitumen Emulsion | 158 |
| 8.2.34 | Aggregates for Surface Dressing | 158 |
| 8.2.35 | Dry Rubble Backing | 159 |
| 8.2.36 | Pre-cast Concrete Kerbs, Channels, Edgings and Quadrants | 159 |
| 8.2.37 | Pre-cast Concrete Flags | 159 |
| 8.2.38 | Paint | 159 |
| 8.3 | Masonry and Block work | 159 |
| 8.3.1 | General | 159 |
| 8.3.2 | Workmanship | 159 |
| 8.4 | Walling | 160 |
| 8.4.1 | Materials | 160 |
| (a) | Cement | 160 |
| (b) | Lime | 160 |
| (c) | Sand | 160 |
| (d) | Water | 160 |
| (e) | Concrete Blocks | 160 |
| (f) | Hollow Clay Blocks | 161 |
| (g) | Louvre Block Walling | 161 |
| (h) | Stone | 161 |
| (i) | Fire Bricks | 162 |

| | | | |
|-------|-------|---|-----|
| | (j) | Wall Reinforcement | 163 |
| | (k) | Wall Ties | 163 |
| | (l) | Damp-Proof Courses | 163 |
| 8.4.2 | | Workmanship | 163 |
| | (a) | Cement Mortar | 163 |
| | (b) | Mixing of Mortar | 163 |
| | (c) | General Construction | 163 |
| | (i) | Setting out | 163 |
| | (ii) | Building in Wood Frames | 163 |
| | (iii) | Building in Metal Windows and Doors | 163 |
| | (iv) | Walls to Receive Plaster & Similar Finishes | 164 |
| | (d) | Building Walling | 164 |
| | (i) | Laying and Jointing | 164 |
| | (ii) | Bonding | 164 |
| | (iii) | Tolerances | 164 |
| | (iv) | Curing | 164 |
| | (v) | Cavities | 164 |
| | (vi) | Backfilling | 165 |
| | (e) | Reinforced Walls | 165 |
| | (f) | Wall Ties | 165 |
| | (g) | Fair Face | 165 |
| | (h) | Pointing | 165 |
| | (i) | Holes, Cutting and Chasing | 165 |
| 8.5 | | Painting and Decorating | 166 |
| 8.5.1 | | Materials | 166 |
| | (a) | Manufacturers | 166 |
| | (b) | General | 166 |
| | (c) | Emulsion paints | 166 |
| | (d) | Gloss paint | 166 |
| | (e) | Bluchearing paint | 166 |
| | (f) | Automotive paint | 167 |
| | (g) | Bituminous solution | 167 |
| | (h) | Traffic paint | 167 |
| | (i) | Lead based paints | 167 |
| | (j) | Clear finishes | 167 |
| | (k) | Varnish | 167 |
| | (l) | Primers and undercoats | 167 |
| | (m) | Knotting | 167 |
| | (n) | White spirit | 167 |
| | (o) | Timber stain | 167 |
| | (p) | Textured coating | 167 |
| | (q) | Stopping | 168 |
| | (r) | Fillers | 168 |
| 8.5.2 | | Workmanship | 168 |
| | (a) | General | 168 |
| | (b) | Brushwork | 169 |
| | (c) | Stopping and filling | 169 |
| | (d) | Stirring | 169 |
| | (e) | Inspection | 169 |
| | (f) | Paint application | 169 |
| | (g) | Drying | 169 |
| | (h) | Un-primed woodwork | 169 |
| | (i) | Primed woodwork | 169 |
| | (j) | Plywood and block board | 170 |
| | (k) | Clear finished woodwork | 170 |
| | (l) | Bare metalwork | 170 |
| | (m) | Galvanized metalwork | 170 |

| | | | |
|-------|------|--|-----|
| | (n) | Primed metalwork | 170 |
| | (o) | Copper | 170 |
| | (p) | Brickwork, concrete etc. | 170 |
| | (q) | Colours | 171 |
| | (r) | Toxic wash | 171 |
| | (s) | Protection | 171 |
| | (t) | Damage | 171 |
| | (u) | Cleanliness | 171 |
| | (v) | Performance | 171 |
| | (w) | Packaging, delivery and storage | 171 |
| | (x) | Vinyl emulsion paint | 172 |
| | (y) | Gloss finish paint | 172 |
| | (z) | Clear polyurethane varnish | 172 |
| | (aa) | Textured Coating | 172 |
| 8.6 | | Painting | 172 |
| 8.6.1 | | General | 172 |
| 8.6.2 | | Block Work | 173 |
| 8.6.3 | | Woodwork | 173 |
| 8.6.4 | | Metalwork | 174 |
| 8.6.5 | | Structural Steelwork | 174 |
| 8.6.6 | | Galvanising | 174 |
| 8.6.7 | | Finishing Off | 175 |
| 8.7 | | Finishings | 175 |
| 8.7.1 | | General | 175 |
| | (a) | Other specifications | 175 |
| | (b) | Samples | 175 |
| | (c) | Finished thicknesses | 175 |
| | (d) | Materials generally | 175 |
| | (e) | Bonding | 175 |
| | (f) | Chases, openings and holes | 175 |
| 8.7.2 | | In-situ Finishings | 176 |
| | (a) | Generally | 176 |
| | (b) | Mixes | 176 |
| | (c) | Preparation of surfaces for plaster etc. | 176 |
| | (d) | Application of plaster and render | 177 |
| | (e) | Curing of plaster | 177 |
| | (f) | Angle beads | 177 |
| | (g) | Plaster stops | 177 |
| | (h) | Textured decorative plaster finishes | 178 |
| | (i) | Cement and sand screeds | 178 |
| | (j) | Terrazzo and granolithic work | 178 |
| | (k) | Dividing strips | 179 |
| | (l) | Non-slip polished pavings | 179 |
| | (m) | Surface hardeners | 179 |
| | (n) | Rates of in-situ work | 179 |
| 8.7.3 | | Tiles, Slab and Block Finishings | 179 |
| | (a) | PVC Vinyl floor tiles | 179 |
| | (b) | Clay tile paving | 180 |
| | (c) | Ceramic wall and floor tiles | 180 |
| | (d) | Granite and marble tiling | 180 |
| | (i) | Marble Tiling | 180 |
| | (ii) | Granite Vanity Tops | 180 |
| | (e) | PVC bead protection to wall tiling | 180 |
| | (f) | Expansion joint covers | 180 |
| | (g) | Precast concrete paving slabs | 181 |
| | (h) | Rates | 181 |

| | | |
|-------------------|---|-------------------------------------|
| 8.7.4 | Suspended Ceilings | 181 |
| (a) | Generally | 181 |
| (b) | Acoustic ceilings | 181 |
| (c) | Gypsum Plasterboard Ceilings | 181 |
| (d) | Expanded metal lathing ceilings | 182 |
| (e) | Rates for suspended ceilings | 182 |
| 9 | SUPPLY OF PLANT AND WORKSHOP EQUIPMENT | 182 |
| 9.1 | General | 182 |
| 9.2 | Agricultural plant and equipment to be supplied by the Contractor | Error! Bookmark not defined. |
| 9.3 | Workshop equipment to be supplied by the Contractor | Error! Bookmark not defined. |
| 9.4 | Operation and Maintenance of Plant and Equipment | Error! Bookmark not defined. |
| 10 | ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN | 183 |
| 10.1 | General | 183 |
| 10.1.1 | Environmental Responsibility | 183 |
| 10.1.2 | Updated Environmental Management Plan | 183 |
| 10.1.3 | Method Statements | 183 |
| 10.2 | Control of Construction Processes | 184 |
| 10.2.1 | Training, Awareness and Competence | 184 |
| 10.2.2 | Supervision of Construction Activities | 184 |
| 10.2.3 | Inspection of Other Operational Impacts | 184 |
| 10.2.4 | Inspections by the Environmental Team | 184 |
| 10.2.5 | Environmental Inspection and Reporting | 184 |
| 10.2.6 | Environmental Monitoring | 185 |
| 10.2.7 | Control of non-conformance | 185 |
| 10.2.8 | Communication and Co-ordination | 185 |
| (a) | Weekly team meetings | 185 |
| (b) | Monthly Project Environmental Review | 185 |
| 10.2.9 | Environmental due diligence during construction | 185 |
| 11 | CONSTRUCTION TOLERANCES | 187 |
| 11.1 | General | 187 |
| 11.1.1 | Earthworks | 187 |
| 11.1.2 | Concrete Structures | 187 |
| 11.1.3 | Stonework | 188 |
| Appendix A | Engineers office and Housing – floor areas | |
| Appendix B | Furniture for the Engineer’s Office and Accommodation | |

GENERAL

General Description of the Works – KIBARATANI IRRIGATION DEVELOPEMNT PROJECT

The main works to be undertaken under this Contract comprise the following:

- (a) Construction of intake works across Rwamuthambi River about 10m wide. The weir will be 015m high and will be located at the location described below:

| Easting | Northing | Elevation | Weir crest height, 1.5m | Weir length |
|----------------|-----------------|------------------|------------------------------------|--------------------|
| 302489.890 | 9940577.61 | 1416.00 | 1.5 | 10 |

- (b) Besides the intake works, the project entails laying and fixing of pipe network summarized in the table below:

| Category | Pipeline | Length, (m) | Pipe material |
|-----------------|-----------------|--------------------|----------------------|
| Conveyance | | 1733 | GI and uPVC |
| Mainlines + | Mainline | 9294 | uPVC |
| Submains | SM2 – SM13 | 24,6440 | GI and uPVC |
| Feeders | Various | 147,003 | GI and uPVC |
| Total | | 265,269 | |

The pipe diameter in the system varies from 400mm to 20mm diameter.

- (c) PRVs, Air valves and Wash outs

The pipe network will also involve installation of several PRVs, Air valves and wash outs as specified in the drawings. Other fixing the various fittings, these works will also include construction of chambers.

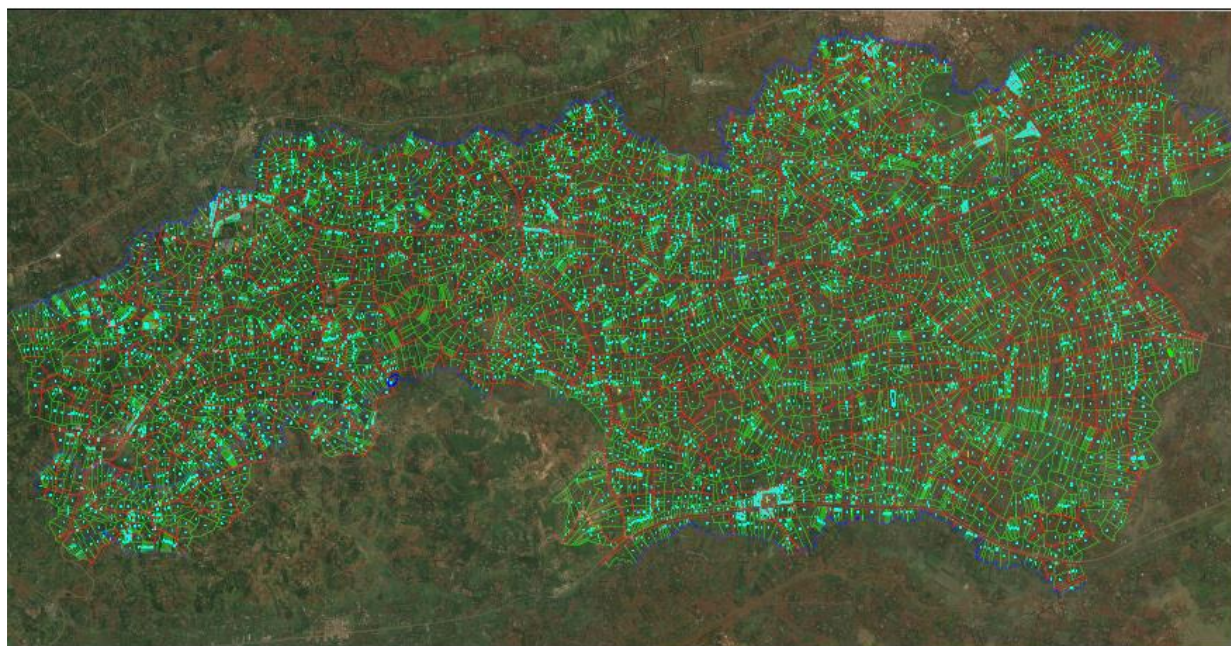
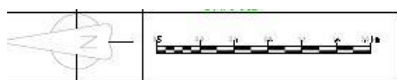
- (d) Section valves

Several section chambers will be constructed at designated points for controlling the water to various blocks and units.

Location of the Works

The project is located in four (4) sub-locations namely; Kianjang'a, Mitheru, Kinya Kiiru and Kithumbu all located in Ndia Sub-County, Kirinyaga County. The intake is located in Gitaku Sub-location across Rwamuthambi River.

The area is located on the southern slopes of Mt. Kenya with the elevation of the project area ranging from 1416 m above mean sea level at the intake point to about 1200 m on the lower boundaries of the project



General Description of the Works – KITHUMBU IRRIGATION DEVELOPEMNT PROJECT

The main works to be undertaken under this Contract comprise the following:

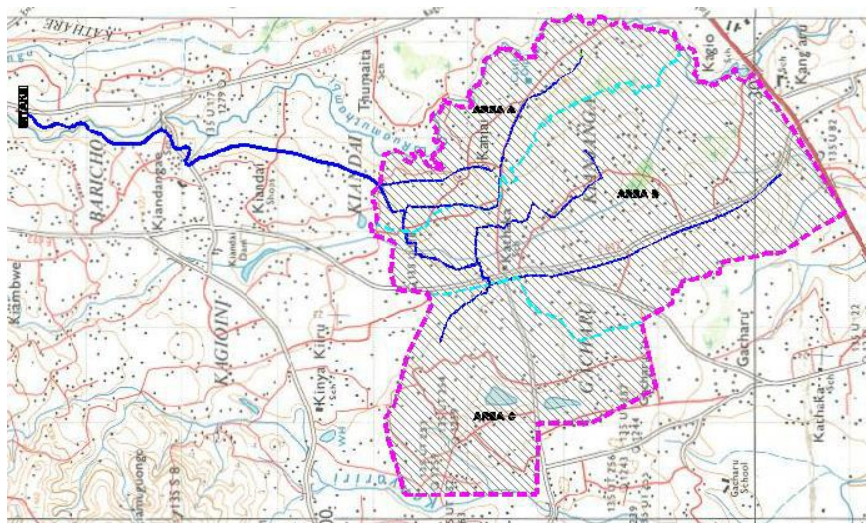
- (e) Rehabilitation of intake works across Rwamuthambi River and construction of new Sedimentation Tank near the intake site
- (f) Besides the headworks above, the project entails laying of a section of pipeline of diameter 315mm and installation of Air valves and wash outs as show in the drawings and the BoQ as per the schedule given below:

| Appertunance | Line | Chainage (m) | Total Number |
|--------------|------------|--|--------------|
| Airv valve | Conveyance | 140m, 460m, 960m,1550m,2160m,2960m,3760m & 4300 m. | 8 |
| Airv valve | Mainline | 820m, 1360m | 2 |
| Airv valve | SMA1 | 540m | 1 |
| Airv valve | SMA2 | 480m & 2060m | 2 |
| Airv valve | SM B1 | 160m, 910m & 1500m | 3 |
| Airv valve | SM B2 | 940m, 1140m, 1820 & 2700m | 4 |
| Wash out | Conveyance | 540m, 1040m & 3480m. | 3 |
| | | | |

Location of the Works

The Project is located in Kariti and Kiini wards, Ndia Sub-County in Kirinyaga County. The project was started in the year 2007 as an Irrigation Water Users' Association (IWUA). The group was later registered as a co-operative

society known as Kithumbu Multipurpose Co-operative Society. The project currently has 291 members



Climatic Conditions

The rainfall pattern is bi modal with long rains falling from March to May and short rains from October to December. The average annual rainfall is between 1200mm and 1400mm with 75% reliability. The mean temperature is about 25° C. with the coldest season between June and August and the hottest between December and February. Sunshine is at annual average of 8 to 9 hours a day. The area is thus classified as high potential

Drawings and Documents

The drawings listed in Section 5 of the Tender Documents and any modifications to those drawings and any other drawings that may be prepared by the Contractor and approved by the Engineer shall subsequently become the Contract Drawings.

For the purpose of carrying out the Contract, the Contractor will be provided with 2 sets of the Contract Documents and full size (A1) Contract Drawings. To be collected from the chief Engineer, Planning and Design Office.

Drawings Designed by the Contractor

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

All shop drawings, including field erection, layout and construction details shall be furnished by the Contractor for the approval of the Engineer.

All the drawings and calculation to substantiate the design shall be checked, signed and approved by the Contractor prior to submission. The drawings shall also be signed by a qualified engineer responsible for the design.

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

All the cost thereof will be deemed to be included in the Contractor's unit rates and Contract Price.

“As Built” Drawings

Within sixty (60) days after the receipt of the Completion Certificate, the Contractor shall submit to the Engineer all the approved drawings and documents (including operation and maintenance manuals), clearly revised and brought up to date by the Contractor to show the permanent construction actually made. The submission shall be made in the following manner and quantity:

- (a) One (1) set of the A1 size reproducible drawings on high quality polyester transparent film or similar material,
- (b) One (1) bound set of reduced size, clearly photocopied drawings with hard cover (A3 size).

The submission shall contain the drawing index.

No separate payments will be made for the provision of the drawings as the cost thereof shall be deemed to be included in the unit rates and the Contract Price.

Standard Specifications

For convenience, and in order to establish the necessary standards of quality, reference will be made to specifications issued by national or other widely recognised bodies. Such specifications shall be referred to as “Standard Specifications” and shall be the latest editions of such Standard Specifications issued prior to the issue of Tender Documents, together with such additions and amendments as may have been issued prior to the same date.

Subject to the written approval of the Engineer, any other internationally accepted standard which requires an equal quality of work may be used.

In referring to Standard Specifications, the following abbreviations are used:

| | |
|--------|---|
| BS | British Standard |
| ISO | International Organisation for Standardisation |
| AASHTO | American Association of State Highways and Transportation Officials |
| ASTM | American Society for Testing and Materials |
| ASA | American Standards Association |
| KS | Kenya Standard |
| EN | Normalised European Standards |

In cases where no particular Specification or Standard is given for any article or material to be used in the Contract the relevant Specification of the British Standards Institution or other relevant Standard shall apply unless otherwise stated. The latest version of the standards referred to shall be used where applicable.

If the Contractor proposes to use a Standard Specification other than that specified, three copies of the proposed Standard Specification, in the English Language, shall be submitted to the Engineer not less than 28 days before approval of the Standard Specification is required.

Site Meetings

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

The Engineer shall invite the Employer for such meetings.

Progress Photographs

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

The Contractor shall make a soft copy of all the photos. This copy will be retained on the site and on completion of the Works the negatives shall become the property of the Employer.

The Contractor shall supply cameras to the Engineer for taking of photographs

Level Datum

The survey control points and bench marks shown on the drawings shall be handed over to the Contractor as basis for surveying and setting out of the Works. The Contractor shall be responsible for carrying out the field surveys for the performance of the Works.

Before using the control points and bench marks for setting out of the Works, the Contractor shall carry out a check survey thereon and satisfy himself as to their accuracy. The Employer shall bear no responsibility for the accuracy of any control point or bench mark.

The Contractor may establish additional temporary bench marks for his own convenience but each temporary bench mark shall be of a design and in a location approved by the Engineer and shall be accurate in relation to the bench marks established by the Engineer.

The Contractor shall protect the reference points and level bench marks and in the event of any damage he shall re-survey and re-establish the points and bench marks all to the satisfaction of the Engineer.

Setting Out

The Contractor shall appoint and employ the necessary qualified and experienced staff to set out the Works accurately. The Contractor shall establish and locate all lines and levels and be responsible for the correct location of all Works.

Where directed by the Engineer, the Contractor shall take such levels and dimensions as may be required for the purposes of measurements prior to disturbance of the ground. These shall be agreed between the Contractor and the Engineer in writing before any of the surface is disturbed or covered up.

Construction and Checking of Work

The Contractor shall be solely responsible for and shall provide all labour, tools, lifting tackle and other equipment required for the construction and checking of the Works.

No operatives shall be allowed to execute any type of work, which is normally carried out by a skilled tradesman, unless the operative is thoroughly experienced and proficient in the trade concerned. Supervisors and operatives may be required to demonstrate their proficiency or produce certificate of competence to the satisfaction of the Engineer.

As each part of the work is carried out it shall be subject to the approval by the Engineer.

Supervision and Labour

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

All staff and labour employed on the Works shall be employed in accordance with the local labour and employment laws and regulations.

Works Executed by the Employer or by other Contractors

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

Contractor's Site Offices, Workshops, Storage and Working Areas

The Contractor shall at his own cost provide office and other temporary accommodation for his Site Personnel including sanitary facilities and canteen where necessary.

The Sanitary facilities shall be kept in a clean and orderly condition to the approval of the Engineer and public health authorities. Any employee found fouling the site shall be removed from Site immediately.

Site office and sanitary facilities shall be removed on completion of the work and all trenches shall be chemically treated and completely back-filled to the satisfaction of the Engineer.

The Contractor shall be deemed to have included for the costs thereof in his Tender.

Definition and Use of the Site

Definition of the Site

The Site shall include all those areas of land which, being public or private:

- (a) Are being provided by the Employer for the purpose of constructing the permanent works.
- (b) Are being provided by the Employer or leased by the Contractor for Temporary Works, including camps, offices and stores.
- (c) Are acquired, leased, or operated by the Contractor as borrow pits or spoil tips for the Permanent Works, including all access roads.

Use of the Site

The lands and other places outside the Site which are the property of or under the control of the Employer shall not be used except with the approval of the Engineer.

The Contractor shall at any time remove any vehicle or vessel or any other obstruction under his control that may be required to be removed by the Engineer for any purpose. The Contractor shall move such obstruction promptly on instruction being given.

The Contractor shall maintain access for the inspection, operation and maintenance of any of the Employer's plant or works which lies within the Site or elsewhere.

The Contractor shall not use any portion of the Site for any purpose not connected with the Works unless the written permission of the Engineer has been obtained.

Except with the written permission of the Employer, to be given when necessary for the execution of the Works, the Contractor's employees will not be permitted to enter any of the Employer's buildings or lands or sites under the control of other contractors or the Engineer. The Contractor shall warn his employees that any person found within such buildings or sites without authority is liable to be removed from the Works in accordance with the Conditions of Contract.

Possession of the Site

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

Interference with the Works

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

Material for the Works

All material shall comply with appropriate Standard Specifications unless otherwise required hereinafter.

The Contractor shall, before placing any order of materials, manufactured articles or machinery for incorporation in the Works, submit for the approval of the Engineer the names of the suppliers from whom he proposes to obtain such materials, manufactured articles or machinery, together with a list of the same, giving the origin, quality, weight, strength, description and other relevant details. No materials, manufactured articles or machinery shall be ordered or obtained from any suppliers which the Engineer has not approved in writing.

All materials shall be delivered to the Site a sufficient period of time before they are required for use in the Works, to enable the Engineer to take such samples as he may wish for testing and approval.

Notwithstanding the fact that approval has been given to the source of supply, the Engineer may forbid the use of any materials if, upon delivery, they are found to be defective, or he considers them unsuitable for incorporation in the Works. Such rejected materials shall be removed from the site forthwith.

The Contractor may propose alternative materials of equivalent quality to those specified, and subject to the approval, such materials may be used in the Works.

The Contractor shall have no claim against the Employer in respect of any financial loss which he may suffer as a result of the rejection of any such materials, and he shall also bear the cost of removing them from the Site.

The Engineer shall have the right to inspect materials and plant for the permanent works during the course of manufacture. The Contractor shall arrange for the right of access to manufacturing premises for the Engineer and his staff during normal working hours. The Engineer shall be given sufficient notice by the Contractor to allow him to observe the testing of any materials for the works at the place of manufacture. The Engineer shall also be given the opportunity to inspect any material or plant in their completed state prior to packing for transport to the site.

If requested by the Engineer, the Contractor shall provide to the Engineer copies of orders for the supply of goods or materials required in connection with the works.

Rejected Materials and Defective Work

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

Existing Works and Services

The Contractor shall acquaint himself with the positions of all existing works and services including water mains, stormwater drains, cables, and service poles before any excavation are commenced.

The Contractor will be held responsible for any damage, however caused, in the course of the execution of the Works, to such existing works and services.

Such existing works and services, where exposed by the execution of the works, shall be properly shored, hung-up and supported to the satisfaction of the Engineer and of the authority concerned.

Poles supporting cables and the like adjacent to the Works shall be kept securely in place until the Works are completed and shall then be made as safe and permanent as before.

Notwithstanding the foregoing requirements and without lessening the Contractor's responsibility, the Contractor shall inform the Engineer immediately any existing works have been exposed and shall comply with any requirements of the authority concerned.

Only when and as directed by the Engineer shall the position of existing works or services be changed by the Contractor to meet the requirements of the proposed work.

The Contractor shall make adequate provision so that when carrying out his work, no interference, damage or pollution is caused to roads and footpaths, or to any mains, drains, and the like or other parts of the Works. Wherever loads have to be carried over ground in which pipes, valves, culverts, and the like are buried, the Contractor shall take all precautions including where necessary, the provision and use of sleeper roads, light gauge railways or other means to prevent damage occurring to such underground works. The Contractor shall not store any plant or materials or spoil heaps over existing water mains, or in such positions that interference with access to the mains, control gates and the like, is created. Approval by the Engineer to the

means of protection employed shall not relieve the Contractor of any responsibility in respect of damage occasioned by his operations.

The laying of pipework, ducts, drains, and the like shall be arranged so as to cause as little interference as possible with the smooth operation of existing works.

When breaking out and making good existing structures, the Contractor shall disturb the existing structures as little as possible. All structures shall be made good with materials similar to those used in the existing works, or such materials which are considered by the Engineer to be of similar appearance and suitable in all other respects.

Existing Access

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

Liaison with Police and other Officials

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

Water and Power for Use on the Works

The Contractor shall be solely responsible for the location, procurement and maintenance of a water supply adequate in quality and quantity to meet his obligations under the Contract.

The Contractor shall be solely responsible for the location and continuity of the supply of water for use on the Works. Supplies may be derived from rivers and streams, but shall in all cases be to the Engineer's approval, and the abstraction of water from any sources shall not interfere with any permanent water supply and be to the requirements and permitted by Water Resources Management Authority (WRMA). The Contractor shall be solely responsible for the transporting of water from its source to the point at which it is required for construction purposes, and in such quantities and quality as to enable the Works to proceed without hinderance due to the shortage of adequate water supplies.

The Contractor shall make his own arrangements for power supplies and shall be solely responsible for the location, procurement and maintenance of a power supply, adequate to meet his obligations under the Contract.

The Contractor shall make his own arrangements for the supply of adequate safe drinking water, electricity and other services to the Permanent Works, Temporary Works and plant and shall provide and maintain all pipes, cables and fittings which may be necessary to carry such services to his operations

Employer as a Supplier of Water and Power

The position of the Employer or his Agent as a supplier of water or power shall be identical with that of other suppliers, and quite separate from his position as Employer under the Contract. As in the case of a supplier, a failure on the part of the Employer or his Agent to supply water or power will not relieve the Contractor of any of his obligations under the Contract, nor, in respect of any such failure, shall the Contractor have any claim under the Contract against the Employer.

Inspection by Engineer during Period of Maintenance

The Engineer will give the Contractor due notice of his intention to carry out any inspection during the period of maintenance. The Contractor shall, upon receipt of such notice, arrange for responsible representatives to be present at the times and dates named by the Engineer. This representative shall render all necessary assistance and shall take note of all matters and things to which his attention is directed by the Engineer.

Site Offices for the Engineer

The Contractor shall supply, erect and maintain offices and accommodations for the sole use of the Engineer and his staff for the duration of the Contract in a position to be designated by the Engineer.

The offices shall be soundly constructed of approved materials upon concrete bases, and shall be fully weatherproof. The exterior and interior faces of walls and ceilings shall be given two coats of emulsion paint of an approved colour or other approved finish. The offices shall be made dust, insect and vermin proof as far as possible.

The floor areas of the offices shall be as detailed in Appendix A to this Specification. Each room shall have a suitable lockable door and windows. The rooms shall either open onto a common internal passageway or onto a concrete floored covered walkway. Separate washing and toilet facilities shall be provided connected to a mains water supply and a suitable septic tank or sewage disposal system.

The Contractor shall arrange, provide and pay, all charges in connection with water, electricity and telephone supplies to the offices.

Each room shall be wired for electric light, power points, all to approved standards. The Contractor shall be responsible for a continuous supply of potable water, sufficient 240 volt electricity for the office and waterborne sanitation facilities to the office.

The Contractor shall provide and install furniture and equipment as detailed in Appendix B to this Specification, which shall revert to the Employer at the end of the Contract period.

The Contractor shall arrange for all offices and toilets to be cleaned each day and shall provide clean towels daily and an adequate supply of soap and toilet paper. The offices and contents shall be insured by the Contractor against fire, burglary, larceny and other risks ordinarily insured by a householder.

Hard standing for four vehicles shall be provided adjacent to the offices. This area shall be covered with corrugated iron sheets of gauge 28.

At the end of the Contract Period the offices shall be handed over to the community to serve as scheme office.

Time for Erection of Site Offices for the Engineer

The Contractor shall, within two weeks of the award of the contract submit to the Engineer his layouts and construction proposals for the offices of the Engineer and his staff together with details of furniture and equipment to be provided in accordance with Appendix B of this Specification.

The Engineer will then either approve or require modifications to be made to the Contractor's proposals and will instruct the Contractor to proceed with the erection of the offices and with the provisions of furniture and equipment. The Contractor shall then provide the offices, furniture and equipment within six weeks of the date on which the Engineer instructs the Contractor to proceed with such provision.

The Contractor shall bear all expenses incurred by the Employer due to the failure of the Contractor to complete and hand over to the Engineer the offices; furniture and equipment required within the six weeks or such other period as may be stipulated.

The minimum furniture expected are as outlined below:

| No | Description | Qty |
|----|--|------|
| 1 | 4 DRAWERS METAL FILING CABINET | 1.00 |
| 2 | WRITING DESKS | 2.00 |
| 3 | MEDIUM BACK CHAIRS IN GREEN, Black or grey | 2.00 |
| 4 | VISITOR'S CHAIR | 2.00 |
| 5 | CONFERENCE CHAIRS | 6.00 |
| 6 | MODULAR CONFERENCE TABLE TO SEAT 10 PEOPLE | 1.00 |

Survey Instruments and Chainmen for the Engineer

The Contractor shall provide and maintain in first class working order, for the sole use of the Engineer and his staff for the duration of the Contract, the following minimum survey instruments complete with all accessories, tapes, poles, staves, stagings, moulds, templates, profiles, and requisites necessary for checking and setting out, and measurement of the Works. The equipment shall revert to the Contractor at the end of the Contract Period.

The survey equipment shall include those shown in Table 1.13 or similar approved as a minimum:

Table 1.13 Survey equipment

| Description | Quantity |
|---------------------------------------|----------|
| TOPCON RTK survey equipment and rover | 1 |
| TOPCON On board batteries | 2 |
| TOPCON Battery charger | 1 |
| Single Prism and target | 4 |
| Auto level | 1 |
| Plumbing pole 4.6 m length | 6 |
| Wooden Tripod | 4 |
| Plumbing pole tripod with bubble | 4 |
| Interface cable to computer | 1 |
| External battery | 1 |
| External battery charger | 1 |
| Ranging rods | 8 |
| 5 m steel tape | 7 |
| 50 m glass fibre tape | 2 |
| Scale rule | 6 |
| Drawing table | 1 |
| Digital Camera | 4 |
| Dust proof mask | 30 |

| Description | Quantity |
|----------------|----------|
| Rock hammer | 3 |
| Schmidt hammer | 3 |
| Helmet | 15 |
| Life jackets | 10 |

Engineer's Material Laboratory

The Contractor shall be responsible for organizing for testing of materials in designated Government Laboratories or any other as approved by the Engineer. The contractor shall provide the materials for testing and cater for the costs associated with all the tests.

The Contractor shall provide all necessary labour required by the Engineer, for the efficient running of the laboratory for the purpose of controlling the quality of materials used in the Works. The management of the laboratory shall be by the Engineer.

The existence of the laboratory shall in no way relieve the Contractor of the responsibility for carrying out his own tests in order to maintain the degree of control of quality hereinafter specified.

The Contractor is required to keep at the project site, the following minimum equipment at all times during the Contract period:

- (a) Two (2) complete set of sieves of 200 mm or 300 mm diameter including cover, pan and brush;
- (b) Two (2) pan type weighing scale complete with weights, to weigh up to ten kilograms (10kg) with sensitivity one gramme (1 g);
- (c) Two (2) galvanized steel slump test cone apparatus complete with standard tamping rod and base plate;
- (d) Six (6) steel 15cm cube moulds, complete with two (2) tamping rods, base plates and trowels;
- (e) One (1) chemical balance to weigh up to two hundred and fifty grammes (250 g) with weight box and sensitivity of one tenth of a gramme (0.1 g);
- (f) Fifty kilograms (50 kg) of clean, air-dried uniformly graded sand passing a 1.2 mm sieve and retained on a 600 micron sieve;
- (g) Two (2) sand-cone apparatus comprising glass jars, metal funnel, base plate and excavating tools for determination of field density;
- (h) Three (6) glass graduated cylinders of one litre (1 l) capacity each;
- (i) Three (3) thermometers with a range of zero (⁰C) up to one hundred degrees Celsius (100⁰C);
- (j) Twelve (12) moisture cans with lid, 100 mm diameter and 25 mm deep for moisture content determination of soil samples.
- (k) Six (6) sample drying trays 0.5 x 0.5 x 0.03 m;
- (l) Four (4) sample drying trays 1.0 x 1.0 x 0.05 m;
- (m) Six (6) sample drying trays 0.25 x 0.25 x 0.03 m;
- (n) One (1) sample drying oven, 100 litre capacity;
- (o) Four (4) standard compaction moulds with base plates;
- (p) Four (4) standard compaction rammers;
- (q) Two (2) pairs of Atterberg limit apparatus;
- (r) Four (4) stainless steel flexible spatulas;
- (s) Concrete Cube Crushing Machine.

All mechanical equipments to be used for measurement or weighing shall be calibrated as required and calibration certification issued by the calibrating body.

Transport for the Engineer

The Contractor shall provide and maintain in first class working order, vehicles for the sole use of the Engineer and his staff for the duration of the Contract as detailed below:

Four wheel drive Double cabin vehicle of not less than 2700 cc - 1 No capacity or similar approved.

The vehicle shall be handed over to the Engineer new from the suppliers and shall be comprehensively insured for all drivers and passengers. The Contractor shall be responsible for the provision of fuel and lubricants, and for maintaining the vehicles in a fully road-worthy and serviceable condition. The vehicles shall be provided within 28 days of the date of the Notice to commence. The Contractor shall provide similar rented vehicles to the approval of the Engineer, at no extra cost to the Contract within two weeks of the date of the Letter of Acceptance until such time as the Engineer takes delivery of the new vehicles to be supplied for his site staff under the Contract.

The vehicles shall, as far as possible, be maintained on a regular basis and the Contractor shall provide a replacement vehicle of similar standard wherever a vehicle supplied under this Clause is not available for use because of un-serviceability or because of regular maintenance taking more than four hours a week. The Contractor shall provide one workshop manual for the type of vehicles supplied. The Contractor shall provide the Engineer with the vehicle specifications for confirmation/approval prior to the placing of an order.

The Contractor shall provide the full time services of a driver for each vehicle. The drivers supplied shall be experienced in driving the type of vehicle supplied, and shall speak and understand the English language. Should the Engineer consider a driver's standard of driving to be inadequate for any reason, the Contractor shall replace the driver with another. Any senior member of the Engineer's staff holding a valid driving licence shall be entitled to drive the vehicles supplied under this Contract.

The vehicles shall revert to the Employer at the end of the Contract.

Sign Boards

Before the erection of any sign boards or posters by the Contractor, the Contractor shall obtain the approval of the Employer and the Engineer to the size, location and wording of such sign boards or posters.

Unless otherwise agreed, the signboard shall be in three sections. Section One shall contain:

Name of Financing Governments

In white lettering on a blue background

The Second section shall bear the words:

Names of the Program and Project

In white lettering on a blue background

The Third section shall bear the words:

Name of the Financier

In white lettering on a blue background

The Fourth section shall bear the words:

Name of the Employer

In white lettering on a blue background

The Fifth section shall bear the words:

Name of the Implementing Agency

In white lettering on a blue background

The Sixth section shall bear the words:

Name of the Executing Agency

In white lettering on a blue background

The Seventh section (Contractors Board) shall bear the words:

Name of the Contractor

In white lettering on a blue background

The Eighth section shall bear the words:

Name of the Supervising Consultancy

In white lettering on a blue background

Further boards may be added with the names of sub-contractors.

Lettering on these boards shall be as directed by the Engineer

Further boards may be added with the names of sub-contractors.

Tracked Plant

The Contractor's tracked plant may not be run on any public or private road without the written permission of the owner or authority concerned.

Fuel Supplies

The Contractor shall arrange for obtaining, storing and distributing all fuel oils required for the completion of the Works. The storage of fuel on site shall comply with the Petroleum Act and Factories Act applicable in Kenya. Copies of this can be purchased by the Contractor at the Government Printers.

Telephone and Communications

The Contractor shall obtain suitable means of communications during the course of the Contract. The use of radio communications may be permitted but the Contractor shall be responsible for obtaining all the necessary permission and licences.

Preservation of Trees

No tree shall be removed without prior written permission of the Engineer who will limit the removal of trees to the minimum necessary to accommodate the Permanent Works.

If trees are removed or damaged by the Contractor or his employees, without approval, then the Contractor shall replace such trees.

Replacement of trees shall not be with seedlings less than two years of age, obtained from a reputable nursery and of a species approved by the Engineer. The Contractor shall plant, water and ensure that the replacement trees are properly established, all at his own costs.

Protection from Water

The Contractor shall keep the whole of the Works free from water and shall be deemed to have included in his Contract Sum all costs for pumping, shoring, temporary drains, sumps and other measures and provisions necessary for such purposes and for clearing away and making good to the satisfaction of the Engineer any damage caused thereby.

Protection against Fires

The Contractor is advised that, at all times, it is necessary to guard against fires starting within the Site or in the environs thereof, particularly as the result of the Works or from the actions of his employees. The Contractor shall have available, at all times, a trained fire-fighting team provided with adequate fire-fighting equipment and shall deal with all fires on the Site howsoever caused.

The Contractor shall be responsible for maintaining qualified fire fighting crew on the Site at all times as well as maintaining an efficient fire alarm system. The Contractor shall also submit a fire prevention and fire fighting program for the Engineer's approval.

The Contractor shall provide suitable and adequate fire fighting equipment, to the satisfaction of the Engineer, for ready use at all the times in all the Engineer's site establishment including Contractor's residential quarters, labour camps and ancillary buildings. These shall be maintained until the completion of the construction and handing over of the works to the Employer.

The Contractor shall comply with laws and regulations such as Occupational Health and Safety Act 2007 legislation and any other legislations and regulations regarding fires and with respect to the prevention of fires. No fire may be lit in the dry season without written permission from the Engineer and/ or the relevant Authority.

Safety Precautions

The Contractor shall adhere to the current legislative requirements from Factories Inspectorate, Ministry of Labour, in respect of the appointment of Safety Supervisors on Building and Works of Engineering Construction. In accordance with these requirements, the Contractor shall appoint a Safety Supervisor who shall be qualified in safety and familiar with the works being performed. The Safety Officer shall ensure that adequate measures and rules for the protection of health and safeguarding against accidents are enforced.

The Contractor shall take all necessary precautions against risks of loss of life or of injury to any person employed on the Works or to employees of the Employer and to the Engineer or to visitors or to persons having good and sufficient reasons to be about the Works, and to this end he shall properly safeguard the Works to the satisfaction of the Engineer and in accordance with the Occupational Health and Safety Act 2007 legislation and any other legislations that govern safety at construction sites in Kenya.

The Contractor shall at all times comply with any accident prevention regulations and any safety regulations peculiar to the various trades employed on the Works, and any safety regulations published by the Government.

The Contractor shall report promptly to the Engineer all accidents involving the death of or serious injury to any person on the Site or resulting from the Contractor's operations.

The Contractor shall, at his own expense, educate all his employees on safety precautions based on good practice on site. This shall be done in both English and Kiswahili languages. Safety instructions shall deal with all safety measures including but not be limited to the following; protective clothing, helmets and footwear, use of lifting equipment, precautions against electrical shock, welding, routine procedures in case of accidents, fires, etc., watchmen, warning notices and barriers, use of drilling equipment and dust suppression and use and storage of explosive.

Explosives and Fuels

The Contractor shall make arrangements to transport, store and handle explosives and fuels in a safe manner for protecting the public in accordance with the laws and security regulations in force in the Republic of Kenya. In this regard, he shall submit a program to the Engineer for approval for the safe handling and storage of explosives and fuels. The programme shall be accompanied by material data sheets for each of the explosives and fuels. When approved, the Contractor shall issue a copy to each of his personnel involved with the handling of explosives and fuels.

The Contractor shall obtain all necessary licenses and shall pay all fees and charges in respect of the same as may be necessary for the purpose of moving explosives and fuels from place to place and storing the same, and shall make all applications and obtain approvals from the relevant authorities of the Government of Kenya.

The Contractor shall construct his explosives magazines at locations and in a manner complying with the relevant regulations of Kenya and approved by the Engineer. Detonators and fuse shall be stored in a separate magazine away from explosives. In no case shall they be transported in the same vehicle with explosives.

The Contractor shall provide adequate protective facilities to safely store and to prevent the loss or theft of explosives. Overnight storage of explosives and detonators outside of the magazines will not be permitted. Magazines shall be securely locked when not in use.

The Contractor shall maintain an inventory record of storage and withdrawal of all explosives including detonators. This record shall be available to the Engineer, and the Engineer shall be promptly notified of any loss or theft of explosives.

The Contractor shall supply and install sirens and loudspeakers systems, so that adequate warning may be given to all persons who may be endangered when explosives charges are to be fired. The Contractor shall ensure, prior to discharging explosives, that the area to be blasted is clear of all workmen, residents, pedestrians etc. in addition he shall post flagmen on each of the roads entering the said area so as to stop and prevent any traffic from entering into the area until "all clear" notification is given.

During thunderstorms and other electrical disturbances, no charging and firing will be permitted.

Above Ground Fuel Storage Tanks

The fuel storage tank shall comply with BS 21, 1387, 799, 2594 and 5410 and shall have internal working pressure up to and including 0.4 bar, measured at the top of the tank, and a maximum internal vacuum of 10 mbar. Unless otherwise shown on the drawings, the tank shall have a manhole whose centre shall be 450 mm from one end. Filling point shall be fitted to the highest point in the tank shell and vent and dip point shall be fitted preferably at the centre of the manhole lid. The Contractor shall supply the dip stick.

The drain point shall be fitted at the lowest point in the tank and flush with the inside of the shell. This shall be at a minimum of 150 mm from the ground level. The draw off shall be welded near the base of the tank on the vertical centre-line and at the opposite end to the drain.

The tank shall be suspended from the ground by saddle supports and the bond between the tank and the supports shall be broken by application of bituminous paint on the tank and the saddles. The tank shall be fitted with lifting tugs /hooks of sufficient strength at locations shown on the drawings. The location of the tank shall be firm ground with reinforced concrete slab with a provision of catch pits and sumps of sufficient capacities and to the satisfaction of the Engineer. A bund wall shall be provided round the hard standing concrete slab.

The tank shall be earthed in accordance with BS 7430 AND 6651. The earth system shall terminate with copper earth rod in earth test pit.

Watching, Fencing and Lighting

The Contractor shall employ competent watchmen to guard the Works both by day and night.

Any excavations, material dumps, spoil dumps or other obstructions likely to cause injury to any person or thing shall be suitably fenced off and at night marked by red warning lights.

Fences shall consist of at least three 15 millimetres diameter hemp ropes or 4mm diameter wires, or more if required, stretched tightly between poles, and standards securely planted in solid ground, well clear of the excavation. The poles, and standards shall not be more than 15 metres apart, and where circumstances require, they shall be placed closer. Ropes or wires shall be stretched tight approximately 0.4 metres, 0.8 metres and 1.2 metres respectively above the ground. Banks of spoil may be accepted by the Engineer in lieu of fencing if of suitable height and form.

Fences and spoil banks shall be clearly marked at the ends, all corners, and along the length at intervals of not more than 15 metres by means of white limewashed boards, discs, stones or oil drums during the daytime and by red lamps burning at night. Markers shall be freshly limewashed at regular intervals to ensure that they are white and clean.

If a road is closed, or partly closed to traffic, temporary traffic and barricades shall be erected by the Contractor to the satisfaction of the Engineer and the police, or other relevant authority, to give proper warning to traffic and the public. Lettering on road signs shall be black on a yellow background and shall incorporate reflective material. The signs shall be adequately illuminated at night.

Soil Conservation

All precautions shall be taken by the Contractor to prevent the erosion of soil from any lands used or occupied by the Contractor for the purpose of the execution of the Temporary Works.

If in the opinion of the Engineer, the Contractor's operations in areas other than the permanent works caused soil erosion, the Contractor shall undertake soil conservation measures in these areas as directed by the Engineer. The details of the proposed soil conservation measures shall be submitted by the Contractor for the Engineer's approval prior to the execution of the said works.

All soil conservation measures shall be carried out at the earliest possible time, as approved by the Engineer, to ensure that the required protection is established most effectively during the progress of Works.

No separate payment will be made for the soil conservation measures and such costs shall be deemed to be included in the respective unit rates and the Contract Sum

Dust Abatement

During the performance of the work the Contractor shall carry out proper and efficient measures wherever and as often as necessary to reduce the dust nuisance resulting from his operations. Measures shall include, but not be limited, to installation of dust suppression units on his rock drilling equipment, watering down of excavated material during loading operations, and use of water tankers to sprinkle access roads, disposal areas, etc.

The Contractor shall be held liable for any damage to crops, cultivated fields and dwellings of persons in the neighbourhood of the Works resulting from his operations.

In addition, the Contractor shall provide his employees, visitors or any other individual on site with personal protective equipment against dust at all times so that they are not exposed to the dust hazard.

No separate payment will be made for the dust abatement measures and the costs thereof shall be deemed to be included in the respective unit rates and the Contract Sum

Noise Control

All work shall be carried out without unreasonable noise. Compressors used on site shall be silenced either by using only full silenced models or fitted with effective exhaust silencers and properly lined and scaled acoustic covers all to the design of the manufacturers of the compressor or by the use of effective acoustic screens to enclose the noise source. Pneumatic percussion tools used on Site shall be fitted with silencers of a type recommended by the manufacturers of the tools. Compressors, silencers or other equipment shall be maintained in good and efficient working order.

Additionally, where noise from the equipment cannot be minimised using silencers and other equipment related measures, the Contractor shall at all times provide the correct Personal protective equipment for the employees, visitors and any other person on site working within the noise range.

No separate payment will be made for noise suppression measures and the costs thereof shall be included in the unit rates and the Contract Sum.

Sanitation

The Contractor shall provide adequate sanitation and refuse collection and disposal facilities complying with state laws and local by-laws for all houses, offices, workshops, and the like, erected on the site, all to the satisfaction of the Engineer.

The toilet facilities provided at the site by the Contractor shall be made available, free of charge, to the employees of the Contractor and any of his subcontractors.

The Contractor shall warn his employees and sub-contractors that any employee found fouling the site shall be removed from the site immediately in accordance with the Conditions of Contract.

The Contractor shall remove all rubbish and to this end shall provide adequate number of covered garbage bins/containers placed at convenient points around the site establishments. The Contractor shall institute and maintain a regular garbage collection and disposal system. Garbage shall be disposed of by burning, by burial or by other means approved by the Engineer.

No separate payment will be made for such sanitary arrangements and all such costs will be deemed to be included in the unit rates and Contract Sum.

First Aid and Medical Services

The Contractor shall provide and maintain all equipment necessary to render first aid in case of accidents, snake bites or other emergencies according to Occupational Health and Safety Act 2007 legislations regarding workplace health and safety and any other relevant legislation. This equipment shall be kept in readiness at the sites of the works, at camps and wherever the Contractor's staff may regularly live and work. The Contractor shall ensure that there are persons available to all such places with knowledge of simple first aid procedures and able to administer snake bite treatment.

In addition, the Contractor shall provide at his own cost, training to the relevant employees on ways and means of preventing snake bites.

In general, the contractor shall be guided by the following,

- Where the number of workers exceeds 25 - provide a stretcher and a vehicle that can carry a person on a stretcher
- Where the number of workers exceeds 250 - provide first aid room with a qualified nurse to be on duty during all shifts.

Notwithstanding the minimum requirements prescribed above, the Contractor shall be responsible for the adequacy of all the arrangements made.

HIV/AIDS Awareness

The Contractor shall implement an HIV/AIDS awareness programme for his Personnel.

Pollution

During the execution of the Works, the Contractor shall ensure that no pollution of existing watercourses is allowed to take place as a result of his operations. The Contractor shall take all reasonable steps to protect the environment on and off the site and to avoid damage or nuisance to persons or to property of the republic or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

Maintenance of Irrigation Water Supplies

The Contractor shall be responsible for maintaining perennial irrigation water supplies so that the supply may be used in any part of the command area at all times unless otherwise agreed in advance with the Irrigators' Association and approved by the Engineer.

Restoration of Drains, Streams, Canals etc.

Subject to any requirement of the Works whereby a permanent change is to be effected, all drains, canals, pipes, channels, water-courses or streams temporarily cut through or disturbed by the excavation of the Works are to be restored so that the water flowing in them may continue to flow in as full and free manner as it did before the disturbance.

Site Clearance

On completion of the Works, the Contractor shall clear the site and remove all temporary buildings, equipment and debris. The Contractor shall level off and grade all areas used for haul roads and all building, store and workshop areas. The whole of the site shall be left in a clean and tidy condition.

Weather Records

The Contractor shall erect two rain gauges ("Nylex 600" or similar approved) and a double bulb, minimum/maximum thermometer (0.1°C accuracy) at sites agreed with the Engineer. The Contractor shall be responsible for the daily measurement of rainfall and minimum and maximum temperature to be taken at 8:00am each day.

Units and Abbreviations

The units of measurement used in these Contract Documents are metric.

The following abbreviations have been used for units and for other words or phrases as indicated.

Abbreviations in the Contract Documents shall have the following meanings:

| | |
|---------------------|--------------------------------------|
| mm | millimetre |
| m | meter |
| km | kilometre |
| sq.m,m ² | square metre |
| ha | hectare |
| cu m,m ³ | cubic metre |
| sec,s | second |
| hr | hour |
| min | minute |
| wk | week |
| l | litre |
| gm | gram |
| kg | kilogram |
| t | tonne |
| No | Number |
| nr | Number (in bill of quantities) |
| dia | diameter |
| max | maximum |
| min | minimum |
| AD | above datum (levels in metres) |
| ch | chainage (distance in metres) |
| eo | extra over |
| e | exceeding |
| ne | not exceeding |
| PQ | Provisional Quantity |
| PS | Provisional Sum |
| Do | Ditto |
| fob | free on board |
| cif | cost, insurance, freight |
| wt | weight |
| % | percent |
| mh | manhole |
| ic | inspection chamber |
| HYS | high yield steel |
| PCC | precast concrete |
| uPVC | uplasticised polyvinylchloride |
| GMS | galvanised mild steel |
| DI | ductile iron |
| SV | sluice valve |
| ISO | International Standards Organisation |
| KS | Kenyan Standard |
| BS | British Standard |
| KES. | Kenya Shillings |

EARTHWORKS

Site Clearance and Stripping

General clearance is defined as the clearing, grubbing, removal and disposal of all vegetation, grass, debris, bushes, dense bush, trees, hedges, undergrowth, stumps, roots, shrubs plants and backfilling of holes left by the removal of stumps and roots.

The widths and length over which site clearance is to be carried out shall be instructed by the Engineer. Site clearance over the area of quarries, borrow pits, stockpiles and spoil tips shall be carried out where instructed by the Engineer. The Engineer may give instructions that specific trees, stumps or objects shall not be removed during site clearance operation.

If termite moulds are excavated, the whole of the mould shall be removed.

Where the Engineer instructs that site clearance is required, the entire area shall be cleared and all materials thus cleared shall become the property of the Employer. Unless otherwise instructed, vegetation and perishable materials shall be disposed of by burning. Where material or debris cannot be burnt, it shall be carted to spoil areas, which spoil areas shall be provided in accordance with requirement of this Specification.

If the Contractor clears the Site in advance of the main Works such that the grass and other vegetation re-grows prior to the main Works commencing at any particular location then any additional, or repeating of, site clearance required shall be at the Contractor's expense.

When instructed by the Engineer, the Contractor shall demolish wholly or in part, remove and dispose of all buildings, foundations, structures, fences and any other obstructions which have not been designed to remain.

The Contractor shall carefully take down such buildings, structures; fences etc. and the components shall be dismantled, cleaned and stacked in separate heaps. All materials which, in the opinion of the Engineer, are not fit for re-use shall be removed from the site to spoil areas provided in accordance with the requirements of this Specification. All materials, which are re-usable, shall remain the property of the Employer and shall be preserved and protected by the Contractor until removed by the Employer or until the expiry of the Period of Maintenance.

All existing paths, fences, walls, hedges, trees, shrubs, lawn and other features which the Engineer instructs not to be removed or otherwise dealt with, shall be protected from the damage, and any damage which occurs due to the Contractor's failure to take adequate precautions shall be repaired at the Contractor's expense.

Site clearance shall be measured in square metre, calculated as the plan area instructed by the Engineer to be cleared. The rate for the site clearance shall include for the cost of complying with the requirements of Clauses 2.1, 2.13 and 2.14.

Stripping work shall basically consist of removal of top soil, grasses, vegetative material to a depth of 150 mm below ground level and its disposal to a stockpile. Stripping shall include for removal, stockpiling and for reinstatement or spreading as directed by the Engineer. Measurement and payment of this shall be in square metres, calculated as the plan area instructed by the Engineer.

Surface Levels

After the area of any section of the Works has been cleared and after trees have been felled, stumps removed and termite mounds excavated to the satisfaction of the Engineer, but before any other work is commenced, surface levels of the ground shall be taken. The levels shall be taken at spacings agreed with the Engineer. Levels shall similarly be taken on the surface of the ground after the removal of unsuitable overburden prior to placing fill and at the interface between natural ground, rock or artificial hard material layers. The levels shall be agreed with the Engineer. The Contractor shall prepare plans and sections which shall, when finally and mutually agreed, be signed by the Engineer and Contractor as truly representing the configurations of the areas in question at the commencement of excavation or fill construction.

Definition of Earthwork Materials

The following definitions of earthworks materials shall apply to this and other Clauses of the Specification in which reference is made to the defined materials:

- (a) "Top soil" shall mean the top layer of soil that can support vegetation
- (b) "Suitable material" shall comprise all material which arises from excavations within the Site and which is approved by the Engineer as acceptable for use in the Works
- (c) "Unsuitable material" shall mean material other than suitable material and shall comprise:
 - Material from swamps, marshes and bogs
 - Logs, stumps and perishable materials
 - Material susceptible to spontaneous combustion
 - Clay of liquid limit exceeding ninety (90) and/or plasticity index exceeding sixty five (65)
- (d) "Rock" or "hard material"

Rock or hard material shall be material which cannot be ripped to an average depth of greater than 300mm by a track type crawler tractor complying with the following:

- In good order complete with all equipment and accessories as supplied;
- Rated 300 BHP flywheel power or over;
- With an operating weight of not less than 37.2 tonnes;
- Equipped with a hydraulically operated single tine ripper compatible with the tractor used; and
- Operated by a qualified operator in accordance with the manufacturer's recommendations and to the satisfaction of the Engineer.

Where it is impractical to prove hard material by the above method then the quantity of hard material, if any, shall be determined by the Engineer.

Where excavation contains individual boulders of hard material greater than 0.3 m³ each in volume then such boulders shall be classified as hard material.

- (d) "Soft material" material shall mean all material other than that defined as "rock" or "hard material".

Removal of Unsuitable Material

Where directed by the Engineer the Contractor shall remove unsuitable material to the depth as ordered or agreed with the Engineer and shall dispose of it in approved spoil tips.

Excavation General

Excavation shall be carried out with the allowances for working space given in the Method of Measurement to the Bill of Quantities, unless otherwise shown as lines, levels and profiles on the Drawings or to such other lines, levels and profiles as the Engineer may direct or approve in writing. The work shall be carried out by the Contractor in such a way as to avoid disturbance to the surrounding ground. Particular care shall be taken to maintain stability when excavating in close proximity to existing works.

The work shall be carried out in a careful manner to ensure that the exposed surfaces are as sound as the nature of the material permits and that no point shall protrude inside the lines shown on the Drawings except as otherwise specified or agreed by the Engineer. In soft excavation, which is to remain open permanently, exposed faces shall be formed accurately to the required slopes and profiles. Excavations in rock where the faces shall remain open permanently shall be trimmed so that no point protrudes within the required profile.

The Contractor shall examine all excavated faces regularly and shall remove all insecure material or materials resulting from any falls. Where instructed in writing by the Engineer, the Contractor shall wash down exposed surfaces of excavated rock for inspection.

The Contractor shall dispose of all material arising from excavations. If it is suitable and required for the Permanent Works it shall be placed directly in such Works or set aside for use as and when required in suitable approved dumps, otherwise it shall be removed to tips provided by the Contractor unless otherwise provided or directed by the Engineer.

The Contractor shall be responsible for keeping all excavations free from water from whatever cause arising and shall provide such pumping capacity and other measures as may be necessary for this purpose. The Contractor shall make good any damage that may result from his failure to keep the excavations free from water.

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

The Contractor will be permitted, subject to the approval of the Engineer, to adjust side slopes of excavations in soft materials which are to remain open temporarily in preference to shoring or strutting. However no payment shall be made for extra excavation volume as a result of these measures.

The Contractor shall notify the Engineer without delay of any permeable strata, fissures or unusual ground encountered during excavation.

Blasting

The Contractor shall not be permitted to use explosives for rock excavation without the approval of the Engineer. The Contractor shall only employ suitably qualified and experienced personnel to manage and supervise blasting operations. For each blasting operation, the Contractor shall submit to the Engineer for approval a statement detailing the type of explosives to be used, method of transport, storage, blasting procedures, safety precautions to be observed and the names and experience of the personnel who will supervise the work. Notwithstanding the Engineer's approval, the Contractor will be responsible for the blasting operations and shall accept full and absolute liability for any claims resulting either directly or indirectly from the use of explosives on the Site.

The blasting operations shall comply in every respect with the regulations and laws covering the use of explosives and the Contractor shall be responsible for obtaining all necessary permits.

Excavation Beyond Line or Level

If from any cause whatsoever excavations are carried out beyond their true line and level other than on the instructions of the Engineer, the Contractor shall make good to the required line and level with the appropriate grade of filling to be contained in the true excavation, or with concrete or other approved material in such a manner as the Engineer may direct. This shall be at the Contractor's expense.

Approval of Excavation

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

Excavation for Structures

Open excavation to form a foundation for a structure shall be carried out to the lines necessary to permit the proper construction of the structure to the approval of the Engineer.

Where a structure is to be founded on soft ground, the excavation shall be taken down until the required formation is exposed and prepared to the approval of the Engineer. Where concrete has to be placed on a soft foundation, the Engineer may direct that a blinding layer of lean concrete be placed beneath the structural concrete immediately after completion and approval of the excavation, or require the Contractor to remove the last 100 mm of excavation immediately prior to placing the concrete. If foundation conditions are very soft the Engineer may instruct that additional material be excavated and replaced with compacted gravel or hardcore.

Where a structure is required to be founded on rock but is not required to penetrate into it, all soft overburden shall be removed and the surface of the rock cleared of any loose material by barring and wedging. Where the foundation is required to penetrate into the rock, excavation of the rock may be carried out by blasting but in such a manner as to prevent the shattering of the rock which is to remain. The Engineer may direct that the last 300 mm of rock be left and be removed by barring and wedging or by the use of approved pneumatic tools so that the exposed surface is sound.

The Contractor shall report to the Engineer whenever excavations are ready to receive concrete. No concrete shall be placed in the foundations until the Contractor has obtained the Engineer's agreement that a secure foundation has been reached and that the excavation has been carried out to the lines and levels required.

Excavation for Fill Foundation

Foundations for embankments shall be excavated to the depths or to the soil or rock grade indicated on the Drawings or described in the Specification. The suitability of each part of the foundation for placing fill thereon shall be determined by the Engineer. No fill shall be placed before acceptance of the foundation by the Engineer and recording of the geology.

Where specified in the Drawings or Specification or directed by the Engineer, seams and other defects below the general level of the foundations shall be excavated and filled or covered with materials including mortar and concrete to the satisfaction of the Engineer before fill is placed thereon.

Where embankments are to be constructed on sloping ground, and where shown on the Drawings, benches shall be excavated in the foundations to the dimensions shown on the Drawings.

Except where specifically permitted by the Engineer all foundations for fill shall be kept free of water when placing fill thereon.

Earth foundations shall have the top 150 mm sufficiently moistened and, if necessary, harrowed or scarified and compacted to at least ninety five per cent (95%) of the maximum dry density as determined by the AASHTO T99. Material too wet to be so compacted shall, as directed by the Engineer, be allowed to dry, harrowed or scarified to reduce the moisture content to the required amount and then be re-compacted.

Trench Excavation

Trench excavation shall be performed by the use of hand tools and approved mechanical equipment, in such manner as to minimise disturbance of the sides and bottom of the excavation.

Trenches for pipes shall be excavated to a sufficient depth to enable the pipe and the specified joint, bedding, haunching and surround to be accommodated. Unless otherwise stated, the width of the trench shall be equal to the nominal diameter of the pipe plus 600 mm.

The Contractor shall fill any over excavation beneath the pipe or bedding at his own cost with well rammed selected general excavation material as per requirement of this Specification. The Contractor shall dispose of surplus excavated material not required for backfill to spoil tips.

The sides of trenches shall be adequately supported at all times. Alternatively where the Contractor has to excavate the trenches in open cut the Contractor shall ensure that the side slopes of the excavation are sufficient for stability.

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

The Contractor shall be entirely responsible for the sufficiency of all temporary supports and side slopes to the excavations. The excavation shall be carried out in such a way as to maintain the stability of all roads and other adjacent structures or works.

Channel Excavation

The excavation of all channels shall be executed in such a manner as to ensure that the stability of side slopes is not endangered. Should slips or undercutting occur for reasons attributable to the Contractor's negligence or method of working, the Engineer will give instructions for remedial works to be carried out by the Contractor at the expense of the Contractor.

Where channels are to be reshaped, cleared and trimmed, the width, depth, side slopes and centre line radius shall be as shown on the Drawings. The Contractor shall clear all weeds and growth from existing channels and grade the beds to required levels. The area of waterway shown is the minimum required and sides of channels shall be trimmed to the required slope so as to provide widths not less than those shown on the Drawings.

Any channels, streams, drains or pipes taking water to or from cultivated land shall be diverted so as to maintain their flow before being moved or broken into unless express permission to the contrary is given by the Engineer. All diversions and their subsequent reinstatement are to be carried out to the satisfaction of the Engineer. The Contractor shall be deemed to have included the cost of dealing with this in his rates.

Side banks of channels shall be trimmed to a neat appearance and even surface.

In the construction of channels and embankments a local balance of cut and fill shall be maintained as far as possible unless the cut is unsuitable material or is specified in the drawings that the fill should be imported. A deficiency of fill material shall be made up by bed borrow or gleaning. Surplus material, if suitable and approved by the Engineer may be used for an increased width of embankment otherwise it may be spread at the toe of the embankment or placed on spoil tips as directed by the Engineer.

Where required the Contractor shall control the rates of filling and draw-down of water in channels so as not to endanger the stability of earthworks.

Disposal of Excavated Material

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

If the Contractor is permitted to remove suitable material from the site to suit his operational procedure or to take such material for purposes other than forming embankments or other fill areas, he shall make good any consequent deficit of filling arising there from, unless otherwise agreed by the Engineer.

All material not suitable for embankments or other filling shall, unless otherwise directed by the Engineer, be taken to separate spoil tips provided by the Contractor.

The cost of disposal of surplus or unsuitable materials shall be deemed to be included in the respective unit rates for the excavation work and the Contract Sum.

Spoil Tips

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

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

Borrow Pits and Quarries

Where there may be an insufficiency of suitable material from excavations for filling or is specified on the drawings, the Contractor shall obtain such material from borrow pits or quarries approved by the Engineer where the filling is required for Permanent Works. The Engineer may propose a borrow pit for exploration by the Contractor, however, it shall be entirely the responsibility of the Contractor to locate suitable sources of borrow material for fills.

The Contractor shall investigate the site or sites which they propose to open up and shall provide full and detailed information by means of boreholes, trial pit testing reports, etc. to satisfy the Engineer that the quality of the material meets Specification requirements and that the quantity is adequate for the Works.

Notwithstanding the foregoing, the Engineer shall have the right to order the Contractor to obtain materials from a particular designated source or by widening cuttings for permanent works beyond specified profiles.

The Contractor shall provide plant and equipment and make all other arrangements for excavating, loading and transporting material of the specified quality for completion of the Works in accordance with the agreed programme. These provisions shall include where necessary for any operations involving selection, stockpiling and rehandling of suitable material, the disposal of unsuitable material or overburden and any other operations which may be found necessary due to the nature and disposition of the excavated materials.

The pits and quarries shall be operated in a safe manner provided with ample drainage leaving no stagnant pools. On completion of the Works they shall be left free-draining and in a tidy and regular state. All loose material shall be barred down and no face shall be left overhanging except with the approval of the Engineer.

The removal of vegetation, topsoil and overburden at the borrow pits shall not be paid for separately. Contractor will be deemed to have allowed for the costs elsewhere in his rates. The same applies to any works required to access the borrow pits.

The rate for fill shall include for the supply, processing and compaction of material inclusive of extraction, loading and transportation to Site for a maximum haulage distance of 30 km, one way. Where suitable borrow pit is not available within this distance, overhaul will be paid for. Measurement shall be the product of the volume of compacted material in situ and the haulage distance in excess of 30 km, one way, along the shortest route, as determined by the Engineer. The Contractor shall be responsible for the maintenance of this selected route, at his own cost.

Earth Filling

Material for filling shall be obtained from approved sources and shall not contain more than 1% of vegetation matter, rubbish and humus material and shall contain no boulders or rock of a size greater than half the compacted thickness of the layer. No material shall be used which is so uniformly graded that D_{60} divided by D_{10} is 4 or less, where D_{60} and D_{10} are sizes such that 60% and 10% by width of the particles are finer than D_{60} and D_{10} respectively.

Unless otherwise specified the fill material for the canal and stilling basin embankments shall meet the following requirements:

- (a) CBR after 4 days soaking compacted to 100% of AASHTO T99 at optimum moisture content of not more than 3%.
- (b) Plasticity Index (PI) of not more than 40%.
- (c) Permeability of less than 1×10^{-6} mm/s

Prior to commencement of filling, the Contractor shall submit in writing to the Engineer for approval his proposals for carrying out the work such that the optimum use may be made of excavated material as far as possible. The proposals shall include the compaction plant and methods for adjusting the moisture content of the material which he intends to use. No filling shall be carried out until the proposals and the material intended to be used are approved by the Engineer.

Fill shall be placed in layers not exceeding 150 mm compacted thickness, each layer being scarified and thoroughly compacted to obtain a dry density of not less than 95% of the maximum dry density as determined by AASHTO T99. The moisture content shall be adjusted as necessary to achieve the compaction standards. All silt or mud shall be removed from the base and sides of canals before the commencing the filling. Fill on canal side slopes shall allow benching of a minimum 500mm width for each two successive 150mm compacted layers.

The Contractor shall take all necessary measures to prevent any damage or defects to the Works which may be caused by settlements, slips or falls of embankments and shall make good such damage or defects as may occur to the satisfaction of the Engineer, all at his own cost.

Any instability of any adjacent excavation resulting from the embankment not being formed to the lines, levels and profile shown in the Drawings or as ordered by the Engineer will be the responsibility of the Contractor. Where double-handling of excavated material is necessary, the Contractor will be responsible for the temporary disposition of the material such that it does not endanger the stability of the excavation.

Backfilling of Structural Excavations

Backfilling of structural excavations shall be carried out with excavated material selected or approved by the Engineer. The material shall be placed in layers not exceeding 150 mm compacted thickness or such other thickness as the Engineer may approve or direct and shall be compacted as specified in Clause 2.16.

When material is filled up to or over any structure, the filling shall be brought up equally on each side or as otherwise agreed by the Engineer so that no unequal pressures likely to cause damage to the structure are applied.

Filling under raised foundations

The material to be used as filling under raised foundations shall consist of suitable material obtained from adjacent excavations or approved borrow sources, and shall be placed in layers not exceeding 150 mm compacted thickness. The material shall be compacted in accordance with Clause 2.16.

Frequency of Testing

Testing will be carried out as instructed by the Engineer with the following being the minimum testing frequencies:

- Field Dry Density Moisture Content Test. Every 500 square meters of compacted fill layer placed or at least 3 tests in any one length of compacted fill, whichever is greater.
- Particle Size Sieving Analysis, Atterberg Limits and AASHTO T180 test. Every 1000 cubic meters of compacted fill or at least 3 tests in any one length of compacted fill, whichever is greater.

The apparatus for these tests and the manner in which they are carried out will be as described in BS 1377/1990 and AASHTO T99. All results of these tests shall be submitted to the Engineer with the least possible delay.

Granular Bedding

Granular bedding material shall comply with BS 882 for aggregates within the sizes range 14 mm to 5 mm. Material complying with BS 882 except in respect of grading may be used provided that it has a maximum size not exceeding 14 mm.

Slopes and Batters

Where a slope is given in the Specification or on the Drawings as a ratio of vertical and horizontal components, it shall be understood that the first component is vertical in all cases e.g. a "slope of 1 in 2" will mean one vertical in two horizontal and a "batter of 4 to 1" will mean four vertical to one horizontal. This meaning will be attributed to all other terms such as "inclination" and "gradient".

Trial Pits

The Contractor shall excavate, maintain and afterwards refill any trial pits ordered by the Engineer. The sides of the pits shall, where deemed necessary by the Engineer for safety purposes, be supported by sheeting or boarding with adequate framing. A ladder shall be provided for inspection purposes.

Sheet Piling

Where shown on the drawings or instructed by the Engineer the construction of sheet piling shall comply with the codes of practice for earth retaining structures, BS 8002: 1994.

CONCRETE

Concrete General

Concrete shall consist of cement, graded aggregate (coarse and fine) and water carefully proportioned, thoroughly mixed, placed and compacted as specified.

The Contractor shall obtain formal approval from the Engineer before pouring any concrete for the permanent works. The Engineer shall allow concreting after ascertaining the required lines and levels, suitability of formwork, availability of required plant and labour, proper fabrication and spacing of the steel bars and quality and quantity of cement and aggregates.

Cement

Cement for use in the permanent works shall be Ordinary Portland Cement from approved manufacture and shall comply with BS 12. Where sulphate-resisting cement is specified, it shall comply with BS.4027.

All cements shall be certified by the manufacturers as complying with the requirements of the specification. Before orders are placed the Contractor shall submit details of the proposed supplier(s) together with such information on the proposed methods of transport, storage and certification so that the Engineer may satisfy himself that the quantity and quality required can be supplied and maintained throughout the construction period. Where necessary the Engineer may require representative samples of the proposed cement to be taken and forwarded to a nominated laboratory for analysis and testing before the source is approved.

No cement shall be used in the Works until deemed satisfactory by the Engineer.

Supply of Cement

Cement shall be obtained from one manufacturer unless otherwise authorised by the Engineer. Should the use of cement from different manufacturers be authorised, the different supplies of cement shall be stored separately and shall not be mixed.

The Contractor shall supply to the Engineer copies of the manufacturer's test certificates certifying that each consignment of cement has been tested and analysed in accordance with Clause 3.5 of the specifications, and that the results comply in all respects with the above standards. Each certificate shall state clearly the date of despatch and the number of bags despatched in each consignment.

Bagged cement shall be delivered in sealed 50 kilogramme sacks. Each bag shall be marked with the parcel number of the cement contained. Bagged cement shall be transported so that at no time is it exposed to damp and so that moisture cannot be absorbed from the atmosphere. Cement in bulk shall be transported in totally enclosed water tight and sealed containers.

If cement is obtained from an intermediate agent, such agent's arrangements for transporting and storing cement shall be to the approval of the Engineer.

Storage of Cement

The Contractor shall provide sufficient storage capacity on Site to ensure that his anticipated programme of work is not interrupted due to lack of cement. Factors outside the Contractor's control such as transport, weather conditions, holidays and breakdowns shall be taken into account.

Cement delivered to the Site in bulk shall be stored in dry, well ventilated weather proof silos or bins which shall be self clearing. Cement delivered to the Site in bags shall be stored in dry, weather-proof sheds which shall have floors of damp proof construction raised at least 150 millimetres above the surrounding ground.

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

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

Testing of Cement

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

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

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

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

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

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

Aggregate for Concrete

General

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

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

(c) Intermixing of aggregates of differing characteristics.

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

During concreting operations, tests shall be carried out to check that aggregates delivered for use in the Permanent Works comply with the requirements of the Specification.

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

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

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

Fine Aggregates

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

As an alternative, fine aggregate for mortar only shall comply with BS 1199 and 1200.

The fine aggregate shall not contain iron pyrites or iron oxides. It shall not contain mica, shale, coal or other laminar, soft or porous materials unless the Contractor can show by tests on finished concrete as set out in BS 1881 that the presence of such materials does not adversely affect the properties of the concrete.

The proportion of clay, silt and other impurities passing a 75 microns BS sieve shall not exceed three per cent for natural or crushed gravel sand or 15 per cent for crushed rock sand. The shell content shall not exceed 15 per cent by weight.

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

Soundness: After five cycles of the test set out in ASTM C88-76, the aggregate shall not show a weight loss of more than 10 per cent.

Samples taken from the fine aggregate shall pass the colour test for organic impurities described in sub-clause 3.6.4.

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

- (a) Sieve analysis
- (b) Moisture content. An approved "rapid" test may be used for this test.
- (c) Percentage of material passing a 75 microns BS sieve by the Field Settling Test, checked when necessary by the Decantation Method.
- (d) Test for organic impurities as described in sub-clause 3.5.4.

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

- (e) Specific gravity and water absorption.
- (f) Bulk density.
- (g) Other tests described in BS 812.

Coarse Aggregates

Coarse aggregates shall be clean, hard and durable crushed rock, crushed gravel or natural gravel complying with the requirements of BS 882. The material shall be frost resistant and shall not contain any iron pyrites, iron oxides, flaky or laminated material, hollow shells, coals or other soft or porous material, or organic matter. The pieces shall be predominantly angular, rounded or irregular as defined in BS 812.

Coarse aggregate shall be supplied in the nominal sizes called for in the Contract and shall be graded in accordance with BS 882 for each nominal size.

The proportions of clay, silt and other impurities passing a 75 microns BS sieve shall be not more than one per cent by weight.

The content of hollow and flat shells shall not be such as will adversely affect the concrete quality when tested as set out in BS 1881. The total shell content shall not be more than the following:

| | |
|-----------------------------|---------------------------|
| 40mm nominal size and above | 2 per cent of dry weight |
| 20mm nominal size | 5 per cent of dry weight |
| 10mm nominal size | 15 per cent of dry weight |

Chlorides soluble in a 10 percent solution by weight of nitric acid shall not exceed 0.03 per cent by weight, expressed as chloride ion when tested as set out in BS 812 but subject also to the further restriction on total chloride content given in sub-clause 3.5.5.

When tested in accordance with ASTM C289, the aggregate shall be non-reactive.

Soundness: After 5 cycles of the test set out in ASTM C88-76, the aggregate shall not show a weight loss of more than 12 per cent.

Flakiness Index: When tested in accordance with BS 812 shall be as set out hereunder:

| | |
|-----------------------------|------------------|
| 40mm nominal size and above | Not more than 40 |
| 20mm nominal size and below | Not more than 34 |

If the flakiness index of the coarse aggregate varies more than five units from the average value of the aggregate used in the approved trial mix, a new set of trial mixes shall be carried out in the workability of the mixes have been adversely affected by such variation.

Impact Value: Not more than 45 per cent when tested in accordance with BS 812.

Ten per cent fines value: Not less than 50 kilonewtons when tested in accordance with BS 812.

Shrinkage: When mixed with other ingredients in the approved proportions for concrete and tested as set out in BS 1881, the shrinkage factor shall not exceed 0.05 per cent.

Water absorption: The aggregate shall not have a water absorption of more than 2.5 per cent when tested as described in BS 812.

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

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

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

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

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

Test for Organic Impurities

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

A 340 millilitres graduated prescribed bottle shall be filled to the 123 millilitres mark with a sample of the aggregate to be tested. A 3 per cent solution of sodium hydroxide in water shall be added until the volume of the aggregate and liquid after shaking gives a total volume of 194 millilitres. The bottle shall be stoppered, shaken thoroughly and allowed to stand for 24 hours. Should the liquid then be darker than the standard colour solution the aggregate shall not be used for making concrete.

The standard colour solution shall be prepared in a 340 millilitres prescription bottle as follows:

2.5 millilitres of a 2 per cent solution of tannic acid in 10 per cent alcohol shall be added to 97.5 millilitres of a 3 per cent solution of sodium hydroxide in water. The mixture shall be shaken and allowed to stand for 24 hours.

A glass of the standard colour may be used in place of the standard solution.

Total Chloride and Sulphate Contents

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

The total sulphate content arising from all ingredients in a mix shall not exceed 0.4 per cent by weight of the aggregates or 4 per cent of the weight of cement in the mix, whichever is less. For this purpose the sulphate contents shall be expressed as SO_3 and shall be calculated from the sulphate contents of the cement, aggregates and any admixtures. Where applicable, sulphate contents shall be determined in accordance with tests described in BS 1047 and 3892.

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

Admixtures

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

The Contractor shall submit samples of the admixtures he proposes to use to the Engineer for testing. If an admixture is approved for use it shall be obtained from an approved supplier and the Contractor's arrangement for measuring, mixing and adding the admixture to the concrete batch shall be strictly in accordance with the manufacturer's instructions or recommendations and subject to the approval of the Engineer.

The proportions of the concrete mixes and water/cement ratio shall be adjusted to the satisfaction of the Engineer so that the strength of the concrete with admixture is at least equal to the strength of the equivalent concrete without admixture.

Water for Concrete

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

Concrete Mixes

The design of concrete mixes shall be the sole responsibility of the Contractor, but may be undertaken in conjunction with the Engineer. Concrete mixes shall be designed mixes in accordance with the requirements of BS 5328 having the characteristics specified in Table 3.1 of this Specification. Concrete for use in water retaining structures shall comply with BS 8007.

Evidence shall be submitted to the Engineer, for all classes of concrete to be used, showing that at the intended workability the proposed mix proportions and production methods will produce concrete of the required quality.

The following information shall be provided before any designed mix is supplied:

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

No change in the approved mix design will be permitted, unless the Contractor carries out trials on the proposed mix design to show that compliance with this Specification can be maintained.

Mix design shall in all cases be subject to the approval of the Engineer, but such approval shall in no way relieve the Contractor of his responsibility for the design and production of concrete in compliance with this Specification.

Trial Mixes

At least six (6) weeks before commencing the placing of any concrete in the works, trial mixes shall be prepared for each class of concrete to be used on the works. Three (3) batches of each class of concrete shall be made using materials typical of the proposed supply and under full scale production conditions.

The workability of each of the trial batches shall be determined and three (3) cubes made from each batch for testing at 28 days. A further three (3) cubes made from each batch may be made for tests at an earlier age if required.

The trial mix proportions shall be approved if the average compressive strength of the nine (9) cubes tested at 28 days exceeds the specified characteristic strength by 3 Newtons per square millimetre, or if nine tests at an earlier age indicate that it is likely to be exceeded by this amount.

To demonstrate that the maximum free water/cement ratio is not exceeded, two batches of concrete shall be made in a laboratory with cement and surface-dry aggregate known from past records of the supplier of the material to be typical. The proposed mix proportions will not be accepted unless both batches have the cement content specified and free water/cement ratio below the maximum specified in Table 3.1.

Table 3.1 - Classes of Concrete

| Class | Characteristic Compressive Strength N/mm ² | Maximum Free Water/cement Ratio | Minimum Cement Content kg/m ³ | Maximum Cement Content kg/m ³ | Maximum Aggregate Size mm |
|----------|---|---------------------------------|--|--|---------------------------|
| C25/10/A | 25 | 0.55 | 360 | 400 | 10 |
| C25/20/A | 25 | 0.55 | 360 | 400 | 20 |
| C25/20/B | 25 | 0.55 | 290 | 400 | 20 |
| C25/20/C | 25 | - | 240 | 540 | 20 |
| C20/20/B | 20 | 0.55 | 290 | 400 | 20 |
| C20/40/B | 20 | 0.55 | 260 | 400 | 40 |
| C20/40/C | 20 | - | 220 | 540 | 40 |
| C15/40/C | 15 | - | 180 | 540 | 40 |
| C15/20/C | 15 | - | 180 | 540 | 20 |
| C10/40/C | 10 | - | 150 | 540 | 40 |

A, B and C denote exposure conditions for the finished concrete as defined in BS 8007.

Testing of Concrete

General

All concrete shall be sampled and tested in accordance with the requirements of BS 1881 unless otherwise stated in this Specification or instructed by the Engineer.

The Contractor shall allow for all the necessary labour, materials, plant and equipment necessary for the regular sampling and testing of concrete to be placed in the Works.

Cement Content

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

Workability

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

| | | |
|-------------------|---|---|
| Slump | ± | 25mm or ± one third of required value whichever is greater. |
| Compacting Factor | ± | 0.03 where required value is 0.90 or more |
| | ± | 0.04 where required value is 0.90 to 0.80 |
| | ± | 0.05 where required value is 0.80 or less |

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

Water/Cement Ratio

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

Compressive Strength

Samples of concrete shall be taken for compressive strength at a rate of one sample per 15 cubic metres of concrete placed or 15 batches of concrete placed whichever is the lesser volume. A greater frequency of sampling may be instructed by the Engineer until compliance with specified strength requirements has been confirmed for each class of concrete used in the Works.

Two test specimens shall be prepared from each sample and shall be cured for 28 days, or by any other method approved by the Engineer that enables the prediction of 28 day strength at an earlier time.

On completion of curing, the two test specimens shall be tested. Provided the difference between the two results does not exceed 14 per cent of the mean of the two results, the mean shall be taken as the test result. Where the difference between the two results exceeds 14 per cent of their mean, the lower of the two results shall be taken as the test result.

Compliance with the specified strength may be assumed if the conditions given in both (a) and (b) below are satisfied.

- (a) The average compressive strength determined from any one group of four consecutive 28 day test results exceeds the specified characteristic strength by not less than 3 Newtons per square millimetre for classes of concrete C20, C25 and C30 and not less than 2 Newtons per square millimetre for class C15 concrete.
- (b) Each individual 28 day test results is greater than the specified characteristic strength minus 3 Newtons per square millimetre for classes of concrete C20, C25 and C30 or 2 Newtons per square millimetre for class C15 concrete.

If only one tests result fails to meet the second requirement then that result may be considered to represent only the particular batch of concrete from which that sample was taken provided the average strength of the group satisfies the first requirement.

If more than one result in a group fails to meet the second requirement or if the average strength of any group of four consecutive test results fails to meet the first requirement, then all the concrete in all the batches represented by all such results shall be deemed not to comply with the strength requirements. For the purposes of this Clause, the batches of concrete represented by a group of four consecutive test results shall include the batches from which samples were taken to make the first and the last tests in the group of four, together with all the intervening batches.

Failure to Comply with Specified Requirements

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

Concrete Returns and Records

The Contractor shall send weekly to the Engineer a return showing the quantities of cement and the number of mixings of each class of concrete used in each section of the Works.

Records shall be kept by the Contractor of the positions in the Works of all batches of concrete, of their class and of all test cubes or other specimens taken from them. Copies of these records shall be supplied to the Engineer.

Plant, Equipment and Construction Procedure

The design, layout, installation and operation of plant and equipment for processing, handling, transporting, storing and proportioning concrete ingredients and for mixing, transporting and placing concrete shall be to the satisfaction of the Engineer. Before the plant and equipment is ordered or delivered to site, the Contractor shall submit to the Engineer drawings showing the proposed arrangements of the plant together with detailed descriptions of the equipment proposed

Batching

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

For volume batching suitable gauge boxes shall be used.

Mixing Concrete by Machine

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

Mixing Concrete by Hand

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

Preparation of Surface to Receive Concrete

Foundations which are to receive concrete shall be properly drained and dewatered so that no water runs over or stands on a surface on which concrete is being placed. If required by the Engineer drains provided through or beneath concrete for the temporary conveyance of water shall afterwards be completely sealed to the Engineer's approval.

Before deposition of concrete against rock, the rock surface shall be thoroughly wetted and cleaned by the application of water, or of water and air, under pressure. No concrete shall be deposited until the surface has been cleaned and passed as satisfactory by the Engineer.

Faults or seams in the rock shall be cleaned to a depth satisfactory to the Engineer and if necessary stemmed with cement mortar of an approved mix.

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

Authority to Commence Placing of Concrete

The Contractor shall give the Engineer at least 24 hours notice of his intention to place concrete in a particular section of the Works. Before concrete is placed the Contractor shall apply to the Engineer for approval of the cleanliness, alignment and suitability of surfaces against which the new concrete is to be placed and of the fixing of formwork, reinforcement, embedded parts and the like and he shall obtain written permission from the Engineer to proceed with concreting.

The Contractor shall carefully plan his concreting operation to ensure, where possible, that these operations are completed within the normal working day.

Dimension of Concrete Pours and Programme of Placing

Unless otherwise approved by the Engineer concrete shall be cast in one operation between external faces of concrete and joints shown on the Drawings or between construction joints or both.

The Contractor shall submit and obtain the Engineer's approval to a detailed concreting programme and his proposals for the location of construction joints.

Transport and Deposition of Concrete

Concrete shall be transported and deposited in such manner as to prevent segregation, loss of materials or contamination with foreign matter. The means of transport of concrete shall be subject to the approval of the Engineer. The containers for conveying the concrete shall be thoroughly cleaned immediately after use and sides dampened before work is started or restarted to prevent cement and fine material in the first batch adhering to the sides. Adequate precautions shall be taken to protect the concrete against wetting or drying out through exposure to the weather and to prevent segregation and consolidation of the mix due to prolonged jolting of the concrete. Concrete shall be placed in its final position and fully compacted before the onset of initial set. Wherever possible, concrete shall be deposited vertically in the final position required and shall not be dropped through a greater height than 1.5 m. Where necessary, bins, drop chutes, down pipes or baffles shall be provided to prevent segregation of the material. Drying out of fresh concrete

before deposition shall be prevented by the provision where necessary of suitable covers. Loss of slump during transport and deposition of the concrete shall not exceed 25 millimetres.

Concrete shall not be placed in standing or running water unless so specified. Where concrete has to be placed under water, the Contractor shall submit to the Engineer his proposals indicating the methods and equipment to be employed. The concrete shall be deposited by bottom discharging watertight containers or through funnel shaped tremies which are kept continuously full with concrete up to a level above the water and which shall have the discharging bottoms 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 and additional cement of about 25% must be added.

Distribution and Spreading of Concrete

Concrete shall be placed in layers not exceeding 500 millimetres in depth approximately parallel to the horizontal or inclined construction joint planes. These layers shall be deposited from one face to the other until the full height of the lift is reached. Each layer shall be deposited on the previous one before the latter has taken its initial set and the exposed area of fresh concrete shall be maintained to the practical minimum. In order to accomplish this timing a new layer may be started before the previous layer is completed.

The face from which placing of concrete is to commence shall be selected so that if an emergency should occur which prevents the layer being completed the vertical construction joint will be formed in a structurally acceptable position.

Concrete shall not be placed during rain sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed sloping faces of fresh concrete unless adequate shelter is provided.

Concrete shall not be placed against any surface (including formwork, reinforcement, embedded steelwork, adjacent concrete or rock) which during hot weather is not adequately dampened to prevent excessive absorption of water from the fresh concrete.

Once commenced, concreting shall be carried on as continuous operation between pre-arranged construction, expansion or contraction joints save only if an emergency occurs and interruption is unavoidable. The Contractor shall have readily available suitable prefabricated formwork for stop ends to form emergency vertical construction joints and, in the event of such an interruption occurring, the concrete already placed shall be properly finished up to the stop end and to a horizontal or inclined surface as directed by the Engineer. In water retaining structures the Contractor shall propose methods of making the joint watertight.

Concrete shall be placed carefully so as not to displace the formwork or reinforcement.

Compaction of Concrete

The Contractor shall thoroughly compact all concrete immediately after it has been placed in position. Unless otherwise authorised by the Engineer, compaction shall be accomplished with the aid of immersion vibrators as specified below, together, if necessary, with rods, shovels and the like. Particular care shall be taken to fill all voids and to work the concrete against rock and existing concrete surfaces, round any reinforcement and embedded fixtures and into the corners of the formwork.

If the Contractor does not wish to use immersion vibrators for any portion of the works he shall submit his proposals for alternative vibrators or compaction equipment and shall receive the Engineer's approval to the equipment before commencing to concrete the portion concerned.

Vibrators shall be of a type and size adequate for the portion placed. Vibrators shall operate at a frequency of between 7000 and 10000 impulses per minute. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacturer in order to ensure that the compactive effort is not reduced.

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

Only men experienced in the use of vibrators shall be employed on this type of work.

Vibration shall be continued at each point until the concrete ceases to contract, a thin layer of mortar has appeared on the surface and air bubbles have ceased to appear. The period of vibration necessary shall be determined by trial in the presence of the Engineer. Vibration shall then be continued for this period at each point before any further concrete is superimposed.

Immersion vibrators shall be inserted vertically to penetrate into the layer underneath at regular intervals, which shall not exceed the distance from the element over which vibration is visibly effective and in any case shall not exceed 700 millimetres. Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids. Vibrators shall not be applied to reinforcement or other embedded items.

Protection of 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 this cause.

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 Permanent Works shall not be subjected to any structural loading until it has attained at least its nominal strength.

If the Contractor desires to impose structural 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.

No Partially Set Concrete shall be used

All concrete must be placed and compacted in its final position within thirty minutes (30min) of discharge from the mixer unless otherwise approved. No partially set material shall be used in this work.

Plum Concrete

Plums shall be hard clean natural stones embedded in mass concrete during the placing of the concrete. Unless otherwise shown on the drawings, the plums shall not be larger than one third of the cross section of the concrete and should not be placed closer than 150 mm to each other vertically and 100mm horizontally. The volume of plums shall unless otherwise specified, not exceed forty per cent (40%) of the mass concrete volume and care shall be taken to ensure that the minimum cover over any plums is 100mm.

Concrete canal lining

Earth filling

The canal shall be properly formed to the required shape, grade and alignment. Earth filling and compaction for the sub-grade on canal base and banks shall be carried out to ensure a firm foundation in accordance with the provisions of this Specification covering Earthworks (embankment to be thoroughly compacted by hand-tamping, rolling or water soaking. New embankments should be compacted in 150mm layers). The sub-grade shall be wetted several hours before the lining to ensure that the sub-grade is saturated at the commencement of lining.

Concrete works

Concrete works in lining shall be carried out in accordance with the provisions of this Specification covering Concrete Works. Special attention shall be paid to the concrete mix to ensure that it is properly controlled to avoid it creeping downward from the sides.

The thickness of the concrete lining shall be 75mm or as directed by the Engineer. Where a completed section has a thickness less than that specified, it will be removed and replaced. Plastering or other methods of building up the lining thickness will not be allowed.

Concrete canal linings will be placed in-situ and in panels of 2 - 3 m lengths and be constructed in alternate bays, so that at least 24 hours elapse between the completion of one panel and the start of lining of an adjacent panel. This will be in order to maintain uniform spacing for the joints. Screed guides shall be used to maintain the desired grade and thickness of the lining during laying of the concrete. Any other method of constructing the lining will require the approval of the Engineer. In forming the concrete (screeding operation) at least three passes with a wooden plank, or any other method chosen by the contractor and approved by the Engineer, are necessary in order to maintain the shape and the inside of the canal. After completing the required number of passes, the concrete will be immediately floated (smoothing of the surface with a wooden plank) and troweled to produce the specified finish. Striking off, or removal of any concrete from the consolidated surface by means other than those used in the construction, will not be permitted.

Curing of concrete shall be carried out in accordance with the provisions of this Specification covering Concrete Works (proper curing by keeping the concrete damp by sprinkling or by covering with wet gunny bags).

Expansion and shrinkage joints

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

After the sealant has been applied to the joint, it can be smoothed using a spatula lubricated with diluted washing-up liquid (10:1 dilution).

Concreting in Adverse Weather

No concreting will be allowed to take place in the open during storms or heavy rains. Where strong winds are likely to be experienced additional precautions to ensure protection from driving rain and dust shall also be taken.

The Engineer may withhold approval of commencement of concreting until he is satisfied that full and adequate arrangements have been made.

Concreting at Night or in the Dark

In general, concrete works will not be permitted to be carried out at night.

Where approval has been given to carry out concreting operations at night or in places where daylight is excluded, the Contractor is to provide adequate lighting at all points where mixing, transportation and placing of concrete are in progress.

Concreting in High or Low Ambient Temperature

Where the ambient temperature exceeds thirty two degrees Celsius (32°C), the Contractor shall take special measures in the mixing, placing and curing of concrete. The temperature of the concrete when deposited shall not exceed thirty degrees Celsius (30°C). The Contractor shall carry out all necessary special measures to ensure that the maximum concrete temperature after placing shall not exceed fifty degrees Celsius (50°C) or thirty degrees Celsius (30°C) above the concrete temperature at the time of placing, whichever is lower.

During placing suitable means shall be provided to prevent premature stiffening of the concrete placed in contact with hot surfaces.

The Contractor shall not mix and place concrete when the ambient temperature falls below three degrees Celsius (3°C).

Curing and Protection

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

- (a) A layer of sacking, canvas, hessian, straw mats or similar absorbent material or a layer of sand, kept constantly moist by spraying with water as necessary for fourteen (14) days or such periods as may be directed by the Engineer.
- (b) After thoroughly wetting, a layer of approved waterproof paper or plastic membrane kept in contact with the concrete for fourteen (14) days or such period as may be directed by the Engineer.

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

Steel Reinforcement

Materials

Unless otherwise directed or otherwise shown on the Drawings, hot rolled high yield reinforcement shall be used throughout the works.

Where required, mild steel reinforcement, medium tensile steel reinforcement and high tensile steel reinforcement shall comply with BS 4449. Cold twisted steel wire for the reinforcement of concrete shall comply with BS 4482.

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

Tying wire shall be 1.6 mm diameter soft annealed iron wire.

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

Fabricating Reinforcement

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

Fixing Reinforcement

When placed in the work reinforcement shall be free from coatings or dirt, detrimental scale, paint, oil or other foreign substances. When steel has on its surface rust, loose scale and dust which is easily removable, it may be cleaned by a method approved by the Engineer.

All reinforcing bars, ties, links and fabric shall be fixed in the positions shown on the Drawings within the tolerances specified in BS 8666. In no case shall the cover specified on the Drawings be increased by more than 5 millimetres.

Displacement of reinforcement beyond the specified tolerance shall be prevented by supporting the bars sufficiently and securely fixing them together at intersections where necessary.

The ends of all tying wires shall be turned into the body of the concrete and not allowed to project towards the surfaces of the concrete.

Spacers shall be used to maintain the cover to all steel and shall be made of dense cement mortar of one part cement and two parts sand.

Spacers shall be triangular in section and only one acute edge shall bear against the formwork, the flat side shall bear against the steel. Wire cast into the blocks to fix them to the reinforcement shall be 1.6 millimetres diameter soft annealed iron. Spacers shall not be used on the wet face of water retaining or water excluding structures. Chairs, stools, etc. shall be used to maintain clearance between two or more layers of reinforcement.

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

Splicing and Lapping

All reinforcement shall be provided in full lengths as indicated on the Drawings or bending schedules. Splicing of bars, except where shown on the Drawings, shall not be permitted without the written approval of the Engineer. Splices shall be staggered as far as possible. Bar reinforcement shall not be welded without the Engineer's written permission.

In lapped splices, the bars shall be placed in contact and wired together in such manner as to maintain a clearance between bars of not less than 50 millimetres.

Mesh or bar reinforcement shall overlap sufficiently to maintain a uniform strength and shall be securely fastened at ends and edges. The edge lap shall not be less than 40 diameters of the mesh reinforcement bar or two mesh widths whichever is greater.

Cover to reinforcement

The concrete cover to reinforcement shall be 50 mm unless otherwise shown on the Drawings.

The Contractor shall provide any necessary concrete pads for ensuring the cover is attained and in no case shall timber packing be used.

Formwork

Definitions

Forms, formwork or shuttering shall mean all temporary moulds forming the concrete to the required shape together with any special lining that may be required to produce the concrete finish specified.

False work or centering shall mean the furnishing, placing and removal of all temporary construction such as framing, props and struts required for the support of forms.

Materials

The formwork may of seasoned, planed, tongued and grooved timber, plywood, block board, tempered hardboard, steel or as specified on the Drawings.

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

Forms

All forms shall be of wood or metal and shall be built grout-tight and of sufficient rigidity to prevent distortion due to the pressure of the concrete and other loads incidental to the construction operations. Forms shall be constructed and maintained so as to prevent warping and the openings of joints due to shrinkage of the timber.

The forms shall be substantial and unyielding and shall be so designed that the finished concrete will conform to the proper dimensions and contours. The design of the forms shall take into account the effect of vibration of concrete as it is placed.

All formwork shall, unless otherwise directed, be provided with 25 millimetres by 25 millimetres angle fillets (chamfers) so as to form splays on internal and external angles.

A grout check formed from 25 millimetres square hardwood timber shall be incorporated in the formwork to provide a clean, level, horizontal joint on exposed concrete surfaces at the top of each lift.

All joints in the formwork shall be either horizontal or vertical. End formwork shall be square across the mass of concrete.

Where concrete is to be deposited to a slope steeper than 20 degrees to the horizontal, top formwork shall be used to enable the concrete to be properly compacted unless the Engineer agrees otherwise.

Openings for the inspection and cleaning of the inside of formwork for walls, piers and columns shall be formed in such a way that they can be closed conveniently before commencing to place concrete.

Form clamps, tie bolts and anchors shall be used to fasten forms. The use of wire ties to hold forms in position during placing of concrete will not be permitted. Tie bolts and clamps shall be positive in action and of sufficient strength and number to prevent spreading or springing of the forms. They shall be of such type that no metal part shall be left within the specified concrete cover. For water retaining sections, methods of fixing the forms which result in holes through the concrete section when the formwork is removed shall not be used and built-in wall ties shall be fitted with water baffles.

All forms for outside surfaces shall be constructed with stiff wales at right angles to the studs and all form clamps shall extend through and fasten such wales.

The shape, strength, rigidity, grout tightness and surface smoothness of forms which are re-used shall be maintained at all times. Any warped, bulged or otherwise damaged timber shall be replaced. Forms which are unsatisfactory shall not be re-used. If the surface finish on the formed concrete deteriorates as a result of deterioration of the faces of the forms, the Engineer shall instruct that forms be resurfaced, or discarded.

All forms shall be treated with approved mould or similar oil or be soaked with water immediately before placing concrete to prevent adherence of concrete. Any materials which adhere to or discolour concrete shall not be used.

All forms shall be set and maintained true to the line designated until the concrete is sufficiently hardened. Forms shall remain in place for periods which shall be as specified in Clause 3.34. When forms appear to be unsatisfactory in any way, either before or during the placing of concrete, the Engineer shall order the work stopped until the defects have been corrected.

All formwork shall be approved by the Engineer before concrete is placed within it. The Contractor shall, if required by the Engineer, provide copies of calculations of the strength and stability of the formwork and false work. Notwithstanding the Engineer's approval of these calculations, the Contractor shall be held responsible for the safety and adequacy of formwork.

False work and Centering

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

All false work shall be designed and constructed to provide the necessary rigidity and to support the loads from the weight of green concrete and shuttering and incidental construction loads.

False work or centering shall be founded upon a solid footing safe against undermining and protected from softening. False work which cannot be founded on satisfactory footings shall be supported on piling which shall be spaced, driven and removed in a manner approved by the Engineer. The Engineer may require the Contractor to employ screw jacks, or hard wood wedges to take up any settlement in the formwork either before or during the placing of concrete.

False work shall be set to give the finished structure the required grade and camber shown on the Drawings.

Forms for Joints

Where permanent or temporary joints are to be made in horizontal or inclined members, stout stopping off boards shall be securely fixed across the mould to form a water-tight joint. The form of the permanent joint shall be as shown on the Drawings.

Where reinforcement or water stops pass through the face of a joint the stopping off board shall be drilled so that the bars or water stop can pass through, or the board shall be made in sections with a half round indentation in the joint faces for each bar so that when placed the board is neat and accurate fit and no grout leaks from the concrete through the bar holes, joints or around the water stop.

Release Agents

Only approved chemical release agents, mould creams (emulsions of water in oil) or oils containing a proportion of surfactant not exceeding 2 percent will be permitted. Water soluble emulsions and oils without surfactant shall not be used. Oil based release agents shall be applied at a rate of 7 square metres per litre one day in advance of concreting, preferably by spray or roller. Chemical release agents shall be applied in accordance with the manufacturer's recommendations.

New timber face work shall be given three coats of release agent before use on the work to ensure uniformity of porosity on the surface.

On no account shall the release agent come into contact with the reinforcement.

Removal of Formwork

Formwork shall be carefully removed without shock or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand safely any stresses to which it may thereby be subjected.

The minimum periods which shall elapse between completion of placing concrete and removal of forms are given in the following Table 3.2, and apply to ambient temperatures higher than 10°C. At lower temperatures or if cements other than ordinary Portland are involved, the Engineer may instruct longer periods.

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

Table 3.2 – Formwork striking time

| Position of formwork | Striking Time |
|---|---------------|
| Beam sides, walls and columns | 1 to 2 day |
| Slab soffits - props remain undisturbed | 4 days |
| Beam soffits - props remain undisturbed | 7 days |
| Removal of slab props | 14 days |
| Removal of beam props | 21 days |

Surface Finishes

General

After removal of the formwork no treatment of any kind other than that required for curing the concrete shall be applied to the concrete faces until after inspection by the Engineer. All honeycombed areas, deformed surfaces or other defective surfaces shall then be repaired at the direction of the Engineer. Immediately following the Engineer's inspection of surface finish, all tie bolt cavities shall be filled with sand cement mortar and the surface left smooth, sound, even and uniform in colour.

Should the finishes surface either as-stuck or after repair exhibit a non uniform colour or texture, the Engineer shall have the right to order that the surface be given a skim coat and then painted.

Formed Surfaces

All joints between panels shall be vertical and horizontal unless otherwise directed. Suitable joints shall be provided between sheets to maintain accurate alignment in the plane of the sheets.

For warped surfaces, facings shall be built up of laminated splines cut to make a tight surface which shall then be dressed and sanded to the required curvature.

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

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

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

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

Unformed Surfaces

- Type U1:** This is screed finish for surfaces of roads of foundations, beds, slabs, and structural members to be covered by backfill, subsequent stages of construction, bonded concrete topping or cement mortar beds to receive pavings, and on exposed surfaces of paving where a superior finish is not required. It is also the first stage of Type U2 and U3 finishes. The finishing operations shall consist of levelling and screeding the concrete to produce a uniform, plane or ridged surface, surplus concrete being struck off by a straight edge immediately after compaction.
- Type U2:** This is a floated finish for exposed surfaces where a hard smooth steel trowelled surface is not required. Floating shall be done only after the concrete has hardened sufficiently, and may be by hand or machine. Care should be taken that the concrete is worked no more than is necessary to produce a uniform surface free from float marks.
- Type U3:** This is a hard smooth steel trowelled finish for surfaces exposed to water flowing at high velocity. Trowelling shall not commence until the moisture film has disappeared and the concrete has hardened sufficiently to prevent excess laitance from being worked to the surface. The surface shall be trowelled under firm pressure and left free from trowel marks.
- Type U4:** This finish is similar to Type U3 finish but the permissible tolerances are smaller.

Surface Tolerances

All parts of concrete surfaces shall be in the positions shown on the Drawings within the tolerances set out in Table 3.3 or Table 3.4.

In cases where the Drawings call for tolerances other than those given in Table 3.3 or Table 3.4, the Drawings shall rule.

Where precast units have been set to a specified tolerance, further adjustments shall be made as necessary to provide 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 3.3 - Surface Tolerances for Formed Surfaces

| Type of Finish | Tolerance in Millimetres (See Note 1) | | |
|----------------|---------------------------------------|----|------------|
| | A | B | C |
| FI | 10 | 10 | +25 to -10 |
| F2 | 5 | 10 | +15 to -15 |
| F3 | 2 | 5 | +10 to -10 |
| F4 | See Note 2 | 2 | +5 to -5 |

Note 1:

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

- A** is an abrupt irregularity in the surface due to misaligned formwork or defects in the face of the formwork.
- B** is a gradual deviation from a plane surface as indicated by a straight edge 3 metres long. In the case of curved surfaces, the straight edge shall be replaced by a correctly shaped template.
- C** is the amount by which the whole or part of a concrete face is displaced from the correct position shown on the Drawings.

Note 2:

Abrupt irregularities are not permitted in a Type F4 finish. Any residual irregularities which remain after removal of formwork shall be removed by grinding to achieve a transition of 1 in 50 between the surfaces adjacent to the irregularity.

Table 3.4 - Surface Tolerances for Unformed Surfaces

| Type of Finish | Tolerance in Millimetres (See Note 1) | | |
|----------------|---------------------------------------|----|---------------|
| | D | E | F |
| U1 | - | 10 | +20 to -10 |
| U2 | Nil | 10 | +20 to -10 |
| U3 | Nil | 5 | +12.5 to -7.5 |
| U4 | Nil | 2 | +6 to -4 |

Notes:

- D** is the maximum allowable value of any sudden change of level in the surface.
- E** is the maximum allowable value of any gradual irregularity of the surface, as indicated by the gap between the surface and a 3 metres long straight edge or correctly shaped template placed on the surface.
- F** is the maximum allowable value of the difference in level or position between a straight edge or correctly shaped template placed on the surface and the specified level or position of that surface.

Conduits, Box-outs and Apertures

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

Conduits shall be placed as near the centres of members as possible and sufficient space shall be provided between adjacent conduits to prevent difficulties in the placing of concrete.

Box-outs, holes, grooves, apertures and the like shall be accurately set out in the formwork prior to placing the concrete. Fixing blocks, ends of brackets, bolts and, where possible, built in parts shall be cast into the concrete at the time of placing. No part of the concrete works shall be cut out for any such item, or for any other reason, without the Engineer's permission.

The Contractor shall ensure that all sub-contractors are informed of his programme for the structural works at the commencement of the Contract and that such sub-contractor's requirements relating to concrete members are approved well in advance. The Contractor shall obtain from all such sub-contractors complete information of their requirements regarding conduits, pipes, fixing blocks, ducts, holes and any other items to be cast into or formed in the concrete members. Failure of a sub-contractor to supply such information shall not be allowed to delay the progress of the Works.

Construction joints

Concreting shall be carried out continuously up to construction joints, the position and arrangement of which shall be as indicated on the Drawings or as previously approved by the Engineer. The Contractor is to allow for working beyond the ordinary working hours where necessary in order that each section of concrete may be completed without any lapse while the work is in hand. All construction joints are to be formed square to the work.

Where vertical construction joints are required, the joint face of the first stage concrete shall be finished against a stopping-off board, or vertical end shutter, suitably notched to pass the reinforcement. When the concrete is hard and the shutter is removed, the whole joint surface shall be thoroughly hacked and roughened or scabbled with suitable tools so that no smooth skin of concrete is visible and that all aggregates and solid matrix around them is exposed.

For horizontal or slightly inclined construction joints, the surfaces shall preferably be prepared when the concrete has set but not hardened by jetting with a fine spray of water and brushing with a stiff brush to remove the smooth skin and expose the aggregate without disturbing it. Where this treatment is impractical and work is resumed after the concrete surface has hardened, a similar procedure shall be adopted as on vertical joints.

If, in the opinion of the Engineer, any deleterious material has come into contact with the concrete of the construction joint or if the concrete is honeycombed or unsound for any reason, the concrete shall be cut back to such a depth as the Engineer shall order and the roughened surfaces shall be thoroughly cleaned by compressed air and water jets or other approved means.

Immediately before concreting is resumed, the roughened joint surface shall be thoroughly cleaned with compressed air and water jets and slightly wetted and cement grout placed. The Contractor shall take precaution to avoid segregation of the concrete along the joint plane and to obtain thorough compaction.

Movement joints

Movement joints shall be formed in the position and manner shown on the Contract Drawings or instructed by the Engineer. In the case of water retaining structures, joints shall be made water-tight by the provision of a continuous water stop, with suitable water resistant filler material and sealant. The materials and workmanship utilised in movement joints shall comply with the following:

- (a) Compressible filler shall be self-expanding cork filler consisting of cork granules bonded together with an insoluble, synthetic resin. When subject to wet or moist conditions the filler shall be capable of swelling to occupy a larger volume than that of the material supplied. The expansion properties of the filler shall not be less than one hundred and forty per cent (140%) when immersed in boiling water for one hour (1hr). The filler shall be supplied and stored in sealed moisture resistant wrappings. Compressible filler shall be secured to the first cast concrete surface using an approved adhesive.
- (b) Water stops, either centrally or externally placed, shall be Polyvinyl Chloride (PVC) of the dimensions and type shown on the Drawings. PVC water stops shall have an elongation of at least 300% at rupture with a tensile strength of more than 12.3 N/mm². Gluing temperature shall be about 150°C. The PVC water stop shall accommodate a transverse movement of at least 50 mm. For expansion joints the water stops shall incorporate a centre bulb or box to allow movement to be accommodated. Centrally placed water stops shall have reinforced eyelets on the outer flange to facilitate the positioning of the water stops by wiring to the surrounded steelwork. Externally placed water stops shall include a wide reinforced nailing flange for positive fixing to formwork or adjacent concrete faces.

Water stop shall be firmly supported by split stop-end shuttering where appropriate, and in no case shall the water stops be pierced to assist in fixing. Special care should be taken to ensure that the concrete is well worked against the embedded part of the water stops and is free from honeycombing. Precautions shall be taken to protect any projecting portions of the water stops from damage during the progress of the work and from sunlight and heat. Where water stops are required to be jointed, this shall be undertaken using approved heat welding equipment. The water stops shall be installed in accordance with the manufacturer's instructions and to the approval of the Engineer.

- (c) Joint sealant shall be bitumen-rubber sealing compounds and shall be pourable and in accordance with BS 2499 for horizontal joints and shall be an approved solvent type gun grade applied by suitable for vertical joints.
- (d) Miscellaneous materials necessary for the installation of movement joints such as adhesives for securing filler materials, bond breaking tapes, bituminous paints for creating a discontinuity between concrete surfaces and primers shall be compatible with the compressible filler, water stops and sealant specified previously.

Contraction joints where specified shall be formed in the position and manner shown on the Drawings. The reinforcement shall be discontinuous across the joint. Dowel bars, water stops and sealant shall be provided as shown. The face of the first stage concrete shall be finished fair faced and after curing painted with two coats of bituminous paint. Casting of water stops and sealing of joints is to be carried out in accordance with the manufacturer's instructions. Dowel bars shall be round mild steel of the dimensions shown on the Drawings. The bars shall be cast into the first stage concrete and the protruding part shall be painted with two coats of bituminous paint.

Expansion joints where specified shall be formed in the position and manner shown on the Drawings. The reinforcement shall be discontinuous across the joint. Dowel bars, water stops, compressible filler and sealant shall be provided as shown. The face of the first stage concrete shall be finished fair faced and after curing the compressible filler shall be fixed in position in a manner to the approval of the Engineer. Casting in of water stops and sealing of joints is to be carried out in accordance with the manufacturer's instructions. Dowel bars shall be round mild steel of the dimensions shown on the drawings. The bars shall be cast into the first stage concrete and the protruding part shall be painted with two coats of bituminous paint. An end cap shall be fixed to the end of each bar prior to pouring the second stage concrete, in order to create a void at the end of the bar to accommodate any movement.

Pre-cast Concrete Units

Pre-cast concrete units shall be provided by an approved specialist supplier or may, subject to the Engineer's written approval, be manufactured by the Contractor. The Engineer may require the Contractor to supply samples of pre-cast concrete units for testing prior to the approval of the proposed supply for each type of unit and such samples shall be supplied and tested as directed by the Engineer.

Pre-cast concrete units shall be made in accordance with the provisions of this Specification covering concrete work. Pre-cast concrete units shall be manufactured under shed roofs and protected from the weather. The units shall remain in the moulds for seven days and shall remain protected for a further seven days, during which periods the concrete shall be shielded by sacking or other approved material which shall be kept wet. The units shall then be moved from the sheds and stacked in the open for at least a further seven days to season before being set in position.

Pre-cast concrete work shall be tested as directed by the Engineer and work failing to meet the requirements of the Specification shall be rejected. Pre-cast units that become damaged during handling shall likewise be rejected.

The Contractor shall, when required, make arrangements with his supplier for access to the supplier's work for the Engineer to inspect and carry out tests on pre-cast concrete units.

All pre-cast units shall be marked with individual identification. Lifting hooks are to be attached only to those positions shown on the Drawings or detailed by the Engineer. The Contractor shall be deemed to have included in their rates for all measures required to handle and stack units safely and without undue stressing.

Breaking out Existing Concrete or Block work

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

Cement Grout

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

Cement Mortar

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

Concrete Block and Bricks Masonry

Concrete blocks and bricks shall comply with BS 6073: Part 1 and shall have a minimum 28 days compressive strength of 3.5 N/mm² and 7 N/mm² respectively. The concrete blocks and bricks shall be laid in a staggered pattern such that the vertical joints between two consecutive layers are offset by half a block length. Joints on the inside faces shall be rendered in which case the joints shall be raked out at a depth of 5 mm. Rendering shall consist of 1:2 mortar applied to a thickness so as to ensure professional finish

The mix used to manufacture concrete blocks shall not be leaner than 1:9 by volume and the maximum size of aggregate shall be 10mm. The standard size of the concrete block shall be 400 mm x 200 x 200 mm and 300 x 100 x 100 for bricks. However blocks and bricks of other sizes may be used if approved by the Engineer for proper bonding at corners and openings

The concrete blocks and bricks shall be wetted before laying and shall be set in mortar, which complies with the specifications given in Clause 3.42. Unless otherwise stated, the maximum joint thickness shall be 12 mm and the horizontal and vertical joints shall be filled with mortar. Joints shall be finished flush with the face of the blocks and bricks. The Concrete block and brick masonry shall be cured for a period of seven days by covering the work with two layers of Hessian, which is kept permanently saturated. Provision shall be made to clean all exposed faces both as the work proceeds and on completion so that they are left in a neat, tidy and clean condition.

Building masonry will not be permitted in heavy rain without the approval of the Engineer. In such instances the Contractor shall make provision to protect materials and the newly placed mortar from the rain.

Concrete blocks shall either be obtained from an approved manufacture or made on site in approved block making machines. When casting of the concrete blocks is done at site, these shall be removed from the casting machine and deposited on edge on covered racks and left for 3 days, during which time they shall be kept constantly wet. Afterwards they may be placed on racks in the open provided they are protected by Hessian cloth or similar and kept wet for a further 5 days. Thereafter they shall not be moved or used in the works until they are 28 days old.

Chambers shall be constructed after pipes have been laid, except the bases may be constructed earlier to avoid deterioration of the formation.

Backfilling around completed chambers shall be with suitable material deposited equally all round and compacted in accordance with the Specifications.

Where any pipes are built into concrete or block work the pipe shall be surrounded in two layers of polythene sheeting unless a puddle flange has been shown on the Drawings.

Rendering Work

Material

Cement, water and fine aggregate shall conform to the requirements specified in the concrete works. Mesh reinforcement shall be plain diamond expanded steel lathing to BS 1369 where specified. Lime shall be to BS 980 and shall be mixed with water and allowed to stand prior to use according to the manufacturer's recommendations.

The mix proportion of the cement mortar by volume shall be as follows:

- For rendering coat, Cement : Sand = 1:5
- For finishing coat, Cement : Sand = 1:3

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

Waterproof cement mortar

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

Application

The surfaces which are to receive a rendering coat shall be free from all laitance, scum, loose carbonate scale, loose aggregate dirt and other foreign matters. Concrete block, brick or stone surfaces shall be sufficiently and uniformly damped immediately before application of mortar. Concrete surfaces shall be kept thoroughly wet for 24 hours prior to the application of mortar.

Where shown on the drawings or directed by the Engineer, steel wire lath shall be fixed to the brick, concrete block or concrete walls before applying cement mortar plaster.

Cement mortar shall be used within 30 minutes from the time of mixing. Re-tempering shall not be permitted.

The total thickness of rendering plus finishing coat shall be 30 mm for the floors and 20 mm for wall. Cement mortar finish shall be trowel finished unless otherwise specified. When the finishing coat is applied, the entire surface of floor or wall shall be finished in one operation in order to minimise joint marks.

When expansion and control joints exist in the base structure, provision shall be made to prevent cracking of the mortar by inserting metal expansion beads within the coating thickness in a manner approved by the Engineer.

The finished surface shall be perfectly plumb or level as the case may be except where otherwise specified without any bulging, runs, bruises or stains.

After application of the finishing coat, the surfaces shall be kept continuously damp for not less than 48 hours and then allowed to become thoroughly dry. Moistening shall be started as soon as the surface has hardened sufficiently not to cause displacement or damage.

In Situ Concrete Chambers

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

Chamber Covers and Slabs

Covers and slabs shall be the type, size and weight shown in the drawings. Care shall be taken to see that slabs are even so that the cover can seat without rocking.

Covers and frames shall be provided as shown on the drawings. The tops of the covers shall be flush at all points with the surrounding surface of paved areas or as directed in unpaved areas. Any slight adjustment of the slab level which may be necessary to accomplish this shall be effected by topping the side walls with concrete.

STONEMWORK

Stones

Stone for all purposes shall be the best of its kind, sound and durable, free from flaws and from soft, weathered or decomposed parts. The stone and the quarry from which it is obtained shall be subject to the approval of the Engineer, samples shall be submitted by the Contractor of the stone he proposes to use in the Works and the Engineer's approval shall be obtained before such stone is used or any order is placed. The stone used shall be clean and must be washed if deemed necessary in the opinion of the Engineer.

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

Stone Masonry

Masonry shall be built to the lines and levels shown on the Drawings.

For face work the stones shall show a face of not less than 0.025 m² and not more than 0.1 m² in area and none shall be less than 100 mm in depth; they shall be laid to give a uniformly random appearance and shall be selected in laying so as to present an even distribution of large and small stones on the face.

For the arises, stones shall be roughly squared, quarry split and of a size to give out bands varying from 300 mm to 500 mm in length and in bands from 150 mm to 250 mm. The alignment of arises shall be set true to the required lines.

The stones shall be set in mortar with their natural bedding plane (if any) as near normal as possible to the face or normal to the line of thrust in the case of load bearing structures. Particular care must be given to obtaining a sound bond both longitudinally and transversely and there shall be at least one bonder, or length not less than two-thirds of the wall thickness, in each square yard of wall face.

The mortar, unless otherwise specified, shall be machine mixed cement and sand in the proportion of one part to three (1:3) parts generally as described in the specification. Mortar shall completely fill all interstices between the stones.

The face joints in rubble masonry may vary in thickness from 10 mm to 20 mm. They shall be finished as a neat weathered joint with mortar while the work proceeds where the masonry is specified to be "un-pointed". Where pointing is specified, the joints in each day's work shall be raked out to a depth of not less than 25 mm before the mortar has set. Subsequently the joint shall be filled with mortar and finished in accordance with Clause 4.6. The face of the masonry is to be kept wet while the pointing is proceeding. Provision shall be made to clean all exposed faces both as work proceeds and on completion so that they are left in a neat, tidy and clean condition.

Building of masonry will not be allowed in heavy rain without the written consent of the Engineer. Building shall only proceed when suitable precautions to the satisfaction of the Engineer shall be taken against the action of rain on newly placed mortar. If for any reason of urgency the consent of the Engineer should be desired to a departure from these provisions, the Contractor shall submit to the Engineer for approval their proposals for protecting the materials and work from the weather.

Types of Masonry

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

- (a) Random rubble un-coursed masonry shall be built with stones of irregular shapes taken generally as they come from the quarry, preparation being limited to the removal of inconvenient corners and excrescences. They shall be selected as the work proceeds to give a uniformly random appearance and no attempt shall be made to form courses.
 - (b) Random rubble masonry brought to courses shall be generally as the preceding type except that it shall be levelled up to courses between 300 mm to 400 mm in depth and coinciding with the quoin stones.
 - (c) Squared rubble coursed masonry shall be built in courses between 100 mm to 250 mm in depth of stones squared to rectangular shapes and selected so that all stones in one course are of approximately the same height.
-

Bedding of Stone Masonry

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

Special Stonework

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

Pointing of Joints in Masonry

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

Hand Placed Rubble Filling

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

Tipped Rock/Pitching

Rock protection on embankment slopes and around structures shall be to the lines and levels shown on the contract Drawings. The terms "tipped rock" and "pitching" refer to the manner in which the rock is placed.

The different classes of rock are specified on the Drawings according to nominal size and the maximum and minimum size of the individual particles. Within the size limits of each class, the rock fragments shall be well graded with not more than forty per cent (40%) of the rocks being smaller than the stated nominal size. The shape of the rock shall be roughly uniform with no dimension less than sixty percent (60%) of the largest dimension. The individual rock pieces shall be dense, durable and abrasion resistant.

The Contractor shall submit bulk samples of not less than 2 m³ of each class of rock for approval by the Engineer prior to placing. These samples shall be retained for comparison with material being placed in order to ensure a reasonable degree of uniformity within each class.

The base on which rock protection is to be placed shall be compacted and trimmed to the lines and levels shown on the drawings. Where two or more classes of rock are specified, the lower layers shall be completed to the Engineer's approval before the placing of subsequent layers.

Tipped Rock shall be tipped directly into place and roughly trimmed to the required profile. The thickness, lines and levels of each class of tipped rock is shown on the Drawings.

Pitching will be used where a finished horizontal or inclined surface is required. It shall consist of hand placed stones, with spalls wedged into the interstices to produce an even surface, without projection above the neat lines shown on the Drawings. Care shall be taken to ensure that the stones are well bedded and the percentage of spalls shall not exceed forty percent (40%) of the total rock volume. Pitching on slopes shall be built upwards from the toe, unless otherwise directed by the Engineer. A coping consisting of large flat stones shall be laid along the top of stone pitching on slopes to produce a firm edge.

Tipped Rock and Stone Pitching shall consist of selected hard durable rock free from weathered or decomposed parts to the approval of the Engineer, containing no flaky stone and being well graded within the limits shown below. The class and the thickness of the layer shall be as shown on the drawings.

| Class | Size of stone d (mm) | Percentage by weight smaller than stone sized |
|-------|-------------------------|--|
| A | 300 | 100 |
| | 125 | 40-55 |
| | 45 | 0 |
| B | 150 | 100 |
| | 63 | 40-55 |
| | 31.5 | 0 |
| C | 63 | 100 |
| | 22 | 60-85 |
| | 8 | 20-40 |
| | 4 | 0 |
| Class | Size of stone d (mm) | Percentage by weight smaller than stone sized |
| D | 31.5 | 100 |
| | 16 | 50-80 |
| | 8 | 20-50 |
| | 4 | 0 |
| E | 350 | 100 |
| | 200 | 0 |
| F | 225 | 100 |
| | 90 | 35-55 |
| | 45 | 0 |
| G | 850 | 100 |
| | 500 | 30-60 |
| | 300 | 0 |

Tipped rock / stone pitching shall be placed in an approved manner in order to produce a uniform well knit un-segregated layer in which all sized are held in position.

Gabions

Gabions shall be of the types and sizes shown on the Drawings. The cages shall be constructed from mild steel wire complying with BS 1052, "Specification for mild steel wire for general engineering purposes", galvanised in accordance with BS 443, "Specification for testing zinc coatings on steel wire and for quality requirements". The wire shall be 3mm diameter formed into a fabric having a mesh of 75 mm x 100 mm for baskets and 60 mm x 80 mm for mattresses.

Stone filling for gabions shall consist of hard durable rock, free from weathered or decomposed parts. The minimum dimensions of each stone shall not be less than half its maximum dimension. For mattresses the stone shall be 200 mm to 150 mm for baskets the stone shall be 300 mm to 200 mm. The stone shall be obtained from a source approved by the Engineer. No stone shall be smaller than the size of the gabion mesh. In carrying out the filling, selected pieces of stone of elongated shape shall be placed with their flatter and elongated faces in contact with the mesh wherever possible.

The empty gabions shall be placed to line and level as shown on the Drawings or as directed by the Engineer and then stretched so that the gabions regain their shape on being filled. Diaphragms shall be provided at not more than 1m intervals for baskets and not more than 0.6 m intervals for mattresses. A gabion shall not be completely filled until the adjacent basket or mattress has been half filled, unless otherwise directed, in order not to cause displacements from bulging during filling.

For baskets at least two horizontal connection wires shall be tied between front and back of the gabion in each 1m compartment, at a height of 300 mm and 600 mm from the bottom as the stone fill reaches these levels. Additional tie wires shall be provided if necessary and in no case shall the gabion basket bulge by more than 40 mm. Where a continuous line of gabions is required, adjacent gabions shall be securely tied together at the top and bottom of the gabions with tying wire.

The gabions shall be filled to a level just sufficient to require the lid to be forced into place with a bar. The lid and all joints between baskets and between diaphragms and baskets shall each be tied down with a continuous running wire.

Where gabions are to be shaped, the shape shall be formed by folding the mesh internally and tying it with a continuous running wire.

All tying wire shall be galvanised and of same gauge as specified for the cages above.

The surface upon which gabions are to be laid shall be compacted to a minimum dry density of 95% of the maximum dry density (AASHTO T99).

Geotextile Filter Cloth

Geotextile filter cloth shall be made of non-woven polyester material with a minimum weight of 270 g/m² and minimum thickness of 2.3mm.

The material shall be placed carefully on suitably cleared surfaces, such that tearing or piercing is avoided at all times.

Continuity at horizontal and vertical joins shall be achieved with a minimum overlap of 0.6m. Overlaps may be physically sealed using spot welds with an open flame and subject to approval of the Engineer. On a horizontal join, the new layer shall be placed on the outside and backfilling shall proceed carefully to ensure that full contact of the join overlap is maintained. On a vertical join, the new layer shall be placed on the inside, and backfilling shall proceed such that contact is first on the outside layer, thereby sealing the inside layer to prevent soil migration between the overlap.

Graded Filters

The filter shall consist of well graded natural or manufactured aggregate having the following gradation. In the following ratios, FM represents the filter material and BM the base material.

For graded filters of sub-rounded particles:

$$R_{50} = \frac{50\% \text{ size FM}}{50\% \text{ size BM}} = 12 \text{ to } 58$$

and

$$R_{15} = \frac{15\% \text{ size FM}}{15\% \text{ size BM}} = 12 \text{ to } 40$$

15% size BM

For graded filters of angular particles:

$$R_{50} = \frac{50\% \text{ size FM}}{50\% \text{ size BM}} = 9 \text{ to } 30$$

and

$$R_{15} = \frac{15\% \text{ size FM}}{15\% \text{ size BM}} = 6 \text{ to } 18$$

The filter material should pass a 75mm for minimising particle segregation and bridging during placement. Also the filter must not have more than five per cent (5%) of material finer than that passing a 60 micron sieve to prevent movement of fines within the filter.

The graded filters shall consist of stone graded to meet the requirements indicated below.

| Class | Size of particles d (mm) | Percentage smaller than particle size |
|-------|-----------------------------|--|
| A | 63 | 100 |
| | 31 | 70-100 |
| | 8 | 10-80 |
| | 2 | 0-25 |
| | 1.4 | 0 |
| B | 16 | 100 |
| | 4 | 64-100 |
| | 1 | 15-64 |
| | 0.25 | 0-15 |
| | 0.09 | 0 |

The filter shall be placed in layers and tamped into place in such a manner that mixing between layers or between the filter material and the formation to be protected, shall not occur.

Care shall be taken to ensure that segregation of sizes does not occur. The minimum thickness of each filter layer shall be 250 mm unless otherwise shown on the Drawings. Where the term “gravel backing” is used on the drawings or Bills of Quantities, this shall be taken to mean graded filter Class A material.

Hardcore

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

PIPEWORK

General

The Contractor shall construct pipelines to the lines and levels using grades, classes, or designs of pipe, bedding, haunching and surrounding as shown on the Drawings or directed by the Engineer.

Unless otherwise described in the Contract or agreed by the Engineer only one type of pipe shall be used within any individual length.

All materials shall be subject to the approval of the Engineer prior to procurement and delivery. Upon delivery, the Engineer shall inspect the delivered material for compliance with the specifications. In case of non-conformity, the Contractor shall replace the material at his own cost.

The pipes and fittings shall comply in all respects with British Standards and jointing of pipes and fittings shall be carried out in accordance with the manufacturers' instructions and to the approval of the Engineer.

Storage and Protection of Materials

Pipes shall be stacked on a firm base using two timber packers only under the barrel of rigid pipes such as concrete or steel.

Flexible pipes such as uPVC shall be stacked closely side by side on a firm plane base so that the whole length of the barrel is uniformly supported and sockets are clear of the ground. Each succeeding layer shall be placed at right angles to the previous layers. The height of any stack shall be not more than six layers of pipes and in the case of steel, not more than two layers.

Fittings and specials of any type shall be stored in a single layer only.

Pipes and fittings shall at all times be adequately protected from damage during transport, storage and handling. Cracked or chipped pipes shall not be used in the permanent works. Steel and large diameter plastic pipes shall be fitted in the factory with end caps or reinforcement adequate to prevent distortion during transport, storage and handling.

Plastic pipes and fittings shall be protected from direct sunshine and excessive heat. Deformed pipes and fittings shall not be used in the permanent works.

Rubber rings and other pipe jointing material shall be stored under cover from direct sunshine.

Granular bedding shall be stored on a firm impermeable base so that it does not become contaminated with deleterious matter.

Handling Pipes and Fittings

Before any pipes are delivered to site the Contractor shall submit details to the Engineer of his proposals for handling pipes during transport, in store and during laying.

During transport and in store, pipes shall not rest on narrow traverse supports likely to cause damage to the pipe or its coating. Pipes shall not be unloaded from a vehicle by tipping or dropping.

Pipes shall be lifted by flat braided wire slings or band slings except in the case of externally coated pipes and plastic pipes for which band slings having a width of at least 300 mm shall be used. Wire rope sling shall not be used for any pipes. No pipes shall be lifted by means of hooks applied to the ends of the pipe or by means of appliances such as grabs and togs.

In making arrangements for handling pipes, the Contractor shall take into account any recommendations made by the pipe manufacturer.

Where appropriate the requirements of this Clause shall apply to fittings and other components.

Cutting Pipes

The cutting of pipes for making up lengths shall be carried out by a method which leaves a clean square end.

Concrete pipes shall be cut with a concrete saw or by hand. If cut by hand the end of the pipes shall be trimmed even and square and if reinforced, the steel shall be cut flush with the face of the concrete. If instructed by the Engineer the exposed ends of the steel shall be protected with bitumen or a cement grout.

Steel pipes to be cut shall have the line to be cut clearly marked round the pipe. Cutting shall be carried out by cutting disc or by oxy-acetylene and the cut end shall subsequently be ground to the correct profile for the method of jointing in use.

Pipes and Fittings

Concrete Pipes

Concrete pipes shall comply with BS 5911 "Specification for concrete cylindrical pipes, bends, junctions and manholes, un-reinforced or reinforced with steel cages or hoops" save that the crushing test loads for the various diameters of pipe shall be as shown in Table 5.1:

Table 5.1 Crushing test loads

| Nominal size of pipe (mm) | Works proof load KN/m effective length |
|---------------------------|--|
| 300 | 23 (Class M equivalent) |
| 450 | 35 (Class M equivalent) |
| 600 | 46 (Class M equivalent) |
| 800 | 54 (Class M equivalent) |
| 900 | 85 (Class M equivalent) |
| 1000 | 73 (Class M equivalent) |
| 1200 | 110 (Class M equivalent) |
| 1500 | 132 (Class M equivalent) |

Works proof loads shall be 80% of the maximum loads for each size of pipe.

Damaged pipes showing signs of visible cracking either on the inside or outside surface shall not be used.

Steel pipes

Steel pipes and specials for water and sewerage shall comply with BS 534.

Galvanised mild steel pipes and fittings shall comply with BS 1387 Class B or "Medium Grade" and complying with ISO 65. Threading for screwed and socketed joints shall be in accordance with the requirements of BS 21.

Joints shall be made with an approved pipe-jointing compound in accordance with the manufacturer's instructions. Red lead compounds shall not be used. Joints in underground piping shall be coated with bitumen or other approved composition.

All underground sections of pipework to be protected against corrosion by treating with "COLAS primer, and wrapped with fibreglass and coated with two coats of 'COLAS' bituminous tap coats all to manufacturers specification.

The bituminous paint is to be manufactured to ASTM D1187-82.

All fittings for galvanised steel water pipework shall be galvanised heavy weight fittings in accordance with BS 1740, BS 5153 and BS 5154. All fittings shall be subject to the approval of the Engineer.

Brass or gunmetal fittings shall be subject to the approval of the Engineer.

uPVC pipes

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

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

The metal adaptor fittings shall comply with ISO 4132.

Valves

Gate valves

Gate valves shall conform to BS 5153 for cast iron and BS 5154 for copper alloy "valves for general purposes".

All gate valves shall close in a clockwise direction and the direction of opening and closing shall be cast on the hand wheels or valve casing with the words 'OPEN' and 'CLOSE' respectively. All gate valves shall be capable of being operated manually with a maximum applied torque of 100 Nm for valves with a nominal diameter less than 450mm. The Contractor shall ensure that the gate valves supplied are fitted with appropriate thrust bearing guides and gearing to fulfil these requirements, ensuring that when reduction gearing is employed, the gear ratio shall not exceed 4:1.

Isolating gate valves shall permit manual closing off of the raw water supply.

Butterfly valves

Butterfly valves shall conform to BS 5155 "Specification for butterfly valves". The use of butterfly valves as main line valves shall not be permitted.

Check valves

Cheek valves shall conform to BS 5153 for cast iron and BS 5154 for copper alloy "check valves for general purposes".

The valves shall be installed in a horizontal position to avoid malfunctioning of the check.

Float ball valves

Float operated valves shall comply with BS 1212 and BS 1968 and BS 2456 "specifications for float ball valves".

Ball valves shall be the plastic diaphragm type or similar approved with seatings to suit the working pressure of 5 bars with plastic float to BS 2456 and internal overflow.

Painting of valves

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

Laying Pipes in Trenches and Headings

Immediately before pipes are placed in any trench, the bottom shall be cleared of all stones and other debris and shall be in a condition acceptable to the Engineer. Prior to placing in the trench, all pipes shall be inspected for damage. Damaged pipes which in the opinion of the Engineer cannot satisfactorily be made good shall not be used in the permanent works. End caps or discs placed on the pipes for protection during transit shall not be removed until immediately before the pipes are jointed.

Pipes shall be laid in straight lines unless otherwise shown on the drawings. No pipe shall deviate from the true line and level by more than 5 mm. Pipes shall be firmly bedded throughout their length to the required alignment and level so that they are concentric at each joint. All pipes shall be suitably wedged, shored or otherwise restrained to prevent movement during testing and backfilling but such restraints shall not be left in place permanently unless instructed or agreed by the Engineer.

Pipes which are to receive a concrete bed and haunch or surround shall be set on suitable concrete blocks or bricks with a pad of Hessian based damp proof course two millimetres thick interposed between the pipe and the block. Setting blocks shall not be used with other forms of bedding.

Unless otherwise agreed by the Engineer a close fitting brush or swap shall be placed in pipelines having nominal diameters of 650 mm or less and shall be drawn forward progressively as pipe laying proceeds by means of a suitable rope which shall be threaded through each pipe as it is laid. Pipelines having nominal diameters greater than 650 mm shall be kept clean by suitable means as pipe laying proceeds. No debris of any kind shall be allowed to remain in the pipeline. Where the pipeline has internal lining, persons entering shall wear rubber boots and equipment trolleys shall have rubber tyred wheels. Pipes and joints shall be kept free of dirt, mud and other deleterious matter at all times. If pipelaying is stopped at any time, a cap shall immediately be placed on the end of the last pipe laid to exclude dirt.

Suitable precautions shall be taken to prevent the floating of pipes due to flooding of trenches. If floating should occur, the whole of the pipe run affected shall be removed and trench prepared again. No pipes shall be re-laid in trenches which have flooded until the trenches and the pipes have been inspected by the Engineer. The Contractor shall be entirely responsible for the sufficiency of all temporary supports and side slopes to

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

Pipes having integral sockets shall be laid with sockets facing upstream unless otherwise agreed or instructed by the Engineer.

Pipes in headings shall be laid in accordance with the requirements of this clause but pipe lengths shall not exceed 1.5 m unless otherwise agreed by the Engineer.

Pipes Laid on Natural Ground

Filling shall commence with selected fill consisting of easily compacted material from which all stones larger than 25 mm and all lumps of clay larger than 75 mm have been removed. The selected fill shall be deposited equally on each side of the pipe carefully compacted in layers not more than 150 mm thick. Care shall be taken to ensure that no voids are left under the pipe. The filling shall be continued to a level of 300 mm above the crown of the pipe

In the case of steel, ductile iron and plastic pipes, the Contractor shall ensure that no distortion of the pipe takes place during the backfilling operation.

The remainder of the trench shall be filled with excavated material and compacted in 150 mm thick layers by means of a vibrating plate compactor or a mechanical rammer. The trench shall be filled flush with the surrounding ground surface.

Pipes laid on Granular Bedding

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

Pipes with Concrete Bedding and Surround

The configuration of the concrete bedding, surround or arch shall be as shown on the drawings including the location of reinforcement if any is required. Pipes to be set in concrete shall be supported as set out in Clause 5.7. Small diameter pipes in short lengths shall be supported behind pipe socket. Large diameter pipes and long lengths shall be supported on two packers.

After jointing and testing as set out in the appropriate parts of this section, concrete of the class shown on the drawings shall be carefully placed and compacted under the pipes making sure that no voids are left, and brought up to the configuration shown on the drawings. The Contractor shall ensure that the pipes do not float or are in any way disturbed during concrete placing. The remainder of the backfill shall be placed as set out in Section 2 of this Specification.

Where pipes, which are laid on a bed of granular material, are to be protected by a concrete arch, the laying and jointing shall proceed as set out in the appropriate parts of the Specification and granular material shall be brought up to the horizontal diameters of the pipes.

After testing, concrete shall be placed over the pipes to the configuration shown on the drawings and the remainder of the backfill shall hereafter be placed as set out in Section 2 of this Specification.

Flexible joints shall be formed in concrete beddings, arches or surrounds in the location shown on the drawings. Such joints shall coincide with the pipe joint in such a way that the end of the socket is flush with one face of the joint and the socket faces into the joint space.

Joints in concrete beddings, arches and surrounds shall be 18 mm wide unless otherwise instructed by the Engineer and shall be filled with a compressible material such as a sheet of cane fibre board or cork board. The material used shall be subject to the approval of the Engineer.

Joints in Pipelines

Concrete pipes

(a) Rigid Joints

When laying rigidly jointed pipelines with pipes having integral sockets, before entering a pipe spigot into its socket, both spigot and socket shall be clean and free from mud, oil, grease or other deleterious matter. A gasket of tarred hemp yarn, cut to length so that it forms a butt joint at the crown of the pipe shall be wrapped round the spigot which shall then be fully entered into the socket and the gasket caulked up hard into the joint. The joint shall then be filled completely with a plastic mortar composed of one part of cement to two parts of sand.

The pipes shall not be pressure tested or disturbed in any way for at least 48 hours after jointing.

Rigidly jointed sleeves used to join two spigots shall be jointed in the same manner as integral sockets.

If the drawings require ogee jointed pipes to be laid with a mortar joint, the joint shall be made at the time of laying. Mortar as described above shall be applied to the lower semi-circumference of the socket and to the upper semi circumference of the spigot and the pipe shall be drawn hard into the socket. Excess mortar squeezed out of the joint shall be removed from both the inside and outside of the joint.

(b) Flexible Joints

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

uPVC pipes

Flexible jointed uPVC pipes shall be jointed in accordance with the manufacturer's instructions.

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

Steel pipes

These shall be caulked in thread seal for rigid joints. Flexible joints incorporating rubber O-rings shall be made in accordance with the manufacturer's instructions. Joints incorporating bolted or screwed glands or couplings shall be made in accordance with the manufacturer's instructions.

Components of flexible joints from different manufacturers shall not be used together.

Connections to Existing Pipelines

Where a connection is to be made to an existing water pipe other than that at a chamber, a pipe saddle of the correct size shall be used for this purpose. The hole in the pipe shall be cut precisely to fit the saddle.

Saddles for uPVC pipes shall be made of the same material as the pipes and shall be fixed with a solvent in accordance with the manufacturer's instructions.

Pipes Through Structures

Where a pipeline passes into or out of a structure, including a manhole cover or similar chamber, two flexible joints shall be formed. The flexible joint shall consist of a 500 mm long pipe section connected along the main pipe, with the nearest end 500 mm from the face of the structure. One joint will be made on the incoming pipe and another joint on the outgoing pipe.

When the structure is less than one pipe length wide, the above requirement shall not apply and a sleeve shall be formed through the structure so that there is a clear space at least 75 mm wide all round the pipe. Adequate means shall be provided to prevent soil from entering this gap.

Pipelines within Concrete Structures

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

Pipes under Roads

All pipes at the crossing of driveways and roads shall be surrounded with concrete for the entire length of crossing before trench backfilling.

Concrete surround shall be approved by the Engineer on satisfactory compliance with protection of pipes as detailed in Section 5.9.

Cleaning

The insides of all pipes, valves, tanks and fittings shall be clean, smooth, and free from blister, loose scale and dirt when erected. All lines shall be cleaned after all installation work.

When pipes are installed all ends shall be suitably plugged until final fixing of fixtures can be carried out. Pieces of cloth or stone will not be permitted.

Pressure Testing of Pipelines

As the installation of the pipework proceeds, the various sections shall be tested before they are built in, concealed, or finally connected. The Contractor shall advise the Engineer in writing at least three days in advance of the carrying out of such tests, and such tests shall, if considered necessary by the Engineer, be carried out in his presence.

All tests shall be at the expense of the Contractor and it shall be the responsibility of the Contractor to make all necessary records of the tests and results and submit these to the Engineer in the final form agreed

All pipe systems shall be tested hydraulically for a period of one hour to not less than one and a half times the design working pressure. Testing shall comply with BS 8010 for standard field testing of pipelines.

If preferred, the Contractor may test the pipelines in sections. Any such section found to be satisfactory need not be the subject of a further test when the system has been completed, unless specifically requested by the Engineer.

During the test, each branch and joint shall be examined carefully for leaks and any defects observed shall be made good by the Contractor and the section re-tested.

Painting of Exposed Pipes and Fittings

All metal surfaces within chambers shall be mechanically wire brushed to remove all loose scale, grease etc. Within two hours of cleaning a primer shall be applied, followed after two hours by a first coat of heavy consistency bitumen paint all to the approval of the Engineer. A second coat of the heavy consistency paint shall be applied after 24 hours. The final coating thickness shall not be less than 250 microns.

Preparation and application of the coating system shall be strictly in accordance with the Manufacturer's instructions.

This clause shall not be applied to chemically or thermally bonded coatings on steel pipes.

Marker Posts

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

Water Tanks

Pressed Steel Tanks

The pressed steel tank shall comply with the BS 1564. The material thickness of the tank panels shall be 5 mm. The assembly of the tank shall be done in accordance with the manufacturer's recommendations. The tank shall be provided with a cover which shall have a square manhole of at least 460 mm that give access to the interior of the tank. The tank cover shall be fitted with a suitable vent that is fitted with a suitable screen as recommended by the manufacturer to prevent the entry of insects and small animals.

A tank shall be fitted with external ladder, the length of which would be as shown on the drawings or as determined on site.

Each panel shall be clearly and indelibly marked to indicate its position in the tank.

Plastic Water Tank

Plastic based water tanks shall be tested in accordance with the requirements of BS 6920. For a tank to be acceptable it must give satisfactory results in tests designed to determine that there is:

- (a) No test imparted to the water.
- (b) No change in the appearance of the water.
- (c) No growth of micro-organisms in the water, in contact with the materials or on the surface of the material.
- (d) No release of substances into the water that may be of concern to public health.
- (e) No release of metals into the water.

Chemical Mixing and Dosing

To facilitate chemical mixing and dosing at the clarifiers and chlorine contact tanks the contractor shall put following in place:

2 No. cylindrical chemical mixing tanks each of 100 litres capacity. The tanks shall be of GRP (glass reinforced plastic) manufacture and shall be fitted with fibreglass dissolving tray fixed at a third depth freeboard mark. The tanks shall also be fitted at the bottom with a PVC 15mm diameter stub pipe with a gate valve. The stub pipe shall connect the mixing tanks to the FRO chemical gravity dosers, The FRO dosers shall be installed on block masonry platform resting on the chlorine underground tank and shall be for each clarifier and chlorine contact tanks, as indicated on the drawings.

Each clarifier shall have a FRO (Patterson Candy International gravity or similar approved manufacturer) doser rated at 32 ml/sec with provision for adjustment of the dosing rate in accordance with the quantity and turbidity of the raw water to be treated.

The Contractor shall provide the necessary potable water supply pipework to the GRP mixing tanks for each site. The water supply pipework shall be non-corrodible and to the approval of the Engineer.

The solution pipework between the solution tanks and the doser shall also be non-corrodible and to the approval of the Engineer. Coagulation chemicals shall be dissolved in the upper compartment of the solution tank and shall flow by gravity to the FRO doser and into the mixing tank with water to be treated.

STEELWORK

General

Except where otherwise specified, structural steel shall be Grade 43, complying with BS 7668, "Specification for weldable structural steels".

All structural rolled steel members shall comply in dimension, weight and tolerance with that shown on the drawings and with BS 4, "Structural steel sections" and BS EN 10056, 10067 and 10210.

Bolts, nuts and fastenings

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

Where nuts, bolts and washers are required to be galvanized, the galvanizing shall be to BS 3382, "Specification for electroplated coatings on threaded components".

Electrodes

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

Contractor's Shop Drawings

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

Fabrication and Erection of Steelwork

The standard of workmanship and engineering practices to be adopted for fabrication and erection shall conform to BS 449, "Specification for the use of structural steel in building" and BS 5531, "Code of practice for safety in erecting structural frames".

The Contractor shall supply samples of materials and standards of workmanship as required by the Engineer. All samples approved by the Engineer shall be retained and shall be considered as setting the standard for all subsequent work.

Inspection of work will be carried out by the Engineer and the Contractor shall give sufficient notice of the date when fabricated steelwork is ready for inspection. The Contractor shall provide particulars of places and dates of manufacture of all materials for the Permanent Works and the names of the manufacturers. Copies in duplicate of all orders for materials shall be sent to the Engineer at the time of placing such orders.

The Contractor shall ensure that all foundation bolts and supports including built-in bolts, etc upon which the steelwork is to be erected are in the correct position and that the steelwork fits correctly in required positions without forcing or straining in any way. Any check by the Engineer of the Contractor's measurements shall not relieve him of his responsibility for obtaining this fit unless any errors in position are clearly not attributable to him.

No permanent bolting or site welding shall be done until proper alignment has been obtained. The Contractor may use temporary jigs, anchors or supports during erection, but must allow for thermal movement to take place freely at all times.

If the Contractor wishes to drill holes in or fix attachments to the steelwork to carry temporary work such as shuttering, he shall obtain the Engineer's approval of the positions and details of all such holes or attachments and shall close such holes and remove the attachments to the satisfaction of the Engineer.

On completion of erection of any part of the steelwork on which the Contractor wishes to add further works, such as roofing, he shall first obtain the Engineer's approval of the steelwork and remedy any defects required by the Engineer. Any approval given shall in no way relieve the contractor of his responsibility for ensuring the subsequent correct positioning and behaviour of the steel work of other parts of the structure.

Welding

All shop welds shall be carried out by qualified welders who shall be under competent supervision. All welding is to be carried out in accordance with BS 5135, "Specification for arc welding of carbon and carbon manganese steels". The Contractor's proposals for welding shall be submitted to the Engineer for approval before any work is undertaken.

The Engineer may call for a test of a welder's capabilities in accordance with BS 4872, "Specification for approval testing of welders when welding procedure is not required".

In the case of site welds, the welding procedure for making each type of joint shall be approved by the Engineer before the work is commenced and the Contractor shall make such trial welds as the Engineer may require to demonstrate the soundness of the proposed method and the competence of his workmen.

Where site welding is used all welded joints shall be subject to inspection by the Engineer. Any welds that are in the opinion of the Engineer defective shall be cut out and the welds remade to the satisfaction of the Engineer. The cost of such corrective measures including any resultant delays, shall be borne by the Contractor.

Painting General

The Contractor shall submit to the Engineer for his approval details of the types and manufacturers of paints he is proposing to use, together with the manufacturer's recommendations concerning preparation of surfaces, primers and undercoats, application methods, safety precautions and drying times for each type of paint. All paints used in the Works must be supplied ready-mixed in unbroken, sealed containers, which clearly show the type, colour and manufacturer of the paint and carry detailed "instructions for use".

All metal surfaces on which paint is to be applied shall be blast cleaned as laid down in BS 7079, "Preparation of steel substrates before application of paints and related products", or other mechanical means and fully prepared in accordance with the manufacturer's recommendations. Applications of paint coatings on external work shall not be carried out or continued in mist, rain or excessively damp conditions. The Contractor shall take all necessary precautions to prevent dust and dirt coming into contact with freshly applied paint before it has dried.

Paints shall be applied either by brushing or spraying in accordance with the manufacturer's instructions. The thinning of paints shall not be permitted without the approval of the Engineer. Unless otherwise recommended by the manufacturer, the minimum interval between the application of a first coat of paint and the second shall be twenty four hours (24hrs). Special care shall be taken to ensure complete coverage of all corners, arises and openings without causing an excessive build-up of paint and avoiding runs.

Steelwork to be painted shall be clean and free from all rust, grease, oil and mill scale.

The Contractor Shall provide all the relevant employees, visitors and any other persons who shall be exposed to the painting works, with personal protective equipment for the entire duration of their exposure to the paint works.

No separate payment will be made for the dust abatement measures and the costs thereof shall be deemed to be included in the respective unit rates and the Contract Sum

Painting Steelwork Immersed in Water

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

After erection, damaged areas of steelwork shall be mechanically cleaned and touched up with primer and bituminous paint to fully restore the factory applied coating system and thickness.

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

Painting other steelwork

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

- (a) one coat of zinc phosphate or similar compatible metallic inhibitive primer with a minimum dry film thickness of 50 microns.

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

After erection, damaged areas of steelwork shall be mechanically cleaned and touched up with primer and under coat to fully restore the factory applied coating system and thickness.

Finally, one overall finish coat of enamel gloss micaceous iron oxide paint with a minimum dry film thickness of 50 microns giving an overall minimum dry film thickness for the complete coating system of 250 microns.

Galvanising

All steel and ironwork of whatever kind required to be galvanised is to be pickled in dilute hydrochloric acid and then washed, fluxed and stoved and coated with zinc by dipping in a bath of molten zinc. All components are to be immersed in the bath only for the time sufficient for them to attain the temperature of the bath, they are then to be withdrawn at such a speed that a coating of 80 microns thickness is achieved, or such other practical maximum thickness for the component as defined in BN EN ISO 1461:1999, "Specification for hot dip galvanised coatings on iron and steel articles".

The galvanising is to be carried out after all drilling, chipping, trimming, filing; fitting and bending operations are complete and shall cover all faces evenly.

After erection of galvanised steel components, damaged or welded areas shall be painted immediately after cleaning with two coats of metallic zinc primer with each coat having a thickness of 50 microns. The paint shall be applied strictly on accordance with the manufacturer's instructions and shall be compatible with any subsequent paint systems to be applied.

Galvanised handrails

Handrail tubes shall be 38 mm nominal diameter steel tube to BS 1387, "Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or for screwing to BS 21 pipe threads". The top and bottom rails shall be 900 mm and 450 mm respectively above floor level. The rails and vertical standards shall be connected using screwed steel pipe fittings to BS 1740, "Specification for wrought steel pipe fittings (screwed BS 21 R-series threads)", where practical with the final connections being welded in accordance with Clause 6.6.

The handrail assembly shall be securely mounted on base plates fabricated of mild steel and attached to the base or foundation slab in a manner to be approved by the Engineer.

All sharp edges and rough areas shall be carefully ground off and the entire handrail assembly cleaned and galvanised in accordance with Clause 6.10.

Gates

Gates of the types and sizes shown on the drawings shall be supplied and installed where indicated on the drawings. The gate shall be drop-tight and shall be suitable in all respects for use in raw water. The gates shall have flush inverts.

Gates shall be supplied complete with all frames, cills, seals, spindles, hand wheels and headstocks as required. The frames and gates shall be fabricated in galvanized steel as per WATERMAN Industries Ltd, or equivalent approved. The contact address for WATERMAN Industries as at the time of this tender are:

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

Web site: www.watermanusa.com

All gates shall have rising spindles with protection tubes, headstock, hand wheel etc. and intermediate supports where the spindle is longer than 1500 mm. Intermediate guide brackets are to be located 600 mm above the gate frame, 400 mm below the base of the headstock and at a maximum spacing of 1500 mm, to suit or as recommended by the manufacturer and as approved by the Engineer.

All gates on structures in the link, main and branch canals having a base gate width of 500mm or more shall be of Type A (Sluice gate with a control rising spindle and wheel) as shown on the book of drawings. All gates on structures in the link, main and branch canals with a base gate width of less than 500mm shall be of Type B (slide gate or "Hand pull") as shown on the book of drawings. All gates on structures on the main feeder canals shall be Type B.

The gates shall conform to the following specifications or equivalent:

- Self-contained frame;
- Rising stainless steel frame;
- Flat back for wall mounting
- Maximum on seating pressure, measured from invert – 1.5 m
- Material for leaf, arms, hoist is: carbon steel Din 17100 St. 37-2(EN 10025 S235 JR)
- Non- geared hand wheel manual lift, mounted on the top of the frame
- Material of side rubbing plates, sill plate and pivot pins: Stainless steel ASTM A-276 type 304
- Side and bottom seals: Neoprene to ASTM D-200
- Mill finish on all stainless steel surfaces
- Epoxy paint on carbon steel surfaces

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

Stop-logs

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

ROADWORKS

General

Earthworks

Earthworks shall be carried out in accordance with the requirements of Section 2 of this Specification.

In carrying out the earthworks, the Contractor shall take all necessary precautions to avoid damage to or deterioration of the earthwork materials. He shall so arrange his work that water, which is brought onto or enters the earthworks at any time either in advance of or during construction shall be rapidly dispersed until the permanent work is completed.

Formation Level

Formation level on embankments and in cuttings shall be the surface level of the ground obtained after completion of the earthworks.

Preparation and Formation

The formation to carriageways and verges shall be prepared to the satisfaction of the Engineer, well cleaned, free from mud and slurry, properly shaped and compacted by rolling to an even and uniform surface as shown on the Drawings or directed by the Engineer. Where soft pockets become evident during rolling, they shall be removed and replaced with sound compacted material.

Unless directed otherwise by the Engineer the formation shall be covered by the sub-base within 48 hours after the preparation the formation.

Once the formation has been prepared, constructional traffic, other than that specifically required for subsequent roadwork operations, shall not be allowed to run thereon without the permission of the Engineer.

Gravel Wearing Course

On completion of the road formation the Contractor shall lay sufficient gravel wearing course over the full width of the carriageway to achieve the consolidated depth and camber shown on the drawings or as directed by the Engineer.

Gravel wearing course shall consist of suitable natural gravel obtained from borrow pits approved by the Engineer and complying with the wet sieve analysis given below:

Wet Sieve Analysis

| BS Sieve size (mm) | Percentage passing |
|--------------------|--------------------|
| 75 | 100 |
| 37.5 | 100 |
| 20 | 95 – 100 |
| 10 | 65 – 100 |
| 5 | 45 – 85 |
| 2.36 | 30 – 70 |
| 0.60 | 20 – 45 |
| 0.075 | 10 - 30 |

The gravel wearing course shall also comply with the following requirements:

| | | |
|------------------|---|-----|
| 4 day soaked CBR | > | 20 |
| Plasticity Index | > | 25 |
| Plastic Modulus | > | 500 |

The CBR shall be determined in accordance with BS 1377 Test 16 on a sample compacted to 95% of maximum dry density as determined by BS 1377 test B and then soaked for 4 days.

The material shall be spread in a uniform layer across the full width of the construction. The thickness of the layer shall be such that after compaction the thickness shall not exceed 150 mm. Where a greater final thickness is required the material shall be laid and processed in two or more equal layers.

The material shall be mixed to a uniform consistency and any oversize materials shall be removed to an approved spoil dump.

The work area shall be kept continuously drained and any damage caused by water accumulating on or running off the surface shall be made good.

If necessary, water shall be added to bring the moisture content to between 80% and 105% of the optimum prior to commencing compaction.

Compaction of Gravel Wearing Course

All rolling shall be carried out longitudinally along the carriageway commencing at the carriageway edges and working in towards the centre. Material is to be compacted to 95% of the centre. Material is to be compacted to 95% of its maximum dry density or such other percentages as indicated on the drawings. Maximum dry density shall be as determined by AASHTO T99.

The in-situ dry density of the compacted material will be determined by the sand replacement method described in Test No 15A in BS 1377 or such other test as the Engineer shall consider appropriate. Each layer of fill material shall be approved by the Engineer prior to the placing of subsequent layers. Where the material is too wet or too dry the Contractor shall have the option of collecting the moisture content by watering or drying as appropriate, or modifying his compaction procedure so as to obtain the required dry density.

Rehabilitation of Existing Access Roads

General

The provisions of Clause 2 shall apply save where expressly varied hereunder.

All interventions shown on strip maps provided are subject to confirmation by the Engineer on Site.

Site clearing

The width and length over which site clearing is to be carried out shall be as instructed by the Engineer.

Spoil of Unsuitable Material

This shall be in-situ material, which is unsuitable to remain in the road, and has been instructed by the Engineer to be spoilt. Unsuitable material shall be deposited in spoil areas located by the Contractor subject to the approval by the Engineer. The rate for spoil shall include for the cost of excavating the material, loading, transporting, depositing, spreading and levelling the material in a spoil area, all to the satisfaction of the Engineer.

Earthworks Fill

The Contractor shall supply from a source approved by the Engineer, place and compact suitable borrow material having a minimum CBR of 10%, at 95% compaction as determined by AASHTO T99 to areas that require to be raised or where there is a deficiency of in-situ material for reshaping.

Light Grading

Where this term is instructed, the road shall be graded to redistribute the existing material as required to achieve the specified cross section of the road, watered and compacted. This item applies where the required movement of material is not greater than 1 m³/m

Heavy Grading

The Contractor shall scarify the road surface, add fill material where required, reshape and compact to achieve the specified cross section. This item applies where the required movement of material is greater than 1 m³/m

Gravel Stockpiling

No separate measurement shall be made for stockpiling gravel and the Contractor will be deemed to have allowed for the costs elsewhere in his rates.

Overburden Removal

The removal of vegetation, topsoil and overburden at gravel borrow pits shall not be paid for separately. Contractor will be deemed to have allowed for the costs elsewhere in his rates. The same applies to any works required to access the borrow pits.

Haulage

The rate for gravel wearing course shall include for the supply of material, processing and compaction inclusive of extraction, loading and transportation to Site for a maximum haulage distance of 30 km one way. Where suitable gravel is not available within this distance, overhaul will be paid for. Measurement shall be the product of the volume of compacted material insitu and the haulage distance in excess of 30 km, one way,

along the shortest route, as determined by the Engineer. The Contractor shall be responsible for the maintenance of this selected route at his own cost.

Drainage Works

Culvert installation

This shall include the provision and installation of a specified internal diameter including excavation and backfill to a compaction of 95% of maximum dry density as determined by AASHTO T99. The backfill material is to be approved by the Engineer. The rate includes any provisions necessary for diversion of traffic.

Mass Concrete, Beds and Surrounds

Unless otherwise shown on the drawings, the concrete shall be class C20/20

Mitre Drains and Catch Water Drains

These will be formed at the locations and the lines and levels shown on the drawings or instructed by the Engineer.

Side Drains

These will be formed to the lines and levels as shown in the drawings and at locations as instructed by the Engineer. Material excavated from the side drains may be incorporated into the reshaped road if suitable. Otherwise, it shall be spoiled in approved spoil areas.

Cleaning of Existing Drains

The Contractor shall clean existing blocked culverts and clear side drains as may be directed by the Engineer.

Repair of Existing Drains

The Contractor shall replace broken culverts, and repair or reconstruct broken wingwalls and headwalls as directed by the Engineer.

BUILDINGS

Demolitions and Alterations

Demolition

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

Protection

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

Laying the dust

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

Making good

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

Credit for Materials

Unless otherwise specified materials arising from the demolitions and alterations will become the property of the Contractor. If the Contractor wishes to allow a credit for any such materials the appropriate allowance should be included in the 'credit' column of the Bills of Quantities.

In the event that the Employer wishes to take possession of any such materials the Contractor will only be entitled to receive compensation to the amount of credit indicated.

Definitions of Terms

The following definitions explain and simplify the terms indicated in the description of the works.

Removal shall include:

Dismantling/ pulling down/ taking down/ taking out/ taking up/ stripping etc., at the site of the works getting from the site of the works to the outside of building by whatever means is necessary and disposal.

Disposal shall include:

- Handling on site to store or to pick up point for loading;
- loading into skips or lorries;
- transporting away from site to yard, store or tip payment of all tip charges.

Making out shall include:

Infilling to voids, openings, gaps and the like and matching materials and construction to existing.

Making good shall include:

Work as last described consequent on the carrying out of other work.

Form opening in brickwork or block work shall include:

- Shoring up and needling as required;
- cutting the opening;
- designing, providing and inserting required beam or lintel and providing any calculations if required and obtaining building regulation approval;
- providing and inserting cavity gutters and the like;
- forming new arches and the like in face work to match existing;
- quoining up jambs;
- sealing cavity of hollow walls, at jambs and cill and providing and inserting damp proof course;
- making good face work and features to match existing;
- forming new external sub-cills or sub-thresholds to match existing;
- making good the plasterwork or other applied finishes including making out into reveals and providing metal angle beads to arrises where required;
- removing debris.

Block in/Blank off/Fill in opening in brick work or block work shall include:

- Carefully cutting out any flooring in opening and levelling and preparing for raising new work;
- cutting toothings for bonding in new work;
- filling the opening with brickwork or block work to match existing;
- making out face work including cutting out arches, cills or ornamentation around the opening and continuing any general face work pattern;
- wedging and pinning to existing soffit;
- providing and inserting matching damp proof course;
- making out any plasterwork including continuing any existing patterns or labours and making good between new and old work so that after decoration or weathering the original opening cannot be discerned remove debris.

Remove partition shall include:

- Shoring up if required;
- sizing, providing and inserting required timber beam if the partition is load bearing;
- taking off skirtings, picture rails and the like;
- stripping off lath plaster or other finished and insulation quilts;
- taking out doors, borrowed lights, hatches and the like, frames, linings and architraves and the like within any area of partitioning to be removed;
- dismantling and taking down studding or framed work;
- making good plasterwork or other wall and ceiling finishes including cornices and other enrichments;
- making good or making out floor boarding and any applied finishes;

- taking out timber skirtings, picture rails and the like;
- removing debris.

Repair roof covering shall include:

The term repair as applied to a tiled or slatted roof includes any or all of the following operations as are necessary:

- Renew broken or missing tiles/slates to match existing including nailing with composition nails or securing with copper tingles;
- re-wedge and re-point flashings and making out with new as required;
- re-make tile/slate verges or eaves including any bedding and pointing;
- renew defective or missing ridge or hip tiles;
- remove debris.

Renew roof covering shall include:

The term renew roof covering as applied to a tiled or slatted roof includes:

- Lift and afterwards re-fix flashings, soakers, ridge, hip and valley coverings etc;
- strip existing roofing and battens, sort and set aside sound tiles/slates;
- renew battens and re-lay existing tiles/slates together with new tiles/slates as required all to match existing including sarking felt underlay whether previously provided or not, and including any special tiles/slates to eaves, verges, ridges and valleys;
- re-wedge and re-point flashings;
- remove debris.

The term renew roof covering as applied to a sheet metal, felt or asphalt roof includes:

- Strip existing roofing
- renovate sub-base as required
- lift and afterwards re-fix flashings
- renew roof covering to match existing
- re-wedge and re-point flashings
- remove debris.

Renew flashings and the like shall include:

The term renew flashings and the like as applied to pitched or flat roofs any or all of the following as may be applicable:

- Strip existing flashings, soakers, gutters, ridge and hip coverings
- renew all work previously removed in material or similar quality and substance
- re-wedge and re-point all new flashings
- remove debris.

Ease and adjust shall include:

The terms ease and adjust as applied to doors, cupboard doors, casement sashes and the like includes:

- Re-hanging on existing hinges;
- planing edges as necessary;
- oiling locks and hinges and leaving in working order.

Overhaul shall include:

The term overhaul applied to doors, cupboard doors, casement sashes and the like includes any or all of the following operations as are necessary:

- Cramp up loose tenon joints and wedge or re-wedge including gluing wedges;
- piecing in any damaged timber to door, frame and linings or architraves;
- re-hanging on existing hinges or renewing hinges if required;
- plane edges;
- plane off protruding tenons;
- re-fix ironmongery and locks or renew if required;
- oil locks and hinges;
- renew glass where cracked or broken;
- renew putties where loose, missing or defective

Strip existing installation shall include:

The term strip existing installation in relation to electrical installation includes:

- Disconnecting at mains and making safe
- disconnecting and taking out all existing conduit, wiring and fittings (except where conduit is to be re-used)

Strip existing installations in relation to plumbing and Engineering installations shall include:

- Turning off incoming supplies;
- disconnecting and taking out all existing appliances, fittings and pipe work;
- removing defunct pipe clips, fixings and the like;
- making good walls, floors, ceilings as required;
- removing debris.

Materials

Submission of Samples

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

The information regarding the names of the suppliers may be submitted at different times, as may be convenient, but not source of supply shall be changed without the Engineer's prior approval.

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.

Cement

Ordinary Portland Cement and rapid-hardening Portland cement shall comply with the relevant section of the “Concrete Specification” or other standards as given in Concrete Specification.

Sulphate resisting cement shall comply with the physical requirements of British Standard 12: Portland cement (Ordinary and Rapid-hardening).

High alumina cement shall comply with the requirements of British Standard 915: High Alumina Cement.

White or coloured cement shall be of approved quality and chemical composition, and shall comply with the physical requirements of British Standard 12: Portland cement (Ordinary and Rapid-hardening).

Cement shall be delivered in broken bags, barrels or by an approved bulk delivery vehicle.

Cement shall be stored in a dry weatherproof shed with a raised wooden floor, or in a silo, and shall be delivered in quantities sufficient to ensure that there is no suspension or interruption of the work of concreting at any time and if in sheds, each consignment shall be kept separate and distinct. Any cement which shall have become injuriously affected by damp or other causes shall at once be removed from the Site. Cement should be used in rotation.

The Contractor shall furnish as directed by the Engineer test certificates relating to the cement to be used on the work. Each certificate shall indicate that the sample has been tested and analysed by an approved laboratory and that it complies in all respects with the requirements of the appropriate Specification for the particular type of cement.

Aggregates for Concrete

Aggregates for concrete shall consist of naturally occurring material complying with the requirements of British Standard 882: Concrete Aggregates from Natural Resources.

A certificate as to compliance with the British Standard shall be provided by the supplier to the aggregate. Tests for the determination of impurities in the sand shall be made once daily, until the Engineer is satisfied that the specified compressive strength is being regularly obtained, when, with his approval, such tests shall be made once weekly and at other times as directed by the Engineer.

The coarse aggregate, unless otherwise authorised by the Engineer, shall be delivered to the Site in separate sizes (two sizes when the maximum size is 20mm and three sizes when the maximum size is 38mm or more).

The Flakiness Index when determined by the sieve method described in British Standard 812 shall not exceed 20 for 65mm and 38mm aggregates nor shall it exceed 35 for 20mm and 10mm aggregates.

All aggregates brought upon the Site shall be kept free from contact with deleterious matter and in the case of aggregates passing a 5mm sieve they shall have been deposited in the site of mixing for not less than 16 hours before further use; aggregates of different sizes shall be stored in different hoppers, or different stacks on a clean hard surface and shall be separated from each other as approved by the Engineer.

Sand for Mortar

- a) Sand for mortar shall be natural or crushed stone sand and shall be in accordance with BS 1198-1200 where applicable to sands for general purpose mortars.
- b) The source of the sand is to be approved by the Engineer.

c) At the Works the sand is to be stored on a clean, hard surface.

All building stone shall be capable of withstanding when wet a crushing stress of 10N/mm². The source of stone shall be approved by the Engineer and stone supplied there from shall be free from Magadi, overburden, mudstone, cracks, sand holes, 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 BS 1438: Media for Biological Percolating Filters, (Sodium Sulphate Soundless test) 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 weight of not more than 20% of its original weight.

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%.

Murram

Murram shall be from an approved source quarried so as to exclude vegetable matter, loam, topsoil or clay. The California Bearing Ratio of the murram, as determined for a sample compacted to maximum density (as defined under Bs 1377) and allow to soak in water for four days, shall not be less than 30. This CBR is a guide to quality only and the compaction in the work will be judged by density.

Water for Cement Treated Materials

If water for the Works is not available from the Public Mains 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 the requirements of British Standard 3148: Tests for Water for Making Concrete.

Cement Mortar

Cement mortar shall consist of proportions by volume as specified of Portland cement and natural sand or crushed natural stone of a combination of both as specified in British Standard 1198-1200: 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.

Hydrated Lime

Hydrated Lime shall comply with British Standard 890: Building Lime, and shall be Class B of the semi-hydrated type.

Calcium Chloride

Calcium Chloride shall be of a good industrial grade, and shall be obtained from an approved source.

Lime Mortar

Lime mortar shall consist of proportions by volume as specified of hydrated lime and natural sand or crushed natural stone or a combination of both as specified for cement mortar in clause 14.10. The constituent materials shall be accurately gauged and mixed in an approved manner.

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 Section 3 of this Specification. 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 and any mortar which has begun to set or which has been mixed for a period of more than two hours shall be rejected.

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.

Concrete Building Blocks

Pre-cast concrete building blocks shall be in accordance with BS 2028 for Type A blocks from an approved source.

The faces of the blocks shall be smooth, true to shape with sharp arrises and be free from pitting and other surface defects.

Building Stone

Stone used for building shall be the best quality hard local stone obtained from approved quarries and shall be sound throughout so as to ring when struck and shall be free from all defects. Stones shall be dressed into true rectangular blocks with each surface even and at right angles to all adjoining surfaces and equal to samples submitted to and approved by the Engineer.

Steel Reinforcement

Mild steel and hot-rolled high tensile steel rod reinforcement for concrete shall be as specified in British Standards 4449, 4482: Rolled Steel Bars and Hard Drawn Wire for Concrete Reinforcements. Cold-twisted high tensile bars shall be as specified in British Standard 4461 Metric Units: Cold-twisted Steel Bars for Concrete Reinforcement. Steel fabric reinforcement shall be as specified in British Standard 4483 : Steel Fabric for Concrete Reinforcement, and shall be delivered to the Site in mats, unless the Engineer allows otherwise, and free from any permanent set tending to make it curl under vibration.

The Contractor shall furnish the Engineer with copies of the manufacturer's certificates of test for the steel reinforcement to be supplied. The Engineer, may however, order independent tests to be made and any steel which does not comply in all respects with the appropriate foregoing Specifications will be rejected.

Granular Material for Pipe Beddings

Granular material for pipe beddings shall consist of well and evenly graded material such as gravel or broken stone, having a grading of 19mm to 5mm, free from fines, readily compactible and free draining. The grading of supplies will be frequently checked.

Concrete Pipes and Specials

Concrete pipes and specials shall comply with the requirements of British Standards 5591. They shall carry the British Standards Institution registration certificate trade mark, or test certificates shall be furnished by the manufacturers.

Concrete Porous Pipes

Concrete porous pipes shall comply with the requirements of British Standard 5911: Concrete porous Pipes for Under-drainage.

Concrete Drain Invert Blocks

Pre-cast concrete invert blocks shall be 150 mm dia. half round manufactured to the detail Drawings supplied from concrete of the appropriate Class specified in Section 3 of this Specification using maximum 12mm size aggregate. If required, cube test certificates shall be supplied by the manufacturer.

Concrete Slabs for Open Drains

Pre-cast concrete slabs for lining open drains shall be manufactured to the detail Drawings supplied from concrete of the appropriate Class as specified in Tables 14.2, 14.3 and 14.4 using maximum 12mm size aggregate. If required, cube test certificates shall be supplied by the manufacturers.

Drainage Ditch Warning Posts

Pre-cast concrete drainage ditch warning posts shall be manufactured to the detail drawings from concrete of the appropriate Class specified in Section 3 of this Specification. If required, cube test certificates shall be supplied by the manufacturers.

Agricultural Tiles and Pipes

Agricultural tiles and pipes shall be best well burnt earthenware, true and circular in bore and with an externally flat bottom and plain ends suitable for laying with open or butt joints.

Manhole Covers and Frames

Manhole covers and frames shall be basically in accordance with the requirements of BS EN 124: Cast Manhole Covers, Road Gully Gratings and Frames for Drainage Purposes, except that manhole covers shall be constructed of mild steel, concrete filled, and set in grease/bitumen for water tightness in accordance with the Local Authority's standard detail drawings.

Foulwater sewer manholes shall have triangular Grade 'A' heavy duty covers and frames. Circular manhole covers and frames shall be used on surface water sewer manholes, and also heavy duty covers where indicated on the drawings.

Gully Gratings and Frames

Gully gratings and frames shall be basically in accordance with the requirements of BS EN 124 497, nominal size 500mm x 350mm, except that the gully gratings shall be constructed of mild steel, concrete filled in accordance with the Local Authority's standard detail Drawings.

Pre-cast Concrete Manholes and Inspection Chambers

Pre-cast concrete manholes and inspection chambers shall comply with the requirements of British Standard 5911: Concrete Cylindrical Pipes and Fittings including Manholes, Inspection Chambers and Street Gullies, and they carry the British Standard Institution registered certification trade mark, or test certificates shall be furnished by the manufacturers.

Pre-cast Concrete Gullies

Pre-cast concrete gullies shall be un-reinforced and shall comply with the requirements of British Standard 5911: Concrete Cylindrical Pipes and Fittings including Manholes, Inspection Chambers and Street Gullies.

Manhole Step-irons

Step-irons of general-purpose type shall comply in all respects with BS 1247: Malleable Step Irons.

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 British Standard 144: Coal Tar Creosote for the Preservation of Timber, or an alternative approved timber preservative.

PVC Pipes

uPVC pipes for potable water supply shall comply with BS 3505 and shall be of the type and class as specified in the Drawings or the Bills of Quantities. Where uPVC pipes are to be used for gravity sewerage, they shall be to BS 5481 for sizes DN200 and above and to BS 4660 for under sizes. Laying, jointing and testing shall be to BS 5955. The joint shall employ a flexible rubber ring which shall meet the requirements of BS 2494. Laying, jointing and testing shall generally be carried out according to the relevant Clauses of this Specification and all as per the manufacturer's instructions.

Bitumen

Bitumen shall unless otherwise stated be commercial straight run of penetration 85 - 100 as specified in Table IV - I of the Asphalt Handbook of the Asphalt Institute (USA).

Cut-Back Bitumen

Cut-back bitumen shall be of the specified grade stated in Tables IV - 2 to IV - 4 of the Asphalt Handbook of the Asphalt Institute (USA).

Bitumen Emulsion

Bitumen emulsion shall conform to the requirements of British Standard 434: Bitumen Road Emulsion.

Aggregates for Surface Dressing

Aggregates for surface dressing shall consist of hard, rough, clean crushed rock (blacktrap) as approved by the Engineer. It shall be of approved nominal size and quality and otherwise in conformity with the requirements of British Standard 63: Single Sized Road Stone and Chippings.

Dry Rubble Backing

Dry rubble backing shall consist of broken stone of approved quality, graded from 100mm to 50mm.

Pre-cast Concrete Kerbs, Channels, Edgings and Quadrants

Unless otherwise stated in the Bills of Quantities pre-cast concrete kerbs, channels and edgings shall comply with the requirements of British Standard 7263: Pre-cast Concrete Kerbs, Channels, Edgings and Quadrants. The date of manufacture shall be marked on each unit. If required, test certificates shall be furnished by the manufacturers.

Pre-cast Concrete Flags

Pre-cast concrete flags/paving slabs shall comply with British Standard 7263: Pre-cast concrete paving slabs shall be 600 x 600 x 50 mm thick, laid on a 50 mm thick sand bed. If required, test certificates shall be furnished by the manufacturers.

Paint

All priming, undercoating and finishing paints shall be in accordance with British Standard 2521/4: Ready Mixed Oil-based Priming Paints, or British Standard 2525/32: Ready Mixed Oil-based Undercoating and Finishing Paints (Exterior Quality), as appropriate.

Masonry and Block work

General

All masonry work shall be constructed from building stone as specified in Part 4 or approved concrete block work as specified in Part 4.

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

Workmanship

All masonry work is to be constructed in compliance with BS 5.

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

Stones and blocks shall be well soaked before use and the tops of walls shall be kept wet as the work proceeds. The stones and blocks shall be properly bonded so that no vertical joint in a course is within 115mm of a joint in the previous course. Alternate courses of walling at angles and intersections shall be carried through the full thickness of the adjoining walls. All perpendics; reveals and other angles of the walling shall be built strictly true and square.

The stones and blocks shall be bedded, jointed and pointed in mortar (1:3) in accordance with Part 4, with beds and joints 9mm thick flushed up and grouted solid as the work proceeds.

All work shall be cured in accordance with the relevant requirements of Part 4.

Walling

Materials

Cement

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

Lime

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

Sand

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

Water

Shall be as described in "Concrete Work".

Concrete Blocks

Concrete blocks shall comply with the requirements of BS 2028, 1384 except where amended or extended by the following clause. Blocks shall have square arises and corners. For fairfaced work damage to arises and corners shall not exceed the removal of 6 mm of the blocks depth or thickness.

Concrete blocks shall have a minimum crushing strength of 3.5 N/mm² except when below the damp course level or in contact with soil when they shall have a minimum crushing strength of 7 N/mm², unless noted otherwise on drawings.

Hollow concrete blocks shall not be used below the damp course level or in contact with soil.

Concrete blocks used for external walls shall be Class 'A' and for internal load bearing walls they shall be at least Class 'B'. Class 'C' blocks shall only be used for non-load bearing partitions.

No pre-cast blocks shall be incorporated into the works unless approved by the Architect. The delivery of present blocks from which samples tested do not comply with this specification shall be deemed defective. Any work constructed with blocks from which samples tested do not comply with this specification shall be deemed to be defective.

From every 1,000 pre-cast concrete blocks delivered to site ten blocks samples shall be provided for testing. The pre-cast block samples shall be selected in accordance with BS 2028, 1364. Samples of pre-cast concrete blocks for testing shall be tested for the following properties in

accordance with the methods given in BS 2028, 1364 and the test results shall comply with the requirements of BS 2018, 1364 except where amended by this specification:-

- (a) Drying shrinkage
- (b) Compressive strength or transverse breaking load (as applicable)
- (c) Wetting expansion *
- (d) Density
- (e) Dimensional Tolerance
- (f) Cavity size

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

Blocks shall also be tested to determine the suction rate. The test shall consist of weighing the block, placing in a tray of water such that only 3 mm of the block side is immersed for a period of sixty seconds +/- 2 seconds; quickly wiping off excess water and reweighing. The suction rate is the increase in weight due to water absorbed and shall not exceed 2kg/m²/minute. Blocks which have a suction rate exceeding 2kg/m²/minute may be used if the Contractor uses an approved water reactive additive in the mortar or can show that the blocks are wetted such that the blocks will have a suction rate not exceeding 2kg/m²/minute for a period of 24 hours from being laid and provided the blocks comply with all other requirements.

Concrete blocks shall be stacked on prepared dry areas free of clinker, ashes and sulphate bearing strata. Blocks of different strengths shall be stacked separately and clearly marked to differentiate the strengths.

Blocks shall not be used for a minimum of 7 days after manufacture and shall not be loaded for at least 14 days after laying. For the first 7 days after manufacture, blocks shall be cured by maintaining in a damp condition, e.g. covering with polythene sheeting after wetting blocks.

Hollow Clay Blocks

Hollow clay partition blocks shall comply with the provisions of BS 1190 Section 1 and are to be hard, well burnt, true to size and shape and with sharp arrises and keyed faces and joints and are to be obtained from an approved manufacturer and to be equal in every respect to a sample to be deposited with, and approved by, the Architect.

Blocks are to be 190 mm high (to give 200 mm course height including the joint) and of the thickness given herein. Cutting of blocks is to be avoided wherever possible and full use is to be made of quarter, half and three-quarter blocks, and blocks with conduit recesses.

Louvre Block Walling

- (a) To be pre-cast concrete mix 1:1.5:3 or 25 N/mm² (12 mm aggregate) but with 10 mm finished fair on all exposed surfaces, built in cement and sand (1:5) mortar with straight horizontal and vertical joints to flush pointed both sides.
- (b) Each block to be size 200 mm x 400 mm x 200 mm high and consisting of two ends each 200 mm x 200 mm x 50 mm thick joined with a 50 mm thick twice cranked louvre with top end of louvre projecting 40 mm above top of block.

Stone

All stone shall comply with the requirements of CP 121.202 for masonry and rubble walls respectively except where amended or extended by the following clauses.

Unless otherwise noted, all masonry walls shall be coursed squared rubble walling with mortar joints.

The size of stones for rubble walling shall be such that the length of stone does not exceed three times its height. For coursed squared rubble walls blocks shall not exceed 300 mm in height and shall be not less than 150 mm in height.

Where snecked rubble walls are specified, the snecks shall not be less than 100 mm square on the exposed face.

Stone for masonry shall have a minimum compressive strength of 10 N/mm². (Stone shall not be required to be tested to failure). The density of stone for masonry shall be not less than 2300 kg/m³. The drying shrinkage of stone shall not exceed 0.05%

Samples of stone provided for testing shall be tested for the following in accordance with the methods given in BS 2028, 1364 and the test results shall comply with the requirements of this specification.

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

The colour and texture of stone shall be uniform and consistent. Prior to delivering any stone to site, the Contractor shall supply the Architect with a sample of stone in order that he may approve the colour and texture. The Contractor shall ensure that sufficient suitable stone is available for the whole of the project prior to ordering the stone.

Where cast stone including stone described as artificial stone, reconstructed stone, etc., is specified the stone shall comply with the requirements of BS 1217.

Masonry shall be of stone, having no irregular faces and only the back face if not visible shall be left as from the saw.

Prior to ordering dry stone the Contractor shall demonstrate that the stone is durable. This may be done by supplying details of buildings constructed with stone from the same quarry and which has been exposed to the same environmental condition for at least ten years.

The maximum projection from the face of stone for rubble walls shall be 20 mm beyond the specified face of the wall.

The Contractor shall provide six samples of stone measuring 150 mm x 150 mm for testing prior to delivering any stone to site. As work proceeds the Contractor shall provide six samples 150 x 150 x 150 mm for testing from every 300 m² of work.

All stone shall be stacked on prepared dry areas free of clinker, ashes and sulphate bearing strata.

Fire Bricks

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

Wall Reinforcement

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

Wall Ties

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

Damp-Proof Courses

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

Workmanship

Cement Mortar

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

Mixing of Mortar

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

General Construction

Setting out

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

Building in Wood Frames

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

Building in Metal Windows and Doors

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

All frames must be set plum and level and free from twist.

Walls to Receive Plaster & Similar Finishes

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

Building Walling

Laying and Jointing

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

Bonding

The blocks shall be properly bonded together and in such manner that no vertical joint in any one course shall be within 115 mm of a similar joint in the courses immediately above or below. All walling of 300 mm thickness or less shall be built in single thickness of blocks. Walling exceeding 300 mm in thickness shall be built with through bonders not more than 1070 mm apart in each course as directed by the Architect.

Alternate courses of walling at all angles and intersections shall be carried through the full thickness of the adjoining wall. All perpend, reveals and other angles of the walling shall be built strictly true and square.

Tolerances

All courses of walls shall be level with a maximum deviation of ± 3 mm in any one metre length and a maximum overall deviation of 10 mm for lengths of wall exceeding 3 metres. Walls shall be plumb with a maximum deviation of ± 3 mm in any metre height of wall with a maximum deviation of ± 10 mm in the total height of the wall or any storey.

All corners of walls which are shown as being at right angles shall be square with a maximum deviation of 3 in 1000. All walls shall be straight with a maximum deviation of ± 3 mm in any one metre length and a maximum overall deviation of 10 mm in any length exceeding 3 metres.

All bed and vertical joints shall be an average of 10 mm thick with a maximum deviation of ± 3 mm of block work, and stone rubble walls. Joints for stone masonry walls shall be 6 mm ± 1 mm thick.

Curing

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

Cavities

Cavity walls shall be of the overall thickness shown on the drawings.

Cavities above ground level between leaves of block or masonry shall be free of mortar droppings or other debris. The Contractor shall take proper precautions to prevent mortar or debris entering the cavity.

Cavities below ground level shall be filled with mortar for cavities up to 75 mm wide and for cavities over 75 mm wide filling shall be concrete mix 1:3:6. Cavities shall be filled such that there is maximum of three times the thickness of the thinner leaf of the wall filled with wet mortar or concrete unless the wall is continuously supported for the depth.

Backfilling

Earth backfilling against walls shall be carried out such that the level of the backfill is always equal on each side of the wall.

When a wall has filling material on one side only to a fill width of more than three times the wall thickness, the wall shall be continuously supported during backfilling.

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

Reinforced Walls

Steel reinforcing bars in walls shall be carefully placed and spacers used to ensure that a minimum of 20 mm cover is given to the reinforcement unless otherwise specified.

Horizontal reinforcement in mortar joints shall be laid such that the reinforcement is not in contact with the blocks or stone.

Wall Ties

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

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

Fair Face

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

Pointing

Pointing of walls shall be carried out as the work proceeds wherever possible. When coloured mortar is specified for pointing only the pointing shall be carried out after work has been completed.

Existing walls shall be prepared for pointing by raking out all loose friable material to a minimum depth of 15 mm to form a square recess. The joints shall then be wetted and new mortar shall be forced into the joints and finished as directed.

Holes, Cutting and Chasing

- (a) putlog holes shall be not less than one course deep and carefully filled with a block cut to fit size of opening with beds and joints filled with mortar well tamped in after scaffolding is removed, and if in faced walls to match facing.
 - (b) Where walling is cut, holed or chased for conduits, pipes and the like all such cuttings etc., shall be filled in solid with cement mortar (1:4) prior to the application of finishes.
-

Painting and Decorating

Materials

Manufacturers

Except where stated all materials shall be obtained from approved manufacturers. The Contractor shall state the name and address of the manufacturer whose materials he proposes to use. Once approval has been given the Contractor shall not obtain materials from other sources without the prior written agreement of the Architect.

Painting products shall be obtained from one of the following approved manufacturers

- (a) Crown Paints
- (b) Basco Paints
- (c) Sadolin paints
- (d) Dulux Paints

All paint shall be grade A quality

General

Each succeeding coat of priming, undercoating and finishing (pigment) or clear coating shall be sufficiently different in colour as to be readily distinguishable.

All primers and paints in one system upon a particular surface shall be obtained from the same manufacturer.

The mixing of paints, etc., of difference brands before or during application will not be permitted.

Emulsion paints

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

Gloss paint

Gloss paint shall be hard gloss finish oil paint.

Bluchearing paint

Bluchearing paint for door handles and gutters is to achieve a wrot iron effect to be obtained from Sadolin paints or equal approved.

Automotive paint

Automotive paint is to be two pack epoxy paint on specified surfaces factory applied, with baked finish, by Sadolin or other approved manufacturer. Colour selection is to be to the Architects approval.

Bituminous solution

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

Traffic paint

To be as Crown Paints, Road Paint or other approved for use on concrete block paving.

Lead based paints

The use of lead based paints will not be permitted.

Clear finishes

Clear finishes internally shall be clear polyurethane varnish one or two pack as specified.

Varnish

Varnish is to be an imported water based varnish/stain by Sadolin Paints or other equal approved.

Primers and undercoats

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

Knotting

Shellac knotting shall comply with B.S. 1336.

White spirit

The white shall comply with B.S. 245.

Timber stain

Timber stain shall be oil based pigmented stain. The application of this material shall be strictly in accordance with the manufacturers written instructions. Tint and degree of application shall be to the approval of the Architect.

Textured coating

Textured coating is to be of proprietary manufacture approved by the Architect of an approved colour.

Technical information concerning the coating is to be submitted to the Architect before ordering, but the minimum qualities of the coating are to be as follows:-

- (i) Suitable for application internally and externally to plastered, rendered, concrete, (ii) block, stone, brick, asbestos and timber surfaces.
- (iii) Minimum durability of 10 years even in exposed conditions.
- (iv) Maintenance free.
- (v) Built-in mould resistant fungicide.

Stopping

The stopping shall be as follows: -

- (i) Plasterwork shall be plaster based filler.
- (ii) Concrete and brickwork shall be similar material to the background and finished in a similar texture.
- (iii) Internal woodwork, plywood and blockboard shall be putty complying with B.S. 544.
- (iv) External woodwork shall be white lead paste complying with B.S. 2029.
- (vi) Internal clear wood finishes: the stopping shall be that recommended by the clear lacquer manufacturer.

Fillers

The fillers for internal joinery shall be the type recommended by the paint manufacturer for use with his type of paint or lacquer.

Stopper and fillers shall be tinted to match the undercoat, and shall be compatible with both undercoats and primers.

All materials shall be used strictly in accordance with the manufacturer's instructions.

Workmanship

General

Workmanship generally shall be carried out in accordance with B.S. C.P. 231, unless otherwise specified.

Before painting is commenced floors shall be swept and washed over; surfaces to be painted shall be cleaned before applying paint as specified, and all precautions taken to keep down dust whilst work is in progress.

No paint shall be applied to surfaces structurally or superficially damp and all surfaces must be ascertained to be free from condensation, efflorescence, etc., before the application of each coat.

No painting shall be carried out externally during humid, rainy, damp, foggy or freezing conditions or conditions where surfaces have attained excessively high temperatures or during dust storms.

No new, primed or undercoated woodwork and metalwork shall be left in an exposed or unsuitable situation for an undue period before completing the process.

No dilution of paint materials shall be allowed except strictly as detailed by the manufacturer's own direction, either on the containers, or their literature, and with the special permission of the Architect. For external work dilution of paints will not be allowed whatsoever. For internal work,

where permitted by the Architect, undercoats may be thinned by the addition of not more than 5% thinners. Gloss finish shall not be thinned at all.

Metal fittings such as ironmongery etc., not required to be painted shall first be fitted and then removed before the preparatory processes are commenced. When all painting is completed the fittings shall be cleaned as necessary and re-fixed in position.

Brushwork

Unless otherwise specified, all primers and paints shall be brush applied. Written permission must be obtained from the Architect's if an alternative method of application is to be used.

Stopping and filling

Unless otherwise specified by the manufacturer all primers and undercoats shall be stopped flush and rubbed down to a smooth surface with an abrasive paper and all dust removed before each succeeding coat is applied. Care shall be taken to prevent burnishing of the surface.

Stirring

Unless otherwise specified by the paint manufacturer all paint materials shall be thoroughly mixed and/or stirred before and during use, and suitably strained as and when necessary.

Inspection

No priming coats shall be applied until the surfaces have been inspected and the preparatory work has been approved by the Architect. No undercoats or finishing coats shall be applied until the previous coat has been similarly inspected and approved.

Paint application

Each coat of paint shall be so applied as to produce a film of uniform thickness. All paint shall be applied in accordance with the manufacturer's instructions. Special attention shall be given to ensure that all surfaces including edges, corners, crevices, welds and rivets receive a film thickness equivalent to that of adjacent painted surfaces.

Drying

All coats shall be thoroughly dried before succeeding coats are applied. Allow a minimum of 24 hours between applications on any one surface, unless otherwise specified by the manufacturer.

Un-primed woodwork

Un-primed woodwork scheduled to be painted shall be rubbed down with abrasive paper and dusted off. Care shall be taken to prevent 'burnishing' of the surface. All knots and resinous areas shall be coated with two coats of knotting. Pitch on large, open unseasoned knots and all other beads or streaks of pitch shall be scraped off, or if still soft, shall be removed with white spirit before applying the knotting. Apply one coat of priming to all surface, two coats to all end grain, to be subsequently painted. Backs of all wood frames in contact with concrete, brickwork, block work and metalwork or similar materials shall be primed before fixing. After priming all joints, holes, cracks shall be stopped and filled, rubbed down and dusted off.

Primed woodwork

Woodwork delivered primed shall be lightly rubbed down with abrasive paper, and dusted off. Touch up bare areas with a similar priming including open grained ends. After touch priming all

joints, holes, cracks and open grained ends shall be stopped and filled, rubbed down and dusted off.

Plywood and block board

Edges of exterior plywood and block board shall be sealed with two coats of aluminium primer and the backs treated with a lead primer.

Clear finished woodwork

All woodwork scheduled to receive a clear finish shall be well sanded with the grain removing all dirt etc., to give as smooth a surface as possible. Resinous timber shall be swabbed down with white spirit and dried thoroughly. Split or end grain shall be filled with suitable filler recommended by the clear lacquer manufacturer, in accordance with their instructions, and of the appropriate shade.

Bare metalwork

Bare metalwork shall be thoroughly cleaned off all dirt, grease, rust and scale by means of chipping, scrapping and wire brushing; particular attention should be given to the cleaning of welded, brazed and soldered joints. Wash down with white spirit and wipe dry with clean rags. Apply a coat of metal primer immediately the cleaned surfaces have been approved by the Architect.

Galvanized metalwork

Galvanized metalwork scheduled for painting shall be thoroughly cleaned of dirt, grease, dusted and washed down with white spirit and wiped dry with clean rags. Any minor areas of rust shall be removed by wire brushing and spot primed with a zinc rich primer. Apply at least one coat of calcium plumbate primer to all surfaces subsequently to be painted.

Primed metalwork

If the priming coat of pre-primed metalwork has suffered damage in transit, or during erection on site, the affected areas shall be cleaned off by wire brushing, abrading and dusting off, the bared patches touched up with a primer of a similar type to that already applied.

Copper

Copper scheduled for painting shall be lightly abraded with emery cloth, washed with white spirit and wiped dry with clean rags. Apply a coat of etch primer immediately the cleaned surfaces have been approved.

Brickwork, concrete etc.

All brickwork, block work, concrete, rendered and plaster surfaces scheduled to be painted shall be brushed down, all holes and cracks filled, all projections such as plaster, or mortar splashes etc., removed to leave a suitable dust free surface. All traces of mould oil shall be removed from concrete surfaces by scrubbing with water, detergent and rinsing with clean water. All these surfaces shall be thoroughly dry before any primer or paints are applied. Apply a coat of alkali resisting primer where surfaces are to be finished with oil paints or alkyd resin type emulsion.

Asbestos cement surfaces scheduled for painting shall be brushed down to remove powdery deposits, and a coat of alkali resisting primer applied where such surfaces are to be finished with oil paints or alkyd resin type emulsion.

Colours

The colours will be selected by the Architect from the paint manufacturer's standard colour range.

Toxic wash

Concrete, block work, plaster and timber surfaces which are to be painted shall be washed down prior to painting with a toxic wash applied by brush or spray. A second wash shall be applied two days after the first wash. The surfaces shall be then allowed to dry out completely before application of paint.

Protection

Proper care must be taken to protect surfaces while still wet by using of screens and 'wet paint' signs where necessary.

Damage

Care must be taken when preparing surfaces, or painting etc., not to stain or damage other work. Dust sheets and covers to the satisfaction of the Architect shall be used to protect adjacent work. Any such stains or damage shall be removed and made good at the Contractor's expense.

Cleanliness

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

Performance

If, while the work is in progress, the paint appears to be faulty, such as consistency of colour, drying time, or quality of finish, the work shall be stopped at once and the manufacturer consulted.

The manufacturer's of the materials shall be given every facility for inspecting the work during progress in order to ascertain that the materials are being used in accordance to their directions, and to take samples of their products from the site if they so desire for tests.

The finishing coats of the various paints or surface finishings shall be free from sags, brush marks, runs, wrinkling, dust, bare or 'starved' patches, variations in colour and texture, and other blemishes.

When the work has been completed, the finished surfaces shall not be inferior in quality, colour and finish to the samples approved by the Architect, and imperfections in manufacture shall not be apparent through these finished surfaces.

In the event that the Architect is not satisfied that the quality of finish does not comply with the required standards and/or the sample panel the Contractor will be required to repaint at his own expense, such work to the satisfaction of the Architect. If in the opinion of the Architect it is necessary to remove completely the unsatisfactory paintwork this shall also be done under the direction of the Architect at the expense of the Contractor.

Packaging, delivery and storage

All paints and surface coatings shall be delivered in sound sealed containers, labelled clearly by the manufacturers, the label or decorated container must state the following:-

- (i) The type of product.
- (ii) The brand name and colour
- (iii) The use for which it is intend
- (iv) The manufacturer's batch number
- (v) The B.S. number if applicable
- (vi) All labels shall be printed - containers bearing type written labels will not be acceptable.

Materials shall be stored under cover in accordance with the manufacturer's instructions, and with local fire and safety regulations. The store itself must be maintained at a temperature of not less than 50 degrees F (10 degrees C) and must not be subjected to extreme changes of temperature.

The batch deliveries are to be dated and used strictly in order of delivery.

Vinyl emulsion paint

Surfaces to be painted shall receive one mist coat followed by two full coats of vinyl emulsion paint. Application may be by means of rollers or brushes.

Gloss finish paint

Surfaces to be painted shall be primed then painted with two undercoats followed by one coat gloss finish paint.

Clear polyurethane varnish

Surfaces to be clear varnished shall be treated with two coats water based as Sadolins (UK) Ltd or equal approved.

Textured Coating

The manufacturer's instructions concerning application of the coating are to be strictly followed under the direction of the Architect.

All surfaces to receive textured coatings are to be clean and dry with surfaces scraped and brushed before application of the coating.

Application of the coating is to be with textured roller or fibre brush as directed by the Architect with a minimum spreading capacity of 1 kilogramme per square metre. Under no circumstances is the coating to be thinned.

Painting

General

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

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

All surfaces to be painted shall be adequately cleaned and prepared to the satisfaction of the Engineer's Representative and shall be dry and free from any oils, greases, stains or other marks prior to being painted. The paint shall be well and evenly applied. Where sprays are used, markings of the edges of the painted area shall be carried out to provide a definite edge. Brushes and sprays shall be the correct size and type for the work being executed.

For painting applied in several coats each coat shall be of a different shade or colour from the others. Each coat shall be allowed to dry thoroughly and sufficiently harden before the next coat is applied.

All colours shall be selected and approved by the Architect.

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

Block Work

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

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

Woodwork

Woodwork to be painted shall be reasonably dry and its surfaces shall be cleaned and made smooth by the use of fine sand paper obliquely across the grain. The surfaces shall then be dusted off with a dusting brush.

Knots shall be sealed with knotting putty to BS 1336, unless very resinous, when they shall be cut out and the depressions filled after priming. The work shall then be thoroughly primed by brush with a priming paint to BS 5082 and 5358, end grain being given two coats. Cracks, holes and open joints shall be stopped with a mixture of equal parts of hard stopping and linseed oil putty.

Two coats of undercoating of approved manufacture shall be applied, the surfaces being rubbed down between coats. The surfaces on being dry shall then be painted with a final coat of gloss paint leaving no brush traces or irregularities.

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

Metalwork

Galvanised metal surfaces shall first be treated with one coat of mordant solution which shall in due time be carefully washed off. The surface shall then be primed with a calcium plumbate primer. When this has dried thoroughly, the surfaces shall be given one coat of undercoat and one of a gloss finishing paint.

All metalwork shall be cleaned free from all rust, scales, grease, oils and any other surface stains, and shall be given one coat of an approved primer compatible with the metal to be painted, two applications of undercoat and one application of a gloss finishing coat.

The Contractor shall seek specific instructions to paint any non-ferrous metal surface.

All metalwork which has been supplied with bituminous protection or painting prior to despatch from the place of manufacture, such as pipes, tubes, valves, manhole covers, etcetera, shall have all exposed surfaces painted after erection.

The manufacturer's primer or coating shall be made good to the same standard and specification as supplied, and shall then be given two coats of paint as follows:-

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

Structural Steelwork

All surfaces to be painted shall be dried and cleansed free of all oil, grease, dirt or other extraneous matter by the use of white spirit, water or other appropriate cleaning material. Where surfaces have been damaged in transit they shall be made good to the same standard to which they were originally protected. Where as a result of such damage the metal has been bared, the paint immediately adjacent to the affected area shall be trimmed down, the affected area cleaned by wire brushing and the protective paint system restored, to provide a coat by coat lapping at the junction of the new and old paint systems. Where welding has been carried out on site, the welds shall be de-slagged and wire brushed, and a protective paint system applied similar to that of the surrounding steel surfaces.

Where surfaces have been left unpainted and are to be connected by High strength friction grip bolts they shall be cleaned as specified in Specifications Section 20 and the contact surfaces brought together without further treatment. After bolting up, those surfaces which, being exposed are not protected, shall be wire brushed, primed and painted to the requirements of Specifications Section 20 to give a coat by coat lapping with adjoining painted surfaces.

Where surfaces have been left unpainted and are to be completely embedded in concrete they shall be cleaned of all oil, grease millscale or other extraneous matter immediately prior to concreting but shall otherwise be left untreated. Where steelwork is to be partially embedded in concrete the paint system shall be continued into the concrete for a distance equal to the least lateral dimension of the concrete forming the surround.

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

Galvanising

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

Finishing Off

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

Finishings

General

Other specifications

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

Samples

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

Finished thicknesses

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

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

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

Materials generally

All materials shall be of high quality, obtained from manufacturer's to be approved by the Architect.

Cement, sand and water shall be as described under Concrete Work and Block work.

Bonding

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

Chases, openings and holes

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

In-situ Finishings

Generally

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

Mixes

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

| Item of Work | Mix | Minimum Thickness and Finish |
|---------------------|--|--|
| Internal Plaster | 1 part cement ¼ part lime 4 parts sand | 12 mm finish to walls and ceilings steel trowelled finish unless otherwise specified |
| External Render | 1 part cement 4 parts sand | 12 mm finish with wood float finish unless otherwise specified |
| Tyrolean finish | Ditto | 6 mm finished thickness in two coats on 10 mm plastered backing |

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

With regard to the lime mortars gauged with cement, the addition just before use, of the cement to small quantities of the lime/sand mix shall preferably take place in a mechanical mixer and mixing shall continue for such time as will ensure uniform distribution of materials and uniform colour and consistency.

It is important to note that the quantity of water used shall be carefully controlled. Plaster may be mixed either in a mechanical mixing machine or by hand.

Hand mixed plaster shall first be mixed in the dry state being turned over at least three times. The required amount of water should then be added and the mix again turned over three times or until such time as the mass is uniform in colour and homogeneous.

The plaster shall be completely used within thirty minutes of mixing and hardened plaster shall not be remixed but removed from the site.

Preparation of surfaces for plaster etc.

Irregularities in the surfaces to be plastered or rendered shall be filled with mortar, without lime, twenty four hours before plastering is commenced. Joints in block work, etc., are to be well raked out before plastering to form a good key. Smooth concrete surfaces to be plastered shall be treated with an approved proprietary bonding agent or hacked to provide an adequate key for the plaster.

All surfaces to be plastered or rendered shall be clean and free from dust, loose mortar and all traces of salts.

All surfaces shall be thoroughly sprayed with water and all free water allowed to disappear before plaster is applied.

As far as practical, plastering shall not be commenced until all mechanical and electrical services, conduits, pipes and fixtures have been installed.

Before plastering is commenced all junctions between differing materials shall be reinforced. This shall apply where walls join columns and beams, particularly where flush, and similar situations where cracks are likely to develop and as directed by the Architect. The reinforcement shall consist of a strip of galvanised wire mesh 'Expamet' or equal approved 15 cm wide which shall be plugged, nailed or stapled as required at intervals not exceeding 45 mm at both edges. The surfaces to which such mesh shall be applied shall be painted with one coat bituminous paint prior to fixing the mesh.

Application of plaster and render

After preparation of the surfaces a key coat of cement slurry shall be applied to the wetted surface to be plastered. When this coat is dry the plaster coat shall be applied, by means of a trowel, between screeds laid, ruled and plumbed as necessary. This coat which shall be to the required thickness shall be allowed to set hard and then cured as described. Surfaces are to be finished with a wood or steel float to a smooth flat surface free from all marks.

All plastering and rendering shall be executed in a neat workmanlike manner. All faces except circular work shall be true and flat and angles shall be straight and level or plumb. Plastering shall be neatly made good around pipes or fittings. Angles shall be rounded to 6 mm radius.

All tools, implements, vessels and surfaces shall be at all times kept scrupulously clean and strict precautions shall be taken to prevent the plaster or other materials from being contaminated by pieces of partially set material which would tend to retard or accelerate the setting time.

Curing of plaster

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

Angle beads

Where required by the Architect, salient external angles of plastered walls shall be protected with galvanized mild steel angle beads complying with BS 1246 Fig. 7 Profile C3.

They shall be securely plugged, nailed or stapled as required at intervals not exceeding 450 mm at both edges.

Plaster stops

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

Textured decorative plaster finishes

Textured decorative plaster finishes shall be a pre-mixed textured finish. The finishes shall be applied by trowel or roller as stipulated by the manufacturer for the particular finish as specified in the bills of quantities.

The finishes shall be applied strictly in accordance with the manufacturer's instructions and to the approval of the Architect. Finished thicknesses shall be in accordance with the manufacturer's recommendations.

Finish Type SP2 is to be applied to external walls and finish Type SP3 is to be applied to internal piers and columns and external veranda columns.

Cement and sand screeds

Screeds shall be mixed and formed as described.

Terrazzo and granolithic work

The whole of the terrazzo and granolithic work is to be carried out by a specialist sub-contractor who is to be specifically approved by the Architect and the contractor will be required to make arrangements for the execution of this work and bear all expenses incurred.

The materials used and method of construction for terrazzo work are to be in accordance with the BS Code of Practice CP 204/1951.

The surface finish to terrazzo is to be polished to comply with samples approved by the Architect.

The terrazzo topping is to be 20mm thick with imported white cement and 12mm marble aggregate, rolled and trowelled to a dense even surface and rubbed down at completion to a grit finished surface free from holes and blemishes.

Terrazzo features for capitals and bases will be either pre-cast or in-situ with the approval of the Architect. Colours shall be as selected by the Architect.

The paving is to be laid in squares divided by divided strips anchored securely in the screed and having their top edges truly level with the finished floor surface. The terrazzo work is to be laid and finished complete to the approval of the Architect.

The granolithic topping is to be 15mm thick and shall consist of one part coloured cement to two parts aggregate to 6mm gauge mixed with 15% fine dust. Aggregate is to be 70% black trap and remainder approved local coloured stone. Colours shall be as selected by the Architect. Paving is to be rolled and trowelled to a dense even surface and rubbed down at completion to a grit surface free from holes and blemishes. The paving is to be laid in squares divided by plastic strips anchored securely in the screed and having their top edges level with the finished floor surface.

The granolithic work is to be laid and polished complete to the approval of the Architect. The screed between the granolithic topping and the concrete floor is to be cement and sand (1:3)

The contractor is to twice scrub the topping with soap and water before twice wax polishing and handing over.

Dividing strips

Dividing strips shall be 3mm thick plastic and of a similar height as the paving in which they are embedded. Strips shall be cut to lengths and embedded in the pavings to form margins or bays to a detailed pattern or between differing floor finishes.

Dividing strips are to be cut as required to ensure a flush level surface with the paving.

Non-slip polished pavings

Where pavings are described as non-slip they shall have carborundum dust sprinkled evenly over the surface at the rate of one kilogram per square metre lightly trowelled in whilst still green.

Surface hardeners

Floor hardeners shall comprise an approved type guaranteed by the makers to produce a hard dense concrete with high abrasive resistance, impervious to the penetration of heavy oils, acid or alkali solutions and to be used strictly in accordance with the maker's instructions.

The first dressing of sodium silicate for granolithic flooring shall be one part of sodium silicate to six parts of water by volume.

Subsequent dressing shall be composed of one part of sodium silicate to four parts of water by volume, for all surfaces. The two liquids shall be well mixed together, sprayed over the flooring and spread evenly with a mop or soft brush, any excess being wiped off and the flooring allowed to dry for at least 24 hours after each dressing. After final drying, floors shall be washed with clean water.

Rates of in-situ work

The rates for in-situ work shall include for raking out joints of block work or bonding coat or spraying cement slurry on new concrete surfaces to form key, for work in narrow widths, small and isolated areas, rounded arrises, fair and chamfered edges, for making good up to boundaries of other work for making good and working around pipes, brackets etc., and for all other incidental labours.

Rates shall also include for masking before the application of spray finishes work executed overhead, temporary rules, supports, screeds and templates.

Tiles, Slab and Block Finishings

PVC Vinyl floor tiles

PVC vinyl floor tiles shall be imported as Marleyflex or other equal approved manufacturer.

PVC vinyl floor tiles shall be 2.5mm thick and comply with B.S. 3260 of an approved manufacturer to patterns as directed by the Architect. Adhesives are to be as recommended by the manufacturer in writing and approved by the Architect. Bitumen is not an approved adhesive.

The tiles are to be laid and bedded direct in adhesive on to a cement and sand bed to make up the total paving thickness.

The cement and sand screed is to be finished with a steel trowel to a perfectly smooth surface before the application of the mastic and tiling.

On completion the PVC vinyl tiles are to be sealed and polished with wax all in accordance with the manufacturer's printed instructions.

Adhesives are to be polychloroprene as approved by the manufacturer and the Architect.

Clay tile paving

Clay tile pavings are to be in 200 mm x 200 mm tiles obtained from an approved manufacturer, and are to be laid on prepared screeds. The tiles are to be bedded in cement and sand (1:4) with straight joints in each direction. Upon completion grout in cement and wash and clean down. Tiles are to be cut with an electric tile cutting saw.

Finish to clay tiles to be three coats Transeal by Sadolin Ltd applied strictly in accordance with the manufacturers instructions.

Ceramic wall and floor tiles

The ceramic wall and floor tiles shall be from an approved manufacturer, and shall conform with the requirements of BS 1281. Tiles shall be of standard quality of the colours specified or approved. Tiles shall be laid with continuous straight joints and internal angles shall be butt jointed. Rounded on edge tiles shall be used at all external angles and at edges of panels. Cut tiles will be used in internal corners, full tiles in external corners.

Maximum joint size is 3mm when grouted.

Movement joints are to be at maximum 6m centres

Skirtings are to be formed in matching tiles, fixed with tile adhesive

300 x 300 special ribbed tread nosing tiles are to be utilised on all stair treads.

Tiles shall be well soaked in water, bedded in approved proprietary tile adhesive, pointed in an imported proprietary coloured grouting material, and cleaned and polished on completion.

Granite and marble tiling

Marble Tiling

20mm polished marble tiling in colours and sizes approved by the Architect. All tiles shall be carefully chosen for consistency in colour, size and texture.

Tiles to be bedded in sand cement bedding, and to be laid level with other adjacent finishes.

Granite Vanity Tops

Vanity tops to be formed in 600 x 400 x 20mm thick polished granite tiles, bedded in mortar on concrete vanity substrata. Edging tile to front edge to have rounded nosing, with vertical fascia panel, fixed with 'Laticrete' or equal and approved bonding agent.

PVC bead protection to wall tiling

PVC corner and edge beads to the Architects approval are to be provided to external corners and edges of ceramic wall tiles.

Expansion joint covers

Expansion joint covers are to be a proprietary imported stainless steel sliding cover with PVC infill strips fixed on both sides of structured movement joints. The contractor shall provide samples for the Architects approval.

Precast concrete paving slabs

To be all in accordance with B.S. 368. The slabs are to be of the sizes given herein and bedded, jointed and pointed in cement lime mortar (1:2:9).

Rates

The rates for tile, slab and block finishings shall include for rounded edge tiles and angles, cutting and fitting up to boundaries and around pipes, brackets, etc., and waste; for work in narrow widths, small and isolated areas and for all other incidental labours.

Suspended Ceilings

Generally

The Contractor shall provide shop drawings to show the final layout and sizes of members of all suspension systems and to co-ordinate the design and work of suspended ceilings with other trades to provide for the reception and installation of outlets, fixtures etc., pertaining to mechanical or electrical work, all for the Architect's approval before any work is commenced.

Ceilings shall be erected by workmen skilled in this work in a rigid and secure manner so that the final surface is free from any waves, buckles or sags.

Acoustic ceilings

Acoustic tile ceilings shall be 600 x 600 x 15 mineral fibre tiles, fine fissured finish, with regular edge in shops and WC's with exposed powder coated suspended aluminium 24mm T frame grid system. All ceilings to have shadow gap trim to junction with wall, and to be set out with full tile at centre line in both directions of room or space ceiling installation. Manufacturer to be Armstrong or approved alternative, and to be installed entirely in accordance with the manufacturer's instructions, incorporating all fittings and accessories, including suspension cable wires and hanger system.

The ceilings shall include a proprietary suspension system as recommended by the manufacturer. The suspension system shall be suspended from wire hangers fixed to concrete soffit and steel roof structures by an approved method. All to be fixed strictly in accordance with the manufacturers instructions.

Gypsum Plasterboard Ceilings

Plasterboard for ceilings to comply with the requirements of BS1230 Part I and to be manufactured under BS 750 Part 2 12.7mm thick. Fixing, installation and filling of joints to be strictly in accordance with manufacturers instructions. Plasterboard to have tapered edge, with taped and filled joints, finished in accordance with the manufacturers instructions.

The joints between boards shall be provided with a fine metal or plastic scrim tape, nailed or stapled to the boards so as to fully cover the joints and ready for a plaster skim.

Gypsum plaster skim coat

All joints between boards and blemishes in boards are to be skimmed with a fine proprietary gypsum plaster specially manufactured for that purpose. A gypsum plaster skim coat is to be

applied to the whole surface of the gypsum plasterboard in accordance with the manufacturer's instructions and to the approval of the Architect.

Plasterboard is to be fixed to a proprietary pressed metal brander system to Architects approval.

Expanded metal lathing ceilings

Framework for expanded metal lath ceilings shall be as specified. Straps shall be bolted either to steelwork or to steel angle cleats raw bolted to concrete soffit.

Covering shall be galvanized expanded metal lathing Ref. 264 fixed to underside of suspension grid with 16 gauge soft galvanized tying wire or to underside of timber framing at maximum 356mm centres.

The whole to form a suspension grid ready and of adequate strength to receive plaster or other applied finish and with supports for lighting fittings where required.

The Contractor shall submit to the Architect for approval prior to erection, shop drawings showing the precise layout of suspended ceiling systems.

Rates for suspended ceilings

Rates shall include for shop drawings as specified; all hangers and supports as required including fixing same to concrete or ductwork; for angles at edges, for corner angles at upstands, for cutting and fitting around grilles and registers and light fixtures and for leaving in a perfect condition to the entire satisfaction of the Architect.

Rates shall also be deemed to include the use of plaster stops and angle beads around the edges and at all corners.

Rates shall include for all edge details, angle runners and light fitting frames as required.

SUPPLY OF PLANT AND WORKSHOP EQUIPMENT

General

The Contractor shall supply and commission plant and equipment listed under this section unless otherwise specified or directed by the Engineer. The Contractor, through his appointed personnel, shall train the Employer's staff on the operational and maintenance of the plant and equipment such that this shall be a prerequisite for the issuance of the certificate of completion by the Engineer. The Contractor shall also provide operation and maintenance manual of all the machines and moving parts supplied. The Contractor shall include in his tender method statement to demonstrate his ability to comply with this clause.

The Contractor shall indicate in his programme, repair and maintenance schedule for all the plant and equipment under the contract and the progress achieved on this shall be evaluated on daily basis or as directed by the Engineer alongside other works.

The Contractor is encouraged to visit the site at his own costs, during tender in order to acquaint and ascertain himself with the nature and the extent of work to be undertaken under the contract.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

General

Environmental Responsibility

The Contractor will be required to include in his site staff an Environmental Specialist in his team to co-ordinate all aspects of the environment during project implementation. This will include following the construction to monitor, review and verify the implementation of the project's Environmental and Social Management Plan (ESMP).

During construction, the Environmental Specialist will be responsible but not limited to the following tasks:

- Update environmental aspects (not covered in the ESIA / ESMP);
- Report to the Engineer on environmental issues that were included in the ESMP and the emerging ones during construction;
- Audit environmental and safety aspects at the work sites;
- Participate in the definition of the no working-areas and the location of campsite, borrow pits, quarries and other areas;
- Recommend solutions for specific environmental problems;
- Liaise with Community Liaison Groups with regard to compliance of the social clauses of the Contract, in terms of local labour force and HIV/AIDS campaign;
- Oversee strategies for sensitising Contractor' staff on health and safety problems;
- Attend consultations held at key stages of the project with the community and interested parties;
- Liaise with the respective Environmental Authorities on the level of compliance with the ESMP achieved by the Contractor on a regular basis for the duration of the contract;
- Control and supervise the implementation of the ESMP;
- Prepare quarterly environmental and social progress or "audits" reports on the status of implementation of measures and management of work sites.

Updated Environmental Management Plan

An updated Environmental Management Plan will be required to be prepared to identify emerging and sequence environmental activities that are needed in order to complete a required construction process.

The Environmental Management Plan would identify reference documentation, the approval required to complete that activity and the verification documentation to be produced as evidence of satisfactory completion. The Environmental Management Plan would also identify where "hold points" would be required. These are where continuation of subsequent activity is prohibited unless a former activity has been signed-off. The ESMP would be broken down into various activities as listed in ESIA Report will be undertaken.

Method Statements

Method statements would be completed on behalf of the Main Contractor or Sub Contractor by the Environmental Specialist, in consultation with on-site Engineering staff. The method statements would include a review of the environmental risks and commitments, as identified in the ESMP and risk assessment, so that appropriate control measures are developed and included within the construction process.

Method statements would be reviewed by the Consultants Environmental Manager. Where necessary, all method statements would be submitted to the enforcement agencies (EMA and District Assembly.) as appropriate. Method statements would contain as a minimum:

- Location of the activity and access/egress arrangements.
 - Work to be undertaken and methods of construction.
 - Plant and materials to be used.
 - Labour and supervision requirements.
 - Health, safety and environmental considerations.
 - Any permit or consent requirements.
-

Control of Construction Processes

Training, Awareness and Competence

The raising of environmental awareness is viewed as a crucial element in the appreciation and implementation of the Construction Environmental Management Plan (CEMP). As a consequence, all of the Contractor's staff will undergo environmental awareness training, initially by way of the pre-start induction process. A project specific training plan that identifies the competency requirements for all personnel allocated with environmental responsibilities will be produced and contained within the CEMP. Training for all personnel identified in the training plan will be completed before commencement of the associated construction activities. Line managers and supervisors would ensure that all personnel engaged in activities that may have an impact on the environment are competent to carry out their duties or, where necessary, arrange for suitable training to be undertaken.

Supervision of Construction Activities

All construction and installation activities including those carried out by subcontractors and suppliers would be supervised, or regularly checked through the completion of site inspections by the Contractors Environmental Specialist, to ensure that requirements identified in risk assessments or method statements have been implemented. The frequency and extent of this supervision will vary according to the degree of competence displayed by the workforce and the level of risk to the environment.

Inspection of Other Operational Impacts

Appointed environmental representatives would carry out weekly inspections of their respective construction areas, to verify that housekeeping or supporting controls are being implemented effectively. These inspections would utilize the site environmental standards as the minimum standards that should be achieved, with necessary actions being recorded and raised at weekly progress meetings. Subsequent inspections would commence with a review of all outstanding actions from previous reports to verify that they have been completed.

Inspections by the Environmental Team

Environmental deliverables required by the Construction Environmental Management Plan (CEMP) will be subject to regular independent inspections by either the Environmental Manager or the relevant environmental specialists. These inspections will be used to confirm that:

- Construction works are progressing in accordance with the agreed method statements';
- Agreed protection or mitigation measures are in place, prior to or during the implementation of construction activities;
- Construction works have been completed in accordance with the design and;
- Commitments made during the statutory process.

Environmental Inspection and Reporting

The Contractors Environmental Manager would carry out an assessment of the Project's environmental performance, based upon the reports from the environmental management representatives during the period, reports from the environmental specialists and from his own site inspections. This would be carried out at a frequency at no greater than monthly intervals but could be held more regularly depending on the nature of the construction activity. An assessment of the performance over the month would be made and

quantified. A monthly report detailing performance for the period would be provided to the Engineer and would include a summary of environmental inspections completed, audits undertaken, complaints and incidents.

Environmental Monitoring

Monitoring of noise, vibration, dust and water quality would be carried out in accordance with the specialist environmental procedures and environmental commitments made.

Control of non-conformance

Non-conforming products or processes would initiate a Non-Conformance Report, which would identify the nature of the problem, the proposed corrective action, action taken to prevent recurrence of the problem and verification that the agreed actions have been carried out.

Communication and Co-ordination

Internal project communications would be via two processes:

- Weekly team meetings;
- A monthly Project Environmental Review;

Weekly team meetings

Weekly meetings chaired by the Client's Environmental Manager will be held by each of the construction teams to review performance and co-ordinate short-term planning of forthcoming activities. Environmental management representatives would use these meetings to report on the findings of their inspections together with any systematic or recurring issues. Actions from these meetings would be recorded via minutes and reviewed by the Contract Manager.

Monthly Project Environmental Review

Environmental issues will be primarily discussed at a monthly Project Environmental Review, chaired by the Contract Manager and attended by the Contractors Environmental Manager, the Clients Environmental Manager, relevant sub-contractors environmental representatives and, when necessary, environment specialists and representatives from statutory consultees. The Project Environmental Review will:

- Consider past performance from inspections, audit reports and monitoring data.
- Plan actions required to mitigate forthcoming risks.
- Disseminate best practice.

Environmental due diligence during construction

During the construction phase, environmental due diligence will be incorporated into the Project implementation mainly to:

- Control the residual risk of accidental environmental damage;
- Prevent the negative environmental impacts during construction.
- The contractor will be required to include environmental considerations in the monthly progress reports and indicate progress in the implementation of mitigation measures as outlined in the ESMP.

The Construction risks to be monitored will include, but not be limited to the following issues:

- Handling of hazardous materials as part of construction activities;
- Movement of machinery;
- Management of borrow areas;
- Sedimentation of watercourses

- Collection and disposal of wastes;
- Management of pollution incidents.

Tables 10.1, gives a summary of the Environmental and Social Management Plans during Construction phase of the project.

Table 10.1 Environmental and Social Management Plan for Proposed Changachicha Irrigation Development Project

| Project Activity/ environmental concern | Possible Impacts | Mitigation Measures | Institutional Responsibility | Time Frame | Estimated Costs (KES) |
|--|--|--|------------------------------|---------------------|----------------------------|
| Construction Phase | | | | | |
| Vegetation Loss | Reduced biodiversity and loss of indigenous trees and shrubs | <ul style="list-style-type: none"> The clearing of vegetation and trees, especially indigenous trees, should be strictly controlled and only done if it's absolutely necessary. Disturbed areas adjacent to the canals should be re-vegetated with locally occurring grasses, shrubs and trees after completion of each section. | IWUA | During Construction | No additional costs to BOQ |

CONSTRUCTION TOLERANCES

General

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

Earthworks

| | |
|---|---|
| Top level of Embankments after compaction | +100/ -0 mm |
| Sides of Embankments over a 10 m length | +100/ -0 mm |
| Channel or Excavation cutting | +20/ -20 mm |
| Channel Water Way Area | - 0 |
| Horizontal Alignment of Channels: | Maximum 300 mm Over 20 m length 100 mm |
| Formation Level for Structures | +0/ -ve filled with concrete |
| Formation Level for Gabions | +0/ -100 mm |

Concrete Structures

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

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

Tolerance from Specified Position

Maximum departure of plan position of structure 150 mm

Tolerance from Specified Dimension

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

Surface Tolerance on Straightness or Departure from Specified Curve

General Surfaces

Maximum deviation in horizontal or vertical direction

- gradual over a 10m length 25 mm
- abrupt 10 mm.

Surfaces in Contact with Flowing Water

Maximum deviation in direction of flow or normal to flow

- gradual over a 10m length 15 mm
- abrupt 5 mm

Reinforcement

Maximum departure in required spacing 15 mm

Minimum lap length shall be:

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

Stonework

Pitching and Masonry over a 2 m length +100/ -25 mm
Face of gabion basket + 75/ -25 mm
Thickness of tipped rock or filter layer +100/ - 0 mm

SECTION VI: DRAWINGS

***TO BE COLLECTED AT CHIEF ENGINEER'S OFFICE (PLANNING AND DESIGN)
NIB HEAD OFFICE, LENANA ROAD, UNYUNYIZI HOUSE***

SECTION VII – BILLS OF QUANTITIES

A. Preamble

1. The Bill of Quantities shall be read in conjunction with the Instructions to Tenderers, General and Special Conditions of Contract, Technical Specifications, and Drawings.
2. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices bid in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
3. The rates and prices bid in the priced Bill of Quantities shall, except insofar as it is otherwise provided under the Contract, include all Constructional Plant, labour, supervision, materials, erection, maintenance, insurance, profit, taxes, and duties, together with all general risks, liabilities, and obligations set out or implied in the Contract.
4. A rate or price shall be entered against each item in the priced Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.
5. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.
6. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the priced Bill of Quantities.
7. Provisional Sums included and so designated in the Bill of Quantities shall be expended in whole or in part at the direction and discretion of the Employer in accordance with Clauses 58.4 of the SCC.
8. The method of measurement of completed work for payment shall be in accordance with clauses 56.1 and 57.1 of the SCC.
9. Errors will be corrected by the Employer for any arithmetic errors in computation or summation as follows:
 - (a) where there is a discrepancy between amounts in figures and in words, the amount in words will govern; and

- (b) where there is a discrepancy between the unit rate and the total amount derived from the multiplication of the unit price and the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer, there is an obviously gross misplacement of the decimal point in the unit price, in which event the total amount as quoted will govern and the unit rate will be corrected.

10. Rock is defined as all materials that, in the opinion of the Engineer, require blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for their removal, and that cannot be extracted by ripping with a tractor of at least 150 brake hp with a single, rear-mounted, heavy-duty ripper.

BILLS OF QUANTITIES

KITHUMBU IRRIGATION DEVELOPMENT PROJECT

Bill No .1- PRELIMINARY AND GENERALS

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KShs) | AMOUNT (KShs) |
|------------|---|-----------|----------|--------------|---------------|
| 1.1 | Laboratory Tests | | | | |
| 1.1.1 | Concrete cube tests in accordance with the Specifications. | No. | 20 | | - |
| 1.1.2 | Allow for additional testing, as directed by the Project Engineer | Prov. sum | | | 50,000.00 |
| 1.2 | Signboards | | | | |
| 1.2.1 | Provision, erection and maintenance of project signboards in accordance with the Specifications | No. | 2 | | |
| 1.3 | Specified requirements-Services for Resident Engineer and his staff. | | | | |
| 1.3.1 | Allow for supervision costs | P sum | | 1,500,000.00 | 1,500,000.00 |
| 1.3.2 | Add contractors overheads and profit for item 1.3.1 | % | | | |
| 1.4 | Resident Engineer's Office | | | | |
| 1.4.1 | Allow for renting for Resident Engineer's office | Months | 6 | 20,000.00 | 120,000.00 |
| 1.4.2 | Supply, deliver and install Furniture and Equipment for the Engineer's Office and in accordance with Specifications and as directed by the Engineer | P.C Sum | 1 | 200,000.00 | 200,000.00 |
| 1.4.3 | Allow for operation and maintenance of the office in accordance with the Specifications. | Month | 6 | 20,000.00 | 120,000.00 |
| 1.4.4 | Provide for payment of miscellaneous accounts for Stationery, office consumables etc as directed by the engineer (Prov. Sum) | Month | 6 | 20,000.00 | 120,000.00 |
| 1.4.5 | Add percent on Item 1.4.3 to 1.4.4 for overheads and profits | % | | | |
| 1.6 | Contractor's Camp | | | | |

| | | | | | |
|-------------|---|------------------------|---|------------------|--------------|
| 1.6.1 | Provide for establishment of the Contractor's camp, mobilisation and demobilisation | LS | 1 | | 500,000.00 |
| 1.70 | Other Works, Obligations | | | | |
| 1.9.1 | Allow for training of IWUA committees and farmers on O&M and agri-bussiness as directed by the Engineer | Provisi onal Sum | 1 | 1,000,000.0 0 | 1,000,000.00 |
| | | | | | |
| | TOTAL CARRIED OVER TO GRAND SUMMARY | | | | |
| | | | | | |

Bill No. 2 - INTAKE WORKS

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|------------|--|----------------|----------|------------|--------------|
| 2.1 | SITE CLEARANCE | | | | |
| 2.1.1 | Clear site of all trees, bushes, shrubs, etc and dispose as specified with respect to weir and intake locations | m ² | 200 | | |
| 2.6 | METALWORKS | | | | |
| 2.6.1 | Supply and install galvanized steel trash rack complete with all fixing ironmongery to intake as specified. | No. | 1 | | |
| 2.6.2 | 100x100x10 mild steel angle with 300 mm long 120 Ms mild steel tangs welded at 500 mm c/c and cast into concrete at crest of weir. | Sum | 1 | | |
| 2.6.3 | Supply and install metal slide gate to intake pipe as shown | No. | 1 | | |
| 2.6.4 | Supply and install galvanised sluice gate as specified / shown in the drawings | No. | 1 | | |
| 2.6.5 | Provide and place debris screens as specified/shown in the drawings | No | 2 | | |
| 2.7 | INTAKE CHAMBER PIPEWORK AND FITTINGS | | | | |
| | Provide, handle, install and test the following steel pipes and fittings, valves and specials. Rates shall include for completion and pipe protection at all pipe joints as specified in specifications and drawings | | | | |
| 2.7.1 | 350 mm dia double flanged 0.5m long steel spigot with puddle flange welded. | No. | 1 | | |
| 2.7.3 | Dia 350 mm x 1m length double flanged spigot pipe | No. | 1 | | |
| 2.7.5 | Scour pipes dia 50 mm x 3 m long GI pipe(intake chamber) | No. | 2 | | |
| 2.7.5 | Scour pipes dia 80mm x 3 m long GI pipe(| No. | 1 | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|--|--|--|--|--|--|
| | weir body) | | | | |
| | | | | | |
| | TOTAL CARRIED OVER TO GRAND SUMMARY | | | | |
| | | | | | |

Bill No. 3 - SEDIMENTATION TANK

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|--------------|---|----------------|----------|------------|--------------|
| | | | | | |
| 3.1 | EXCAVATION | | | | |
| | | | | | |
| | To include for all trimming to levels, backfilling with approved selected spoil, compacting, disposal of surplus material and reinstatement for sedimentation basin, drainage chambers and washout structure. | | | | |
| | | | | | |
| 3.1.1 | Strip topsoil average 200 mm dispose | m ² | 150 | | |
| | | | | | |
| 3.1.2 | In normal soil (material) to a depth not exceeding 3.0 | m ³ | 254 | | |
| | | | | | |
| 3.1.3 | E.O. for Item 2 for excavation in rock (provisional). | m ³ | 15 | | |
| | | | | | |
| 3.2 | CONCRETE WORKS | | | | |
| | | | | | |
| 3.2.1 | Provide and place the following concrete including all form work. | | | | |
| | | | | | |
| 3.2.2 | Blinding concrete grade 15/40 - 75 mm thick | m ³ | 6 | | |
| | | | | | |
| 3.2.3 | Reinforced concrete grade 25/20 as shown on drawings | m ³ | 56 | | |
| | | | | | |
| 3.3 | REINFORCEMENT | | | | |
| | | | | | |
| 3.3.1 | Provide, support and fix the following reinforcement, including all cutting, bending and supports. | | | | |
| | | | | | |
| 3.3.2 | High yield bars | kg | 3178 | | |
| | | | | | |
| | Inlet and Outlet Pipe work and Fittings | | | | |
| | | | | | |
| | The rates inserted should cover supplying of fittings including all jointing accessories, handling, fixing, jointing and testing. | | | | |
| | | | | | |
| 3.3.3 | Inlet Chamber | | | | |
| | | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|-------------------|--|-----|----|--|--|
| 3.3. 3.1 | Dia 350 mm Ductile Iron/GI/Steel 45/90 deg double flanged elbow (short radius bend) | No. | 2 | | |
| 3.3. 3.2 | Dia 350 mm double flanged spigot pipe x 0.5 m length | No. | 2 | | |
| 3.3. 3.3 | Dia 350 mm double flanged spigot pipe | m | 30 | | |
| 3.3. 3.4 | Dia 350 mm double flanged spigot pipe with 2 sets of 100 mm dia hole outlets | m | 3 | | |
| 3.3. 4 | Outlet Chamber | | | | |
| 3.3. 4.1 | Dia 350 mm double flanged spigot pipe with 2 sets of 100 mm dia hole outlets | m | 3 | | |
| 3.3. 4.2 | Dia 350 mm double flanged spigot pipe x 0.5 m length | No. | 3 | | |
| 3.3. 4.3 | Dia 350 mm Ductile Iron/GI/Steel 45/90 deg double flanged elbow (short radius bend) | No. | 2 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | SUB-TOTAL CARRIED FORWARD TO NEXT PAGE | | | | |
| | | | | | |
| | SUB-TOTAL CARRIED FORWARD FROM PREVIOUS PAGE | | | | |
| | | | | | |
| | Outlet Chamber Contd | | | | |
| 3.3. 4.4 | Dia 350 mm double flanged spigot pipe x 0.5m length | No | 1 | | |
| 3.3. 4.5 | Dia 350 mm Sluice valve | | 1 | | |
| 3.3. 4.6 | Dia 350/355 V/J uPVC flanged adaptor | | 1 | | |
| 3.3. 4.7 | Provision for an air vent on the outlet pipe after sluice valve | No. | 1 | | |
| 3.3. 4.8 | Excavate for , provide all materials and construct complete sluice valve chamber as specified/shown in the drawings. Rates to include for all thrust blocks and pipe supports. | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|-----|--|---|
| 3.3.5 | Drainage Chamber Piping | | | | |
| | | | | | |
| 3.3.5.1 | Dia 200 mm steel pipe with 3 No. 20 mm dia pipes welded as shown | m | 4 | | |
| | | | | | |
| 3.3.5.2 | Dia 200 mm butterfly valve. | No | 1 | | |
| | | | | | |
| 3.3.5.3 | Dia 200 mm flanged adaptor | No. | 1 | | |
| | | | | | |
| 3.3.5.4 | Dia 160 mm uPVC PN 8 pipe | m | 150 | | |
| | | | | | |
| 3.3.5.5 | Supply and Install Manhole covers as shown | No. | 2 | | |
| | | | | | |
| | | | | | |
| 3.3.6 | Sedimentation Basin Cover | | | | |
| | | | | | |
| 3.3.6.1 | Provide and install MS cover plate complete with frames/hinges/locks as shown in the drawings and directed by the Engineer | Sum | 2 | | |
| | | | | | |
| | | | | | |
| 3.4 | Miscellaneous | | | | |
| | | | | | |
| 3.4.1 | Provision for guardrails 25mm dia GI pipe | m | 150 | | |
| | | | | | |
| | | | | | |
| | Total carried to over to summary page | | | | - |

Bill No 4 PIPELINES

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|------|---|----------------|----------|------------|--------------|
| | Excavation and Backfilling | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing bedding and surround materials | | | | |
| | Excavation and backfilling in trench normal material for Dia 315 mm pipe for depth not exceeding 2.5 m | m ³ | 840 | | 0.00 |
| | Removal of the existing pipes | No. | 58 | | 0.00 |
| | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly Materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | UPVC Straights | | | | |
| | Class PN6 | | | | |
| | 315 mm diameter | m | 350 | | |
| | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| | 315 mm dia UPVC | No. | 2 | | |
| | TOTAL CARRIED OVER TO GRAND SUMMARY SHEET | | | | |

BILL NO. 5 - Air Valves & Washouts

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|------|---|------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| | AIR VALVES | | | | |
| | Excavate for, provide all materials and construct complete air valve chambers. Internal dimensions 900 x 900 x 1000 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. | No. | 16 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 8 No. Double Air Valves (DAVs) on Conveyance at Chainages 140m, 460m, 960m,1550m,2160m,2960m,3760m & 4300 m. | | | | |
| | 315 x 50 mm GI saddle clamp | No. | 8 | | |
| | 50 mm x 400mm dia steel piece flanged both sides | No. | 8 | | |
| | 50 mm gate valve double flanged | No. | 8 | | |
| | 50 mm double orifice air valve | No. | 8 | | |
| | | | | | |
| | 2 No. Double Air Valves (DAVs) on Mainline at Chainages 820m & 1360m | | | | |
| | 280 x 50 mm GI saddle clamp | No. | 1 | | |
| | 250 x 50 mm GI saddle clamp | No. | 1 | | |
| | 50 mm x 400mm dia steel piece flanged both sides | No. | 2 | | |
| | 50 mm gate valve double flanged | No. | 2 | | |
| | 50 mm double orifice air valve | No. | 2 | | |
| | | | | | |

| | | | | |
|--|-----|---|--|--|
| 1 No. Double Air Valves (DAVs) on line SMA1 at Chainage 540m | | | | |
| 63 mm x 50mm dia tee | No. | 1 | | |
| 50 mm gate valve double flanged | No. | 1 | | |
| 50 mm dia x 400 mm long GI pipe | No. | 1 | | |
| 50 mm Double Orifice Air Valve | No. | 1 | | |
| 2No. Double Air Valves (DAVs) on line SMA2 at Chainage 480m & 2060m | | | | |
| 125 x 50 mm GI saddle clamp | No. | 1 | | |
| 75 mm x 50mm dia tee | No. | 1 | | |
| 50 mm x 400mm dia steel piece flanged both sides | No. | 2 | | |
| 50 mm gate valve double flanged | No. | 2 | | |
| 50 mm double orifice air valve | No. | 2 | | |
| 3No. Double Air Valves (DAVs) on line SM B1 at Chainage 160m, 910m & 1500m | | | | |
| 160 x 50 mm GI saddle clamp | No. | 1 | | |
| 140 x 50 mm GI saddle clamp | No. | 1 | | |
| 90 mm x 50mm dia tee | No. | 1 | | |
| 50 mm x 400mm dia steel piece flanged both sides | No. | 3 | | |
| 50 mm gate valve double flanged | No. | 3 | | |
| 50 mm double orifice air valve | No. | 3 | | |
| 4No. Double Air Valves (DAVs) on line SM B2 at Chainage 940m, 1140m, 1820 & 2700m | | | | |
| 125 mm x 50 mm dia saddle clamp | No. | 1 | | |
| 90 mm x 50mm dia tee | No. | 1 | | |
| 75 mm x 50mm dia tee | No. | 1 | | |

| | | | | |
|--|-----|----|--|--|
| 50 mm x 50mm dia tee | No. | 1 | | |
| 50 mm x 400mm dia steel piece flanged both sides | No. | 4 | | |
| 50 mm gate valve double flanged | No. | 4 | | |
| 50 mm double orifice air valve | No. | 4 | | |
| WASHOUTS (W/O) | | | | |
| Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 500 x 500 x 1200 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | |
| Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| 3 No. Washouts (W/Os) on Conveyance at Chainages 540m, 1040m & 3480m. | | | | |
| 315mm x 80mm dia saddle clamp | No. | 2 | | |
| 80 mm dia gate valve | No. | 2 | | |
| 80 mm dia , GI elbow | No. | 2 | | |
| 80 /90 mm dia uPVC / GI adaptor | No. | 4 | | |
| 90 mm UPVC pipe Class PN6 | m | 12 | | |
| 80mm GI threaded pipe 500 mm long with a flap valve | No. | 1 | | |
| TOTAL CARRIED OVER TO GRAND SUMMARY | | | | |

KIBARATANI IRRIGATION DEVELOPMENT PROJECT

| GRAND SUMMARY | | |
|----------------------|--|--|
| | | |
| | | |

| Bill No. | Description | Amount (KSh) |
|----------|--|--------------|
| | | |
| | | |
| | | |
| 1 | Preliminaries and General | |
| | | |
| 2 | Intake Works | |
| | | |
| 3 | Sedimentation Tank | |
| | | |
| 4 | Conveyance Pipeline | |
| | | |
| 5 | Main line | |
| | | |
| 6 | Sub-main lines | |
| | | |
| 7 | Feeder Lines | |
| | | |
| 8 | In-Field System | |
| | | |
| 9 | Day works (Provisional) | |
| | | |
| | | |
| | Sub-Total | |
| | | |
| | | |
| | | |
| | Contingencies (5% of Sub-total) | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | GRAND TOTAL CARRIED TO FORM OF TENDER | |
| | | |

**Bill No .1- PRELIMINARY AND
GENERALS**

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KShs) | AMOUNT (KShs) |
|------------|---|-----------|----------|--------------|---------------|
| 1.1 | Laboratory Tests | | | | |
| 1.1.1 | Concrete cube tests in accordance with the Specifications. | No. | 20 | | |
| 1.1.2 | Allow for additional testing, as directed by the Project Engineer | Prov. sum | LS | | 200,000.00 |
| 1.2 | Signboards | | | | |
| 1.2.1 | Provision, erection and maintenance of project signboards in accordance with the Specifications | No. | 3 | | |
| 1.3 | Specified requirements-Services for Resident Engineer and his staff. | | | | |
| 1.3.1 | Allow for supervision costs | P sum | | 3,000,000.00 | 3,000,000.00 |
| 1.3.2 | Add contractors overheads and profit for item 1.3.1 | % | | | |
| 1.4 | Resident Engineer's Office | | | | |
| 1.4.1 | Cosntruct IWUA's office as specified in the drawings and to the satisfaction of the Engineer | Lumpsum | 1 | 2,500,000.00 | 2,500,000.00 |
| 1.4.2 | Supply, deliver and install Furniture and Equipment for the Engineer's Office and in accordance with Specifications and as directed by the Engineer | P.C Sum | 1 | 500,000.00 | 500,000.00 |
| 1.4.3 | Allow for operation and maintainance of the office in accordance with the Specifications. | Month | 12 | 25,000.00 | 300,000.00 |
| 1.4.4 | Provide for payment of miscellaneous accounts for Stationery, office consumables etc as directed by the engineer (Prov. Sum) | Month | 12 | 20,000.00 | 240,000.00 |
| 1.4.5 | Add percent on Item 1.4.3 to 1.4.4 for overheads and profits | % | | 15% | 81,000.00 |
| 1.5 | Survey Equipment: | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|------------|---|-----------------|----|--------------|--------------|
| 1.5.1 | Purchase for RTK equipment for use by engineer and to be maintained during the period to revert back to the employer | Item | LS | 1,680,000.00 | 1,680,000.00 |
| 1.6 | Vehicles for Project Engineer and his Staff | | | | |
| 1.6.1 | Purchase of one (1) 4WD Vehicle for Project Engineer in accordance with specifications. The vehicle shall revert back to the Employer at the end of the contract period. Not less than 2700 cc and to revert back to employer | Item | LS | 7,000,000.00 | 7,000,000.00 |
| 1.6.2 | Allow for operation and maintenance of the Vehicle for the project during the contract | Month | 12 | 50,000.00 | 600,000.00 |
| 1.6.3 | Provide 1 No. Drivers for the Project Engineer's Vehicle | Man-month | 12 | 40,000.00 | 480,000.00 |
| 1.6.4 | Add% for profit, administration, attendance upon, overheads, etc. for Items 1.6.1 to 1.6.3 above. | % | | | |
| 1.7 | Contractor's Camp | | | | |
| 1.7.1 | Provide for establishment of the Contractor's camp, mobilisation and demobilisation | LS | 1 | | 500,000.00 |
| 1.8 | Testing and commissioning of the works | | | | |
| 1.9 | Allow for training of IWUA committees and farmers on O&M and agri-business as directed by the Engineer | Provisional Sum | 1 | 1,000,000.00 | 1,000,000.00 |
| | TOTAL CARRIED OVER TO GRAND SUMMARY | | | | |

Bill No. 2 - INTAKE WORKS

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|------|-------------|------|----------|------------|--------------|
|------|-------------|------|----------|------------|--------------|

| | | | | | |
|------------|--|----------------|-----|--|---|
| | | | | | |
| 2.1 | SITE CLEARANCE AND SETTING OUT | | | | |
| 2.1.1 | Clear site of all trees (less than 500 mm diameter), bushes, shrubs, etc and dispose as specified with respect to weir and intake locations | m ² | 200 | | - |
| 2.1.2 | Removal of trees of girth greater than 1500 mm (provisional) | No. | 5 | | - |
| 2.2 | RIVER DIVERSION/ACCESS TO INTAKE SITE | | | | |
| 2.2.1 | Provide for river diversion works and/or coffer dam. Price to include for all labor, materials and superintendence during the construction period, and reinstatement at the end. | Lump Sum | 1 | | - |
| 2.2.2 | Provide for acquisition of access road to site and temporary camp/storage area at intake. | Sum | 1 | | - |
| 2.3 | EXCAVATION/EARTHWORKS | | | | |
| | To include for all trimming to levels, backfilling with approved selected spoil, compacting, disposal of surplus material and reinstatement. | | | | |
| 2.3.1 | In rock to take weir and wing-walls and to depth n.e 3.0 m and form sections as specified. | m ³ | 150 | | - |
| 2.3.2 | Ditto for intake chamber | m ³ | 26 | | - |
| 2.3.3 | Compacted hardcore as shown | m ³ | 1 | | - |
| 2.4 | CONCRETE WORKS | | | | |
| | Provide and place the following concrete mixes including all form-work. | | | | |
| 2.4.1 | Reinforced concrete grade 25/20 for weir body | m ³ | 50 | | - |
| 2.4.2 | Ditto in weir retaining and wing walls (including base) | m ³ | 75 | | - |
| 2.4.3 | Ditto for intake chambers, separating wall (for sluiceway) and foundation | m ³ | 20 | | - |

| | | | | | |
|-------|--|----------------|-------|--|---|
| 2.4.4 | Ditto for breast wall | m ³ | 5 | | - |
| 2.4.5 | Ditto for deck slabs as shown | m ³ | 5 | | - |
| 2.4.6 | Ditto for offtake pipe supports (anchor blocks) | m ³ | 10 | | - |
| 2.4.7 | Blinking concrete grade 15/40, 75 mm thick to weir body, intake chambers, retaining walls and wing walls | m ³ | 10 | | - |
| | Reinforcement | | | | |
| | Provide support and fix the following reinforcement, including all cutting, bending and supports for weir body, floors, walls, slabs, etc as shown in the drawings | | | | |
| 2.4.8 | High yield bars (D-12) as specified in the drawings | Kg | 16500 | | - |
| 2.5 | PROTECTION WORKS | | | | |
| 2.5.1 | Provide all materials, lay and place grouted rip rap (mortared stone pitching) 300- 350 mm on sloping sides as shown in the drawings | m ³ | 12 | | - |
| 2.5.2 | Provide and place selected stones in mass concrete (1:1) ratio as shown | m ³ | 50 | | - |
| 2.6 | METALWORKS | | | | |
| 2.6.1 | Supply and install galvanized steel trash rack complete with all fixing ironmongery to intake as specified. | No. | 1 | | - |
| 2.6.2 | 100x100x10 mild steel angle with 300 mm long 120 Ms mild steel tangs welded at 500 mm c/c and cast into concrete at crest of weir. | sum | 1 | | - |
| 2.6.3 | Supply and install metal slide gate to intake pipe as shown | No. | 1 | | - |
| 2.6.4 | Supply and install galvanised sluice gate as specified / shown in the drawings | No. | 1 | | - |
| 2.6.5 | Provide and place debris screens as specified/shown in the drawings | No | 2 | | - |
| 2.7 | INTAKE CHAMBER PIPEWORK AND FITTINGS | | | | |

| | | | | | |
|------------|--|-----|-----|--|---|
| | Provide, handle, install and test the following steel pipes and fittings, valves and specials. Rates shall include for completion and pipe protection at all pipe joints as specified in specifications and drawings | | | | |
| 2.7.1 | 400 mm dia double flanged 0.5m long steel spigot with puddle flange welded. | No. | 1 | | - |
| 2.7.3 | Dia 400 mm x 1m length double flanged spigot pipe | No. | 1 | | - |
| 2.7.5 | Scour pipes dia 100 mm x 3 m long GI pipe(intake chamber) | No. | 2 | | - |
| 2.7.5 | Scour pipes dia 100mm x 3 m long GI pipe(weir body) | No. | 1 | | - |
| 2.8 | Miscellaneous | | | | |
| 2.8.1 | Provide treated hardwood stoplogs for Sluiceway as shown | No. | 13 | | - |
| 2.8.2 | Supply and install cast in step irons (high tensile 16 mm dia) as shown in the drawings | No. | 20 | | - |
| 2.8.3 | Provision for guardrails 25mm dia GI pipe | m | 250 | | - |
| | | | | | |
| | TOTAL CARRIED OVER TO GRAND SUMMARY | | | | - |
| | | | | | |

Bill No. 3 - SEDIMENTATION BASIN

| IT EM | DESCRIPTION | UN IT | QUAN TITY | RATE (KSh) | AMOUNT (KSh) |
|------------------|--------------------|------------------|----------------------|-----------------------|-------------------------|
| | | | | | |
| | | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|--------------|---|----------------|-------|--|---|
| 3.1 | EXCAVATION | | | | |
| | | | | | |
| | To include for all trimming to levels, backfilling with approved selected spoil, compacting, disposal of surplus material and reinstatement for sedimentation basin, drainage chambers and washout structure. | | | | |
| | | | | | |
| 3.1.1 | Strip topsoil average 200 mm dispose | m ² | 500 | | - |
| | | | | | |
| 3.1.2 | In normal soil (material) to a depth not exceeding 3.0 | m ³ | 500 | | - |
| | | | | | |
| 3.1.3 | E.O. for Item 2 for excavation in rock (provisional). | m ³ | 50 | | - |
| | | | | | |
| 3.2 | CONCRETE WORKS | | | | |
| | | | | | |
| 3.2.1 | Provide and place the following concrete including all form work. | | | | |
| | | | | | |
| 3.2.2 | Blinding concrete grade 15/40 - 75 mm thick | m ³ | 10 | | - |
| | | | | | |
| 3.2.3 | Reinforced concrete grade 25/20 as shown on drawings | m ³ | 200 | | - |
| | | | | | |
| 3.3 | REINFORCEMENT & METAL WORKS | | | | |
| | | | | | |
| 3.3.1 | Provide, support and fix the following reinforcement, including all cutting, bending and supports. | | | | |
| | | | | | |
| 3.3.2 | High yield bars (D-12) as specified in the drawings | kg | 20000 | | - |
| | | | | | |
| | Inlet and Outlet Pipe work and Fittings | | | | |
| | | | | | |
| | The rates inserted should cover supplying of fittings including all jointing accessories, handling, fixing, jointing and testing. | | | | |
| | | | | | |
| 3.3.3 | Inlet Chamber | | | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 3.3.3.1 | Dia 400 mm Ductile Iron/GI/Steel 45/90 deg double flanged elbow (short radius bend) | No. | 2 | | |
| 3.3.3.2 | Dia 400 mm double flanged spigot pipe x 0.5 m length | No. | 2 | | |
| 3.3.3.3 | Dia 400 mm x 1m length double flanged spigot pipe | m | 1 | | |
| 3.3.3.4 | Dia 400 mm double flanged spigot pipe with 2 sets of 100 mm dia hole outlets | m | 3 | | |
| 3.3.4 | Outlet Chamber | | | | |
| 3.3.4.1 | Dia 400 mm double flanged spigot pipe with 2 sets of 100 mm dia hole outlets | m | 3 | | |
| 3.3.4.2 | Dia 400 mm double flanged spigot pipe x 0.5 m length | No. | 3 | | |
| 3.3.4.3 | Dia 400 mm Ductile Iron/GI/Steel 45/90 deg double flanged elbow (short radius bend) | No. | 2 | | |
| | Outlet Chamber Contd | | | | |
| 3.3.4.4 | Dia 400 mm double flanged spigot pipe x 0.5m length | No | 1 | | |
| 3.3.4.5 | Dia 400 mm Sluice valve | | 1 | | |
| 3.3.4.6 | Dia 400/400 V/J Upvc flanged adaptor | | 1 | | |
| 3.3.4.7 | Provision for an air vent on the outlet pipe after sluice valve | No. | 1 | | |
| 3.3.4.8 | Excavate for , provide all materials and construct complete sluice valve chamber as specified/shown in the drawings. Rates to include for all thrust blocks and pipe supports. | No. | 1 | | |
| 3.3.5 | Drainage Chamber Piping | | | | |

| | | | | | |
|--------------|--|-----|-----|--|--|
| 3.3.5.1 | Dia 200 mm steel pipe with 3 No. 20 mm dia pipes welded as shown | m | 4 | | |
| 3.3.5.2 | Dia 200 mm butterfly valve. | No | 1 | | |
| 3.3.5.3 | Dia 200 mm flanged adaptor | No. | 1 | | |
| 3.3.5.4 | Dia 160 mm uPVC pipe | m | 400 | | |
| 3.3.5.5 | Supply and Install Manhole covers as shown | No. | 2 | | |
| 3.3.6 | Sedimentation Basin Cover | | | | |
| 3.3.6.1 | Provide and install MS cover plate complete with frames/hinges/locks as shown in the drawings and directed by the Engineer | Sum | 2 | | |
| 3.3.7 | Water Meter and chamber | | | | |
| 3.3.7.1 | Excavate for, provide all materials and construct water meter chamber as shown in the drawings | No. | 1 | | |
| | Provide, handle, install and test steel (or GI)/uPVC pipes and fittings, valves and specials for the water meter chamber | | | | |
| | Rates shall include for completing all pipe joints as specified in the specification | | | | |
| 3.3.7.2 | Water meter to fit 400 mm dia pipe | No. | 1 | | |
| 3.4 | Miscellaneous | | | | |
| 3.4.1 | Provision for guardrails 25mm dia GI pipe | m | 150 | | |
| | | | | | |
| | | | | | |

| | | | | | |
|--|---|--|--|--|--|
| | Total carried over to summary page | | | | |
| | | | | | |

Bill No 4 CONVEYANCE

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|------------|---|----------------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| 4.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing bedding and surround materials | | | | |
| | | | | | |
| 4.1.1 | Excavation and backfilling in trench normal material for Dia 400 mm pipe for depth not exceeding 2.5 m | m ³ | 4159 | | |
| | | | | | |
| 4.1.1 | E.O for excavation in soft rock (provisional) | m ³ | 416 | | |
| | | | | | |
| 4.1.2 | E.O for excavation in hard rock (provisional) | m ³ | 416 | | |
| | | | | | |
| 4.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly Materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | UPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 4.2.1 | 400 mm diameter | m | 1733 | | |

| | | | | | |
|------------|--|-----|---|--|--|
| | | | | | |
| 4.3 | BLOCK CHAMBERS | | | | |
| | | | | | |
| 4.3.1 | Excavate for, provide all Materials and construct complete inspection valve chambers at the pipe junctions. Internal dimensions 2500 x 2500 x 2500 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. | No. | 1 | | |
| | | | | | |
| | 1 No. Section Chamber for offtake to Mainline Pipeline at chainage 1+732.9m | | | | |
| | | | | | |
| 4.3.2 | 400 x 400 mm dia UPVC/G.I VJ coupling | No | 1 | | |
| | | | | | |
| 4.3.2 | 355 x 350 mm dia UPVC/G.I VJ coupling | No | 1 | | |
| | | | | | |
| 4.3.3 | 400 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| | | | | | |
| 4.3.4 | 350 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| | | | | | |
| 4.3.5 | 400 x 350mm dia double flanged GI tapered reducer | No | 1 | | |
| | | | | | |
| 4.3.6 | 350 mm dia flanged sluice valve | No | 1 | | |
| | | | | | |
| 4.4 | AIR VALVES | | | | |
| | | | | | |
| 4.4.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 2 No. Double Air Valves (DAVs) at Chainages 1280 and 1721m | | | | |
| | | | | | |
| 4.4.2 | 400 x 400 mm dia UPVC/G.I VJ coupling | No. | 4 | | |
| | | | | | |
| 4.4.3 | 400mm dia, 0.5m long single flanged steel spigot | No. | 4 | | |
| | | | | | |
| 4.4.4 | 400 x 100mm dia double flanged tee | No. | 2 | | |
| | | | | | |
| 4.4.5 | 100mm dia double flanged steel pipe, 0.4m long | No. | 2 | | |
| | | | | | |
| 4.4.6 | 100mm dia Flanged Double Air Valve | No. | 2 | | |

| | | | | | |
|------------|--|-----|---|--|--|
| 4.4.7 | 100mm dia Flanged sluice Valve | No. | 2 | | |
| 4.5 | WASHOUT (W/O) | | | | |
| | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Wash Out (WO) at Chainage 980m | | | | |
| 4.5.1 | 400 x 400 mm dia UPVC/G.I VJ Adaptors | No. | 2 | | |
| 4.5.2 | 400mm dia, 0.5m long single flanged steel spigot | No. | 2 | | |
| 4.5.3 | 400 x 100mm dia level invert scour tee with flanged branch | No. | 1 | | |
| 4.5.4 | 100mm dia flanged sluice valve | No. | 1 | | |
| 4.5.5 | 100 x 110mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 4.5.6 | 100mm dia, 0.5m long single flanged steel spigot | No. | 1 | | |
| 4.5.7 | 100mm dia steel pipe 500mm long with flap valve | No. | 1 | | |
| 4.5.8 | 110 mm dia uPVC pipe | m | 6 | | |
| 4.6 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 4.6.1 | 400 mm dia UPVC | No. | 2 | | |
| | 22.5 degrees | | | | |
| 4.6.2 | 400 mm dia UPVC | No. | 2 | | |
| | 45 degrees | | | | |
| 4.6.3 | 400 mm dia UPVC | No. | 2 | | |
| | 90 degrees | | | | |

| | | | | | |
|-------|--|-----|---|--|--|
| 4.6.4 | 400 mm dia UPVC | No. | 2 | | |
| | | | | | |
| | TOTAL CARRIED OVER TO GRAND SUMMARY SHEET | | | | |
| | | | | | |

Bill Nr 5 MAINLINE

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|------------|---|----------------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| 5.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing bedding and surround Materials | | | | |
| | | | | | |
| 5.1.1 | Excavation and backfilling in trench normal material for Dia 355 mm pipe for depth not exceeding 2.0 m | m ³ | 5787 | | |
| | | | | | |
| 5.1.2 | Ditto for 315 mm diameter pipe | m ³ | 1756 | | |
| | | | | | |
| 5.1.3 | Ditto for 280 mm diameter pipe | m ³ | 4187 | | |
| | | | | | |
| 5.1.4 | Ditto for 250 mm diameter pipe | m ³ | 360 | | |
| | | | | | |
| 5.1.5 | Ditto for 200 mm diameter pipe | m ³ | 360 | | |
| | | | | | |
| 5.1.6 | Ditto for 125 mm diameter pipe | m ³ | 1400 | | |
| | | | | | |
| 5.1.7 | Ditto for 50 mm diameter pipe | m ³ | 115 | | |
| | | | | | |
| 5.1.8 | E.O for excavation in soft rock (provisional) | m ³ | 698 | | |
| | | | | | |
| 5.1.9 | E.O for excavation in hard rock (provisional) | m ³ | 698 | | |
| | | | | | |
| 5.2 | PIPEWORK | | | | |
| | | | | | |
| | UPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following High Density Polyethylene pipes and fittings with electric fusion joints. Rates to include for all jointly Materials, cutting wastage. | | | | |

| | | | | | |
|------------|---|----------------|---|------|--|
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Pressure (m) | Working | | | |
| | PN6 | 60 | m | | |
| | PN8 | 80 | m | | |
| | PN10 | 100 | m | | |
| | PN12.5 | 125 | m | | |
| | PN16 | 160 | m | | |
| | | | | | |
| | UPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 5.2.1 | 355 mm diameter | | m | 2160 | |
| | | | | | |
| 5.2.2 | 315 mm diameter | | m | 1050 | |
| | | | | | |
| 5.2.3 | 280 mm diameter | | m | 2311 | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 5.2.4 | 355 mm diameter | | m | 500 | |
| | | | | | |
| 5.2.5 | 280 mm diameter | | m | 480 | |
| | | | | | |
| 5.2.6 | 250 mm diameter | | m | 240 | |
| | | | | | |
| 5.2.7 | 200 mm diameter | | m | 360 | |
| | | | | | |
| 5.2.8 | 125 mm diameter | | m | 60 | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 5.2.9 | 355 mm diameter | | m | 680 | |
| | | | | | |
| 5.2.10 | 125 mm diameter | | m | 1340 | |
| | | | | | |
| 5.2.11 | 50 mm diameter | | m | 115 | |
| | | | | | |
| 5.3 | UPVC PIPE FITTINGS | | | | |

| | | | | | |
|------------|--|-----|----|--|--|
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 5.3.1 | 355 x 315mm dia | No. | 1 | | |
| | | | | | |
| 5.3.2 | 315 x 280mm dia | No. | 1 | | |
| | | | | | |
| 5.3.3 | 280 x 250mm dia | No. | 1 | | |
| | | | | | |
| 5.3.4 | 250 x 200mm dia | No. | 1 | | |
| | | | | | |
| 5.3.5 | 200 x 125mm dia | No. | 1 | | |
| | | | | | |
| 5.3.6 | 125 x 50mm dia | No. | 1 | | |
| | | | | | |
| 5.4 | BLOCK CHAMBERS | | | | |
| | | | | | |
| 5.4.1 | Excavate for, provide all Materials and construct complete inspection valve chambers at the pipe junctions. Internal dimensions 2500 x 2500 x 2500 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. | No. | 19 | | |
| | | | | | |
| | 2 No. Section Chamber for offtake to M-F1 & M-F2 Chainage 0+080m & 0+780m | | | | |
| | | | | | |
| 5.4.2 | 355 x 350 mm dia uPVC/G.I VJ coupling | No | 4 | | |
| | | | | | |
| 5.4.3 | 350 mm dia, 0.5m long single flanged GI pipe | No | 4 | | |
| | | | | | |
| 5.4.4 | 350 x 50 mm dia flanged , 3rd side threaded GI tee | No | 2 | | |
| | | | | | |
| 5.4.5 | 50 mm dia, 0.5m long threaded GI pipe | No | 2 | | |
| | | | | | |
| 5.4.6 | 50 mm dia gate valve | No | 2 | | |
| | | | | | |
| 5.4.7 | 50 mm dia threaded GI union | No | 2 | | |
| | | | | | |
| 5.4.8 | 50 x 50 mm dia GI/UPVC adaptor | No | 2 | | |
| | | | | | |
| | 3 No. Section Chamber for offtake to SM2, SM6 & M-F3 Chainage 0+280m, 2+700m | | | | |

| | | | | | |
|---|--|----|---|--|--|
| | & 3+220m | | | | |
| 5.4.9 | 355 x 350 mm dia uPVC/G.I VJ coupling | No | 6 | | |
| 5.4.10 | 350 mm dia, 0.5m long single flanged GI pipe | No | 6 | | |
| 5.4.11 | 350 x 65 mm dia flanged , 3rd side threaded GI tee | No | 3 | | |
| 5.4.12 | 65 mm dia, 0.5m long threaded GI pipe | No | 3 | | |
| 5.4.13 | 65 mm dia gate valve | No | 3 | | |
| 5.4.14 | 65 mm dia threaded GI union | No | 3 | | |
| 5.4.15 | 65 x 63 mm dia GI/UPVC adaptor | No | 3 | | |
| 1 No. Section Chamber for offtake to SM3 Chainage 1+200m | | | | | |
| 5.4.16 | 355 x 350 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| 5.4.17 | 350 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.18 | 350 x 80 mm dia flanged , 3rd side threaded GI tee | No | 1 | | |
| 5.4.19 | 80 mm dia, 0.5m long threaded GI pipe | No | 1 | | |
| 5.4.20 | 80 mm dia gate valve | No | 1 | | |
| 5.4.21 | 80 mm dia threaded GI union | No | 1 | | |
| 5.4.22 | 80 x 90 mm dia GI/UPVC adaptor | No | 1 | | |
| 1 No. Section Chamber for offtake to SM4 | | | | | |

| | | | | | |
|------------|---|----|---|--|--|
| | Chainage 1+520m | | | | |
| 5.4.2 3 | 355 x 350 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| 5.4.2 4 | 350 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.2 5 | 350 x 65 mm dia flanged , 3rd side threaded GI tee | No | 1 | | |
| 5.4.2 6 | 65 mm dia, 0.5m long threaded GI pipe | No | 1 | | |
| 5.4.2 7 | 65 mm dia gate valve | No | 1 | | |
| 5.4.2 8 | 65 mm dia threaded GI union | No | 1 | | |
| 5.4.2 9 | 65 x 75 mm dia GI/UPVC adaptor | No | 1 | | |
| | 1 No. Section Chamber for offtake to SM5 Chainage 1+600m | | | | |
| 5.4.3 0 | 355 x 350 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| 5.4.3 1 | 350 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.3 2 | 350 x 100 mm dia all flanged GI tee | No | 1 | | |
| 5.4.3 3 | 100 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| 5.4.3 4 | 100 mm dia sluice valve | No | 1 | | |
| 5.4.3 5 | 100 x 110 mm dia GI/UPVC VJ Coupling | No | 1 | | |
| | 1 No. Section Chamber for offtake to SM7 Chainage 3+340m | | | | |
| 5.4.3 | 355 x 350 mm dia uPVC/G.I VJ coupling | No | 2 | | |

| | | | | | |
|--------|---|----|---|--|--|
| 6 | | | | | |
| 5.4.37 | 350 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.38 | 350 x 125 mm dia all flanged GI tee | No | 1 | | |
| 5.4.39 | 125 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| 5.4.40 | 125 mm dia sluice valve | No | 1 | | |
| 5.4.41 | 125 x 140 mm dia GI/UPVC VJ Coupling | No | 1 | | |
| | 1 No. Section Chamber for offtake to SM8 &M-F4 Chainage 4+020m | | | | |
| 5.4.42 | 315 x 300 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| 5.4.43 | 300 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.44 | 300 x 80 x 65 mm flanged, 3rd &4th side threaded GI cross tee | No | 1 | | |
| 5.4.45 | 80 mm dia, 0.5m long threaded GI pipe | No | 1 | | |
| 5.4.46 | 65 mm dia, 0.5m long threaded GI pipe | No | 1 | | |
| 5.4.47 | 80 mm dia gate valve | No | 1 | | |
| 5.4.48 | 65 mm dia gate valve | No | 1 | | |
| 5.4.49 | 80 mm dia GI union | No | 2 | | |
| 5.4.50 | 65 mm dia GI union | No | 2 | | |
| 5.4.51 | 80 x 90 mm dia GI/UPVC adaptor | No | 1 | | |

| | | | | | |
|------------|---|----|---|--|--|
| 1 | | | | | |
| 5.4.5 2 | 65 x 63 mm dia GI/UPVC adaptor | No | 1 | | |
| | | | | | |
| | 1 No. Section Chamber for offtake to SM9 Chainage 4+389.1m | | | | |
| | | | | | |
| 5.4.5 3 | 315 x 300 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| | | | | | |
| 5.4.5 4 | 300 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| | | | | | |
| 5.4.5 5 | 300 x 100 mm dia all flanged GI tee | No | 1 | | |
| | | | | | |
| 5.4.5 6 | 100 mm dia, 0.5m long single flanged steel pipe | No | 1 | | |
| | | | | | |
| 5.4.5 7 | 100 mm dia sluice valve | No | 1 | | |
| | | | | | |
| 5.4.5 8 | 100 x 110 mm dia GI/UPVC VJ coupling | No | 1 | | |
| | | | | | |
| | 1 No. Section Chamber for offtake to SM10 Chainage 5+420m | | | | |
| | | | | | |
| 5.4.5 9 | 280 x 250 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| | | | | | |
| 5.4.6 0 | 250 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| | | | | | |
| 5.4.6 1 | 250 x 80 mm dia all flanged GI tee | No | 1 | | |
| | | | | | |
| 5.4.6 2 | 80 mm dia, 0.5m long threaded GI pipe | No | 1 | | |
| | | | | | |
| 5.4.6 3 | 80 mm dia gate valve | No | 1 | | |
| | | | | | |
| 5.4.6 4 | 80 mm dia union | No | 1 | | |
| | | | | | |
| 5.4.6 | 80 x 90 mm dia GI/UPVC adaptor | No | 1 | | |

| | | | | | |
|------------|--|----|---|--|--|
| 5 | | | | | |
| | | | | | |
| | 1 No. Section Chamber for offtake to SM11 Chainage 7+180m | | | | |
| | | | | | |
| 5.4.6 6 | 280 x 250 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| | | | | | |
| 5.4.6 7 | 250 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| | | | | | |
| 5.4.6 8 | 250 x 125 mm dia all flanged GI tee | No | 1 | | |
| | | | | | |
| 5.4.6 9 | 125 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| | | | | | |
| 5.4.7 0 | 125 mm dia sluice valve | No | 1 | | |
| | | | | | |
| 5.4.7 1 | 125 x 140 mm dia GI/UPVC VJ coupling | No | 1 | | |
| | | | | | |
| | 1 No. Section Chamber for offtake to SM12 Chainage 7+240m | | | | |
| | | | | | |
| 5.4.7 2 | 250 x 250 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| | | | | | |
| 5.4.7 3 | 250 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| | | | | | |
| 5.4.7 4 | 250 x 100 mm dia all flanged GI tee | No | 1 | | |
| | | | | | |
| 5.4.7 5 | 100 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| | | | | | |
| 5.4.7 6 | 100 mm dia sluice valve | No | 1 | | |
| | | | | | |
| 5.4.7 7 | 100 x 110 mm dia GI/UPVC VJ coupling | No | 1 | | |
| | | | | | |
| | 1 No. Section Chamber for offtake to M-F5 Chainage 7+420m | | | | |
| | | | | | |
| 5.4.7 | 250 x 250 mm dia uPVC/G.I VJ coupling | No | 2 | | |

| | | | | | |
|--------|--|----|---|--|--|
| 8 | | | | | |
| 5.4.79 | 250 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.80 | 250 x 65 mm dia double flanged, 3rd side threaded GI tee | No | 1 | | |
| 5.4.81 | 65 mm dia, 0.5m long threaded GI pipe | No | 1 | | |
| 5.4.82 | 65 mm dia gate valve | No | 1 | | |
| 5.4.83 | 65 mm dia threaded GI union | No | 1 | | |
| 5.4.84 | 65 x 75 mm dia GI/UPVC adaptor | No | 1 | | |
| | 1 No. Section Chamber for offtake to SM13 Chainage 7+780m | | | | |
| 5.4.85 | 200 x 200 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| 5.4.86 | 200 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.87 | 200 x 125 mm dia all flanged GI tee | No | 1 | | |
| 5.4.88 | 125 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| 5.4.89 | 125 mm dia sluice valve | No | 1 | | |
| 5.4.90 | 125 x 140 mm dia GI/UPVC VJ coupling | No | 1 | | |
| | 1 No. Section Chamber for offtake to M-F6 Chainage 8+740m | | | | |
| 5.4.91 | 125 x 125 mm dia uPVC/G.I VJ coupling | No | 2 | | |

| | | | | | |
|-------------|--|----|---|--|--|
| 5.4.9 2 | 125 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.9 3 | 125 x 65 mm dia double flanged, 3rd side threaded GI tee | No | 1 | | |
| 5.4.9 4 | 65 mm dia, 0.5m long threaded GI pipe | No | 1 | | |
| 5.4.9 5 | 65 mm dia gate valve | No | 1 | | |
| 5.4.9 6 | 65 mm dia threaded GI union | No | 1 | | |
| 5.4.9 7 | 65 x 63 mm dia GI/UPVC adaptor | No | 1 | | |
| | 1 No. Section Chamber for offtake to M-F7 Chainage 9+180m | | | | |
| 5.4.9 8 | 125 x 125 mm dia uPVC/G.I VJ coupling | No | 2 | | |
| 5.4.9 9 | 125 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.4.1 00 | 125 x 100 mm dia all flanged GI tee | No | 1 | | |
| 5.4.1 01 | 100 mm dia, 0.5m long single flanged GI pipe | No | 1 | | |
| 5.4.1 02 | 100 mm dia sluice valve | No | 1 | | |
| 5.4.1 03 | 100 x 110 mm dia GI/UPVC VJ coupling | No | 1 | | |
| | 1 No. Section Chamber for offtake to M-F8 Chainage 9+294.1m | | | | |
| 5.4.1 04 | 40 x 40 mm dia GI/UPVC adaptor | No | 3 | | |
| 5.4.1 05 | 40 mm dia, 0.5m long threaded GI pipe | No | 3 | | |

| | | | | | |
|--|---|-----|---|--|--|
| 5.4.1 06 | 40 x 40 mm dia threaded GI tee | No | 1 | | |
| 5.4.1 07 | 40 mm dia gate valve | No | 1 | | |
| 5.4.1 08 | 40 mm dia threaded GI union | No | 3 | | |
| 5.4.1 09 | 40 mm dia UPVC end cap | No | 1 | | |
| 5.5 PRV CHAMBERS | | | | | |
| 5.5.1 | Excavate for, provide all Materials and construct complete inspection valve chambers at the PRV's. Internal dimensions 2500 x 2500 x 2500 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as detailed in the drawings. | No. | 1 | | |
| 1 No. PRV Chamber at Chainage 3+300m | | | | | |
| 5.5.2 | 355 x 350 mm dia UPVC/G.I VJ coupling | No | 2 | | |
| 5.5.3 | 350 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| 5.5.4 | 350 mm dia sluice valve | No | 1 | | |
| 5.5.5 | 350 mm dia PRV | No | 1 | | |
| 5.6 AIR VALVES | | | | | |
| 5.6.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 8 | | |
| Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | | |
| 2 No. Double Air Valve (DAV) at Chainage | | | | | |

| | | | | | |
|--------|---|-----|---|--|--|
| | 1120m & 2120m | | | | |
| 5.6.2 | 355 x 350 mm dia UPVC/G.I VJ coupling | No. | 4 | | |
| 5.6.3 | 350mm dia, 0.5m long single flanged GI spigot | No. | 4 | | |
| 5.6.4 | 350 x 80mm dia double flanged tee | No. | 2 | | |
| 5.6.5 | 80mm dia double flanged GI pipe, 0.4m long | No. | 2 | | |
| 5.6.6 | 80mm dia Flanged Double Air Valve | No. | 2 | | |
| 5.6.7 | 80mm dia Flanged sluice Valve | No. | 2 | | |
| | 4 No. Double Air Valves (DAVs) at Chainages 3500, 4280, 5380 and 6200m | | | | |
| 5.6.8 | 315 x 300 mm dia UPVC/G.I VJ coupling | No. | 8 | | |
| 5.6.9 | 300mm dia, 0.5m long single flanged GI spigot | No. | 8 | | |
| 5.6.10 | 300 x 80mm dia double flanged tee | No. | 4 | | |
| 5.6.11 | 80mm dia double flanged GI pipe, 0.4m long | No. | 4 | | |
| 5.6.12 | 80mm dia Flanged Double Air Valve | No. | 4 | | |
| 5.6.13 | 80mm dia Flanged sluice Valve | No. | 4 | | |
| | 1 No. Double Air Valve (DAV) at Chainage 7140m | | | | |
| 5.6.14 | 280 x 250 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| 5.6.15 | 250mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| 5.6.16 | 250 x 80mm dia double flanged tee | No. | 1 | | |
| 5.6.1 | 80mm dia double flanged GI pipe, 0.4m long | No. | 1 | | |

| | | | | | |
|------------|--|-----|---|--|--|
| 7 | | | | | |
| 5.6.1 8 | 80mm dia Flanged Double Air Valve | No. | 1 | | |
| 5.6.1 9 | 80mm dia Flanged sluice Valve | No. | 1 | | |
| | 1 No. Double Air Valve (DAV) at Chainage 8220m | | | | |
| 5.6.2 0 | 125 x 125 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| 5.6.2 1 | 125mm dia, 0.5m long single flanged steel spigot | No. | 2 | | |
| 5.6.2 2 | 125 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| 5.6.2 3 | 50mm dia double threaded steel pipe, 0.4m long | No. | 1 | | |
| 5.6.2 4 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| 5.6.2 5 | 50mm dia gate Valve | No. | 1 | | |
| 5.6.2 6 | 50mm dia GI Union | No. | 1 | | |
| 5.7 | WASHOUT (W/O) | | | | |
| | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 4 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 2 No. Wash Out (WO) at Chainages 740m | | | | |

| | | | | | |
|--------|--|-----|----|--|--|
| | & 2400m | | | | |
| 5.7.1 | 355 x 350 mm dia UPVC/G.I VJ Adaptors | No. | 4 | | |
| 5.7.2 | 350mm dia, 0.5m long single flanged GI spigot | No. | 4 | | |
| 5.7.3 | 350 x 80mm GI dia level invert scour tee with flanged branch | No. | 2 | | |
| 5.7.4 | 80mm dia flanged sluice valve | No. | 2 | | |
| 5.7.5 | 80 x 90mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 5.7.6 | 80mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| 5.7.7 | 80mm dia GI pipe 500mm long with flap valve | No. | 2 | | |
| 5.7.8 | 90 mm dia uPVC pipe | m | 12 | | |
| | 1 No. Wash Out (WO) at Chainage 5180m | | | | |
| 5.7.9 | 315 x 300 mm dia uPVC/G.I VJ Adaptors | No. | 2 | | |
| 5.7.10 | 300mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| 5.7.11 | 300 x 80mm dia GI level invert scour tee with flanged branch | No. | 1 | | |
| 5.7.12 | 80mm dia flanged sluice valve | No. | 1 | | |
| 5.7.13 | 80 x 90mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 5.7.14 | 80mm dia, 0.5m long single flanged GI spigot | No. | 1 | | |
| 5.7.15 | 80mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 5.7.16 | 90 mm dia uPVC pipe | m | 6 | | |
| | 1 No. Wash Out (WO) at Chainage 8640m | | | | |

| | | | | | |
|--------------------------------|---|-----|---|--|--|
| 5.7.17 | 125 x 125 mm dia uPVC/G.I VJ Adaptors | No. | 2 | | |
| 5.7.18 | 125mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| 5.7.19 | 125 x 50mm dia GI level invert scour tee with threaded branch | No. | 1 | | |
| 5.7.20 | 50mm dia threaded gate valve | No. | 1 | | |
| 5.7.21 | 50 x 50mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 5.7.22 | 50mm dia threaded GI union | No. | 3 | | |
| 5.7.23 | 50mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 5.7.24 | 50mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 5.7.25 | 50 mm dia uPVC pipe | m | 6 | | |
| 5.8 BENDS (PROVISIONAL) | | | | | |
| 11.25 degrees | | | | | |
| 5.8.1 | 355 mm dia uPVC | No. | 2 | | |
| 5.8.2 | 315 mm dia uPVC | No. | 2 | | |
| 5.8.3 | 280 mm dia uPVC | No. | 2 | | |
| 5.8.4 | 250 mm dia uPVC | No. | 2 | | |
| 5.8.5 | 200 mm dia uPVC | No. | 2 | | |
| 5.8.6 | 125 mm dia uPVC | No. | 2 | | |
| 22.5 degrees | | | | | |
| 5.8.7 | 355 mm dia uPVC | No. | 2 | | |

| | | | | | |
|--------|-------------------|-----|---|--|--|
| 5.8.8 | 315 mm dia uPVC | No. | 2 | | |
| 5.8.9 | 280 mm dia uPVC | No. | 2 | | |
| 5.8.10 | 250 mm dia uPVC | No. | 2 | | |
| 5.8.11 | 200 mm dia uPVC | No. | 2 | | |
| 5.8.12 | 125 mm dia uPVC | No. | 2 | | |
| | 45 degrees | | | | |
| 5.8.13 | 355 mm dia uPVC | No. | 2 | | |
| 5.8.14 | 315 mm dia uPVC | No. | 2 | | |
| 5.8.15 | 280 mm dia uPVC | No. | 2 | | |
| 5.8.16 | 250 mm dia uPVC | No. | 2 | | |
| 5.8.17 | 200 mm dia uPVC | No. | 2 | | |
| 5.8.18 | 125 mm dia uPVC | No. | 2 | | |
| | 90 degrees | | | | |
| 5.8.19 | 355 mm dia uPVC | No. | 2 | | |
| 5.8.20 | 315 mm dia uPVC | No. | 2 | | |
| 5.8.21 | 280 mm dia uPVC | No. | 2 | | |
| 5.8.22 | 250 mm dia uPVC | No. | 2 | | |

| | | | | | |
|-------|---|-----|---|--|--|
| 5.8.2 | 200 mm dia uPVC | No. | 2 | | |
| 3 | | | | | |
| 5.8.2 | 125 mm dia uPVC | No. | 2 | | |
| 4 | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED OVER TO MAINLINE SUMMARY SHEET | | | | |
| | | | | | |

BILL NO. 7 - SUBMAIN PIPELINES

| ITEM NO. | DESCRIPTION | AMOUNT (KSh) |
|---------------------|--------------------|-------------------------|
| | COLLECTION | |
| | | |
| 6.1 | SM2 | - |
| | | |
| 6.2 | SM3 | - |
| | | |
| 6.3 | SM4 | - |
| | | |
| 6.4 | SM5 | - |
| | | |
| 6.5 | SM6 | - |
| | | |

| | | |
|--|------|---|
| 6.6 | SM7 | - |
| 6.7 | SM8 | - |
| 6.8 | SM9 | - |
| 6.9 | SM10 | - |
| 6.10 | SM11 | - |
| 6.11 | SM12 | - |
| 6.12 | SM13 | - |
| TOTAL CARRIED OVER TO COLLECTION SHEET | | - |

| Bill No.6.1: Sub Main 2 Pipeline | | | | | |
|----------------------------------|----------------------------|------|----------|------------|--------------|
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 6.1.1 | Excavation and Backfilling | | | | |
| | | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021
Page **237** of **545**

| | | | | | |
|--------------|--|----------------|-------|--|--|
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| 6.1.1.1 | Excavation and Backfilling in normal soil for Dia 63 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+299 m. | m ³ | 138.4 | | |
| 6.1.1.2 | Ditto for dia 50 mm from chainage 0+299 m to 0+520 m. | m ³ | 99.9 | | |
| 6.1.1.3 | Ditto for dia 40 mm from chainage 0+520 m to 0+620 m. | m ³ | 44.0 | | |
| 6.1.1.4 | Ditto for dia 32 mm from chainage 0+620 m to 0+661 m. | m ³ | 17.7 | | |
| 6.1.1.5 | Ditto for dia 25 mm from chainage 0+661 m to 0+700 m. | m ³ | 17.0 | | |
| 6.1.1.6 | Ditto for dia 20 mm from chainage 0+700 m to 0+764 m. | m ³ | 26.9 | | |
| 6.1.1.7 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 17.20 | | |
| 6.1.1.8 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 17.20 | | |
| 6.1.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |

| | | | | | |
|--------------|--|-----|--------|--|--|
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 6.1.2 .1 | 63 mm diameter | m | 300.00 | | |
| | | | | | |
| 6.1.2 .2 | 50 mm diameter | m | 285.00 | | |
| | | | | | |
| 6.1.2 .3 | 40 mm diameter | m | 70.00 | | |
| | | | | | |
| 6.1.2 .4 | 32 mm diameter | m | 55.00 | | |
| | | | | | |
| 6.1.2 .5 | 25 mm diameter | m | 40.00 | | |
| | | | | | |
| 6.1.2 .6 | 20 mm diameter | m | 25.00 | | |
| | | | | | |
| | | | | | |
| 6.1.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 6.1.3 .1 | 63 x 50 | No. | 1 | | |
| | | | | | |
| 6.1.3 .2 | 50 x 40 | No. | 1 | | |
| | | | | | |
| 6.1.3 .3 | 40 x 32 | No. | 1 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.1.3 .4 | 32 x 25 | No. | 1 | | |
| 6.1.3 .5 | 25 x 20 | No. | 1 | | |
| | | | | | |
| | Tees | | | | |
| 6.1.3 .6 | 63 x 40 | No. | 1 | | |
| 6.1.3 .7 | 63 x 25 | No. | 1 | | |
| 6.1.3 .8 | 50 x 20 | No. | 1 | | |
| 6.1.3 .9 | 40 x 20 | No. | 6 | | |
| 6.1.3 .10 | 32 x 20 | No. | 3 | | |
| 6.1.3 .11 | 25 x 20 | No. | 3 | | |
| 6.1.3 .12 | 20 x 20 | No. | 2 | | |
| 6.1.4 | JUNCTION CHAMBERS | | | | |
| 6.1.4 .1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |

| | | | | | |
|----------|--|-----|---|--|--|
| | 1 No. Junction Chamber fittings to Offtake SM2-F1 at Chainage 0+032 m | | | | |
| 6.1.4.2 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| 6.1.4.3 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.1.4.4 | 50 mm x 32 mm dia steel tee | No. | 1 | | |
| 6.1.4.5 | 50 mm dia Nipple | No. | 2 | | |
| 6.1.4.6 | 50 mm dia Gate valve | No. | 1 | | |
| 6.1.4.7 | 50 mm dia Union | No. | 1 | | |
| 6.1.4.8 | 32 mm dia Nipple | No. | 1 | | |
| 6.1.4.9 | 32 mm dia Gate valve | No. | 1 | | |
| 6.1.4.10 | 32 mm dia Union | No. | 1 | | |
| 6.1.4.11 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.1.4.12 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM2-F2 at Chainage 0+299 m | | | | |
| 6.1.4.13 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| 6.1.4.14 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.1.4 .15 | 50 mm x 20 mm dia steel tee | No. | 1 | | |
| 6.1.4 .16 | 50 mm dia Nipple | No. | 2 | | |
| 6.1.4 .17 | 50 mm dia Gate valve | No. | 1 | | |
| 6.1.4 .18 | 50 mm dia Union | No. | 1 | | |
| 6.1.4 .19 | 50/50 PVC-U/GI Adaptor | No. | 1 | | |
| 6.1.4 .20 | 20 mm dia Nipple | No. | 1 | | |
| 6.1.4 .21 | 20 mm dia Gate valve | No. | 1 | | |
| 6.1.4 .22 | 20 mm dia Union | No. | 1 | | |
| 6.1.4 .23 | 20 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.1.4 .24 | 25/20 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED OVER TO COLLECTION SHEET | | | | |
| | | | | | |

Bill No.6.2: Sub Main 3 Pipeline

| ITE M | DESCRIPTION | UNI T | QUANTI TY | RATE (KSh) | AMOUNT (KSh) |
|----------|-------------|----------|--------------|---------------|-----------------|
| | | | | | |
| | | | | | |

| | | | | | |
|--------------|--|----------------|-------|--|--|
| 6.2.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.2.1.1 | Excavation and Backfilling in normal soil for Dia 90 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+256 m. | m ³ | 125.4 | | |
| | | | | | |
| 6.2.1.2 | Ditto for dia 63 mm from chainage 0+256 m to 0+600 m. | m ³ | 159.7 | | |
| | | | | | |
| 6.2.1.3 | Ditto for dia 50 mm from chainage 0+600 m to 1+280 m. | m ³ | 297.0 | | |
| | | | | | |
| 6.2.1.4 | Ditto for dia 40 mm from chainage 1+280 m to 1+974 m. | m ³ | 61.6 | | |
| | | | | | |
| 6.2.1.5 | Ditto for dia 32 mm from chainage 1+974 m to 1+840 m. | m ³ | 190.1 | | |
| | | | | | |
| 6.2.1.6 | Ditto for dia 25 mm from chainage 1+840 m to 1+920 m. | m ³ | 34.0 | | |
| | | | | | |
| 6.2.1.7 | Ditto for dia 20 mm from chainage 1+920 m to 1+970 m. | m ³ | 21.0 | | |
| | | | | | |
| 6.2.1.8 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 44.44 | | |
| | | | | | |
| 6.2.1.9 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 44.44 | | |
| | | | | | |
| | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to | | | | |

| | | | | | |
|--------------|---|---|--------|--|--|
| | include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| 6.2.2 | uPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 6.2.2. 1 | 90 mm diameter | m | 256.00 | | |
| | | | | | |
| 6.2.2. 2 | 63 mm diameter | m | 345.00 | | |
| | | | | | |
| 6.2.2. 3 | 50 mm diameter | m | 660.00 | | |
| | | | | | |
| 6.2.2. 4 | 40 mm diameter | m | 80.00 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 6.2.2. 5 | 40 mm diameter | m | 60.00 | | |
| | | | | | |
| 6.2.2. 6 | 32 mm diameter | m | 440.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|-------|--|--|
| 6.2.2. 7 | 25 mm diameter | m | 80.00 | | |
| 6.2.2. 8 | 20 mm diameter | m | 50.00 | | |
| 6.2.3 | Upvc Pipe Fittings | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Reducers | | | | |
| 6.2.3. 1 | 90 x 63 | No. | 1 | | |
| 6.2.3. 2 | 63 x 50 | No. | 1 | | |
| 6.2.3. 3 | 63 x 50 | No. | 1 | | |
| 6.2.3. 4 | 50 x 40 | No. | 1 | | |
| 6.2.3. 5 | 40 x 32 | No. | 1 | | |
| 6.2.3. 6 | 32 x 25 | No. | 1 | | |
| 6.2.3. 7 | 25 x 20 | No. | 1 | | |
| 6.2.4 | Tees | | | | |
| 6.2.4. 1 | 90 x 40 | No. | 1 | | |
| 6.2.4. 2 | 90 x 50 | No. | 2 | | |
| 6.2.4. 3 | 63 x 20 | No. | 5 | | |
| 6.2.4. 4 | 50 x 20 | No. | 8 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.2.4. 5 | 40 x 20 | No. | 6 | | |
| 6.2.4. 6 | 32 x 20 | No. | 4 | | |
| 6.2.4. 7 | 25 x 20 | No. | 2 | | |
| 6.2.4. 8 | 20 x 20 | No. | 1 | | |
| 6.2.5 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 6.2.5. 1 | 90 mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 6.2.5. 2 | 90 mm dia | No. | 4 | | |
| | 45 degrees | | | | |
| 6.2.5. 3 | 90 mm dia | No. | 2 | | |
| 6.2.6 | JUNCTION CHAMBERS | | | | |
| 6.2.6. 1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| | 1 No. Junction Chamber fittings to Offtake SM3-F1 at Chainage 0+020 m | | | | |
| 6.2.6. 2 | 80/90 Stepped coupling | No. | 2 | | |
| 6.2.6. 3 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.2.6. 4 | 80 mm x 32 mm dia double flanged steel tee | No. | 1 | | |
| 6.2.6. 5 | 80 mm dia flanged sluice valve | No. | 1 | | |
| 6.2.6. 6 | 32 mm dia Nipple | No. | 2 | | |
| 6.2.6. 7 | 32 mm dia Gate valve | No. | 1 | | |
| 6.2.6. 8 | 32 mm dia Union | No. | 1 | | |
| 6.2.6. 9 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.2.6. 10 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | 2 No. Junction Chamber fittings to Offtake SM3-F2 and SM3-F3 at Chainage 0+200m and chainage 0+255 | | | | |
| 6.2.6. 11 | 80/90 Stepped coupling | No. | 4 | | |
| 6.2.6. 12 | 80 mm dia single flanged steel pipe 500 mm long | No. | 4 | | |
| 6.2.6. 13 | 80 mm x 40 mm dia double flanged steel tee | No. | 2 | | |
| 6.2.6. 14 | 80 mm dia flanged sluice valve | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.2.6. 15 | 40 mm dia Nipple | No. | 4 | | |
| 6.2.6. 16 | 40 mm dia Gate valve | No. | 2 | | |
| 6.2.6. 17 | 40 mm dia Union | No. | 2 | | |
| 6.2.6. 18 | 40 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.2.6. 19 | 40/50 PVC-U/GI Adaptor | No. | 2 | | |
| 6.2.7 | AIR VALVES | | | | |
| 6.2.7. 1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 520m | | | | |
| 6.2.7. 2 | 63 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| 6.2.7. 3 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 6.2.7. 4 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| 6.2.7. 5 | 65mm dia threaded GI union | No. | 4 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.2.7.6 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| 6.2.7.7 | 25 mm dia threaded GI union | No. | 2 | | |
| 6.2.7.8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 6.2.7.9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 6.2.7.10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| 6.2.8 | WASHOUT (W/O) | | | | |
| | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | 1 No. Wash Out (WO) at Chainage 1740m | | | | |
| 6.2.8.1 | 32 x 25 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| 6.2.8.2 | 25mm dia, 0.5m long threaded GI spigot | No. | 3 | | |
| 6.2.8.3 | 25 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| 6.2.8.4 | 25mm dia gate valve | No. | 1 | | |
| 6.2.8.5 | 25 x 25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 6.2.8.6 | 25mm dia GI union | No. | 3 | | |

| | | | | | |
|-------------|--|-----|---|--|--|
| 6.2.8. 7 | 25mm dia GI nipple | No. | 2 | | |
| 6.2.8. 8 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 6.2.8. 9 | 25 mm dia uPVC pipe | m | 6 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTALS CARRIED OVER TO COLLECTION SHEET | | | | |
| | | | | | |

Bill No.6.3: Sub Main 4 Pipeline

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|--------------|--|----------------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| 6.3.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.3.1. 1 | Excavation and Backfilling in normal soil for Dia 75 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+633 m. | m ³ | 310.2 | | |
| | | | | | |
| 6.3.1. 2 | Ditto for dia 63 mm from chainage 0+633 m to 0+752 m. | m ³ | 55.6 | | |
| | | | | | |
| 6.3.1. 3 | Ditto for dia 40 mm from chainage 0+752 m to 1+420 | m ³ | 288.6 | | |
| | | | | | |

| | | | | | |
|-----------------------------|---|----------------|--------|--|--|
| 6.3.1. 4 | Ditto for dia 32 mm from chainage 1+420 m to 1+600 m. | m ³ | 76.5 | | |
| 6.3.1. 5 | Ditto for dia 25 mm from chainage 1+600 m to 1+757 m. | m ³ | 63.4 | | |
| 6.3.1. 6 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 39.71 | | |
| 6.3.1. 7 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 39.71 | | |
| uPVC Pipework | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| 6.3.2 uPVC Straights | | | | | |
| | Class PN6 | | | | |
| 6.3.2. 1 | 75 mm diameter | m | 560.00 | | |
| | Class PN8 | | | | |
| 6.3.2. 2 | 75 mm diameter | m | 73.00 | | |

| | | | | | |
|--------------|--|-----|--------|--|--|
| 6.3.2. 3 | 63 mm diameter | m | 120.00 | | |
| 6.3.2. 4 | 32 mm diameter | m | 248.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| 6.3.2. 5 | 32 mm diameter | m | 420.00 | | |
| 6.3.2. 6 | 25 mm diameter | m | 180.00 | | |
| 6.3.2. 7 | 20 mm diameter | m | 151.00 | | |
| | | | | | |
| | | | | | |
| 6.3.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Reducers | | | | |
| 6.3.3. 1 | 75 x 63 | No. | 1 | | |
| 6.3.3. 2 | 63 x 32 | No. | 1 | | |
| 6.3.3. 3 | 32 x 25 | No. | 1 | | |
| 6.3.3. 4 | 25 x 20 | No. | 1 | | |
| 6.3.4 | Tees | | | | |
| 6.3.4. 1 | 75 x 50 | No. | 1 | | |
| 6.3.4. 2 | 75 x 40 | No. | 1 | | |
| 6.3.4. 3 | 63 x 50 | No. | 1 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.3.4. 4 | 32 x 20 | No. | 4 | | |
| 6.3.4. 5 | 25 x 20 | No. | 3 | | |
| 6.3.4. 6 | 20 x 20 | No. | 2 | | |
| 6.3.5 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 6.3.5. 1 | 90 mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 6.3.5. 2 | 90 mm dia | No. | 4 | | |
| | 45 degrees | | | | |
| 6.3.5. 3 | 90 mm dia | No. | 2 | | |
| 6.3.6 | JUNCTION CHAMBERS | | | | |
| 6.3.6. 1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM4-F1 at Chainage 0+042 m | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.3.6. 1 | 75 / 65 dia PVC-U/GI adaptor | No. | 2 | | |
| | | | | | |
| 6.3.6. 2 | 65 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.3.6. 3 | 65 mm x 40 mm dia threaded steel tee | No. | 1 | | |
| | | | | | |
| 6.3.6. 4 | 65 mm dia GI nipple | No. | 2 | | |
| | | | | | |
| 6.3.6. 5 | 40 mm dia GI nipple | No. | 2 | | |
| | | | | | |
| 6.3.6. 6 | 65 mm dia gate valve | No. | 1 | | |
| | | | | | |
| 6.3.6. 7 | 40 mm dia gate valve | No. | 1 | | |
| | | | | | |
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| | | | | | |
| | Sub-Total Carried Forward To Next Page | | | | |
| | | | | | |
| | | | | | |
| | Sub-Total Brought Forward From Previous Page | | | | |
| | | | | | |
| | | | | | |
| 6.3.6. 7 | 65 mm dia GI union | No. | 1 | | |
| | | | | | |
| 6.3.6. 8 | 40 mm dia GI union | No. | 1 | | |
| | | | | | |
| 6.3.6. 9 | 40 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.3.6. 10 | 40/50 mm dia PVC-U/GI adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM4-F2 at Chainage 0+632 m | | | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.3.6. 10 | 75 / 65 dia PVC-U/GI adaptor | No. | 2 | | |
| 6.3.6. 11 | 65 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.3.6. 12 | 65 mm x 32 mm dia threaded steel tee | No. | 1 | | |
| 6.3.6. 13 | 65 mm dia GI nipple | No. | 2 | | |
| 6.3.6. 14 | 32 mm dia GI nipple | No. | 2 | | |
| 6.3.6. 15 | 65 mm dia gate valve | No. | 1 | | |
| 6.3.6. 16 | 32 mm dia gate valve | No. | 1 | | |
| 6.3.6. 17 | 65 mm dia GI union | No. | 1 | | |
| 6.3.6. 18 | 32 mm dia GI union | No. | 1 | | |
| 6.3.6. 19 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.3.6. 20 | 40/32 mm dia PVC-U/GI adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM4-F3 at Chainage 0+752 m | | | | |
| 6.3.6. 20 | 63 / 50 dia PVC-U/GI adaptor | No. | 2 | | |
| 6.3.6. 21 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.3.6. 22 | 50 mm x 40 mm dia threaded steel tee | No. | 1 | | |
| 6.3.6. 23 | 50 mm dia GI nipple | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.3.6. 24 | 40 mm dia GI nipple | No. | 2 | | |
| 6.3.6. 25 | 50 mm dia gate valve | No. | 1 | | |
| 6.3.6. 26 | 40 mm dia gate valve | No. | 1 | | |
| 6.3.6. 27 | 50 mm dia GI union | No. | 1 | | |
| 6.3.6. 28 | 40 mm dia GI union | No. | 1 | | |
| 6.3.6. 29 | 40 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.3.6. 30 | 50/40 mm dia PVC-U/GI adaptor | No. | 1 | | |
| 6.3.7 | AIR VALVES | | | | |
| 6.3.7. 1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 520m | | | | |
| 6.3.7. 2 | 32 x 25 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| 6.3.7. 3 | 25 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |

| | | | | | |
|-------------|--|-----|---|--|--|
| 6.3.7. 4 | 25 x 25 mm dia threaded GI tee | No. | 2 | | |
| 6.3.7. 5 | 25mm dia threaded GI union | No. | 6 | | |
| 6.3.7. 6 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| 6.3.7. 7 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 6.3.7. 8 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 6.3.7. 9 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.6.4: Sub Main SM5 Pipeline | | | | | |
|------------------------------------|--|----------------|--------------|---------------|-----------------|
| ITE M | DESCRIPTION | UNI T | QUANTI TY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 6.4.1 | Excavation and Backfilling | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.4.1. 1 | Excavation and Backfilling in normal soil for Dia 110 mm to a depth n.e 1.5 m from chainage 0+000 m to 1+1132 m. | m ³ | 803.7 | | |
| | | | | | |
| 6.4.1. 2 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 40.2 | | |
| | | | | | |
| 6.4.1. 3 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 40.2 | | |

| | | | | | |
|--------------|--|-----|----------|--|--|
| | | | | | |
| | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 m | | | | |
| | CLASS PN8 80 m | | | | |
| | CLASS PN10 100 m | | | | |
| | CLASS PN12.5 125 m | | | | |
| | | | | | |
| 6.4.2 | uPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 6.4.2.1 | 110 mm diameter | m | 1,132.00 | | |
| | | | | | |
| 6.4.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Bends (Provisional) | | | | |
| | | | | | |
| | 90 degrees | | | | |
| | | | | | |
| 6.4.3.1 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 22.5 degrees | | | | |
| | | | | | |
| 6.4.3.2 | 90 mm dia | No. | 4 | | |
| | | | | | |
| | 45 degrees | | | | |
| | | | | | |
| 6.4.3.3 | 90 mm dia | No. | 2 | | |
| | | | | | |
| 6.4.4 | JUNCTION CHAMBERS | | | | |
| | | | | | |
| 6.4.4.1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| | thrust blocks, pipe supports as shown in the drawings. | | | | |
| | | | | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | | | | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM5-F1 at Chainage 0+010 m | | | | |
| | | | | | |
| 6.4.4. 2 | 110/100 mm dia stepped couplings | No. | 2 | | |
| | | | | | |
| 6.4.4. 3 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.4.4. 4 | 100 x 65 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.4.4. 5 | 100 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.4.4. 6 | 65 mm dia GI nipple | No. | 1 | | |
| | | | | | |
| 6.4.4. 7 | 65 mm dia gate valve | No. | 1 | | |
| | | | | | |
| 6.4.4. 8 | 65 mm dia GI union | No. | 1 | | |
| | | | | | |
| 6.4.4. 9 | 65 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.4.4. 10 | 75/65 mm dia PVC-U/GI adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM5-F2 at Chainage 1+131 m | | | | |
| | | | | | |
| 6.4.4. 11 | 110 / 100 mm dia stepped couplings | No. | 3 | | |
| | | | | | |
| 6.4.4. 12 | 100 mm dia single flanged steel pipe 500 mm long | No. | 3 | | |
| | | | | | |
| 6.4.4. 13 | 100 mm x 100 mm dia All flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.4.4. 14 | 100 mm dia flanged sluice valve | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| | | | | | |
| 6.4.5 | AIR VALVES | | | | |
| | | | | | |
| 6.4.5.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 2 No. Double Air Valves (DAVs) at Chainage 720m & 1120m | | | | |
| | | | | | |
| 6.4.5.2 | 110 x 100 mm dia UPVC/G.I VJ coupling | No. | 4 | | |
| | | | | | |
| 6.4.5.3 | 100mm dia, 0.5m long single flanged GI spigot | No. | 4 | | |
| | | | | | |
| 6.4.5.4 | 100 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 2 | | |
| | | | | | |
| 6.4.5.5 | 50mm dia double threaded steel pipe, 0.4m long | No. | 2 | | |
| | | | | | |
| 6.4.5.6 | 50mm dia threaded Double Air Valve | No. | 2 | | |
| | | | | | |
| 6.4.5.7 | 50mm dia gate Valve | No. | 2 | | |
| | | | | | |
| 6.4.5.8 | 50mm dia GI Union | No. | 4 | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED OVER TO COLLECTION SHEET | | | | |
| | | | | | |

Bill No.6.5: Sub Main SM6 Pipeline

| | | | | | |
|--------------|-----------------------------------|-------------|-----------------|-------------------|---------------------|
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 6.5.1 | Excavation and Backfilling | | | | |
| | | | | | |

| | | | | | |
|--------------|--|----------------|-------|--|---|
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| 6.5.1.1 | Excavation and Backfilling in normal soil for Dia 63 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+619 m. | m ³ | 286.6 | | - |
| 6.5.1.2 | Ditto for dia 32 mm from chainage 0+619 m to 0+660 m. | m ³ | 18.1 | | - |
| 6.5.1.3 | Ditto for dia 25 mm from chainage 0+660 m to 0+820 m. | m ³ | 68.0 | | - |
| 6.5.1.4 | Ditto for dia 20 mm from chainage 0+820 m to 1+115 m. | m ³ | 58.8 | | - |
| 6.5.1.5 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 21.58 | | - |
| 6.5.1.6 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 21.58 | | - |
| | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| 6.5.2 | uPVC Straights | | | | |
| | Class PN10 | | | | |

| | | | | | |
|--------------|---|-----|--------|--|---|
| 6.5.2. 1 | 63 mm diameter | m | 619.00 | | - |
| 6.5.2. 2 | 32 mm diameter | m | 42.00 | | - |
| 6.5.2. 3 | 25 mm diameter | m | 160.00 | | - |
| 6.5.2. 4 | 20 mm diameter | m | 140.00 | | - |
| | Class PN12.5 | | | | |
| 6.5.2. 5 | 20 mm diameter | m | 155.00 | | - |
| 6.5.3 | Upvc Pipe Fittings | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Reducers | | | | |
| 6.5.3. 1 | 63 x 32 | No. | 1 | | - |
| 6.5.3. 2 | 32 x 25 | No. | 1 | | - |
| 6.5.3. 3 | 25 x 20 | No. | 1 | | - |
| | Sub-Total Carried Forward To Next Page | | | | - |
| | Sub-Total Brought Forward From Previous Page | | | | - |
| 6.5.4 | Tees | | | | |
| 6.5.4. 1 | 63 x 40 | No. | 2 | | - |
| 6.5.4. 2 | 63 x 32 | No. | 1 | | - |
| 6.5.4. 3 | 63 x 20 | No. | 4 | | - |
| 6.5.4. 4 | 32 x 20 | No. | 1 | | - |

| | | | | | |
|--------------|---|-----|---|--|---|
| 6.5.4. 5 | 25 x 20 | No. | 2 | | - |
| 6.5.4. 6 | 20 x 20 | No. | 2 | | - |
| 6.5.5 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 6.5.5. 1 | 63 mm diameter | No. | 2 | | - |
| | 22.5 degrees | | | | |
| 6.5.5. 2 | 63 mm dia | No. | 2 | | - |
| | 45 degrees | | | | |
| 6.5.5. 3 | 63 mm dia | No. | 2 | | - |
| 6.5.6 | JUNCTION CHAMBERS | | | | |
| 6.5.6. 1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | - |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM6-F1 at Chainage 0+030 m | | | | |
| 6.5.6. 2 | 63/50 PVC-U/GI Adaptor | No. | 2 | | - |
| 6.5.6. 3 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | - |
| 6.5.6. 4 | 50 mm x 25 mm dia steel tee | No. | 1 | | - |
| 6.5.6. 5 | 50 mm dia Nipple | No. | 2 | | - |

| | | | | | |
|--------------|---|-----|---|--|---|
| 6.5.6. 6 | 50 mm dia Gate valve | No. | 1 | | - |
| 6.5.6. 7 | 50 mm dia Union | No. | 1 | | - |
| 6.5.6. 8 | 25 mm dia Nipple | No. | 1 | | - |
| 6.5.6. 9 | 25 mm dia Gate valve | No. | 1 | | - |
| 6.5.6. 10 | 25 mm dia Union | No. | 1 | | - |
| 6.5.6. 11 | 25 mm dia x 500 mm threaded GI pipe | No. | 1 | | - |
| 6.5.6. 12 | 32/25 PVC-U/GI Adaptor | No. | 1 | | - |
| | 1 No. Junction Chamber fittings to Offtake SM6-F2 & SM6-F3 at Chainage 0+148 m & 0+618 | | | | |
| 6.5.6. 13 | 63/50 PVC-U/GI Adaptor | No. | 4 | | - |
| 6.5.6. 14 | 50 mm dia x 500 mm threaded GI pipe | No. | 4 | | - |
| 6.5.6. 15 | 50 mm x 32 mm dia steel tee | No. | 2 | | - |
| 6.5.6. 16 | 50 mm dia Nipple | No. | 4 | | - |
| 6.5.6. 17 | 50 mm dia Gate valve | No. | 2 | | - |
| 6.5.6. 18 | 50 mm dia Union | No. | 2 | | - |
| 6.5.6. 19 | 32 mm dia Nipple | No. | 2 | | - |
| 6.5.6. 20 | 32 mm dia Gate valve | No. | 2 | | - |
| 6.5.6. 21 | 32 mm dia Union | No. | 2 | | - |
| 6.5.6. 22 | 32 mm dia x 500 mm threaded GI pipe | No. | 2 | | - |

| | | | | | |
|--------------|--|-----|---|--|---|
| 6.5.6. 23 | 40/32 PVC-U/GI Adaptor | No. | 2 | | - |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | - |
| | | | | | |

Bill No.6.6: Sub Main A7 Pipeline

| ITE M | DESCRIPTION | UNI T | QUANT ITY | RATE (KSh) | AMOUNT (KSh) |
|--------------|--|----------------|--------------|---------------|-----------------|
| | | | | | |
| | | | | | |
| 6.6.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.6.1 .1 | Excavation and Backfilling in normal soil for Dia 140 mm to a depth n.e 1.5 m from chainage 0+000 m to 1+1609 m. | m ³ | 1,184.7 | | |
| | | | | | |
| 6.6.1 .2 | Ditto for dia 125 mm from chainage 1+609 m to 2+2147 m. | m ³ | 390.8 | | |
| | | | | | |
| 6.6.1 .3 | Ditto for dia 110 mm from chainage 2+147 m to 2+774 m. | m ³ | 324.9 | | |
| | | | | | |
| 6.6.1 .4 | Ditto for dia 75 mm from chainage 2+774 m to 2+951 m. | m ³ | 84.1 | | |
| | | | | | |
| 6.6.1 .5 | Ditto for dia 20 mm from chainage 2+951 m to 3+036 m. | m ³ | 35.7 | | |
| | | | | | |
| 6.6.1 .6 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 101.01 | | |
| | | | | | |
| 6.6.1 .7 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 101.01 | | |
| | | | | | |
| 6.6.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|--------------|---|-------------------------|----------|--|--|
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class | Working Pressure | | | |
| | (m) | | | | |
| | CLASS PN6 | 60 | m | | |
| | CLASS PN8 | 80 | m | | |
| | CLASS PN10 | 100 | m | | |
| | CLASS PN12.5 | 125 | m | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 6.6.2 .1 | 140 mm diameter | m | 1,900.00 | | |
| | | | | | |
| 6.6.2 .2 | 125 mm diameter | m | 685.00 | | |
| | | | | | |
| 6.6.2 .3 | 110 mm diameter | m | 685.00 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 6.6.2 .4 | 110 mm diameter | m | 195.00 | | |
| | | | | | |
| 6.6.2 .5 | 75 mm diameter | m | 180.00 | | |
| | | | | | |
| 6.6.2 .6 | 20 mm diameter | m | 90.00 | | |
| | | | | | |
| 6.6.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 6.6.3 .1 | 140 x 125 mm dia | No. | 1 | | |
| | | | | | |
| 6.6.3 .2 | 125 x 110 mm dia | No. | 1 | | |
| | | | | | |
| 6.6.3 .3 | 110 x 75 mm dia | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.6.3 .4 | 75 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | Tees | | | | |
| | | | | | |
| 6.6.3 .22 | 20 x 20 | No. | 1 | | |
| | | | | | |
| | BENDS (PROVISIONAL) | | | | |
| | | | | | |
| | 11.25 degrees | | | | |
| | | | | | |
| 6.6.3 .23 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.6.3 .24 | 90mm diameter | No. | 2 | | |
| | | | | | |
| | 22.5 degrees | | | | |
| | | | | | |
| 6.6.3 .25 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.6.3 .26 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 45 degrees | | | | |
| | | | | | |
| 6.6.3 .27 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.6.3 .28 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 90 degrees | | | | |
| | | | | | |
| 6.6.3 .29 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.6.3 .30 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| 6.6.4 | JUNCTION CHAMBERS | | | | |
| | | | | | |
| 6.6.4 .1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 9 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|--------------|--|-----|---|--|--|
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F1 at Chainage 0+015 m | | | | |
| | | | | | |
| 6.6.4 .2 | 140/125 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.6.4 .3 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.6.4 .4 | 125 mm x 32 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.6.4 .5 | 125 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.6.4 .6 | 32 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.6.4 .7 | 32 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.6.4 .8 | 32 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.6.4 .9 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.6.4 .10 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F3 at Chainage 1+152 m | | | | |
| | | | | | |
| 6.6.4 .11 | 140/125 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.6.4 .12 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.6.4 .13 | 125 mm x 40 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.6.4 .14 | 125 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.6.4 .15 | 40 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.6.4 .16 | 40 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.6.4 .17 | 40 mm dia Union | No. | 1 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.6.4 .18 | 40 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.6.4 .19 | 50/50 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F5 at Chainage 1+608 m | | | | |
| 6.6.4 .20 | 140/125 Stepped coupling | No. | 2 | | |
| 6.6.4 .21 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.6.4 .22 | 125 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| 6.6.4 .23 | 125 mm dia flanged sluice valve | No. | 1 | | |
| 6.6.4 .24 | 50 mm dia Nipple | No. | 2 | | |
| 6.6.4 .25 | 50 mm dia Gate valve | No. | 1 | | |
| 6.6.4 .26 | 50 mm dia Union | No. | 1 | | |
| 6.6.4 .27 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.6.4 .28 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F6 at Chainage 1+897 m | | | | |
| 6.6.4 .29 | 140/125 Stepped coupling | No. | 2 | | |
| 6.6.4 .30 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.6.4 .31 | 125 mm x 65 mm dia double flanged steel tee | No. | 1 | | |
| 6.6.4 .32 | 125 mm dia flanged sluice valve | No. | 1 | | |
| 6.6.4 .33 | 65 mm dia Nipple | No. | 2 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.6.4 .34 | 65 mm dia Gate valve | No. | 1 | | |
| 6.6.4 .35 | 65 mm dia Union | No. | 1 | | |
| 6.6.4 .36 | 65 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.6.4 .37 | 75/65 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F7 at Chainage 2+147 m | | | | |
| 6.6.4 .38 | 125/125 Stepped coupling | No. | 2 | | |
| 6.6.4 .39 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.6.4 .40 | 125 mm x 40 mm dia double flanged steel tee | No. | 1 | | |
| 6.6.4 .41 | 125 mm dia flanged sluice valve | No. | 1 | | |
| 6.6.4 .42 | 40 mm dia Nipple | No. | 2 | | |
| 6.6.4 .43 | 40 mm dia Gate valve | No. | 1 | | |
| 6.6.4 .44 | 40 mm dia Union | No. | 1 | | |
| 6.6.4 .45 | 40 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.6.4 .46 | 50/40 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F8 & SM7-F9 at Chainage 2+370 m & 2+612 m | | | | |
| 6.6.4 .47 | 110/100 Stepped coupling | No. | 4 | | |
| 6.6.4 .48 | 100 mm dia single flanged steel pipe 500 mm long | No. | 4 | | |
| 6.6.4 .49 | 100 mm x 32 mm dia double flanged steel tee | No. | 2 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.6.4 .50 | 100 mm dia flanged sluice valve | No. | 2 | | |
| 6.6.4 .51 | 32 mm dia Nipple | No. | 4 | | |
| 6.6.4 .52 | 32 mm dia Gate valve | No. | 2 | | |
| 6.6.4 .53 | 32 mm dia Union | No. | 2 | | |
| 6.6.4 .54 | 32 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.6.4 .55 | 40/32 PVC-U/GI Adaptor | No. | 2 | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F10 at Chainage 2+274 m | | | | |
| 6.6.4 .56 | 110/100 Stepped coupling | No. | 2 | | |
| 6.6.4 .57 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.6.4 .58 | 100 mm x 80 mm dia all flanged steel tee | No. | 1 | | |
| 6.6.4 .59 | 100 mm dia flanged sluice valve | No. | 1 | | |
| 6.6.4 .60 | 80 mm dia flanged sluice valve | No. | 1 | | |
| 6.6.4 .61 | 80 mm dia single flanged steel pipe 500 mm long | No. | 1 | | |
| 6.6.4 .62 | 90/80 Stepped coupling | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM7-F11 at Chainage 2+950 m | | | | |
| 6.6.4 .63 | 110/100 Stepped coupling | No. | 2 | | |
| 6.6.4 .64 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.6.4 .65 | 100 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.6.4 .66 | 100 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.6.4 .67 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.6.4 .68 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.6.4 .69 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.6.4 .70 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.6.4 .71 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| 6.6.5 | AIR VALVES | | | | |
| | | | | | |
| 6.6.5. 1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 500m | | | | |
| | | | | | |
| 6.6.5. 2 | 160 x 150 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| | | | | | |
| 6.6.5. 3 | 150mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| | | | | | |
| 6.6.5. 4 | 150 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| | | | | | |
| 6.6.5. 5 | 50mm dia double threaded steel pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 6.6.5. 6 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 6.6.5. 7 | 50mm dia gate Valve | No. | 1 | | |
| | | | | | |
| 6.6.5. 8 | 50mm dia GI Union | No. | 2 | | |
| | | | | | |

| | | | | | |
|----------|--|-----|---|--|--|
| | 1 No. Double Air Valve (DAV) at Chainage 2500m | | | | |
| 6.6.5.9 | 110 x 100 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| 6.6.5.10 | 100mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| 6.6.5.11 | 100 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| 6.6.5.12 | 50mm dia double threaded steel pipe, 0.4m long | No. | 1 | | |
| 6.6.5.13 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| 6.6.5.14 | 50mm dia gate Valve | No. | 1 | | |
| 6.6.5.15 | 50mm dia GI Union | No. | 2 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.6.7: Sub Main 8 Pipeline | | | | | |
|---|-----------------------------------|-------------|-----------------|-------------------|---------------------|
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 6.7.1 | Excavation and Backfilling | | | | |

| | | | | | |
|--------------|--|----------------|-------|--|--|
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| 6.7.1.1 | Excavation and Backfilling in normal soil for Dia 63 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+696 m. | m ³ | 322.2 | | |
| 6.7.1.2 | Ditto for dia 40 mm from chainage 0+696 m to 0+780 m. | m ³ | 37.4 | | |
| 6.7.1.3 | Ditto for dia 32 mm from chainage 0+780 m to 0+895 m. | m ³ | 49.7 | | |
| 6.7.1.4 | Ditto for dia 25 mm from chainage 0+895 m to 0+980 m. | m ³ | 36.1 | | |
| 6.7.1.5 | Ditto for dia 20 mm from chainage 0+980 m to 1+157 m. | m ³ | 74.3 | | |
| 6.7.1.6 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 25 | | |
| 6.7.1.7 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 25 | | |
| 6.7.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and | | | | |

| | | | | | |
|--------------|---|-----|-----|--|--|
| | socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 6.7.2.1 | 63 mm diameter | m | 696 | | |
| | | | | | |
| 6.7.2.2 | 40 mm diameter | m | 85 | | |
| | | | | | |
| 6.7.2.3 | 32 mm diameter | m | 115 | | |
| | | | | | |
| 6.7.2.4 | 25 mm diameter | m | 85 | | |
| | | | | | |
| 6.7.2.5 | 20 mm diameter | m | 177 | | |
| | | | | | |
| 6.7.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 6.7.3.1 | 63 x 40 | No. | 1 | | |

| | | | | | |
|--------------|--------------------------------|-----|---|--|--|
| 6.7.3.2 | 40 x 32 | No. | 1 | | |
| 6.7.3.3 | 32 x 25 | No. | 1 | | |
| 6.7.3.4 | 25 x 20 | No. | 1 | | |
| | Tees | | | | |
| 6.7.3.5 | 63 x 20 | No. | 6 | | |
| 6.7.3.6 | 63 x 40 | No. | 1 | | |
| 6.7.3.7 | 63 x 20 | No. | 1 | | |
| 6.7.3.8 | 63 x 32 | No. | 1 | | |
| 6.7.3.9 | 40 x 20 | No. | 2 | | |
| 6.7.3.1 0 | 32 x 20 | No. | 1 | | |
| 6.7.3.1 1 | 32 x 25 | No. | 1 | | |
| 6.7.3.1 2 | 63 x 40 | No. | 1 | | |
| | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 6.7.3.1 3 | 63 mm diameter | No. | 2 | | |
| 6.7.3.1 4 | 50 mm diameter | No. | 2 | | |
| 6.7.3.1 5 | 40mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 6.7.3.1 6 | 63 mm diameter | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.7.3.1 7 | 50 mm diameter | No. | 2 | | |
| 6.7.3.1 8 | 40mm diameter | No. | 2 | | |
| | | | | | |
| | 45 degrees | | | | |
| | | | | | |
| 6.7.3.1 9 | 63 mm diameter | No. | 2 | | |
| | | | | | |
| 6.7.3.2 0 | 50 mm diameter | No. | 2 | | |
| | | | | | |
| 6.7.3.2 1 | 40mm diameter | No. | 2 | | |
| | | | | | |
| 6.7.4 | AIR VALVES | | | | |
| | | | | | |
| 6.7.4.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 620m | | | | |
| | | | | | |
| 6.7.4.2 | 63 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 6.7.4.3 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.7.4.4 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| 6.7.4.5 | 65mm dia threaded GI union | No. | 4 | | |
| 6.7.4.6 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| 6.7.4.7 | 25 mm dia threaded GI union | No. | 2 | | |
| 6.7.4.8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 6.7.4.9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 6.7.4.10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| 6.7.5 | JUNCTION CHAMBERS | | | | |
| 6.7.5.1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 5 | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | 1 No. Junction Chamber fittings to | | | | |

| | | | | | |
|----------|--|-----|---|--|--|
| | Offtake SM8-F1 at Chainage 0+170 m | | | | |
| 6.7.5.2 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| 6.7.5.3 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.7.5.4 | 50 mm x 32 mm dia steel tee | No. | 1 | | |
| 6.7.5.5 | 50 mm dia Nipple | No. | 2 | | |
| 6.7.5.6 | 50 mm dia Gate valve | No. | 1 | | |
| 6.7.5.7 | 50 mm dia Union | No. | 1 | | |
| 6.7.5.8 | 32 mm dia Nipple | No. | 1 | | |
| 6.7.5.9 | 32 mm dia Gate valve | No. | 1 | | |
| 6.7.5.10 | 32 mm dia Union | No. | 1 | | |
| 6.7.5.11 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.7.5.12 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM8-F2 at Chainage 0+170 m | | | | |
| 6.7.5.13 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| 6.7.5.14 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.7.5.15 | 50 mm x 15 mm dia steel tee | No. | 1 | | |
| 6.7.5.16 | 50 mm dia Nipple | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.7.5.1 7 | 50 mm dia Gate valve | No. | 1 | | |
| 6.7.5.1 8 | 50 mm dia Union | No. | 1 | | |
| 6.7.5.1 9 | 20 mm dia Nipple | No. | 1 | | |
| 6.7.5.2 0 | 20 mm dia Gate valve | No. | 1 | | |
| 6.7.5.2 1 | 20 mm dia Union | No. | 1 | | |
| 6.7.5.2 2 | 20 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.7.5.2 3 | 20/20 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM8-F3 at Chainage 0+267 m | | | | |
| 6.7.5.2 4 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| 6.7.5.2 5 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.7.5.2 6 | 50 mm x 25 mm dia steel tee | No. | 1 | | |
| 6.7.5.2 7 | 50 mm dia Nipple | No. | 2 | | |
| 6.7.5.2 8 | 50 mm dia Gate valve | No. | 1 | | |
| 6.7.5.2 9 | 50 mm dia Union | No. | 1 | | |
| 6.7.5.3 0 | 25 mm dia Nipple | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.7.5.3 1 | 25 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.7.5.3 2 | 25 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.7.5.3 3 | 25 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.7.5.3 4 | 32/25 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM8-F4 at Chainage 0+695 m | | | | |
| | | | | | |
| 6.7.5.3 5 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 6.7.5.3 6 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.7.5.3 7 | 50 mm x 32 mm dia steel tee | No. | 1 | | |
| | | | | | |
| 6.7.5.3 8 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.7.5.3 9 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.7.5.4 0 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.7.5.4 1 | 32 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.7.5.4 2 | 32 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.7.5.4 3 | 32 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.7.5.4 4 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.7.5.4 5 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM8-F5 at Chainage 0+895 m | | | | |
| | | | | | |
| 6.7.5.4 6 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 6.7.5.4 7 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.7.5.4 8 | 50 mm x 20 mm dia steel tee | No. | 1 | | |
| | | | | | |
| 6.7.5.4 9 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.7.5.5 0 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.7.5.5 1 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.7.5.5 2 | 20 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.7.5.5 3 | 20 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.7.5.5 4 | 20 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.7.5.5 5 | 20 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.7.5.5 6 | 25/20 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

Bill No.6.8: Sub Main SM9 Pipeline

| ITEM | DESCRIPTION | UNIT | QUANT ITY | RATE (KSh) | AMOUNT (KSh) |
|--------------|--|----------------|--------------|---------------|-----------------|
| | | | | | |
| | | | | | |
| 6.8.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.8.1.1 | Excavation and Backfilling in normal soil for Dia 110 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+024 m. | m ³ | 12 | | |
| | | | | | |
| 6.8.1.2 | Ditto for dia 90 mm from chainage 0+024 m to 0+654 m. | m ³ | 309 | | |
| | | | | | |
| 6.8.1.3 | Ditto for dia 63 mm from chainage 0+654 m to 1+080 m. | m ³ | 198 | | |
| | | | | | |
| 6.8.1.4 | Ditto for dia 50 mm from chainage 1+080 m to 1+319 m. | m ³ | 108 | | |
| | | | | | |
| 6.8.1.5 | Ditto for dia 40 mm from chainage 1+319 m to 1+580 m. | m ³ | 115 | | |
| | | | | | |
| 6.8.1.6 | Ditto for dia 32 mm from chainage 1+580 m to 1+691 m. | m ³ | 48 | | |
| | | | | | |

| | | | | | |
|--------------|---|----------------|----|--|--|
| 6.8.1.7 | Ditto for dia 25 mm from chainage 1+691 m to 1+720 m. | m ³ | 21 | | |
| 6.8.1.8 | Ditto for dia 20 mm from chainage 1+720 m to 1+804 m. | m ³ | 27 | | |
| 6.8.1.9 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 42 | | |
| 6.8.1.10 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 42 | | |
| | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| 6.8.2 | uPVC Straights | | | | |
| | Class PN6 | | | | |
| 6.8.2.1 | 110 mm diameter | m | 24 | | |

| | | | | | |
|--------------|--|-----|-----|--|--|
| 6.8.2.2 | 90 mm diameter | m | 630 | | |
| 6.8.2.3 | 63 mm diameter | m | 427 | | |
| 6.8.2.4 | 50 mm diameter | m | 100 | | |
| | Class PN8 | | | | |
| 6.8.2.5 | 50 mm diameter | m | 140 | | |
| 6.8.2.6 | 40 mm diameter | m | 261 | | |
| 6.8.2.7 | 32 mm diameter | m | 111 | | |
| 6.8.2.8 | 25 mm diameter | m | 29 | | |
| | Class PN10 | | | | |
| 6.8.2.9 | 25 mm diameter | m | 20 | | |
| 6.8.2.10 | 20 mm diameter | m | 64 | | |
| 6.8.3 | Upvc Pipe Fittings | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Reducers | | | | |
| 6.8.3.1 | 110 x 90 mm dia | No. | 1 | | |
| 6.8.3.2 | 90 x 63 mm dia | No. | 1 | | |
| 6.8.3.3 | 63 x 50 mm dia | No. | 1 | | |
| 6.8.3.4 | 50 x 40 mm dia | No. | 1 | | |
| 6.8.3.5 | 40 x 32 mm dia | No. | 1 | | |
| 6.8.3.6 | 32 x 25 mm dia | No. | 1 | | |
| 6.8.3.7 | 25 x 20 mm dia | No. | 1 | | |
| | Tees | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.8.3.8 | 90 x 50 mm dia | No. | 2 | | |
| 6.8.3.9 | 90 x 20 mm dia | No. | 3 | | |
| 6.8.3.10 | 63 x 20 mm dia | No. | 3 | | |
| 6.8.3.11 | 63 x 25 mm dia | No. | 1 | | |
| 6.8.3.12 | 63 x 20 mm dia | No. | 3 | | |
| 6.8.3.13 | 50 x 20 mm dia | No. | 3 | | |
| 6.8.3.14 | 50 x 40 mm dia | No. | 1 | | |
| 6.8.3.15 | 40 x 20 mm dia | No. | 2 | | |
| 6.8.3.16 | 40 x 25 mm dia | No. | 1 | | |
| 6.8.3.17 | 32 x 20 mm dia | No. | 5 | | |
| 6.8.3.18 | 25 x 20 mm dia | No. | 3 | | |
| 6.8.3.19 | 20 x 20 mm dia | No. | 2 | | |
| | Saddle Clamps and Adaptors | | | | |
| 6.8.3.20 | 110 x 40 mm diameter Saddle Clamp | No. | 1 | | |
| 6.8.3.21 | 110 x 50 mm diameter Saddle Clamp | No. | 1 | | |
| 6.8.3.22 | 50/40 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.8.3.23 | 63/50 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.8.5 | AIR VALVES | | | | |
| 6.8.5.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, | No. | 2 | | |

| | | | | | |
|----------|--|-----|---|--|--|
| | pipe supports as shown in the drawings. | | | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 460m | | | | |
| | | | | | |
| 6.8.5.2 | 90 x 80 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| | | | | | |
| 6.8.5.3 | 80mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| | | | | | |
| 6.8.5.4 | 80 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| | | | | | |
| 6.8.5.5 | 50mm dia double threaded steel pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 6.8.5.6 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 6.8.5.7 | 50mm dia gate Valve | No. | 1 | | |
| | | | | | |
| 6.8.5.8 | 50mm dia GI Union | No. | 2 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 1540m | | | | |
| | | | | | |
| 6.8.5.9 | 40 x 40 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 6.8.5.10 | 40 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 6.8.5.11 | 40 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.8.5.12 | 40 mm dia threaded GI union | No. | 4 | | |
| 6.8.5.13 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| 6.8.5.14 | 25 mm dia threaded GI union | No. | 2 | | |
| 6.8.5.15 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 6.8.5.16 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 6.8.5.17 | 25 mm dia threaded gate Valve | No. | 1 | | |
| 6.8.6 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 6.8.6.1 | 110 mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 6.8.6.2 | 110 mm diameter | No. | 2 | | |
| | 45 degrees | | | | |
| 6.8.6.3 | 110 mm diameter | No. | 2 | | |
| | 90 degrees | | | | |
| 6.8.6.4 | 110 mm diameter | No. | 2 | | |
| 6.8.7 | JUNCTION CHAMBERS | | | | |
| 6.8.7.1 | Excavate for; provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 7 | | |

| | | | | | |
|----------|--|-----|---|--|--|
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM9-F1 at Chainage 0+020 m | | | | |
| | | | | | |
| 6.8.7.2 | 110/100 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.8.7.3 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.8.7.4 | 100 mm x 40 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.8.7.5 | 100 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.8.7.6 | 40 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.8.7.7 | 40 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.8.7.8 | 40 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.8.7.9 | 40 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.8.7.10 | 50/40 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM9-F3 & SM9-F4 at Chainage 0+193 m & 0+653 m | | | | |
| | | | | | |
| 6.8.7.11 | 80/90 Stepped coupling | No. | 4 | | |
| | | | | | |
| 6.8.7.12 | 80 mm dia single flanged steel pipe 500 mm long | No. | 4 | | |
| | | | | | |
| 6.8.7.13 | 80 mm x 40 mm dia double flanged steel tee | No. | 2 | | |
| | | | | | |

| | | | | | |
|----------|---|-----|---|--|--|
| 6.8.7.14 | 80 mm dia flanged sluice valve | No. | 2 | | |
| 6.8.7.15 | 40 mm dia Nipple | No. | 4 | | |
| 6.8.7.16 | 40 mm dia Gate valve | No. | 2 | | |
| 6.8.7.17 | 40 mm dia Union | No. | 2 | | |
| 6.8.7.18 | 40 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.8.7.19 | 50/40 PVC-U/GI Adaptor | No. | 2 | | |
| | 1 No. Junction Chamber fittings to Offtake SM9-F2 at Chainage 0+024 m | | | | |
| 6.8.7.20 | 110/100 Stepped coupling | No. | 2 | | |
| 6.8.7.21 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.8.7.22 | 100 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| 6.8.7.23 | 100 mm dia flanged sluice valve | No. | 1 | | |
| 6.8.7.24 | 50 mm dia Nipple | No. | 2 | | |
| 6.8.7.25 | 50 mm dia Gate valve | No. | 1 | | |
| 6.8.7.26 | 50 mm dia Union | No. | 1 | | |
| 6.8.7.27 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.8.7.28 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake PI 1487+3 at Chainage 1+080 m | | | | |
| 6.8.7.29 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |

| | | | | | |
|----------|--|-----|---|--|--|
| 6.8.7.30 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.8.7.31 | 50 mm x 20 mm dia steel tee | No. | 1 | | |
| | | | | | |
| 6.8.7.32 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.8.7.33 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.8.7.34 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.8.7.35 | 20 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.8.7.36 | 20 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.8.7.37 | 20 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.8.7.38 | 20 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.8.7.39 | 25/20 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM9-F5 at Chainage 1+320 m | | | | |
| | | | | | |
| 6.8.7.40 | 50/40 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 6.8.7.41 | 40 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.8.7.42 | 40 mm x 40 mm dia steel tee | No. | 1 | | |
| | | | | | |
| 6.8.7.43 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.8.7.44 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.8.7.45 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.8.7.46 | 40 mm x 32 mm threaded steel reducer | No. | 1 | | |
| | | | | | |
| 6.8.7.47 | 32 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.8.7.48 | 32 mm dia Gate valve | No. | 1 | | |
| | | | | | |

| | | | | | |
|----------|--|-----|---|--|---|
| 6.8.7.49 | 32 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.8.7.50 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.8.7.51 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM9-F6 at Chainage 1+580 m | | | | |
| | | | | | |
| 6.8.7.52 | 40/32 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 6.8.7.53 | 32 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.8.7.54 | 32 mm x 20 mm dia GI tee | No. | 1 | | |
| | | | | | |
| 6.8.7.55 | 32 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.8.7.56 | 32 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.8.7.57 | 32 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.8.7.58 | 20 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.8.7.59 | 20 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.8.7.60 | 20 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.8.7.61 | 20 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.8.7.62 | 25/20 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | - |
| | | | | | |

Bill No.6.9: Sub Main SM10 Pipeline

| | | | | | |
|--|--|--|--|--|--|
| | | | | | |
|--|--|--|--|--|--|

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|--------------|--|----------------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| 6.9.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.9.1.1 | Excavation and Backfilling in normal soil for Dia 90 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+680 m. | m ³ | 333 | | |
| | | | | | |
| 6.9.1.2 | Ditto for dia 63 mm from chainage 0+680 m to 1+340 m. | m ³ | 306 | | |
| | | | | | |
| 6.9.1.3 | Ditto for dia 32 mm from chainage 1+340 m to 1+480 m. | m ³ | 61 | | |
| | | | | | |
| 6.9.1.4 | Ditto for dia 25 mm from chainage 1+480 m to 1+560 m. | m ³ | 34 | | |
| | | | | | |
| 6.9.1.5 | Ditto for dia 20 mm from chainage 1+560 m to 1+827 m. | m ³ | 112 | | |
| | | | | | |
| 6.9.1.6 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 42 | | |
| | | | | | |
| 6.9.1.7 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 42 | | |
| | | | | | |
| 6.9.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe | | | | |

| | | | | | |
|-------------|--|----------------|--------|--|--|
| | dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Pressure (m) | Working | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 6.9. 2.1 | 90 mm diameter | m | 680.00 | | |
| | | | | | |
| 6.9. 2.2 | 63 mm diameter | m | 200.00 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 6.9. 2.3 | 63 mm diameter | m | 460 | | |
| | | | | | |
| 6.9. 2.4 | 32 mm diameter | m | 140 | | |
| | | | | | |
| 6.9. 2.5 | 25 mm diameter | m | 80 | | |
| | | | | | |
| 6.9. 2.6 | 20 mm diameter | m | 267 | | |
| | | | | | |
| | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 6.9. 2.7 | 90 x 63 mm dia | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| | | | | | |
| 6.9.2.8 | 63 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 6.9.2.9 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 6.9.2.10 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | Tees | | | | |
| | | | | | |
| 6.9.2.11 | 90 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 6.9.2.12 | 90 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 6.9.2.13 | 90 x 63 mm dia | No. | 1 | | |
| | | | | | |
| 6.9.2.14 | 63 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 6.9.2.15 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 6.9.2.16 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 6.9.2.17 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 6.9.2.18 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 6.9.3 | AIR VALVES | | | | |
| | | | | | |
| 6.9.3.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | | | | | |

| | | | | | |
|-------------------|--|-----|---|--|--|
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 540m | | | | |
| | | | | | |
| 6.9. 3.2 | 90 x 80 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| | | | | | |
| 6.9. 3.3 | 80mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| | | | | | |
| 6.9. 3.4 | 80 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| | | | | | |
| 6.9. 3.5 | 50mm dia double threaded steel pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 6.9. 3.6 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 6.9. 3.7 | 50mm dia gate Valve | No. | 1 | | |
| | | | | | |
| 6.9. 3.8 | 50mm dia GI Union | No. | 2 | | |
| | | | | | |
| 6.9. 4 | BENDS (PROVISIONAL) | | | | |
| | | | | | |
| | 11.25 degrees | | | | |
| | | | | | |
| 6.9. 4.1 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 22.5 degrees | | | | |
| | | | | | |
| 6.9. 4.2 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 45 degrees | | | | |
| | | | | | |
| 6.9. 4.3 | 90 mm diameter | No. | 2 | | |
| | | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| | 90 degrees | | | | |
| 6.9.4.4 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| 6.9.5 | JUNCTION CHAMBERS | | | | |
| | | | | | |
| 6.9.5.1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 4 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM10-F1 at Chainage 0+020 m | | | | |
| | | | | | |
| 6.9.5.2 | 80/90 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.9.5.3 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.9.5.4 | 80 mm x 40 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.9.5.5 | 80 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.9.5.6 | 40 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.9.5.7 | 40 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.9.5.8 | 40 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.9.5.9 | 40 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.9. 5.10 | 50/40 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM10-F2 at Chainage 0+255 m | | | | |
| | | | | | |
| 6.9. 5.11 | 80/90 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.9. 5.12 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.9. 5.13 | 80 mm x 25 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.9. 5.14 | 80 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.9. 5.15 | 25 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.9. 5.16 | 25 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.9. 5.17 | 25 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.9. 5.18 | 25 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.9. 5.19 | 32/25 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM10-F3 at Chainage 0+680 m | | | | |
| | | | | | |
| 6.9. 5.20 | 80/90 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.9. 5.21 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.9. 5.22 | 80 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.9. 5.23 | 80 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 6.9. 5.24 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.9. 5.25 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.9. 5.26 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.9. 5.27 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.9. 5.28 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM10-F4 at Chainage 1+340 m | | | | |
| | | | | | |
| 6.9. 5.29 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 6.9. 5.30 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.9. 5.31 | 50 mm x 40 mm dia steel tee | No. | 1 | | |
| | | | | | |
| 6.9. 5.32 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.9. 5.33 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.9. 5.34 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.9. 5.35 | 40 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.9. 5.36 | 40 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.9. 5.37 | 40 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.9. 5.38 | 40 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 6.9. 5.39 | 50/40 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.6.10: Sub Main SM11 Pipeline | | | | | |
|---|--|----------------|-----------------|-------------------|---------------------|
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 6.10.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.10.1.1 | Excavation and Backfilling in normal soil for Dia 140 mm to a depth n.e 1.5 m from chainage 0+000 m to 0+040 m. | m ³ | 21.6 | | |
| | | | | | |
| 6.10.1.2 | Ditto for dia 125 mm from chainage 0+040 m to 1+160 m. | m ³ | 588.0 | | |
| | | | | | |
| 6.10.1.3 | Ditto for dia 110 mm from chainage 1+160 m to 1+860 m. | m ³ | 357.0 | | |
| | | | | | |
| 6.10.1.4 | Ditto for dia 75 mm from chainage 1+860 m to 2+960 m. | m ³ | 522.5 | | |
| | | | | | |

| | | | | | |
|---------------|---|----------------|-------|--|--|
| 6.10.1.5 | Ditto for dia 50 mm from chainage 2+960 m to 3+000 m. | m ³ | 18.0 | | |
| 6.10.1.6 | Ditto for dia 40 mm from chainage 3+000 m to 3+080 m. | m ³ | 35.2 | | |
| 6.10.1.7 | Ditto for dia 20 mm from chainage 3+080 m to 3+159 m. | m ³ | 33.2 | | |
| 6.10.1.8 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 78.77 | | |
| 6.10.1.9 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 78.77 | | |
| 6.10.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class | Working | | | |
| | Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | uPVC Straights | | | | |
| | Class PN8 | | | | |
| 6.10.2.1 | 140 mm diameter | m | 40 | | |

| | | | | | |
|--------------------|--|-----|-----|--|--|
| 6.10. 2.2 | 125 mm diameter | m | 840 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 6.10. 2.3 | 125 mm diameter | m | 280 | | |
| | | | | | |
| 6.10. 2.4 | 110 mm diameter | m | 700 | | |
| | | | | | |
| 6.10. 2.5 | 75 mm diameter | m | 340 | | |
| | | | | | |
| | Class PN12.5 | | | | |
| | | | | | |
| 6.10. 2.6 | 75 mm diameter | m | 760 | | |
| | | | | | |
| 6.10. 2.7 | 50 mm diameter | m | 40 | | |
| | | | | | |
| 6.10. 2.8 | 40 mm diameter | m | 80 | | |
| | | | | | |
| 6.10. 2.9 | 20 mm diameter | m | 79 | | |
| | | | | | |
| 6.10. 3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 6.10. 3.1 | 140 x 125 mm PVC-U Reducer | No. | 1 | | |
| | | | | | |
| 6.10. 3.2 | 125 x 110 mm PVC-U Reducer | No. | 1 | | |
| | | | | | |
| 6.10. 3.3 | 110 x 75 mm PVC-U Reducer | No. | 1 | | |
| | | | | | |
| 6.10. 3.4 | 75 x 50 mm PVC-U Reducer | No. | 1 | | |
| | | | | | |

| | | | | | |
|---------------|-----------------------------------|-----|---|--|--|
| 6.10. 3.5 | 50 x 40 mm PVC-U Reducer | No. | 1 | | |
| 6.10. 3.6 | 40 x 20 mm PVC-U Reducer | No. | 1 | | |
| | | | | | |
| | Saddle Clamp and Adaptors | | | | |
| 6.10. 3.7 | 140 x 80 mm diameter Saddle Clamp | No. | 1 | | |
| 6.10. 3.8 | 125 x 50 mm diameter Saddle Clamp | No. | 1 | | |
| 6.10. 3.9 | 125 x 32 mm diameter Saddle Clamp | No. | 1 | | |
| 6.10. 3.10 | 110 x 65 mm diameter Saddle Clamp | No. | 1 | | |
| 6.10. 3.11 | 110 x 50 mm diameter Saddle Clamp | No. | 1 | | |
| 6.10. 3.12 | 90/80 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.10. 3.13 | 63/50 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.10. 3.14 | 40/32 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.10. 3.15 | 75/65 mm GI/PVC-U Adaptor | No. | 1 | | |
| 6.10. 3.16 | 63/50 mm PVC-U/GI Adaptor | No. | 1 | | |
| | Tees | | | | |
| 6.10. 3.17 | 75 x 32 mm PVC-U Tee | No. | 2 | | |
| 6.10. 3.18 | 75 x 50 mm PVC-U Tee | No. | 1 | | |
| 6.10. 3.19 | 75 x 20 mm PVC-U Tee | No. | 1 | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| 6.10.3.20 | 50 x 32 mm PVC-U Tee | No. | 1 | | |
| 6.10.3.21 | 40 x 32 mm PVC-U Tee | No. | 1 | | |
| 6.10.3.22 | 20 x 20 mm PVC-U Tee | No. | 2 | | |
| 6.10.4 | AIR VALVES | | | | |
| 6.10.4.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 800m | | | | |
| 6.10.4.2 | 125 x 125 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| 6.10.4.3 | 125 mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| 6.10.4.4 | 125 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| 6.10.4.5 | 50mm dia double threaded steel pipe, 0.4m long | No. | 1 | | |
| 6.10.4.6 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| 6.10.4.7 | 50mm dia gate Valve | No. | 1 | | |
| 6.10.4.8 | 50mm dia GI Union | No. | 2 | | |

| | | | | | |
|--------------------|---|-----|---|--|--|
| | | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 2300m | | | | |
| | | | | | |
| 6.10. 4.9 | 75 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 6.10. 4.10 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 6.10. 4.11 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 6.10. 4.12 | 65mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 6.10. 4.13 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 6.10. 4.14 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 6.10. 4.15 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 6.10. 4.16 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 6.10. 4.17 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| 6.10. 5 | BENDS (PROVISIONAL) | | | | |
| | | | | | |
| | 11.25 degrees | | | | |
| | | | | | |
| 6.10. 5.1 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10. 5.2 | 125 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10. 5.3 | 110 mm diameter | No. | 2 | | |
| | | | | | |
| | 22.5 degrees | | | | |
| | | | | | |

| | | | | | |
|---------------|---|-----|----|--|--|
| 6.10.5.4 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10.5.5 | 125 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10.5.6 | 110 mm diameter | No. | 2 | | |
| | | | | | |
| | 45 degrees | | | | |
| | | | | | |
| 6.10.5.7 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10.5.8 | 125 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10.5.9 | 110 mm diameter | No. | 2 | | |
| | | | | | |
| | 90 degrees | | | | |
| | | | | | |
| 6.10.5.10 | 140 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10.5.11 | 125 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10.5.12 | 110 mm diameter | No. | 2 | | |
| | | | | | |
| 6.10.6 | JUNCTION CHAMBERS | | | | |
| | | | | | |
| 6.10.6.1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 10 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | | | | | |

| | | | | | |
|-----------|---|-----|---|--|--|
| | 1 No. Junction Chamber fittings to Offtake SM11-F1 at Chainage 0+040 m | | | | |
| 6.10.6.2 | 140 / 125 mm dia stepped couplings | No. | 2 | | |
| 6.10.6.3 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.10.6.4 | 125 mm x 80 mm dia All flanged steel tee | No. | 1 | | |
| 6.10.6.5 | 125 mm dia flanged sluice valve | No. | 1 | | |
| 6.10.6.6 | 80 mm dia flanged sluice valve | No. | 1 | | |
| 6.10.6.7 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.10.6.8 | 80/90 mm dia stepped couplings | No. | 2 | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F2 at Chainage 0+300 m | | | | |
| 6.10.6.9 | 125/125 Stepped coupling | No. | 2 | | |
| 6.10.6.10 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.10.6.11 | 125 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| 6.10.6.12 | 125 mm dia flanged sluice valve | No. | 1 | | |
| 6.10.6.13 | 50 mm dia Nipple | No. | 2 | | |
| 6.10.6.14 | 50 mm dia Gate valve | No. | 1 | | |
| 6.10.6.15 | 50 mm dia Union | No. | 1 | | |

| | | | | | |
|---------------|---|-----|---|--|--|
| 6.10. 6.16 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.10. 6.17 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F3 at Chainage 1+160 m | | | | |
| | | | | | |
| 6.10. 6.18 | 125/125 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.10. 6.19 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.10. 6.20 | 125 mm x 32 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.10. 6.21 | 125 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.10. 6.22 | 32 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.10. 6.23 | 32 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.10. 6.24 | 32 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.10. 6.25 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.10. 6.26 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F4 at Chainage 1+840 m | | | | |
| | | | | | |
| 6.10. 6.27 | 110/100 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.10. 6.28 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.10. 6.29 | 100 mm x 65 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |

| | | | | | |
|---------------|---|-----|---|--|--|
| 6.10. 6.30 | 100 mm dia flanged sluice valve | No. | 1 | | |
| 6.10. 6.31 | 65 mm dia Nipple | No. | 2 | | |
| 6.10. 6.32 | 65 mm dia Gate valve | No. | 1 | | |
| 6.10. 6.33 | 65 mm dia Union | No. | 1 | | |
| 6.10. 6.34 | 65 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.10. 6.35 | 75/65 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F5 at Chainage 1+860 m | | | | |
| 6.10. 6.36 | 110/100 Stepped coupling | No. | 2 | | |
| 6.10. 6.37 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.10. 6.38 | 100 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| 6.10. 6.39 | 100 mm dia flanged sluice valve | No. | 1 | | |
| 6.10. 6.40 | 50 mm dia Nipple | No. | 2 | | |
| 6.10. 6.41 | 50 mm dia Gate valve | No. | 1 | | |
| 6.10. 6.42 | 50 mm dia Union | No. | 1 | | |
| 6.10. 6.43 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.10. 6.44 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |

| | | | | | |
|---------------|---|-----|---|--|--|
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F6 & SM11-F6 at Chainage 2+740 m & 2+800 m | | | | |
| | | | | | |
| 6.10. 6.45 | 75/65 PVC-U/GI Adaptor | No. | 4 | | |
| | | | | | |
| 6.10. 6.46 | 65 mm dia x 500 mm threaded GI pipe | No. | 4 | | |
| | | | | | |
| 6.10. 6.47 | 65 mm x 25 mm dia steel tee | No. | 2 | | |
| | | | | | |
| 6.10. 6.48 | 65 mm dia Nipple | No. | 4 | | |
| | | | | | |
| 6.10. 6.49 | 65 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.50 | 65 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.10. 6.51 | 25 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.10. 6.52 | 25 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.53 | 25 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.10. 6.54 | 25 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.10. 6.55 | 32/25 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F8 at Chainage 2+960 m | | | | |
| | | | | | |
| 6.10. 6.56 | 75/65 PVC-U/GI Adaptor | No. | 4 | | |
| | | | | | |
| 6.10. 6.57 | 65 mm dia x 500 mm threaded GI pipe | No. | 4 | | |
| | | | | | |

| | | | | | |
|---------------|---|-----|---|--|--|
| 6.10. 6.58 | 65 mm x 40 mm dia steel tee | No. | 2 | | |
| | | | | | |
| 6.10. 6.59 | 65 mm dia Nipple | No. | 4 | | |
| | | | | | |
| 6.10. 6.60 | 65 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.61 | 65 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.10. 6.62 | 40 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.10. 6.63 | 40 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.64 | 40 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.10. 6.65 | 40 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.10. 6.66 | 50/40 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F9 at Chainage 3+000 m | | | | |
| | | | | | |
| 6.10. 6.67 | 50/40 PVC-U/GI Adaptor | No. | 4 | | |
| | | | | | |
| 6.10. 6.68 | 40 mm dia x 500 mm threaded GI pipe | No. | 4 | | |
| | | | | | |
| 6.10. 6.69 | 40 mm x 25 mm dia steel tee | No. | 2 | | |
| | | | | | |
| 6.10. 6.70 | 40 mm dia Nipple | No. | 4 | | |
| | | | | | |
| 6.10. 6.71 | 40 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.72 | 40 mm dia Union | No. | 2 | | |
| | | | | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| 6.10. 6.73 | 25 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.10. 6.74 | 25 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.75 | 25 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.10. 6.76 | 25 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.10. 6.77 | 32/25 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM11-F10 at Chainage 3+080 m | | | | |
| | | | | | |
| 6.10. 6.78 | 40/32 PVC-U/GI Adaptor | No. | 4 | | |
| | | | | | |
| 6.10. 6.79 | 32 mm dia x 500 mm threaded GI pipe | No. | 4 | | |
| | | | | | |
| 6.10. 6.80 | 32 mm x 25 mm dia steel tee | No. | 2 | | |
| | | | | | |
| 6.10. 6.81 | 32 mm dia Nipple | No. | 4 | | |
| | | | | | |
| 6.10. 6.82 | 32 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.83 | 32 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.10. 6.84 | 25 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.10. 6.85 | 25 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.10. 6.86 | 25 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.10. 6.87 | 25 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| 6.10. 6.88 | 32/25 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.6.11: Sub Main SM12 Pipeline | | | | | |
|---|--|----------------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 6.11.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.11.1. 1 | Excavation and Backfilling in normal soil for Dia 110 mm to a depth n.e 1.5 m from chainage 0+000 m to 2+080 m. | m ³ | 1,060 | | |
| | | | | | |
| 6.11.1. 2 | Ditto for dia 90 mm from chainage 2+080 m to 2+433 m. | m ³ | 173 | | |
| | | | | | |
| 6.11.1. 3 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 62 | | |
| | | | | | |
| 6.11.1. 4 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 62 | | |
| | | | | | |
| 6.11.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to | | | | |

| | | | | | |
|---------------|---|-----|-------|--|--|
| | include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 6.11.2. 1 | 110 mm diameter | m | 1,180 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 6.11.2. 2 | 110 mm diameter | m | 900 | | |
| | | | | | |
| 6.11.2. 3 | 90 mm diameter | m | 353 | | |
| | | | | | |
| 6.11.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 6.11.3. 1 | 110 x 90 | No. | 1 | | |
| | | | | | |
| | Saddle Clamps and Adaptors | | | | |
| | | | | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| 6.11.3. 2 | 110 x 32 mm diameter Saddle Clamp | No. | 1 | | |
| 6.11.3. 3 | 110 x 40 mm diameter Saddle Clamp | No. | 2 | | |
| 6.11.3. 4 | 110 x 50 mm diameter Saddle Clamp | No. | 1 | | |
| 6.11.3. 5 | 110 x 15 mm diameter Saddle Clamp | No. | 1 | | |
| 6.11.3. 6 | 40/32 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.11.3. 7 | 50/40 mm PVC-U/GI Adaptor | No. | 2 | | |
| 6.11.3. 8 | 63/50 mm GI/PVC-U Adaptor | No. | 1 | | |
| 6.11.3. 9 | 20/15 mm PVC-U/GI Adaptor | No. | 1 | | |
| | Tees | | | | |
| 6.11.3. 10 | 90 x 90 mm dia tee | No. | 1 | | |
| 6.11.3. 11 | 90 x 20 mm dia | No. | 3 | | |
| 6.11.4 | AIR VALVES | | | | |
| 6.11.4. 1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe | | | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| | joints as specified in the specification | | | | |
| | | | | | |
| | 2 No. Double Air Valves (DAVs) at Chainage 600m & 1720m | | | | |
| | | | | | |
| 6.11.4.2 | 110 x 100 mm dia UPVC/G.I VJ coupling | No. | 4 | | |
| | | | | | |
| 6.11.4.3 | 100mm dia, 0.5m long single flanged GI spigot | No. | 4 | | |
| | | | | | |
| 6.11.4.4 | 100 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 2 | | |
| | | | | | |
| 6.11.4.5 | 50mm dia double threaded steel pipe, 0.4m long | No. | 2 | | |
| | | | | | |
| 6.11.4.6 | 50mm dia threaded Double Air Valve | No. | 2 | | |
| | | | | | |
| 6.11.4.7 | 50mm dia gate Valve | No. | 2 | | |
| | | | | | |
| 6.11.4.8 | 50mm dia GI Union | No. | 4 | | |
| | | | | | |
| 6.11.5 | WASHOUT (W/O) | | | | |
| | | | | | |
| | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | | | | | |
| | 1 No. Wash Out (WO) at Chainage 1400m | | | | |
| | | | | | |
| 6.11.5.1 | 110 x 100 mm dia uPVC/G.I VJ Adaptors | No. | 2 | | |
| | | | | | |
| 6.11.5.2 | 100mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| | | | | | |

| | | | | | |
|---------------|---|-----|---|--|--|
| 6.11.5.3 | 100 x 50mm dia GI level invert scour tee with threaded branch | No. | 1 | | |
| 6.11.5.4 | 50mm dia threaded gate valve | No. | 1 | | |
| 6.11.5.5 | 50 x 50mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 6.11.5.6 | 50mm dia threaded GI union | No. | 3 | | |
| 6.11.5.7 | 50mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 6.11.5.8 | 50mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 6.11.5.9 | 50 mm dia uPVC pipe | m | 6 | | |
| 6.11.6 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 6.11.6.1 | 110 mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 6.11.6.2 | 110 mm diameter | No. | 2 | | |
| | 45 degrees | | | | |
| 6.11.6.3 | 110 mm diameter | No. | 2 | | |
| | 90 degrees | | | | |
| 6.11.6.4 | 110 mm diameter | No. | 2 | | |
| 6.11.7 | JUNCTION CHAMBERS | | | | |
| 6.11.7.1 | Excavate for, provide all materials and construct complete inspection valve chambers of | No. | 5 | | |

| | | | | | |
|-----------|--|-----|---|--|--|
| | internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | | | | |
| | | | | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F1 at Chainage 0+100 m | | | | |
| | | | | | |
| 6.11.7.2 | 110 mm x 32 mm dia Saddle Clamp | No. | 1 | | |
| | | | | | |
| 6.11.7.3 | 40/32 mm dia GI/uPVC adaptor | No. | 3 | | |
| | | | | | |
| 6.11.7.4 | 32 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.11.7.5 | 40 mm dia x 6 m long PVC pipe | m | 6 | | |
| | | | | | |
| 6.11.7.6 | 32 mm dia GI union | No. | 1 | | |
| | | | | | |
| 6.11.7.7 | 32 mm dia GI nipple | No. | 1 | | |
| | | | | | |
| 6.11.7.8 | 32 mm dia gate valve | No. | 1 | | |
| | | | | | |
| 6.11.7.9 | 110/100 mm dia stepped couplings | No. | 2 | | |
| | | | | | |
| 6.11.7.10 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.11.7.11 | 100 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |

| | | | | | |
|-----------|---|-----|---|--|--|
| | 1 No. Junction Chamber fittings to Offtake SM12-F2 & SM12-F3 at Chainage 1+200 m & 1+740 m | | | | |
| 6.11.7.12 | 110/100 Stepped coupling | No. | 4 | | |
| 6.11.7.13 | 100 mm dia single flanged steel pipe 500 mm long | No. | 4 | | |
| 6.11.7.14 | 100 mm x 40 mm dia double flanged steel tee | No. | 2 | | |
| 6.11.7.15 | 100 mm dia flanged sluice valve | No. | 2 | | |
| 6.11.7.16 | 40 mm dia Nipple | No. | 4 | | |
| 6.11.7.17 | 40 mm dia Gate valve | No. | 2 | | |
| 6.11.7.18 | 40 mm dia Union | No. | 2 | | |
| 6.11.7.19 | 40 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 6.11.7.20 | 50/40 PVC-U/GI Adaptor | No. | 2 | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F4 at Chainage 2+080 m | | | | |
| 6.11.7.21 | 110/100 Stepped coupling | No. | 2 | | |
| 6.11.7.22 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.11.7.23 | 100 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| 6.11.7.24 | 100 mm dia flanged sluice valve | No. | 1 | | |

| | | | | | |
|---------------|---|-----|---|--|---|
| 6.11.7. 25 | 50 mm dia Nipple | No. | 2 | | |
| 6.11.7. 26 | 50 mm dia Gate valve | No. | 1 | | |
| 6.11.7. 27 | 50 mm dia Union | No. | 1 | | |
| 6.11.7. 28 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 6.11.7. 29 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F5 at Chainage 2+433 m | | | | |
| 6.11.7. 30 | 90/80 mm dia stepped couplings | No. | 2 | | |
| 6.11.7. 31 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.11.7. 32 | 80 mm x 80 mm dia All flanged steel tee | No. | 1 | | |
| 6.11.7. 33 | 100 mm dia flanged sluice valve | No. | 1 | | |
| 6.11.7. 34 | 80 mm dia blank flange | No. | 1 | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | - |

Bill No.6.12: Sub Main SM13 Pipeline

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|---------------|--|----------------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| 6.12.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 6.12.1.1 | Excavation and Backfilling in normal soil for Dia 140 mm to a depth n.e 1.5 m from chainage 0+000 m to 2+633 m. | m ³ | 1,949 | | |
| | | | | | |
| 6.12.1.2 | Ditto for dia 90 mm from chainage 2+633 m to 2+680 m. | m ³ | 32 | | |
| | | | | | |
| 6.12.1.3 | Ditto for dia 63 mm from chainage 2+680 m to 4+240 m. | m ³ | 1,034 | | |
| | | | | | |
| 6.12.1.4 | Ditto for dia 75 mm from chainage 4+240 m to 4+500 m. | m ³ | 109 | | |
| | | | | | |
| 6.12.1.5 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 156 | | |
| | | | | | |
| 6.12.1.6 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 156 | | |
| | | | | | |
| 6.12.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |

| | Class Pressure (m) | Working | | | |
|--------------------|--|----------------|-------|--|--|
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 6.12. 2.1 | 140 mm diameter | m | 120 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 6.12. 2.2 | 140 mm diameter | m | 1,260 | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 6.12. 2.3 | 140 mm diameter | m | 1,254 | | |
| | | | | | |
| 6.12. 2.4 | 90 mm diameter | m | 47 | | |
| | | | | | |
| 6.12. 2.5 | 63 mm diameter | m | 1,560 | | |
| | | | | | |
| 6.12. 2.6 | 20 mm diameter | m | 260 | | |
| | | | | | |
| 6.12. 3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| 6.12. 3.1 | 140 x 90 | No. | 1 | | |
| | | | | | |
| | | | | | |

| | | | | | |
|---------------|------------------------------------|-----|---|--|--|
| 6.12. 3.2 | 90 x 63 | No. | 1 | | |
| 6.12. 3.3 | 63 x 20 | No. | 1 | | |
| | | | | | |
| | Tees | | | | |
| 6.12. 3.4 | 90 x 75 | No. | 1 | | |
| 6.12. 3.5 | 63 x 25 | No. | 1 | | |
| 6.12. 3.6 | 63 x 40 | No. | 1 | | |
| 6.12. 3.7 | 63 x 20 | No. | 6 | | |
| 6.12. 3.8 | 20 x 20 | No. | 2 | | |
| | | | | | |
| | Saddle Clamps and Adaptors | | | | |
| 6.12. 3.9 | 140 x 25 mm diameter Saddle Clamp | No. | 2 | | |
| 6.12. 3.10 | 140 x 65 mm diameter Saddle Clamp | No. | 2 | | |
| 6.12. 3.11 | 140 x 50 mm diameter Saddle Clamp | No. | 1 | | |
| 6.12. 3.12 | 140 x 100 mm diameter Saddle Clamp | No. | 1 | | |
| 6.12. 3.13 | 140 x 15 mm diameter Saddle Clamp | No. | 1 | | |
| 6.12. 3.14 | 32/25 mm PVC-U/GI Adaptor | No. | 2 | | |
| 6.12. 3.15 | 75/65 mm PVC-U/GI Adaptor | No. | 2 | | |
| 6.12. 3.16 | 63/50 mm PVC-U/GI Adaptor | No. | 1 | | |

| | | | | | |
|---------------|---|-----|---|--|--|
| 6.12.3.17 | 110/100 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.12.3.18 | 20/15 mm PVC-U/GI Adaptor | No. | 1 | | |
| 6.12.4 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 6.12.4.1 | 140 mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 6.12.4.2 | 140 mm diameter | No. | 2 | | |
| | 45 degrees | | | | |
| 6.12.4.3 | 140 mm diameter | No. | 2 | | |
| | 90 degrees | | | | |
| 6.12.4.4 | 140 mm diameter | No. | 2 | | |
| 6.12.5 | PRV CHAMBERS | | | | |
| 6.12.5.1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |
| | 1 No. PRV at chainage 1+400 m | | | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| 6.12.5.2 | 140/125 mm dia VJ stepped couplings | No. | 2 | | |
| 6.12.5.3 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 6.12.5.4 | 125 mm dia Double Flanged sluice valve | No. | 1 | | |
| 6.12.5.5 | 125 mm dia Flanged Pressure Reducing Valve | No. | 1 | | |
| 6.12.6 | AIR VALVES | | | | |
| 6.12.6.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 2 No. Double Air Valves (DAVs) at Chainage 400m & 2000m | | | | |
| 6.12.6.2 | 140 x 125 mm dia UPVC/G.I VJ coupling | No. | 4 | | |
| 6.12.6.3 | 125mm dia, 0.5m long single flanged GI spigot | No. | 4 | | |
| 6.12.6.4 | 125 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 2 | | |
| 6.12.6.5 | 50mm dia double threaded steel pipe, 0.4m long | No. | 2 | | |
| 6.12.6.6 | 50mm dia threaded Double Air Valve | No. | 2 | | |
| 6.12.6.7 | 50mm dia gate Valve | No. | 2 | | |

| | | | | | |
|---------------|---|-----|----|--|--|
| 6.12.6.8 | 50mm dia GI Union | No. | 4 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at Chainage 3600m | | | | |
| | | | | | |
| 6.12.6.9 | 63 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 6.12.6.10 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 6.12.6.11 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 6.12.6.12 | 65mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 6.12.6.13 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 6.12.6.14 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 6.12.6.15 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 6.12.6.16 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 6.12.6.17 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| 6.12.7 | JUNCTION CHAMBERS | | | | |
| | | | | | |
| 6.12.7.1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 10 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for | | | | |

| | | | | | |
|-----------|---|-----|----|--|--|
| | completing all pipe joints as per specifications /drawings | | | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM13-F1 & SM13-F2 at Chainage 0+035 m & 0+680 m | | | | |
| | | | | | |
| 6.12.7.2 | 140 mm x 25 mm dia Saddle Clamp | No. | 2 | | |
| | | | | | |
| 6.12.7.3 | 32/25 mm dia GI/uPVC adaptor | No. | 6 | | |
| | | | | | |
| 6.12.7.4 | 25 mm dia x 500 mm threaded GI pipe | No. | 4 | | |
| | | | | | |
| 6.12.7.5 | 32 mm dia x 6 m long PVC pipe | m | 12 | | |
| | | | | | |
| 6.12.7.6 | 25 mm dia GI union | No. | 2 | | |
| | | | | | |
| 6.12.7.7 | 25 mm dia GI nipple | No. | 2 | | |
| | | | | | |
| 6.12.7.8 | 25 mm dia gate valve | No. | 2 | | |
| | | | | | |
| 6.12.7.9 | 140/125 mm dia stepped couplings | No. | 4 | | |
| | | | | | |
| 6.12.7.10 | 125 mm dia single flanged steel pipe 500 mm long | No. | 4 | | |
| | | | | | |
| 6.12.7.11 | 125 mm dia flanged sluice valve | No. | 2 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F3 & SM12-F4 at Chainage 1+260 m & 1+620 m | | | | |
| | | | | | |
| 6.12.7.12 | 140/125 Stepped coupling | No. | 4 | | |
| | | | | | |
| 6.12.7.13 | 125 mm dia single flanged steel pipe 500 mm long | No. | 4 | | |
| | | | | | |

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|---------------|---|-----|---|--|--|
| 6.12. 7.14 | 125 mm x 65 mm dia double flanged steel tee | No. | 2 | | |
| | | | | | |
| 6.12. 7.15 | 125 mm dia flanged sluice valve | No. | 2 | | |
| | | | | | |
| 6.12. 7.16 | 65 mm dia Nipple | No. | 4 | | |
| | | | | | |
| 6.12. 7.17 | 65 mm dia Gate valve | No. | 2 | | |
| | | | | | |
| 6.12. 7.18 | 65 mm dia Union | No. | 2 | | |
| | | | | | |
| 6.12. 7.19 | 65 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.12. 7.20 | 75/65 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F5 at Chainage 2+316 m | | | | |
| | | | | | |
| 6.12. 7.21 | 140/125 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.12. 7.22 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.12. 7.23 | 125 mm x 50 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.12. 7.24 | 125 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.25 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.12. 7.26 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.27 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.12. 7.28 | 50 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |

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|---------------|---|-----|---|--|--|
| 6.12. 7.29 | 63/50 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F6 at Chainage 2+633 m | | | | |
| | | | | | |
| 6.12. 7.30 | 140/125 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.12. 7.31 | 125 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.12. 7.32 | 125 mm x 100 mm dia all flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.12. 7.33 | 125 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.34 | 100 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.35 | 100 mm dia single flanged steel pipe 500 mm long | No. | 1 | | |
| | | | | | |
| 6.12. 7.36 | 110/100 Stepped coupling | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F7 at Chainage 2+680 m | | | | |
| | | | | | |
| 6.12. 7.37 | 90/80 Stepped coupling | No. | 2 | | |
| | | | | | |
| 6.12. 7.38 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 6.12. 7.39 | 80 mm x 65 mm dia double flanged steel tee | No. | 1 | | |
| | | | | | |
| 6.12. 7.40 | 80 mm dia flanged sluice valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.41 | 65 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.12. 7.42 | 65 mm dia Gate valve | No. | 1 | | |
| | | | | | |

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|---------------|---|-----|---|--|--|
| 6.12. 7.43 | 65 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.12. 7.44 | 65 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.12. 7.45 | 75/65 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F8 at Chainage 3+700 m | | | | |
| | | | | | |
| 6.12. 7.46 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 6.12. 7.47 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.12. 7.48 | 50 mm x 20 mm dia steel tee | No. | 1 | | |
| | | | | | |
| 6.12. 7.49 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.12. 7.50 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.51 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.12. 7.52 | 20 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.12. 7.53 | 20 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.54 | 20 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.12. 7.55 | 20 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.12. 7.56 | 25/20 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | 1 No. Junction Chamber fittings to Offtake SM12-F9 at Chainage 4+240 m | | | | |
| | | | | | |

| | | | | | |
|---------------|---|-----|---|--|----------|
| 6.12. 7.57 | 63/50 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 6.12. 7.58 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| | | | | | |
| 6.12. 7.59 | 50 mm x 32 mm dia steel tee | No. | 1 | | |
| | | | | | |
| 6.12. 7.60 | 50 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 6.12. 7.61 | 50 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.62 | 50 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.12. 7.63 | 32 mm dia Nipple | No. | 1 | | |
| | | | | | |
| 6.12. 7.64 | 32 mm dia Gate valve | No. | 1 | | |
| | | | | | |
| 6.12. 7.65 | 32 mm dia Union | No. | 1 | | |
| | | | | | |
| 6.12. 7.66 | 32 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| | | | | | |
| 6.12. 7.67 | 40/32 PVC-U/GI Adaptor | No. | 1 | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED OVER TO COLLECTION SHEET | | | | - |
| | | | | | |

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|---------------------------------------|--------------------|---------------------|
| | | |
| BILL NO. 7 - SUBMAIN PIPELINES | | |
| ITEM NO. | DESCRIPTION | AMOUNT (KSh) |
| | | |
| | COLLECTION | |
| | | |
| 7.1 | Mainline Feeders | |
| | | |

| | | |
|-------------|---|--|
| 7.2 | SM2 Feeders | |
| | | |
| 7.3 | SM3 Feeders | |
| | | |
| 7.4 | SM4 Feeders | |
| | | |
| 7.5 | SM5 Feeders | |
| | | |
| 7.6 | SM6 Feeders | |
| | | |
| 7.7 | SM7 Feeders | |
| | | |
| 7.8 | SM8 Feeders | |
| | | |
| 7.9 | SM9 Feeders | |
| | | |
| 7.10 | SM10 Feeders | |
| | | |
| 7.11 | SM11 Feeders | |
| | | |
| 7.12 | SM12 Feeders | |
| | | |
| 7.13 | SM13 Feeders | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | TOTAL CARRIED OVER TO COLLECTION SHEET | |
| | | |

| Bill No.7.1: MAINLINE FEEDERS | | | | | |
|--------------------------------------|--|-------------|-----------------|-------------------|---------------------|
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.1.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |

| | | | | | |
|--------------|--|----------------|---------|--|--|
| 7.1.1. 1 | Excavation and Backfilling in normal soil for M-F1 to a depth n.e 1.5 m. | m ³ | 245.3 | | |
| 7.1.1. 2 | Ditto for M-F1a. | m ³ | 55.3 | | |
| 7.1.1. 3 | Ditto for M-F2. | m ³ | 822.6 | | |
| 7.1.1. 4 | Ditto for M-F2a. | m ³ | 117.9 | | |
| 7.1.1. 5 | Ditto for Pl 1080+2. | m ³ | 23.8 | | |
| 7.1.1. 6 | Ditto for M-F3. | m ³ | 233.8 | | |
| 7.1.1. 7 | Ditto for M-F3a. | m ³ | 689.0 | | |
| 7.1.1. 8 | Ditto for M-F3a-1. | m ³ | 247.5 | | |
| 7.1.1. 9 | Ditto for m-F3b. | m ³ | 217.8 | | |
| 7.1.1. 10 | Ditto for SM9-F3a. | m ³ | 48.5 | | |
| 7.1.1. 11 | Ditto for SM9-F3b. | m ³ | 1,631.7 | | |
| 7.1.1. 12 | Ditto for Pl 1418+2. | m ³ | 342.3 | | |
| 7.1.1. 13 | Ditto for M-F4. | m ³ | 143.0 | | |
| 7.1.1. 14 | Ditto for M-F4a. | m ³ | 73.5 | | |
| 7.1.1. 15 | Ditto for M-F4b. | m ³ | 1,424.1 | | |
| 7.1.1. 16 | Ditto for M-F4c. | m ³ | 307.2 | | |

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|--------------|----------------------|----------------|---------|--|--|
| | | | | | |
| 7.1.1. 17 | Ditto for M-F4d. | m ³ | 232.3 | | |
| | | | | | |
| 7.1.1. 18 | Ditto for M-F5. | m ³ | 658.8 | | |
| | | | | | |
| 7.1.1. 19 | Ditto for M-F5a. | m ³ | 1,224.6 | | |
| | | | | | |
| 7.1.1. 20 | Ditto for M-F5b. | m ³ | 46.8 | | |
| | | | | | |
| 7.1.1. 21 | Ditto for M-F5c. | m ³ | 1,056.0 | | |
| | | | | | |
| 7.1.1. 22 | Ditto for M-F6. | m ³ | 882.1 | | |
| | | | | | |
| 7.1.1. 23 | Ditto for M-F6a. | m ³ | 53.2 | | |
| | | | | | |
| 7.1.1. 24 | Ditto for M-F7. | m ³ | 91.6 | | |
| | | | | | |
| 7.1.1. 25 | Ditto for M-F7a. | m ³ | 103.5 | | |
| | | | | | |
| 7.1.1. 26 | Ditto for M-F7a-1. | m ³ | 25.9 | | |
| | | | | | |
| 7.1.1. 27 | Ditto for M-F7a-2. | m ³ | 19.6 | | |
| | | | | | |
| 7.1.1. 28 | Ditto for M-F7a-3. | m ³ | 53.1 | | |
| | | | | | |
| 7.1.1. 29 | Ditto for M-F7a-3-1. | m ³ | 97.8 | | |
| | | | | | |
| 7.1.1. 30 | Ditto for M-F7a-3-2. | m ³ | 229.2 | | |
| | | | | | |
| 7.1.1. 31 | Ditto for M-F7b. | m ³ | 120.8 | | |
| | | | | | |
| 7.1.1. 32 | Ditto for M-F7c. | m ³ | 130.7 | | |

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|--------------|---|----------------|-------|--|--|
| | | | | | |
| 7.1.1. 33 | Ditto for M-F7d. | m ³ | 85.9 | | |
| | | | | | |
| 7.1.1. 34 | Ditto for M-F7e. | m ³ | 22.9 | | |
| | | | | | |
| 7.1.1. 35 | Ditto for M-F7e-1. | m ³ | 23.8 | | |
| | | | | | |
| 7.1.1. 36 | Ditto for M-F7e-2. | m ³ | 24.6 | | |
| | | | | | |
| 7.1.1. 37 | Ditto for M-F7e-3. | m ³ | 25.9 | | |
| | | | | | |
| 7.1.1. 38 | Ditto for M-F7e-4. | m ³ | 208.1 | | |
| | | | | | |
| 7.1.1. 39 | Ditto for M-F7e-5. | m ³ | 47.6 | | |
| | | | | | |
| 7.1.1. 40 | Ditto for M-F7e-6. | m ³ | 50.4 | | |
| | | | | | |
| 7.1.1. 41 | Ditto for M-F7f. | m ³ | 33.2 | | |
| | | | | | |
| 7.1.1. 42 | Ditto for M-F7f-1. | m ³ | 784.1 | | |
| | | | | | |
| 7.1.1. 43 | Ditto for M-F7f-2. | m ³ | 36.1 | | |
| | | | | | |
| 7.1.1. 44 | Ditto for M-F7f-3. | m ³ | 33.2 | | |
| | | | | | |
| 7.1.1. 45 | Ditto for M-F8. | m ³ | 784.1 | | |
| | | | | | |
| 7.1.1. 46 | Ditto for M-F8a. | m ³ | 36.1 | | |
| | | | | | |
| 7.1.1. 47 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 677.4 | | |
| | | | | | |
| 7.1.1. 48 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 677.4 | | |

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|--------------|---|---|-----|--|--|
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| 7.1.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class | | | | |
| | Working Pressure (m) | | | | |
| | CLASS PN6 | | | | |
| | 60 | | | | |
| | CLASS PN8 | | | | |
| | 80 | | | | |
| | CLASS PN10 | | | | |
| | 100 | | | | |
| | CLASS PN12.5 | | | | |
| | 125 | | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | M-F1 | | | | |
| | | | | | |
| 7.1.2. 1 | 50 mm dia PN6 | m | 248 | | |
| | | | | | |
| 7.1.2. 2 | 40 mm dia PN6 | m | 151 | | |
| | | | | | |
| 7.1.2. 3 | 32 mm dia PN6 | m | 37 | | |
| | | | | | |
| 7.1.2. 4 | 25 mm dia PN6 | m | 36 | | |
| | | | | | |
| 7.1.2. 5 | 20 mm dia PN6 | m | 74 | | |
| | | | | | |
| | M-F1a | | | | |
| | | | | | |

| | | | | | |
|--------------|-------------------|---|-----|--|--|
| 7.1.2. 6 | 25 mm dia PN6 | m | 40 | | |
| 7.1.2. 7 | 20 mm dia PN6 | m | 91 | | |
| | | | | | |
| | SM9-F2 | | | | |
| 7.1.2. 8 | 50 mm dia PN6 | m | 400 | | |
| 7.1.2. 9 | 40 mm dia PN6 | m | 479 | | |
| 7.1.2. 10 | 32 mm dia PN6 | m | 478 | | |
| 7.1.2. 11 | 25 mm dia PN6 | m | 285 | | |
| 7.1.2. 12 | 20 mm dia PN6 | m | 187 | | |
| | | | | | |
| | M-F2a | | | | |
| 7.1.2. 13 | 32 mm dia PN6 | m | 89 | | |
| 7.1.2. 14 | 25 mm dia PN6 | m | 99 | | |
| 7.1.2. 15 | 20 mm dia PN6 | m | 86 | | |
| | | | | | |
| | Pl. 1080+2 | | | | |
| 7.1.2. 16 | 25 mm dia PN6 | m | 14 | | |
| 7.1.2. 17 | 20 mm dia PN6 | m | 42 | | |
| | | | | | |
| | M-F3 | | | | |
| 7.1.2. 18 | 63 mm dia PN10 | m | 180 | | |
| | | | | | |

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|--------------|------------------|---|-----|--|--|
| 7.1.2. 19 | 63 mm dia PN12.5 | m | 116 | | |
| | | | | | |
| 7.1.2. 20 | 40 mm dia PN12.5 | m | 120 | | |
| | | | | | |
| 7.1.2. 21 | 25 mm dia PN12.5 | m | 33 | | |
| | | | | | |
| 7.1.2. 22 | 20 mm dia PN12.5 | m | 57 | | |
| | | | | | |
| | M-F3a | | | | |
| | | | | | |
| 7.1.2. 23 | 40 mm dia PN10 | m | 40 | | |
| | | | | | |
| 7.1.2. 24 | 40 mm dia PN12.5 | m | 550 | | |
| | | | | | |
| 7.1.2. 25 | 32 mm dia PN12.5 | m | 759 | | |
| | | | | | |
| 7.1.2. 26 | 25 mm dia PN12.5 | m | 192 | | |
| | | | | | |
| 7.1.2. 27 | 20 mm dia PN12.5 | m | 26 | | |
| | | | | | |
| | M-F3a-1 | | | | |
| | | | | | |
| 7.1.2. 28 | 32 mm dia PN12.5 | m | 215 | | |
| | | | | | |
| 7.1.2. 29 | 25 mm dia PN12.5 | m | 130 | | |
| | | | | | |
| 7.1.2. 30 | 20 mm dia PN12.5 | m | 228 | | |
| | | | | | |
| | M-F3b | | | | |
| | | | | | |
| 7.1.2. 31 | 40 mm dia PN12.5 | m | 278 | | |
| | | | | | |
| 7.1.2. 32 | 32 mm dia PN12.5 | m | 97 | | |
| | | | | | |

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|--------------|-------------------|---|-----|--|--|
| 7.1.2. 33 | 25 mm dia PN12.5 | m | 27 | | |
| | | | | | |
| 7.1.2. 34 | 20 mm dia PN12.5 | m | 95 | | |
| | | | | | |
| | Pl. 1418+2 | | | | |
| | | | | | |
| 7.1.2. 35 | 25 mm dia PN12.5 | m | 34 | | |
| | | | | | |
| 7.1.2. 36 | 20 mm dia PN12.5 | m | 80 | | |
| | | | | | |
| | M-F4 | | | | |
| | | | | | |
| 7.1.2. 37 | 90 mm dia PN6 | m | 905 | | |
| | | | | | |
| 7.1.2. 38 | 75 mm dia PN6 | m | 905 | | |
| | | | | | |
| 7.1.2. 39 | 63 mm dia PN6 | m | 81 | | |
| | | | | | |
| 7.1.2. 40 | 40 mm dia PN6 | m | 195 | | |
| | | | | | |
| 7.1.2. 41 | 40 mm dia PN8 | m | 185 | | |
| | | | | | |
| 7.1.2. 42 | 25 mm dia PN8 | m | 93 | | |
| | | | | | |
| 7.1.2. 43 | 20 mm dia PN8 | m | 93 | | |
| | | | | | |
| | M-F4a | | | | |
| | | | | | |
| 7.1.2. 44 | 40 mm dia PN6 | m | 377 | | |
| | | | | | |
| 7.1.2. 45 | 32 mm dia PN6 | m | 138 | | |
| | | | | | |
| 7.1.2. 46 | 25 mm dia PN6 | m | 166 | | |
| | | | | | |

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|--------------|---------------|---|-----|--|--|
| 7.1.2. 47 | 20 mm dia PN6 | m | 98 | | |
| | | | | | |
| | M-F4b | | | | |
| | | | | | |
| 7.1.2. 48 | 40 mm dia PN6 | m | 200 | | |
| | | | | | |
| 7.1.2. 49 | 32 mm dia PN6 | m | 46 | | |
| | | | | | |
| 7.1.2. 50 | 25 mm dia PN6 | m | 35 | | |
| | | | | | |
| 7.1.2. 51 | 20 mm dia PN6 | m | 45 | | |
| | | | | | |
| | M-F4c | | | | |
| | | | | | |
| | 40 mm dia PN6 | m | 140 | | |
| | | | | | |
| 7.1.2. 52 | 40 mm dia PN8 | m | 80 | | |
| | | | | | |
| 7.1.2. 53 | 32 mm dia PN8 | m | 500 | | |
| | | | | | |
| 7.1.2. 54 | 25 mm dia PN8 | m | 200 | | |
| | | | | | |
| 7.1.2. 55 | 20 mm dia PN8 | m | 343 | | |
| | | | | | |
| | M-F4d | | | | |
| | | | | | |
| 7.1.2. 56 | 25 mm dia PN8 | m | 111 | | |
| | | | | | |
| 7.1.2. 57 | 20 mm dia PN8 | m | 63 | | |
| | | | | | |
| | M-F5 | | | | |
| | | | | | |
| 7.1.2. 58 | 75 mm dia PN8 | m | 540 | | |
| | | | | | |

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|--------------|------------------|---|-------|--|--|
| 7.1.2. 59 | 75 mm dia PN10 | m | 1,100 | | |
| | | | | | |
| 7.1.2. 60 | 75 mm dia PN12.5 | m | 119 | | |
| | | | | | |
| 7.1.2. 61 | 50 mm dia PN12.5 | m | 322 | | |
| | | | | | |
| 7.1.2. 62 | 40 mm dia PN12.5 | m | 680 | | |
| | | | | | |
| 7.1.2. 63 | 32 mm dia PN12.5 | m | 120 | | |
| | | | | | |
| 7.1.2. 64 | 25 mm dia PN12.5 | m | 50 | | |
| | | | | | |
| 7.1.2. 65 | 20 mm dia PN12.5 | m | 68 | | |
| | | | | | |
| | M-F5a | | | | |
| | | | | | |
| 7.1.2. 66 | 40 mm dia PN10 | m | 120 | | |
| | | | | | |
| 7.1.2. 67 | 32 mm dia PN10 | m | 200 | | |
| | | | | | |
| 7.1.2. 68 | 25 mm dia PN10 | m | 140 | | |
| | | | | | |
| 7.1.2. 69 | 20 mm dia PN10 | m | 68 | | |
| | | | | | |
| | M-F5b | | | | |
| | | | | | |
| 7.1.2. 70 | 32 mm dia PN8 | m | 440 | | |
| | | | | | |
| 7.1.2. 71 | 32 mm dia PN10 | m | 140 | | |
| | | | | | |
| 7.1.2. 72 | 25 mm dia PN10 | m | 88 | | |
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| 7.1.2. 73 | 20 mm dia PN10 | m | 43 | | |

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| | M-F5c | | | | |
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| 7.1.2. 74 | 50 mm dia PN10 | m | 300 | | |
| | | | | | |
| 7.1.2. 75 | 50 mm dia PN12.5 | m | 420 | | |
| | | | | | |
| 7.1.2. 76 | 40 mm dia PN12.5 | m | 300 | | |
| | | | | | |
| 7.1.2. 77 | 32 mm dia PN12.5 | m | 160 | | |
| | | | | | |
| 7.1.2. 78 | 25 mm dia PN12.5 | m | 180 | | |
| | | | | | |
| 7.1.2. 79 | 20 mm dia PN12.5 | m | 104 | | |
| | | | | | |
| | M-F6 | | | | |
| | | | | | |
| 7.1.2. 80 | 63 mm dia PN10 | m | 40 | | |
| | | | | | |
| 7.1.2. 81 | 63 mm dia PN6 | m | 760 | | |
| | | | | | |
| 7.1.2. 82 | 50 mm dia PN6 | m | 983 | | |
| | | | | | |
| 7.1.2. 83 | 50 mm dia PN8 | m | 190 | | |
| | | | | | |
| 7.1.2. 84 | 40 mm dia PN6 | m | 108 | | |
| | | | | | |
| 7.1.2. 85 | 32 mm dia PN6 | m | 160 | | |
| | | | | | |
| 7.1.2. 86 | 25 mm dia PN8 | m | 320 | | |
| | | | | | |
| 7.1.2. 87 | 20 mm dia PN8 | m | 115 | | |
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| | M-F6a | | | | |
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| 7.1.2. 88 | 25 mm dia PN8 | m | 180 | | |
| | | | | | |
| 7.1.2. 89 | 20 mm dia PN8 | m | 169 | | |
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| | M-F7 | | | | |
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| 7.1.2. 90 | 110 mm dia PN10 | m | 20 | | |
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| 7.1.2. 91 | 110 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 92 | 90 mm dia PN6 | m | 742 | | |
| | | | | | |
| 7.1.2. 93 | 75 mm dia PN6 | m | 989 | | |
| | | | | | |
| 7.1.2. 94 | 50 mm dia PN6 | m | 267 | | |
| | | | | | |
| 7.1.2. 95 | 20 mm dia PN6 | m | 118 | | |
| | | | | | |
| | M-F7a | | | | |
| | | | | | |
| 7.1.2. 96 | 75 mm dia PN6 | m | 740 | | |
| | | | | | |
| 7.1.2. 97 | 63 mm dia PN6 | m | 1,060 | | |
| | | | | | |
| 7.1.2. 98 | 32 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 99 | 25 mm dia PN6 | m | 26 | | |
| | | | | | |
| 7.1.2. 100 | 20 mm dia PN6 | m | 11 | | |
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| | M-F7a-1 | | | | |
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| 7.1.2. 101 | 40 mm dia PN6 | m | 40 | | |
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| 7.1.2. 102 | 32 mm dia PN6 | m | 40 | | |
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| 7.1.2. 103 | 25 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 104 | 20 mm dia PN6 | m | 21 | | |
| | | | | | |
| | M-F7a-2 | | | | |
| | | | | | |
| 7.1.2. 105 | 32 mm dia PN6 | m | 100 | | |
| | | | | | |
| 7.1.2. 106 | 25 mm dia PN6 | m | 80 | | |
| | | | | | |
| 7.1.2. 107 | 20 mm dia PN6 | m | 13 | | |
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| | M-F7a-3 | | | | |
| | | | | | |
| 7.1.2. 108 | 50 mm dia PN6 | m | 80 | | |
| | | | | | |
| 7.1.2. 109 | 40 mm dia PN6 | m | 40 | | |
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| 7.1.2. 110 | 32 mm dia PN6 | m | 40 | | |
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| 7.1.2. 111 | 25 mm dia PN6 | m | 60 | | |
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| 7.1.2. 112 | 20 mm dia PN6 | m | 11 | | |
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| | M-F7a-3-1 | | | | |
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| 7.1.2. 113 | 25 mm dia PN6 | m | 40 | | |
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| 7.1.2. 114 | 20 mm dia PN6 | m | 22 | | |
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| | M-F7a-3-2 | | | | |
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| 7.1.2. 115 | 25 mm dia PN6 | m | 30 | | |
| | | | | | |
| 7.1.2. 116 | 20 mm dia PN6 | m | 17 | | |
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| | M-F7b | | | | |
| | | | | | |
| 7.1.2. 117 | 32 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 118 | 25 mm dia PN6 | m | 60 | | |
| | | | | | |
| 7.1.2. 119 | 20 mm dia PN6 | m | 44 | | |
| | | | | | |
| | M-F7c | | | | |
| | | | | | |
| 7.1.2. 120 | 25 mm dia PN6 | m | 150 | | |
| | | | | | |
| 7.1.2. 121 | 20 mm dia PN6 | m | 80 | | |
| | | | | | |
| | M-F7d | | | | |
| | | | | | |
| 7.1.2. 122 | 40 mm dia PN6 | m | 160 | | |
| | | | | | |
| 7.1.2. 123 | 32 mm dia PN6 | m | 220 | | |
| | | | | | |
| 7.1.2. 124 | 25 mm dia PN6 | m | 80 | | |
| | | | | | |
| 7.1.2. 125 | 20 mm dia PN6 | m | 62 | | |
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| | M-F7e | | | | |
| | | | | | |
| 7.1.2. 126 | 63 mm dia PN6 | m | 186 | | |
| | | | | | |
| 7.1.2. 127 | 50 mm dia PN6 | m | 10 | | |

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| 7.1.2. 128 | 40 mm dia PN6 | m | 19 | | |
| | | | | | |
| 7.1.2. 129 | 25 mm dia PN8 | m | 18 | | |
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| 7.1.2. 130 | 20 mm dia PN6 | m | 30 | | |
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| | M-F7e-1 | | | | |
| | | | | | |
| 7.1.2. 131 | 40 mm dia PN6 | m | 120 | | |
| | | | | | |
| 7.1.2. 132 | 32 mm dia PN6 | m | 16 | | |
| | | | | | |
| 7.1.2. 133 | 25 mm dia PN6 | m | 54 | | |
| | | | | | |
| 7.1.2. 134 | 20 mm dia PN6 | m | 77 | | |
| | | | | | |
| | M-F7e-2 | | | | |
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| 7.1.2. 135 | 25 mm dia PN6 | m | 60 | | |
| | | | | | |
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| 7.1.2. 136 | 20 mm dia PN6 | m | 142 | | |
| | | | | | |
| | M-F7e-3 | | | | |
| | | | | | |
| 7.1.2. 137 | 32 mm dia PN6 | m | 9 | | |
| | | | | | |
| 7.1.2. 138 | 25 mm dia PN6 | m | 36 | | |
| | | | | | |
| 7.1.2. 139 | 20 mm dia PN6 | m | 9 | | |
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| | M-F7e-4 | | | | |
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| 7.1.2. 140 | 40 mm dia PN6 | m | 6 | | |

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| 7.1.2. 141 | 32 mm dia PN6 | m | 15 | | |
| | | | | | |
| 7.1.2. 142 | 25 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 143 | 20 mm dia PN6 | m | 15 | | |
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| | M-F7e-5 | | | | |
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| 7.1.2. 144 | 40 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 145 | 25 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 146 | 20 mm dia PN6 | m | 16 | | |
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| | M-F7e-6 | | | | |
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| 7.1.2. 147 | 25 mm dia PN6 | m | 20 | | |
| | | | | | |
| 7.1.2. 148 | 20 mm dia PN6 | m | 42 | | |
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| | M-F7f | | | | |
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| 7.1.2. 149 | 40 mm dia PN6 | m | 180 | | |
| | | | | | |
| 7.1.2. 150 | 40 mm dia PN8 | m | 40 | | |
| | | | | | |
| 7.1.2. 151 | 32 mm dia PN8 | m | 64 | | |
| | | | | | |
| 7.1.2. 152 | 25 mm dia PN8 | m | 29 | | |
| | | | | | |
| 7.1.2. 153 | 20 mm dia PN8 | m | 162 | | |
| | | | | | |
| | M-F7f-1 | | | | |
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| 7.1.2. 154 | 25 mm dia PN6 | m | 20 | | |
| 7.1.2. 155 | 20 mm dia PN6 | m | 93 | | |
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| | M-F7f-2 | | | | |
| 7.1.2. 156 | 20 mm dia PN6 | m | 121 | | |
| | | | | | |
| | M-F7f-3 | | | | |
| 7.1.2. 157 | 25 mm dia PN6 | m | 79 | | |
| | | | | | |
| | M-F8 | | | | |
| 7.1.2. 158 | 40 mm dia PN10 | m | 20 | | |
| 7.1.2. 159 | 40 mm dia PN6 | m | 1,120 | | |
| 7.1.2. 160 | 40 mm dia PN8 | m | 31 | | |
| 7.1.2. 161 | 32 mm dia PN8 | m | 370 | | |
| 7.1.2. 162 | 25 mm dia PN8 | m | 220 | | |
| 7.1.2. 163 | 20 mm dia PN8 | m | 22 | | |
| | | | | | |
| | M-F8a | | | | |
| 7.1.2. 164 | 25 mm dia PN8 | m | 60 | | |
| 7.1.2. 165 | 20 mm dia PN8 | m | 26 | | |
| 7.1.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |

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| | Reducers | | | | |
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| | M-F1, M-F1a | | | | |
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| 7.1.3. 1 | 50 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 2 | 40 x 32 mm dia | No. | 1 | | |
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| 7.1.3. 3 | 32 x 25 mm dia | No. | 1 | | |
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| 7.1.3. 4 | 25 x 20 mm dia | No. | 2 | | |
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| | M-F2, M-F2a & Pl. 1080+2 | | | | |
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| 7.1.3. 5 | 50 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 6 | 40 x 32 mm dia | No. | 1 | | |
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| 7.1.3. 7 | 32 x 25 mm dia | No. | 2 | | |
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| 7.1.3. 8 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | M-F3, M-F3a, M-F3a-1, M-F3b & Pl. 1418+2 | | | | |
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| 7.1.3. 9 | 63 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 10 | 40 x 32 mm dia | No. | 2 | | |
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| 7.1.3. 11 | 40 x 25 mm dia | No. | 1 | | |
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| 7.1.3. 12 | 32 x 25 mm dia | No. | 3 | | |
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| 7.1.3. 13 | 25 x 20 mm dia | No. | 5 | | |
| | | | | | |
| | M-F4, M-F4a, M-F4b, M-F4c & M-F4d | | | | |
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| 7.1.3. 14 | 90 x 75 mm dia | No. | 1 | | |
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| 7.1.3. 15 | 75 x 63 mm dia | No. | 1 | | |
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| 7.1.3. 16 | 63 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 17 | 40 x 25 mm dia | No. | 1 | | |
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| 7.1.3. 18 | 40 x 32 mm dia | No. | 3 | | |
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| 7.1.3. 19 | 32 x 25 mm dia | No. | 3 | | |
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| 7.1.3. 20 | 25 x 20 mm dia | No. | 5 | | |
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| | M-F5, M-F5a, M-F5b & M-F5c | | | | |
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| 7.1.3. 21 | 75 x 50 mm dia | No. | 1 | | |
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| 7.1.3. 22 | 63 x 50 mm dia | No. | | | |
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| 7.1.3. 23 | 50 x 40 mm dia | No. | 2 | | |
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| 7.1.3. 24 | 40 x 32 mm dia | No. | 3 | | |
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| 7.1.3. 25 | 32 x 25 mm dia | No. | 4 | | |
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| 7.1.3. 26 | 25 x 20 mm dia | No. | 4 | | |
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| | M-F6 & M-F6a | | | | |

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| 7.1.3. 27 | 63 x 50 mm dia | No. | 1 | | |
| 7.1.3. 28 | 50 x 40 mm dia | No. | 1 | | |
| 7.1.3. 29 | 40 x 32 mm dia | No. | 1 | | |
| 7.1.3. 30 | 32 x 25 mm dia | No. | 1 | | |
| 7.1.3. 31 | 25 x 20 mm dia | No. | 2 | | |
| | M-F7, M-F7a, M-F7a-1, M-F7a-2, M-F7a-3, M-F7a-3-1, M-F7a-3-2, M-F7b, M-F7c, M-F7d, M-F7e, M-F7e-1, M-F7e-2, M-F7e-3, M-F7e-4, M-F7e-5, M-F7e-5, M-F7e-6, M-F7f, M-F7f-1, M-F7f-2, M-F7f-3 | | | | |
| 7.1.3. 32 | 110 x 90 mm dia | No. | 1 | | |
| 7.1.3. 33 | 90 x 75 mm dia | No. | 1 | | |
| 7.1.3. 34 | 75 x 63 mm dia | No. | 1 | | |
| 7.1.3. 35 | 75 x 50 mm dia | No. | 1 | | |
| 7.1.3. 36 | 63 x 50 mm dia | No. | 1 | | |
| 7.1.3. 37 | 63 x 32 mm dia | No. | 1 | | |
| 7.1.3. 38 | 50 x 40 mm dia | No. | 2 | | |
| 7.1.3. 39 | 50 x 20 mm dia | No. | 1 | | |

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| 7.1.3. 40 | 40 x 32 mm dia | No. | 7 | | |
| 7.1.3. 41 | 40 x 25 mm dia | No. | 1 | | |
| 7.1.3. 42 | 32 x 25 mm dia | No. | 10 | | |
| 7.1.3. 43 | 32 x 20 mm dia | No. | 1 | | |
| 7.1.3. 44 | 25 x 20 mm dia | No. | 16 | | |
| | M-F8 & M-F8a | | | | |
| 7.1.3. 45 | 40 x 32 | No. | 1 | | |
| 7.1.3. 46 | 32 x 25 | No. | 1 | | |
| 7.1.3. 47 | 25 x 20 | No. | 2 | | |
| | Saddle Clamps and Adaptors | | | | |
| 7.1.3. 48 | 110 x 65 mm Saddle Clamp | No. | 1 | | |
| 7.1.3. 49 | 65/75 PVC-U/GI Adaptor | No. | 1 | | |
| | PVC-U Tees | | | | |
| | M-F1, M-F1a | | | | |
| 7.1.3. 50 | 50 x 20 mm dia | No. | 3 | | |
| 7.1.3. 51 | 40 x 20 mm dia | No. | 6 | | |
| 7.1.3. 52 | 40 x 25 mm dia | No. | 1 | | |

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| 7.1.3. 53 | 32 x 20 mm dia | No. | 3 | | |
| 7.1.3. 54 | 25 x 20 mm dia | No. | 3 | | |
| 7.1.3. 55 | 20 x 20 mm dia | No. | 6 | | |
| | | | | | |
| | M-F2, M-F2a & Pl. 1080+2 | | | | |
| 7.1.3. 56 | 50 x 20 mm dia | No. | 4 | | |
| 7.1.3. 57 | 50 x 32 mm dia | No. | 1 | | |
| 7.1.3. 58 | 40 x 20 mm dia | No. | 4 | | |
| 7.1.3. 59 | 40 x 25 mm dia | No. | 1 | | |
| 7.1.3. 60 | 32 x 20 mm dia | No. | 4 | | |
| 7.1.3. 61 | 32 x 25 mm dia | No. | 1 | | |
| 7.1.3. 62 | 25 x 20 mm dia | No. | 5 | | |
| 7.1.3. 63 | 20 x 20 mm dia | No. | 6 | | |
| | | | | | |
| | M-F3, M-F3a, M-F3a-1, M-F3b & Pl. 1418+2 | | | | |
| 7.1.3. 64 | 63 x 20 mm dia | No. | 3 | | |
| 7.1.3. 65 | 63 x 40 mm dia | No. | 2 | | |
| 7.1.3. 66 | 40 x 20 mm dia | No. | 10 | | |

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| 7.1.3. 67 | 40 x 25 mm dia | No. | 1 | | |
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| 7.1.3. 68 | 40 x 32 mm dia | No. | 1 | | |
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| 7.1.3. 69 | 32 x 20 mm dia | No. | 4 | | |
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| 7.1.3. 70 | 25 x 20 mm dia | No. | 8 | | |
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| 7.1.3. 71 | 20 x 20 mm dia | No. | 10 | | |
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| | M-F4, M-F4a, M-F4b, M-F4c & M-F4d | | | | |
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| 7.1.3. 72 | 90 x 20 mm dia | No. | 34 | | |
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| 7.1.3. 73 | 90 x 40 mm dia | No. | 2 | | |
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| 7.1.3. 74 | 75 x 20 mm dia | No. | 19 | | |
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| 7.1.3. 75 | 63 x 20 mm dia | No. | 6 | | |
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| 7.1.3. 76 | 63 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 77 | 50 x 20 mm dia | No. | 20 | | |
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| 7.1.3. 78 | 40 x 32 mm dia | No. | 2 | | |
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| 7.1.3. 79 | 40 x 20 mm dia | No. | 33 | | |
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| 7.1.3. 80 | 40 x 25 mm dia | No. | 1 | | |
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| 7.1.3. 81 | 32 x 20 mm dia | No. | 12 | | |

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| 7.1.3. 82 | 25 x 20 mm dia | No. | 12 | | |
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| 7.1.3. 83 | 20 x 20 mm dia | No. | 10 | | |
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| | M-F5, M-F5a, M-F5b & M-F5c | | | | |
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| 7.1.3. 84 | 75 x 32 mm dia | No. | 1 | | |
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| 7.1.3. 85 | 75 x 50 mm dia | No. | 1 | | |
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| 7.1.3. 86 | 75 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 87 | 75 x 20 mm dia | No. | 29 | | |
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| 7.1.3. 88 | 50 x 20 mm dia | No. | 13 | | |
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| 7.1.3. 89 | 40 x 20 mm dia | No. | 9 | | |
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| 7.1.3. 90 | 32 x 20 mm dia | No. | 15 | | |
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| 7.1.3. 91 | 25 x 20 mm dia | No. | 9 | | |
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| 7.1.3. 92 | 20 x 20 mm dia | No. | 5 | | |
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| | M-F6 & M-F6a | | | | |
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| 7.1.3. 93 | 63 x 20 mm dia | No. | 13 | | |
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| 7.1.3. 94 | 50 x 20 mm dia | No. | 11 | | |
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| 7.1.3. 95 | 50 x 25 mm dia | No. | 1 | | |
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| 7.1.3. 96 | 40 x 20 mm dia | No. | 6 | | |
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| 7.1.3. 97 | 32 x 20 mm dia | No. | 5 | | |
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| 7.1.3. 98 | 25 x 20 mm dia | No. | 3 | | |
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| 7.1.3. 99 | 20 x 20 mm dia | No. | 22 | | |
| | | | | | |
| | M-F7, M-F7a, M-F7a-1, M-F7a-2, M-F7a-3, M-F7a-3-1, M-F7a-3-2, M-F7b, M-F7c, M-F7d, M-F7e, M-F7e-1, M-F7e-2, M-F7e-3, M-F7e-4, M-F7e-5, M-F7e-5, M-F7e-6, M-F7f, M-F7f-1, M-F7f-2, M-F7f-3 | | | | |
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| 7.1.3. 100 | 90 x 20 mm dia | No. | 16 | | |
| | | | | | |
| 7.1.3. 101 | 90 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.1.3. 102 | 90 x 25 mm dia | No. | 1 | | |
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| 7.1.3. 103 | 90 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 104 | 75 x 20 mm dia | No. | 26 | | |
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| 7.1.3. 105 | 75 x 63 mm dia | No. | 1 | | |
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| 7.1.3. 106 | 75 x 40 mm dia | No. | 1 | | |
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| 7.1.3. 107 | 75 x 50 mm dia | No. | 3 | | |
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| 7.1.3. 108 | 63 x 20 mm dia | No. | 17 | | |
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| 7.1.3. 109 | 63 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.1.3. 110 | 63 x 40 mm dia | No. | 3 | | |
| | | | | | |
| 7.1.3. 111 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.1.3. 112 | 50 x 20 mm dia | No. | 12 | | |
| | | | | | |
| 7.1.3. 113 | 50 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.1.3. 114 | 50 x 32 mm dia | No. | 5 | | |
| | | | | | |
| 7.1.3. 115 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.1.3. 116 | 40 x 20 mm dia | No. | 25 | | |
| | | | | | |
| 7.1.3. 117 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| | | | | | |
| 7.1.3. 118 | 40 x 32 mm dia | No. | 3 | | |
| | | | | | |
| 7.1.3. 119 | 32 x 20 mm dia | No. | 19 | | |
| | | | | | |
| 7.1.3. 120 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.1.3. 121 | 25 x 20 mm dia | No. | 34 | | |
| | | | | | |
| 7.1.3. 122 | 20 x 20 mm dia | No. | 31 | | |
| | | | | | |
| | M-F8 & M-F8a | | | | |
| | | | | | |
| 7.1.3. 123 | 40 x 20 mm dia | No. | 11 | | |
| | | | | | |

| | | | | | |
|---------------|---|-----|---|--|--|
| 7.1.3. 124 | 32 x 20 mm dia | No. | 2 | | |
| 7.1.3. 125 | 25 x 20 mm dia | No. | 5 | | |
| 7.1.3. 126 | 20 x 20 mm dia | No. | 2 | | |
| 7.1.4 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 7.1.4. 1 | 110 mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 7.1.4. 2 | 110 mm diameter | No. | 2 | | |
| | 45 degrees | | | | |
| 7.1.4. 2 | 110 mm diameter | No. | 2 | | |
| | 90 degrees | | | | |
| 7.1.4. 3 | 110 mm diameter | No. | 2 | | |
| 7.1.5 | PRESSURE REDUCING VALVE CHAMBERS | | | | |
| 7.1.5. 1 | Excavate for, provide all materials and construct complete inspection valve chambers of internal dimensions 1000 x 1000 x 1000 mm at the pipe junctions. Rates to include thrust blocks, pipe supports as shown in the drawings. | No. | 4 | | |
| | Provide, handle, install and test the following steel and upvc pipes and fittings, valves and specials. Rates shall include for completing all pipe joints as per specifications /drawings | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| | | | | | |
| | | | | | |
| | 1 No. Pressure Regulating Valve fittings for M-F8 at Chainages 0+020 m | | | | |
| | | | | | |
| 7.1.5. 2 | 32/40 GI/PVC-U Adaptor | No. | 2 | | |
| | | | | | |
| 7.1.5. 3 | 32 mm dia PRV | No. | 1 | | |
| | | | | | |
| 7.1.5. 4 | 32 mm dia Nipple | No. | 2 | | |
| | | | | | |
| 7.1.5. 5 | 32 mm dia union | No. | 1 | | |
| | | | | | |
| 7.1.5. 6 | 32 mm gate valve | No. | 1 | | |
| | | | | | |
| 7.1.5. 7 | 50 mm dia single threaded pipe 500 mm long | No. | 2 | | |
| | | | | | |
| | 1 No. Pressure Regulating Valve fittings for M-F6 at Chainages 0+060 m | | | | |
| | | | | | |
| 7.1.5. 6 | 63/50 mm dia PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |
| 7.1.5. 7 | 50 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 7.1.5. 8 | 50 mm Dia Flanged sluice valve | No. | 1 | | |
| | | | | | |
| 7.1.5. 9 | 50 mm dia Flanged Pressure Reducing Valve | No. | 1 | | |
| | | | | | |
| | 1 No. Pressure Regulating Valve fittings for M-F7a at Chainages 0+020 m | | | | |
| | | | | | |
| 7.1.5. 10 | 65/75 mm dia stepped couplings | No. | 2 | | |
| | | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 7.1.5. 11 | 65 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 7.1.5. 12 | 65 mm Dia Flanged sluice valve | No. | 1 | | |
| 7.1.5. 13 | 65 mm dia Flanged Pressure Reducing Valve | No. | 1 | | |
| | 1 No. Pressure Regulating Valve fittings for M-F7 at Chainages 0+020 m | | | | |
| 7.1.5. 10 | 110/100 mm dia stepped couplings | No. | 2 | | |
| 7.1.5. 11 | 100 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| 7.1.5. 12 | 100 mm Dia Flanged sluice valve | No. | 1 | | |
| 7.1.5. 13 | 100 mm dia Flanged Pressure Reducing Valve | No. | 1 | | |
| 7.1.6 | AIR VALVES | | | | |
| 7.1.6. 1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 5 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Double Air Valve (DAV) at M-F2 Chainage 1040m | | | | |
| 7.1.6. 2 | 32 x 25 mm dia UPVC/G.I Adaptor | No. | 2 | | |

| | | | | | |
|----------|---|-----|---|--|--|
| 7.1.6.3 | 25 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.1.6.4 | 25 x 25 mm dia threaded GI tee | No. | 2 | | |
| 7.1.6.5 | 25mm dia threaded GI union | No. | 6 | | |
| 7.1.6.6 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| 7.1.6.7 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 7.1.6.8 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 7.1.6.9 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | 2 No. Double Air ValveS (DAV) at M-F5 & M-F7 Chainages 340m & 1080m respectively | | | | |
| 7.1.6.10 | 75 x 65 mm dia UPVC/G.I Adaptor | No. | 4 | | |
| 7.1.6.11 | 65 mm dia, 0.5m long threaded GI spigot | No. | 4 | | |
| 7.1.6.12 | 65 x 25 mm dia threaded GI tee | No. | 4 | | |
| 7.1.6.13 | 65mm dia threaded GI union | No. | 8 | | |
| 7.1.6.14 | 25 mm dia threaded GI pipe, 0.4m long | No. | 2 | | |
| 7.1.6.15 | 25 mm dia threaded GI union | No. | 4 | | |
| 7.1.6.16 | 25 mm dia threaded GI nipple | No. | 2 | | |
| 7.1.6.17 | 25 mm dia threaded Double Air Valve | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 7.1.6.18 | 25 mm dia threaded gate Valve | No. | 2 | | |
| | | | | | |
| | 2 No. Double Air Valves (DAVs) at M-F5 & M-F6 Chainages 1860m & 1020m respectively | | | | |
| | | | | | |
| 7.1.6.19 | 50 x 50 mm dia UPVC/G.I Adaptor | No. | 4 | | |
| | | | | | |
| 7.1.6.20 | 50 mm dia, 0.5m long threaded GI spigot | No. | 4 | | |
| | | | | | |
| 7.1.6.21 | 50 x 25 mm dia threaded GI tee | No. | 4 | | |
| | | | | | |
| 7.1.6.22 | 50 mm dia threaded GI union | No. | 8 | | |
| | | | | | |
| 7.1.6.23 | 25 mm dia threaded GI pipe, 0.4m long | No. | 2 | | |
| | | | | | |
| 7.1.6.24 | 25 mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.1.6.25 | 25 mm dia threaded GI nipple | No. | 2 | | |
| | | | | | |
| 7.1.6.26 | 25 mm dia threaded Double Air Valve | No. | 2 | | |
| | | | | | |
| 7.1.6.27 | 25 mm dia threaded gate Valve | No. | 2 | | |
| | | | | | |
| 7.1.7 | WASHOUT (W/O) | | | | |
| | | | | | |
| | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | | | | | |
| | 1 No. Wash Out (WO) at M-F2 Chainage 780m | | | | |
| | | | | | |

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|--------------|---|-----|---|--|--|
| 7.1.7. 1 | 40 x 40 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| 7.1.7. 2 | 40 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.1.7. 3 | 40 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| 7.1.7. 4 | 25mm dia gate valve | No. | 1 | | |
| 7.1.7. 5 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 7.1.7. 6 | 25 x 25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 7.1.7. 7 | 25mm dia GI union | No. | 3 | | |
| 7.1.7. 8 | 25mm dia GI nipple | No. | 2 | | |
| 7.1.7. 9 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 7.1.7. 10 | 25 mm dia uPVC pipe | m | 6 | | |
| | 1 No. Wash Out (WO) at M-F6 Chainage 1780m | | | | |
| 7.1.7. 11 | 50 x 50 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| 7.1.7. 12 | 50 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.1.7. 13 | 50 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| 7.1.7. 14 | 25mm dia gate valve | No. | 1 | | |
| 7.1.7. 15 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 7.1.7. 16 | 25 x 25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| | | | | | |
| 7.1.7. 17 | 25mm dia GI union | No. | 3 | | |
| | | | | | |
| 7.1.7. 18 | 25mm dia GI nipple | No. | 2 | | |
| | | | | | |
| 7.1.7. 19 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| | | | | | |
| 7.1.7. 20 | 25 mm dia uPVC pipe | m | 6 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.7.2: SM 2 FEEDERS | | | | | |
|---------------------------|--|----------------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.2.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 7.2.1 .1 | Excavation and Backfilling in normal soil for SM2-F1 to a depth n.e 1.5 m. | m ³ | 203.3 | | |
| | | | | | |
| 7.2.1 | Ditto for SM2-F1a. | m ³ | | | |

| | | | | | |
|--------------|---|----------------|-------|--|--|
| .2 | | | 37.0 | | |
| 7.2.1 .3 | Ditto for SM2-F2. | m ³ | 118.4 | | |
| 7.2.1 .4 | Ditto for SM2-F2a. | m ³ | 28.1 | | |
| 7.2.1 .5 | Ditto for SM2-F2b. | m ³ | 17.7 | | |
| 7.2.1 .6 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 20.22 | | |
| 7.2.1 .7 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 20.22 | | |
| 7.2.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | uPVC Straights | | | | |
| | SM2-F1 | | | | |
| | Class PN6 | | | | |
| 7.2.2 | 40 mm dia | m | | | |

| | | | | | |
|--------------|------------------|---|--------|--|--|
| .1 | | | 172.00 | | |
| | | | | | |
| 7.2.2 .2 | 32 mm dia | m | 108.00 | | |
| | | | | | |
| 7.2.2 .3 | 25 mm dia | m | 20.00 | | |
| | | | | | |
| 7.2.2 .4 | 20 mm dia | m | 162.00 | | |
| | | | | | |
| | | | | | |
| | SM2-F1a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.2.2 .5 | 25 mm dia | m | 29.00 | | |
| | | | | | |
| 7.2.2 .6 | 20 mm dia | m | 58.00 | | |
| | | | | | |
| | SM2-F2 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.2.2 .7 | 40 mm dia | m | 140.00 | | |
| | | | | | |
| 7.2.2 .8 | 32 mm dia | m | 20.00 | | |
| | | | | | |
| 7.2.2 .9 | 25 mm dia | m | 80.00 | | |
| | | | | | |
| 7.2.2 .10 | 20 mm dia | m | 29.00 | | |
| | | | | | |
| | SM2-F2a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.2.2 .11 | 25 mm dia | m | 140.00 | | |
| | | | | | |
| 7.2.2 .12 | 20 mm dia | m | 60.00 | | |
| | | | | | |

| | | | | | |
|--------------|---|-----|--------|--|--|
| | SM2-F2b | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.2.2 .13 | 32 mm dia | m | 140.00 | | |
| | | | | | |
| 7.2.2 .14 | 25 mm dia | m | 60.00 | | |
| | | | | | |
| 7.2.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM2-F1, SM-F2, SM2-F1a, SM-F2a & SM2-F2b | | | | |
| | | | | | |
| 7.2.3 .1 | 40 x 32 dia | No. | 2 | | |
| | | | | | |
| 7.2.3 .2 | 32 x 25 dia | No. | 3 | | |
| | | | | | |
| 7.2.3 .3 | 25 x 20 dia | No. | 4 | | |
| | | | | | |
| | | | | | |
| | PVC-U Tees | | | | |
| | | | | | |
| | SM2-F1, SM2-F1a, SM2-F2, SM2-F2a & SM2-F2b | | | | |
| | | | | | |
| 7.2.3 .4 | 40 x 20 | No. | 14 | | |
| | | | | | |
| | | | | | |
| 7.2.3 .5 | 40 x 25 | No. | 1 | | |
| | | | | | |
| 7.2.3 .6 | 40 x 32 | No. | 2 | | |
| | | | | | |
| 7.2.3 .7 | 32 x 20 | No. | 8 | | |
| | | | | | |
| 7.2.3 | 32 x 25 | No. | 1 | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|--------------|--|-----|----|--|--|
| .8 | | | | | |
| 7.2.3 .9 | 25 x 20 | No. | 12 | | |
| | | | | | |
| 7.2.3 .10 | 20 x 20 | No. | 9 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.7.3: SM 3 FEEDERS | | | | | |
|----------------------------------|--|------------------|----------------------|-----------------------|--------------------------|
| | | | | | |
| | | | | | |
| ITE M | DESCRIPTION | UN IT | QUAN TITY | RATE (KSh) | AMOUN T (KSh) |
| | | | | | |
| | | | | | |
| 7.3.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 7.3.1 .1 | Excavation and Backfilling in normal soil for SM3-F1 to a depth n.e 1.5 m. | m ³ | 52.8 | | |
| | | | | | |
| 7.3.1 .2 | Ditto for SM3-F1a. | m ³ | 142.6 | | |
| | | | | | |
| 7.3.1 .3 | Ditto for SM3-F2. | m ³ | 451.4 | | |
| | | | | | |
| 7.3.1 .4 | Ditto for Pl. 544-1686. | m ³ | 98.3 | | |
| | | | | | |
| 7.3.1 .5 | Ditto for SM3-F3. | m ³ | 619.5 | | |
| | | | | | |
| 7.3.1 .6 | Ditto for SM3-F3a. | m ³ | 248.0 | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|--------------|---|----------------|--------|--|--|
| | | | | | |
| 7.3.1 .7 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 80.6 | | |
| | | | | | |
| 7.3.1 .8 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 80.6 | | |
| | | | | | |
| 7.3.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM3-F1 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.3.2 .1 | 40 mm dia | m | 120.00 | | |
| | | | | | |
| 7.3.2 .2 | 32 mm dia | m | 140.00 | | |
| | | | | | |
| 7.3.2 .3 | 25 mm dia | m | 260.00 | | |
| | | | | | |
| 7.3.2 .4 | 20 mm dia | m | 84.00 | | |

| | | | | | |
|--------------|---------------------|---|--------|--|--|
| | | | | | |
| | SM3-F1a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.3.2 .5 | 32 mm dia | m | 240.00 | | |
| | | | | | |
| 7.3.2 .6 | 25 mm dia | m | 40.00 | | |
| | | | | | |
| 7.3.2 .7 | 20 mm dia | m | 50.00 | | |
| | | | | | |
| | SM3-F2 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.3.2 .8 | 50 mm dia | m | 388.00 | | |
| | | | | | |
| 7.3.2 .9 | 40 mm dia | m | 325.00 | | |
| | | | | | |
| 7.3.2 .10 | 32 mm dia | m | 104.00 | | |
| | | | | | |
| 7.3.2 .11 | 25 mm dia | m | 160.00 | | |
| | | | | | |
| 7.3.2 .12 | 20 mm dia | m | 28.00 | | |
| | | | | | |
| | Pl. 544-1686 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.3.2 .13 | 20 mm dia | m | 234.00 | | |
| | | | | | |
| | SM3-F3 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.3.2 .14 | 50 mm dia | m | 335.00 | | |
| | | | | | |
| 7.3.2 | 32 mm dia | m | | | |

| | | | | | |
|--------------|--|-----|--------|--|--|
| .15 | | | 185.00 | | |
| | | | | | |
| 7.3.2 .16 | 25 mm dia | m | 660.00 | | |
| | | | | | |
| 7.3.2 .17 | 20 mm dia | m | 227.00 | | |
| | | | | | |
| | SM3-F3a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | m | 420.00 | | |
| 7.3.2 .18 | 32 mm dia | | | | |
| | | m | 80.00 | | |
| 7.3.2 .19 | 25 mm dia | | | | |
| | | m | 74.00 | | |
| 7.3.2 .20 | 20 mm dia | | | | |
| | | | | | |
| 7.3.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM3-F1, SM3-F1a, SM-F2, Pl. 544-1686, SM3-F3 & SM3-F3 | | | | |
| | | | | | |
| 7.3.3 .1 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.3.3 .2 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.3.3 .3 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.3.3 .4 | 32 x 25 mm dia | No. | 5 | | |
| | | | | | |
| 7.3.3 .5 | 25 x 20 mm dia | No. | 5 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|----|--|--|
| | PVC-U Tees | | | | |
| | | | | | |
| | SM3-F1, SM3-F1a, SM-F2, Pl. 544-1686, SM3-F3 & SM3-F3 | | | | |
| | | | | | |
| 7.3.3 .6 | 50 x 20 | No. | 20 | | |
| | | | | | |
| 7.3.3 .7 | 50 x 32 | No. | 1 | | |
| | | | | | |
| 7.3.3 .8 | 40 x 32 | No. | 1 | | |
| | | | | | |
| 7.3.3 .9 | 40 x 20 | No. | 12 | | |
| | | | | | |
| 7.3.3 .10 | 32 x 20 | No. | 14 | | |
| | | | | | |
| 7.3.3 .11 | 25 x 20 | No. | 14 | | |
| | | | | | |
| 7.3.3 .12 | 20 x 20 | No. | 11 | | |
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| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
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|----------------------------------|----------------------------|-------------|-----------------|-------------------|---------------------|
| Bill No.7.4: SM 4 FEEDERS | | | | | |
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.4.1 | Excavation and Backfilling | | | | |
| | | | | | |

| | | | | | |
|----------|--|----------------|-------|--|--|
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| 7.4.1.1 | Excavation and Backfilling in normal soil for SM4-F1 to a depth n.e 1.5 m. | m ³ | 931.1 | | |
| 7.4.1.2 | Ditto for SM4-F1a. | m ³ | 166.6 | | |
| 7.4.1.3 | Ditto for SM4-F1b. | m ³ | 99.9 | | |
| 7.4.1.4 | Ditto for Pl. 1870-71 | m ³ | 76.9 | | |
| 7.4.1.5 | Ditto for SM4-F2. | m ³ | 307.6 | | |
| 7.4.1.6 | Ditto for SM4-F2a. | m ³ | 121.4 | | |
| 7.4.1.7 | Ditto for SM4-F2a-1. | m ³ | 53.6 | | |
| 7.4.1.8 | Ditto for SM4-F3. | m ³ | 499.1 | | |
| 7.4.1.9 | Ditto for Pl. 922-923 | m ³ | 46.6 | | |
| 7.4.1.10 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 115.1 | | |
| 7.4.1.11 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 115.1 | | |
| 7.4.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |

| | | | | | |
|----------|---|---|--------|--|--|
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM4-F1 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.4.2 .1 | 50 mm dia | m | 660.00 | | |
| | | | | | |
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| | Sub-Total Brought Forward From Previous Page | | | | |
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| | Class PN8 | | | | |
| | | | | | |
| 7.4.2 .2 | 50 mm | m | 260.00 | | |
| | | | | | |
| 7.4.2 .3 | 40 mm | m | 280.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.4.2 .4 | 40 mm dia | m | 487.00 | | |

| | | | | | |
|--------------|-------------------|---|--------|--|--|
| | | | | | |
| 7.4.2 .5 | 32 mm dia | m | 133.00 | | |
| | | | | | |
| 7.4.2 .6 | 25 mm dia | m | 60.00 | | |
| | | | | | |
| | Class PN12.5 | | | | |
| | | | | | |
| 7.4.2 .7 | 20 mm dia | m | 189.00 | | |
| | | | | | |
| | SM4-F1a & SM4-F1b | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.4.2 .8 | 25 mm dia | m | 280.00 | | |
| | | | | | |
| 7.4.2 .9 | 20 mm dia | m | 446.00 | | |
| | | | | | |
| | Pl. 1870-71 | | | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.4.2 .10 | 20 mm dia | m | 183.00 | | |
| | | | | | |
| | SM4-F2 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.4.2 .11 | 40 mm dia | m | 340.00 | | |
| | | | | | |
| 7.4.2 .12 | 32 mm dia | m | 152.00 | | |
| | | | | | |
| 7.4.2 .13 | 25 mm dia | m | 109.00 | | |
| | | | | | |
| 7.4.2 .14 | 20 mm dia | m | 99.00 | | |
| | | | | | |
| | SM4-F2a | | | | |
| | | | | | |
| | Class PN8 | | | | |

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|--------------|--|---|--------|--|--|
| | | | | | |
| 7.4.2 .15 | 32 mm dia | m | 149.00 | | |
| | | | | | |
| 7.4.2 .16 | 25 mm dia | m | 91.00 | | |
| | | | | | |
| 7.4.2 .17 | 20 mm dia | m | 20.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.4.2 .18 | 20 mm dia | m | 21.00 | | |
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| | SM4-F2a-1 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.4.2 .19 | 25 mm dia | m | 80.00 | | |
| | | | | | |
| 7.4.2 .20 | 20 mm dia | m | 46.00 | | |
| | | | | | |
| | SM4-F3 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.4.2 .21 | 50 mm dia | m | 240.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.4.2 .22 | 50 mm dia | m | 300.00 | | |
| | | | | | |
| 7.4.2 .23 | 40 mm dia | m | 220.00 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|--------|--|--|
| 7.4.2 .24 | 32 mm dia | m | 200.00 | | |
| 7.4.2 .25 | 25 mm dia | m | 120.00 | | |
| 7.4.2 .26 | 20 mm dia | m | 29.00 | | |
| | Pl. 922-923 | | | | |
| | Class PN10 | | | | |
| 7.4.2 .27 | 20 mm dia | m | 111.00 | | |
| 7.4.3 | Upvc Pipe Fittings | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Reducers | | | | |
| | SM4-F1, SM4-F1a, SM4-F1b, Pl. 1870-71, SM4-F2,SM4-F2a, SM4-F2a-1, SM4-F3 &Pl 922-923 | | | | |
| 7.4.3 .1 | 50 x 40 mm dia | No. | 2 | | |
| 7.4.3 .2 | 40 x 32 mm dia | No. | 3 | | |
| 7.4.3 .3 | 32 x 25 mm dia | No. | 4 | | |
| 7.4.3 .4 | 25 x 20 mm dia | No. | 7 | | |
| | PVC-U Tees | | | | |
| | SM4-F1, SM4-F1a, SM4-F1b, Pl. 1870-71, SM4-F2,SM4-F2a, SM4-F2a-1, SM4-F3 &Pl 922-923 | | | | |
| 7.4.3 .5 | 50 x 20 mm dia | No. | 37 | | |
| 7.4.3 | 50 x 25 mm dia | No. | 2 | | |

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| .6 | | | | | |
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| 7.4.3 .7 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.4.3 .8 | 40 x 20 mm dia | No. | 22 | | |
| | | | | | |
| 7.4.3 .9 | 32 x 20 mm dia | No. | 12 | | |
| | | | | | |
| 7.4.3 .10 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.4.3 .11 | 25 x 20 mm dia | No. | 11 | | |
| | | | | | |
| 7.4.3 .12 | 20 x 20 mm dia | No. | 17 | | |
| | | | | | |
| 7.4.4 | AIR VALVES | | | | |
| | | | | | |
| 7.4.4 .1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM4-F1 at chainage 1+1040 m. | | | | |
| | | | | | |
| 7.4.4 .2 | 40/32 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |

| | | | | | |
|----------|--|-----|---|--|--|
| 7.4.4.3 | 32 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.4.4.4 | 32 x 25 mm dia threaded GI tee | No. | 2 | | |
| 7.4.4.5 | 32 mm dia threaded GI union | No. | 4 | | |
| 7.4.4.6 | 25 mm dia threaded GI pipe, 0.5m long | No. | 1 | | |
| 7.4.4.7 | 25 mm dia threaded GI union | No. | 2 | | |
| 7.4.4.8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 7.4.4.9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 7.4.4.10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.7.5: SM 5 FEEDERS | | | | | |
|----------------------------------|--|------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.5.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |

| | | | | | |
|--------------|---|----------------|---------|--|--|
| 7.5.1.1 | Excavation and Backfilling in normal soil for SM4-F1 to a depth n.e 1.5 m. | m ³ | 1,284.3 | | |
| 7.5.1.2 | Ditto for Pl. 462+2. | m ³ | 100.3 | | |
| 7.5.1.3 | Ditto for SM5-F2. | m ³ | 1,553.7 | | |
| 7.5.1.4 | Ditto for SM5-F2a. | m ³ | 292.2 | | |
| 7.5.1.5 | Ditto for SM5-F2b. | m ³ | 33.6 | | |
| 7.5.1.6 | Ditto for SM4-F2a. | m ³ | 95.0 | | |
| 7.5.1.7 | Ditto for SM5-F2c. | m ³ | 89.0 | | |
| 7.5.1.8 | Ditto for SM5 F2d. | m ³ | 155.5 | | |
| 7.5.1.9 | Ditto for SM5 F2e. | m ³ | 571.1 | | |
| 7.5.1.10 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 208.7 | | |
| 7.5.1.11 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 208.7 | | |
| 7.5.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class | | | | |

| | | | | | |
|---------|-----------------------|---|--------|--|--|
| | Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM5-F1 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.5.2.1 | 75 mm dia | m | 776.00 | | |
| | | | | | |
| 7.5.2.2 | 63 mm dia | m | 305.00 | | |
| | | | | | |
| | | | | | |
| 7.5.2.3 | 50 mm dia | m | 340.00 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.5.2.4 | 50 mm dia | m | 500.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.5.2.5 | 50 mm dia | m | 100.00 | | |
| | | | | | |
| 7.5.2.6 | 40 mm dia | m | 480.00 | | |
| | | | | | |
| 7.5.2.7 | 32 mm dia | m | 140.00 | | |
| | | | | | |
| 7.5.2.8 | 25 mm dia | m | 90.00 | | |
| | | | | | |
| 7.5.2.9 | 20 mm dia | m | 62.00 | | |
| | | | | | |

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|--------------|---------------------|---|--------|--|--|
| | | | | | |
| | Pl. 462+2 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.5.2.1 0 | 25 mm dia | m | 100.00 | | |
| | | | | | |
| 7.5.2.1 1 | 20 mm dia | m | 136.00 | | |
| | | | | | |
| | | | | | |
| | SM5-F2 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.5.2.1 2 | 110 mm dia | m | 291.00 | | |
| | | | | | |
| 7.5.2.1 3 | 90 mm dia | m | 370.00 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.5.2.1 4 | 90 mm dia | m | 498.00 | | |
| | | | | | |
| 7.5.2.1 5 | 75 mm dia | m | 583.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.5.2.1 6 | 75 mm dia | m | 360.00 | | |
| | | | | | |
| 7.5.2.1 7 | 63 mm dia | m | 260.00 | | |
| | | | | | |
| | Class PN12.5 | | | | |
| | | | | | |
| 7.5.2.1 8 | 50 mm dia | m | 295.00 | | |
| | | | | | |
| 7.5.2.1 9 | 40 mm dia | m | 225.00 | | |
| | | | | | |
| 7.5.2.2 0 | 32 mm dia | m | 220.00 | | |

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|--------------|-------------------|---|--------|--|--|
| | | | | | |
| 7.5.2.2 1 | 25 mm dia | m | 120.00 | | |
| | | | | | |
| 7.5.2.2 2 | 20 mm dia | m | 51.00 | | |
| | | | | | |
| | SM5-F2a | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.5.2.2 3 | 40 mm dia | m | 120.00 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.5.2.2 4 | 40 mm dia | m | 340.00 | | |
| | | | | | |
| 7.5.2.2 5 | 32 mm dia | m | 100.00 | | |
| | | | | | |
| 7.5.2.2 6 | 25 mm dia | m | 80.00 | | |
| | | | | | |
| 7.5.2.2 7 | 20 mm dia | m | 24.00 | | |
| | | | | | |
| | Pl. 1266+1 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.5.2.2 8 | 20 mm dia | m | 80.00 | | |
| | | | | | |
| | SM5-F2b | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.5.2.2 9 | 32 mm dia | m | 60.00 | | |
| | | | | | |
| 7.5.2.3 0 | 25 mm dia | m | 60.00 | | |
| | | | | | |
| 7.5.2.3 1 | 20 mm dia | m | 20.00 | | |
| | | | | | |

| | | | | | |
|--------------|--|---|--------|--|--|
| | SM5-F2c | | | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.5.2.3 2 | 32 mm dia | m | 120.00 | | |
| | | | | | |
| 7.5.2.3 3 | 25 mm dia | m | 40.00 | | |
| | | | | | |
| 7.5.2.3 4 | 20 mm dia | m | 45.00 | | |
| | | | | | |
| | SM5-F2d | | | | |
| | | | | | |
| | Class PN12.5 | | | | |
| | | | | | |
| 7.5.2.3 5 | 32 mm dia | m | 200.00 | | |
| | | | | | |
| 7.5.2.3 6 | 25 mm dia | m | 100.00 | | |
| | | | | | |
| 7.5.2.3 7 | 20 mm dia | m | 60.00 | | |
| | | | | | |
| | | | | | |
| | SM5-F2e | | | | |
| | | | | | |
| | Class PN12.5 | | | | |
| | | | | | |
| 7.5.2.3 8 | 40 mm dia | m | 540.00 | | |
| | | | | | |
| 7.5.2.3 9 | 32 mm dia | m | 620.00 | | |
| | | | | | |
| 7.5.2.4 0 | 25 mm dia | m | 60.00 | | |
| | | | | | |
| 7.5.2.4 1 | 20 mm dia | m | 78.00 | | |
| | | | | | |
| | | | | | |
| 7.5.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |

| | | | | | |
|----------|--|-----|----|--|--|
| | Saddle Clamps and adaptors | | | | |
| | | | | | |
| | SM5-F2 | | | | |
| | | | | | |
| 7.5.3.1 | 110 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.5.3.2 | 15/20 GI/PVC-U Adaptor | No. | 1 | | |
| | | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM5-F1, PI 462+2, SM5-F2, SM5-F2a, PI1266+1, SM5-F2b, SM5-F2c, SM5-F2d, SM5-F2e | | | | |
| | | | | | |
| 7.5.3.3 | 110 x 90 mm dia | No. | 1 | | |
| | | | | | |
| 7.5.3.4 | 90 x 75 mm dia | No. | 1 | | |
| | | | | | |
| 7.5.3.5 | 75 x 63 mm dia | No. | 2 | | |
| | | | | | |
| 7.5.3.6 | 63 x 50 mm dia | No. | 2 | | |
| | | | | | |
| 7.5.3.7 | 50 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.5.3.8 | 40 x 32 mm dia | No. | 4 | | |
| | | | | | |
| 7.5.3.9 | 32 x 25 mm dia | No. | 6 | | |
| | | | | | |
| 7.5.3.10 | 25 x 20 mm dia | No. | 7 | | |
| | | | | | |
| | | | | | |
| | PVC-U Tees | | | | |
| | | | | | |
| | SM5-F1 | | | | |
| | | | | | |
| 7.5.3.10 | 90 x 20 mm dia | No. | 11 | | |
| | | | | | |
| 7.5.3.11 | 90 x 40 mm dia | No. | 1 | | |
| | | | | | |
| | | | | | |
| 7.5.3.12 | 75 x 20 mm dia | No. | 29 | | |
| | | | | | |
| 7.5.3.1 | 75 x 20 mm dia | No. | 1 | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|--------------|----------------------------|-----|----|--|--|
| 3 | | | | | |
| 7.5.3.1 4 | 75 x 32 mm dia | No. | 2 | | |
| 7.5.3.1 5 | 63 x 20 mm dia | No. | 13 | | |
| 7.5.3.1 6 | 63 x 32 mm dia | No. | 1 | | |
| 7.5.3.1 7 | 50 x 20 mm dia | No. | 25 | | |
| 7.5.3.1 8 | 50 x 40 mm dia | No. | 1 | | |
| 7.5.3.1 9 | 40 x 20 mm dia | No. | 32 | | |
| 7.5.3.2 0 | 32 x 20 mm dia | No. | 20 | | |
| 7.5.3.2 1 | 25 x 20 mm dia | No. | 15 | | |
| 7.5.3.2 2 | 20 x 20 mm dia | No. | 20 | | |
| 7.5.4 | BENDS (PROVISIONAL) | | | | |
| | 11.25 degrees | | | | |
| 7.5.4.1 | 110 mm diameter | No. | 2 | | |
| | 22.5 degrees | | | | |
| 7.5.4.2 | 110 mm diameter | No. | 2 | | |
| | 45 degrees | | | | |
| 7.5.4.3 | 110 mm diameter | No. | 2 | | |
| | 90 degrees | | | | |
| 7.5.4.4 | 110 mm diameter | No. | 2 | | |
| 7.5.5 | WASHOUT (W/O) | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| | | | | | |
|----------|--|-----|---|--|--|
| 7.5.5.1 | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | |
| | | | | | |
| | 1 No. Washout Fittings for SM5-F1 at chainage 1+000 m. | | | | |
| | | | | | |
| 7.5.5.2 | 63/50 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| | | | | | |
| 7.5.5.3 | 50 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.5.5.4 | 50 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| | | | | | |
| 7.5.5.5 | 25mm dia gate valve | No. | 1 | | |
| | | | | | |
| 7.5.5.6 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| | | | | | |
| | | | | | |
| 7.5.5.7 | 25/25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| | | | | | |
| 7.5.5.8 | 25mm dia GI union | No. | 3 | | |
| | | | | | |
| 7.5.5.9 | 25mm dia GI nipple | No. | 2 | | |
| | | | | | |
| 7.5.5.10 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| | | | | | |
| 7.5.5.11 | 25 mm dia uPVC pipe to drainage outlet | m | 6 | | |
| | | | | | |
| | 1 No. Washout Fittings for SM5-F1 at chainage 2+500 m. | | | | |
| | | | | | |
| 7.5.5.12 | 40/32 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| | | | | | |
| 7.5.5.13 | 32 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.5.5.14 | 32 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| 7.5.5.1 5 | 25mm dia gate valve | No. | 1 | | |
| 7.5.5.1 6 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 7.5.5.1 7 | 25/25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 7.5.5.1 8 | 25mm dia GI union | No. | 3 | | |
| 7.5.5.1 9 | 25mm dia GI nipple | No. | 2 | | |
| 7.5.5.2 0 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 7.5.5.2 1 | 25 mm dia uPVC pipe to drainage outlet | m | 6 | | |
| | 1 No. Washout Fittings for SM5-F2 at chainage 1+280 m. | | | | |
| 7.5.5.2 2 | 75/65 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| 7.5.5.2 3 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.5.5.2 4 | 65 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| 7.5.5.2 5 | 25mm dia gate valve | No. | 1 | | |
| 7.5.5.2 6 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 7.5.5.2 7 | 25/25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 7.5.5.2 8 | 25mm dia GI union | No. | 3 | | |
| 7.5.5.2 9 | 25mm dia GI nipple | No. | 2 | | |

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|--------------|--|-----|---|--|--|
| 7.5.5.3 0 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 7.5.5.3 1 | 25 mm dia uPVC pipe to drainage outlet | m | 6 | | |
| 7.5.6 | AIR VALVES | | | | |
| 7.5.6.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM5-F1 at chainage 0+740 m. | | | | |
| 7.5.6.2 | 75 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| 7.5.6.3 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.5.6.4 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| 7.5.6.5 | 65 mm dia threaded GI union | No. | 4 | | |
| 7.5.6.6 | 25 mm dia threaded GI pipe, 0.5m long | No. | 1 | | |
| 7.5.6.7 | 25 mm dia threaded GI union | No. | 2 | | |
| 7.5.6.8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 7.5.6.9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 7.5.6.1 0 | 25 mm dia threaded gate Valve | No. | 1 | | |

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| | | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM5-F1 at chainage 2+160 m. | | | | |
| | | | | | |
| 7.5.6.1 1 | 40/32 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 7.5.6.1 2 | 32 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.5.6.1 3 | 32 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 7.5.6.1 4 | 32 mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.5.6.1 5 | 25 mm dia threaded GI pipe, 0.5m long | No. | 1 | | |
| | | | | | |
| 7.5.6.1 6 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 7.5.6.1 7 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.5.6.1 8 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.5.6.1 9 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM5-F2 at chainage 0+600 m. | | | | |
| | | | | | |
| 7.5.6.2 0 | 80/90 mm dia stepped coupling | No. | 2 | | |
| | | | | | |
| 7.5.6.2 1 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 7.5.6.2 2 | 80 mm x 50 mm dia All flanged steel tee | No. | 1 | | |
| | | | | | |
| 7.5.6.2 3 | 50 mm flanged sluice valve | No. | 1 | | |
| | | | | | |

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|--------------|--|-----|---|--|--|
| 7.5.6.2 4 | 50 mm dia double flanged steel pipe 500 mm long | No. | 1 | | |
| 7.5.6.2 5 | 50 mm Double air valve | No. | 1 | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
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| Bill No.7.6: SM 6 FEEDERS | | | | | |
|----------------------------------|--|----------------|-----------------|-------------------|---------------------|
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.6.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 7.6.1.1 | Excavation and Backfilling in normal soil for SM6-F1 to a depth n.e 1.5 m. | m ³ | 140.8 | | |
| | | | | | |
| 7.6.1.2 | Ditto for SM6-F2. | m ³ | 261.4 | | |
| | | | | | |
| 7.6.1.3 | Ditto for SM6-F3. | m ³ | 514.8 | | |
| | | | | | |
| 7.6.1.4 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 45.8 | | |
| | | | | | |
| 7.6.1.5 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 45.8 | | |

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| 7.6.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM6-F1 | | | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.6.2. 1 | 32 mm dia | m | 160.00 | | |
| | | | | | |
| 7.6.2. 2 | 25 mm dia | m | 100.00 | | |
| | | | | | |
| 7.6.2. 3 | 20 mm dia | m | 66.00 | | |
| | | | | | |
| | SM6-F2 | | | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.6.2. 4 | 40 mm dia | m | 280.00 | | |
| | | | | | |

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|--------------|------------------------------------|-----|--------|--|--|
| 7.6.2. 5 | 32 mm dia | m | 380.00 | | |
| 7.6.2. 6 | 25 mm dia | m | 220.00 | | |
| 7.6.2. 7 | 20 mm dia | m | 74.00 | | |
| | | | | | |
| | SM6-F3 | | | | |
| | | | | | |
| | Class PN10 | | | | |
| 7.6.2. 8 | 40 mm dia | m | 240.00 | | |
| | | | | | |
| | Class PN12.5 | | | | |
| 7.6.2. 9 | 40 mm dia | m | 480.00 | | |
| 7.6.2. 10 | 32 mm dia | m | 160.00 | | |
| 7.6.2. 11 | 25 mm dia | m | 100.00 | | |
| 7.6.2. 12 | 20 mm dia | m | 190.00 | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM6-F1, SM6-F2 & SM6-F3 | | | | |
| 7.6.2. 13 | 40 x 32 mm dia | No. | 2 | | |
| 7.6.2. 14 | 32 x 25 mm dia | No. | 3 | | |
| 7.6.2. 15 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | PVC-U Tees | | | | |
| | | | | | |
| | SM6-F1, SM6-F2 & SM6-F3 | | | | |
| 7.6.2. | 40 x 20 mm dia | No. | 22 | | |

| | | | | | |
|----------|--|-----|---|--|--|
| 16 | | | | | |
| 7.6.2.17 | 32 x 20 mm dia | No. | 7 | | |
| 7.6.2.18 | 25 x 20 mm dia | No. | 6 | | |
| 7.6.2.19 | 20 x 20 mm dia | No. | 6 | | |
| | | | | | |
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| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
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| Bill No.7.7: SM 7 FEEDERS | | | | | |
|----------------------------------|--|----------------|----------|------------|--------------|
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| 7.7.1 | Excavation and Backfilling | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| 7.7.1.1 | Excavation and Backfilling in normal soil for SM7-F1 to a depth n.e 1.5 m. | m ³ | 269 | | |
| 7.7.1.2 | Ditto for SM6-F1a. | m ³ | 213 | | |
| 7.7.1.3 | Ditto for SM7-F3. | m ³ | 315 | | |
| 7.7.1.4 | Ditto for SM7-F5. | m ³ | 596 | | |

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|----------|---|----------------|------|--|--|
| 7.7.1.5 | Ditto for SM7-F5a. | m ³ | 105 | | |
| | | | | | |
| 7.7.1.6 | Ditto for SM7-F6. | m ³ | 932 | | |
| | | | | | |
| 7.7.1.7 | Ditto for SM7-F6a. | m ³ | 195 | | |
| | | | | | |
| 7.7.1.8 | Ditto for SM7-Fa-1. | m ³ | 66 | | |
| | | | | | |
| 7.7.1.9 | Ditto for SM7-F6b. | m ³ | 197 | | |
| | | | | | |
| 7.7.1.10 | Ditto for SM7-F7. | m ³ | 319 | | |
| | | | | | |
| 7.7.1.11 | Ditto for SM7-F7a. | m ³ | 232 | | |
| | | | | | |
| 7.7.1.12 | Ditto for SM7-F7a-1. | m ³ | 118 | | |
| | | | | | |
| 7.7.1.13 | Ditto for SM7-F8. | m ³ | 1361 | | |
| | | | | | |
| 7.7.1.14 | Ditto for SM7-F8a. | m ³ | 410 | | |
| | | | | | |
| 7.7.1.15 | Ditto for SM7-F8b. | m ³ | 1486 | | |
| | | | | | |
| 7.7.1.16 | Ditto for SM7-F8b-1. | m ³ | 197 | | |
| | | | | | |
| 7.7.1.17 | Ditto for SM7-F8b-2. | m ³ | 644 | | |
| | | | | | |
| 7.7.1.18 | Ditto for SM7-F8c. | m ³ | 177 | | |
| | | | | | |
| 7.7.1.19 | Ditto for SM7-F8d. | m ³ | 76 | | |
| | | | | | |
| 7.7.1.20 | Ditto for SM7-F8. | m ³ | 422 | | |
| | | | | | |
| 7.7.1.21 | Ditto for SM7-F8e-1. | m ³ | 149 | | |
| | | | | | |
| 7.7.1.22 | Ditto for SM7-F8f. | m ³ | 168 | | |
| | | | | | |
| 7.7.1.23 | Ditto for SM7-F9. | m ³ | 899 | | |
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| 7.7.1.24 | Ditto for PI 79+2. | m ³ | 70 | | |
| | | | | | |
| 7.7.1.25 | Ditto for SM7-F9a. | m ³ | 177 | | |
| | | | | | |
| 7.7.1.26 | Ditto for SM7-F9b. | m ³ | 62 | | |
| | | | | | |
| 7.7.1.27 | Ditto for SM7-F9c. | m ³ | 101 | | |
| | | | | | |
| 7.7.1.28 | Ditto for SM7-F10. | m ³ | 194 | | |
| | | | | | |
| 7.7.1.29 | Ditto for SM7-F10a. | m ³ | 88 | | |
| | | | | | |
| 7.7.1.30 | Ditto for SM7-F11. | m ³ | 160 | | |
| | | | | | |
| 7.7.1.31 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 519.8 | | |
| | | | | | |
| 7.7.1.32 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 519.8 | | |
| | | | | | |
| 7.7.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 | m | | | |

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|----------|---|---|-----|--|--|
| | 125 | | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM7-F1 | | | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.7.2.1 | 40 mm dia | m | 10 | | |
| | | | | | |
| 7.7.2.2 | 32 mm dia | m | 30 | | |
| | | | | | |
| 7.7.2.3 | 25 mm dia | m | 320 | | |
| | | | | | |
| 7.7.2.4 | 20 mm dia | m | 261 | | |
| | | | | | |
| | SM7-F1a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.5 | 25 mm dia | m | 400 | | |
| | | | | | |
| 7.7.2.6 | 20 mm dia | m | 102 | | |
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| | SM7-F3 | | | | |
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| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.7 | 50 mm dia | m | 300 | | |
| | | | | | |
| 7.7.2.8 | 40 mm dia | m | 140 | | |
| | | | | | |
| 7.7.2.9 | 32 mm dia | m | 140 | | |
| | | | | | |
| 7.7.2.10 | 25 mm dia | m | 40 | | |
| | | | | | |
| 7.7.2.11 | 20 mm dia | m | 79 | | |
| | | | | | |

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|----------|---|---|------|--|--|
| | SM7-F5 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.12 | 63 mm dia | m | 380 | | |
| | | | | | |
| 7.7.2.13 | 50 mm dia | m | 474 | | |
| | | | | | |
| 7.7.2.14 | 40 mm dia | m | 207 | | |
| | | | | | |
| 7.7.2.15 | 32 mm dia | m | 40 | | |
| | | | | | |
| 7.7.2.16 | 25 mm dia | m | 80 | | |
| | | | | | |
| 7.7.2.17 | 20 mm dia | m | 107 | | |
| | | | | | |
| | SM7-F5a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.18 | 32 mm dia | m | 60 | | |
| | | | | | |
| 7.7.2.19 | 25 mm dia | m | 120 | | |
| | | | | | |
| 7.7.2.20 | 20 mm dia | m | 63 | | |
| | | | | | |
| | SM7-F6 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.21 | 75 mm dia | m | 1060 | | |
| | | | | | |
| 7.7.2.22 | 63 mm dia | m | 140 | | |
| | | | | | |
| 7.7.2.23 | 50 mm dia | m | 117 | | |
| | | | | | |
| 7.7.2.24 | 40 mm dia | m | 164 | | |
| | | | | | |
| 7.7.2.25 | 32 mm dia | m | 300 | | |
| | | | | | |
| 7.7.2.26 | 25 mm dia | m | 100 | | |
| | | | | | |
| 7.7.2.27 | 20 mm dia | m | 83 | | |
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| | SM7-F6a | | | | |
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| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.27 | 40 mm dia | m | 268 | | |
| | | | | | |
| 7.7.2.28 | 32 mm dia | m | 53 | | |
| | | | | | |
| 7.7.2.29 | 25 mm dia | m | 60 | | |
| | | | | | |
| 7.7.2.30 | 20 mm dia | m | 62 | | |
| | | | | | |
| | SM7-F6a-1 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.31 | 25 mm dia | m | 120 | | |
| | | | | | |
| 7.7.2.32 | 20 mm dia | m | 36 | | |
| | | | | | |
| | SM7-F6b | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.33 | 32 mm dia | m | 160 | | |
| | | | | | |
| 7.7.2.34 | 25 mm dia | m | 180 | | |
| | | | | | |
| 7.7.2.35 | 20 mm dia | m | 115 | | |
| | | | | | |
| | SM7-F7 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.36 | 50 mm dia | m | 160 | | |
| | | | | | |
| 7.7.2.37 | 40 mm dia | m | 120 | | |
| | | | | | |
| 7.7.2.38 | 32 mm dia | m | 220 | | |
| | | | | | |
| 7.7.2.39 | 25 mm dia | m | 140 | | |

| | | | | | |
|----------|---|---|------|--|--|
| 7.7.2.40 | 20 mm dia | m | 84 | | |
| | | | | | |
| | SM7-F7a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.41 | 40 mm dia | m | 200 | | |
| | | | | | |
| 7.7.2.42 | 32 mm dia | m | 120 | | |
| | | | | | |
| 7.7.2.43 | 25 mm dia | m | 160 | | |
| | | | | | |
| 7.7.2.44 | 20 mm dia | m | 47 | | |
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| | SM7-F7a-1 | | | | |
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| | Class PN6 | | | | |
| | | | | | |
| 7.7.2.45 | 25 mm dia | m | 100 | | |
| | | | | | |
| 7.7.2.46 | 20 mm dia | m | 177 | | |
| | | | | | |
| | SM7-F8 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.7.2.47 | 90 mm dia | m | 950 | | |
| | | | | | |
| 7.7.2.48 | 63 mm dia | m | 1371 | | |
| | | | | | |
| 7.7.2.49 | 40 mm dia | m | 49 | | |
| | | | | | |
| 7.7.2.50 | 32 mm dia | m | 232 | | |
| | | | | | |
| 7.7.2.51 | 25 mm dia | m | 80 | | |

| | | | | | |
|----------|-------------------|---|------|--|--|
| 7.7.2.52 | 20 mm dia | m | 98 | | |
| | | | | | |
| | SM7-F8a | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.7.2.53 | 40 mm dia | m | 100 | | |
| | | | | | |
| 7.7.2.54 | 32 mm dia | m | 436 | | |
| | | | | | |
| 7.7.2.55 | 25 mm dia | m | 184 | | |
| | | | | | |
| 7.7.2.56 | 20 mm dia | m | 212 | | |
| | | | | | |
| | SM7-F8b | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.7.2.57 | 75 mm dia | m | 620 | | |
| | | | | | |
| 7.7.2.58 | 63 mm dia | m | 60 | | |
| | | | | | |
| 7.7.2.59 | 50 mm dia | m | 120 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.7.2.60 | 75 mm dia | m | 1183 | | |
| | | | | | |
| 7.7.2.61 | 63 mm dia | m | 18 | | |
| | | | | | |
| 7.7.2.62 | 50 mm dia | m | 180 | | |
| | | | | | |
| 7.7.2.63 | 40 mm dia | m | 120 | | |
| | | | | | |
| 7.7.2.64 | 32 mm dia | m | 80 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 7.7.2.65 | 25 mm dia | m | 360 | | |
| | | | | | |
| 7.7.2.66 | 20 mm dia | m | 388 | | |
| | | | | | |
| | SM7-F8b-1 | | | | |
| | | | | | |
| | Class PN8 | | | | |

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|----------|---------------------|---|-----|--|--|
| 7.7.2.67 | 25 mm dia | m | 20 | | |
| | Class PN10 | | | | |
| 7.7.2.68 | 20 mm dia | m | 444 | | |
| | SM7-F8b-2 | | | | |
| | Class PN10 | | | | |
| 7.7.2.69 | 50 mm dia | m | 520 | | |
| 7.7.2.70 | 40 mm dia | m | 260 | | |
| 7.7.2.71 | 32 mm dia | m | 360 | | |
| 7.7.2.72 | 25 mm dia | m | 180 | | |
| | Class PN12.5 | | | | |
| 7.7.2.73 | 32 mm dia | m | 60 | | |
| 7.7.2.74 | 25 mm dia | m | 50 | | |
| | SM7-F8c | | | | |
| | Class PN8 | | | | |
| 7.7.2.75 | 32 mm dia | m | 260 | | |
| 7.7.2.76 | 25 mm dia | m | 148 | | |
| | SM7-F8d | | | | |
| | Class PN8 | | | | |
| 7.7.2.77 | 32 mm dia | m | 20 | | |
| 7.7.2.78 | 25 mm dia | m | 100 | | |
| 7.7.2.79 | 20 mm dia | m | 57 | | |
| | SM7-F8e | | | | |
| | Class PN8 | | | | |

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|----------|---|---|-----|--|--|
| 7.7.2.80 | 40 mm dia | m | 320 | | |
| | | | | | |
| 7.7.2.81 | 32 mm dia | m | 20 | | |
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| 7.7.2.82 | 25 mm dia | m | 140 | | |
| | | | | | |
| 7.7.2.83 | 20 mm dia | m | 20 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.7.2.84 | 40 mm dia | m | 460 | | |
| | | | | | |
| 7.7.2.85 | 20 mm dia | m | 18 | | |
| | | | | | |
| | SM7-F8e-1, SM7-F8f, Pl. 79+2 & SM7-F9b | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.7.2.86 | 25 mm dia | m | 480 | | |
| | | | | | |
| 7.7.2.87 | 20 mm dia | m | 226 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.7.2.88 | 25 mm dia | m | 200 | | |
| | | | | | |
| 7.7.2.89 | 20 mm dia | m | 150 | | |
| | | | | | |
| | SM7-F9 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.7.2.90 | 63 mm dia | m | 780 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.7.2.91 | 63 mm dia | m | 194 | | |

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|-----------|-------------------|---|-----|--|--|
| | | | | | |
| 7.7.2.92 | 50 mm dia | m | 247 | | |
| | | | | | |
| 7.7.2.93 | 40 mm dia | m | 399 | | |
| | | | | | |
| 7.7.2.94 | 32 mm dia | m | 160 | | |
| | | | | | |
| 7.7.2.95 | 25 mm dia | m | 120 | | |
| | | | | | |
| 7.7.2.96 | 20 mm dia | m | 41 | | |
| | | | | | |
| | SM7-F9a | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.7.2.97 | 32 mm dia | m | 180 | | |
| | | | | | |
| 7.7.2.98 | 25 mm dia | m | 100 | | |
| | | | | | |
| 7.7.2.99 | 20 mm dia | m | 129 | | |
| | | | | | |
| | | | | | |
| | SM7-F9c | | | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.7.2.100 | 32 mm dia | m | 40 | | |
| | | | | | |
| 7.7.2.101 | 25 mm dia | m | 100 | | |
| | | | | | |
| 7.7.2.102 | 20 mm dia | m | 94 | | |
| | | | | | |
| | SM7-F10 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.7.2.103 | 40 mm dia | m | 21 | | |
| | | | | | |
| 7.7.2.104 | 32 mm dia | m | 120 | | |
| | | | | | |
| 7.7.2.105 | 25 mm dia | m | 240 | | |
| | | | | | |
| 7.7.2.106 | 20 mm dia | m | 181 | | |
| | | | | | |
| | SM7-F10a | | | | |
| | | | | | |
| | Class PN8 | | | | |

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|--------------|---|-----|-----|--|--|
| 7.7.2.107 | 25 mm dia | m | 60 | | |
| 7.7.2.108 | 20 mm dia | m | 146 | | |
| | SM7-F11 | | | | |
| | Class PN6 | | | | |
| 7.7.2.109 | 40 mm dia | m | 80 | | |
| 7.7.2.110 | 32 mm dia | m | 60 | | |
| 7.7.2.111 | 25 mm dia | m | 60 | | |
| | Class PN8 | | | | |
| 7.7.2.112 | 25 mm dia | m | 60 | | |
| 7.7.2.113 | 20 mm dia | m | 104 | | |
| 7.7.3 | Upvc Pipe Fittings | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Tees | | | | |
| | SM7-F1 & SM7-F1a | | | | |
| 7.7.3.1 | 40 x 25 mm dia | No. | 1 | | |
| 7.7.3.2 | 32 x 20 mm dia | No. | 1 | | |
| | Sub-Total Carried Forward To Next Page | | | | |
| | Sub-Total Brought Forward From Previous Page | | | | |
| 7.7.3.3 | 25 x 20 mm dia | No. | 5 | | |
| 7.7.3.4 | 20 x 20 mm dia | No. | 4 | | |

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|----------|---|-----|----|--|--|
| | SM7-F3 | | | | |
| 7.7.3.4 | 50 x 20 mm dia | No. | 16 | | |
| 7.7.3.5 | 40 x 20 mm dia | No. | 6 | | |
| 7.7.3.6 | 32 x 20 mm dia | No. | 6 | | |
| 7.7.3.7 | 25 x 20 mm dia | No. | 1 | | |
| 7.7.3.8 | 20 x 20 mm dia | No. | 2 | | |
| | SM7-F5 & SM7-F5a | | | | |
| 7.7.3.9 | 63 x 20 mm dia | No. | 12 | | |
| 7.7.3.10 | 63 x 32 mm dia | No. | 1 | | |
| 7.7.3.11 | 50 x 20 mm dia | No. | 10 | | |
| 7.7.3.12 | 40 x 20 mm dia | No. | 6 | | |
| 7.7.3.13 | 32 x 20 mm dia | No. | 5 | | |
| 7.7.3.14 | 25 x 20 mm dia | No. | 3 | | |
| 7.7.3.15 | 20 x 20 mm dia | No. | 4 | | |
| | SM7-F6, SM7-F6a, SM7-F6a-1 & SM7-F6b | | | | |
| 7.7.3.16 | 75 x 20 mm dia | No. | 27 | | |
| 7.7.3.17 | 75 x 40 mm dia | No. | 1 | | |
| 7.7.3.18 | 63 x 20 mm dia | No. | 8 | | |
| 7.7.3.19 | 50 x 20 mm dia | No. | 3 | | |
| 7.7.3.20 | 50 x 32 mm dia | No. | 1 | | |
| 7.7.3.21 | 40 x 20 mm dia | No. | 13 | | |
| 7.7.3.22 | 40 x 25 mm dia | No. | 1 | | |
| 7.7.3.23 | 32 x 20 mm dia | No. | 10 | | |

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| 7.7.3.24 | 25 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.7.3.25 | 20 x 20 mm dia | No. | 7 | | |
| | | | | | |
| | SM7-F7, SM7-F7a & SM7-F7a-1 | | | | |
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| 7.7.3.26 | 50 x 20 mm dia | No. | 6 | | |
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| | Sub-Total Carried Forward To Next Page | | | | |
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| | Sub-Total Brought Forward From Previous Page | | | | |
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| 7.7.3.27 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.28 | 40 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.7.3.29 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.30 | 32 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.7.3.31 | 25 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.7.3.32 | 20 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | SM7-F8, SM7-F8a, SM7-F8b & SM7-F8b-1 | | | | |
| | | | | | |
| 7.7.3.33 | 90 x 75 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.34 | 90 x 20 mm dia | No. | 22 | | |
| | | | | | |
| 7.7.3.35 | 90 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.36 | 75 x 20 mm dia | No. | 18 | | |
| | | | | | |
| 7.7.3.37 | 75 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.38 | 75 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.39 | 63 x 20 mm dia | No. | 3 | | |
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| 7.7.3.40 | 63 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.41 | 63 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.42 | 50 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.7.3.43 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.44 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.7.3.45 | 32 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.7.3.46 | 25 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.7.3.47 | 20 x 20 mm dia | No. | 7 | | |
| | | | | | |
| | SM7-F8b-2, SM7-F8c, SM7-F8c & SM7-F8d, SM7-F8e, SM7-F8e-1 & SM7-F8f | | | | |
| | | | | | |
| 7.7.3.48 | 63 x 20 mm dia | No. | | | |
| | | | | | |
| 7.7.3.49 | 50 x 20 mm dia | No. | 12 | | |
| | | | | | |
| 7.7.3.50 | 40 x 20 mm dia | No. | 21 | | |
| | | | | | |
| 7.7.3.51 | 32 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.7.3.52 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| | | | | | |
| 7.7.3.53 | 25 x 20 mm dia | No. | 13 | | |
| | | | | | |
| 7.7.3.54 | 20 x 20 mm dia | No. | 15 | | |
| | | | | | |
| | SM7-F9, Pl. 79+2, SM7-F9a, SM7-F9b & SM7-F9c | | | | |
| | | | | | |
| 7.7.3.55 | 63 x 20 mm dia | No. | 25 | | |
| | | | | | |
| 7.7.3.56 | 63 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.57 | 63 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.58 | 50 x 20 mm dia | No. | 5 | | |

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|----------|-------------------------------|-----|---|--|--|
| | | | | | |
| 7.7.3.59 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.60 | 40 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.7.3.61 | 32 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.7.3.62 | 25 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.7.3.63 | 20 x 20 mm dia | No. | 9 | | |
| | | | | | |
| | SM7-F10 & SM7-F10a | | | | |
| | | | | | |
| 7.7.3.64 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.65 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.7.3.66 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.67 | 20 x 20 mm dia | No. | 4 | | |
| | | | | | |
| | SM7-F11 | | | | |
| | | | | | |
| 7.7.3.68 | 40 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.7.3.69 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.7.3.70 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.71 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM7-F1 & SM7-F1a | | | | |
| | | | | | |
| 7.7.3.72 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.73 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.74 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | SM7-F3 | | | | |
| | | | | | |
| 7.7.3.75 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |

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|----------|--|-----|---|--|--|
| 7.7.3.76 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.77 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.78 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM7-F5 & SM7-F5a | | | | |
| | | | | | |
| 7.7.3.79 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.80 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.81 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.82 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.83 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM7-F6 | | | | |
| | | | | | |
| 7.7.3.84 | 75 x 63 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.85 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.86 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.87 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.88 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| | SM7-F6a & SM7-F6a-1 & SM7-F6b | | | | |
| | | | | | |
| 7.7.3.89 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.90 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.91 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | SM7-F7, SM7-F7a & SM7-F7a-1 | | | | |
| | | | | | |
| 7.7.3.92 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.93 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.94 | 32 x 25 mm dia | No. | 2 | | |

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|-----------|--|-----|---|--|--|
| 7.7.3.95 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | SM7-F8 & SM7-F8a | | | | |
| | | | | | |
| 7.7.3.96 | 90 x 63 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.97 | 63 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.98 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.99 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.100 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM7-F8b, SM7-F8b-1, SM7-F8b-2, SM7-F8c, SM7-F8d, SM7-F8e, SM7-F8e-1 & SM7-F8f | | | | |
| | | | | | |
| 7.7.3.101 | 75 x 63 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.102 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.103 | 50 x 40 mm dia | No. | 2 | | |
| | | | | | |
| 7.7.3.104 | 40 x 32 mm dia | No. | 4 | | |
| | | | | | |
| 7.7.3.105 | 32 x 25 mm dia | No. | 6 | | |
| | | | | | |
| 7.7.3.106 | 25 x 20 mm dia | No. | 8 | | |
| | | | | | |
| | SM7-F9, SM7-F9a, SM7-F9b, SM7-F9c & Pl.79+2 | | | | |
| | | | | | |
| 7.7.3.107 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.108 | 50x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.109 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.110 | 32 x 25 mm dia | No. | 3 | | |
| | | | | | |
| 7.7.3.111 | 25 x 20 mm dia | No. | 5 | | |
| | | | | | |
| | SM7-F10 & SM7-F10a | | | | |
| | | | | | |

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|--------------|--|-----|---|--|--|
| 7.7.3.112 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.113 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.114 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM7-F11 | | | | |
| | | | | | |
| 7.7.3.115 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.116 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.3.117 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.7.4 | BENDS (PROVISIONAL) | | | | |
| | | | | | |
| | 11.25 degrees | | | | |
| | | | | | |
| 7.7.4.1 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 22.5 degrees | | | | |
| | | | | | |
| 7.7.4.2 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 45 degrees | | | | |
| | | | | | |
| 7.7.4.3 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| | 90 degrees | | | | |
| | | | | | |
| 7.7.4.4 | 90 mm diameter | No. | 2 | | |
| | | | | | |
| 7.7.5 | WASHOUT (W/O) | | | | |
| | | | | | |
| 7.7.5.1 | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | | | | | |
| | 1 No. Washout Fittings for SM7-F8b at chainage 0+800 m. | | | | |
| | | | | | |
| 7.7.5.2 | 75 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 7.7.5.3 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.7.5.4 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| 7.7.5.5 | 65 mm dia threaded GI union | No. | 4 | | |
| 7.7.5.6 | 25 mm dia threaded GI pipe, 0.5m long | No. | 1 | | |
| 7.7.5.7 | 25 mm dia threaded GI union | No. | 2 | | |
| 7.7.5.8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 7.7.5.9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 7.7.5.10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| 7.7.6 | AIR VALVES | | | | |
| 7.7.6.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 5 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM7-F8 at chainage 1+720 m. | | | | |
| 7.7.6.2 | 63 x 50 mm dia UPVC/G.I Adaptor | No. | 2 | | |
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| | Sub-Total Brought Forward From Previous Page | | | | |
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| 7.7.6.3 | 50 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.7.6.4 | 50 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 7.7.6.5 | 50 mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.7.6.6 | 25 mm dia threaded GI pipe, 0.5m long | No. | 1 | | |
| | | | | | |
| 7.7.6.7 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 7.7.6.8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.7.6.9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.7.6.10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM7-F8 at chainage 0+360 m. | | | | |
| | | | | | |
| 7.7.6.11 | 80/90 mm dia stepped coupling | No. | 2 | | |
| | | | | | |
| 7.7.6.12 | 80 mm dia single flanged steel pipe 500 mm long | No. | 2 | | |
| | | | | | |
| 7.7.6.13 | 80 mm x 50 mm dia All flanged steel tee | No. | 1 | | |
| | | | | | |
| 7.7.6.14 | 50 mm flanged sluice valve | No. | 1 | | |
| | | | | | |
| 7.7.6.15 | 50 mm dia double flanged steel pipe 500 mm long | No. | 1 | | |
| | | | | | |
| 7.7.6.16 | 50 mm Double air valve | No. | 1 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM7-F8a at chainage 0+320 m. | | | | |
| | | | | | |

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|----------|--|-----|---|--|--|
| 7.7.6.17 | 32/25 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 7.7.6.18 | 25 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.7.6.19 | 25 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 7.7.6.20 | 25mm dia threaded GI union | No. | 6 | | |
| | | | | | |
| 7.7.6.21 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 7.7.6.22 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.7.6.23 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.7.6.24 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | 2 No. Double Air Valve (DAV) Fittings for SM7-F8b at chainage 1+000 m and chainage 1+760 m. | | | | |
| | | | | | |
| 7.7.6.25 | 75 x 65 mm dia UPVC/G.I Adaptor | No. | 4 | | |
| | | | | | |
| 7.7.6.26 | 65 mm dia, 0.5m long threaded GI spigot | No. | 4 | | |
| | | | | | |
| 7.7.6.27 | 65 x 25 mm dia threaded GI tee | No. | 4 | | |
| | | | | | |
| | | | | | |
| 7.7.6.28 | 65mm dia threaded GI union | No. | 8 | | |
| | | | | | |
| 7.7.6.29 | 25 mm dia threaded GI pipe, 0.4m long | No. | 2 | | |
| | | | | | |
| 7.7.6.30 | 25 mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.7.6.31 | 25 mm dia threaded GI nipple | No. | 2 | | |
| | | | | | |
| 7.7.6.32 | 25 mm dia threaded Double Air Valve | No. | 2 | | |
| | | | | | |
| 7.7.6.33 | 25 mm dia threaded gate Valve | No. | 2 | | |
| | | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

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| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
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| Bill No.7.8: SM 8 FEEDERS | | | | | |
|----------------------------------|--|----------------|-----------------|-----------------------|---------------------|
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.8.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 7.8.1.1 | Excavation and Backfilling in normal soil for SM8-F1 to a depth n.e 1.5 m. | m ³ | 125.8 | | |
| | | | | | |
| 7.8.1.2 | Ditto for SM8-F2. | m ³ | 38.2 | | |
| | | | | | |
| 7.8.1.3 | Ditto for SM8-F3. | m ³ | 187.5 | | |
| | | | | | |
| 7.8.1.4 | Ditto for SM8-F4. | m ³ | 374.4 | | |
| | | | | | |
| 7.8.1.5 | Ditto for SM8-F4a. | m ³ | 108.4 | | |
| | | | | | |
| 7.8.1.6 | Ditto for Pl. 1006+1. | m ³ | 24.8 | | |
| | | | | | |
| 7.8.1.7 | Ditto for SM8-F5. | m ³ | 60.8 | | |

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|--------------|---|----------------|--------|--|--|
| 7.8.1.8 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 46.0 | | |
| 7.8.1.9 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 46.0 | | |
| 7.8.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | uPVC Straights | | | | |
| | SM8-F1 | | | | |
| | Class PN6 | | | | |
| 7.8.2.1 | 40 mm dia | m | 40.00 | | |
| 7.8.2.2 | 32 mm dia | m | 80.00 | | |
| 7.8.2.3 | 25 mm dia | m | 100.00 | | |
| 7.8.2.4 | 20 mm dia | m | 66.00 | | |
| | | | | | |
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|----------|-------------------|---|--------|--|--|
| | | | | | |
| | SM8-F2 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.8.2.5 | 20 mm dia | m | 91.00 | | |
| | | | | | |
| | SM8-F3 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.8.2.6 | 32 mm dia | m | 180.00 | | |
| | | | | | |
| 7.8.2.7 | 25 mm dia | m | 180.00 | | |
| | | | | | |
| 7.8.2.8 | 20 mm dia | m | 74.00 | | |
| | | | | | |
| | SM8-F4 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.8.2.9 | 40 mm dia | m | 130.00 | | |
| | | | | | |
| 7.8.2.10 | 32 mm dia | m | 60.00 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.8.2.11 | 25 mm dia | m | 71.00 | | |
| | | | | | |
| 7.8.2.12 | 20 mm dia | m | 74.00 | | |
| | | | | | |
| | SM8-F4a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.8.2.13 | 32 mm dia | m | 125.00 | | |
| | | | | | |
| 7.8.2.14 | 25 mm dia | m | 80.00 | | |
| | | | | | |
| 7.8.2.15 | 20 mm dia | m | 11.00 | | |
| | | | | | |
| | Pl. 1006+1 | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

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|--------------|---|-----|-------|--|--|
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.8.2.1 6 | 20 mm dia | m | 59.00 | | |
| | | | | | |
| | SM8-F5 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.8.2.1 7 | 25 mm dia | m | 94.00 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.8.2.1 8 | 25 mm dia | m | 27.00 | | |
| | | | | | |
| 7.8.2.1 9 | 20 mm dia | m | 23.00 | | |
| | | | | | |
| | | | | | |
| 7.8.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM8-F1, SM8-F2 &SM8-F3 | | | | |
| | | | | | |
| 7.8.3.1 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.8.3.2 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.8.3.3 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM8-F4, SM8-F4a, Pl. 1006+1 & SM8-F5 | | | | |
| | | | | | |
| 7.8.3.4 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.8.3.5 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.8.3.6 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | PVC-U Tees | | | | |
| | | | | | |

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|----------|--|-----|---|--|--|
| | SM8-F1, SM8-F2, SM8-F3 | | | | |
| 7.8.3.7 | 40 x 20 mm dia | No. | 3 | | |
| 7.8.3.8 | 32 x 20 mm dia | No. | 4 | | |
| 7.8.3.9 | 25 x 20 mm dia | No. | 6 | | |
| 7.8.3.10 | 20 x 20 mm dia | No. | 5 | | |
| | SM8-F4 | | | | |
| 7.8.3.11 | 40 x 20 mm dia | No. | 8 | | |
| 7.8.3.12 | 40 x 32 mm dia | No. | 1 | | |
| 7.8.3.13 | 32 x 20 mm dia | No. | 4 | | |
| 7.8.3.14 | 25 x 20 mm dia | No. | 2 | | |
| 7.8.3.15 | 20 x 20 mm dia | No. | 2 | | |
| | SM8-F4a, Pl. 1006+1 & SM8-F5 | | | | |
| 7.8.3.16 | 32 x 20 mm dia | No. | 1 | | |
| 7.8.3.17 | 25 x 20 mm dia | No. | 6 | | |
| 7.8.3.18 | 20 x 20 mm dia | No. | 6 | | |
| | | | | | |
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| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
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| Bill No.7.9: SM 9 FEEDERS | | | | | |
|----------------------------------|--|----------------|-----------------|-------------------|---------------------|
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| 7.9.1 | Excavation and Backfilling | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| 7.9.1.1 | Excavation and Backfilling in normal soil for SM9-F1 to a depth n.e 1.5 m. | m ³ | 1,131.3 | | |
| 7.9.1.2 | Ditto for SM8-F1a. | m ³ | 127.9 | | |
| 7.9.1.3 | Ditto for SM9-F1b. | m ³ | 69.1 | | |
| 7.9.1.4 | Ditto for SM9-Fc. | m ³ | 101.1 | | |
| 7.9.1.5 | Ditto for SM9-F2. | m ³ | 802.4 | | |
| 7.9.1.6 | Ditto for SM9-F2a. | m ³ | 46.3 | | |
| 7.9.1.7 | Ditto for SM9-F2b. | m ³ | 77.0 | | |
| 7.9.1.8 | Ditto for SM9-F2c. | m ³ | 136.0 | | |
| 7.9.1.9 | Ditto for SM9-F3. | m ³ | 630.5 | | |

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| | | | | | |
| 7.9.1 .10 | Ditto for SM9-F3a. | m ³ | 82.5 | | |
| 7.9.1 .11 | Ditto for SM9-F3b. | m ³ | 114.8 | | |
| 7.9.1 .12 | Ditto for SM9-F4. | m ³ | 645.8 | | |
| 7.9.1 .13 | Ditto for SM9-F4a. | m ³ | 51.4 | | |
| 7.9.1 .14 | Ditto for Pl. 381+1. | m ³ | 83.2 | | |
| 7.9.1 .15 | Ditto for Pl. 1497+3. | m ³ | 68.0 | | |
| 7.9.1 .16 | Ditto for SM9-F5. | m ³ | 384.6 | | |
| 7.9.1 .17 | Ditto for SM9-F6. | m ³ | 46.8 | | |
| 7.9.1 .18 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 229.9 | | |
| 7.9.1 .19 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 229.9 | | |
| 7.9.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 | m | | | |

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|-------------|-----------------------|---|-----|--|--|
| | 60 | | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM9-F1 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .1 | 50 mm dia | m | 940 | | |
| | | | | | |
| 7.9.2 .2 | 40 mm dia | m | 560 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.9.2 .3 | 40 mm dia | m | 125 | | |
| | | | | | |
| 7.9.2 .4 | 32 mm dia | m | 167 | | |
| | | | | | |
| 7.9.2 .5 | 25 mm dia | m | 550 | | |
| | | | | | |
| 7.9.2 .6 | 20 mm dia | m | 174 | | |
| | | | | | |
| | SM9-F1a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .7 | 25 mm dia | m | 140 | | |
| | | | | | |
| 7.9.2 .8 | 20 mm dia | m | 161 | | |
| | | | | | |
| | SM9-F1b | | | | |
| | | | | | |
| | Class PN6 | | | | |

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|--------------|------------------|---|-----|--|--|
| | | | | | |
| 7.9.2 .9 | 32 mm dia | m | 30 | | |
| | | | | | |
| 7.9.2 .10 | 25 mm dia | m | 71 | | |
| | | | | | |
| 7.9.2 .11 | 20 mm dia | m | 60 | | |
| | | | | | |
| | SM9-F1c | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.9.2 .12 | 32 mm dia | m | 80 | | |
| | | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .13 | 32 mm dia | m | 50 | | |
| | | | | | |
| 7.9.2 .14 | 25 mm dia | m | 51 | | |
| | | | | | |
| 7.9.2 .15 | 20 mm dia | m | 54 | | |
| | | | | | |
| | SM9-F2 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .16 | 63 mm dia | m | 863 | | |
| | | | | | |
| 7.9.2 .17 | 50 mm dia | m | 277 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.9.2 .18 | 50 mm dia | m | 43 | | |
| | | | | | |
| 7.9.2 .19 | 40 mm dia | m | 417 | | |
| | | | | | |
| 7.9.2 | 32 mm dia | m | | | |

| | | | | | |
|--------------|------------------|---|-----|--|--|
| .20 | | | 80 | | |
| | | | | | |
| 7.9.2 .21 | 25 mm dia | m | 20 | | |
| | | | | | |
| 7.9.2 .22 | 20 mm dia | m | 33 | | |
| | | | | | |
| | SM9-F2a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .23 | 25 mm dia | m | 80 | | |
| | | | | | |
| 7.9.2 .24 | 20 mm dia | m | 29 | | |
| | | | | | |
| | SM9-F2b | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .25 | 40 mm dia | m | 40 | | |
| | | | | | |
| 7.9.2 .26 | 32 mm dia | m | 80 | | |
| | | | | | |
| 7.9.2 .27 | 25 mm dia | m | 20 | | |
| | | | | | |
| 7.9.2 .28 | 20 mm dia | m | 35 | | |
| | | | | | |
| | SM9-F2c | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.9.2 .29 | 25 mm dia | m | 240 | | |
| | | | | | |
| 7.9.2 .30 | 20 mm dia | m | 80 | | |
| | | | | | |
| | SM9-F3 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |

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|--------------|------------------|---|-----|--|--|
| 7.9.2 .31 | 50 mm dia | m | 947 | | |
| 7.9.2 .32 | 40 mm dia | m | 94 | | |
| 7.9.2 .33 | 32 mm dia | m | 74 | | |
| 7.9.2 .34 | 25 mm dia | m | 60 | | |
| | Class PN8 | | | | |
| 7.9.2 .35 | 40 mm dia | m | 87 | | |
| 7.9.2 .36 | 32 mm dia | m | 74 | | |
| 7.9.2 .37 | 20 mm dia | m | 81 | | |
| | SM9-F3a | | | | |
| | Class PN6 | | | | |
| 7.9.2 .38 | 25 mm dia | m | 120 | | |
| 7.9.2 .39 | 20 mm dia | m | 74 | | |
| | SM9-F3b | | | | |
| | Class PN6 | | | | |
| 7.9.2 .40 | 40 mm dia | m | 29 | | |
| 7.9.2 .41 | 32 mm dia | m | 81 | | |
| 7.9.2 .42 | 25 mm dia | m | 111 | | |
| 7.9.2 .43 | 20 mm dia | m | 41 | | |

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|--------------|-------------------|---|-----|--|--|
| | | | | | |
| | SM9-F4 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .44 | 50 mm dia | m | 631 | | |
| | | | | | |
| 7.9.2 .45 | 40 mm dia | m | 330 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.9.2 .46 | 40 mm dia | m | 180 | | |
| | | | | | |
| 7.9.2 .47 | 32 mm dia | m | 109 | | |
| | | | | | |
| 7.9.2 .48 | 25 mm dia | m | 151 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.9.2 .49 | 20 mm dia | m | 15 | | |
| | | | | | |
| | SM9-F4a | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .50 | 32 mm dia | m | 51 | | |
| | | | | | |
| 7.9.2 .51 | 25 mm dia | m | 31 | | |
| | | | | | |
| 7.9.2 .52 | 20 mm dia | m | 39 | | |
| | | | | | |
| | Pl. 381+1 | | | | |
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .53 | 20 mm dia | m | 198 | | |
| | | | | | |
| | Pl. 1497+3 | | | | |

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|--------------|--|---|-----|--|--|
| | | | | | |
| | Class PN6 | | | | |
| | | | | | |
| 7.9.2 .54 | 25 mm dia | m | 120 | | |
| | | | | | |
| 7.9.2 .55 | 20 mm dia | m | 20 | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.9.2 .56 | 20 mm dia | m | 20 | | |
| | | | | | |
| | SM9-F5 | | | | |
| | | | | | |
| | Class PN8 | | | | |
| | | | | | |
| 7.9.2 .57 | 40 mm dia | m | 360 | | |
| | | | | | |
| 7.9.2 .58 | 32 mm dia | m | 80 | | |
| | | | | | |
| | Class PN10 | | | | |
| | | | | | |
| 7.9.2 .59 | 32 mm dia | m | 320 | | |
| | | | | | |
| 7.9.2 .60 | 25 mm dia | m | 80 | | |
| | | | | | |
| 7.9.2 .61 | 20 mm dia | m | 34 | | |
| | | | | | |
| | SM9-F6 | | | | |
| | | | | | |
| 7.9.2 .62 | 25 mm dia PN8 | m | 80 | | |
| | | | | | |
| 7.9.2 .63 | 20 mm dia PN10 | m | 30 | | |
| | | | | | |
| 7.9.3 | Upvc Pipe Fittings | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |

| | | | | | |
|--------------|---|-----|---|--|--|
| | | | | | |
| | SM9-F1, SM9-F1a, SM9-F1b & SM9-F1c | | | | |
| | | | | | |
| 7.9.3 .1 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .2 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .3 | 32 x 25 mm dia | No. | 3 | | |
| | | | | | |
| 7.9.3 .4 | 25 x 20 mm dia | No. | 4 | | |
| | | | | | |
| | SM9-F2, SM9-F2a, SM9-F2b & SM9-F2c | | | | |
| | | | | | |
| 7.9.3 .5 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .6 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .7 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.9.3 .8 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.9.3 .9 | 25 x 20 mm dia | No. | 4 | | |
| | | | | | |
| | SM9-F3, SM9-F3a & SM9-F3b | | | | |
| | | | | | |
| 7.9.3 .10 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .11 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.9.3 .12 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.9.3 .13 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|----|--|--|
| | SM9-F4, SM9-F4a, Pl. 381+1 & Pl. 1497+3 | | | | |
| 7.9.3 .14 | 50 x 40 mm dia | No. | 1 | | |
| 7.9.3 .15 | 40 x 32 mm dia | No. | 1 | | |
| 7.9.3 .16 | 32 x 25 mm dia | No. | 2 | | |
| 7.9.3 .17 | 25 x 20 mm dia | No. | 3 | | |
| | SM9-F5 & SM9-F6 | | | | |
| 7.9.3 .18 | 40 x 32 mm dia | No. | 1 | | |
| 7.9.3 .19 | 32 x 25 mm dia | No. | 1 | | |
| 7.9.3 .20 | 25 x 20 mm dia | No. | 2 | | |
| | PVC-U Tees | | | | |
| | SM9-F1, SM9-F1a, SM9-F1b & SM9-F1c | | | | |
| 7.9.3 .21 | 50 x 20 mm dia | No. | 10 | | |
| 7.9.3 .22 | 50 x 25 mm dia | No. | 1 | | |
| 7.9.3 .23 | 40 x 20 mm dia | No. | 2 | | |
| 7.9.3 .24 | 40 x 32 mm dia | No. | 2 | | |
| 7.9.3 .25 | 32 x 20 mm dia | No. | 3 | | |
| 7.9.3 | 25 x 20 mm dia | No. | 3 | | |

| | | | | | |
|--------------|---|-----|----|--|--|
| .26 | | | | | |
| 7.9.3 .27 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM9-F2, SM9-F2a, SM9-F2b & SM9-F2c | | | | |
| | | | | | |
| 7.9.3 .28 | 63 x 20 mm dia | No. | 23 | | |
| | | | | | |
| 7.9.3 .29 | 63 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .30 | 63 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .31 | 50 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.9.3 .32 | 50 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .33 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.9.3 .34 | 32 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.9.3 .35 | 25 x 20 mm dia | No. | 12 | | |
| | | | | | |
| 7.9.3 .36 | 20 x 20 mm dia | No. | 9 | | |
| | | | | | |
| | SM9-F3, SM9-F3a & SM9-F3b | | | | |
| | | | | | |
| 7.9.3 .37 | 50 x 20 mm dia | No. | 23 | | |
| | | | | | |
| 7.9.3 .38 | 50 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .39 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .40 | 40 x 20 mm dia | No. | 5 | | |

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|--------------|---|-----|----|--|--|
| | | | | | |
| 7.9.3 .41 | 32 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.9.3 .42 | 25 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.9.3 .43 | 20 x 20 mm dia | No. | 5 | | |
| | | | | | |
| | SM9-F4, SM9-F4a, Pl. 381+1, Pl. 1497+3 | | | | |
| | | | | | |
| 7.9.3 .44 | 50 x 20 mm dia | No. | 7 | | |
| | | | | | |
| | | | | | |
| 7.9.3 .45 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.9.3 .46 | 40 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.9.3 .47 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.9.3 .48 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.9.3 .49 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM9-F5 & SM9-F6 | | | | |
| | | | | | |
| 7.9.3 .50 | 40 x 20 mm dia | No. | 10 | | |
| | | | | | |
| 7.9.3 .51 | 32 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.9.3 .52 | 25 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.9.3 .53 | 20 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.9.4 | AIR VALVES | | | | |
| | | | | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| 7.9.4 .1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM9-F1 at chainage 1+120 m. | | | | |
| | | | | | |
| 7.9.4 .2 | 40 x 40 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 7.9.4 .3 | 40 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.9.4 .4 | 40 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 7.9.4 .5 | 40 mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.9.4 .6 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 7.9.4 .7 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 7.9.4 .8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.9.4 .9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.9.4 .10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM9-F2 at chainage 0+900 m. | | | | |
| | | | | | |
| 7.9.4 .11 | 50/50 PVC-U/GI Adaptor | No. | 2 | | |
| | | | | | |

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|--------------|--|-----|---|--|--|
| 7.9.4 .12 | 50 mm dia x 500 mm threaded GI pipe | No. | 2 | | |
| 7.9.4 .13 | 50 mm x 25 mm dia steel tee | No. | 1 | | |
| 7.9.4 .14 | 50 mm dia Nipple | No. | 2 | | |
| 7.9.4 .15 | 50 mm dia Gate valve | No. | 1 | | |
| 7.9.4 .16 | 50 mm dia Union | No. | 1 | | |
| 7.9.4 .17 | 25 mm dia Nipple | No. | 1 | | |
| 7.9.4 .18 | 25 mm dia Gate valve | No. | 1 | | |
| 7.9.4 .19 | 25 mm dia Union | No. | 1 | | |
| 7.9.4 .20 | 25 mm dia x 500 mm threaded GI pipe | No. | 1 | | |
| 7.9.4 .21 | 32/25 PVC-U/GI Adaptor | No. | 1 | | |
| | 1 No. Double Air Valve (DAV) Fittings for SM9-F5 at chainage 0+440 m. | | | | |
| 7.9.4 .22 | 32/25 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| 7.9.4 .23 | 25 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.9.4 .24 | 25 x 25 mm dia threaded GI tee | No. | 2 | | |
| 7.9.4 .25 | 25mm dia threaded GI union | No. | 6 | | |
| 7.9.4 .26 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| | | | | | |
| 7.9.4 .27 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.9.4 .28 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.9.4 .29 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

| Bill No.7.10: SM 10 FEEDERS | | | | | |
|------------------------------------|--|----------------|----------------------|-----------------------|--------------------------|
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTIT Y | RATE (KSh) | AMOUN T (KSh) |
| | | | | | |
| | | | | | |
| 7.10.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing selected bedding and surround materials from the excavations in accordance with the specifications | | | | |
| | | | | | |
| 7.10.1.1 | Excavation and Backfilling in normal soil for SM10-F1 to a depth n.e 1.5 m. | m ³ | 765.0 | | |
| | | | | | |
| 7.10.1.2 | Ditto for SM10-F1a. | m ³ | 211.7 | | |
| | | | | | |
| 7.10.1.3 | Ditto for SM Pl.1713+2 | m ³ | 85.9 | | |
| | | | | | |
| 7.10.1.4 | Ditto for SM10-F2. | m ³ | 141.7 | | |
| | | | | | |

| | | | | | |
|---------------|---|----------------|-------|--|--|
| 7.10.1.5 | Ditto for SM10-F3. | m ³ | 537.1 | | |
| | | | | | |
| 7.10.1.6 | Ditto for SM10-F3a. | m ³ | 202.0 | | |
| | | | | | |
| 7.10.1.7 | Ditto for SM10-F3a-1. | m ³ | 109.7 | | |
| | | | | | |
| 7.10.1.8 | Ditto for Plot 968+2. | m ³ | 56.5 | | |
| | | | | | |
| 7.10.1.9 | Ditto for SM10-F3b. | m ³ | 117.7 | | |
| | | | | | |
| 7.10.1.10 | Ditto for SM10-F4. | m ³ | 734.9 | | |
| | | | | | |
| 7.10.1.11 | E.O for excavating in soft rock (Provisional quantity) | m ³ | 148.1 | | |
| | | | | | |
| 7.10.1.12 | Ditto for excavating in hard rock (Provisional quantity) | m ³ | 148.1 | | |
| | | | | | |
| 7.10.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |

| | | | | | |
|-----------|---|---|-----|--|--|
| | | | | | |
| | SM10-F1 | | | | |
| | | | | | |
| 7.10.2.1 | 50 mm dia Class PN6 | m | 340 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | Sub-Total Carried Forward To Next Page | | | | |
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| | Sub-Total Brought Forward From Previous Page | | | | |
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| | | | | | |
| 7.10.2.2 | 40 mm dia Class PN6 | m | 40 | | |
| | | | | | |
| 7.10.2.3 | 32 mm dia Class PN6 | m | 225 | | |
| | | | | | |
| 7.10.2.4 | 25 mm dia Class PN6 | m | 50 | | |
| | | | | | |
| 7.10.2.5 | 20 mm dia Class PN6 | m | 10 | | |
| | | | | | |
| | SM10-F1a | | | | |
| | | | | | |
| 7.10.2.6 | 32 mm dia Class PN6 | m | 190 | | |
| | | | | | |
| 7.10.2.7 | 25 mm dia Class PN6 | m | 90 | | |
| | | | | | |
| 7.10.2.8 | 20 mm dia Class PN6 | m | 50 | | |
| | | | | | |
| | Plot 1713+2 | | | | |
| | | | | | |
| 7.10.2.9 | 25 mm dia Class PN6 | m | 90 | | |
| | | | | | |
| 7.10.2.10 | 20 mm dia Class PN6 | m | 50 | | |
| | | | | | |
| | SM10-F2 | | | | |
| | | | | | |
| 7.10.2.11 | 32 mm dia Class PN6 | m | 38 | | |
| | | | | | |
| 7.10.2.12 | 25 mm dia Class PN6 | m | 50 | | |
| | | | | | |

| | | | | | |
|---------------|---------------------|---|-----|--|--|
| 7.10.2.1 3 | 20 mm dia Class PN6 | m | 28 | | |
| | | | | | |
| | SM10-F3 | | | | |
| | | | | | |
| 7.10.2.1 4 | 63 mm dia Class PN6 | m | 660 | | |
| | | | | | |
| 7.10.2.1 5 | 63 mm dia Class PN8 | m | 200 | | |
| | | | | | |
| 7.10.2.1 6 | 50 mm dia Class PN8 | m | 60 | | |
| | | | | | |
| 7.10.2.1 7 | 40 mm dia Class PN8 | m | 70 | | |
| | | | | | |
| 7.10.2.1 8 | 32 mm dia Class PN8 | m | 90 | | |
| | | | | | |
| 7.10.2.1 9 | 25 mm dia Class PN8 | m | 60 | | |
| | | | | | |
| 7.10.2.2 0 | 20 mm dia Class PN8 | m | 10 | | |
| | | | | | |
| | SM10-F3a | | | | |
| | | | | | |
| 7.10.2.2 1 | 40 mm dia Class PN8 | m | 70 | | |
| | | | | | |
| 7.10.2.2 2 | 32 mm dia Class PN8 | m | 90 | | |
| | | | | | |
| 7.10.2.2 3 | 25 mm dia Class PN8 | m | 60 | | |
| | | | | | |
| 7.10.2.2 4 | 20 mm dia Class PN8 | m | 10 | | |
| | | | | | |
| | SM10-F3a-1 | | | | |
| | | | | | |
| 7.10.2.2 5 | 25 mm dia Class PN8 | m | 60 | | |
| | | | | | |
| 7.10.2.2 6 | 20 mm dia Class PN8 | m | 10 | | |
| | | | | | |

| | | | | | |
|---------------|---|-----|-----|--|--|
| | Plot 968+2 | | | | |
| 7.10.2.2 7 | 25 mm dia Class PN8 | m | 60 | | |
| 7.10.2.2 8 | 20 mm dia Class PN6 | m | 10 | | |
| | SM10-F3b | | | | |
| 7.10.2.2 9 | 25 mm dia Class PN8 | m | 60 | | |
| 7.10.2.3 0 | 20 mm dia Class PN8 | m | 10 | | |
| | SM10-F4 | | | | |
| 7.10.2.3 1 | 50 mm dia Class PN8 | m | 500 | | |
| 7.10.2.3 2 | 40 mm dia Class PN8 | m | 320 | | |
| 7.10.2.3 3 | 40 mm dia Class PN10 | m | 370 | | |
| 7.10.2.3 4 | 32 mm dia Class PN10 | m | 80 | | |
| 7.10.2.3 5 | 25 mm dia Class PN10 | m | 90 | | |
| 7.10.2.3 6 | 20 mm dia Class PN10 | m | 273 | | |
| 7.10.3 | Upvc Pipe Fittings | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Reducers | | | | |
| | SM10-F1, SM10-F1a & Pl. 1713+2 | | | | |
| 7.10.3.1 | 50 x 40 mm dia | No. | 1 | | |

| | | | | | |
|-----------|--|-----|---|--|--|
| 7.10.3.2 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.10.3.3 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.10.3.4 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | SM9-F2 | | | | |
| | | | | | |
| 7.10.3.5 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.10.3.6 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM10-F3, SM10-F3a, SM10-F3a-1 & Plot 968+2 & SM10-F3b | | | | |
| | | | | | |
| 7.10.3.7 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
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| | Sub-Total Carried Forward To Next Page | | | | |
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| | Sub-Total Brought Forward From Previous Page | | | | |
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| 7.10.3.8 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.10.3.9 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.10.3.10 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.10.3.11 | 25 x 20 mm dia | No. | 5 | | |
| | | | | | |
| | SM10-F4 | | | | |
| | | | | | |
| 7.10.3.12 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.10.3.13 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.10.3.14 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| 7.10.3.1 5 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | PVC-U Tees | | | | |
| | | | | | |
| | SM10-F1, SM10-F1a & Pl 1713+2 | | | | |
| | | | | | |
| 7.10.3.1 6 | 50 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.10.3.1 7 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.10.3.1 8 | 40 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.10.3.1 9 | 32 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.10.3.2 0 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.10.3.2 1 | 25 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.10.3.2 2 | 20 x 20 mm dia | No. | 6 | | |
| | | | | | |
| | SM10-F2 | | | | |
| | | | | | |
| 7.10.3.2 3 | 32 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.10.3.2 4 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.10.3.2 5 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM10-F3, SM10-F3a, SM10- F3a-1 & Plot 968+2 & SM10- F3b | | | | |
| | | | | | |
| 7.10.3.2 6 | 63 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.10.3.2 | 63 x 40 mm dia | No. | 1 | | |

| | | | | | |
|---------------|--|-----|----|--|--|
| 7 | | | | | |
| 7.10.3.2 8 | 50 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.10.3.2 9 | 50 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.10.3.3 0 | 40 x 20 mm dia | No. | 15 | | |
| | | | | | |
| 7.10.3.3 1 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| | | | | | |
| 7.10.3.3 2 | 32 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.10.3.3 3 | 25 x 20 mm dia | No. | 12 | | |
| | | | | | |
| 7.10.3.3 4 | 20 x 20 mm dia | No. | 10 | | |
| | | | | | |
| | SM9-F4 | | | | |
| | | | | | |
| 7.10.3.3 5 | 50 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.10.3.3 6 | 40 x 20 mm dia | No. | 14 | | |
| | | | | | |
| 7.10.3.3 7 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.10.3.3 8 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.10.3.3 9 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED FORWARD TO COLLECTION SHEET | | | | |
| | | | | | |

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|-----------------------------------|--|----------------|-----------------|-------------------|---------------------|
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| Bill Nr 7.11 SM 11 FEEDERS | | | | | |
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.11.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing bedding and surround materials | | | | |
| | | | | | |
| | Excavation and backfilling in trench normal material for SM11-F1 pipeine for depth not exceeding 1.5 m | m ³ | 1221 | | |
| | | | | | |
| 7.11.1.1 | Ditto for SM11-F1a | m ³ | 462 | | |
| | | | | | |
| 7.11.1.2 | Ditto for SM11-F1b | m ³ | 371 | | |
| | | | | | |
| 7.11.1.3 | Ditto for SM11-F1c | m ³ | 940 | | |
| | | | | | |
| 7.11.1.4 | Ditto for SM11-F1c-1 | m ³ | 229 | | |
| | | | | | |
| 7.11.1.5 | Ditto for SM11-F1c-2 | m ³ | 199 | | |
| | | | | | |
| 7.11.1.6 | Ditto for SM11-F1c-2a | m ³ | 134 | | |
| | | | | | |
| 7.11.1.7 | Ditto for SM11-F1c-3 | m ³ | 50 | | |
| | | | | | |
| 7.11.1.8 | Ditto for PL2153+2 | m ³ | 155 | | |
| | | | | | |
| 7.11.1.9 | Ditto for PL1636+2 | m ³ | 143 | | |
| | | | | | |
| 7.11.1.10 | Ditto for SM11-F1d | m ³ | 1199 | | |
| | | | | | |
| 7.11.1.11 | Ditto for SM11-F1d-1 | m ³ | 125 | | |
| | | | | | |
| 7.11.1.12 | Ditto for SM11-F1d-2 | m ³ | 151 | | |
| | | | | | |

| | | | | | |
|-----------|----------------------|----------------|------|--|--|
| 7.11.1.13 | Ditto for SM11-F1d-3 | m ³ | 88 | | |
| | | | | | |
| 7.11.1.14 | Ditto for SM11-F2 | m ³ | 938 | | |
| | | | | | |
| 7.11.1.15 | Ditto for SM11-F2a | m ³ | 119 | | |
| | | | | | |
| 7.11.1.16 | Ditto for SM11-F2b | m ³ | 123 | | |
| | | | | | |
| 7.11.1.17 | Ditto for SM11-F2c | m ³ | 172 | | |
| | | | | | |
| 7.11.1.18 | Ditto for SM11-F2d | m ³ | 166 | | |
| | | | | | |
| 7.11.1.19 | Ditto for SM11-F2e | m ³ | 133 | | |
| | | | | | |
| 7.11.1.20 | Ditto for SM11-F2f | m ³ | 176 | | |
| | | | | | |
| 7.11.1.21 | Ditto for SM11-F3 | m ³ | 104 | | |
| | | | | | |
| 7.11.1.22 | Ditto for SM11-F3a | m ³ | 75 | | |
| | | | | | |
| 7.11.1.23 | Ditto for SM11-F3b | m ³ | 87 | | |
| | | | | | |
| 7.11.1.24 | Ditto for SM11-F4 | m ³ | 646 | | |
| | | | | | |
| 7.11.1.25 | Ditto for SM11-F4a | m ³ | 494 | | |
| | | | | | |
| 7.11.1.26 | Ditto for PL2841+2 | m ³ | 49 | | |
| | | | | | |
| 7.11.1.27 | Ditto for SM11-F4b | m ³ | 160 | | |
| | | | | | |
| 7.11.1.28 | Ditto for SM11-F4b-1 | m ³ | 27 | | |
| | | | | | |
| 7.11.1.29 | Ditto for SM11-F4c | m ³ | 216 | | |
| | | | | | |
| 7.11.1.30 | Ditto for SM11-F5 | m ³ | 1017 | | |
| | | | | | |
| 7.11.1.31 | Ditto for SM11-F5a | m ³ | 389 | | |
| | | | | | |
| 7.11.1.32 | Ditto for SM11-F5a-1 | m ³ | 124 | | |
| | | | | | |
| 7.11.1.33 | Ditto for SM11-F5b | m ³ | 112 | | |
| | | | | | |
| 7.11.1.34 | Ditto for SM11-F5c | m ³ | 98 | | |
| | | | | | |
| 7.11.1.35 | Ditto for PL436+2 | m ³ | 256 | | |

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|---------------|---|----------------|-----|--|--|
| 7.11.1.36 | Ditto for SM11-F6 | m ³ | 396 | | |
| 7.11.1.37 | Ditto for SM11-F7 | m ³ | 192 | | |
| 7.11.1.38 | Ditto for SM11-F7a | m ³ | 45 | | |
| 7.11.1.39 | Ditto for SM11-F8 | m ³ | 586 | | |
| 7.11.1.40 | Ditto for SM11-F8a | m ³ | 105 | | |
| 7.11.1.41 | Ditto for SM11-F8a-1 | m ³ | 61 | | |
| 7.11.1.42 | Ditto for SM11-F9 | m ³ | 28 | | |
| 7.11.1.43 | Ditto for SM11-F10 | m ³ | 33 | | |
| 7.11.1.44 | E.O for excavation in soft rock (provisional) | m ³ | 629 | | |
| 7.11.1.45 | E.O for excavation in hard rock (provisional) | m ³ | 629 | | |
| 7.11.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly Materials, cutting wastage. | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | Class | | | | |
| | Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |

| | | | | | |
|-----------|-----------------------|---|------|--|--|
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM11-F1 | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.11.2.1 | 90 mm diameter | m | 670 | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.2 | 90 mm diameter | m | 420 | | |
| | | | | | |
| 7.11.2.3 | 75 mm diameter | m | 1150 | | |
| | | | | | |
| 7.11.2.4 | 32 mm diameter | m | 120 | | |
| | | | | | |
| 7.11.2.5 | 25 mm diameter | m | 30 | | |
| | | | | | |
| 7.11.2.6 | 20 mm diameter | m | 51 | | |
| | | | | | |
| | SM11-F1a | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.11.2.7 | 40 mm diameter | m | 600 | | |
| | | | | | |
| 7.11.2.8 | 32 mm diameter | m | 150 | | |
| | | | | | |
| 7.11.2.9 | 25 mm diameter | m | 60 | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.10 | 25 mm diameter | m | 20 | | |
| | | | | | |
| 7.11.2.11 | 20 mm diameter | m | 93 | | |
| | | | | | |
| | SM11-F1b | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.11.2.12 | 32 mm diameter | m | 620 | | |
| | | | | | |
| 7.11.2.13 | 25 mm diameter | m | 70 | | |

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|-----------|----------------------|---|-----|--|--|
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.14 | 25 mm diameter | m | 30 | | |
| | | | | | |
| 7.11.2.15 | 20 mm diameter | m | 22 | | |
| | | | | | |
| | SM11-F1c | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.16 | 50 mm diameter | m | 857 | | |
| | | | | | |
| 7.11.2.17 | 40 mm diameter | m | 294 | | |
| | | | | | |
| 7.11.2.18 | 32 mm diameter | m | 130 | | |
| | | | | | |
| 7.11.2.19 | 25 mm diameter | m | 150 | | |
| | | | | | |
| 7.11.2.20 | 20 mm diameter | m | 158 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.21 | 40 mm diameter | m | 290 | | |
| | | | | | |
| | SM11-F1c-1 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.22 | 25 mm diameter | m | 370 | | |
| | | | | | |
| 7.11.2.23 | 20 mm diameter | m | 88 | | |
| | | | | | |
| | SM11-F1c-2 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.24 | 40 mm diameter | m | 170 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.25 | 40 mm diameter | m | 30 | | |
| | | | | | |
| 7.11.2.26 | 25 mm diameter | m | 120 | | |
| | | | | | |
| 7.11.2.27 | 20 mm diameter | m | 77 | | |
| | | | | | |

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|-----------|----------------------|---|------|--|--|
| | SM11-F1c-2a | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.28 | 32 mm diameter | m | 190 | | |
| | | | | | |
| 7.11.2.29 | 25 mm diameter | m | 40 | | |
| | | | | | |
| 7.11.2.30 | 20 mm diameter | m | 38 | | |
| | | | | | |
| | SM11-F1c-3 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.31 | 20 mm diameter | m | 30 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.32 | 32 mm diameter | m | 40 | | |
| | | | | | |
| 7.11.2.33 | 25 mm diameter | m | 30 | | |
| | | | | | |
| | PL2153+2 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.34 | 25 mm diameter | m | 280 | | |
| | | | | | |
| 7.11.2.35 | 20 mm diameter | m | 29 | | |
| | | | | | |
| | PL1636+2 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.36 | 25 mm diameter | m | 140 | | |
| | | | | | |
| 7.11.2.37 | 20 mm diameter | m | 146 | | |
| | | | | | |
| | SM11-F1d | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.38 | 63 mm diameter | m | 1420 | | |
| | | | | | |
| 7.11.2.39 | 50 mm diameter | m | 102 | | |
| | | | | | |
| 7.11.2.40 | 40 mm diameter | m | 19 | | |

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|-----------|----------------------|---|-----|--|--|
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.41 | 63 mm diameter | m | 90 | | |
| | | | | | |
| 7.11.2.42 | 40 mm diameter | m | 450 | | |
| | | | | | |
| 7.11.2.43 | 32 mm diameter | m | 80 | | |
| | | | | | |
| 7.11.2.44 | 25 mm diameter | m | 80 | | |
| | | | | | |
| 7.11.2.45 | 20 mm diameter | m | 157 | | |
| | | | | | |
| | SM11-F1d-1 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.46 | 20 mm diameter | m | 120 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.47 | 20 mm diameter | m | 130 | | |
| | | | | | |
| | SM11-F1d-2 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.48 | 40 mm diameter | m | 110 | | |
| | | | | | |
| 7.11.2.49 | 32 mm diameter | m | 90 | | |
| | | | | | |
| 7.11.2.50 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.11.2.51 | 20 mm diameter | m | 41 | | |
| | | | | | |
| | | | | | |
| | SM11-F1d-3 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.52 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.11.2.53 | 20 mm diameter | m | 116 | | |
| | | | | | |
| | SM11-F2 | | | | |
| | | | | | |
| | Class PN 8 | | | | |

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|-----------|--------------------|---|-----|--|--|
| | | | | | |
| 7.11.2.54 | 63 mm diameter | m | 560 | | |
| | | | | | |
| 7.11.2.55 | 50 mm diameter | m | 50 | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.56 | 50 mm diameter | m | 617 | | |
| | | | | | |
| 7.11.2.57 | 40 mm diameter | m | 244 | | |
| | | | | | |
| 7.11.2.58 | 32 mm diameter | m | 260 | | |
| | | | | | |
| 7.11.2.59 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.11.2.60 | 20 mm diameter | m | 84 | | |
| | | | | | |
| | SM11-F2a | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.11.2.61 | 25 mm diameter | m | 100 | | |
| | | | | | |
| 7.11.2.62 | 20 mm diameter | m | 138 | | |
| | | | | | |
| | SM11-F2b | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.11.2.63 | 20 mm diameter | m | 246 | | |
| | | | | | |
| | SM11-F2c | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.11.2.64 | 40 mm diameter | m | 164 | | |
| | | | | | |
| 7.11.2.65 | 32 mm diameter | m | 87 | | |
| | | | | | |
| 7.11.2.66 | 25 mm diameter | m | 50 | | |
| | | | | | |
| 7.11.2.67 | 20 mm diameter | m | 42 | | |
| | | | | | |
| | SM11-F2d | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |

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|-----------|--------------------|---|-----|--|--|
| 7.11.2.68 | 25 mm diameter | m | 40 | | |
| | | | | | |
| 7.11.2.69 | 20 mm diameter | m | 292 | | |
| | | | | | |
| | SM11-F2e | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.70 | 20 mm diameter | m | 266 | | |
| | | | | | |
| | SM11-F2f | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.71 | 32 mm diameter | m | 230 | | |
| | | | | | |
| 7.11.2.72 | 25 mm diameter | m | 50 | | |
| | | | | | |
| 7.11.2.73 | 20 mm diameter | m | 72 | | |
| | | | | | |
| | SM11-F3 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.74 | 40 mm diameter | m | 147 | | |
| | | | | | |
| 7.11.2.75 | 32 mm diameter | m | 50 | | |
| | | | | | |
| 7.11.2.76 | 20 mm diameter | m | 11 | | |
| | | | | | |
| | SM11-F3a | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.77 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.11.2.78 | 20 mm diameter | m | 89 | | |
| | | | | | |
| | SM11-F3b | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.79 | 25 mm diameter | m | 80 | | |
| | | | | | |
| 7.11.2.80 | 20 mm diameter | m | 94 | | |
| | | | | | |
| | SM11-F4 | | | | |

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|-----------|----------------------|---|-----|--|--|
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.81 | 75 mm diameter | m | 22 | | |
| | | | | | |
| 7.11.2.82 | 63 mm diameter | m | 369 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.83 | 63 mm diameter | m | 230 | | |
| | | | | | |
| 7.11.2.84 | 50 mm diameter | m | 240 | | |
| | | | | | |
| 7.11.2.85 | 40 mm diameter | m | 210 | | |
| | | | | | |
| 7.11.2.86 | 32 mm diameter | m | 140 | | |
| | | | | | |
| 7.11.2.87 | 25 mm diameter | m | 40 | | |
| | | | | | |
| 7.11.2.88 | 20 mm diameter | m | 40 | | |
| | | | | | |
| | SM11-F4a | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.89 | 40 mm diameter | m | 780 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.90 | 40 mm diameter | m | 53 | | |
| | | | | | |
| 7.11.2.91 | 32 mm diameter | m | 18 | | |
| | | | | | |
| 7.11.2.92 | 25 mm diameter | m | 79 | | |
| | | | | | |
| 7.11.2.93 | 20 mm diameter | m | 57 | | |
| | | | | | |
| | PL2841+2 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.94 | 25 mm diameter | m | 10 | | |
| | | | | | |
| 7.11.2.95 | 20 mm diameter | m | 87 | | |
| | | | | | |
| | SM11-F4b | | | | |
| | | | | | |

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|------------|----------------------|---|-----|--|--|
| | Class PN 12.5 | | | | |
| 7.11.2.96 | 32 mm diameter | m | 270 | | |
| | | | | | |
| 7.11.2.97 | 20 mm diameter | m | 50 | | |
| | | | | | |
| | SM11-F4b-1 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.98 | 25 mm diameter | m | 10 | | |
| | | | | | |
| 7.11.2.99 | 20 mm diameter | m | 43 | | |
| | | | | | |
| | | | | | |
| | SM11-F4c | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.100 | 32 mm diameter | m | 220 | | |
| | | | | | |
| 7.11.2.101 | 25 mm diameter | m | 180 | | |
| | | | | | |
| 7.11.2.102 | 20 mm diameter | m | 32 | | |
| | | | | | |
| | SM11-F5 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.103 | 63 mm diameter | m | 10 | | |
| | | | | | |
| 7.11.2.104 | 50 mm diameter | m | 150 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.105 | 50 mm diameter | m | 790 | | |
| | | | | | |
| 7.11.2.106 | 40 mm diameter | m | 570 | | |
| | | | | | |
| 7.11.2.107 | 32 mm diameter | m | 170 | | |
| | | | | | |
| 7.11.2.108 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.11.2.109 | 20 mm diameter | m | 273 | | |
| | | | | | |
| | SM11-F5a | | | | |
| | | | | | |

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|------------|----------------------|---|-----|--|--|
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.110 | 40 mm diameter | m | 144 | | |
| | | | | | |
| 7.11.2.111 | 32 mm diameter | m | 167 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.112 | 32 mm diameter | m | 350 | | |
| | | | | | |
| 7.11.2.113 | 25 mm diameter | m | 50 | | |
| | | | | | |
| 7.11.2.114 | 20 mm diameter | m | 67 | | |
| | | | | | |
| | SM11-F5a-1 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.115 | 32 mm diameter | m | 130 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.116 | 25 mm diameter | m | 80 | | |
| | | | | | |
| 7.11.2.117 | 20 mm diameter | m | 37 | | |
| | | | | | |
| | SM11-F5b | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.11.2.118 | 25 mm diameter | m | 89 | | |
| | | | | | |
| 7.11.2.119 | 20 mm diameter | m | 68 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.120 | 25 mm diameter | m | 66 | | |
| | | | | | |
| | SM11-F5c | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.121 | 32 mm diameter | m | 120 | | |
| | | | | | |
| 7.11.2.122 | 25 mm diameter | m | 50 | | |
| | | | | | |
| 7.11.2.123 | 20 mm diameter | m | 26 | | |

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|------------|----------------------|---|-----|--|--|
| | | | | | |
| | PL436+2 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.124 | 25 mm diameter | m | 300 | | |
| | | | | | |
| 7.11.2.125 | 20 mm diameter | m | 211 | | |
| | | | | | |
| | SM11-F6 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.126 | 32 mm diameter | m | 410 | | |
| | | | | | |
| 7.11.2.127 | 25 mm diameter | m | 270 | | |
| | | | | | |
| 7.11.2.128 | 20 mm diameter | m | 112 | | |
| | | | | | |
| | SM11-F7 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.129 | 32 mm diameter | m | 230 | | |
| | | | | | |
| 7.11.2.130 | 20 mm diameter | m | 153 | | |
| | | | | | |
| | SM11-F7a | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.131 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.11.2.132 | 20 mm diameter | m | 30 | | |
| | | | | | |
| | SM11-F8 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.133 | 50 mm diameter | m | 510 | | |
| | | | | | |
| 7.11.2.134 | 40 mm diameter | m | 250 | | |
| | | | | | |
| 7.11.2.135 | 32 mm diameter | m | 300 | | |
| | | | | | |
| 7.11.2.136 | 25 mm diameter | m | 50 | | |
| | | | | | |

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|---------------|--|---|----|--|--|
| 7.11.2.137 | 20 mm diameter | m | 61 | | |
| | | | | | |
| | SM11-F8a | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.138 | 32 mm diameter | m | 70 | | |
| | | | | | |
| 7.11.2.139 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.11.2.140 | 20 mm diameter | m | 70 | | |
| | | | | | |
| | SM11-F8a-1 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.11.2.141 | 25 mm diameter | m | 90 | | |
| | | | | | |
| 7.11.2.142 | 20 mm diameter | m | 32 | | |
| | | | | | |
| | SM11-F9 | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
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| 7.11.2.143 | 32 mm diameter | m | 40 | | |
| | | | | | |
| 7.11.2.144 | 25 mm diameter | m | 16 | | |
| | | | | | |
| | SM11-F10 | | | | |
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| | Class PN 12.5 | | | | |
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| 7.11.2.145 | 32 mm diameter | m | 30 | | |
| | | | | | |
| 7.11.2.146 | 25 mm diameter | m | 20 | | |
| | | | | | |
| 7.11.2.147 | 20 mm diameter | m | 16 | | |
| | | | | | |
| 7.11.3 | uPVC PIPE FITTINGS | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM11-F1 | | | | |
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| 7.11.3.1 | 90 x 75 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.2 | 75 x 32 mm dia | No. | 1 | | |
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| 7.11.3.3 | 32 x 25 mm dia | No. | 1 | | |
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| 7.11.3.4 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM11-F1a, SM11-F1d-2, SM11-F2c, SM11-F4a, SM11-F5a | | | | |
| | | | | | |
| 7.11.3.5 | 40 x 32 mm dia | No. | 5 | | |
| | | | | | |
| 7.11.3.6 | 32 x 25 mm dia | No. | 5 | | |
| | | | | | |
| 7.11.3.7 | 25 x 20 mm dia | No. | 5 | | |
| | | | | | |
| | SM11-F1b, SM11-F1c-1, PL2153+2, PL1336+2, SM11-F1d-3, SM11-F2a, SM11-F2d, SM11-F3a, SM11-F3b, PL2841+2, SM11-F4b-1, SM11-F5b, PL436+2, SM11-F7a, SM11-F8a-1 | | | | |
| | | | | | |
| 7.11.3.8 | 25 x 20 mm dia | No. | 16 | | |
| | | | | | |
| | SM11-F1c, SM11-F8 | | | | |
| | | | | | |
| 7.11.3.9 | 50 x 40 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.10 | 40 x 32 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.11 | 32 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.12 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F1c-2 | | | | |
| | | | | | |
| 7.11.3.13 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.14 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM11-F1c-2a, SM11-F1c-3, SM11-F2f, SM11-F4c, SM11-F5a-1, SM11-F5c, SM11-F6, SM11-F8a, SM11-F10 | | | | |

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| 7.11.3.15 | 32 x 25 mm dia | No. | 9 | | |
| 7.11.3.16 | 25 x 20 mm dia | No. | 9 | | |
| | | | | | |
| | SM11-F1d, SM11-F2 | | | | |
| 7.11.3.17 | 63 x 50 mm dia | No. | 2 | | |
| 7.11.3.18 | 50 x 40 mm dia | No. | 2 | | |
| 7.11.3.19 | 40 x 32 mm dia | No. | 2 | | |
| 7.11.3.20 | 32 x 25 mm dia | No. | 2 | | |
| 7.11.3.21 | 25 x 20 mm dia | No. | 2 | | |
| | SM11-F3 | | | | |
| 7.11.3.22 | 40 x 32 mm dia | No. | 1 | | |
| 7.11.3.23 | 32 x 20 mm dia | No. | 1 | | |
| | SM11-F4 | | | | |
| 7.11.3.24 | 75 x 63 mm dia | No. | 1 | | |
| 7.11.3.25 | 63 x 50 mm dia | No. | 1 | | |
| 7.11.3.26 | 50 x 40 mm dia | No. | 1 | | |
| 7.11.3.27 | 40 x 32 mm dia | No. | 1 | | |
| 7.11.3.28 | 32 x 25 mm dia | No. | 1 | | |
| 7.11.3.29 | 25 x 20 mm dia | No. | 1 | | |
| | SM11-F4b, SM11-F7 | | | | |
| 7.11.3.30 | 32 x 20 mm dia | No. | 2 | | |
| | SM11-F5 | | | | |
| 7.11.3.31 | 63 x 50 mm dia | No. | 1 | | |
| 7.11.3.32 | 50 x 40 mm dia | No. | 1 | | |

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| 7.11.3.33 | 40 x 32 mm dia | No. | 1 | | |
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| 7.11.3.34 | 32 x 25 mm dia | No. | 1 | | |
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| 7.11.3.35 | 25 x 20 mm dia | No. | 1 | | |
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| | SM11-F9 | | | | |
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| 7.11.3.36 | 32 x 25 mm dia | No. | 1 | | |
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| | UPVC TEES | | | | |
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| | SM11-F1 | | | | |
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| 7.11.3.37 | 90 x 50 mm dia | No. | 1 | | |
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| 7.11.3.38 | 90 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.39 | 90 x 25 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.40 | 90 x 20 mm dia | No. | 14 | | |
| | | | | | |
| 7.11.3.41 | 75 x 63 mm dia | No. | 1 | | |
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| 7.11.3.42 | 75 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.43 | 75 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.11.3.44 | 32 x 20 mm dia | No. | 2 | | |
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| 7.11.3.45 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.46 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F1a | | | | |
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| 7.11.3.47 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.11.3.48 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.49 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.50 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F1b | | | | |
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| 7.11.3.51 | 25 x 20 mm dia | No. | 3 | | |
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| 7.11.3.52 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F1c | | | | |
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| 7.11.3.53 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.54 | 50 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.55 | 50 x 20 mm dia | No. | 8 | | |
| | | | | | |
| 7.11.3.56 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.57 | 40 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.58 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.59 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.60 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F1c-1 | | | | |
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| 7.11.3.61 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.62 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F1c-2 | | | | |
| | | | | | |
| 7.11.3.63 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.64 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.65 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F1c-2a | | | | |
| | | | | | |
| 7.11.3.66 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.67 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.68 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F1c-3 | | | | |
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| 7.11.3.69 | 32 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.70 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.71 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | PL 2153+2, PL1636+2, SM11-F1d-3, SM11-F2a, SM11-F2d | | | | |
| | | | | | |
| 7.11.3.72 | 25 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.11.3.73 | 20 x 20 mm dia | No. | 10 | | |
| | | | | | |
| | SM11-F1d | | | | |
| | | | | | |
| 7.11.3.74 | 63 x 20 mm dia | No. | 26 | | |
| | | | | | |
| 7.11.3.75 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.76 | 50 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.77 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.78 | 40 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.11.3.79 | 32 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.80 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.81 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F1d-1 | | | | |
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| 7.11.3.82 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F1d-2 | | | | |
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| 7.11.3.83 | 40 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.84 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.85 | 25 x 20 mm dia | No. | 3 | | |
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| 7.11.3.86 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F2 | | | | |

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| 7.11.3.87 | 63 x 40 mm dia | No. | 1 | | |
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| 7.11.3.88 | 63 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.89 | 63 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.90 | 50 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.91 | 50 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.92 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.93 | 40 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.94 | 32 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.11.3.95 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.96 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F2b, SM11-F2e | | | | |
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| 7.11.3.97 | 20 x 20 mm dia | No. | 3 | | |
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| | SM11-F2c | | | | |
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| 7.11.3.98 | 40 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.99 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.100 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.101 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F2f | | | | |
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| 7.11.3.102 | 32 x 20 mm dia | No. | 2 | | |
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| 7.11.3.103 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.104 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F3 | | | | |
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| 7.11.3.105 | 40 x 25 mm dia | No. | 1 | | |
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| 7.11.3.106 | 40 x 20 mm dia | No. | 1 | | |
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| 7.11.3.107 | 35 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.108 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F3a, SM11-F3b | | | | |
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| 7.11.3.109 | 25 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.11.3.110 | 20 x 20 mm dia | No. | 4 | | |
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| | SM11-F4 | | | | |
| | | | | | |
| 7.11.3.111 | 75 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.112 | 63 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.113 | 63 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.114 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.115 | 50 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.116 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.11.3.117 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.118 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.119 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F4a | | | | |
| | | | | | |
| 7.11.3.120 | 40 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.121 | 40 x 20 mm dia | No. | 13 | | |
| | | | | | |
| 7.11.3.122 | 32 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.123 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.124 | 20 x 20 mm dia | No. | 2 | | |
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| | PL 2841+2, SM11-F4b-1 | | | | |

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| 7.11.3.125 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.126 | 20 x 20 mm dia | No. | 4 | | |
| | | | | | |
| | SM11-F4b | | | | |
| | | | | | |
| 7.11.3.127 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.128 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.129 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.130 | 20 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM11-F4c | | | | |
| | | | | | |
| 7.11.3.131 | 35 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.11.3.132 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.133 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F5 | | | | |
| | | | | | |
| 7.11.3.134 | 63 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.135 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.136 | 50 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.137 | 50 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.11.3.138 | 40 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.11.3.139 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.140 | 32 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.141 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.142 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F5a | | | | |
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| 7.11.3.143 | 40 x 32 mm dia | No. | 1 | | |
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| 7.11.3.144 | 40 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.145 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.146 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.147 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F5a-1 | | | | |
| | | | | | |
| 7.11.3.148 | 32 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.11.3.149 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.150 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F5b, PL436+2 | | | | |
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| 7.11.3.151 | 25 x 20 mm dia | No. | 3 | | |
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| 7.11.3.152 | 20 x 20 mm dia | No. | 3 | | |
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| | SM11-F5c | | | | |
| | | | | | |
| 7.11.3.153 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.11.3.154 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.155 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F6 | | | | |
| | | | | | |
| 7.11.3.156 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.157 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.158 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F7 | | | | |
| | | | | | |
| 7.11.3.159 | 32 x 25 mm dia | No. | 1 | | |
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| 7.11.3.160 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F7a | | | | |

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| 7.11.3.161 | 25 x 20 mm dia | No. | 3 | | |
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| 7.11.3.162 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM11-F8 | | | | |
| | | | | | |
| 7.11.3.163 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.164 | 50 x 20 mm dia | No. | 20 | | |
| | | | | | |
| 7.11.3.165 | 40 x 20 mm dia | No. | 3 | | |
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| 7.11.3.166 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.167 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.168 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F8a | | | | |
| | | | | | |
| 7.11.3.169 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.11.3.170 | 32 x 20 mm dia | No. | 1 | | |
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| 7.11.3.171 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.11.3.172 | 20 x 20 mm dia | No. | 1 | | |
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| | SM11-F8a-1 | | | | |
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| 7.11.3.173 | 25 x 20 mm dia | No. | 2 | | |
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| 7.11.3.174 | 20 x 20 mm dia | No. | 2 | | |
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| | SM11-F9 | | | | |
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| 7.11.3.175 | 32 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.11.3.176 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| | SM11-F10 | | | | |
| | | | | | |
| 7.11.3.177 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.11.3.178 | 25 x 20 mm dia | No. | 3 | | |

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| 7.11.3.179 | 20 x 20 mm dia | No. | 1 | | |
| 7.11.4 | AIR VALVES | | | | |
| 7.11.4.1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 4 | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | 1 No. Double Air Valve (DAV) at SM11-F1 Chainage 1300m | | | | |
| 7.11.4.2 | 75 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| 7.11.4.3 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.11.4.4 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| 7.11.4.5 | 65mm dia threaded GI union | No. | 4 | | |
| 7.11.4.6 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| 7.11.4.7 | 25 mm dia threaded GI union | No. | 2 | | |
| 7.11.4.8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 7.11.4.9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 7.11.4.10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | | | | | |

| | | | | | |
|-----------|---|-----|---|--|--|
| | 1 No. Double Air Valve (DAV) at SM11-F1d Chainage 1060m | | | | |
| 7.11.4.11 | 63 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| 7.11.4.12 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.11.4.13 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| 7.11.4.14 | 65mm dia threaded GI union | No. | 4 | | |
| 7.11.4.15 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| 7.11.4.16 | 25 mm dia threaded GI union | No. | 2 | | |
| 7.11.4.17 | 25 mm dia threaded GI nipple | No. | 1 | | |
| 7.11.4.18 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| 7.11.4.19 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | 2 No. Double Air Valves (DAVs) at SM11-F2 & SM11- F5 Chainage 720m & 780m respectively | | | | |
| 7.11.4.20 | 50 x 50 mm dia UPVC/G.I Adaptor | No. | 4 | | |
| 7.11.4.21 | 50 mm dia, 0.5m long threaded GI spigot | No. | 4 | | |
| 7.11.4.22 | 50 x 25 mm dia threaded GI tee | No. | 4 | | |
| 7.11.4.23 | 50 mm dia threaded GI union | No. | 8 | | |
| 7.11.4.24 | 25 mm dia threaded GI pipe, 0.4m long | No. | 2 | | |
| 7.11.4.25 | 25 mm dia threaded GI union | No. | 4 | | |
| 7.11.4.26 | 25 mm dia threaded GI nipple | No. | 2 | | |
| 7.11.4.27 | 25 mm dia threaded Double Air | No. | 2 | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| | Valve | | | | |
| 7.11.4.28 | 25 mm dia threaded gate Valve | No. | 2 | | |
| 7.11.5 | WASHOUT (W/O) | | | | |
| | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 2 | | |
| | 1 No. Wash Out (WO) at SM11-F1c Chainage 1180m | | | | |
| 7.11.5.1 | 40 x 40 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| 7.11.5.2 | 40 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.11.5.3 | 40 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| 7.11.5.4 | 25mm dia gate valve | No. | 1 | | |
| 7.11.5.5 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 7.11.5.6 | 25 x 25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 7.11.5.7 | 25mm dia GI union | No. | 3 | | |
| 7.11.5.8 | 25mm dia GI nipple | No. | 2 | | |
| 7.11.5.9 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 7.11.5.10 | 25 mm dia uPVC pipe | m | 6 | | |
| | 1 No. Wash Out (WO) at SM11-F5 Chainage 240m | | | | |
| 7.11.5.11 | 50 x 50 mm dia UPVC/G.I | No. | 2 | | |

| | | | | | |
|-----------|--|-----|---|--|--|
| | Adaptors | | | | |
| | | | | | |
| 7.11.5.12 | 50 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.11.5.13 | 50 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| | | | | | |
| 7.11.5.14 | 25mm dia gate valve | No. | 1 | | |
| | | | | | |
| 7.11.5.15 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| | | | | | |
| 7.11.5.16 | 25 x 25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| | | | | | |
| 7.11.5.17 | 25mm dia GI union | No. | 3 | | |
| | | | | | |
| 7.11.5.18 | 25mm dia GI nipple | No. | 2 | | |
| | | | | | |
| 7.11.5.19 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| | | | | | |
| 7.11.5.20 | 25 mm dia uPVC pipe | m | 6 | | |
| | | | | | |
| | SUB-TOTAL CARRIED FORWARD TO COLLECTIONS PAGE | | | | |
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|-----------------------------------|--|-------------|-----------------|-------------------|---------------------|
| | | | | | |
| Bill Nr 7.12 SM 12 FEEDERS | | | | | |
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.12.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing bedding and surround materials | | | | |
| | | | | | |

| | | | | | |
|---------------|--|----------------|------|--|--|
| | Excavation and backfilling in trench normal material for SM12-F1 pipeine for depth not exceeding 1.5 m | m ³ | 491 | | |
| 7.12.1 .1 | Ditto for PL674+1 | m ³ | 131 | | |
| 7.12.1 .2 | Ditto for SM12-F2 | m ³ | 730 | | |
| 7.12.1 .3 | Ditto for PL1321+1 | m ³ | 122 | | |
| 7.12.1 .4 | Ditto for SM12-F3 | m ³ | 1052 | | |
| 7.12.1 .5 | Ditto for SM12-F3a | m ³ | 96 | | |
| 7.12.1 .6 | Ditto for SM12-F4 | m ³ | 908 | | |
| 7.12.1 .7 | Ditto for pl822+1 | m ³ | 59 | | |
| 7.12.1 .8 | Ditto for SM12-F4a | m ³ | 118 | | |
| 7.12.1 .9 | Ditto for SM12-F5 | m ³ | 2248 | | |
| 7.12.1 .10 | Ditto for SM12-F5a | m ³ | 239 | | |
| 7.12.1 .11 | Ditto for SM12-F5b | m ³ | 130 | | |
| 7.12.1 .12 | Ditto for SM12-F5c | m ³ | 98 | | |
| 7.12.1 .13 | Ditto for SM12-F5d | m ³ | 139 | | |
| 7.12.1 .14 | E.O for excavation in soft rock (provisional) | m ³ | 328 | | |
| 7.12.1 .15 | E.O for excavation in hard rock (provisional) | m ³ | 328 | | |

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|---------------|---|---|-----|--|--|
| | | | | | |
| 7.12.2 | uPVC Pipework | | | | |
| | | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly Materials, cutting wastage. | | | | |
| | | | | | |
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM12-F1 | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.12.2 .1 | 40 mm diameter | m | 480 | | |
| | | | | | |
| 7.12.2 .2 | 32 mm diameter | m | 138 | | |
| | | | | | |
| 7.12.2 .3 | 25 mm diameter | m | 134 | | |
| | | | | | |
| 7.12.2 .4 | 20 mm diameter | m | 230 | | |
| | | | | | |
| | PL674+1 | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |

| | | | | | |
|---------------|----------------------|---|------|--|--|
| 7.12.2 .5 | 20 mm diameter | m | 262 | | |
| | | | | | |
| | SM12-F2 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.12.2 .6 | 50 mm diameter | m | 750 | | |
| | | | | | |
| 7.12.2 .7 | 40 mm diameter | m | 270 | | |
| | | | | | |
| 7.12.2 .8 | 32 mm diameter | m | 170 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.12.2 .9 | 32 mm diameter | m | 130 | | |
| | | | | | |
| 7.12.2 .10 | 25 mm diameter | m | 90 | | |
| | | | | | |
| 7.12.2 .11 | 20 mm diameter | m | 49 | | |
| | | | | | |
| | PL 1321+1 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.12.2 .12 | 20 mm diameter | m | 243 | | |
| | | | | | |
| | SM12-F3 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.12.2 .13 | 50 mm diameter | m | 1030 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.12.2 .14 | 40 mm diameter | m | 480 | | |
| | | | | | |
| 7.12.2 .15 | 32 mm diameter | m | 330 | | |

| | | | | | |
|---------------|----------------------|---|-----|--|--|
| 7.12.2 .16 | 25 mm diameter | m | 130 | | |
| 7.12.2 .17 | 20 mm diameter | m | 134 | | |
| | | | | | |
| | SM12-F3a | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| 7.12.2 .18 | 25 mm diameter | m | 110 | | |
| 7.12.2 .19 | 20 mm diameter | m | 81 | | |
| | | | | | |
| | SM12-F4 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| 7.12.2 .20 | 63 mm diameter | m | 840 | | |
| 7.12.2 .21 | 50 mm diameter | m | 120 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| 7.12.2 .22 | 50 mm diameter | m | 240 | | |
| 7.12.2 .23 | 40 mm diameter | m | 190 | | |
| 7.12.2 .24 | 32 mm diameter | m | 320 | | |
| 7.12.2 .25 | 25 mm diameter | m | 50 | | |
| 7.12.2 .26 | 20 mm diameter | m | 55 | | |
| | | | | | |
| | PL822+1 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |

| | | | | | |
|---------------|----------------------|---|------|--|--|
| 7.12.2 .27 | 20 mm diameter | m | 118 | | |
| | | | | | |
| | SM12-F4a | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.12.2 .28 | 25 mm diameter | m | 100 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.12.2 .29 | 25 mm diameter | m | 40 | | |
| | | | | | |
| 7.12.2 .30 | 20 mm diameter | m | 95 | | |
| | | | | | |
| | SM12-F5 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.12.2 .31 | 90 mm diameter | m | 1150 | | |
| | | | | | |
| 7.12.2 .32 | 75 mm diameter | m | 630 | | |
| | | | | | |
| 7.12.2 .33 | 63 mm diameter | m | 490 | | |
| | | | | | |
| 7.12.2 .34 | 50 mm diameter | m | 390 | | |
| | | | | | |
| 7.12.2 .35 | 40 mm diameter | m | 150 | | |
| | | | | | |
| 7.12.2 .36 | 32 mm diameter | m | 310 | | |
| | | | | | |
| 7.12.2 .37 | 25 mm diameter | m | 150 | | |
| | | | | | |
| 7.12.2 .38 | 20 mm diameter | m | 135 | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |

| | | | | | |
|---------------|----------------------|---|-----|--|--|
| 7.12.2 .39 | 90 mm diameter | m | 948 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.12.2 .40 | 90 mm diameter | m | 143 | | |
| | | | | | |
| | SM12-F5a | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.12.2 .41 | 25 mm diameter | m | 80 | | |
| | | | | | |
| 7.12.2 .42 | 20 mm diameter | m | 267 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.12.2 .43 | 20 mm diameter | m | 130 | | |
| | | | | | |
| | SM12-F5b | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.12.2 .44 | 25 mm diameter | m | 140 | | |
| | | | | | |
| 7.12.2 .45 | 20 mm diameter | m | 119 | | |
| | | | | | |
| | SM12-F5c | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.12.2 .46 | 25 mm diameter | m | 120 | | |
| | | | | | |
| 7.12.2 .47 | 20 mm diameter | m | 76 | | |
| | | | | | |
| | | | | | |
| | SM12-F5d | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |

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|---------------|---|-----|-----|--|--|
| 7.12.2 .48 | 32 mm diameter | m | 220 | | |
| 7.12.2 .49 | 25 mm diameter | m | 20 | | |
| 7.12.2 .50 | 20 mm diameter | m | 38 | | |
| 7.12.3 | uPVC PIPE FITTINGS | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | Reducers | | | | |
| | SM12-F1 | | | | |
| 7.12.3 .1 | 40 x 32 mm dia | No. | 1 | | |
| 7.12.3 .2 | 32 x 25 mm dia | No. | 1 | | |
| 7.12.3 .3 | 25 x 20 mm dia | No. | 1 | | |
| | SM12-F2, SM12-F3 | | | | |
| 7.12.3 .4 | 50 x 40 mm dia | No. | 2 | | |
| 7.12.3 .5 | 40 x 32 mm dia | No. | 2 | | |
| 7.12.3 .6 | 32 x 25 mm dia | No. | 2 | | |
| 7.12.3 .7 | 25 x 20 mm dia | No. | 2 | | |
| | SM12-F3a,SM12-F4a SM12-F5a, SM12-F5b, SM12-F5c | | | | |
| 7.12.3 .8 | 25 x 20 mm dia | No. | 5 | | |
| | SM12-F4 | | | | |

| | | | | | |
|---------------|------------------|-----|---|--|--|
| 7.12.3 .9 | 63 x 50 mm dia | No. | 1 | | |
| 7.12.3 .10 | 50 x 40 mm dia | No. | 1 | | |
| 7.12.3 .11 | 40 x 32 mm dia | No. | 1 | | |
| 7.12.3 .12 | 32 x 25 mm dia | No. | 1 | | |
| 7.12.3 .13 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM12-F5 | | | | |
| 7.12.3 .14 | 90 x 75 mm dia | No. | 1 | | |
| 7.12.3 .15 | 75 x 63 mm dia | No. | 1 | | |
| 7.12.3 .16 | 63 x 50 mm dia | No. | 1 | | |
| 7.12.3 .17 | 50 x 40 mm dia | No. | 1 | | |
| 7.12.3 .18 | 40 x 32 mm dia | No. | 1 | | |
| 7.12.3 .19 | 32 x 25 mm dia | No. | 1 | | |
| 7.12.3 .20 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM12-F5d | | | | |
| 7.12.3 .21 | 32 x 25 mm dia | No. | 1 | | |
| 7.12.3 .22 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | UPVC TEES | | | | |

| | | | | | |
|---------------|-----------------------------------|-----|----|--|--|
| | | | | | |
| | SM12-F1 | | | | |
| | | | | | |
| 7.12.3 .23 | 40 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.12.3 .24 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.12.3 .25 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.12.3 .26 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | PL674+1, PL1321+1, PL822+1 | | | | |
| | | | | | |
| 7.12.3 .27 | 20 x 20 mm dia | No. | 6 | | |
| | | | | | |
| | SM13-F2 | | | | |
| | | | | | |
| 7.12.3 .28 | 50 x 20 mm dia | No. | 18 | | |
| | | | | | |
| 7.12.3 .29 | 40 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.12.3 .30 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.12.3 .31 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.12.3 .32 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | | | | | |
| | SM12-F3 | | | | |
| | | | | | |
| 7.12.3 .33 | 50 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.12.3 .34 | 50 x 20 mm dia | No. | 20 | | |
| | | | | | |
| 7.12.3 .35 | 40 x 20 mm dia | No. | 6 | | |

| | | | | | |
|---------------|---|-----|----|--|--|
| 7.12.3 .36 | 32 x 20 mm dia | No. | 4 | | |
| 7.12.3 .37 | 25 x 20 mm dia | No. | 2 | | |
| 7.12.3 .38 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM12-F3a, SM12-F4a, SM12-F5a, SM12-F5b, SM12-F5c | | | | |
| 7.12.3 .39 | 25 x 20 mm dia | No. | 9 | | |
| 7.12.3 .40 | 20 x 20 mm dia | No. | 9 | | |
| | | | | | |
| | SM12-F4 | | | | |
| 7.12.3 .41 | 63 x 25 mm dia | No. | 1 | | |
| 7.12.3 .42 | 63 x 20 mm dia | No. | 22 | | |
| 7.12.3 .43 | 50 x 20 mm dia | No. | 9 | | |
| 7.12.3 .44 | 40 x 20 mm dia | No. | 3 | | |
| 7.12.3 .45 | 32 x 20 mm dia | No. | 4 | | |
| 7.12.3 .46 | 25 x 20 mm dia | No. | 2 | | |
| 7.12.3 .47 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM12-F5 | | | | |
| 7.12.3 .48 | 90 x 25 mm dia | No. | 2 | | |
| 7.12.3 | 90 x 20 mm dia | No. | 47 | | |

| | | | | | |
|---------------|---|-----|----|--|--|
| .49 | | | | | |
| 7.12.3 .50 | 75 x 20 mm dia | No. | 7 | | |
| 7.12.3 .51 | 63 x 25 mm dia | No. | 1 | | |
| 7.12.3 .52 | 63 x 20 mm dia | No. | 22 | | |
| 7.12.3 .53 | 50 x 32 mm dia | No. | 1 | | |
| 7.12.3 .54 | 50 x 20 mm dia | No. | 12 | | |
| 7.12.3 .55 | 40 x 20 mm dia | No. | 2 | | |
| 7.12.3 .56 | 32 x 20 mm dia | No. | 4 | | |
| 7.12.3 .57 | 25 x 20 mm dia | No. | 3 | | |
| 7.12.3 .58 | 20 x 20 mm dia | No. | 2 | | |
| | SM12-F5d | | | | |
| 7.12.3 .59 | 32 x 20 mm dia | No. | 3 | | |
| 7.12.3 .60 | 25 x 20 mm dia | No. | 2 | | |
| 7.12.3 .61 | 20 x 20 mm dia | No. | 1 | | |
| 7.12.4 | PRV CHAMBERS | | | | |
| 7.12.4 .1 | Excavate for, provide all Materials and construct complete inspection valve chambers at the PRV's. Internal dimensions 2500 x 2500 x 2500 mm. Rates to include for all thrust blocks , pipe supports, inspection covers, etc as | No. | 1 | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| | detailed in the drawings. | | | | |
| | | | | | |
| | 1 No. PRV Chamber along SM12-F5 Chainage 1+100m | | | | |
| | | | | | |
| 7.12.4 .2 | 90 x 80 mm dia UPVC/G.I VJ coupling | No | 2 | | |
| | | | | | |
| 7.12.4 .3 | 80 mm dia, 0.5m long single flanged GI pipe | No | 2 | | |
| | | | | | |
| 7.12.4 .4 | 80 mm dia sluice valve | No | 1 | | |
| | | | | | |
| 7.12.4 .5 | 80 mm dia PRV | No | 1 | | |
| | | | | | |
| 7.12.5 | AIR VALVES | | | | |
| | | | | | |
| 7.12.5 .1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 1 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at SM12-F5 Chainage 2200m | | | | |
| | | | | | |
| 7.12.5 .2 | 90 x 80 mm dia UPVC/G.I VJ coupling | No. | 2 | | |
| | | | | | |
| 7.12.5 .3 | 80mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| | | | | | |
| 7.12.5 .4 | 80 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| | | | | | |
| 7.12.5 | 50mm dia double threaded steel pipe, | No. | 1 | | |

| | | | | | |
|--------------|--|-----|---|--|--|
| .5 | 0.4m long | | | | |
| 7.12.5 .6 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| 7.12.5 .7 | 50mm dia gate Valve | No. | 1 | | |
| 7.12.5 .8 | 50mm dia GI Union | No. | 2 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | SUB-TOTAL CARRIED FORWARD TO COLLECTIONS PAGE | | | | |
| | | | | | |

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|---------------------------------|--|----------------|-----------------|-------------------|---------------------|
| | | | | | |
| Bill 7.13. SM 13 FEEDERS | | | | | |
| | | | | | |
| | | | | | |
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| | | | | | |
| | | | | | |
| 7.13.1 | Excavation and Backfilling | | | | |
| | | | | | |
| | Rates for excavation and backfilling in trench shall include for trimming trench bottom and for providing bedding and surround materials | | | | |
| | | | | | |
| | Excavation and backfilling in trench normal material for SM13-F1 pipeline for depth not exceeding 1.5 m | m ³ | 385 | | |
| | | | | | |
| 7.13.1. 1 | Ditto for SM13-F2 | m ³ | 331 | | |
| | | | | | |
| 7.13.1. 2 | Ditto for SM13-F3 | m ³ | 1333 | | |
| | | | | | |
| 7.13.1. 3 | Ditto for SM13-F3a | m ³ | 126 | | |
| | | | | | |

| | | | | | |
|---------------|----------------------|----------------|------|--|--|
| 7.13.1. 4 | Ditto for SM13-F4 | m ³ | 1428 | | |
| 7.13.1. 5 | Ditto for SM13-F4a | m ³ | 263 | | |
| 7.13.1. 6 | Ditto for SM13-F4b | m ³ | 53 | | |
| 7.13.1. 7 | Ditto for pl760+1 | m ³ | 122 | | |
| 7.13.1. 8 | Ditto for SM13-F4c | m ³ | 550 | | |
| 7.13.1. 9 | Ditto for SM13-F4d | m ³ | 35 | | |
| 7.13.1. 10 | Ditto for SM13-F5 | m ³ | 821 | | |
| 7.13.1. 11 | Ditto for SM13-F5a | m ³ | 121 | | |
| 7.13.1. 12 | Ditto for SM13-F5b | m ³ | 214 | | |
| 7.13.1. 13 | Ditto for SM13-F6 | m ³ | 1885 | | |
| 7.13.1. 14 | Ditto for SM13-F6a | m ³ | 1614 | | |
| 7.13.1. 15 | Ditto for SM13-F6a-1 | m ³ | 773 | | |
| 7.13.1. 16 | Ditto for PL3002+5 | m ³ | 90 | | |
| 7.13.1. 17 | Ditto for SM13-F6b | m ³ | 230 | | |
| 7.13.1. 18 | Ditto for SM13-F6c | m ³ | 137 | | |
| 7.13.1. 19 | Ditto for SM13-F6d | m ³ | 137 | | |

| | | | | | |
|---------------|---|----------------|------|--|--|
| 7.13.1. 20 | Ditto for SM13-F6e | m ³ | 197 | | |
| 7.13.1. 21 | Ditto for PL839+2 | m ³ | 35 | | |
| 7.13.1. 22 | Ditto for PL1869+1 | m ³ | 38 | | |
| 7.13.1. 23 | Ditto for SM13-F7 | m ³ | 1020 | | |
| 7.13.1. 24 | Ditto for SM13-F7a | m ³ | 122 | | |
| 7.13.1. 25 | Ditto for SM13-F7b | m ³ | 87 | | |
| 7.13.1. 26 | Ditto for SM13-F7c | m ³ | 253 | | |
| 7.13.1. 27 | Ditto for SM13-F7d | m ³ | 171 | | |
| 7.13.1. 28 | Ditto for SM13-F8 | m ³ | 75 | | |
| 7.13.1. 29 | Ditto for SM13-F9 | m ³ | 383 | | |
| 7.13.1. 30 | Ditto for SM13-F9a | m ³ | 227 | | |
| 7.13.1. 31 | E.O for excavation in soft rock (provisional) | m ³ | 662 | | |
| 7.13.1. 32 | E.O for excavation in hard rock (provisional) | m ³ | 662 | | |
| 7.13.2 | uPVC Pipework | | | | |
| | Provide, lay, joint and test the following flexible spigot and socket pipe and fittings with rubber ring joints. Rates to include for all jointly Materials, cutting wastage. | | | | |

| | | | | | |
|--------------|---|---|-----|--|--|
| | Note: The following have been used on the drawings to specify pipe diameters/types/classes. Pipe dimensions/working pressures shall conform to KS-06-149 Part 2:2000. | | | | |
| | | | | | |
| | Class Working Pressure (m) | | | | |
| | CLASS PN6 60 | m | | | |
| | CLASS PN8 80 | m | | | |
| | CLASS PN10 100 | m | | | |
| | CLASS PN12.5 125 | m | | | |
| | | | | | |
| | uPVC Straights | | | | |
| | | | | | |
| | SM13-F1 | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.13.2. 1 | 32 mm diameter | m | 50 | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.13.2. 2 | 32 mm diameter | m | 420 | | |
| | | | | | |
| 7.13.2. 3 | 25 mm diameter | m | 110 | | |
| | | | | | |
| 7.13.2. 4 | 20 mm diameter | m | 190 | | |
| | | | | | |
| | SM13-F2 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.13.2. 5 | 32 mm diameter | m | 360 | | |
| | | | | | |
| 7.13.2. 6 | 25 mm diameter | m | 120 | | |
| | | | | | |
| 7.13.2. | 20 mm diameter | m | 181 | | |

| | | | | | |
|---------------|----------------------|---|------|--|--|
| 7 | | | | | |
| | | | | | |
| | SM13-F3 | | | | |
| | | | | | |
| | Class PN 10 | | | | |
| | | | | | |
| 7.13.2. 8 | 75 mm diameter | m | 310 | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.13.2. 9 | 75 mm diameter | m | 1110 | | |
| | | | | | |
| 7.13.2. 10 | 63 mm diameter | m | 460 | | |
| | | | | | |
| 7.13.2. 11 | 50 mm diameter | m | 170 | | |
| | | | | | |
| 7.13.2. 12 | 40 mm diameter | m | 90 | | |
| | | | | | |
| 7.13.2. 13 | 32 mm diameter | m | 160 | | |
| | | | | | |
| 7.13.2. 14 | 25 mm diameter | m | 290 | | |
| | | | | | |
| 7.13.2. 15 | 20 mm diameter | m | 75 | | |
| | | | | | |
| | SM13-F3a | | | | |
| | | | | | |
| | Class PN 12.5 | | | | |
| | | | | | |
| 7.13.2. 16 | 25 mm diameter | m | 120 | | |
| | | | | | |
| 7.13.2. 17 | 20 mm diameter | m | 131 | | |
| | | | | | |
| | SM13-F4 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 18 | 75 mm diameter | m | 1690 | | |

| | | | | | |
|---------------|-------------------|---|-----|--|--|
| 7.13.2. 19 | 50 mm diameter | m | 540 | | |
| 7.13.2. 20 | 40 mm diameter | m | 380 | | |
| 7.13.2. 21 | 32 mm diameter | m | 180 | | |
| 7.13.2. 22 | 25 mm diameter | m | 30 | | |
| 7.13.2. 23 | 20 mm diameter | m | 35 | | |
| | SM13-F4a | | | | |
| | Class PN 6 | | | | |
| 7.13.2. 24 | 32 mm diameter | m | 150 | | |
| 7.13.2. 25 | 25 mm diameter | m | 210 | | |
| 7.13.2. 26 | 20 mm diameter | m | 166 | | |
| | SM13-F4b | | | | |
| | Class PN 6 | | | | |
| 7.13.2. 27 | 25 mm diameter | m | 50 | | |
| 7.13.2. 28 | 20 mm diameter | m | 56 | | |
| | pl 760+1 | | | | |
| | Class PN 6 | | | | |
| 7.13.2. 29 | 20 mm diameter | m | 244 | | |
| | SM13-F4c | | | | |

| | | | | | |
|---------------|-------------------|---|-----|--|--|
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 30 | 40 mm diameter | m | 510 | | |
| | | | | | |
| 7.13.2. 31 | 32 mm diameter | m | 390 | | |
| | | | | | |
| 7.13.2. 32 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.13.2. 33 | 20 mm diameter | m | 129 | | |
| | | | | | |
| | SM13-F4d | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 34 | 25 mm diameter | m | 30 | | |
| | | | | | |
| 7.13.2. 35 | 20 mm diameter | m | 39 | | |
| | | | | | |
| | SM13-F5 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 36 | 63 mm diameter | m | 530 | | |
| | | | | | |
| 7.13.2. 37 | 50 mm diameter | m | 500 | | |
| | | | | | |
| 7.13.2. 38 | 40 mm diameter | m | 310 | | |
| | | | | | |
| 7.13.2. 39 | 32 mm diameter | m | 150 | | |
| | | | | | |
| 7.13.2. 40 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.13.2. 41 | 20 mm diameter | m | 81 | | |
| | | | | | |
| | SM13-F5a | | | | |
| | | | | | |

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|---------------|-------------------|---|-----|--|--|
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 42 | 32 mm diameter | m | 140 | | |
| | | | | | |
| 7.13.2. 43 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.13.2. 44 | 20 mm diameter | m | 41 | | |
| | | | | | |
| | SM13-F5b | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 45 | 32 mm diameter | m | 300 | | |
| | | | | | |
| 7.13.2. 46 | 25 mm diameter | m | 20 | | |
| | | | | | |
| 7.13.2. 47 | 20 mm diameter | m | 107 | | |
| | | | | | |
| | SM13-F6 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 48 | 110 mm diameter | m | 760 | | |
| | | | | | |
| 7.13.2. 49 | 90 mm diameter | m | 980 | | |
| | | | | | |
| 7.13.2. 50 | 75 mm diameter | m | 300 | | |
| | | | | | |
| 7.13.2. 51 | 63 mm diameter | m | 379 | | |
| | | | | | |
| 7.13.2. 52 | 50 mm diameter | m | 512 | | |
| | | | | | |
| 7.13.2. 53 | 40 mm diameter | m | 340 | | |
| | | | | | |
| 7.13.2. 54 | 32 mm diameter | m | 270 | | |

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|---------------|-------------------|---|------|--|--|
| | | | | | |
| 7.13.2. 55 | 25 mm diameter | m | 80 | | |
| | | | | | |
| 7.13.2. 56 | 20 mm diameter | m | 149 | | |
| | | | | | |
| | SM13-F6a | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 57 | 90 mm diameter | m | 1970 | | |
| | | | | | |
| 7.13.2. 58 | 75 mm diameter | m | 410 | | |
| | | | | | |
| 7.13.2. 59 | 50 mm diameter | m | 280 | | |
| | | | | | |
| 7.13.2. 60 | 40 mm diameter | m | 170 | | |
| | | | | | |
| 7.13.2. 61 | 32 mm diameter | m | 170 | | |
| | | | | | |
| 7.13.2. 62 | 25 mm diameter | m | 140 | | |
| | | | | | |
| 7.13.2. 63 | 20 mm diameter | m | 88 | | |
| | | | | | |
| | SM13-F6a-1 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 64 | 50 mm diameter | m | 180 | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.13.2. 65 | 50 mm diameter | m | 420 | | |
| | | | | | |
| 7.13.2. 66 | 40 mm diameter | m | 410 | | |
| | | | | | |
| 7.13.2. | 32 mm diameter | m | 230 | | |

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|---------------|-------------------|---|-----|--|--|
| 67 | | | | | |
| | | | | | |
| 7.13.2. 68 | 25 mm diameter | m | 86 | | |
| | | | | | |
| 7.13.2. 69 | 20 mm diameter | m | 219 | | |
| | | | | | |
| | PL3002+5 | | | | |
| | | | | | |
| | Class PN 8 | | | | |
| | | | | | |
| 7.13.2. 70 | 32 mm diameter | m | 80 | | |
| | | | | | |
| 7.13.2. 71 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.13.2. 72 | 20 mm diameter | m | 39 | | |
| | | | | | |
| | SM13-F6b | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 73 | 32 mm diameter | m | 240 | | |
| | | | | | |
| 7.13.2. 74 | 25 mm diameter | m | 130 | | |
| | | | | | |
| 7.13.2. 75 | 20 mm diameter | m | 89 | | |
| | | | | | |
| | SM13-F6c | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 76 | 32 mm diameter | m | 150 | | |
| | | | | | |
| 7.13.2. 77 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.13.2. 78 | 20 mm diameter | m | 54 | | |
| | | | | | |
| | SM13-F6d | | | | |

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|---------------|-------------------|---|-----|--|--|
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 79 | 32 mm diameter | m | 60 | | |
| | | | | | |
| 7.13.2. 80 | 25 mm diameter | m | 60 | | |
| | | | | | |
| 7.13.2. 81 | 20 mm diameter | m | 154 | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | SM13-F6e | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 82 | 40 mm diameter | m | 140 | | |
| | | | | | |
| 7.13.2. 83 | 32 mm diameter | m | 130 | | |
| | | | | | |
| 7.13.2. 84 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.13.2. 85 | 20 mm diameter | m | 54 | | |
| | | | | | |
| | PL839+2 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 86 | 25 mm diameter | m | 20 | | |
| | | | | | |
| 7.13.2. 87 | 20 mm diameter | m | 49 | | |
| | | | | | |
| | PL1869+1 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 88 | 20 mm diameter | m | 76 | | |
| | | | | | |
| | SM13-F7 | | | | |

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|---------------|-------------------|---|------|--|--|
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 89 | 75 mm diameter | m | 1350 | | |
| | | | | | |
| 7.13.2. 90 | 50 mm diameter | m | 300 | | |
| | | | | | |
| 7.13.2. 91 | 32 mm diameter | m | 210 | | |
| | | | | | |
| 7.13.2. 92 | 25 mm diameter | m | 80 | | |
| | | | | | |
| 7.13.2. 93 | 20 mm diameter | m | 99 | | |
| | | | | | |
| | SM13-F7a | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 94 | 32 mm diameter | m | 80 | | |
| | | | | | |
| 7.13.2. 95 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.13.2. 96 | 20 mm diameter | m | 93 | | |
| | | | | | |
| | SM13-F7b | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 97 | 25 mm diameter | m | 70 | | |
| | | | | | |
| 7.13.2. 98 | 20 mm diameter | m | 103 | | |
| | | | | | |
| | | | | | |
| | SM13-F7c | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 99 | 40 mm diameter | m | 290 | | |

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|----------------|-------------------|---|-----|--|--|
| 7.13.2. 100 | 32 mm diameter | m | 110 | | |
| 7.13.2. 101 | 25 mm diameter | m | 80 | | |
| 7.13.2. 102 | 20 mm diameter | m | 26 | | |
| | | | | | |
| | SM13-F7d | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| 7.13.2. 103 | 32 mm diameter | m | 140 | | |
| 7.13.2. 104 | 25 mm diameter | m | 130 | | |
| 7.13.2. 105 | 20 mm diameter | m | 72 | | |
| | | | | | |
| | SM13-F8 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| 7.13.2. 106 | 25 mm diameter | m | 80 | | |
| 7.13.2. 107 | 20 mm diameter | m | 69 | | |
| | | | | | |
| | SM13-F9 | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| 7.13.2. 108 | 40 mm diameter | m | 480 | | |
| 7.13.2. 109 | 32 mm diameter | m | 210 | | |
| 7.13.2. 110 | 25 mm diameter | m | 40 | | |
| 7.13.2. 111 | 20 mm diameter | m | 36 | | |

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|----------------|---|-----|-----|--|--|
| | | | | | |
| | SM13-F9a | | | | |
| | | | | | |
| | Class PN 6 | | | | |
| | | | | | |
| 7.13.2. 112 | 20 mm diameter | m | 454 | | |
| | | | | | |
| 7.13.3 | uPVC PIPE FITTINGS | | | | |
| | | | | | |
| | Provide , lay, joint and test Fittings | | | | |
| | | | | | |
| | Reducers | | | | |
| | | | | | |
| | SM13-F1, SM13-F2,SM13-F4a,SM13-F5a, SM13-F5b, PL3002+5, SM13-F6b, SM13-F6c, SM13-F6d, SM13-F7a, SM13-F7d | | | | |
| | | | | | |
| 7.13.3. 1 | 32 x 25 mm dia | No. | 11 | | |
| | | | | | |
| 7.13.3. 2 | 25 x 20 mm dia | No. | 11 | | |
| | | | | | |
| | SM13-F3 | | | | |
| | | | | | |
| 7.13.3. 3 | 75 x 63 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 4 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 5 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 6 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 7 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 8 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM13-F3a, SM13-F4b, SM13-F4d, PL839+2, PL839+2, SM13-F7b, SM13-F8 | | | | |

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|---------------|--|-----|---|--|--|
| | | | | | |
| 7.13.3. 9 | 25 x 20 mm dia | No. | 7 | | |
| | | | | | |
| | SM13-F4 | | | | |
| | | | | | |
| 7.13.3. 10 | 75 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 11 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 12 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 13 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 14 | 25 x 20 mm dia | No. | 6 | | |
| | | | | | |
| | SM13-F4c, SM13-F6e, SM13-F7c, SM13-F9 | | | | |
| | | | | | |
| 7.13.3. 15 | 32 x 25 mm dia | No. | 4 | | |
| | | | | | |
| 7.13.3. 16 | 25 x 20 mm dia | No. | 4 | | |
| | | | | | |
| | SM13-F5 | | | | |
| | | | | | |
| 7.13.3. 17 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 18 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 19 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 20 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 21 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | | | | | |

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|---------------|-----------------|-----|---|--|--|
| | SM13-F6 | | | | |
| | | | | | |
| 7.13.3. 22 | 110 x 90 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 23 | 90 x 75 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 24 | 75 x 63 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 25 | 63 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 26 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 27 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 28 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 29 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM13-F6a | | | | |
| | | | | | |
| 7.13.3. 30 | 90 x 75 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 31 | 75 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 32 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 33 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 34 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 35 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM13-F6c | | | | |
| | | | | | |

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|---------------|------------------|-----|---|--|--|
| 7.13.3. 36 | 50 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 37 | 40 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 38 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 39 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM13-F7 | | | | |
| | | | | | |
| 7.13.3. 40 | 75 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 41 | 50 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 42 | 32 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 43 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | UPVC TEES | | | | |
| | | | | | |
| | SM13-F1 | | | | |
| | | | | | |
| 7.13.3. 44 | 32 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.13.3. 45 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.13.3. 46 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F2 | | | | |
| | | | | | |
| 7.13.3. 47 | 32 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.13.3. 48 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.13.3. | 20 x 20 mm dia | No. | 2 | | |

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|---------------|-----------------|-----|----|--|--|
| 49 | | | | | |
| | | | | | |
| | SM13-F3 | | | | |
| | | | | | |
| 7.13.3. 50 | 75 x 20 mm dia | No. | 35 | | |
| | | | | | |
| 7.13.3. 51 | 63 x 20 mm dia | No. | 11 | | |
| | | | | | |
| 7.13.3. 52 | 50 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 53 | 50 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.13.3. 54 | 40 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.13.3. 55 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.13.3. 56 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.13.3. 57 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F3a | | | | |
| | | | | | |
| 7.13.3. 58 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 59 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F4 | | | | |
| | | | | | |
| 7.13.3. 60 | 75 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 61 | 75 x 32 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 62 | 75 x 25 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. | 75 x 20 mm dia | No. | 21 | | |

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|---------------|-----------------|-----|----|--|--|
| 63 | | | | | |
| 7.13.3. 64 | 50 x 20 mm dia | No. | 6 | | |
| 7.13.3. 65 | 40 x 20 mm dia | No. | 5 | | |
| 7.13.3. 66 | 32 x 25 mm dia | No. | 1 | | |
| 7.13.3. 67 | 32 x 20 mm dia | No. | 3 | | |
| 7.13.3. 68 | 25 x 20 mm dia | No. | 1 | | |
| 7.13.3. 69 | 20 x 20 mm dia | No. | 2 | | |
| | SM13-F4a | | | | |
| 7.13.3. 70 | 32 x 20 mm dia | No. | 1 | | |
| 7.13.3. 71 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3. 72 | 20 x 20 mm dia | No. | 2 | | |
| | SM13-F4b | | | | |
| 7.13.3. 73 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3. 74 | 20 x 20 mm dia | No. | 2 | | |
| | PL760+1 | | | | |
| 7.13.3. 75 | 20 x 20 mm dia | No. | 2 | | |
| | SM13-F4c | | | | |
| 7.13.3. 76 | 40 x 20 mm dia | No. | 13 | | |

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|---------------|-----------------|-----|----|--|--|
| 7.13.3. 77 | 32 x 20 mm dia | No. | 5 | | |
| 7.13.3. 78 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3. 79 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F4d | | | | |
| 7.13.3. 80 | 25 x 20 mm dia | No. | 1 | | |
| 7.13.3. 81 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F5 | | | | |
| 7.13.3. 82 | 63 x 32 mm dia | No. | 2 | | |
| 7.13.3. 83 | 63 x 20 mm dia | No. | 4 | | |
| 7.13.3. 84 | 50 x 20 mm dia | No. | 14 | | |
| 7.13.3. 85 | 40 x 20 mm dia | No. | 5 | | |
| 7.13.3. 86 | 32 x 20 mm dia | No. | 5 | | |
| 7.13.3. 87 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3. 88 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F5a | | | | |
| 7.13.3. 89 | 32 x 20 mm dia | No. | 2 | | |
| 7.13.3. 90 | 25 x 20 mm dia | No. | 2 | | |

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| 7.13.3. 91 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F5b | | | | |
| 7.13.3. 92 | 32 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.13.3. 93 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.13.3. 94 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F6 | | | | |
| 7.13.3. 95 | 90 x 32mm dia | No. | 3 | | |
| | | | | | |
| 7.13.3. 96 | 90 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.13.3. 97 | 75 x 40 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 98 | 75 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.13.3. 99 | 63 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.13.3. 100 | 50 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.13.3. 101 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.13.3. 102 | 32 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.13.3. 103 | 25 x 20 mm dia | No. | 2 | | |
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| 7.13.3. 104 | 20 x 20 mm dia | No. | 2 | | |
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| | SM13-F6a | | | | |

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| 7.13.3. 105 | 90 x 20 mm dia | No. | 50 | | |
| | | | | | |
| 7.13.3. 106 | 75 x 50 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 107 | 75 x 20 mm dia | No. | 9 | | |
| | | | | | |
| 7.13.3. 108 | 50 x 20 mm dia | No. | 7 | | |
| | | | | | |
| 7.13.3. 109 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.13.3. 110 | 32 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.13.3. 111 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.13.3. 112 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F6a-1 | | | | |
| | | | | | |
| 7.13.3. 113 | 50 x 32mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 114 | 50 x 20 mm dia | No. | 10 | | |
| | | | | | |
| 7.13.3. 115 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.13.3. 116 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.13.3. 117 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 118 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | PL3002+5 | | | | |
| | | | | | |
| 7.13.3. | 32 x 20 mm dia | No. | 2 | | |

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|------------|-----------------|-----|---|--|--|
| 119 | | | | | |
| 7.13.3.120 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3.121 | 20 x 20 mm dia | No. | 2 | | |
| | SM13-F6b | | | | |
| 7.13.3.122 | 32 x 20 mm dia | No. | 3 | | |
| 7.13.3.123 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3.124 | 20 x 20 mm dia | No. | 2 | | |
| | SM13-F6c | | | | |
| 7.13.3.125 | 32 x 20 mm dia | No. | 4 | | |
| 7.13.3.126 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3.127 | 20 x 20 mm dia | No. | 2 | | |
| | SM13-F6d | | | | |
| 7.13.3.128 | 32 x 20 mm dia | No. | 5 | | |
| 7.13.3.129 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3.130 | 20 x 20 mm dia | No. | 2 | | |
| | SM13-F6e | | | | |
| 7.13.3.131 | 40 x 25 mm dia | No. | 1 | | |
| 7.13.3.132 | 40 x 20 mm dia | No. | 1 | | |

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|----------------|-----------------|-----|----|--|--|
| 7.13.3. 133 | 32 x 20 mm dia | No. | 3 | | |
| 7.13.3. 134 | 25 x 20 mm dia | No. | 2 | | |
| 7.13.3. 135 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | PL839+2 | | | | |
| 7.13.3. 136 | 25 x 20 mm dia | No. | 1 | | |
| 7.13.3. 137 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | PL1869+1 | | | | |
| 7.13.3. 138 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F7 | | | | |
| 7.13.3. 139 | 75 x 40 mm dia | No. | 1 | | |
| 7.13.3. 140 | 75 x 32 mm dia | No. | 1 | | |
| 7.13.3. 141 | 75 x 25 mm dia | No. | 1 | | |
| 7.13.3. 142 | 75 x 20 mm dia | No. | 20 | | |
| 7.13.3. 143 | 50 x 32 mm dia | No. | 1 | | |
| 7.13.3. 144 | 50 x 20 mm dia | No. | 4 | | |
| 7.13.3. 145 | 32 x 20 mm dia | No. | 5 | | |
| 7.13.3. 146 | 25 x 20 mm dia | No. | 2 | | |

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|----------------|-----------------|-----|---|--|--|
| 7.13.3. 147 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F7a | | | | |
| | | | | | |
| 7.13.3. 148 | 32 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 149 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.13.3. 150 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F7b | | | | |
| | | | | | |
| 7.13.3. 151 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 152 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F7c | | | | |
| | | | | | |
| 7.13.3. 153 | 40 x 20 mm dia | No. | 6 | | |
| | | | | | |
| 7.13.3. 154 | 32 x 20 mm dia | No. | 4 | | |
| | | | | | |
| 7.13.3. 155 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.13.3. 156 | 20 x 20 mm dia | No. | 1 | | |
| | | | | | |
| | SM13-F7d | | | | |
| | | | | | |
| 7.13.3. 157 | 32 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.13.3. 158 | 25 x 20 mm dia | No. | 1 | | |
| | | | | | |
| 7.13.3. 159 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |

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|----------------|--|-----|----|--|--|
| | SM13-F8 | | | | |
| | | | | | |
| 7.13.3. 160 | 25 x 20 mm dia | No. | 3 | | |
| | | | | | |
| 7.13.3. 161 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F9 | | | | |
| | | | | | |
| 7.13.3. 162 | 40 x 20 mm dia | No. | 15 | | |
| | | | | | |
| 7.13.3. 163 | 32 x 20 mm dia | No. | 5 | | |
| | | | | | |
| 7.13.3. 164 | 25 x 20 mm dia | No. | 2 | | |
| | | | | | |
| 7.13.3. 165 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SM13-F9a | | | | |
| | | | | | |
| 7.13.3. 166 | 20 x 20 mm dia | No. | 2 | | |
| | | | | | |
| | SADDLE CLAMPS | | | | |
| | | | | | |
| | SM13-F6 | | | | |
| | | | | | |
| 7.13.3. 167 | 110 x 80 mm dia saddle clamp | No. | 1 | | |
| | | | | | |
| 7.13.3. 168 | 110 x 20 mm dia saddle clamp | No. | 13 | | |
| | | | | | |
| | GI/HDPE Adaptors for saddle clamps provided above | | | | |
| | | | | | |
| 7.13.3. 169 | 80 / 90 mm dia GI/uPVC Adaptor | No. | 1 | | |
| | | | | | |
| 7.13.3. 170 | 20 / 20 mm dia GI/uPVC Adaptor | No. | 13 | | |
| | | | | | |
| 7.13.4 | AIR VALVES | | | | |
| | | | | | |

| | | | | | |
|---------------|--|-----|---|--|--|
| 7.13.4. 1 | Excavate for, provide all materials and construct complete DAV chambers of internal dimensions 1500 x 1500 x 2000 mm mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 4 | | |
| | | | | | |
| | Provide, handle, install and test the following steel and uPVC pipes and fittings, valves and specials. Special rates shall include for completing all pipe joints as specified in the specification | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at SM13-F5 Chainage 820m | | | | |
| | | | | | |
| 7.13.4. 2 | 50 x 50 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 7.13.4. 3 | 50 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.13.4. 4 | 50 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 7.13.4. 5 | 50 mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.13.4. 6 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 7.13.4. 7 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 7.13.4. 8 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.13.4. 9 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.13.4. 10 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at SM13-F6 Chainage 1500m | | | | |
| | | | | | |
| 7.13.4. | 90 x 80 mm dia UPVC/G.I VJ | No. | 2 | | |

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| 11 | coupling | | | | |
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| 7.13.4. 12 | 80mm dia, 0.5m long single flanged GI spigot | No. | 2 | | |
| | | | | | |
| 7.13.4. 13 | 80 x 50 mm dia double flanged tee, 3rd side threaded. | No. | 1 | | |
| | | | | | |
| 7.13.4. 14 | 50mm dia double threaded steel pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 7.13.4. 15 | 50mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.13.4. 16 | 50mm dia gate Valve | No. | 1 | | |
| | | | | | |
| 7.13.4. 17 | 50mm dia GI Union | No. | 2 | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at SM13-F6 Chainage 2080m | | | | |
| | | | | | |
| 7.13.4. 18 | 63 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 7.13.4. 19 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.13.4. 20 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 7.13.4. 21 | 65mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.13.4. 22 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 7.13.4. 23 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 7.13.4. 24 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.13.4. 25 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.13.4. | 25 mm dia threaded gate Valve | No. | 1 | | |

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| 26 | | | | | |
| | | | | | |
| | 1 No. Double Air Valve (DAV) at SM13-F7 Chainage 1200m | | | | |
| | | | | | |
| 7.13.4.27 | 75 x 65 mm dia UPVC/G.I Adaptor | No. | 2 | | |
| | | | | | |
| 7.13.4.28 | 65 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| | | | | | |
| 7.13.4.29 | 65 x 25 mm dia threaded GI tee | No. | 2 | | |
| | | | | | |
| 7.13.4.30 | 65mm dia threaded GI union | No. | 4 | | |
| | | | | | |
| 7.13.4.31 | 25 mm dia threaded GI pipe, 0.4m long | No. | 1 | | |
| | | | | | |
| 7.13.4.32 | 25 mm dia threaded GI union | No. | 2 | | |
| | | | | | |
| 7.13.4.33 | 25 mm dia threaded GI nipple | No. | 1 | | |
| | | | | | |
| 7.13.4.34 | 25 mm dia threaded Double Air Valve | No. | 1 | | |
| | | | | | |
| 7.13.4.35 | 25 mm dia threaded gate Valve | No. | 1 | | |
| | | | | | |
| 7.13.5 | WASHOUT (W/O) | | | | |
| | | | | | |
| | Excavate for, provide all materials and construct complete w/o spillway chambers of internal dimensions 1500 x 1500 x 2000 mm. Rates to including thrust blocks, pipe supports as shown in the drawings. | No. | 3 | | |
| | | | | | |
| | 1 No. Wash Out (WO) at SM13-F6 Chainage 1220m | | | | |
| | | | | | |
| 7.13.5.1 | 90 x 80 mm dia uPVC/G.I VJ Adaptors | No. | 2 | | |
| | | | | | |
| 7.13.5. | 80mm dia, 0.5m long single flanged | No. | 2 | | |

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|-----------|--|-----|---|--|--|
| 2 | GI spigot | | | | |
| 7.13.5.3 | 80 x 50mm dia GI level invert scour tee with threaded branch | No. | 1 | | |
| 7.13.5.4 | 50mm dia threaded gate valve | No. | 1 | | |
| 7.13.5.5 | 50 x 50mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 7.13.5.6 | 50mm dia threaded GI union | No. | 3 | | |
| 7.13.5.7 | 50mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 7.13.5.8 | 50mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 7.13.5.9 | 50 mm dia uPVC pipe | m | 6 | | |
| | 1 No. Wash Out (WO) at SM13-F7 Chainage 1360m | | | | |
| 7.13.5.10 | 50 x 50 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| 7.13.5.11 | 50 mm dia, 0.5m long threaded GI spigot | No. | 2 | | |
| 7.13.5.12 | 50 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| 7.13.5.13 | 25mm dia gate valve | No. | 1 | | |
| 7.13.5.14 | 25 mm dia, 0.5m long threaded GI spigot | No. | 1 | | |
| 7.13.5.15 | 25 x 25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 7.13.5.16 | 25mm dia GI union | No. | 3 | | |
| 7.13.5. | 25mm dia GI nipple | No. | 2 | | |

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|-----------|--|-----|---|--|--|
| 17 | | | | | |
| 7.13.5.18 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 7.13.5.19 | 25 mm dia uPVC pipe | m | 6 | | |
| | | | | | |
| | 1 No. Wash Out (WO) at SM13-F7 Chainage 1660m | | | | |
| 7.13.5.20 | 32 x 25 mm dia UPVC/G.I Adaptors | No. | 2 | | |
| 7.13.5.21 | 25 mm dia, 0.5m long threaded GI spigot | No. | 3 | | |
| 7.13.5.22 | 25 x 25mm GI dia level invert scour tee with threaded branch | No. | 1 | | |
| 7.13.5.23 | 25mm dia gate valve | No. | 1 | | |
| 7.13.5.24 | 25 x 25 mm dia G.I/uPVC Adaptor | No. | 2 | | |
| 7.13.5.25 | 25mm dia GI union | No. | 3 | | |
| 7.13.5.26 | 25mm dia GI nipple | No. | 2 | | |
| 7.13.5.27 | 25mm dia GI pipe 500mm long with flap valve | No. | 1 | | |
| 7.13.5.28 | 25 mm dia uPVC pipe | m | 6 | | |
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| | SUB-TOTAL CARRIED FORWARD TO COLLECTIONS PAGE | | | | |
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|------------------------------------|--|--|--|--|--|
| | | | | | |
| BILL NO.8 - IN-FIELD SYSTEM | | | | | |

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
|------------|---|------|----------|------------|--------------|
| | | | | | |
| | | | | | |
| | 40 X 25m Plots (3042No.) | | | | |
| | | | | | |
| 6.1 | Plot Hydrants (1 x 3042) | | | | |
| | | | | | |
| 6.1.1 | 20/20 mm dia UPVC/GI adaptor | No. | 6084 | | |
| | | | | | |
| 6.1.2 | 20 mm dia GI elbow | No. | 12168 | | |
| | | | | | |
| 6.1.3 | 20 mm dia GI straight threaded on both sides 1000 mm long | No. | 6084 | | |
| | | | | | |
| 6.1.4 | 20 mm dia GI nipple | No. | 12168 | | |
| | | | | | |
| 6.1.5 | 20 mm dia gate valve | No. | 3042 | | |
| | | | | | |
| 6.1.6 | 20 x 20 mm dia GI tee | No. | 3042 | | |
| | | | | | |
| 6.1.7 | 20 mm dia plug | No. | 3042 | | |
| | | | | | |
| 6.1.8 | 20 mm dia GI union | No. | 3042 | | |
| | | | | | |
| 6.2 | Field Hydrants (1 x 6927) | | | | |
| | | | | | |
| 6.2.1 | 20/20mm dia UPVC/GI adaptor | No. | 3042 | | |
| | | | | | |
| 6.2.2 | 20x20mm dia GI tee | No. | 3042 | | |
| | | | | | |
| 6.2.3 | 20mm dia GI riser (1m long) | No. | 3042 | | |
| | | | | | |
| 6.2.4 | 20mm dia Equal tee | No. | 6084 | | |
| | | | | | |
| 6.2.5 | 20mm dia GI piece (0.1m long) | No. | 3042 | | |
| | | | | | |
| 6.2.6 | 20mm dia GI end caps | No. | 6084 | | |
| | | | | | |
| 6.2.7 | 20mm dia GI end cap/plug | No. | 3042 | | |
| | | | | | |
| 6.3 | Sprinkler System Arrangement (1 x 6927) | | | | |
| | | | | | |
| 6.3.1 | 20mm dia HDPE pipe | m | 91260 | | |

| | | | | | |
|--|---|-----|--------|--|--|
| 6.3.2 | 20/20mm dia HDPE / GI Adapter | No. | 6084 | | |
| 6.3.3 | 20mm dia GI equal tee | No. | 3042 | | |
| 6.3.4 | 1m high, 20mm dia GI riser with support | No. | 3042 | | |
| 6.3.5 | Sprinklers as specified complete with valve sockets | No. | 3042 | | |
| 6.3.6 | 20/20mm dia HDPE line coupler | No. | 3042 | | |
| 6.3.7 | 20mm dia GI plug | No. | 3042 | | |
| 6.4 | In-field Supply Pipeline (Buried) | | | | |
| 6.4.1 | 20mm dia x 40m long UPVC pipe per plot | m | 121680 | | |
| 6.4.2 | 20 mm dia connecting UPVC pipe (10m/plot) | m | 30420 | | |
| 6.4.3 | 20 mm dia UPVC end cap | No. | 3042 | | |
| 6.4.4 | Excavation in normal soil to depth n.e 1m | m3 | 22815 | | |
| TOTAL CARRIED OVER TO GRAND SUMMARY | | | | | |

| BILL NO. 9 - DAYWORKS | | | | | |
|------------------------------|--|-------------|-----------------|-------------------|---------------------|
| ITEM | DESCRIPTION | UNIT | QUANTITY | RATE (KSh) | AMOUNT (KSh) |
| 10.1 | THE WHOLE OF THIS BILL IS PROVISIONAL | | | | |
| | LABOUR | | | | |

| | | | | | |
|-------|--|----------------|-----|--|--|
| | The rates should include for all costs, such as insurance, traveling time, overtime, accommodation, use of small tools of trade, supervision, overheads and profit. Only time engaged upon work will be paid for: | | | | |
| 10.2 | Unskilled labour | Hrs | 250 | | |
| 10.3 | Semi-skilled labour | Hrs | 200 | | |
| 10.4 | Skilled Labour | Hrs | 150 | | |
| | PLANT | | | | |
| | The rates should be included for all operational and maintenance costs, fuel, oil, operators, turn boys, Supervision, overhead and profits. Only the time employed on work will be paid for and the rates should include the idle, traveling and overtime. | | | | |
| 10.5 | Compressor CP with 2 jacks | Hrs | 100 | | |
| 10.6 | Concrete vibrator (petrol or diesel) | Hrs | 80 | | |
| 10.7 | Concrete mixer 10/7 | Hrs | 60 | | |
| 10.8 | Tipper 7 tones | Hrs | 120 | | |
| 10.8 | Excavator 500 Hp | Hrs | 120 | | |
| 10.9 | Portable water pump 50mp 50mm inclusive of hoses, couplings, valves and strainer) | Hrs | 80 | | |
| | MATERIALS | | | | |
| 10.10 | Ordinary Portland cement | tone | 10 | | |
| 10.11 | Mild steel/High yield steel | tone | 10 | | |
| 10.12 | Fine aggregate for concrete | m ³ | 30 | | |
| 10.13 | Coarse Aggregate for concrete max. size 19mm | m ³ | 30 | | |

| | | | | | |
|-------|--|----------------|-----|--|--|
| 10.14 | Use of Shuttering timber | m ² | 500 | | |
| | | | | | |
| | | | | | |
| | TOTAL CARRIED OVER TO GRAND SUMMARY | | | | |
| | | | | | |

SECTION VIII – STANDARD FORMS

1. Form of Tender
2. Appendix to Form of Tender
3. Letter of Acceptance
4. Form of Agreement
5. Form of Tender Security
6. Performance Bank Guarantee(unconditional)
7. Bank Guarantee for Advance Payment
8. Tender Questionnaire
9. Confidential Business Questionnaire
10. Schedule of Materials;- Basic Prices
11. Schedule of Labour;- Basic Prices
12. Details of Sub-Contractors
13. Certificate of Tenderer's Site visit
14. Form of Written Power of Attorney
15. Key Personnel
16. Schedule of Completed Works
17. Schedule of Ongoing Projects
18. Schedule of Plant and Equipment
19. Other Supplementary Information
20. Declaration Form
21. Letter of notification of award

1. FORM OF TENDER (on letterhead of the tenderer)

TO: _____[Name of Employer] _____[Date]
_____[Name and Identification Number of Contract]

Dear Sir,

1. In accordance with the Conditions of Contract, Specifications, Drawings and Bills of Quantities for the execution of the above named Works, we, the undersigned offer to construct, install and complete such Works and remedy any defects therein for the sum of Kshs. _____[Amount in figures]Kenya Shillings _____[Amount in words]
2. We undertake, if our tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Project Manager's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Appendix to Conditions of Contract.
3. We agree to abide by this tender until _____[Insert date], and it shall remain binding upon us and may be accepted at any time before that date.
4. Unless and until a formal Agreement is prepared and executed this tender together with your written acceptance thereof, shall constitute a binding Contract between us.
5. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this _____ day of _____20_____

Signature _____ in the capacity of _____

duly authorized to sign tenders for and on behalf of

_____[Name of Tenderer]
of _____[Address of Tenderer]

Witness; Name _____

Address _____

Signature _____

Date _____

2. APPENDIX TO FORM OF TENDER

(This appendix forms part of the tender)

| CONDITIONS OF CONTRACT | CLAUSE | AMOUNT |
|---|--------|--|
| Tender Security | | Tenders must be accompanied by tender security of an amount of Kes.2,000,000.00 in the form of a bank guarantee issued by a local reputable bank and addressed to the Chief Executive Officer, National Irrigation Authority |
| Amount of Performance Security (Unconditional Bank Guarantee) | 10.1 | Five (5) percent of Tender Sum in the form of Unconditional Bank Guarantee from a local reputable bank |
| Program to be submitted | 14.1 | Not later than 14 days after issuance of Order to Commence |
| Cash flow estimate to be submitted | 14.3 | Not later than 28days after issuance of Order to Commence |
| Minimum amount of Third Party Insurance | 23.2 | As per applicable laws in Kenya |
| Period for commencement, from the Engineer's order to commence | 41.1 | 28 days |
| Time for completion from Commencement Date | 43.1 | Eighteen (18) calendar months |
| Amount of liquidated damages | 47.1 | KES. 30,000.00 per day |
| Limit of liquidated damages | 47.1 | 10% of Contract Value |
| Defect Liability period | 49.1 | 12 Months |
| Percentage of the invoice value of listed materials | 60.2 | 60% |
| Percentage of Retention | 60.5 | 10% of Interim Payment Certificate |
| Limit of Retention Money | 60.5 | 10% of the contract sum |
| Minimum amount of interim certificates | 60.2 | KES.10,000,000.00 |
| Time within which payment to be made after Interim Payment Certificate signed by Engineer | 60.8 | 30 days |
| Time within which payment to be made after Final Payment Certificate signed by Engineer | 60.8 | 45 days |
| Appointer of Arbitrator | 67(3) | Chartered Institute of Arbitrators – Kenya Chapter |
| Notice to Employer and Engineer | 68.2 | The Employers address is: Chief Executive Officer, National Irrigation Authority (NIB) Unyunyizi House, Lenana Road, Hurlingham P.O. Box 30372-00100, Nairobi, Kenya Tel: + 254-20-2711380/468 Fax: +254-20-2722821 |

| | | |
|--|--|--|
| | | /2711347/2723392 E-mail: purchasing@irrigation.go.ke, enquiries@irrigation.go.ke The Engineer's address is: Deputy Chief Executive Officer (Irrigation and Infrastructure Development Services) National Irrigation Authority (NIB) Unyunyizi House, Lenana Road, Hurlingham P.O. Box 30372-00100, Nairobi, Kenya Tel: + 254-20-2711380/468 Fax: +254-20-2722821 /2711347/2723392 E-mail: purchasing@irrigation.go.ke, enquiries@irrigation.go.ke |
|--|--|--|

Name of tenderer.....

Signature of Tender.....Date.....

Stamp.....

3. LETTER OF ACCEPTANCE

[Letterhead paper of the Employer]

_____ [date]

To: _____
[name of the Contractor]

[address of the Contractor]

Dear Sir,

This is to notify you that your Tender dated _____
for the execution of _____
[name of the Contract and identification number, as given in the Tender documents] for the
Contract Price of Kshs. _____ [amount in figures][Kenya
Shillings _____ (amount in words)] in accordance with the
Instructions to Tenderers is hereby accepted.

You are hereby instructed to proceed with the execution of the said Works in accordance with
the Contract documents.

Authorized Signature

Name and Title of Signatory

Attachment : Agreement

4. FORM OF AGREEMENT

THIS AGREEMENT, made the _____ day of _____ 20 _____
between _____ of [or whose registered
office is situated at] _____
(hereinafter called “the Employer”) of the one part AND
_____ of [or whose registered
office is situated at] _____
(hereinafter called “the Contractor”) of the other part.

WHEREAS THE Employer is desirous that the Contractor executes

_____ *(name and identification number of Contract)* (hereinafter called “the Works”) located
at _____ *[Place/location of the Works]* and the Employer has
accepted the tender submitted by the Contractor for the execution and completion of such
Works and the remedying of any defects therein for the Contract Price of
Kshs _____ *[Amount in figures]*, Kenya
Shillings _____ *[Amount in words]*.

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and shall be read and construed as part of this Agreement i.e.
 - (i) Letter of Acceptance
 - (ii) Form of Tender
 - (iii) Conditions of Contract Part I
 - (iv) Conditions of Contract Part II and Appendix to Conditions of Contract
 - (v) Specifications
 - (vi) Drawings
 - (vii) Priced Bills of Quantities
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga
County, Tender No. NIA/T/225/2020-2021

remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

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

The common Seal of _____

Was hereunto affixed in the presence of _____

Signed Sealed, and Delivered by the said _____

Binding Signature of Employer _____

Binding Signature of Contractor _____

In the presence of (i) Name _____

Address _____

Signature _____

[ii] Name _____

Address _____

Signature _____

5. TENDER SECURITY FORM

Whereas [*name of Bidder*] (hereinafter called <the tenderer> has submitted its bid dated [*date of submission of bid*] for the provision of services (hereinafter called <the tender>)

KNOW ALL PEOPLE by these presents that WE [*name of bank*] of [*name of country*], having our registered office at [*name of procuring entity*] (hereinafter called <the procuring entity> in the sum of [*state the amount*] for which payment well and truly to be made to the said procuring entity, the Bank binds itself, its successors, and assigns by these presents. Sealed with the Common Seal of the said Bank this _____ day of _____ 20_____

THE CONDITIONS of this obligation are: -

1. If the tenderer withdraws its tender during the period of tender validity specified by the procuring entity on the Form; or
2. If the tender, having been notified of the acceptance of its tender by the procuring entity during the period of tender validity
 - (a) fails or refuses to execute the Contract Form, if required; or
 - (b) fails or refuses to furnish the performance security, in accordance with the Instructions to tenders.

We undertake to pay to the procuring entity up to the above amount upon receipt of its first written demand, without the procuring entity having to substantiate its demand, provided that in its demand the procuring entity will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the conditions, specifying the occurred condition(s)

This tender guarantee will remain in force up to and including thirty (30) days after the period of tender validity, i. e until (*date – 120 days from date of tender opening*), and any demand in respect thereof should reach the Bank not later than the above stated date.

[Authorized Signatories and official stamp of the Bank]

7. PERFORMANCE BANK GUARANTEE (UNCONDITIONAL)

To: _____ (Name of Employer) _____ (Date)
_____ (Address of Employer)

Dear Sir,

WHEREAS _____ (hereinafter called “the Contractor”) has undertaken, in pursuance of Contract No. _____ dated _____ to execute _____ (hereinafter called “the Works”);

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

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

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of Kshs. _____ (amount of Guarantee in figures) Kenya Shillings _____ (amount of Guarantee in words), and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of Kenya Shillings _____ (amount of Guarantee in words) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

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

We further agree that no change, addition or other modification of the terms of the Contract or of the Works to be performed 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 be valid until the date of issue of the take over certificate.

SIGNATURE AND SEAL OF THE GUARANTOR _____

Name of Bank _____

Address _____

Date _____

8. BANK GUARANTEE FOR ADVANCE PAYMENT

To: _____ [name of Employer] _____ (Date)
_____ [address of Employer]

Gentlemen,

Ref: _____ [name of Contract]

In accordance with the provisions of the Conditions of Contract of the above-mentioned Contract, We, _____ [name and Address of Contractor] (hereinafter called “the Contractor”) shall deposit with _____ [name of Employer] a bank guarantee to guarantee his proper and faithful performance under the said Contract in an amount of Kshs. _____ [amount of Guarantee in figures] Kenya Shillings _____ [amount of Guarantee in words].

We, _____ [bank or financial institution], as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____ [name of Employer] on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding Kshs _____ [amount of Guarantee in figures] Kenya Shillings _____ [amount of Guarantee in words], such amount to be reduced periodically by the amounts recovered by you from the proceeds of the Contract.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between _____ [name of Employer] and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

No drawing may be made by you under this guarantee until we have received notice in writing from you that an advance payment of the amount listed above has been paid to the Contractor pursuant to the Contract.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ (name of Employer) receives full payment of the same amount from the Contract.

Yours faithfully,

Signature and Seal _____

Name of the Bank or financial institution _____

Address _____

Date _____

Witness: Name: _____

Address: _____

Signature: _____

Date: _____

9. TENDER QUESTIONNAIRE

Please fill in block letters.

1. Full names of tenderer

.....

2. Full address of tenderer to which tender correspondence is to be sent (unless an agent has been appointed below)

.....

3. Telephone number (s) of tenderer

.....

4. Telex address of tenderer

.....

5. Name of tenderer's representative to be contacted on matters of the tender during the tender period

.....

6. Details of tenderer's nominated agent (if any) to receive tender notices. This is essential if the tenderer does not have his registered address in Kenya (name, address, telephone, telex)

.....

Signature of Tenderer:.....

Make copy and deliver to : _____ (*Name of Employer*)

10. CONFIDENTIAL BUSINESS QUESTIONNAIRE

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

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

Part 1 – General

Business Name

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

Plot No..... Street/Road

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

Nature of Business.....

Current Trade Licence No..... Expiring date.....

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

Name of your bankers.....

Branch.....

Part 2 (a) – Sole Proprietor

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

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

*Citizenship details

Part 2 (b) – Partnership

Give details of partners as follows:

Tender Name: Tender for Rehabilitation Works of Kirinyaga Clusters Irrigation Development Project in Kirinyaga County, Tender No. NIA/T/225/2020-2021

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

Part 2(c) – Registered ComPany:

Private or public.....

State the nominal and issued capital of the Company-

Nominal Kshs.....

Issued Kshs.....

Give details of all directors as follows:

| | <i>Name in full</i> | <i>Nationality</i> | <i>Citizenship Details*</i> | <i>Shares</i> |
|--|---------------------|--------------------|-----------------------------|---------------|
|--|---------------------|--------------------|-----------------------------|---------------|

| | | | | |
|----|-------|--|--|--|
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |

Part 2(d) – Interest in the Firm:

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

I certify that the information given above is correct.

| | | |
|---------|-------------|--------|
| | | |
| (Title) | (Signature) | (Date) |

* Attach proof of citizenship

11. SCHEDULE OF MATERIALS;-BASIC PRICES

(Ref: Clause 70 of Conditions of Contract)

| MATERIAL | UNIT | ORIGIN AND PRICE | | | TRANSPORTATION COST FROM SOURCE OF ORIGIN | |
|---------------------|------|----------------------|----------------|-------|---|-----------------|
| | | COUNTRY OF ORIGIN | SUPPLIER PRICE | PRICE | MODE | PRICE (KSHS) |
| Cement | Mg | | | | | |
| Lime | Mg | | | | | |
| Sand | Mg | | | | | |
| Aggregate | Mg | | | | | |
| Diesel | L | | | | | |
| Regular Petrol | L | | | | | |
| Super Petrol | L | | | | | |
| Kerosene | L | | | | | |
| Structural steel | Mg | | | | | |
| Gabion Mesh | M2 | | | | | |
| Reinforcement Steel | Mg | | | | | |
| Explosives | Kg | | | | | |
| Oil and Lubricants | L | | | | | |
| Bitumen Emulsion A3 | L | | | | | |
| Bitumen Emulsion A4 | L | | | | | |
| Bitumen Emulsion K1 | L | | | | | |
| Bitumen Emulsion K3 | L | | | | | |
| Bitumen 80/100 | Kg | | | | | |
| Bitumen MC 30 | ML | | | | | |

| | | | |
|-------------------------------|----|--|--|
| Bitumen MC 70 | L | | |
| Bitumen MC 3000 | L | | |
| Ammonium nitrate for blasting | Kg | | |

I certify that the above information is correct.

.....

(Title)

.....

(Signature)

.....

(Date)

The prices inserted above shall be those prevailing 30 days before the submission of Tenders and shall be quoted in Kenya Shillings using the exchange rates specified in the Appendix to Form of Tender.

Prices of imported materials to be quoted CIF Mombasa or Nairobi as appropriate depending on whether materials are imported by the tenderer directly or through a local agent.

Transportation costs for imported materials to be quoted from Mombasa or Nairobi as appropriate to _____ (Contract Site) depending on whether materials are imported directly by the tenderer or through a local agent.

12. SCHEDULE OF LABOUR:- BASIC RATES

(Reference: Clause 70 of Conditions of Contract)

| LABOUR CATEGORY | UNIT (MONTH/SHIFT/HOUR) | RATES |
|-----------------|----------------------------|-------|
| | | |

Categories to be generally in accordance with those used by the Kenya Building Construction and Engineering and Allied Trades Workers' Union.

13. DETAILS OF SUB-CONTRACTORS

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

Failure to comply with this requirement may invalidate the tender.

(1) Portion of Works to be sublet:

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

.....

.....

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

.....

.....

(2) Portion of Works to sublet:

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

.....

.....

.....

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

.....

[Signature of Tenderer)

Date

14. CERTIFICATE OF TENDERER’S VISIT TO SITE

This is to certify that

[Name/s].....

.....

Being the authorized representative/Agent of [Name of Tenderer]

.....

.....

participated in the organized inspection visit of the site of the works for the (Name of Contract:)

..... day of.....20.....

Signed.....

(Employer’s Representative)

.....

15. FORM OF WRITTEN POWER-OF-ATTORNEY

The Tenderer consisting of a joint venture shall state here below the name and address of his representative who is authorised to receive on his behalf correspondence in connection with the Tender.

.....
(Name of Tenderer's Representative in block letters)

.....
(Address of Tenderer's Representative)

.....
(Signature of Tenderer's Representative)

16. KEY PERSONNEL

| DESIGNATION | NAME | NATIONALITY | SUMMARY OF QUALIFICATIONS AND EXPERIENCE |
|--|------|-------------|--|
| Headquarters: 1. Director 2. 3. 4. 5. etc. | | | |
| Site Office: 1. Site Superintendent 2. 3. 4. 5. etc. | | | |

I certify that the above information is correct.

.....
(Title)

.....
(Signature)

.....
(Date)

**17. SCHEDULE OF COMPLETED WORKS CARRIED OUT BY THE TENDERER
IN THE TEN (10) YEARS**

| DESCRIPTION OF WORKS AND CLIENT | TOTAL VALUE OF WORKS (KSHS) | CONTRACT PERIOD (YEARS) | YEAR COMPLETED |
|---------------------------------|-----------------------------|-------------------------|----------------|
| | | | |

I certify that the above Civil Works were successfully carried out and completed by ourselves.

.....
(Title)

.....
(Signature)

.....
(Date)

*Value in Kshs using Central Bank of Kenya mean exchange rate at a reference date 30 days before date of tender opening.

18. SCHEDULE OF ONGOING PROJECTS

| DESCRIPTION OF WORK AND CLIENT | CONTRACT PERIOD | DATE OF COMMEN- CEMENT | DATE OF COMPLETION | TOTAL VALUE OF WORKS (KSHS.) | PERCENTAGE COMPLETED TO DATE |
|--------------------------------------|--------------------|------------------------------|-----------------------|---------------------------------------|------------------------------------|
| | | | | | |

I certify that the above Civil Works are being carried out by ourselves and that the above information is correct.

.....
(Title)

.....
(Signature)

.....
(Date)

19. SCHEDULE OF PLANT AND EQUIPMENT

Major items of Contractor's Equipment proposed for carrying out the Works. List all information requested below. Refer also to Sub-Clause 2.1 (c) of the Instructions to Tenderers.

| Item of Equipment | Description, make, and age (years) | Condition (new, good, poor) and number available | Owned, leased (from whom?) |
|-------------------|------------------------------------|--|----------------------------|
| (a) (b) | | | |

20. OTHER SUPPLEMENTARY INFORMATION

1. Financial reports for the last five years, balance sheets, profit and loss statements, auditors' reports etc. List them below and attach copies.
.....
.....
.....
2. Evidence of access to financial resources to meet the qualification requirements. Cash in hand, lines of credit etc. List below and attach copies of supporting documents
.....
.....
.....
3. Name, address , telephone, telex, fax numbers of the Tenderer's Bankers who may provide reference if contacted by the Employer.
.....
.....
.....
4. Proposed Program (work method and schedule). Descriptions, drawings, and charts, as necessary, to comply with the requirements of the bidding documents
.....
.....
.....
.....
.....
.....

5. Information on current litigation in which the Tenderer is involved.

| OTHER PARTY (IES) | CAUSE OF DISPUTE | AMOUNT INVOLVED (KSHS) |
|-------------------|------------------|---------------------------|
| | | |

I certify that the above information is correct.

.....

Title

.....

Signature

.....

Date

21. DECLARATION FORM

Date

To *(Name and address of Employer)*

The tenderer i.e. (name and address)

declare the following:

- a) Has not been debarred from participating in public procurement.
- b) Has not been involved in and will not be involved in corrupt and fraudulent practices regarding public procurement.

Title

Signature

Date

(To be signed by authorized representative and officially stamped)

22. LETTER OF NOTIFICATION OF AWARD

Address of Procuring Entity

To:

RE: Tender No.

Tender Name

This is to notify that the contract/s stated below under the above mentioned tender have been awarded to you.

1. Please acknowledge receipt of this letter of notification signifying your acceptance.
2. The contract/contracts shall be signed by the parties within 30 days of the date of this letter but not earlier than 14 days from the date of the letter.
3. You may contact the officer(s) whose particulars appear below on the subject matter of this letter of notification of award.

(FULL PARTICULARS)

SIGNED FOR ACCOUNTING OFFICER