THE UNITED REPUBLIC OF TANZANIA

PRESEDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVRNMENT

MOROGORO REGION

CONTRACT DOCUMENT

Contract No. MRRH/052/2021-2022/W/02

For

PROPSED CONSTRUCTION OF INTENSIVE CARE (ICU) FOR REGIONAL REFERAL HOSPITAL

EMPLOYER.
REGIONAL ADMINISTRATION
SECRETARY,
P.O.BOX 650,
MOROGORO.

CONTRACTOR.
M/S VETA MIKUMI-VTC

P.O.BOX 110,
MOROGORO

2021-2022`

FORM OF AGREEEMENT

CONTRACT NO: MRRH/052/2021-2022/W/02

This Agreement, made the 04th *[date]* day of **January** *[month]*, **2022** between ***REGIONAL ADMINISTRATIVE SECRETARY of P.O.BOX 650, MOROGORO*** *[Name and address of Employer]* (Hereinafter called "the Employer") on the one part and

M/S, VETA MIKUMI-VTC, P.O. BOX 110 - MOROGORO.

[Name and address of Contractor] (Hereinafter called "the Contractor") on the other part.

WHEREAS the Employer is desirous that certain works should be carried out, viz:

PROPOSED CONSTRUCTION OF INTENSIVE CARE UNIT (ICU) FOR REGIONAL REFERAL HOSPITAL *[name of the project]* located at **MOROGORO** and has by the letter of Acceptance Ref. No *MRRH/152/2021/2022/W/O2* dated *17th December, 2021* accepted a Tender by the Contractor for execution, and completion of such Works.

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 and;

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz: -

    1. Form of Agreement;
    2. Letter of Acceptance;
    3 Contractor's Bid/Bid Submission Form,
    4. Special Conditions of Contract,
    5. General Conditions of Contract
    6. Specifications
    7. Drawings
    8. Priced Bill of Quantities

9. Any other document forming part of the contract (Minutes of clarifications, anti-bribery memorandum and power of attorney)

3. All the aforesaid documents are hereinafter referred to as 'the Contract' and shall be taken as complementary and mutually explanatory of one another but in case of ambiguities or discrepancies shall take precedence in the order set out above.

4. 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 in conformity, in all respects, with the provisions of the Contract.

5. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the works, the sum of Tanzanian Shillings **Say Tanzanian Shillings Five Hundred Sixty Million only** [*amount in words*] **(Tshs 560,000,000/-** [*amount in figures*]), Vat 18% Exclusive hereinafter referred to as the "Contract Price", at the times and in the manner prescribed by the Contract.

IN WITNESS where of, the parties hereto have set their hands and seals on the day and year first above written.

REGIONAL ADMINISTRATIVE SECRETARY
P.O. Box 650
MOROGORO

The Common Seal of _____ (Employer)

Binding Signature of Client _____

Was hereunto affixed in the presence of: _____ (Client Witness)

The Common Seal of _____ (Contractor)

Binding Signature of Service Provider _____

In the presence of: _____ Contractor's Witness)

THE UNITED REPUBLIC OF TANZANIA
PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT

Telegraphic Address: "REGCOM"
Telephone No.: 260 4227/260 4237
Fax No.: 260 0974
Email : rasmorogoro@pmoralg.go.tz.
In Reply please quote:

TheRegionalCommissioner's Office
P.O. Box 650,
MOROGORO.

Ref no. MRRH/152/2021/2022/W/02

03rd January, 2022.

VETA MIKUMI VTC,
P.O. Box 110,
MOROGORO.

LETTER OF ACCEPTANCE

SUB; BID NO MRRH/152/2021-2022/W/02 – PROPOSED CONSTRUCTION OF INTENSIVE CARE UNIT (ICU) FOR REGIONAL REFERAL HOSPITAL.

Refererence is made to your submitted bid for the above mentioned contract.

This is to notify that,Regional Secretariat Tender Board decided to award your bid dated 17th-12-2021-Proposed Construction of Intensive Care Unit (ICU) for Regional Referral Hospital for the contract price of Tshs 560,000,000 Vat 18% Exclusive (Say Tanzanian Shillings Five Hundred Sixty Million only) for the period Four Months.

The Institution of Engineers,Tanzania shall appoint the Adjudicator and The Project Manager *responsible for supervising the execution of the Works and administering the contract on behalf* of Regional Administrative Sectetary - Morogoro is Eng.Ezron C.Kilamhama

Your duly authorize representative with a valid Power of Attorney is invited for signing the contract agreement with Regional Administrative Sectetary-Morogoro.

Please confirm receipt of this letter and that you will attend the Signing ceremony on 3th January, 2022

Thanks,

M. A. MTUNGIUJA
REGIONAL ADMINISTRATIVE SECRETARY
MOROGORO

SECTION IX: FORMS - BID

1. Form of Bid

16 December 2021

To: **Regional Administrative Secretary, P. O. Box 650, MOROGORO.**

We offer to execute the Intensive Care Unit (ICU) **Tender NO MRRH/152/2021_2022/W/02** in accordance with the Conditions of Contract accompanying this Tender for the Contract Price of *[Tsh. 726,833,390.00], [Seven Hundred Twenty Six Million, and Eight Hundred Thirty Three Thousand Three Hundred Ninety only]* - VAT INCLUSIVE.
The construction will be completed within four (4) Months

The Contract shall be paid in **TSHS:**

Currency	Percentage payable in currency	Rate of exchange: one foreign equals *[insert local]*	Inputs for which foreign currency is required		
(a)	Tsh.	N/A	N/A		

The advance payment required is:-

Amount	Currency(TSHS)
(a) 81,219,075.00	TSH

We accept the appointment of **National Construction Council (NCC)** as the Adjudicator.

We are not participating, as bids, in more than one bid in this bidding process other than alternative bids in accordance with the bidding documents.

Our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the contract has not been declared ineligible by the Government of the United Republic of Tanzania under Tanzania's laws or any other official regulations.

This bid and your written acceptance of it shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any Bid you receive.

We hereby confirm that this bid complies with the bid validity and bid security required by the bidding documents and specified in the Bid Data Sheet.

Authorized Signature: _____

Name and Title of Signatory: _____

Name of Bidder: _____

Address: P.O. Box 110, Mikumi - 16th Dec. 2021

SECTION V: SPECIAL CONDITIONS OF CONTRACT

Special Conditions of Contract (SCC)

The following Special Conditions of Contract shall supplement the General editions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract. Except where otherwise indicated, all Special Conditions of Contract should be filled in by the Employer prior to issuance of the bidding documents. Schedules and reports to be provided by Employer should be annexed.

<table>
<tr><th>SCC Clause</th><th>GCC Clause</th><th>Description</th></tr>
<tr><td></td><td></td><td>A. General</td></tr>
<tr><td>1</td><td>1.1</td><td>The Employer is: Medical Officer Incharge,Regional Referal Hospital-Morogoro, P. o. Box 110, Morogoro

The Adjudicator is: The National Construction Council (NCC), Tanzania

The Defects Liability Period is 365 days.

The Project Manager is RAS Engineer P.O BOX 650, Morogoro.

The name and identification number of the Contract is Bid number MRRH/052/2021/2022/W/02 Proposed Construction of Intensive Care Unit (ICU) for Regional Referal Hospital

The works have been described as follows:

<table>
<tr><th>Contract Name</th><th>Major Activities</th></tr>
<tr><td>Proposed Construction of Intensive Care Unit (ICU) for Regional Referal Hospital</td><td>Construction of structure, Walling, Roofing, Doors, Windows, Finishing, Painting & Decoration and Plumbing and Engineering Installation</td></tr>
</table>
</td></tr>
<tr><td></td><td></td><td>The Start Date shall be: 3 days after Signing of Contract.

The Intended Completion Date for the whole of the Works shall be: 4 Months from the start date.</td></tr>
<tr><td></td><td></td><td>The following documents also form part of the Contract:</td></tr>
</table>

		The project sites are all located in MOROGORO.
2.	2.2	Indicate whether there is section completion is: **not specified**
3.	2.3(9)	List other documents that form part of the contract if any: **None**
4.	3.1	The language of the Contract documents is ***English Language*** The law that applies to the Contract is the **Tanzanian Law.**
5.	9.1	Include the Schedule of Other Contractors, if any. *N/A*
6.	10.1	Include the Schedule of Key Personnel. **Site Agent**- Professional Civil Engineer registered with ERB with experience of 3 years and above in same position and similar works **Site Engineer(s)**- Professional Civil Engineer with 1year experience **Architect**- Registered Architect with AQRB **QS**- Registered QS with AQRB Surveyors, Foreman,
7.	14.1	The minimum insurance covers shall be: The minimum insurance covers shall be: (a) Loss of or damage to the Works, Plant, and Materials TShs 230,000,000 (b) Loss of or damage to Equipment TShs 50,000,000; (c) Loss of or damage to property (except the Works, Plant, Materials, and Equipment) in connection with the Contract TShs 15,000,000.; and (d) personal injury or death TShs 10,000,000.
8.	15.1	Site Investigation Reports available to the Bidder are: **None**
9.	22.4	The other measures include: a. Minimising the number of migrant workers employed on the project and household in the site camp b. Providing access to voluntary counseling and testing (VCT)

		c. Providing psychological support and health care including prevention and treatment of opportunistic infections for workers infected and affected, as well as their families d. Providing condoms (male and female) to workers
10.	**24.1 & 47.1**	The Site Possession Date shall be: **3 days after Contract Signing.**

11.	**28.2**	Hourly rate of Fees payable to the Adjudicator is **Tshs 100,000.** Types of reimbursable expenses to be paid to the Adjudicator include: *a)* Costs of Report Production. b) Hire of any facilities for adjudication. c) Consultations with Specialists in other disciplines as the needs arises. d) Transport and Communication
12.	**28.3**	Arbitration will take place at *[insert the place]* in accordance with rules and regulations published by **Tanzania Institute of Arbitration** and in accordance with the Laws of the United Republic of Tanzania.
13.	**29.1**	Appointing Authority for the Adjudicator: **National Construction Council (NCC)**
		B. Time Control
14.	**30.1**	The Contractor shall Submit a Programme for the Works within 3 days of delivery of the Letter of Acceptance.
15.	**30.3**	The period between Programme updates is: *90* **days.**
16.	**30.3**	The amount to be withheld by the Project Manager in the case the contractor does not submit an updated programme is: **Tsh 1,000,000.**
		C. Quality Control
17.	**38.1**	The Defects Liability Period is **365 days.**
		D. Cost Control
18	**46.1**	The interest rate shall be 1.5% above prevailing interest rate for commercial borrowing from the contractors bank
19.	**47.1**	Minimum Amount of Interim Payment Certificate will be TShs 28,000,000
21.	**50**	The contract is not subject to price adjustment in accordance

		with Clause 50 of the General Conditions of Contract.
22.	51.1	The amount of retention is ten (10%) Percent of value of works of Interim Payment Certificate'.
		Limit of retention will be five (5%) Percent of contract price.

23.	52.1	The amount of liquidated damages is 0.1% of the Contract Price per day applicable on expiry of two months designated completion period.
	52.1	The maximum amount of liquidated damages must be equivalent to the amount of the performance security 10% of the Contract Price.
24.	53.1	The bonus for early completion is zero
25.	54.1	The amount of advance payment shall be Fifteen per cent of the contract sum payable within twenty-eighty days after submission of the application for advance payment accompanied by an unconditional Bank Guarantee from a bank acceptable to the Employer.
		Monthly Recovery of Advance Payment: twenty (25%). percent of amount of Interim Payment Certificate.
26.	55.1	The Performance Security shall be a minimum amount equivalent to 10 percent of the contract price for a bank guarantee and 30% for a performance bond.
		A. Finishing the Contract
27.	61.1	As built drawings shall be supplied by the contractor within 28 days after issuance of substantial completion certificate. Operating manual shall be supplied by the contractor 28 days prior to substantial completion date.
28.	61.2	The amount to be withheld by the Project Manager in the case the contractor does not submit as built drawings is: TShs 500,000 per week. The amount to be withheld by the Project Manager in the case the contractor does not submit operating manual is TShs 500,000 per week.

SECTION IV: GENERAL CONDITIONS OF CONTRACT

Table of Clauses

Sec. IV

A. General

1. Definitions 1.1 Boldface type is used to identify defined terms.

The **Adjudicator** is the person appointed jointly by the Employer and the Contractor to resolve disputes in the first instance, as provided for in Clauses 24 and 25 hereunder.

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

Compensation Events are those defined in Clause 47 hereunder.

The **Completion Date** is the date of completion of the Works as certified by the Project Manager, in accordance with Sub-Clause 55.1.

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

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

The **Contractor's Bid** is the completed bidding document submitted by the Contractor to the Employer.

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

Days are calendar days; months are calendar months.

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

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

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

The **Defects Liability Period** is the period named in the **Special Conditions of Contract** and calculated from the Completion Date.

Drawings include calculations and other information provided or approved by the Project Manager for the

execution of the Contract.

The **Employer** is the party who employs the Contractor to carry out the Works.

Equipment is the Contractor's machinery and vehicles brought temporarily to the Site to construct the Works.

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

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

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

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

The **Project Manager** is the person named in the **Special Conditions of Contract** (or any other competent person appointed by the Employer and notified to the Contractor, to act in replacement of the Project Manager) who is responsible for supervising the execution of the Works and administering the Contract.

The **Site** is the area defined as such in the **Special Conditions of Contract**.

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

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

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

A **Subcontractor** is a person or corporate body who has a

Contract with the Contractor to carry out a part of the work in the Contract, which includes work on the Site.

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

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

The **Works** are what the Contract requires the Contractor to construct, install, and turn over to the Employer, as defined in the **Special Conditions of Contract**.

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

2. Interpretation

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter, and the other way around. Headings have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Project Manager will provide instructions clarifying queries about these Conditions of Contract.

2.2 If sectional completion is specified in the **Special Conditions of Contract**, references in the Conditions of Contract to the Works, the Completion Date, and the Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion Date for the whole of the Works).

2.3 The documents forming the Contract shall be interpreted in the following order of priority:

(1) Agreement,

(2) Letter of Acceptance,

(3) Contractor's Bid,

(4) Special Conditions of Contract,

(5) Conditions of Contract,

(6) Specifications,

(7) Drawings,

(8) Bill of Quantities, and

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

3. Language and Law

3.1 The language of the Contract and the law governing the Contract are stated in the **Special Conditions of Contract.**

4. Confidentiality

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

5. Project Manager's Decisions

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

6. Delegation

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

7. Communications

7.1 Communications between parties that are referred to in the Conditions shall be effective only when in writing. A notice shall be effective only when it is delivered.

8. Subcontracting

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

9. Other Contractors

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

10. Personnel

10.1 The Contractor shall employ the key personnel named in the Schedule of Key Personnel, as referred to in the **Special Conditions of Contract**, to carry out the functions stated in the Schedule or other personnel approved by the Project Manager. The Project Manager will approve any proposed replacement of key personnel only if their relevant qualifications and abilities are substantially equal to or better than those of the personnel listed in the Schedule.

10.2 If the Project Manager asks the Contractor to remove a

person who is a member of the Contractor's staff or work force, stating the reasons, the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

11. Employer's and Contractor's Risks

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

12. Employer's Risks

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

(a) The risk of personal injury, death, or loss of or damage to property (excluding the Works, Plant, Materials, and Equipment), which are due to

(i) use or occupation of the Site by the Works or for the purpose of the Works, which is the unavoidable result of the Works or

(ii) negligence, breach of statutory duty, or interference with any legal right by the Employer or by any person employed by or contracted to him except the Contractor.

(a) The risk of damage to the Works, Plant, Materials, and Equipment to the extent that it is due to a fault of the Employer or in the Employer's design, or due to war or radioactive contamination directly affecting the country where the Works are to be executed.

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

(a) a Defect which existed on the Completion Date,

(b) an event occurring before the Completion Date, which was not itself an Employer's risk, or

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

13. Contractor's Risks

13.1 From the Starting Date until the Defects Correction Certificate has been issued, the risks of personal injury, death, and loss of or damage to property (including, without limitation, the Works, Plant, Materials, and Equipment)

which are not Employer's risks are Contractor's risks.

14. Insurance

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

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

(b) loss of or damage to Equipment;

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

(d) personal injury or death.

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

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

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

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

15. Site Investigation Reports

15.1 The Contractor, in preparing the Bid, shall rely on any Site Investigation Reports referred to in the **Special Conditions of Contract**, supplemented by any information available to the Bidder.

16. Queries about the Special Conditions of Contract

16.1 The Project Manager will clarify queries on the **Special Conditions of Contract**.

17. Contractor to Construct the Works

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

18.Commence-ment and Completion

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

19. Approval by the Project Manager

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

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

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

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

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

20. Protection of the Environment

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

20.2 The Contractors shall ensure that emissions, surface discharges and effluent from his activities shall not exceed prescribed values in the environmental laws.

21. Labour Laws

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

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

22. Health and Safety

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

personnel.

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

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

22.4 The Contractor shall conduct an HIV-Aids awareness programme, and shall take other such measures as specified in the **Special Conditions of Contractor** to reduce the risk of transfer of HIV virus between and among Contractor personnel, the Employers Staff and the surrounding community.

23. Discoveries

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

24. Possession of the Site

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

25. Access to the Site

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

26. Instructions, Inspections and Audits

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

26.2 The Contractor shall permit the Government of the United Republic of Tanzania to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Government of the United Republic of Tanzania, if so

required by the Government of the United Republic of Tanzania

27. Disputes

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

28. Procedure for Disputes

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

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

28.3 The arbitration shall be conducted in accordance with the arbitration procedure published by the institution named and in the place shown in the **Special Conditions of Contract**.[1]

29. Replacement of Adjudicator

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

B. Time Control

30. Programme

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

30.2 An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work, including any changes to the sequence of the activities.

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

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

31. Extension of the Intended Completion Date

31.1 The Project Manager shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work, which would cause the Contractor to incur additional cost.

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

32. Acceleration

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

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

33. Delays Ordered by the Project Manager

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

34. Management Meetings

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

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

35. Early Warning

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

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

C. Quality Control

36. Identifying Defects

36.1 The Project Manager shall check the Contractor's work and notify the Contractor of any Defects that are found. Such checking shall not affect the Contractor's responsibilities. The Project Manager may instruct the Contractor to search for a Defect and to uncover and test any work that the Project Manager considers may have a Defect.

37. Tests

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

38. Correction of Defects

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

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

38.3 If the Contractor has not corrected a defect within the time specified in the Employer's notice, a penalty for lack of performance will be paid by the Contractor. The amount to be paid will be calculated as a percentage of the cost of having the defect correct, assessed as described in Clause 49.

39. Uncorrected Defects

39.1 If the Contractor has not corrected a Defect within the time specified in the Project Manager's notice, the Project Manager will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

D. Cost Control

40. Bill of Quantities

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

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

41. Changes in the Quantities

41.1 If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than

25 percent, provided the change exceeds 1 percent of the Initial Contract Price, the Project Manager shall adjust the rate to allow for the change.

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

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

42. Variations

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

43. Payments for Variations

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

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

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

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

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

44. Cash Flow Forecasts

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

45. Payment Certificates

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

45.2 The Project Manager shall check the Contractor's monthly statement and certify the amount to be paid to the Contractor within twenty eight 28 days of receipt of the certificate from the contractor.

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

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

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

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

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

46. Payments

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

46.2 If an amount certified is increased in a later certificate or as a result of an award by the Adjudicator or an Arbitrator, the Contractor shall be paid interest upon the delayed payment as

set out in this clause. Interest shall be calculated from the date upon which the increased amount would have been certified in the absence of dispute.

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

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

47. Compensation Events

47.1 The following shall be Compensation Events:

(a) The Employer does not give access to a part of the Site by the Site Possession Date stated in the **Special Conditions of Contract**.

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

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

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

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

(f) Ground conditions are substantially more adverse than could reasonably have been assumed before issuance of the Letter of Acceptance from the information issued to bidders (including the Site Investigation Reports), from information available publicly and from a visual inspection of the Site.

(g) The Project Manager gives an instruction for dealing with an unforeseen condition, caused by the Employer, or additional work required for safety or other reasons.

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

(i) The advance payment is delayed.

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

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

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

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

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

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

48. Taxes

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

49. Currencies

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

50. Price Adjustment

50.1 The amounts payable to the Contractor, in various currencies pursuant to Sub-Clause 45.1, shall be adjusted in respect of

the rise or fall in the cost of labor, Contractor's Equipment, Plant, materials, and other inputs to the Works, by applying to such amounts the formulae prescribed in this clause.

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

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

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

where;

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

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

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

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

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

The value of net work done, certified by the Project Manager, in any monthly Interim or Final Certificate as payable by the Employer to the Contractor before deduction of any retention

money shall be increased or decreased by an amount of **'F'.**

$$F = PnxPc$$

where;

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

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

- any amount for payment or repayment of any advance payment;
- any amount for materials on site (if any);
- any amounts for nominated sub-contractors (if any)
- any amounts for any other items based on actual cost or current prices; or
- any sums for increase or decreases in the Contract Price paid under this Sub-Clause

and

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

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

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

50.6 If the Contractor fails to complete the Works within the time

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

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

51. Retention

51.1 The Employer shall retain from each payment due to the Contractor the proportion stated in the **Special Conditions of Contract** until Completion of the whole of the Works.

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

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

52. Liquidated Damages

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

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

Sub-Clause 46.1.

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

53. Bonus

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

54. Advance Payment

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

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

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

55. Performance Securities

55.1 The Performance Security shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employer, and denominated in the types and proportions of the currencies in which the Contract

Price is payable. The Performance Security shall be valid until a date 28 days from the date of issue of the Certificate of Completion in the case of a Bank Guarantee, and until one year from the date of issue of the Completion Certificate in the case of a Performance Bond.

56. Dayworks

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

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

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

57. Cost of Repairs

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

E. Finishing the Contract

58. Completion Certificate

58.1 The Contractor shall request the Project Manager to issue a certificate of Completion of the Works, and the Project Manager will do so upon deciding that the work is completed.

59. Taking Over

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

60. Final Account

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

61. Operating and Maintenance Manuals

60.1 If "as built" Drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the **Special Conditions of Contract.**

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

62. Termination

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

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

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

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

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

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

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

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

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

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

For the purpose of this paragraph:

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

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

62.3 When either party to the Contract gives notice of a breach of Contract to the Project Manager for a cause other than those listed under Sub-Clause 62.2 above, the Project Manager shall decide whether the breach is fundamental or not.

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

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

63. Payment upon Termination

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

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

64. Property

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

65. Release from Performance

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

66. Suspension of Financing

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

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

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

SECTION VI: SPECIFICATIONS

SECTION VI: SPECIFICATIONS

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 PRELIMINARY & GENERAL

1.1 Advance Payments Guarantee

The advance Payments Guarantee shall be in the form of an unconditional bank guarantee by a bank acceptable to the employer in amounts and currencies equal to the advance payments. The guarantee shall remain effective until the advance payment has been repaid, but the amount of the Guarantee shall be progressively reduced by the amounts repaid by the Contractor. Interest will not be charged on the advance payments.

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

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

1.2 Performance Security

The performance Security shall be provided to the Employer no later than the date specified in the letter of acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the employer, and denominated in the types and proportions of the currencies in which the Contract Price is payable. The performance Security shall be valid until a date 28 days from the date of issue of the certificate of Completion in the case of a bank Guarantee, and until one year from the date of issue the Completion Certificate in the case of a performance Bond.

1.3 Insurance

The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from reputable insurance companies and acceptable to the Employer, from the Start Date to the end of the Defects Liability Period, in the amounts and deductibles started in the Special Conditions of Contract for the following events which are due to the Contractor's risks:

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

(b) Loss of or damage to the equipment,

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

(d) Personal injury or dearth

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

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

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

1.4 Drawings

The Drawings for this contract are listed in section VII. The Book of Drawings form Volume III of the contract Documents. Where the Contractor is required to furnish drawings, they shall be provided in accordance with the conditions of contract and Contract Data.

The Contractor shall be responsible to supply as built drawings of the contracted works. To this extent he will be required to provide the necessary survey and other data to mark-up the drawings and will provide one draughtsman (proficient in the use of AutoCAD) on a continuous basis throughout the contract period to update the electronic copy drawings, under the direction of the Project Manager.

1.5 Contractors Establishment

1.5.1 Definition of the Site

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

(a) Are being provided by the Employer for the contraction of the permanent works.

(b) Are being provided by the Employer 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.

1.5.2 Use of the Site

(a) Access to the Site is gained from public and private roads. The Contractor shall be responsible for maintaining all existing site roads affected by his work while he on Site. He shall also be responsible for repairing and making good any damage to these roads. If the Contractor, his subcontractors or suppliers, causes the damage, then the repairs will be at his own cost. The Contractor shall be responsible for the construction, maintenance and repair of any temporary works access roads

(b) The Contractor shall provide erect and maintain a sign board at the main entrances to the Site and at the camp, where directed by the Project Manager

(c) The Contractor shall maintain access for the inspection, operating and maintenance of any of the Employer assets within the site or elsewhere

(d) 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.

a. All buildings erected by the Contractor upon the site and camp site or sites and the layout of the buildings and the sited shall comply with the laws of Tanzania and all Bye-Laws in so far as they are applicable.

(e) The Contractor shall establish his contraction camps, offices stores, workshops and testing facilities on the site. The exact location of these facilities shall be approved before hand by the Project Manager. Accommodation, ablution and other facilities for site staff shall also be provides as required and the standard of accommodation and the location of all facilities shall comply with the requirements of the authorities concerned and those of the Project Manager.

(f) The Contractor as part of his establishment shall provide and in accordance with the Maji Pipeline. Specifications-Issue I of (May 2007) pipe storage areas for uPVC and HDPE pipes. The pipe storage areas preferably fenced off should be level, of adequate space to enable the stacking of the pipes in accordance with the specification s. The Contractor will be provide adequate number of 150x150mm wooden on which the pipes will be stacked and be uniformly supported throughout their lengths or at not more than one meter centers. The Contractor shall ensure that the pips are covered by a free venting, opaque cover (Tarpaulin or black polythene)

(g) In addition to item g above and as part of his obligation the Contractor shall construct using permanent building materials a store of floor area not less than 20 square meters (3.6m width and length of 5.6m and height of 2.7m)

(h) IT WILL BE THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT THE PIPE STORAGE AREAS AND STORE ARE CONSTRUCTED WITHIN SIXTY DAYS AFTER THE ORDER TO COMMENCE WORKS.

(i) Prior to starting with construction, the Contractor shall also move all constructional plant and personnel to the site. On completion of the work and after receiving approval in writing from the project Manage, all constructional plant, buildings fencing and other temporary structures shall be removed and the camp site shall be restored to its original condition and left neat and tidy.

(j) During construction the Contractors camps, staff living quarters and other facilities shall be maintained in a neat and tidy condition.

(k) Contractor shall take all the necessary steps to comply with the conditions of contract, particularly in respect of the insurance's and sureties required and his general obligations to the public and Employer. He shall comply with all the regulations of statutory bodies.

(l) If the Contractor needs areas in additional to the land made available to him, it is entirely up to him to make whatever arrangements he deems necessary with land occupiers regarding use of additional land for the purpose of erecting camps, workshops, garage, stockpiling of materials, housing of labor and staff, welfare facilities, etc, and all costs incurred in connection with rental or lease of such land shall be at the Contractor's expense.

1.6 Occupation of site

(a) The employer will provide land on which the works shall be constructed. The Contractor shall be given possession of such parts of the site that he requires for activities related to construction works including storage of raw materials, equipments and setting up of camp during the period of contract provided his operation does not interfere with the daily activities of the local community.

(b) The Contractor shall not enter upon or occupy with men, tools, equipment and materials any land other than the land or right of way provided by the employer.

1.7 Temporary works

(a) The Contractor shall supply the Project Manager with drawings for approval showing the layout and general arrangement of all Temporary Works he proposes to construct for the purpose of Contract including, but not limited to:

i. Camps, including accommodation for staff and labor.

ii. Offices

iii. Workshops

iv. Stores

v. Temporary river crossings

vi. Temporary bypass and access roads

(b) No separate payment will be made for Temporary Works, the relevant cost being includes in the rates of the Bill of Quantities under the Item for Contractors Establishment.

1.8 Contractor's Office

(a) As part of the Contractors establishment the Contractor shall construct and maintain an Office complete with two numbers pour flash sanitation facilities built with permanent materials. The

office/offices whose plan and floor area shall be approved by the Project Manager shall not be less than 24 square meters and shall be built on the site approved by the Project Manager's Representative for the Contractors use. On completion of the project the office will be rehabilitated to the Project Managers satisfaction and will be handed over to the Water Users Entity.

(b) Written Instructions delivered to this office by the Project Managers Representative will have been deemed to have been delivered to the Contractor. This office shall be open during the Contractors working hours and when open shall have at least one person present whom the Contractor has authorized to receive on his behalf correspondence or written messages.

1.9 Working Hours

(a) The Project Manager's normal working hours shall be defined as 7.00 to 17.00 on weekdays and 8.00 to 12.00 on Saturdays. Sundays shall be set aside for rest. If the Contractor wishes to execute permanent works outside these hours, he shall obtain written permission from the Project Manager at least one full working day in advance to enable the Project Manager to make provision for supervision of such work. Payment for the overtime of the Project Manager's staff shall then be reimbursed in full by the Contractor to the Project Manager, Including the approved percentage for administrative overheads.

(b) If the Contractor wishes to execute works on a regular basis outside the Project Manager's normal working hours over a prolonged period, the Project Manager may, if he deemed necessary, employ additional supervisory staff for which the required salaries including the approved percentage for administrative overheads shall be reimbursed in full by the Contractor to the Project Manager and the Contractor shall provide the required adequate accommodation facilities for such staff at his own cost. The Contractor shall not be reimbursed any of these costs.

1.10 Accommodation for Employees

The Contractor shall provide and maintain sufficient suitable adequately ventilated and weatherproof shelters and mess rooms for his work men, together with a sufficient number of proper latrines which shall be properly and regularly cleansed and kept in thoroughly sanitary conditions and adequately screened from public view. Camps for workmen, if provided shall comply with all relevant Government Regulations and shall be laid out in an approved and orderly manner. Proper provision shall be made for the disposal of all waste and refuse, and there shall be an adequate supply of water for washing, cooking and drinking purposes. Quarters shall be properly ventilated and lighted, and the whole camp shall be maintained and cleansed at all times to the satisfaction of the Government Medical Officer of Health and the Employer.

1.11 Precautions against Contamination of the Work

The Contractor shall at all times take every precaution against contamination of the Works. He shall give Strict Instructions to all persons employed by him to use the sanitary accommodation provided. Clause 16 of the Conditions of contract will be rigidly enforced in any case where these instructions are disobeyed.

1.12 Supply of Electricity

The Contractor shall make his own arrangements for the provision of electricity for use in the execution of the Works, both Temporary and Permanent, for the work of any Sub-Contractors.

1.13 Supply of Water

Save as is otherwise provided for in the contract, the Contractor shall provide at his cost and arrange for all water required for the execution of the Works and ensure that is of a quality such that it will have no deleterious effects on the Works. The Contractor shall submit proposals to the Project Manager's Representative for the provision and maintenance of the supply of potable water and these proposals shall be approved by the Project Manager's Representative before any works are commenced.

1.14 First Aid outfits

During the progress of the works the contract or shall at each place of work provide an adequate First aid outfit which shall be easily accessible at all time, and which shall include necessary first Aid provisions which shall be replenished and maintained as the use demands, at his own cost. The Provisions of these kits shall be considered part of the Contractor's obligations in setting up his camp. The firs aid kits shall be available for use by the Project Manager's representative's staff as well as the Contractor's staff on site.

1.15 Sign Boards

(a) The Contractor shall provide, sign write, erect and maintain until the expiry of the defects liability period sign boards of sound timber construction and hollow section steel uprights to the dimensions, sign – written and painted in durable colors, as directed by the Project Manager's representative shall include the name of the project, the name of the employer, the name of the financing institution, the name of the consulting engineer and the name of the Contractors.

(b) Such sign boards shall be removed upon expiry the defects ability period, such removal being a pre- requisite for release of final retention money.

(c) The signboards shall each contain no more than 10m of inscribed painted timber surfaces and have a total height above ground level of not more than 3.8m. The steel uprights shall be Imbedded in class 20 concrete of sufficient volume to give the whole assembly adequate stability.

1.16 Provision of survey equipment

(a) If so instructed, the Contractor shall provide for the exclusive use of the project Manager's Representative and his staff the following equipment:-

- Theodolite c/w tripod 1
- Automatic
- Steel tapes, 50m. long 2
- Spirit levels 600mm long 1
- Plumb bobs 1
- Pocket tapes 2
- Staff 2
- Ranging rods 6
- Survey umbrellas 2

(b) Other or additional equipment shall be provided by the Contractor if so requested for the occasional use of the Project Manager's representative without additional payment. In addition experienced chainmen and if necessary labor for clearance of survey lines shall be provided by the Contractor when requested by the Project Manager's representative.

(c) The equipment shall revert to the Contractor on completion of the works and shall be properly maintained and replaced as necessary, by the Contractor.

1.17 Access Road to Site and Storage Area

(a) Having regard to clause 30 of the conditions of contract, the Contractor shall at his own cost undertake such improvements to or construction of drainage culverts on the un surfaced roads and shall be responsible for maintaining these roads for the duration of contract in so far as these improvements or the maintenance is necessary for compliance with said clause 30.

(b) All such improvements, constructions and maintenance shall be to the satisfaction of the Project Manager's representative and the relevant authorities, and no improvement or construction shall be carried out without prior approval by the Project Manager's representative's representative of the Contractor's proposals. At the end of the contract, the un-surfaced roads shall be brought back to a standard not less than that existing at the beginning of the contact.

(c) The Contractor shall construct and maintain such additional temporary access roads and shall make any improvements to the standards of existing roads (subject to the approval of the relevant authorities) as may be necessary for carrying out the works, the cost of which is to be including in his rates.

1.18 Flagging Lighting and Watching

The Contractor shall be responsible for properly watching and lighting the works even where they are on enclosed land, and shall allow for the same within his rates. In this matter and as to flagging and traffic control he shall comply with the requirements of the employer, the police and/or the competent

authority. Prior to the commencement to any work across or alongside public roads the Contractor shall obtain the approval of the Project Manager's representative's of his plans for flagging and traffic control.

1.19 Survey Beacons

(a) During the progress of the works, the Contractor shall not remove, damage, alter or destroy in any way what so ever, any plot or survey beacons. He shall notify the Project Manager's Representative of the need to interfere with any beacon. The Project Manager's Representative shall be responsible for any removal and reinstatement that he considers necessary. Should any Beacon be found to be above or below the level of the finished Work, the Contractor shall immediately report the same to the Project Manager's Representative.

(b) Should any beacon be damaged or destroyed by the Contractor he shall forthwith report the damage to the Project Manager's representative and the relevant authorities and shall be held liable for the cost of reinstatement thereof.

1.20 Damage to Lands

(a) Except where necessary for the proper execution of he works, the Contractor shall not interfere with any fence, hedge, tree, land or crops within, upon or forming the boundary of the site, or elsewhere. In the event the Contractor encounters conditions under which he considers such interference necessary, he shall forthwith notify the Project Manager's representative's representative who shall direct the Contractor either on the manner of execution of the works such as to avoid or render negligible such interference, or otherwise make the necessary arrangements with their owners of the property in question and thereafter give approval to the Contractor to proceed with the interference but to the minimum extent possible given the nature of the work and the usual or customary method of executing such works.

(b) Where damage or interference as above is occasioned to crops, trees, building or shelter, or other things and improvements to the land of economic value and not readily reinstated, the Project Manager's representative shall liaise with the relevant authorities for evaluation of the damage and thereafter, the owner shall be compensated by the Contractor, and the Contractor reimbursed under the relevant item in the bills of quantities. However interference with fences, grass, unlined channels etc. shall be made goods with due dispatch and to the satisfaction of the owner and the Project Manager's representative and the Contractor shall allow for same within his rates.

1.21 Additional land

The Contractor shall select and arrange at his own expense for any temporary occupation of land outside the site which he requires for the efficient execution of the works. The Contractor must comply fully with all Bye-Laws and regulations currently in force in the area.

1.22 Submission of Samples

(a) Before the supply of any materials or articles which he intends to incorporate into the permanent works, the Contractor shall submit to the Project Manager's representative's representative for his approval a sample of each respective material or article, and such sample shall be delivered to and kept at his office for reference.

(b) Should the samples be considered by the Project Manager's to be unsuitable for purpose intended, or not to comply with the specification or the nominated standard specification the Contractor shall submit samples of the materials or articles from a different source for approval.

(c) All the respective kinds of materials and articles used in and upon the works shall be at least equal in quality to the approved samples. Each and every sample shall be a fair average of the bulk material or of the article it represents. The Project Manager may decide the method by which each sample to be taken from the bulk shall be obtained and the number of such samples. The Contractor shall allow for complying with the provisions of this clause within his rates.

1.23 Procurement of Materials and Manufactured articles

(a) The responsibility for so ordering and delivering materials and manufactured articles and samples so that they may be tested sufficiently far in advance of the work so as not to delay occasioned by his neglect to order sufficiently well in advance or to payment or to payment of any costs he may incur as the result thereof.

(b) With regard to any item in the bills of quantities which is the subject of a provisional sum, the Project Manager's representative shall notify the Contractor of his requirements in ample time for the Contractor to make any necessary arrangements so that no delay occurs in the progress of the works. The Contractor shall be deemed to have allowed for compliance with the provisions of this clause within his tender.

1.24 Testing of Materials and Manufactured Articles Before Use

(a) Any or all of the materials and manufactured articles supplied by the Contractor for use on any of the works throughout this contact shall be subject in advance to such tests as may be specified in the relevant specification or standard specification or as may from time to time be deemed necessary by the Project Manager's representative.

(b) Sample of all such materials and manufactured articles together with all the necessary labor, materials, equipment and apparatus for sampling and for carrying out of tests on the site on all such materials and manufactured articles shall be supplied by the Contractor at his own expense.

(c) The cost of special tests ordered by the Project Manager's representative to be carried out by an independent person at a place other than the site or place of manufacture or fabrication shall be

borne by the employer provided the test show that the materials, articles or workmanship are in accordance with the specification, otherwise the cost of such special tests shall be borne by the Contractor.

1.25 Rejected Materials

Should any materials or manufactured articles be brought on the site of the works by the Contractor which are in the judgment of the Project Manager's representative unsound or of inferior quality including defects or damage sustained in transit or in any way unsuited for the works in which it is proposed to employ them, such materials or manufactured articles shall not be used upon the works but shall be branded if, in the opinion of the Project Manager's representative this is necessary, and shall forthwith be removed from the site of the works, all at the Contractor's expense and in each case as the Project Manager's representative shall direct.

1.26 Standard

(a) The Contractors shall observe these specifications and shall carry out all work in a skilled and workmanlike manner in keeping with a customs of the trade, and modern methods of construction and to the Project Manager's representative instructions. In addition, the Contractor shall conform to all conditions, regulations, laws and by – laws currently in force in Tanzania with regard to the execution of construction work and shall follow all instructions issued by the relevant authorities through the Project Manager's representative.

(b) The tenderers shall at his direction base his tender on standard specifications general used or approved save that where a relevant standard specification issued by the Tanzania bureau of standard exists at the date of submission of tenders such a standard should as a minimum be complied with.

(c) Where no Tanzania standard specification exists, then the relevant standard specification issued by the international standard organization (ISO), if any, shall be the minimum to be complied with.

(d) Where a national standard other than a Tanzania standard is referred to in addition to ISO this indicates that such national standard may expend or strengthen further the requirements of ISO.

(e) Where standard specifications are referred to in the text of this specification this is done by reference to a standard specification reference number (SSRN). A table of comparison is provided in the appendix where the SSRN is cross – referenced to ISO and to national standards that will be accepted in their English version by the employer as providing for the quality of workmanship etc. required.

(f) The Contractor shall have indicated in the appropriate tender schedule the standard specification to which the particular item to be supplied complies, or where it meets the

requirements of a national standard not so specified, this standard shall be indicated in the same schedule. In this event two copies in English of the alternative standard offered should have accompanied the tender and shall be subject to the approval of the Project Manager's representative.

(g) In the event that at the time of tender the Contractor had neglected to nominate the standard specification to which any particular item to be supplied shall comply, and there is no relevant local standard or ISO standard for the item, then the Project Manager's representative may at his sole direction and without extra cost to the employer instruct the Contractor on the national standard to be adopted in the manufacture supply and erection etc. Of the item and the works associated with the item.

1.27 Inspection by Project Manager's Representative during Defects Liability Period

(a) The Project Manager's representative will give the contactor due notice of his intention to carry out any inspection during the defects liability period and the Contractor shall upon receipt of such notice arrange for a responsible representative to be present at the times and dates named by the Project Manager's representative.

(b) This representative shall render all necessary assistance and take notice of all matters and things to which his attention is directed by the Project Manager's Representative. Representative. Provided however that no notice shall be required in the event that at the time of the inspection there shall be any part of the Works that have yet to be Taken Over.

1.28 Cleaning up of Site

The Sites of all permanent and temporary works, including borrow areas and tips in connection with this Contract, are to be carefully up, and trimmed, and the site is to be handed over to the Employer in a neat clean condition to the satisfaction of the Project Manager's Representative. Compliance with this Clause shall be a prerequisite condition for the issue of a Taking-Over Certificate.

1.29 Alteration and Preservation of Services

(a) The Contractor shall acquaint himself with the position of all existing works, such as sewers, water drains, cables for electricity and telephone line, telephone and lighting poles, water mains, etc. before any excavation or other work likely to affect the existing services is commenced.

(b) Where work is being carried in the vicinity of overhead power lines, the Contractor is responsible for ensuring that all persons working in such areas are aware of the relatively large distance that high voltage can "short" to earth when cranes or other large masses of steel are in the vicinity of the power line. The Contractor's attention is drawn to SSRN 027 which gives safe clearance to the various voltages. The Contractor shall be held responsible for injury to existing

works or services, and shall indemnify the Employer against any claims in this respect (including consequential damage)

(c) In all cases where such existing works are exposed, they shall be properly shored or hung up. Special care must be exercised in re-filling to consolidate the ground under any main cables, etc. exposed and not to cover up water meters and surface boxes, etc. poles supporting cables, adjacent to the works, shall be kept securely in place until the work is completed, and shall then be made as safe and as permanent as before. Notwithstanding the foregoing requirements, and without lessening the Contractor's responsibility, the Contractor shall inform the Project Manager's Representative immediately of any existing works that are exposed.

(d) The Contractor shall be responsible for arranging for the moving of services, subject to the agreement of the Project Manager's Representative, where necessitated by the Works, and shall pay for the moving of services or alteration to services such as power lines, telephone lines, water pipes, etc. A provisional sum for this work has been allowed for in the Bills of Quantities.

(e) The utilization of that item shall be at the discretion of the Project Manager's Representative who may direct that the work be done by others, or that the Contractor shall execute the work and be compensated on a day work basis.

(f) Where the Contractor encounters conditions where the alteration and preservation of existing services is necessary, he shall at once inform the Project Manager's Representative who shall then direct the Contractor on the means and methods of so doing.

1.30 Closure of Roads

Where a road used by the Contractor for delivery of any material to be used in the Works is closed by order of the Traffic Authorities, the Contractor shall obey such closure and shall suspend operations or use as alternative route. The fact that the Contractor is performing work for the Government of Tanzania, will not give him any special privileges in this respect.

1.31 Liaison with Government and Police Officials

The Contractor shall keep in close contact with the police and other Government officials of the area regarding their requirements in the control of traffic and other matters and shall provide all assistance or facilities which may be required by such officials in the execution of their duties. The Contractors unit rates will be deemed to have allowed for any expenses arising out of compliance with this Clause.

1.32 Regulation of Local Authorities

The Contractor shall at all times conform to the lawful provisions of any ordinance and of any order, proclamation, rule of notice made under any ordinance relating to the works,

employment of labor, etc. and to any regulation and / or by-law of any local authority and of the water or electricity undertaker within whose area and jurisdiction the works are to be executed.

1.33 Building Regulations

All building erected by the Contractor upon the site and camp site or sites, and the layout of the building and Sites shall comply with Laws of Tanzania and with all local by-laws in so far as they are applicable.

1.34 Operation and Maintenance Manual

The Project Manager's Representative will be compiling changes, alterations and additions to existing operation and maintenance manuals for use of the Employer's staff. To this end, the Contractor is required to provide in triplicate and in English details of all the different manufactured new plant, materials and components incorporated in the Works including but not limited to all pertinent manufacturer's brochures. Reference is to be made to the relevant clauses in the Conditions of Contract and the M&E Specifications.

Taking-Over will not be considered until such detailed information as is required has been submitted to and accepted by the Project Manager's Representative.

1.35 Training of the Employer's Personnel

The Contractor shall, if required, provide to a number of the Employer's personnel, nominated by the Project Manager's Representative during the construction of the Works. This shall include but not necessarily be limited to: -

- Provision of a work gang or gangs with gangers or foreman to work alongside the Contractors staff in the fields of pipeline repair and the installation of valves, replacement consumer connections.
- The Contractor shall also train the Employer' nominated personnel, as well as supervise the operation of the works until the operators are fully conversant with the plant. This training phase shall be conducted by a competent instructor(s) and shall include instructions in the operations and maintenance of the works in accordance with a programme previously submitted to and approved by the Project Manager's Representative.

1.36 Site Safety

The Contractor shall observe and cause his employees to observe safety standards commensurate with the nature of the Works. To this end the Contractor shall provide and ensure his employees wear:

i. Overalls,

ii. Boots or shoes with reinforced toe caps,

iii. Hard hats suitable for a construction site, and

iv. Other protective equipment such as gloves, ear muffs, goggles, etc., as are necessary for particular work

The Contractor shall further provide hard hats for the Resident Project Manager's Representative and his staff, and for the use of site visitors up to ten in number. No work shall be permitted to be executed unless the Project Manager's Representative is satisfied that appropriate safety measures are in place and that the Contractor's employees are wearing suitable safety gear. The costs and effects of compliance with this Clause shall be deemed to have been allowed for in the Contractors rates and prices.

1.37 Environmental Protection

With reference to the Conditions of Contract 19 and in order to mitigate the potentially adverse environmental impacts of the proposed constructions works, the Contractor shall execute the works in accordance with the following technical and operational guidelines.

1.37.1 Waste Management, Health and Safety

(a) National Environmental Management of Tanzania approved disposal methods for wastes shall be used.

(b) Wastes dumping sites shall not be located in wildlife areas, wetlands settled areas, cultural heritage and scenic sites.

(c) Waste n abandoned mobile camps shall be buried or incinerated

1.37.2 Water Resources Management

(a) The Contractor shall at all costs avoid conflict with demands of local communities

(b) Abstraction of both surface and groundwater shall only be done in consultation with the local community and after obtaining shall be avoided.

(c) Abstraction of water from wetlands shall be avoided.

(d) No construction water containing spills or site effluents especially cement and oil shall be allowed to flow into natural water draining courses.

(e) Wash water from washing out equipment shall not be discharged into watercourse or road drains.

(f) Site spoils and temporary stockpiles shall be located away from drainage systems and surface runoff shall be directed away from stockpiles to relevant erosion.

1.37.3 Petroleum Products Handling

a) Transportation

- Fuels shall be delivered to the sites by certified petroleum tankers
- All petroleum tankers shall observe the regulations for transportation of petroleum products and the Traffic Act of Tanzania

b) Storage

- Petrol shall only be stored in underground tanks,
- Diesel may be stored in skid tanks positioned in a bund wall,
- Underground tanks shall undergo regular pressure checks,
- Oils shall be stored in oil sheds with concrete floors.

c) Dispensing and disposal

- Petroleum kerb sites shall located on concrete platforms and surrounded by spoon drains,
- Used oil shall be reused, recycled or incinerated,
- Empty PV containers of petroleum products shall be reused, recycled, or incinerated,
- Sludge from petroleum storage tanks shall be incinerated.

1.37.4 Plant /Equipment Operations

a) Noise Control

- Noise from plant and equipment operations shall be limited to no more than 90 db in human settlements
- Stationery plant (generator) shall be noise masked
- No plant and equipment (with noise levels exceeding 45 db) shall be operated after 18:00 hrs near human settlements (i.e. within 1 km)
- Plant and equipment speeds shall be limited to 60 km per hour.

b)Emission Control

- Plant and equipment exhaust pipes shall be fitted with catalytic converters
- Plant and equipment shall meet the National Environmental Management emission standards

c) Safety Control

- Carrying of abnormal loads of plant and equipment shall be done when there is less traffic on the roads
- All abnormal load carrying regulations shall observed (Road traffic Regulations)

1.38 Motorcycle

The Contractor shall procure one number trail motorbike of engine displacement capacity of not less than 100c.c and engine type single cylinder air cooled utilizing petrol. The motorbike will be

handed over to the water user's entity. The Contractors bid rate to include all taxes and retraction fees.

1.39 Measurements and Payments - Preliminary and general Items

The unit of measurement for contractual requirements will be sum and will be claimable in the Contractor's payment certificate upon issuance to the Project Manager of appropriate documentation.

The unity of measure of establishment and maintenance of the Contractor camp including temporary works shall be lump sum.

TABLE OF CONTENTS.....SECTION II DEMOLITION AND SITE CLEARANCE

2.0 DEMOLIATION AND SITE CLEARANCE

Includes: Demolition and removal of natural and artificial articles, objects and obstructions which are above the original surface

2.1 Setting out

(a) The Contractor's attention is drawn to the requirements of the event clause of the conditions of contract, and he shall also comply with all legal provisions in regard to surveying and setting out work.

(b) The Contractor shall be responsible for the proper and accurate setting out of the works as required in the contract documents. The Contractor shall provide all survey and measuring equipment and instrument necessary for his use in the execution of the scheduled works.

(c) The Contractor shall allow in his bid rates for being unable to use up to 70% of the Project Manager's control points where such a provided in the contract, through loss or damage occasioned prior to the commencement date. When the Contractor requires the establishment of a new control point or points due to the above mentioned loss or damage he shall advise the Project Manager who will, if he deems it necessary, arrange for the establishment of a new control point or points.

(d) Where the Project Manager deems additional topographical or transverse surveys are required, the Project Manager and writing shall instruct the Contractor to carry out these additional surveys and forward the results promptly to the Project Manager. As long as the said survey works do not constitute more than one percent of the entire setting out calculated either in linear or squire meters no additional payment will be due the Contractor. Payment to the additional survey works over and above the ten percent and for which the Contractor may be required to demonstrate its eligibility for consideration will be paid for using the day works rates. The Project Manager's decision on this matter shall be final.

(e) Control points not affected by the works shall be protected and preserved by the Contractor. In the case of negligence on the part of the Contractor, or his employees, resulting in the destruction of control points, an amount equal to the cost of replacing the same may be deducted from subsequent payment due to the Contractor.

(f) Control points affected by the works shall be offset by the Contractor to the satisfaction of the Project Manager. The Contractor shall, prior to any setting out, submit to the Project Manager for his approval, the method of setting proposes to employ. The plan shall include the accuracy, positions of the various types of stakes, method of marking stakes, and method to be used for protecting stakes, etc. No survey work shall proceed prior to the Project Manager's approval of the Contractor's plan.

(g) At least 24 hours before he intends to survey any portion of the works, the Contractor shall give written notice to the Project Manager. Such notice shall include time, location and type of works to be set out. The Contractor shall set out the works and obtain approval of his setting out before proceeding with construction.

(h) In general, the Contractor shall check for the existence of original marks, lines and levels of reference not less than one month prior to commencing works in any section, to allow sufficient time for reinstatement of markings, and checking of lines and levels. Any discrepancies encountered shall be immediately reported to the Project Manager, for instruction and coordination.

(i) The Contractor shall be deemed to have allowed in his bid price for checking and reinstatement of original markings, Special care shall be exercised during construction not to damage, displace or disturb property and trigonometrically survey beacons. If such beacons are disturbed or destroyed by the Contractor they shall be replaced without delay by a registered land surveyor at the Contractor's expense. In cases where displacement of or damage to such beacons is an unavoidable the Contractor shall also be responsible for relocation or suitably referencing later reinstatement of such beacon at his own cost.

(j) The Project Manager may if he deems it necessary, revise the line and grade and will require the Contractor to adjust the stake-out accordingly.

(k) The Contractor shall check the condition of all reference and level beacons and shall satisfy himself that they have not been displaced and are true in regard to position and level. If beacons have been destroyed, displaced or damaged before the site is handed over to the Contractor, the Project Manager will arrange to have new beacons installed. A beacon, which have been displaced, shall not be used unless its true position and level have been re-established and the new values verified by the Project Manager.

(l) Where a beacon is likely to be displaced during constructions, the Contractor shall establish suitable reference beacons at locations where they will not be displaced during construction. No beacon shall be covered over, displaced or destroyed before accurate reference beacons have been established and details of the positions and levels of such beacons have been submitted to and approved by the Project Manager. The Contractor's reference beacons shall be of at least the same quality and durability as the existing beacons.

(m) The Contractor shall appoint and employ the necessary qualified and experienced staff to set out the works accurately.

(n) The Contractor shall establish and locate all lines and levels and be responsible for the correct location of all works.

(o) Where directed by the Project Manager, the Contractor shall take such level and dimensions as may be required for the purposes of measurement before disturbance of the ground. These

shall be agreed between the Contractor and the Project Manager in writing before any ground surface is disturbed or covered up. Any work commenced without taking the said levels and commenced manager's recording of their value before disturbance. The Project Manager's decision on this matter shall be final.

2.2 Site Clearance

2.2.1 Area occupied by permanent works

The Contractor shall clear all borrow areas and other areas where it is intended to use the material below for construction purposes by removing all trees, roots stumps, topsoil, vegetable matter and other debris which is unsuitable for fill and will include of rocks and boulders of up to 0.15m in size which are exposed or lying on the surface.

2.2.2 Areas occupied by Temporary Works

The bush clearing for the Contractor's camps, offices, stores, working areas and for his access roads and his own borrow areas shall be at the Contractor's expense. Clearance for temporary works shall be kept to a minimum and be subject to the approved Project Manager.

2.2.3 Structures

Structures shall not be demolished unless specified or directed. Methods of demolition shall be approved.

2.2.4 Removal and Grubbing of Large Trees and Tree Stumps

(a) The girth of Trees or stumps shall be measured at the narrowest point of the tree or stumps in the first meter of its height above ground level. Tree and stumps with a girth exceeding 1.0m shall be measured individually and classified according to the size increments of 1.0 m as indicated above.

(b) The bid rates shall include full compensation for all work necessary for the clearing and grubbing of trees and stumps of all sizes, the backfilling of holes and the removal and disposal of material, all as described in this Section.

(c) Where construction is carried out through plantations or where the number of trees with a girth exceeding 1.0m renders individual measurement impractical, the special Specifications may provide that the clearing and grubbing of trees in such areas be measured in hectares. If this method of measurement is used, the areas where it applies will be shown on the Drawings, stated in the Special Specifications, includes to bids during site inspections, or as instructed by the Project Manager.

(d) Where the Special Specifications provide payment for the clearing and grubbing of large trees per hectare in such specific cases, the bid price shall include full compensation for all work as described in connection with individual trees above.

2.2.5 Removal of Ants and Termite Moulds

(a) Clearing shall include removal of mounds and nests from mould, termites, ants or other insects or burrowing animals. Such removal shall be carried out by excavating to the required depth as directed by the Project Manager, and subsequent poisoning with approved pesticides in the case of ants and termites.

(b) No additional payment will be made for removal of such nests and poisoning with approved pesticides, but backfilling and compaction with approved fill materials will be paid as ordinary earthworks fill under the relevant pay item.

2.2.6 Spoil Materials

Material shall not be left lying around just outside the periphery of the area to be cleared, but shall be properly disposed of or removed completely to the approval of the Project Manager. The Contractor shall dispose of all trees, bushes and other vegetable matter by stockpiling in piles or windrows (longitudinal heaps) and burning. Secondary burning shall be carried out as necessary such that all material is reduced to a white ash. All burning shall be kept full control. Un-burnt tree trunks shall be either restock pilled and included in further burning operations or cut up and removed from the area.

2.2.7 Programming

The programming of all clearing works shall be subject to the approval of the Project Manager.

2.2.8 Trial Holes

The Contractor shall excavate, refill and restore in advance of his programme all such trial holes as he may require for the location of existing services (water and other mains, cables, etc). The cost of these trial holes shall be included in his excavation rates.

2.3 Measurements and Payments-Demolition and Site Clearance

(a) Clearing of site before excavation, if carried out with the approval of the Project Manager, will be measured per square meter of area cleared. Payments shall be made accordingly per square meter of area cleared. The rates shall be inclusive of disposing off the cleared material, up to a distance of 1000 meter.

(b) The bid rates for trees and stumps removal shall include full compensation for all work necessary for the clearing and grubbing of trees and stumps of all sizes, the backfilling of holes and the removal and disposal of material.

(c) No additional payment will be made foe removal of Ants and Termite Mould, poisoning with approved pesticides but backfilling and compaction with approved fill materials will be paid as ordinary earthworks fill under the relevant pay item.

TABLE OF CONTENTS.....SECTION III EARTWORKS

3.0 EARTHWORKS

Includes: Excavation, dredging, compaction, landscaping

3.1 Site Investigation

Information regarding the geology of the soil in the region is not provided to the Contractor, the Contractor will be deemed to have made his own enquiries and investigation at the time of tender.

3.2 Excavation General

The excavation shall be taken out as nearly as possible to exact dimensions and shape so that the minimum of filling in will afterwards be necessary. The Contractor shall keep the sides of excavation true by struts, wailings, poling- boards, sheeting, bracing or otherwise and the supporting timbering shall be of sound construction and be sufficiently watertight to permit the excavation, concreting, etc, being carried out satisfactorily. Water shall be removed by pumping and all temporary expedients required for dealing with water shall be the Contractor's liability. The Contractor shall be responsible for the stability of all excavations and trenches.

3.3 Mechanical Excavation

i. A mechanical Excavation shall be employed by the Contractor only if the sub- soil is suitable and will allow the timbering of the trenches or other excavations to be kept sufficiently closed up to ensure no slips fall or disturbance of the ground takes place or there are no pipes, cables, mains or other services or property which may be disturbed or damaged by its use.

ii. When mechanical excavators are used, a sufficient depth of materials shall be left over the bottom of the excavations to ensure that the ground at finished excavation level is not damaged or disturbed in any way. The excavations shall then be completed by hand to the finished levels required.

3.4 Storage and Handling of Explosive and Blasting

(a) The removal of hard materials by use of explosive will normally be permitted subject to the compliance by the Contractor in all respect with explosive laws of Tanzania, including obtaining the consent of the relevant authorities.

(b) Blasting shall only be carried out in those sections of the works for which permission in writing shall have been given by the Project Manager's representative and shall be restricted to such hours and conditions as he may prescribe. Such permission will not be withheld nor such hours and conditions imposed unreasonably.

(c) The Contractor shall provide proper buildings or magazine suitably located for the storage of explosives in manner and quantities to be approved. He shall also be responsible for the prevention of any unauthorized issue or improper use of any explosive brought on the works. Only experienced and responsible men shall handle explosives for the purpose of the works.

(d) The shots shall be properly loaded and tamped and where necessary, the Contractor shall use heavy – mesh blasting nets. If, in the Project Manager's Representative opinion, blasting could be dangerous to persons or property or to any finished work, he may prohibit it and order the rock to be excavated by other means and the payments will be made at the rate for rock excavation where blasting is not permitted. If blasting is permitted, but in the Project Manager's Representative's opinion, is being carried out in a reckless manner, he may stop it and order the rock excavation to be carried out by other approved means. In such case, the payment shall be made at the rate for the rock excavation where blasting is permitted. The use of explosives by the Contractor in large blasts, as in seams, drifts, shafts, pits, or large holes, is prohibited unless authorized in writing by the Project Manager's Representative. In the events of wasting of rock through any such blasting, the Contractor shall, if required by the Project Manager's Representative, furnish an equivalent amount of approved material for embankments, 1.0 m3 of rock in – situ being taken to equal 1.5 m3 of material in embankment.

3.5 General Excavation Clauses

3.5.1 Advance Notification of Proposed methods

(a) The Contractor shall submit for the consent of the Project Manager detailed proposal for methods, dewatering and safety arrangements in respect for each major or critical section of excavation, including drilling and blasting where appropriate. Except as may be otherwise agreed, the proposals shall be presented at least 1 week before the intended start date and the Project Manager shall comment on the proposals within 4 days. Only after the receipt and revision of these proposals as may be requested, and with the written consent of the Project Manager, shall the Contractor commence the excavation work to the proposals refer.

(b) The Project Manager shall not unreasonably withhold consent and will request revisions of proposals only if he considers that an acceptable end result would otherwise be unlikely. The Contractor shall not subsequently very the agreed procedure, except in detail, without having obtained the written consent of the Project Manager to the change.

(c) No consent as described above shall relieve the Contractor of his responsibility for carrying out his operations in a workmanlike manner and as safety as is reasonably possible to the lines and levels shown on the drawings or as instructed by the Project Manager.

3.5.2 Dewatering of Excavations

(a) The Contractor shall maintain all excavations free from water, irrespective of its source, to the extent necessary for the execution of the works or in the interests of safety, and satisfaction of

the Project Manager. He shall provide, install, operate and maintain all necessary appliances and plant for this purpose.

(b) The Contractor shall take all necessary precautions at points of discharge of water to avoid flooding or damage to the works, adjoining works or property and to avoid pollution of watercourses.

(c) The dewatering of excavations immediately prior to concreting shall not be commenced until at least one standby pump is on hand.

3.5.3 Remedial Work

Any damage resulting from the Contractor's operations during excavation, including damage to foundations and excavated surface shall be repaired at the expense of the Contractor and to the satisfaction of the Project Manager.

3.6 Safety of Excavations and Persons

3.6.1 Safety of Excavations

(a) The Contractor shall take full responsibility for the stability and safety of all excavation works and methods of construction including temporary support of excavated surfaces, diversion of water, pumping etc. He shall assume full responsibility for the safety and prevention of injury to personnel and for damage.

(b) The Contractor shall provide and install handrails, toe boards and all necessary temporary supporting works such as timbering, shoring, anchorages and the like wherever such support is required. All support arrangements must be to the approval of the Project Manager, who may order such support to be strengthened or altered if it is considered necessary in the interests of the work or to safeguard against accidents to workmen.

(c) If the Contractor wishes to batter and / or cut back the face of an excavation in order to eliminate or reduce the quality of timbering and shoring required, he shall obtain permission from the Project Manager. Both the slope and the extent to which such battering is to be carried out must be agreed with the Project Manager before excavation is commenced.

(d) Timbering and shoring shall be so designed and constructed that, if necessary, it can be inserted as excavations proceed and safety withdrawn as backfilling is raised. Waling and trusts shall be suitably positioned to permit pipes and other materials to be installed in the excavations. No temporary supports shall remain in excavations after backfilling unless approved by the Project Manager.

(e) If slips of materials occur in any part of the excavations during the execution of the works or during the defects liability period, the necessary remedial works shall be executed to the approval of the Project Manager. Such remedial work shall be at the Contractor's expense in

cases where the Project Manager considers that the Contractor has not exercised reasonable preventive measures.

3.6.2 Inspection and Surveys by the Project Manager

The Project Manager shall have the right to gain access to any area of excavation giving adequate notice. The Contractor shall provide whatever assistance and incidental materials may be required. This work will be arranged so as not unduly to disrupt the Contractor's normal working arrangements and he shall allow for it in his programme.

3.7 Limits of Excavation

3.7.1 General

The surfaces exposed by open cut excavation against which concrete is to be placed shall be excavated to the lines shown on drawings or as required by the Project Manager. No material shall remain within the outline of structural concrete. Elsewhere in open cut, the excavation shall be to the lines and levels shown on the drawings or as required by the Project Manager except that local points of undisturbed hard rock may be permitted to extend within the required lines of excavation where approved by the Project Manager.

Any excess depth unnecessarily excavated below formation level shall be backfilled with materials acceptable for construction and compacted as directed by the Project Manager's Representative and no payment shall be made for the excess excavation or for its filling and compacting.

3.7.2 Revision of Limits

During the progress of the work, the Project Manager may find it necessary or desirable to revise the required lines and levels of any part of the excavations because conditions disclosed by the excavation or for any other reason. When the Contractor is advised of such revision before the excavation of such part has been commenced to the lines and levels shown on the drawings, the revised excavation will be paid for at the billed rate for the main excavation. If however such revision requires additional excavation to be made after the excavation of such part has already been carried out to appoint where the normal procedure for the main excavation cannot reasonably be used, the additional works shall be carried out as specified and will be paid for under the contractual provisions for variations. This will include removal of rock and filling of resultant voids which, in the opinion of the Project Manager, could not reasonably have been anticipated and are beyond the control of the Contractor.

3.7.3 Excavation beyond limits

The Contractor shall not deliberately excavated beyond the lines and levels shown on the drawings or designated by the Project Manager (as above or otherwise) without prior written

approval. Any deliberate excavation beyond the required lines and levels which is performed by the Contractor for any purpose (such as for working space) shall be at the expense of the Contractor. If such excavation should, in the opinion of the Project Manager, required being backfilled, such backfilled shall be done at the Contractor's expense to the satisfaction of the Project Manager with concrete or materials similar to the fill to be place against the excavated surface. Beneath load bearing structures, foundations and other reinforced concrete work, the filling to any over excavation shall be of the same quality concrete as that required for the associated structure unless the Project Manager permits leaner concrete.

Where it is intended that concrete be cast against the side of excavated material the Contractor may alternatively propose to the Project Manager to over excavate, back shutter and backfill, but the Project Manager will be under no obligation to accept the proposal and, subject to the conditions listed in the notes on measurement, no extra payment will be made if the alternative proposal is accepted.

3.8 Classification of Excavation

(a) Excavation shall be paid for separately for the following three classes of materials:

Class I:

"Rock" or "Hard material" shall include all materials which, In the option of the Project Manager's Representative, requires blasting or the use of metal wedges and sedge hammers or the use of compressed air drilling for its removal or cannot be extracted by ripping with a tractor of at least 180 h.p and rear-mounted heavy-duty ripper.

Individual boulders greater than 0.2m3 in volume shall be included in this class when their nature and size are such that, they cannot be removed without recourse to one of these methods. Where a portion of excavation contains 50% or more by volume of boulders of this order, such portion shall be considered as Class I material throughout.

Class II:

" Compacted Gravel" "Slightly Decomposed" or "Altered Rock" shall include all material such as consolidated murram and altered or stratified rock, stones, or boulders less than 0.2m3 in volume, which are harder than "normal" or "soft" material in that they may be extracted by ripping, as defined in class I, or in confined spaces, by hand excavation by using Compressor tools, providing all reasonable steps to the satisfaction of Project Manager's representatives, have been taken to facilitate the removal of the material by other methods.

Class III:

"Normal" or "Soft Material" shall include weathered or decomposed rock and all material which, in the option of the Project Manager's Representatives, does not require blasting or metal wedges and sledge hammers or compressed air drilling, ripping or rooting.

(b) A detailed summary to aid this classification is given in Table I below. No additional allowances will be made for any material being wet or dry. The Project Manager's Representative or his Representative and the Contractor or his Representative shall be present during classification of material in question for excavation.

(c) All necessary precautions shall be taken to preserve the excavation material below and beyond the lines of all excavation in the soundest possible condition.

(d) All damage to the Works due to the Contractors Operations shall be repaired by and at the expense of the Contractor except when over excavation is ordered in writing by the Project Manager's Representatives.

(e) In excavation of class I (hard) material isolated edges of undisturbed material may extend up to 15cm within the prescribed lines.

(f) In excavation of class I – material beyond the established lines shall be re-filled with concrete (Class 10) at the expense of the Contractor.

(g) All excavation shall be classified either as unsuitable material or as suitable material.

(h) Unsuitable material shall comprise:

Material from swamps or marshes, silt, perishable material, slurry or mud, or any material which is a highly organic clay or silt, which is clay having a liquid limit exceeding 80 and or a plasticity index exceeding 55; which is outside the limit of moisture content specified in the earthworks series of clauses either when excavated or thereafter; which is susceptible to spontaneous combustion; consisting of such domestic refuse which by virtue of its physical or chemical composition or moisture content will not compact to form a stable fill.

(i) Suitable material shall comprise all that are acceptable in accordance with the requirements of the Specification for use in works. Whether obtained from within or without the site. Any reference in this Specification to suitable material and unsuitable material shall have the meanings defined above. For the purpose of selection for use in earthworks all common excavation shall be classified either plastic or non-plastic. Non plastic material shall be those on which is impossible to carry out a plasticity index test and shall include " coarse grained non-cohesive material" shown in table 2 and such shales, silts and other materials which in the option of the Project Manager's Representative are readily self-draining.

(j) Plastic materials shall be all other materials included in the above mentioned Table as "Fine grained cohesive material" as defined in BS1377.

Table 1: IDENTIFICATION OF THE THREE CLASSES

	Class I	Class II	Class III
Typical Material	Black volcanic Rocks Trachyte, and soils Phonotype and igmnibrite	Altered Rocks Agglomerate and Tuff	Weather Rock
Hammer Blow	Solid note from Ringing to a Dully sound	Drummy Noise or crushes pieces.	Dents Sample
Pliers Crushing	Not possible or Grani Fracture	Fractures or Crushes small piece	
50mm dia. Core in Hand	Cannot break 500mm long piece	Can break 300mm piece	Can be crushed into pieces
Soaked in water for One hour	No change	Some change or weaker pieces	Disintegrate in the hand after soaking
Expected Crushing	Above 40N/mm2	1.5 to 40N/mm2	Below 1.5N/mm2

Table 2: IDENTIFICATION OF SOIL TYPES TABLE

Refer to table E3 attached.

3.9 Sources of Fill Materials

(a) The Contractor shall obtain the necessary general fill materials for construction of the works from excavations required to be undertaken for the payment works

(b) Other fill materials such as sand, graded aggregate and rock fill for as fill materials shall be obtained by the Contractor from source to be approved by the Project Manager. The Contractor will be entirely responsible for insuring that the materials supplied meet the requirements of the specification including for any necessary crushing, blending or other preparation

(c) Acceptance by the Project Manager of the source of any material will in on way be deemed to imply approval by the Project Manager of the material to be supplied, nor shall approval of a potential borrow area be construed as constituting approval of all materials contained therein.

3.10 Use of material from Excavations for the works

3.10.1 General

(a) Depending on its nature and quality, excavated material will either be:

- Re- used as fill backfill,
- Taken to spoil

(b) The Contractor shall select materials as required and use his skills to avoid unnecessary waste of potentially usable materials

3.10.2 Re- used fill material

(a) Where the Contractor has been informed that the intention is that excavated material is to be re-used elsewhere in the works, the Contractor shall insure that his excavation techniques result in material suitable for the particular re-use requirement which is described.

(b) In order to achieve particular materials the Contractor shall be prepared to sort materials into different stockpiles, which he must maintain in an uncontaminated condition. Any contaminated material shall be abandoned and replace at the Contractor's expense. The Contractor may be required to cart the excess contaminated material to spoil or dispose them in-situ as directed by the Project Manager. No extra cost will be paid to the Contractor for complying with such instructions. In executing the instructions issued by the Project Manager, the Contractor will be required to give effect to the environmental concerns specified in the relevant section.

(c) In all cases it will be the Contractor's advantage to phase as possible the excavation work to suit the construction in which excavated material is to be re-used, particularity as no additional payment for double handing of materials will be made.

3.11 Requirements Specific to Excavations for Parts of the Works

3.11.1 Trenches, Manholes and Confined Foundations

(a) Confined and narrow excavation such as for trenches and manholes shall be excavated with particular care and attention to adequacy of death and injury on construction sites. The dangers inherent in inadequate supervision of such work, particularly in water bearing ground or damp conditions, cannot be over – emphasized. Continuous dewatering may be necessary in water bearing ground.

(b) Excavated material shall be cast or moved to a position sufficiently far away from the edge of the trench that instability of the trench wall (supported or otherwise) will not be called into question.

(c) Excavated material which will clearly be unsuitable as back full shall be removed to spoil as soon as possible after being excavated.

(d) The widths of trenches for pipes shall be of the minimum required or as shown on the Drawings. Trenches shall not be so narrow that the pipe cannot be properly installed and jointed. Neither shall they be of excessive width or with battered sides because this will increase the loading on an unprotected pipe. At pipe joint locations the trench shall be widened and deepened to leave the unsupported so that they can be properly made and inspected. In class 2 material an extra 150mm over the depth for class 1 material shall be excavated and replaced by pipe bedding material.

(e) Supports shall be left in permanently when so directed when they are removed; the removal shall be done progressively as backfilling proceeds and in stages so that no voids are left

(f) Excavations at or near the toes of cutting or embankment slopes shall be carried out in such a manner that there is no excavation into the slopes. In such trenches the pipe run shall be completed and backfilled at the end of each day's work unless otherwise agreed with the Project Manager.

3.11.2 Structures

(a) The contractor shall excavate such that concrete and other structures may be formed to the lines and levels shown on the Drawings or as instructed by Project Manager. In the course of the excavation work, the surrounding material shall be preserved in the soundest possible condition

(b) Excavation for foundations in class 1 material shall be made to approximately 0.5m above the levels shown on the Drawings. Final trimming shall be delayed until shortly before foundation preparation is due to commence.

(c) During the course of blasting operations where, in the opinion of the Project Manager, action is necessary to avoid damage to adjoining material or to adjacent structures, the Project Manager may instruct the Contractor to reduce the explosive charges or to use other methods such as pre- splitting or cushion blasting or to cease using explosives altogether and to continue by other means such as use of hydraulic breakers or line drilling.

(d) Excavated surfaces which will remain permanently exposed shall be finished off in a neat and workmanlike manner and graded to provide adequate drainage. Rocky material liable to become detached from surfaces shall either be removed (and holes backfilled where practicable) or anchored.

(e) Excavated surfaces on or against which concrete structures will be cast shall be trimmed so that there are no protections within the permissible limits and cleaned to means. Contractor shall cast all in situ concrete structures against the excavated side surface in class 2 material. Thus,

when excavating in class 2 materials, excavation lines shall be kept as close as possible to the actual structural requirements.

(f) Where the Contractor over excavates of excavations by an additional width exceeding 500mm, the Project Manager shall be empowered to direct the Contractor to use formwork at his own expense to achieve the final surfaces of in situ concrete structures.

3.12 Dust and Noise Prevention

(a) The Contractor shall masks ear mufflers to those personnel engaged on operating inherently nosily equipment and other work entailing long-term exposure to dust and noise and the consequent of contracting ill effects there from.

(b) The Project Manager shall be empowered to ask for excessively noisily equipment to be removed and replaced.

3.13 Procedure on Completion of Excavation

(a) Upon substantial completion of excavation, the excavated surface shall be cleared of spoil sufficiently to allow inspection by the Project Manager. Final clearing and surface preparation procedures shall not commence until the Project Manager has approved the excavated level. Neither shall any excavated surface for the Permanent Works be covered until the Contractor has obtained the approval of the Project Manager. The Contractor shall at his own expense uncover any excavation which has been covered without such approval.

(b) Where the material replaced in an excavation is other than the material removed. Supports shall be removed before or during filling and in such s way that the material from the walls of the excavation does not contaminate the replacement material.

(c) Excavated surfaces which are to have filled material or concrete placed upon them shall be prepared as specified elsewhere.

3.14 Backfilling of Excavations

3.14.1 Scope

The clauses cover the backfilling of excavation except for pipe trenches and the like, for which the requirements are given in the pipe work section.

3.14.2 Materials

(a) Fill material used for backfilling excavation shall be approved class1 material free from large clods, large rocks, rubbish and other undesirable constituent. Where free draining material is shown on the Drawings, all layers thereof be of consistent quality.

(b) Backfill material shall normally be selected by the Contractor from excavated material cannot be obtained in this manner, it shall obtained by the Contractor from another borrow source and brought to the site. Both the source and the type of material to be used will be subject to approval by the Project Manager.

3.14.3 Procedure

Unless otherwise agreed, backfilling shall be carried out in layers not exceeding 150mm after compaction. Each layer shall be watered to the approximate optimum moisture content and thoroughly compacted uniformly over the full area of each layer to the density of the surrounding ground. Unless otherwise instructed, vibrating plate or similar compaction equipment shall be used in confined areas. Where appropriate the final layer of backfill shall be neatly finished to accord with the surrounding ground levels and any settlement which occurs shall be made good by re- compacting and the addition of further compacted backfill.

3.15 Measurements and Payments - Excavations

(a) All excavation works, except trench excavation, is measured net in cubic meter and payment shall be effected per cubic meter. The rate shall be inclusive of backfilling around foundations.

(b) The volume measured for excavation of a structure or foundation shall be the volume is either occupied by or vertically above any part of the structure or foundation. Additional excavation necessary to provide working space shall not be measured.

(c) Excavation in pipeline trenches shall be measured per meter length. Payment shall be effected per meter length. The rate shall be inclusive of provision of pipe bed and compaction of bed and after pipe installation surrounding of the pipe and compaction of the pipe surrounding and partial and later complete backfilling of the trenches, including compaction.

(d) Excavation of Rock Class 1 and Class II, if carried out with the approval of the Project Manager, will be measured per cubic meter excavated. The rate shall be installation surrounding of the pipe and compaction of the pipe surrounding and partial and later complete backfilling of the trenches, including compaction.

(e) An isolated volume of artificial hard or rock occurring within other material to be excavated shall not be measured separately unless its volume exceeds one cubic meter.

(f) The location and limits of dredging shall start in item descriptions where its extent would otherwise be uncertain. Such excavation classes in the Bill of Quantities shall be measured as dredging, irrespective of the method of excavation adopted by the Contractor. Payment shall be effected per meter length. The rate shall be inclusive of provision of pipe bed and compaction of bed and after pipe installation surrounding of the pipe and compaction of the pipe surrounding and partial and later complete backfilling of the trenches, including compaction.

TABLE OF CONTENTS.....SECTION CONCRETE, REINFORCEMENT & FORWORK

4.0 CONCRETE, REINFORCEMENT AND FORMWORK

4.1 General

(a) The standard of materials and of workmanship shall be not inferior to the recommendations of the current:-

i. A code of Practice dealing with the structure use of Reinforced Concrete in Buildings, BS 8110 whichever is applicable to or the particular structure

ii. A code of practical dealing with the Design and Construction of Reinforced Concrete Structures for the storage of liquids, BS 8007 and appropriate standard Specifications herein referred to.

(b) The requirements outlined in the above documents must be read of with those of this section of the Specification and where any conflict exists between the recommendations of the above and of this Specification, the requirements of this Specification shall prevail.

(c) As and when required by the Project Manager's Representative, the Contractor shall prepare and submit, before commencing the work, a Time Chart (additional to the General Programme) detailing the various operations concrete work.

(d) No material shall be used in the work until prior approval for its use has been given by the Project Manager's Representative; neither shall any change in the nature, quality, kind, and type, source of supply or manufacture be made without the Project Manager's Representative's permission.

(e) Names of manufactures and test certificates shall be supplied as soon as possible to the Project Manager's Representative.

(f) The prices inserted in the Bill of Quantities shall include for the provision of all samples and for all costs incurred in the execution of the tests specified or referred to herein in accordance with the General Conditions of Contract; the prices shall include also fro transport of samples of cement, sand, concrete, aggregates, and similar materials to the Ministry of Works, Materials Branch, Dar es salaam. Results of laboratory and site tests shall be kept on site and copies all test Reports shall be forwarded in duplicate to the Project Manager's Representative.

(g) Frequency of test and number of samples required will be governed by the results of previous tests, the quality of the materials revealed during the tests and the uniformity of that quality. Should it become evident that the quality of the concrete is deteriorating the Project Manager's Representative may require additional samples to be taken and test cubes to be made and tested to determine the cause.

(h) During the progress of the works, consignment notes shall be supplied to the Project Manager's Representative giving details of each consignment of each concreting material.

(i) Use of the word "approved" in this Specification refers to the Approval by the Project Manager's Representative.

4.2 Steel Reinforcement

4.2.1 Steel Roads

(a) Steel rod reinforcement shall consist of:

i. Mild steel bar complying with BS 4449,

ii. Hot rolled high yield bars complying with BS 4449,

iii. Cold worked high yield bars complying with BS 4461 as described in the drawing

(b) All reinforcement shall be in clean conditions in orderly manner to the satisfaction of the Engineer such that the batch to which each piece belongs can be readily identified.

4.2.2 Steel Fabric Reinforcement

Steel fabric reinforcement shall be electricity cross welded steel mesh reinforcement complying with BS 4483 and of the size weight specified and made of wire to B. S 4482

4.2.3 Tying Wire for fixing reinforcement shall be either:

(a) No. 16 gauge stainless steel wire.

(b) No. 18 gauge stainless steel wire

4.2.4 Spacer Blocks

(a) Spacers block required for ensuring that the Reinforcement is correctly positioned shall be as small as possible consistent with their purpose, of a shape acceptance to the Engineer, and designed so that they will not overturn when the concrete is placed. Unless otherwise approved they shall be made of concrete with 10 mm maximum aggregate size and mix proportions to produce the same strength as the adjacent concrete.

(b) Wire shall be cast in the block for the purpose of typing it to the reinforcement. Spacer block of concrete shall not be used until at least 7 days old.

4.3 Water for Use in Concrete

(a) Water for use in mixing with cement or for curing concrete shall be from any approved source, clean, fresh and free from organic and other deleterious matter.

(b) The Engineer may require that any water be sampled and tested by the method given in BS 3148. Water failing the criteria given in the appendix to BS 3148 will be rejected.

(c) Water for use in mixing with cement shall neither be hotter than 25 degrees centigrade (77 degrees Farenheight) nor colder than 5 degrees centigrade (41 degrees Farenheight) at the time of mixing.

(d) The water for each batch shall be just sufficient to ensure the production of concrete of the required consistency and shall be measured in a small tank, and the quality shall be varied from time to time as required by the Project Manager's Representative.

4.4 Cement

(a) All cement used (unless otherwise ordered) shall be ordinary Portland Cement or if required or allowed by the Project Manager's Representative, rapid-hardening Portland Cement of the best quality and of a brand or brands to be approved by the Project Manager's Representative and shall comply in every respect with the conditions, analyses and tests laid down in BS 4027 for Portland Cement

(b) Sulphate Resisting or High Alumina Cement where a sulphate-resisting cement or a high alumina cement is specified or ordered, it shall be of the best quality and of brand or brands approved by the Project Manager's Representative. The cement shall comply in every respect with BS4027

(c) Cement Storage. The cement shall be delivered on the site of the works in such consignments as shall ensure satisfactory progress of the work, each bag or container being sealed to the satisfaction of the Project Manager's Representative. Cement shall not be delivered in bags of less than 5 ply. The cement shall be stored on the Site in a dry store or in approved bulk containers, large enough to contain the required quantities. The store shall be provided by the Contractor and shall have sufficient sub-division of such sizes as the Project Manager's Representative may approve, it shall be properly roofed and perfectly watertight, and it shall have a dry wooden floor above ground level with an air space at least 15 cm in depth below it. The cost of all work specified in this Clause shall be borne by the Contractor.

(d) The cement shall be used, as far as possible, in the order in which it has been delivered and put into store.

(e) The Project Manager's Representative may cause samples to be taken from any consignment of cement for testing by the Project Manager's Representative at the Ministry of Works, Testing Station. If the results of these tests show that the samples do not conform to this Specification,

the whole consignment will be rejected as unfit for use, and must forthwith be removed from the Site by the Contractor at his own expense. The various consignments must be brought to the Site in ample time to allow the above tests to be carried out before the cement is required for use.

(f) Later Tests Although the Project Manager's Representative may have passed any consignment of cement, he shall nevertheless, have the power at any subsequent time to reject such consignment if he finds that any deterioration in the quality thereof has taken place. Any package of cement in which there are hardened lumps or cakes of cement shall be rejected.

(g) Cement Containing Hardening or Waterproofing Compounds. No cement containing hardening or waterproofing, compounds shall be used nor shall calcium chloride or other chemicals be added to cement or to concrete except on the instructions of the Project Manager's Representative. Any cement so treated shall be stored separately and clearly marked and shall only be used in accordance with the requirements of the Project Manager's Representative.

4.5 Sand

Sand used for mortar shall comply with BS 882 and sand for rendering with BS812.

4.6 Coarse and Fine Aggregates

(a) Mixed ballast for mass concrete shall comply with the requirements for "all-in" aggregates of 40 mm maximum size in BS 882 unless otherwise specified by the Project Manager's Representative.

(b) All aggregates for graded concrete, except granolithic and fine concrete, shall comply with BS.882. Coarse aggregate shall be "graded aggregates" of 20mm to 5mm nominal size as specified in Table 3 – 1 unless otherwise ordered. Fine aggregates shall be natural sand, in grading zone 2, as specified in Table 3 – 2.

(c) Approved course and fine aggregates, mixed before the addition of cement, in volumes to be approved by the Project Manager's Representative, may be used in lieu of "all-in" aggregates for mass concrete.

(d) They shall conform to the moisture absorption requirements of BS 887. Otherwise the Contractor shall prove the durability of the finished concrete by approved tests when used for making concrete required for liquid retaining structures.

(e) Aggregates of rounded shape or otherwise capable of procuring a concrete of good workability with the minimum addition of water, shall be p[referred. The Contractor shall ensure that the nature and, grading of aggregates remain reasonably consistent, and shall, if necessary, stock pipe and include different grading to ensure that the overall grading remains constant for each section of the work.

(f) Dust or flour resulting from crushing the aggregate shall not be allowed to contaminate the stockpipes. When, in the opinion of the Project Manager's Representative such contamination

has taken place to the detriment of the finished concrete, it shall be removed by an approved means; otherwise the aggregate shall be rejected.

(g) For mass concrete, dust or flour resulting form crushing the aggregate may be included in quantities to supplement the fine aggregate in order to improve the consistency of the mix.

(h) Aggregates for fine Concrete Course aggregate for fine concrete shall comply with BS 882, but shall have a grading which shall be 10 mm to No.7 sieve size. Fine aggregates shall be as specified in (ii).

(i) Source of supply of aggregates shall be obtained from a source to be approved by the Project Manager's Representative. Course and fine aggregates shall be delivered and stored separately on to a clean, hard base, in separate compartments or into approved hoppers.

(j) Samples of Aggregates Samples of aggregates and sand for use on the works shall be submitted to the Ministry of Works, Materials Branch, for approved and no materials will be accepted for use unless they comply with the requirements started.

(k) Defective Aggregates if any aggregate is defective in grading other respect, the Contractor shall remedy the defect at his own expense and to the satisfaction of the Project Manager's Representative.

4.7 Grading of Aggregates.

The combined grading of aggregates shall be a smooth curve approximately parallel to the grading envelope limits, given in the following Table, and to the approval of the Project Manager's Representative.

Table 3: COMBINED GRADING CURVES FOR CONCRETE SIEVE

	PERCENTAGE BY WEIGHT PASSING NOMINAL MAXIMUM SIZE OF AGGREGATE (mm)		
SIEVE SIZES	40	20	10
1 ½"	100		
¾"	50 - 75	100	
3/8"	36 - 60	45 - 75	100
3/16"	24 - 47	30 - 48	30 - 75
No. 7	18 - 38	23 - 42	20 - 60
No.14	12 - 30	16 - 34	16 - 46
No.25	7 - 23	9 - 27	4 - 20
No.52	3 - 15	2 - 12	4 - 20
No.100	0 - 5	0 - 2	0 - 6

4.8 Composition of Concrete

All concrete shall be dense, impermeable, durable, and consistent and cast accurately to the lines and dimensions shown on the drawings and shall present a uniform surface free from blemishes, cracks and honeycombing, resistant to wear mild chemical attack. Concrete mixes are to be such to enable the concrete to fill the form-work completely with intimate contact between contact and reinforcement and the concrete is to be thoroughly and uniformly vibrated throughout. The cement aggregates and water for concrete shall be as specified. Samples of cement and aggregate shall be submitted to the Project Manager's Representative for testing as early as possible prior to the commencement of concreting works.

4.9 Class and strength of Concrete

(a) The concrete shall be of the Classes shown on the Drawings, described in the Bills of Quantities or ordered by the Project Manager's Representative, which will be one or more of the Classes described and tabulated below, with the appropriate specified maximum size of aggregate.

(b) The concrete mixes, as described, are "guaranteed strength" mixes in the sense that no proportions are given but the required concrete strength is shown and the Contractor will be

required to design a suitable mix with the given grading to fulfill the requirements as laid down hereunder for relevant Classes shown The mixes will be composed of the following Classes: 10, 15, 20, 25 and 30. These 2 figures represent the minimum 28-day strength in N/mm of the Works Cubes.

(c) The maximum size of aggregate shall be as shown on the Drawing or as ordered by the Project Manager's Representative, as may be indicated in brackets after the mix Class, for example 'Class 30(20)'.

(d) All reinforced and graded concrete shall be composed of cement and fine and coarse aggregates gauged separately and in the following proportions:

Table 3-2: CLASSES OF CONCRETE

CHARACTERISTIC COMPRESSIVE STRENGTH AT 28 DAYS N/mm2	NOMINAL MIX CEMENT, SAND & AGGREGATE	LIMIT OF COMBINED WEIGHT OF DRY AGGREGATE TO 50 KG CEMENT		MAX VALUE OF WATER CEMENT RATION FOR VIBRATED CONCRETE (BY WEIGHT)
		MAX. KG	MIN. KG	
10	1:3:6	-	-	-
15	1:2½:5	450	-	-
20	1:2:4	400	230	0.55
25	1:1½:3	360	180	-
30	1:1:2	320	160	-

(e) Before any concreting commences, trial mixes shall be made and cube tests performed as described in the Specification and these cubes shall obtain strengths at least 30% greater than the works cubes shown in Table 3 – 2 before the mix is approved by the Project Manager's Representative.

(f) If required or allowed by the Project Manager's Representative, the relative proportions of fine and coarse aggregates shall be varied to obtain a denser mixer and to reduce shrinkage and such change shall not affect the price so long as the sum of the volumes of fine and coarse aggregates remain unchanged. Where sulphate-resisting cement is used, the water cement ration shall not

exceed 0.55. Aggregate shall be batched by weight and the weighing hopper shall be of an approved adjustable type. Volume batching will not be allowed for concrete work except under special circumstances such as for small pipe culvert headwalls, pipe surrounds, and other isolated minor works.

(g) When aggregates are batched by volume, the approval of the Project Manager's Representative shall first be obtained before the use of this method of batching. With volume batching, stout gauge boxes approved by the Project Manager's Representatives, shall be used.

(h) When cement in bags is used, the total volume or weight of aggregate per hatch shall be such that a whole number of bags of cement is used and the use of cement from broken bags will not be permitted.

(i) Once the proportions of the mixes have been agreed by the Project Manager's Representative, they shall not be amended without his consent.

4.10 Tests for Crushing Strength

(a) The Contractor shall be held responsible for ensuring that the crushing strength for the respective classes of graded concrete is not less than the following for concrete made with ordinary Portland cement or sulphate-resisting cement.

Table 3-3: CRUSHING STRENGTHS

CLASS MIX	NOMINAL	MINIMUM CRUSHING STRENGTH ON 150 mm WORKS CUBES				MIX AVERAGE MINIMUM TRIAL STRENGTH			
		AT 7 DAYS		AT 28 DAYS		AT 7 DAYS		AT 28 DAYS	
		N/mm²	Kg/cm²	N/mm²	Kg/cm²	N/mm²	Kg/cm²	N/Mm²	Kg/cm²
10	1:3:6	7.7	78	11.4	116	-	-	-	-
15	1:2½:5	10	102	15	153	13	133	19.5	200
20	1:2:4	15	153	20	204	20	204	26	265
25	1:1½:3	19	194	25	255	25	255	32.5	332
30	1:1:2	24	245	30	306	32	326	39	400

(b) Cubes made with rapid-hardening Portland cement must attain at 3 and 7 days after casting a crushing strength equal to that specified for ordinary Portland cement or sulphate-resisting cement at 7 and 28 days respectively after casting.

(c) Test cubes shall be numbered and dated in a conspicuous manner and shall be delivered to the Ministry of Works, Materials Branch at least 24 hours before the date when they are due to be tested. Four cubes shall be made at least 14-days before concreting is to be commenced, from a batch of concrete made on Site with the aggregates, cement and water proposed to be used on the works and at least two additional cubes shall be made for each 25 cubic meter of concrete mixed or when otherwise required by the Project Manager's Representative. Should the crushing strength fall below the figure specified, the Contractor shall, without extra charge, adopt a richer mix or make other changes in proportion or otherwise as the Project Manager's Representative may direct or approve, so as to bring the concrete up to the required strength.

4.11 Cement Content and Water-Ratios

(a) Notwithstanding the strength requirements of this Specification, in order to ensure adequate durability of the finished concrete while at the same time limiting the shrinkage characteristics, the following limits shall not be exceeded:

Table 3-4: LIMITS TO WATER

CLASS OF CONCRETE	MAXIMUM TOTAL WATER/ CEMENT RATIO BY WEIGHT	LITRES WATER PER 50 Kg CEMENT	CEMENT IN KG/m³ FINISHED CONCRETE	
			MAXIMUM	MINIMUM
15	0.60	29.60	356	252
20	0.55	27.30	415	296
25	0.50	25.00	475	341
30	0.45	22.75	534	385

(b) In all cases of mix proportioning, the added water shall be included with due allowance for the moisture contained in the aggregates, and shall be the minimum consistent with the workability requirements.

(c) Where aggregates do not conform to the moisture requirements of BS8007 but are permitted for use, the above maximum water cement ratios shall be reduced by 0.05 (or 2.25 liters of water per 50 kg of cement).

(d) Where the concrete is to be used in structures, protected from the elements, or not exposed to constant wetting and drying, the above maximum water-cement ratios may be increased by 0.05 (or 2.25 liters of water per 50 kg of cement).

4.12 Design Mix

(a) The mix should be designed for a mean strength that exceeds the specified works Cube Strength plus 30%.

(b) The mix design shall follow the method explained in BS8500.

(c) For the purpose of determining the "design strength" of the concrete, an allowance shall be added to the works Cube Strength indicated in Table 3 – 3 for the particular Class of concrete. This allowance shall be assessed on the degree of control reasonably to be expected in manufacturing the concrete and shall not be less than twice the Standard Deviation as defined in BS EN 206-1. Until such time as it has been determined, the Standard Deviation shall be assumed to be not less than 7 N/mm2.

(d) Details of the design mix shall be forwarded to the Project Manager's Representative for his approval. However, such approval by the Project Manager's Representative shall not relieve the Contractor of his obligations.

4.13 Trial Mixes

(a) Trial mixes of the proposed design shall be made on site in the presence of the Project Manager's Representative or his Representative under full scale conditions, i.e. of quantities of similar sized batches as will be used in the works, the costs of the trial mixes being borne by the Contractor. As a preliminary guide a sufficient quantity of each material may be submitted to the Ministry of Works, Materials Branch, for the preparation of preliminary trial mixes and recommendations to the Contractor. The cost of such tests at the Materials Branch shall also be borne by the Contractor.

(b) The workability of the trial mixes shall be recorded and three mixes shall be prepared on three separate days. Nine test cubes shall be made from each mix, and six tested at 7 days and 3 at 28 days, in accordance with Clause 314. For the trial mix to be acceptable, the workability must be adequate for acceptable placement and the average strength of the test cubes made in any one day must exceed the specified works cube strength plus 30%. No result may fall below the works Cube Strength.

(c) Trial mixes may be used in the Permanent Works as blinding, and will be paid for at the rates for blinding.

4.14 Compaction and Slump Tests

(a) The Contractor shall as and whenever required by the Project Manager's Representative carry out slump or any other tests to determine the consistency of the mixed concrete and gauge, by measure, the amount of water prescribed by the Project Manager's Representative for each mixing of concrete.

(b) The tests of concrete shall not show a greater slump or compaction factor than the Project Manager's Representative shall decide for each part of the work, but generally the slump for mass concrete must not exceed 25 mm and for reinforced concrete work 50 mm.

(c) The compaction factor of vibrated concrete shall not exceed 0.91.

4.15 Mixing Concrete

The concrete shall only be mixed in approved power-driven concrete mixers for all Classes of Concrete, except that small batches of Class 15 and Class 10 may be mixed by hand with the approval of the Project Manager's Representative. The concrete shall be mixed continuously in the mixer for not less than 2 minutes after the whole of the ingredients are present in the drum. When a concrete mixer has been out of use for more than 20 minutes, or when the type of cement is changed, the mixer shall be thoroughly cleaned before a fresh batch of concrete is made in it. The Project Manager's Representative may prohibit concreting if in his opinion the number and/or sizes of the mixers available, or the quantity of material in stock, is insufficient; or where he feels that the haulage of concrete from the mixer to the point of application of concrete is not near enough to guarantee quality.

4.16 Weighing, Batching and Mixing

(a) Aggregates and cement shall be proportioned by weigh-batching and water shall be proportioned by volume. Subject to the prior approval of the Project Manager's Representative, volume-batching of aggregates may be used when weigh-batching is not possible, but volume-batching of cement will in no case be accepted. The contractor may, however, so mix his concrete that such batch shall use a whole bag or bags of cement, the weight of which is known precisely.

(b) Gauge boxes for volume-batching shall be strongly constructed and where necessary due allowance shall be made for bulking of the aggregates.

(c) The aggregates and the cement shall be thoroughly mixed in a clean mechanical mixer for a period of time agreed with the Project Manager's Representative and the water added on the basis of the approved design.

(d) The amount of water added shall conform to the requirements as given in Table 3-4.

(e) Batch-mixing machines shall comply with the requirements of BS EN 206-1. They shall be provided in such numbers and of such capacity as to ensure a continuous supply of freshly mixed concrete at all times during construction.

(f) Continuous mixing machines shall be used only with the written permission of the Project Manager's Representative.

(g) When small quantities of concrete are to be mixed the Project Manager's Representative may approve hand-mixing. In such cases, the cement content for all mixes shall be increased by 10% and the Contractor shall allow for this in his rates and prices.

(h) Where concrete is mixed by hand, the fine aggregate and the cement shall be thoroughly mixed first and the coarse aggregate added. Mixing in the dry shall be carried out at least twice then water be added and the concrete again thoroughly mixed.

4.17 Central Batching Plant

If a central batching plant is used, the method of weighing or measuring the cement and aggregate shall be to the approval of the Project Manager's Representative. Accommodation for a Concrete Inspector shall be provided at the batching plant, and shall include a dust-proof room and shall be so situated that the inspector has a visual check on the quantities of cement and aggregate used per batch. The Contractor shall include in his prices for the provision and maintenance of his accommodation.

4.18 Hand Mixing

If hand-mixing is permitted, the quantity of cement to be used shall be increased by 10 per cent. Hand-mixing shall be carried out on an approved water-tight platform, the aggregate and cement being turned over three times in a dry state and thoroughly mixed by means of shovels. The water shall then be added through approved hoses fitted to watering cans, and the mixture shall be worked together until a uniform consistency is obtained.

During windy weather, protection shall be provided by screens or otherwise as directed to prevent cement from being blown away.

4.19 Ready Mixed Concrete

(a) Approval has to be obtained from the Project Manager's Representative if the Contractor intends to use ready-mixed concrete, particularly at the tie-in sections shown on the drawings.

(b) Ready-mixed concrete shall be mixed and delivered to the Site of the works by means of one of the following combinations of operations:

i. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in truck agitators or in non-agitating hauling equipment (known as central-mixed concrete).

ii. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer, (known as shrink-mixed concrete).

(c) Mixed completely in a truck mixer, (known as transit-mixed concrete). Mixers may be stationary mixers or truck mixers. Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal place or plates indicating the basis on which the equipment is designed, the manufacture's guaranteed capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades.

(d) Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified. The counters shall be of the continuous registering non-resettable type, which accurately registers the number of revolutions and shall be mounted on the truck mixer so that the Project Manager's Representative may safely and conveniently inspect them from alongside the truck.

(e) Truck mixers shall be loaded not to exceed the manufacturers guaranteed capacity. They shall combine the ingredients of the concrete into a thoroughly mixed and uniform mass and discharge the concrete with a satisfactory degree of uniformity conforming to the above requirements.

(f) When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed shall be allowed for partial mixing in a central plant.

(g) Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the above requirements.

(h) Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity. They shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.

(i) Bodies of non-agitating hauling equipment shall be so constructed that leakage of the concrete mix, or any part thereof, will not occur at any time, and they shall be self-cleaning during discharge.

(j) Concrete hauling in open-top vehicles shall be protected during hauling against access of rain, or exposure to the sun when the ambient temperature exceeds 24 degrees centigrade.

(k) No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point unless the Project Manager's Representative's Representative orders additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.

(l) The rate of discharge of mixed concrete from truck mixer agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.

(m) When a truck mixer or agitator is used for transporting concrete to a delivery point, discharge shall be completed within 1½ hours, or before 250 revolutions of the drum or blades, whichever comes first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 29 degrees centigrade or above, a time less than 1½ hours will be required.

(n) When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 29 degrees centigrade or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.

(o) Each batch of ready mixed concrete delivered at the job Site shall be accompanied by a ticket showing the volume of concrete, the weight of cement in kgs, and the total weight of all ingredients in kgs, unless they are otherwise ordered by the Project Manager's Representative's Representative. The ticket shall also show the time of day at which the materials were batched and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged.

(p) The organization supplying concrete shall have sufficient plant capacity and transporting apparatus to ensure continuous delivery at the rate required. The rate of delivery of concrete during concreting operations shall be such as to provide for the proper handling, placing and finishing of the concrete. The rate shall be such that the interval between batches shall not exceed 20 minutes. The method of delivering and handling the concrete shall be such as will facilitate placing with the minimum of re-handling and without damage to the structure or the concrete.

4.20 Transporting and Placing of Concrete

(a) No concrete shall be placed until the Project Manager's Representative has approved the formwork and reinforcement.

(b) The Contractor shall provide all facilities for inspection. The Contractor shall give at least 48-hours notice to the Project Manager's Representative of the times he proposes to concrete and the Project Manager's Representative of the times he proposes to concrete and the Project Manager's Representative may order that no concreting shall take place until either he or his Representative is present.

(c) Concrete shall be transported in water-tight containers in such a manner that will avoid the segregation of the constituent materials. The time elapsing between the initial mixing of the concrete and finally placing in the works shall not exceed 30 minutes when Portland cement is used. Where other cements are used, the Project Manager's Representative will stipulate the maximum time allowed. Concrete remaining unplaced at the end of this period shall not be placed in the work, but shall be removed from the Site and disposed off at the Contractor's expense. Should there be need for the use of rapid hardening cement at tie-ins particularly for expediting the completion of the works thereby the Contractor shall inform the Project Manager's Representative who will when he deems it necessary approve such use.

(d) Concrete shall not be dropped through a height exceeding 1.5m. For lowering concrete through heights in excess of 1.5m, special methods shall be used, such as chutes, tremies, bottom dumping hoppers, or bagged placing, and then only with the approval of the Project Manager's Representative. All containers troughs and chutes ad apparatus through and in which concrete is passed, shall be kept clean and entirely free from hardened concrete or cement and free from contamination by extraneous material.

(e) The concrete shall be placed in position in lifts not exceeding the heights to be agreed by the Project Manager's Representative, and the excessive heights which may cause segregation of the aggregate at the working edge, shall be avoided. Concreting of any unit or section of the work shall be carried out in one continuous operation, and no interruption will be allowed without the approval of the Project Manager's Representative.

(f) A competent steel fixer shall be in attendance the whole time concrete is being cast around reinforcement. Proper bridging arrangements for traffic over reinforcement shall be provided so that the reinforcement is not distorted, damaged or displaced.

(g) Where approval is obtained for concrete to be conveyed by chutes, these shall have a slope (not exceeding 1 vertical to 2 horizontal) in order to ensure a continuous flow of concrete. Additional water shall not be introduced to assist the flow of concrete down the chute, deposition is to be intermittent and chutes shall be arranged to discharge into a storage hopper. Under no

circumstances should a clear fall of more than 1.0 m be permitted at the discharge end of the chute.

(h) The pumping of concrete shall be used only for such parts of the work as the Project Manager's Representative considers suitable, and will be subject to the size, design, layout, and sating of the whole concreting plant including pumps, pipelines, water and air supply and all ancillary gear and apparatus and the conditions and methods of its operations and maintenance being to the entire satisfaction and approval of the Project Manager's Representative.

(i) Whenever transport of concrete is interrupted for any length of time (periods of over 30 minutes shall be treated as such), the chutes, pumps, pipes and any other means of distribution shall be thoroughly flushed out and cleaned. These shall also be flushed out immediately prior to resumption of concreting and shall be kept free from hardening concrete.

(j) All wash water used shall be discharged outside the shuttering and clearing of any freshly placed concrete.

4.21 Compaction of Concrete

(a) All concrete shall be compacted mechanically, except when agreed by the Project Manager's Representative that small areas may be otherwise compacted.

(b) All vibrators shall be of a type approved by the Project Manager's Representative. Mould vibrators shall not be used for in-situ concrete work and may only be used for the manufacture of small precast units, with the approval of the Project Manager's Representative. Vibrators shall not be attached to the reinforcement and care shall be taken to avoid contact with it.

(c) Concrete shall be placed to uniform levels in layers not exceeding 450 mm deep in such manner as to avoid segregation, and each layer shall be compacted by means of approved vibrators to form a dense material free from honeycombing and other blemishes. Compaction by hand may be used only with the prior approval of the Project Manager's Representative.

(d) Vibration time, the effectiveness, radius and other vibration characteristics shall be in accordance with the vibrator manufacturer's recommendations. If internal vibrators are used, they shall be withdrawn immediately water or a thin film of mortar begins to appear on the surface of the concrete. Withdrawal shall be carried out slowly to avoid cavitations.

(e) If shuttering vibrators are used, the shuttering shall be strong enough to withstand the forces of vibration.

(f) Unless otherwise specified, before placing new concrete against concrete which has already hardened, the face of the older concrete shall be prepared by the removal of any laitance and loose aggregate, and shall be cleaned by a jet of compressed air.

(g) When displacers are used they shall be so placed that no displacer is within 300 mm of any finished face or within 450 mm of any other displacer. On completion of any lift displacers shall be so arranged that they project for half their height above the surface.

(h) In order to avoid as much as possible the effect on the structure of shrinkage, no concreting of adjacent wall or slab panels will be allowed (except by special permission of the Project Manager's Representative) unless a short intermediate section of not less than 0.45 m is left un-concreted. After the wall sections or slab panels have hardened for a period of not less than 5 days, the intermediates shall be concreted.

(i) For reinforced concrete work in structures, the immersion type of vibrator shall be used. For carriageway and footpath construction, 150mm thick or less, a vibrating screen may be used but for thickness in excess of 150 mm an immersion or plate-type of vibrator shall be used to compact the lower layers. Where a plate-vibrator is used, the thickness of each concrete lift shall be limited to 0.1m.

(j) In conjunction with each vibrator, one rammer consisting of either a pointed metal rod not less than 20 mm diameter and weight not less than 3 kg. or a metal-shod tamper of size not exceeding 0.1 x 0.1m and weight not less than 6 kg shall be used, together with a shovel or spade.

(k) As the concrete flows under the action of the vibrator, it shall be shaped into position and thoroughly rammed, care being taken to fill the void left by the immersion vibrator. The concrete shall be compacted to produce a dense uniform mass and special care taken to ensure that the concrete around the reinforcement and adjacent to the forms is free from voids.

(l) Where agreed by the Project Manager's Representative that a vibrator shall not be used, the concrete shall be compared by rammers only, but otherwise as described above.

(m) Concrete shall not be compacted by hand or machine to such an extent as in such a way that segregation takes place, and any concrete which, in the opinion of the Project Manager's Representative, has been over-compacted, shall be removed, carted from the Site and replaced, all at the Contractor's expense.

4.22 Hot Weather Concreting

(a) Concreting shall not be permitted if its temperature at placing is in excess of 38º C. In order to maintain the temperature of the concrete below this value the following precautions shall be taken wholly or in part as instructed by the Project Manager's Representative.

i. All aggregates stockpiles, water lines and tanks as well as the mixer shall be protected from the direct rays of the sun.

ii. Coarse aggregate shall be cooled by constant watering where possible.

(b) Mixing water shall be cooled by the addition of ice to the storage tanks where necessary.

(c) Rapid hardening cement shall not be used.

(d) Where the above precautions are inadequate concreting shall be carried out during the cooler parts of the day or during the night as may be directed by the Project Manager's Representative.

(e) When the air temperature is above 20 degrees centigrade loss of mixing water by evaporation shall be considered in arriving at the amount of water to be added to the mix. In order to maintain the water/cement ration within permissible limits an approved water-reducing agent shall be included in the mix. The maximum water/cement ratios may be increased with the Project Manager's Representative's permission by 0.05 (or 2.25 liters to 50 kilograms of cement) during mixing, but on no account shall water be added to concrete directly or indirectly once it has left the mixer.

(f) In order to reduce premature drying of the concrete during transporting and placing, all chutes, shuttering and reinforcement shall be cooled by watering when possible, or shall otherwise be protected from the direct rays of the sun. Any water so used shall be removed by jetting with compressed air before placing the concrete in close contact.

(g) As soon as possible after concreting, the shuttering shall be stripped and the surface of the concrete shall be kept moist for a period of 7 days by covering with wetted Hessian or sand, or shall otherwise be treated with an approved curing membrane.

(h) Where drying winds are encountered, wind shields shall be positioned as directed by the Project Manager's Representative to protect exposed surface of the curing concrete.

4.23 Wet Weather Concreting

(a) Concreting during periods of constant rains shall not be permitted unless aggregate stockpiles, mixers and transporting equipment and the areas to be concreted are adequately covered.

(b) During showery weather, the Contractor shall ensure that work can be concluded at short notice by the provision of stop ends.

(c) On no account shall work be terminated before completion of each section, between one stop and another.

(d) Adequate covering shall be provided to protect newly placed concrete from the rain.

4.24 Protection and Curing of Concrete

(a) Immediately after placing, the surface of the finished concrete shall be protected from the harmful effects of sun, drying winds, rains, running or surface water and against any shocks. It shall be cured by keeping it covered with damp material for a minimum period of seven days

after placing. The formwork shall also be kept damp and if struck earlier than 7 days, shall be replaced for the remaining period with some other approved damp material.

(b) In the case of concrete made with high alumina cement, the whole of the concrete shall be kept thoroughly saturated with water for at least 24-hours after casting. The Contractor shall protect and cure the concrete works as soon as practicable after completion by one or more of the following methods:

iii. The concrete shall be covered with a layer of sacking, canvas, Hessian, straw mats, or similar absorbent material or a layer of sand and kept constantly wet for 7 days.

iv. Except in the case of surfaces to which concrete has subsequently to be bonded, the concrete shall be cured by application of an approved liquid-curing membrane. On horizontal surfaces, the curing membrane shall be applied immediately after placing the concrete and on vertical surface immediately after removing the formwork.

(c) Not traffic or constructional loads shall be permitted on newly placed concrete until it has hardened sufficiently to take such traffic or load without surface damage or deformation.

(d) If directed by the Project Manager's Representative, the finished concrete works shall be fenced in such a manner as to prevent the access of traffic, unauthorized persons or animals on the surface of the newly paved concrete, until such time when the concrete will have hardened not to show any imprints or defects caused by any interference.

4.25 Loading

No loads shall be placed on beams, slabs or walls without the permission of the Project Manager's Representative.

4.26 Placing of Concrete in foundations

(a) Before placing concrete in foundations, the bottom shall be thoroughly rammed and cleaned up to a neat horizontal plane, or such profile as is shown on the drawings no steps or batters will be permitted unless shown on the drawings or approved by the Project Manager's representative.

(b) Where shown on the Drawings or ordered by the Project Manager's Representative that the sides of the concrete shall be cast against the existing ground without using shuttering the faces of the earth shall be trimmed neat and true to line. Where such a hole is over excavated due to the control, s method of working the void shall be filled with concrete, at the Contractor's expense of the same class as specified for the foundation.

(c) Where pumping from the foundation is necessary, sumps and drain shall be provided outside of the area to be concreted. Where it is likely that there will be standing water in the foundation after excavation the final 0.1 to 0.15 m of the soil shall not be excavated until immediately before the concreting.

(d) Where , in the opinion of the Project Manager's representative the bottom of the exaction has become unsuitable for bearing due to the Contractor's method of working , the soft material shall be excavated to such a level as the Project Manager's representative may direct , and replaced with concrete class 15 at the Contractor's expense.

(e) No concrete shall be placed in the foundation until the excavation has been approved by the Project Managers representative

4.27 Placing of Concrete in Water

(a) As far as possible all concrete shall be d deposited on a dry bottom and the placing of concrete under water will not be permitted except with the written approval of the Project Manager's representative. Concrete placed under water shall not be dropped, but shall be carefully placed in position by enclosing it in bags or by means of a bottom dumping – bucket or tremie or by continuous discharge through pipes leading from the mixer, full details shall first be permitted to the Project Manager's representative whose written approval shall be obtained before work is commenced.

(b) The surface of the concrete deposited under water shall be kept as nearly as possible horizontal, and no concrete shall be placed in running water or water liable to disturbance or pumping. Placing shall be such as to require the minimum amount of spreading tamping to such an extent or in such a way that segregation takes place shall be avoided. Sufficient time shall be allowed for the concrete to set before it is subjected to any form of loading, and also to ensure that it shall suffer no damage from subsequent pumping or dewatering operation.

4.28 Joints

4.28.1 Construction Joints

(a) Except where indicated on the Drawings, the position of Constructions Joints shall be determined on site. The Contractor shall submit to the Project Manager's representative for approval his proposals for the positioning of all construction joints. They shall be positioned with regard to the capacity of plant weather conditions, conditions of operation curing facilities and the structural requirements for suspended floors, construction joints shall be formed generally at mid –span in both beams and slabs.

(b) Horizontal Joints in walls shall be positioned with regard to the depth of penetration of the vibrator and the satisfactory compaction of the concrete. Unless otherwise indicated on the drawings or otherwise permitted by the Project Manager's representative for the construction of circular tanks concreting shall be carried out continuously for the full circumference without vertical joints where permission is thus granted, the Project Manager's representative may order at no extra cost the inclusion of an approved water bar.

(c) Horizontal construction Joints in walls shall be formed to represent a clean straight line to the exposed face by using a fillet set horizontal and fixed to the shuttering.

(d) For inclined members, joints shall be formed normal to the surface construction joint surfaces shall be formed by the wash off method. The concrete surfaces shall be left straight free from all irregularities of level and clean of all loose aggregate. As soon as possible after placing the concrete the joint shall be sprayed with a fine spray of water to prevent the formulation of laitance. Subsequently all excess water shall be removed by means of a jet of compressed air and the surface left clean. New concrete shall be placed in contract with the clean surface without the application of grout and shall be well vibrated to ensure complete union of the new with the old concrete.

(e) The face of horizontal joints shall preferably be brushed while wet to expose the aggregate.

(f) The face of the joint already set shall be thoroughly roughened by bush – hammering or chiseling or wire brushing if the surface has only partially set all loose pieces of aggregate shall be removed and the face scrubbed clean with a stiff wire bush and thoroughly wetted, in the case of horizontal joints , the face shall be rendered with 10 mm thick layer of cement /sand mortar proportioned to give at least the specified strength for that class of concrete, and the new concrete laid immediately upon it and thoroughly punned in . Where joints will be permanently visible the mortar shall be kept back at least 25 mm from the exposed face. In the case of vertical joints the face shall be rendered with a coat of neat cement placed immediately before each fresh lift of new concrete.

(g) Where due to accident or breakdown, it is impossible to continue concreting, the Project Manager's representative or his representative shall be immediately notified and his verbal instructions regarding either the making of a construction joint or the taking out of the new concrete back to the last construction joint, shall be complied with immediately the cost of complying with these instructions and making good shall be entirely at the Contractors expense.

(h) Rubber, Polyvinyl – chloride, or other approved water stop not les than 125 mm wide, shall be used in construction joints as indicated in the drawings or at additional or alternative positions to be agreed by the Project Managers representative type and size of water stop shall also be as indicated on the drawings and wall to wall - to wall – foundation joints shall have an open centre bulb type water bar, they shall be supported during concreting or shall have eyelets to enable them to be tied and held in place during concrete placing so as to prevent dislodgement and to ensure that the ends remain at right angles to the construction joints

(i) Joints and intersections of water stops shall be sealed by vulcanizing or other approved means. open centre bulb type water stops shall be accurately positioned as detailed in the drawings the cost of forming construction joints where shown on the d drawings shall be paid for at the rates inserted in the bills of quantities but construction joints where shown on the drawings shall be

paid for at the rates inserted in the bills of quantities but construction joints required elsewhere shall be deemed to have been included for by the Contractor in his general concrete rate.

4.28 .2 Rubber bitumen Joint sealer

(a) Joint sealers shall:-

- Retain elasticity at low temperatures;
- Maintain the ability to form a watertight seal
- Not bleed or flow at sun temperatures
- Not impart test or odor to water

(b) Other joint sealers having the above properties may be used with the approval of the project Manager's Representative

(c) Application of bituminous sealer shall be delayed where possible until all construction of the structure has been completed. Recommended time for caulking of floor joints is during wire – winding operations on the tank wall (if any) but under no circumstances shall the joints subject to movement by stressing of adjacent sections be filled until such stressing operations have completed.

(d) The joints shall be filled as detailed on drawings and the handling and laying of bituminastic material including priming must be carried out exactly to the manufactures specifications the practice of flooding the joint with primer is forbidden great care must be exercised when cleaning not to injure any sealing aid such as water bars which have been cast into the joint the hot rubber bitumen filler should be heated to the specified temperature in a purpose made heating unit and the temperature rigidly controlled with the aid of a suitable thermometer.

(e) The practice of heating by the use of a petrol drum over a wood - fire shall be avoid

4.29 Bending, Placing and Fixing of steel Reinforcement

(a) The Contractor shall provide onsite , facilities for cutting and bending reinforcement whether he is ordering his reinforcement bent or not and shall insure that a token amount of straight bar is available on site for bending as and when directed by the Project Managers Representative .

(b) Reinforcement shall be wire – brushed and cleaned at the Contractor expense before and /or after it is placed in position, if required by the Project Manager's.

(c) The bars shall be cold bent in strict accordance with the bending schedules and the Contractor shall be responsible for the accuracy of bending. Bending dimensions shall be worked to the tolerance indicated in Bs 8666 except for binders and links which shall be bent to a tolerance of 1.5 mm Bars in which any errors in bending are beyond the limits of the foregoing tolerances, shall be replaced at the Contractors cost by correctly bent new bars or may be straightened and re-bent cold, subject to the Project Manager's representatives prior approval.

(d) Steel reinforcement shall be sent accurately to the shape and dimensions shown on the drawings the Contractor shall satisfy himself as to the accuracy of any bar bending schedule supplied, and shall provide all steelwork in accordance with the detailed reinforcement drawings.

(e) Any discrepancy or inaccuracy found in the bending schedule shall be notified to the Project Manager's representative immediately.

(f) After bending reinforcement shall be securely bundled and labeled with weather proof tags or shall be marked with other approved signs by which it can readily be identified before assembling or placing the reinforcement the dimensions to which it has been bent it shall be checked with the bending schedules by the Contractor.

(g) The reinforcement shall be fixed in stick accordance with the drawings as regards cover, spacing and position and suitable precautions shall be taken by the Contractor to prevent the displacement of reinforcement during the placing and compaction of concrete.

(h) Where required to support and retain the reinforcement in its correct position the Contractor shall provide templates, stools and other supports at his own cost.

(i) Precast concrete support blocks for reinforcement shall be manufactured from class 25 fine concrete to ensure the correct thickness they shall be well cured before use and carefully stored on site to avoid contamination .Plastic and metal supports, chairs, etc, may be used subject to the Project Manager Representative prior approval.

(j) A lap of not less than forty – four diameters of the large bar shall be provided at the junction of two bars for which the lap in not specifically detailed on the drawings.

(k) Fabric reinforcement shall be lapped at least 40 diameters or two squares whichever is the greater.

(l) Additional splices other than those shown on the Drawings may be permitted by the Project Manager Representative but will not be paid for. All splices shall be staggered and the length shall be as directed by the Project Manager's representative.

(m) All intersection of bars in walls and slabs and all connection between binders and links and main bars in column or beams shall be tied with soft iron wire ties or with fixing clips which shall not be allowed to make contact with the shuttering or to project into the specified cover.

(n) Unless permitted by the Project Manager's representative welding of bar reinforcement at intersections or for the joining of bars is prohibited. Where permission is granted, welding shall be carried out in accordance with the recommendations welding of mild page 18 of 31 and cold worked steel bars for reinforced concrete construction as issued by the institute of welding U.K.

4.30 Forms and Formwork for Concrete

4.31 Definition

(a) "Forms , Formwork or shuttering" shall include all temporary moulds for forming the concrete to the required shape together with all temporary construction such as false work props and struts required for the support o such moulds together with as any special lining that may be required to produce a special concrete finish.

(b) "Wrot" or "Wrought" formwork or shuttering shall mean formwork where the internal timber face in contract with the concrete is planned smooth and the Contractor is to take particular care with the surface of the shuttering and with the floating of un – shuttered surfaces, it being the intention that a very smooth face will result when the shuttering is struck.

(c) "Un – wrot " formwork or shuttering shall mean formwork when the internal timber face in contract with the concrete is left as sawn'

4.32 Forms and Formwork for concrete Construction

(a) All forms shall be constructed so as to facilitate the accurate placing and proper compaction of the concrete. Timber forms shall be constructed of sound well seasoned timber of such quality and strength as will ensure rigidity throughout the placing ramming vibration and setting of the concrete without visible deflection or warping. They shall be so constructed that they can be removed without shock, vibration or damage to the concrete. All joints shall be tongued and grooved, unless otherwise required, and shall be made sufficiently tight to prevent any leakage of grout. Internal ties shall be avoided as far as possible and if used shall be metal. They shall be capable of removal without injury to the concrete, but if permitted by the Project Manager Representative to be permanently embedded in the concrete, shall be cut back after the concrete is cast to at least 25mm below the concrete.

(b) Formwork for columns and small concrete sections or where directed by the Project Managers representative shall be fitted with trap door through which saw – dust shaving and other debris can be removed.

(c) Steel forms of other materials may be sued with the approval of the Project Manager's representative. Traveling forms will only be permitted in special circumstance, and with the written approval of the Project Managers representative.

(d) Struts and props shall where required by the Project Manager representative be fitted with double hardwood wedges or other approved devices so that the moulds may be adjusted as required and eased gradually after casting the concrete . Wedges shall be spiked into position and any adjusting device locked before the concrete is cast.

(e) All formwork shall be approved by the Project Managers representative before concrete is placed within it. The Contractor shall if required by the Project Managers representative provide the latter with copies of his calculations of the strength and stability of the formwork of false work but notwithstanding the Project Manager Representative approval of these calculations nothing shall relieve the Contractor of his responsibility for the safety of adequacy of the formwork.

(f) Top shuttering shall be counter-weighed or otherwise anchored against floatation.

4.33 Formwork for Mould Vibrated Precast Concrete

Where precast concrete is to be cast in vibrating moulds, special ca re shall be taken to maintain the rigidity of the mould and support against the actions of the vibrators form vibrators shall be rigidly attached to the forms to ensure the transmission of the vibrations to the concrete, all wedges and clamps shall be fitted wit locking devices to ensure they are kept tight during the vibrating operation

4.34 Preparation of Forms Before Concreting

Before the concrete is deposited, the forms shall be thoroughly cleaned of saw -dust shaving and other debris and hosed down with water. The face of the forms shall be coated with time wash or painted with approved mould oil where reinforcement has been accidentally coated, it shall be cleaned wit a wire brush and a suitable solvent.

4.35 Forms for Construction Joints

(a) 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 watertight joint temporary contraction joints shall have blocks of timber at least 75 mm thick, slightly tapered to facilitate withdrawal and securely fixed to the face of the stopping of board. The area of the key or keys so formed shall be at last 30%the area of the member. The block shall be kept back at least 50 mm from the exposed surface of the concrete.

(b) Where reinforcement through the face of construction joint, the stopping off board shall be drilled so that the bars can pass through or the board shall be drilled so that the bars 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 a neat and accurate fit, and no grout leaks from the concrete through the bar holes or joint

4.36 Special Methods of working

Should the Contractor propose to use special methods of working not included in these specifications such as pumping concrete or using vacuum moulds he shall obtain the Project Manager Representative approval before commencing work and comply with any subsequent

specification made by the Project Manager representative approval commencing work and comply with any subsequent specification made by the Project Manager representative for this special method of working.

4.39 Formwork left in

Where the striking of formwork would in the opinion of the Project Manager's representative, cause damage to or prejudice the safety of the structure, the formwork shall be left in, if in the opinion of the Project Manager's representative the necessity for leaving in the formwork arises from the Contractor's method of working. Then that loss shall be borne by the Contractor but if it is due to circumstances beyond his control, the timber left in will be paid for at rates se t out in the day works schedule of the Bills of Quantities.

4.40 Removal of Forms

Forms shall be removed in such a manner as will not injure the concrete and no formwork shall be before the concrete has sufficiently set and hardened. The minimum periods which shall elapse between the placing and compacting of Ordinary Portland cement concrete for the various parts of the structure are given in the following schedule but compliance with these requirements shall not relieve the Contractor of obligation to delay the removal of the forms if the concrete has not set sufficiently hard:

Side beams wall columns piles	2days
Soffit of secondary slabs (props left in	3days
Soffit of main slabs (props left in).....	7days
Removed of props slabs	10days
Bottom boars of piles	
Intermediate support left in)	12 days
Soffit of beams less than 6m span ..... m	16 days plus I day per 0.6
Soffit of beams over 6m span ..... maximum of 28 days	in excess of 6m with

4.41 Making Good

Honeycombing or damaged surfaces of concrete which in the opinion of the Project Manager's representative are not such as to warrant cutting out and replacement of the concrete shall be made good as soon as possible after removal of the shuttering as follow:-

A Portland cement and sand mixture shall be worked into the pores over the whole surface with a fine Carborundum float in such a manner that no more material is left on the concrete face than is necessary Completely to fill the pores so that a uniformly smooth and dense surface of uniform color is finally presented.

4.42 Repair of Concrete Structure

4.42.1 General

(a) All materials for use in concrete repairs shall be obtained from an approved manufacturer. The application tools and equipment methods climatic conditions such as temperature and humanity) and surface preparation shall strictly in accordance with the manufacturer's specifications and instructions and these shall be subject to approval by the project manager Representative .The supply source shall not be altered without the Project Manager's approval.

(b) Generally before any repair done, the surface shall be thoroughly cleaned and freed from any oil, grease, cement laitance or loosely adhering particles. Upon application of final layer, the surface shall be suitably finished to give the appearance of a smooth surface.

(c) For surface in contact with potable water, the chemicals shall have been certified as suitable for use in portable water retaining structures by competent and internationally recognized authorities. Products acceptable include water proofing chemicals consisting of rapid hardening Portland cement ,oven dried quartz sand and active inorganic chemicals of a type that upon application to a concrete surface a crystal chain reaction starts as the active chemical ingredients react with the free lime and water in the concrete capillaries resulting in the formation of insoluble crystals which drive out the surplus capillary water ensuring a permanently water tight concrete but which however at the same time allow the concrete to breath.

(d) For application on all water retaining surfaces, the objective shall be to achieve complete water tightness, by forming an effective barrier against water infiltration and bond concrete sections together, there by restoring original structural strength. Not with stand the manufacturer's instructions, the Contractor shall be fully responsible for the water-tightness of water retaining structures and any remedial measures necessary.

4.42.2 Sealing of Cracks and Surfaces with epoxy mortar

(a) For repair of cracks each shall first be widened by cutting a 'V' groove 20mm x 20mm, along its entire length. The crack surface shall be cleaned thoroughly and wire-brushed to remove any loose chippings grease or dirty. The groove shall then be filled with an approved epoxy resin mortar (a solvent free 3-component repair and filling mortar based on a combination of epoxy resins and selected high strength aggregates e.g. Sikadur 43) in accordance with the manufacturer's instructions.

(b) For application on other surfaces as indicated in the Bill of Quantities, the surface shall be prepared in accordance with the manufacturer's instructions, before application of the epoxy mortar. In floors this will also involve hacking away all spilled concrete and cleaning off loosely adhering particles and cement laitance. In the internal surfaces of tanks the surface preparation shall involve water-jetting or as specified by the manufacturer.

4.42.3 Sealing of Cracks in Horizontal Construction Joints with Polyurethane Sealant

The joint shall be cleaned thoroughly along its length to remove any loose substrate, grease and dirt. It shall be repaired by sealing with 1-component polyurethane sealant (e.g. sikaflex PRO 2HP or 1A) that cures on exposure to moisture to form a tough and permanent elastic seal followed by a high performance joint sealing system for irregular and high movement joint (e.g. Sikadur Combiflex)

4.42.4 Sealing of Cracks on walls with injection liquid

The joints shall be cleaned thoroughly to remove any loose substrate, grease and dirt. They shall then be repaired by injecting a 2-component solvent free, low viscosity injection liquid, based on high strength epoxy resins (e.g. Sikadur 52).After mixing the liquid shall be injected into cavities and cracks in concrete where it cures to rigid high strength material.

4.42.5 Water proofing Slurry Walls

The wall surface shall be cleaned by water jetting to the satisfaction of the Project Manager's Representative. A water proofing slurry, such as synthetic rubber based, water resistance bonding agent for mortar (e.g. Sikar Latex), and shall then be applied in accordance to the manufacturer's instructions.

4.42.6 Wall Roof Joints

Where indicated for repair, the joint at the interface between the wall and the roof should be cleared off by removing existing sealant and any loose mortar. The joint shall then be sealed with an approved bitumastic sealant (e.g. Igas Black) according to the manufacturer's instructions.

4.42.7 Replacement of Ground Floor Screed

The floor surface shall be chiseled, to remove all the damaged floor screed, cement laitance or loosely adhering particles and the surface thoroughly wetted. A new 1:3 cement screed floor shall then be placed and finished off appropriately to match existing or adjacent surface.

4.42.8 Repair of Floor Slabs Joints with bitumatic sealant

Where indicated in the bill of quantities, the joint shall be cleaned off by removing existing joint sealant and any loosely adhering particles. The joint shall then be sealed with an approved bitumastic sealant (e.g. Igas Black) in accordance with the manufacturer's instructions.

4.42.9 Repair of Cracks in Walls or floors using Cement Mortar

The cracks should be enlarged into wedge shaped grooves at least 20 mm wide at the top. They should be cleaned thoroughly, wetted and filled with 1:3 cement sand mortar. Such repaired surface shall be adequately cured for at least 3 continuous days or as directed by the Project Manager's Representative.

4.42.10 Repair of Stone Pitching

Where it has worn off, stone pitching shall be replaced by jointing using 1:3 cement sand mortar after replacing and compacting any lost fill material beneath as directed by the Project Manager's Representative. In locations where the jointing has become loose, repair shall be carried out using pressure grouting. The grout shall be 1:3 cement sand mortar made to a sufficient consistency to allow pressing into the cavities with steel trowel.

4.42.11 Replacement of Concrete Paving Slabs

Damaged concrete paving slabs shall be removed and any lost fill replaced and compacted to the Project Manager's Representative's satisfaction. They shall then be re-laid and jointed using 1:3 cement sand mortar made to a sufficient consistency to allow pressing into the cavities with a steel trowel .

4.43 Protection of Concrete after Removal of Shuttering

Any concrete surfaces, rises and treads of stairways which might be damaged during the construction of the works, shall be adequately protected.

4.44 Removal and Replacement of Unsatisfactory Concrete

The Contractor shall on the Project Manager's Representative instruction so to do, cut and replace any concrete in any part of the structure if in the Project Managers representative opinion:

(a) the concrete does not conform to the specification or

(b) deleterious materials or materials are likely to produce harmful effects have been included in the concrete or

(c) the honey combed or damaged surfaces are too extensive or

(d) the finished concrete sized are not in accordance with the drawings within permissible tolerances or

(e) the setting out incorrect or

(f) the steel cover has not been maintained or

(g) the protection including curing of the concrete during the construction was

(h) the work of making or other remedial measures the Project Managers representative may indicates

(i) undue deformation of or damage to the works has taken place due to inadequate shuttering, or to premature traffic and loading; or

(j) any combination of the above points has taken place resulting in unsatisfactory work

4.45 Water Tightness

(a) The water tightness of all members subjects to water pressure shall be ensured by the use of proper materials and good workmanship as specified above and all precautions shall be taken to ensure thorough and proper consolidation of the concrete such members

(b) the Contractor shall carry out such tests for water tightness as the Project Manager's representative may order, the cost of such tests shall be borne by the Contractor , unless otherwise included for in the bills of Quantities

4.46 Faulty Work

The Contractor shall on being requested in writing by the Project Managers representative remove and reconstruct any structural members or position of the work which gives evidence of any fault, or injury which may affect the strength durability of water tightness of the Construction. No concrete or steel shall be cut in any way except on such request and with permission in writing.

4.47 Precast concrete

(a) The foregoing requirements relating to ordinary and reinforced concrete generally shall be observed in the case of precast concrete so far as they are applicable as work as the following requirements relating to precast work in particular

(b) The precast concrete work shall comply with the requirements of BS 5328

(c) The Contractor shall submit for the approval of the Project Manager Representative samples of all aggregates four use in the precast concrete. Where holes or recesses are required for bolts, covers etc. they shall be cast in the units where reinforcement is required, the requirements of the specification regarding holding of the bars or fabric firmly in position shall be strictly adhered to.

4.48 Concrete Work – Tolerances

4.48.1 Cover to Reinforcement

The cover to the reinforcement bars in concrete bars in concrete shall be as shown upon the drawings or as ordered by the Project Managers' representative with the following variations permitted:

Least Dimension on concrete structure	Permitted variation
Less than 0.25 m	+ 4% to – 2%
Greater than 0.25	+ 10% to 5mm

4.48.2 Shuttering

Shuttering shall be of such accuracy, strength and rigidity as to carry the weight and pressure from the concrete to be placed on or against it, together with all constructional, wind or other loads likely to be imported to it , without producing deformation of the finished concrete in excess of the tolerance outlined below:

Overall dimensions and levels	+/-5 mm
Column sizes	+/5mm
Column sizes	+/-5 mm
Slab thickness	+5-/mm
Slab thickness	+10mm
Wall thickness	+5mmor
Vertical lines out of plumb	+12 mm in every 30 meters

Except that in the case of "sawn" shuttering the dimensions of the finished concrete shall be no less than those shown on the drawings.

Beam soffit shall be erected with an upward chamfer of 6mm per 3 meters span.

4.49 Water Bars

Water bars shall be of V.P.C and of approved manufacture and securely fixed in place before concreting is commenced. All joints and junctions shall be welded in an approved manner, the cost of welding and jointing being included in the rate per linear meter entered in the bills of quantities.

4.50 Admixtures to Mortar or Concrete

The use of any admixtures to mortar or concrete shall be subject to the written approval of the Project Manager's representative.

4.51 Precast Concrete Units

Precast concrete covers to be precast units for use in the works whether instructed under the contract or proposed by the Contractor.

4.51.1 Formwork for Precast Units

(a) Moulds shall be so constructed that they do not suffer distortion or dimensional changes during use and are tight against loss of cement grout or fines from the concrete.

(b) Moulds shall be set up on firm foundation so that no settlement occurs under the weight of the fresh concrete.

(c) Moulds shall be constructed so that units may be removed from them without sustaining any damage.

(d) Release agents used for remolding shall not stain the concrete or affect its properties in any way.

4.51.2 Reinforcement for Precast Units

(a) Reinforcement in precast units shall comply with the requirement of Clauses 736 and419-420. When preformed and cages are used the cages shall be made up on jigs to ensure dimensional accuracy and shall be carefully supported within the mould in such a way that they cannot move when concrete is placed. Reinforcement complying with SRN 126 may be tack welded where bars cross to provide rigidity in the cage but reinforcement complying with SRN 127 shall not be welded.

(b) Cover to main reinforcement shall be as shown on the drawings, or if not shown shall be not less than 25 mm or the diameter of the bar, whichever is the greater. Cover on distribution steel shall not be less than 15 mm or the diameter of the bar whichever is the greater.

(c) Bars shall be spaced so that the minimum clear distance between them is the maximum nominal aggregate size plus five millimeters but in any case not less than the diameter of the bars.

(d) Bars may be placed in pairs provided that there are no laps in the paired lengths.

4.51.3 Casting of Units

Concrete for precast units shall comply with clauses 724 and 401 – 410 using the class of concrete specified on the drawings.

If lightweight aggregates are specified, they shall comply with SRN 147

The area in which units are cast shall be adequately protected from the weather so that the process is not affected by rain, sun or drying winds.

4.51.4 Curing Precast Units

The Contractor shall ensure that units do not suffer any loss of moisture or sudden changes of temperature for at least four days after casting. If a water spay is used for curing, the water shall be at a temperature within 5 degrees centigrade of the temperature of the unit being cured.

If Contractor proposes curing at elevated temperatures, the method shall be subject to the agreement of the Engineer and shall include means whereby units are heated and subsequently cooled evenly without sudden changes of temperature.

4.51.5 Dimensional Tolerances of Precast Units

Units shall be accurately formed to the dimensions shown on the drawings unless closer tolerances are called for the Engineer.

4.51.6 Surface Finish of Precast Units

(a) The formed faces of precast units shall be finished to Class F3 as set out in Clause 505(C) unless another class of finish is specified on the drawings.

(b) Free faces shall be finished to Class UF2 unless another class of finish is specified on the drawings.

(c) In cases where a special finish is required a trial panel shall be constructed by the Contractor which after approval by the Engineer shall be kept available for inspection at the place of casting and production units shall thereafter match the approved pattern.

(d) Those parts of the units which are to be joined to other units or to in-situ concrete shall be brushed with a stiff brush before the concrete has fully hardened. Alternatively, if the concrete has been allowed to harden, the surfaces shall be roughened by sand blasting or by the use of a needle gun.

4.51.7 Handling and Storage of Precast Units

(a) Precast units shall be handled in ka manner which will not cause damage of any kind and shall be stored on a hard impermeable base.

(b) Pre-stressed units and large precast normally reinforced units shall be handled and stored so that no stresses shall be induced in excess of those which they will incur in their final positions in the Works unless they have been designed to resist such stresses.

(c) Units shall be provided with adequate lifting holes or loops, placed in the locations shown on the drawings or agreed by the Engineer and they shall be lifted only by such holes or loops. Where it is not possible to provide holes or loops, suitable sling positions shall be indicated in paint on the units.

(d) Units shall be marked indelibly with the reference number and date of casting and shall be stacked on suitable packers which will not damage the concrete or stain the surfaces. Not more than two packers shall be placed under each unit and these shall be located either at the positions of the permanent support points or in positions such that the induced stresses in the unit will be a minimum.

4.51.8 Testing Precast Units

(a) Precast units shall be capable of safely sustaining the loads which they have been designed to carry. The Contractor shall subject units selected by the Engineer to load tests simulating the working conditions. Details of such tests shall be agreed between the Engineer and the Contractor.

(b) In the case of units subject to bending loads the test piece shall be supported at full span and a loading equivalent to 1.25 times the sum of the live and dead loads which were assumed in the design shall be maintained for one hour without the appearance of any signs of distress. The recovery one hour after the removal of load shall be not less than 75 per cent of the full load deflection.

(c) If the unit fails to meet the above requirements, further tests shall be carried out on two more units. If either of these fails the whole batch of units will be rejected.

(d) If the Engineer so requires, a test to destruction shall also be carried out which on units subjected to bending shall be a follows:-

(e) The units shall be supported at full span and a load applied in increments instructed by the Engineer up to 95 per cent o the designed ultimate load. This load shall be held for 15 minutes without failure of the unit. The deflection at the end of this period shall be not more than 1 / 40th of the span. The load shall then be further increased until failure occurs.

(f) If the unit fails to sustain the required load for the prescribed period or if the deflection exceeds the specified amount, the Engineer may order two further tests, and if either of these fails, the batch of units which they represent may be rejected.

4.51 Measurement and Payment for Concrete, Reinforcement & Formwork

4.51.1 Rates for Concrete

(a) The unit of measure will be cubic meters and the prices in the Bills of Quantities shall include for all materials including water for weighting, gauging, mixing, conveying, placing, spreading, compacting, vibrating, finishing and except where otherwise provided for in the Bills of Quantities, for joints with existing work or recently deposited concrete; for shuttering to construction joints, skew – back, stunt end, stepping, bonding chases and the like; for constructing the work under the alternative bay system; for curing and surface finish as specified in Clause 324 for the cost of strengthening and stiffening the shuttering to resist vibration and for handling the concrete at the specified water – cement ratio.

(b) Unless items for shuttering are included in the Bills of Quantities the price for all mass concrete shall include for any necessary shuttering, side forms and timber work.

(c) Unless otherwise specified, separate items are included in the Bills of Quantities, for moulds and shuttering for reinforced and other graded cast – in – place concrete and for finishing concrete to a very smooth surface.

4.51.2 Rates for Precast Concrete

The price for each description of precast concrete shall include for all shuttering, moulds, fillets, for forming the tops to proper shapes, for finishing all exposed surfaces to a very smooth face and for fixing and building in place complete.

4.51.3 Rates for Formwork

(a) Formwork shall be measured as the areas of the concrete actually in contact with the mould, except that in the case of small fillets and chafers of size 30 x 30 mm and less, the overall area of the concrete shall be taken as though the fillets and chamfers had been omitted.

(b) Formwork for construction joints will not be paid for and will be deemed to be included in the Constructor's rates for concreting.

(c) The rates for formwork shall include for all timber or metal moulds inclusive of all necessary supports and stagings, bolts, nuts, straps, clamp-s, wages and other flitting, also all cutting and waste and the cost of all labour transport and materials in making, erecting and removing the formwork and for any other work required to construct the forms to the shapes and dimensions shown on the Drawings, or as directed, by the Project Manager's Representative. The rates shall also include for all cut out rebates, slots, etc. trimming and sealing, cutting and shaping.

(d) The formwork for in situ concrete will be paid for separately according to whether it is vertical, horizontal or inclined, and whether it is un – wrot, wrot or special facing, as set out in the Bill of Quantities.

(e) Formwork for precast units will not be paid for separately and the cost of the moulds will be deemed to be included in the cost of the concrete or completed product.

(f) Where external shuttering is employed in excavations and is measured the cost of any additional excavation necessary for the shuttering shall be included in the rates for the shuttering.

(g) Where an item for shuttering is given, the areas indicated are only approximate and the Contractor should check the areas before pricing the Tender.

(h) No formwork will be paid for where foundations are shown on the Drawings or are required by the Project Manager's o be cast against the existing ground.

(i) The Contractor shall be responsible for the co-ordination of all requirements of his sub-Contractor (s) (if any) a s regards provision of holes, chases, cavities and fixings and shall, if required by the Project Manager's Representative, prepare Drawings giving details of his and his sub- Contractor's requirements and shall send copies of such Drawings to the Project Manager's Representative prior to Construction.

(j) Holes, etc. shall be accurately marked and boxed – out for before concreting operations commence and without the Project Manager's Representative's prior approval, no such holes, etc. shall be formed after the concrete has set.

(k) Where bars, if placed to specify spacing would foul holes of size less than 230 x 230 mm, the full length of the bar shall be moved to one side, and in the case of holes exceeding 230 x 230 mm, the bars shall be cut on site and lapped with additional bars.

(l) Wherever possible, the Contractor shall build in all pipe work, ironwork, etc, which passes through walls and floors and the pipe work, ironwork, etc, shall first be thoroughly cleaned and freed from any deterious matter, and every care shall first be taken to ensure that it is thoroughly encased in concrete.

(m) Bolts, hooks and other fixings shall be embedded in concrete, or holes shall be drilled and fitted with threaded expanding anchors to receive the bolts. The Contractor shall ensure that bolts, hooks, etc, are accurately positioned. Holding-down bolts for machinery shall be set to template.

(n) The rates for fixing pipes, manholes, covers, steelwork, ladders, etc, and the associated bolts and lugs shall include for cutting the shuttering, building-in, grouting-up and making good adjacent concrete, block work or stone surfaces.

TABLE OF CONTENTS

SECTION V PIPEWORK INSTALLATION

5. PIPE WORK INTRALLATION

5.1 Trench Excavation and Earthworks for Plastic Pipes

This clause for shall apply except for trust boring.

(a) The excavation shall be made in open cutting unless tunneling or heading is specified by Project Managers representative or is specified in the bills of quantities.

(b) Trenches for pipes shall be excavated to the lines and depths shown on the drawings or as directed by the Project Managers representative and shall be of sufficient width to give an equal clearance on both sides of the barrel of the pipe or pipes such that the total trench width is 3/2 'D' is the outside diameter of the pipe or the average outside diameter of the group of pipes or will be equal to the outside diameter or the pipe plus 30 cm whichever is greater. For pipes bided in concrete sections, the , the breadth of concrete bedding for the pipes will be equal to the width of the trench excavation for fire hydrants valve chambers or such structures and the rates shall include for any additional excavation or other temporary works required.

(c) If in the opinion of the Project Manager representative due to delays in laying due to the fault of the Contractor the ground becomes weathered prior to the laying of the pipes, the Contractor shall remove the weathered soil and replace it with suitable compacted material to the original formation level at h is own expense.

(d) Where pipes are not laid on concrete the bottoms of the trenches as excavated, shall be smooth and shall be free from stones or other projections. Holes cut out at the joints shall be of as small a size as possible throughout their entire length. The trench shall be dug to within 15 cm of its formation and proper grade pegs shall then be set in the bottom of the trench by Contractor for the accurate taking out of the rest of the exaction grooves about two inches deep shall be cut across the trench at the required positions to enables the easy removal of pipe slings.

(e) Where an imported lower bedding layer is not included and if instructed to do so by the Project Manager representative the pipe trench shall be excavated to a depth of 10 cm below the invert of the pipe and be refilled with suitable material free from stones greater than 20 mm diameter and foreign matter and compacted to a minimum 90% MPD in order to provide a smooth bed for the pipes.

(f) The materials excavated from trenches shall be laid completely and neatly on the sides of the trench except where in the opinion of the Project Managers Representatives' Representative this would so abstract a road or footpath as to prevent the passage of traffic or pedestrians. In such cases the Contractor must dig out the pipe trench in such lengths as directed and keep his exacted material at such a distance as may seem advisable, and the rates shall be deemed to cover for this .

(g) During excavation the Contractor shall ensure that all material for re –use and which he intends for re –use are kept separate and set aside and protected as necessary to prevent loss or deterioration. Material forming the surface and foundation of roads shall when excavated and if required for further use be carefully separated paving slabs bricks and similar surfaces shall be carefully removed and stacked for e- use or as otherwise instructed by the Project Manager's Representative.

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

(i) Where pipes are to be laid under a road formulation or in open country or in cutting trenches shall generally be excavated after the earthwork is completed. The Project Managers representative may permit these pipe trenches to be excavated before the earthwork is complete, but payment for the excavation of the trench will only be made upon the volume excavated below the road formation.

(j) The unit of measurement for the excavation of trenches shall be per linear meter or per cubic meter of void calculated from the deemed width of the trench, and the average depth of excavation as mentioned in the bills o f quantities. no allowance will be made for building unless otherwise indicated for valve chambers and other water words structures the unit of excavation will be per number or per cubic meter of excavated material calculated to the exact outer dimensions and depths of the permanent works no allowance will be made for bulking .

(k) The rates for excavation of trenches in normal material shall include removal of all material except rock selecting and segregation material to be backfilled in special layers supporting or sheeting shoring and strutting any additional working space or room for timbering or sheeting required, dealing with water, maintenance of the trench and all labor tools, material, plants supervision overheads and profit.

(l) The provision of this clause shall also apply to the rates of excavation in rock and in addition the Contractor shall allow in his rates for back – filling the invert with class 15 concrete or other materials as directed by the Project Manager Representative and removing to a spoil dump all rock excavated.

5.2 Pipe Laying and Backfilling for Plastic Pipes

(a) Pipes shall be laid in the presence of a Project Managers representative unless written authority from the Project Managers has been granted.

(b) Pipes generally shall be laid and jointed in accordance with the manufactures instructions extra exaction must not be carried out so as to avoid backfill excessive deviation in joints and other

irregularities. Otherwise the pipe grade will follow the drawings with a continuous but not necessarily uniform) fall towards washout – valves and rise towards air – valves.

(c) Every pipe shall be laid separately and shall bear evenly upon the bedding or concrete for its full length holes to receive sockets couplings or flanges being cut in the bottom of the trench of such size and depth as to allow the joints to be properly made the pipes shall be laid to true inverts straight lines and falls each pipes being separately boned between sight rails the pipes shall be thoroughly brunched inside and outside prior to laying and no foreign matter shall be allowed to enter the pipe during or after laying, at the end of each working day the exposed pipe end shall be stopped up with a stopper plug of appropriate diameter and not merely covered in polythene sheet tied around the end.

(d) Prior to laying in trench the bedding of the trench must provide support thought the entire length of the pipe. The pipe shall never be laid directly on cohesive rocky or stony soil where the natural trench bottom meets the bedding class required this shall initially be loosened on the day of and prior to laying .

(e) Trenches shall bottomed up only immediately in advance of pipe laying, although at least 15 meters shall be prepared in advance of any given pipe. Trenches and joint holes shall kept free from water, until the pipes are laid and the joints completed and no ground water shall be allowed to enter the new pipes.

(f) In rock excavation, the pipes shall be bedded on concrete or selected granular fill e.g. gravel to minimum thickness of 150mm and the exclusion of rocks and other hard subsequently making good with selected material to the Project Managers representative approval.

(g) All flanged joints shall be made jointing rings which shall be carefully inserted concentric to the bore of the pipe so that undue stresses shall not be caused in any of the boils or on the flanges when bolts or on the flanges when bolting up. The joint ring shall be compressed gradually and evenly by taking a few turns on each diagonal bolt in succession over tightening shall be avoided if the Project Manager is dissatisfied with the degree of care taken the Contractor shall provide and use torque wrenches for this purpose at no extra cost.

(h) Mechanical joints shall be made in accordance with the manufactures instructions after successful testing of pipelines the joints will receive external protection as specified or to the Project Manager Representative approval.

(i) The threads of any screw connections shall be coated with red lead before the joint is made

(j) Concrete anchor blocks shall be provided at bends, tees, stopped ends, etc, as shown on the drawings or as directed by the Project Manager Representative.

(k) Where a pipeline crosses under roads or railway lines the pipe shall be sleeved or surrounded with concrete or protected by reinforced concrete slabs as instructed by the Project Manager

Representative and Contractors shall have been deemed to have made allowance in their rates at the time of tender for compliance with the requirements of the relevant authority.

(l) For the insertion of valves and other fitting into existing pipelines, pipes may need to be cut. Approved tools and machines specially made for the purpose shall be provided and used by the Contractor.

(m) The Contractor shall provide and fix wooden drumhead to the open ends of the mains, and similar drumheads shall be used to close the ends of any pipes to exclude dirt and stones etc. when the pipe laying is not actually in progress. Wooden markers properly inscribed shall be left projecting out of the ground to indicate the ends of all pipes, where these are buried in the ground in open country. In public highways a danger sigh or other suitable means as approved by the Project Manager Representative shall be adopted.

(n) At every point of loading or unloading pipes must be handled by approved lifting tackle (unloading by rolling them down planks of any form or including ramp will not be allowed except with the special consent of the Project Managers Representative.)

(o) The stacking of pipes shall be used such as to prevent damage during storage. Timber runners shall be laid to keep the upper row separated from the lower and the bottom row shall be staked to prevent any rolling. The whole arrangement shall be subject to the approval of the Project Manager's Representative

(p) Care should be taken to minimize the risk of bush fires damaging any pipes deposited along the line of the mains.

(q) The soil cover shall be a minimum of 900 mm and the embedment material shall be S1 or 52 (single size or graded gravel) with minimum 90% compaction. For detail of the trench specification and backfill material sizes and grading refer to clause 5.10. Tenderers shall allow for the price of such trenching and importation of necessary backfill material and compaction as part of the pipe supply and installation price.

(r) Marker tapes made of pigment low density polyethylene and aluminum foil in a bright color or other approved material not less than 100 mm wide and 0.15mm thick shall be placed in the ground above the u PVC and HDPE pipelines laid underground as a measure to detect the pipe and at the same time to reduce the risk of accidental measure which may be caused by future excavation. The tape shall be laid about 300 mm above the crown of the pipe. The tape shall be continuously labeled with black printing DANGER-PLASTICS PIPE alternately in English and Kiswahili. The price for the supply and installation of the pipe shall include for the supply and installation of such a tape.

5.3 Back filling of pipe trenches for Plastic Pipes

(a) All excavation of pipe trenches shall be of such form and to dimension as shown on the drawings or as the Project Managers Representative may direct, and in all respects provide with embedment configurations and minimum covers as detailed here below.

Minimum Trench Width

Pipe size ND	Trench Width
General	OD + minimum 600 mm
< 125 mm	D + 450
150 - 300	D + 600
> 300	To suit site condition and to the approval of the Project Manager

Embedment for uPVC (PE 100) Thermoplastic Pipes

Embedment Class	Bedding , Side fill & Initial Backfill Material Allowed	Notes
S1 and52 (mod)	Class S1: Gravel – single size Class S2: Gravel - graded	Processed granular materials required for all plastic pipes

S1 and S2 Embedment Material for Thermoplastic Pipes

Nominal Pipe Diameter (mm)	Grading (TO ASTM sieve sizes)	
	S1 embedment	S2 embedment (mod)
80	10 single – size gravel	10 single – size gravel
100	10 single – size gravel	10 single – size gravel
150	10 or 14 single – size gravel	14 to 5 graded
200 to 500	10, 14 or 20 single – size gravel	14 to 5 graded or 20 to 5 graded

(b) The placing and compaction of pipe embedment shall only be undertaken in the presence of a Project Managers Representative unless written authority from the Project Manager has been granted.

(c) No pipes shall be laid nor lower bedding introduced and no excavation filled in or covered with concrete until the formation has been inspected and permission to proceed with the work obtained.

(d) In every instance, the embedment material (consisting of bedding side fill and initial backfill) filled around the pipe and for 300 mm over the top of the pipes shall be totally free from stones tree roots or similar objects which trough impact or by concentrating imposed loads might damage the pipes the filling shall be carried out concentrating imposed loads might damage the pipes the filling shall be carried out with utmost care , special attention being paid to tamping of material around the pipes and to joint holes so as to obtain the greatest possible compactness and solidity the materials shall if necessary, be screened to exclude material which would damage the pipes. The embedment material shall be no less stringent than a class 52 material for thermoplastic pipes and the source and any material bought to the site from elsewhere shall be approved in writing by the Project Managers representative before excavation commences any delays as a result of not seeking this approval in good time shall be entirely to the Contractors account.

(e) It can be expected that a significant proportion of the 52 (mod) embedment material can be processed from the excavation backfill except in reclaimed ground and swampy areas by screening out larger and smaller sizes. However use of such screened material shall be at the discretion of the Project Managers representative for imported backfill material both the source and the material shall be approved by the Project Managers representative before trench excavation commences.

(f) The lower bedding for the pipes shall have minimum thickness of 100mm in normal trenches and 150mm where rocks/ stones are present and at designated road crossing. in trenches where there is a continues accumulation groundwater the trench shall after obtaining the approval of the project Manages representative be over excavated by 150 mm and shall be backfilled using compacted granular material bedding material shall be compacted in layers not exceeding 50 mm thickness. Compaction of fill around the pipe shall be in layer thickness compaction of fill around the pipe shall be in layer thickness not exceeding half pipe diameter or 75 mm whichever is the lesser layer thickness is however subject of consistently achieving 90% MPD (Modified Density)

(g) The upper bedding shall be introduced as carefully and thoroughly as practicable to the underside or haunch of the pipe such that no large spaces remain before it is compacted.

(h) The side fills and backfill material within the embedment shall be placed in layers of not more than 150 mm thickness when compacted and where hand ramming is employed the number of men filling shall not be more than half the number of men ramming. Side fill shall be placed simultaneously on both sides of the pipe. Where mechanical ramming of the remaining backfill is employed the machines shall be to the approval of the Project Managers representative and soil shall be replaced and well rammed down by hand for a depth of not less than 60 cm to give

sufficient cover to the pipes and obviate risk of damage to them before the mechanical rammer is brought into operation. The rammer shall not cease to be used an any length of trench until thorough compaction has been obtained all backfill soil shall be free from clay lumps boulders and rock fragments grater than150 mm and as far as practicable 90%MPD shall be attained, but this may be relaxed (e.g. in fields and open area) by the Project Manager's representative.

(i) The Contractor in exaction in excavation shall ensure that material from strata containing no stones and suitable for filling around the pipes as described above, shall be kept separately and used for this purpose. the Contractor shall not be entitled to claim for any extra costs (as provide for below) for screening if this requirement is not complied with if no such strata occur in the excavation , the excavation , the excavated material shall either be screened or suitable material transported to the site from the excavation as the Project Manager representative shall direct. The cost of such work shall be paid for according to the rates in the bills of quantities

(j) Before commencing the backfilling of trenches , the Contractor shall obtain approval from the Project Managers representative of the methods he proposes to use and he shall demonstrate by means f tests that the specified compaction can be achieved (according to BS1377 and ISO 22476 using the sand replacement method) The method of compaction and the testing there of shall be at all times to the approval of the Project Managers representative and in general at a frequency of once every 30 meters unless this is specifically relaxed based on continuously good in situ test results.

(k) The pipe trench shall be backfilled entirely without leaving out areas around and at pipe joints uncovered , for subsequent filling to facilitate the subsequent location of suspected leaking joints during pipe testing should this become necessary the Contractor shall provide marker pegs at regular intervals and / or use a hand held GPS to be able to relocate joint positions.

(l) Where for pipes other than those used for service connection a minimum cover of 900 mm cannot be maintained, including highways and trafficked areas then the pipe must either be laid in protective ferrous sleeve or be protected by a 150mm thick reinforced concrete slab above the pipe. A minimum of a 150mm layer of appropriate grade granular bedding material must first be placed and lightly compacted as a cushion above the crown of the pipe before the slab is laid, and the slab must extend at least 150mm out beyond either side of trench.

5.4 Making Good Subsidence after Refilling

(a) Should any but very localized subsidence occur of the pipe trench after refilling and before the expiry of the maintenance period, the Contractor shall first demonstrate that such subsidence is only to the backfilling above the pipe and not to the pipe, bedding or sub-soil itself.

(b) Should this not be so demonstrated then the Contractor at his own expense shall, excavate and remove the pipe or pipes affected and return the bottom of the trench to grade through a

process of over-excavation, re-compaction or use of a lean concrete mix as determined by the Project Manager's Representative, who shall also determine whether or not the affected pipes may be re-used or replaced.

(c) The affected section or sections will in any event be liable for a further twelve months maintenance period.

(d) All subsequent refilling shall be thoroughly compacted by ramming as with a newly completed trench. Any subsidence due to consolidation shall be made up by the Contractor at his own expense with extra compacted material. Should subsidence occur after any topsoil has been replaced, the topsoil shall first be removed before any hollows in the backfilling are made up before being replaced.

5.5 Reinstatement of Surfaces

(a) All surfaces of roads, fields, paths, gardens, verges, etc. whether public or private which are affected by operations of the Contractor shall be temporarily restored by him in the first instance and permanently reinstated in the second instance when the ground has consolidated fully. Separate payment for reinstatement shall be made only for surfaced roads (e.g. tarmac, concrete, paving bricks or similar material), for official designated dirt roads of at least 6m width, grassland, cultivated lands and sports fields. All other reinstatement is deemed to be covered by the pipe installation rates.

(b) The Contractor shall be responsible for the temporary reinstatement and permanent reinstatement of all surfaces whether or not the area requiring restoration is within the limits of his excavations if the necessity for the restoration arises from caused due to the operations of the Contractor. The Contractor's prices shall include for restoring all surfaces so damaged to their original condition, as no extra payment will be made for ay such work. The Contractor shall take all necessary measures to ensure that no toxic materials that may cause damage to vegetation or livestock or pollute streams or water-courses are used in any temporary restoration or permanent reinstatement and shall indemnify the Employer against any claims arising out of the use of such materials.

(c) Temporary restoration shall be carried out immediately after the excavations have been refilled by returning the excavated material to the position from which it was removed and adding such suitable materials as may be required and consolidating the various materials as the Work proceeds in order to provide a surface that is adequate for the purpose that the original surface fulfilled. Temporary surfaces shall be maintained in a condition satisfactory to the Project Manager's Representative and/or responsible Authority until the permanent reinstatement is made. In the case of roads and streets the surface shall be necessary to consolidate the filling and keep the surface fit for traffic, suitable material being added to all placed which have sunk or become rough.

(d) Permanent reinstatement shall not be made until the ground has consolidated permanently and until sanction to do so is received from the Project Manager's Representative. It shall be carried out with materials similar to those that were used in the original Work to the entire satisfaction of the Project Manager's Representative and/or responsible Authority.

(e) In verges and other grass surfaces the topsoil shall be removed, stored and replaced after consolidation of the filling and planted or seeded with approved grass. Should subsidence occur, it shall be made good with additional topsoil and be replanted with grass or re-seeded. New grass shall be planted if for any reason the grass fails to grow or is destroyed.

(f) The trenches, channels, gutters and kerbs shall be reinstated to the condition in which they were before excavation was commenced. The final surface of the trench shall be flush with the surrounding ground.

(g) If the work of restoration or reinstatement as carried out by the Contractor is not to the satisfaction of the Project Manager's Representative and/or the responsible Authority and should the Contractor not remedy the defect forthwith, any remedial work considered necessary may be undertaken by the Project Manager's Representative and/or the responsible Authority and the cost thereof shall be borne by the Contractor.

(h) If at any time any trench becomes dangerous, the Project Manager's Representative shall be at liberty to call upon the Contractor to restore it to a proper condition at three hours' notice and should be Contractor fail to carry out the work, have it done at the Contractor's expense.

5.6 Trench Excavation and Earthworks for Ferrous Pipes

This clause for excavation shall apply except for thrust boring.

(a) The excavation shall be made in open cutting unless tunneling or heading is specified by the Project Manager's Representative or it is specified in the Bills of Quantities.

(b) Trenches for pipes shall be excavated to the lines and depths shown on the Drawings, or as directed by the Project Manager's Representative, and shall be of sufficient width to give an equal clearance on both sides of the barrel of the pipe or pipes such that the total trench width is 3/2 'D' is the outside diameter of the pipe or the average outside diameter of the group of pipes or will be equal to the outside diameter or the pipe plus 30 cm on each side. For pipes bedded in concrete sections. The breadth of concrete bedding for the pipes will be equal to the width of the trench. Excavation for fire hydrants, valve chambers or any other water works structure shall be carried out to the levels and outlines of such structures, and the rates shall include for any additional excavation or other temporary Works required.

(c) If in the opinion of the Project Manager's Representative delays in laying are due to the fault of the Contractor and the ground becomes weathered prior to the laying of the pipes, the

Contractor shall remove the weathered soil and replace it with suitable compacted material to the original formation level at his own expense.

(d) Where pipes are not laid on concrete, the bottoms of the trenches as excavated shall be smooth and shall be free from stones or other projections. Holes cut out at the joints shall be of as small a size as possible throughout their entire length. The trench shall be dug to within 15cm of its formation and proper grade pegs shall then be set in the bottom of the trench by the Contractor for the accurate taking out of the rest of the excavation. Grooves about two inches deep shall be cut across the trench at the required positions to enable the easy removal of pipe slings.

(e) Where an imported lower bedding layer is not included and if instructed to do so by the Project Manager's Representative, the pipe trench shall be excavated to a depth of 10cm below the invert of the pipe and be refilled with suitable "as dug" material free from stones and compacted to a minimum 90% MPD in order to provide a smooth bed for the pipes.

(f) The materials excavated from trenches shall be laid completely and neatly on the sides of the trench except where in the opinion of the Project Manager's Representative's Representative this would so obstruct a road or footpath as to prevent the passage of traffic or pedestrians. In such cases the Contractor must dig out the pipe trench in such lengths as directed and keep his excavated material at such a distance as may seem advisable, and the rates shall be deemed to cover for this.

(g) During excavation, the Contractor shall ensure that all material suitable for re-use and which he intends for re-use are kept separate and set aside and protected as necessary to prevent loss or deterioration. Materials forming the surface and foundations of roads shall when excavated and if required for further sue, be carefully separated. Paving slabs, bricks and similar surfaces shall be carefully removed and stacked for re-use, or as otherwise instructed by the Project Manager's Representative.

(h) No pipes shall be laid no excavation filled in or covered with concrete until the formation has been inspected and permission to proceed obtained. The Contractor shall provide to the Project Manager, a weekly schedule in advance indicating the dates and approximate times he expects to request such inspections.

(i) Where pipes are to be laid under a road formation or in open country. Or in cutting, trenches shall generally be excavated after the earthwork is completed. The Project Manager's Representative may permit these pipe trenches to be excavated before the earthwork is complete, but payment for the excavation of the trench will only be made upon the volume excavated below the road formation.

(j) The unit of measurement for the excavation from the deemed width of the trench, and the average depth of excavation as mentioned in the Bills of Quantities. Unless otherwise indicated, for valve chambers and other water works structures, the unit of excavation will be per meter of

excavated material calculated to the exact outer dimensions and depths of the Permanent Works. In neither case will allowance be made for bulking.

(k) The rates for excavation of trenches in "normal" material shall include removal of all material except "rock", selecting and segregating material to be backfilled in special layers, supporting or sheeting, shoring and strutting, any additional working space or room for timbering or sheeting required, dealing with water, maintenance of the trench, and all labor, tools, materials, plants, supervision, overheads and profit.

(l) The provisions of above Clause shall apply to the rates of excavation in "rock" and in addition the Contractor shall also allow in his rates for back-filling the invert with Class 15 concrete or other materials as directed by the Project Manager's Representative and removing to a spoil dump all "rock" excavated.

5.7 Pipe Laying and Backfilling for Ferrous Pipes

(a) Pipes shall only be laid in the presence of a Project Manager's Representative unless written authority from the Project Manager has been granted.

(b) (b) Pipes generally shall be laid and jointed in accordance with the manufacturer's instructions. Extra excavation must not be carried out so as to avoid backfill, excessive deviation in joints and other irregularities. Otherwise, the pipe grade will follow the Drawings, with a continuous (but not necessarily uniform) fall towards washout-valves and rise towards air-valves.

(c) Prior to laying, damage to linings or coatings shall be repaired in accordance with the manufacturer's instructions and this will be the Contractors liability. Where in the opinion of the Project Manager's Representative, the damage to a pipe coating is significant and notwithstanding the repairs made in accordance with the manufacturer's instructions, the complete pipe shall be further protected by a polythene sleeve. The sleeve shall conform to ISO 8180 for steel pipes and EN 14628 for DI Pipes and be of minimum thickness of 200 microns it shall be strapped the joints of adjoining pipes using a non – metallic strap around the pipe. All costs of supply and installation of such additional protection shall be to the Contractors account.

(d) Every pipe shall be laid separately and shall bear evenly upon the bedding or concrete for its full length, holes to receive sockets, couplings or flanges being cut in the bottom of the trench of such size and depth as to allow the joints to be properly made. The pipes shall be laid to true inverts, straight lines and falls, each pipe being separately boned between sight rails. The pipes shall be thoroughly brushed inside and outside prior to laying, and no foreign matter shall be allowed to enter the pipe during or after laying. At the end of each working day the exposed pipe end shall be stoppered up with a stopper plug of appropriate diameter and not merely covered in polythene sheet tied around the end.

(e) Prior to laying in trench the bedding of the trench must provide support throughout the entire length of the pipe. The pipe shall never be laid directly on cohesive, rocky or stony soil where the natural trench bottom meets the bedding class required, this shall initially be loosened to a depth of 10 cm and then re- compacted to at least 90% MPD and then the surface loosened on the day of and prior to laying.

(f) Trenches shall be bottomed up only immediately in advance of pipe laying, although at least 15 meters shall be prepared in advance of any given pipe. Trenches and joint holes shall keep free from water, until the pipes are laid and the joints completed and no ground water shall be allowed to enter the new pipes.

(g) In rock excavation, the pipes shall be bedded on concrete or selected granular fill, e.g. gravel to a minimum thickness of 150 mm and the exclusion of rocks and other hard material to at least 300 mm around the pipe, leaving proper joint holes and subsequently making good with selected materials to the Project Manager's Representative's approval.

(h) All flanged joints shall be made with jointing rings, which shall be carefully inserted concentric to the bore of the pipe, so that undue stresses shall not be caused in any of the bolts or on the flanges when bolting up. The joint ring shall be compressed gradually and evenly by taking a few turns on each diagonal bolt in succession. Over- tightening shall be avoided. If the Project Manager is dissatisfied with the degree of care taken, the Contractor shall provide and use Torque- wrenches for this purpose at no extra cost.

(i) Mechanical joints shall be made in accordance with the manufacturer's instructions. After successful testing of pipelines, the joints will receive external protection as specified to the Project Manager's Representative's approval.

(j) The threads of any screw connections shall be coated with red lead before the joint is made.

(k) Concrete anchor blocks shall be provided at bends, tees, stopped ends, etc as shown on the drawings or as directed by the Project Manager's Representative.

(l) Where a pipeline cresses roads or railway lines, the pipe shall be sleeved or surrounded with concrete or protected by reinforced concrete slabs as instructed by the Project Manager's Representative, and Contractors shall have been deemed to have made allowance in their rates at the time of tender for compliance with the requirements of the relevant authority.

(m) For the insertion of valves and other fittings into existing pipelines, pipes may need to be cut. Approved tools and machines specially made for the purpose, shall be provided and used by the Contractor.

(n) The Contractor shall provide and fix wooden drumheads to the open ends of the mains, and similar drumheads shall be used to close the ends of any pipes to exclusive dirt and stones, etc. when the pipe laying is not actually in progress. Wooden markers properly inscribed, shall be

left projecting out of the ground to indicate the ends of all pipes, where these are buried in the ground in open country. In public highways, a danger sign or other suitable means as approved by the Project Manager's Representative shall be adopted.

(o) At every point of loading or unloading, pipes must be handled by approved lifting tackle. (Unloading by rolling them down planks of any form or including ramp will not be allowed except with the special consent of the Project Manager's Representative).

(p) The stacking of pipes shall be used such as to prevent damage during storage. Timber runners shall be laid to keep the upper row separated from the lower and the bottom row shall be staked to prevent any rolling. The whole arrangement shall be subject to the approval of the Project Manager's Representative.

(q) Care should be taken to minimize the risk of bush fires damaging any pipes deposited along the line of the mains.

(r) For ferrous pipes laid in trenches the soil cover shall be a minimum of 600 mm and the embedment material required is 53 (sand and course grained soil with less than 12% fines) for epoxy lined steel pipes and class 54 for ferrous cement mortar lined pipes in all cases with a minimum of 90% compaction. Contractors shall be deemed to have made full allowance in their Tender for the price of such trenching and importation of necessary backfill material and compaction as part of pipe installation price method. The method of compaction and the testing thereof shall be at all times to the approval of the Project Manager's Representative and in general at a frequency of one every 30 meters unless this is specifically relaxed based on continuously good in-situ test results.

5.8 Backfilling of Pipe Trenches – Ferrous Pipes

All excavation of pipe trenches shall be of such form and to dimension as shown on the drawings or as Project Manager's Representative may direct, and in all respects provide with embedment configurations and minimum covers as detailed below;

Minimum Trench Width

Pipe size ND	Trench Width
General	Minimum 600 mm
< 125 mm	D + 450
150 - 300	D + 600
> 300	To suit site condition and to the approval of the Project Manager

Lesser trench widths may only be authorized if the Contractor can prove to the satisfaction of the Project Manager that he can consistently achieve the required compaction for a lesser width in which case on absolute minimum of OD+450mm may be permitted.

In areas prone to water logging or where specifically called for on the drawing or in the Bills of Quantities class S1 AND S2 shall be used for lower bedding in accordance with the following grading;

Embedment for Flexible Semi Rigid Pipes Ferrous

Embedment Class	Bedding , Side fill & Initial Backfill Material Allowed	Notes
S1 and52 (mod)	Class 51: Gravel – single size Class 52: Gravel - graded	Normally possessed granular materials where specified as bedding for ferrous pipes.
S3 - S4	Class S3: Sand and coarse grained soil with less than 12% fines. Class S4: Coarse grained soil with more than 12% fine OR Fine grained soil, liquid limit less than 50%, medium to no plasticity and more than 25% coarse grained material.	These represent "as dug" soils but require particularly close control when used with low stiffness pipes. Class S3 shall be used for epoxy lined steel pipe whilst class S4 is suitable for cement mortar lined ferrous pipes

S1 and S2 Material for Lowe Bedding of Ferrous Pipes where specified

Nominal Pipe Diameter (mm)	Grading (TO ASTM sieve sizes)	
	S1 embedment	S2 embedment (mod)
80	10 single – size gravel	10 single – size gravel
100	10 single – size gravel	10 single – size gravel
150	10 or 14 single – size gravel	14 to 5 graded
200 to 500	10, 14 or 20 single – size gravel	14 to 5 graded or 20 to 5 graded

(a) The placing and compaction of pipe embedment shall only be undertaken in presence of a Project Managers Representative unless.

(b) The embedment material filled around and for 300 mm over the top of the pipes shall be free from stones tree roots or similar objects which trough impact or by concentrating imposed loads might damage the pipes and not of black cotton soil type. The filling shall be carried out

with utmost care, special attention being paid to tamping or material around the pipes and to joint holes so as to obtain the greatest possible compactness and solidity. The material shall if necessary, be careened to exclude material which would damage the pipes the material shall be in accordance with the relevant pipe bedding drawing but no worse than a class 53 material for epoxy lined steel pipes (sand and coarse grained soil with not more than 12% fines) or an 54 steel pipes material for cement - mortar lined ferrous pipes and the source and material shall be approved by the Project Managers representative before excavation commences.

(c) The lower bedding for the pipes shall have a minimum thickness of 75 mm in normal trenches, and 125 mm where rock/stones are present and at designated road crossings. in trenches where there is a continuous accumulation of groundwater, the trench shall after abstaining the approval of the Project Managers representative be over excavated by 150 mm and shall be backfilled using compacted granular material bedding material shall be compacted in layers not exceeding 50 mm thickness compaction of fill around the pipe shall be in layer thickness. Compaction of fill around the pipe shall be layer thickness not exceeding half the pipe diameter or 75 mm whichever is the lesser. Layer thickness is however subject to consistently achieving 90% MPS (Modified Product Density) or better failing which layers shall be reduced in depth as necessary to achieve the % compaction .

(d) The side fills and backfill material within the embedment shall be placed in layers of not more than 150 mm thickness when compacted and where hand ramming is employed the number of men filling shall not be more than half the number of men ramming side fill shall be placed simultaneously on both sides of the pipe. Where mechanical ramming of the remaining back fill is employed the machines shall be to the approval of the project manages representative and soil shall be replaced and well rammed down by hand for a depth of not less than 50 cm to give sufficient cover to the pipes and obviate risk of damage to them before the mechanical rammer is brought into thorough compaction has been obtained. All backfill soil above the embedment shall be free from clay lumps boulders and rock fragments greater than 150 mm and as far as practicable 90% MPD shall be attained, but this may be relaxed (e.g. in fields and open areas) by the Project Managers representative.

(e) The Contractor in excavation shall ensure that materials from strata containing no stones, and suitable for filling around the pipes as described above , shall be kept separately and used for this purpose the Contractor shall not be entitled to claim for any extra cost (as provided for below) for screening if this requirement is not complied with if no such strata occur in the excavation the excavated material shall either be screened or suitable material transported to the site from other excavation as the Project Managers representative shall direct. The cost of such work shall be paid for according to the rates in the bills of Quantities.

(f) Before commencing the backfilling o f trenches, the Contractor shall obtain approval from the Project Manager's Representative of the methods he proposes to use and he shall demonstrate by means of tests that the specified compaction can be achieved (according to BS 1377 or 150

22476 using the " sand replacement" method). The method of compaction and the testing there of shall be at all times to the approval of the Project Manager's Representative and in general at a frequency of once every 30 meters unless this is specifically relaxed based on continuously good in – situ test results.

(g) Where pipes are joined by rigid joints (flanges or welded), the pipe trench shall be backfield entirely without leaving out areas around and at pipe joints uncovered, for subsequent filling. To facilitate the subsequent location of any suspected leaking joints during pipe testing, should this become necessary, the Contractor shall provide marker pegs at regular intervals and / or use a handheld GPS to be able to relocate joint positions.

(h) Where for pipes a minimum cover of 600mm (or 900mm for transmission lines) cannot be maintained, including highways and trafficked areas then the pipe must either be laid in a protective sleeve or be protected by a 150mm thick reinforced concrete slab above the pipe. A minimum of a 150mm layer of appropriate grade granular bedding material must first be placed lightly compacted as a cushion above the crown of pipe before the slab is laid, and the slab must extend at least 150mm out beyond either side of trench.

5.9 Making Good Subsidence after Refilling

(a) Should subsidence occur prior to the end of the maintenance period, and where, in the opinion of the Project Managers Representative, subsidence is the result of sub – soil deformation, the Contractor will be required to, excavate and remove the pipe or pipes affected and return the bottom of the trench to grade trough a process of over excavation, re-fill and compaction o ruse of a lean concrete mix as determined by the Project Manager's Representative, who shall also determine whether or not the affected pipes may be re-used or must be replaced.

(b) The affected sections or sections will in any event be liable for a further twelve months maintenance period.

(c) All refilling necessary due to subsidence in pipe trench backfill shall be thoroughly compacted by ramming. Any subsidence due to consolidation shall be made up by the Contractor at his own expense with extra compacted material. Should subsidence occur after any topsoil has been replaced, the topsoil shall first be removed before any hollows are made up before being replaced.

5.10 Reinstatement of surfaces

(a) All surfaces of roads, fields, paths, gardens, verges, etc. whether public or private which are affected by the operations of the Contractor shall be temporarily restored by him in the first instance and permanently reinstated in the second instance when the ground has consolidate fully. Separate payment for reinstatement shall be made only for surfaced roads (e.g. tarmac, concrete, paving bricks or similar material) , for official designated dirt roads of at least 6m

width, grassland, cultivated lands and sports fields. Any other reinstatements are deemed to be covered by the pipe installation rates.

(b) The Contractor shall be responsible for the temporary reinstatement and permanent reinstatement of all surfaces whether or not the area requiring restoration is within the limits of his excavations if the necessity for the restoration arises from causes due to the operations of the Contractor. The Contractor's prices shall include for restoring all surfaces so damaged to their original condition, as no extra payment will be made for any such work. The Contractor shall take necessary measures to ensure that no toxic materials vegetation or livestock or pollute streams or water – courses are used in any temporary restoration or permanent reinstatement and shall indemnify the Employer against any claims arising out of the use of such materials.

(c) Temporary restoration shall be carried out immediately after the excavations have been refilled by returning the excavated material to the position from which it was removed and adding such suitable materials as be required and consolidating the various materials as the work proceeds in order to provide a surface that is adequate for the purpose that the original surface fulfilled, Temporary surfaces shall be maintained is a condition satisfactory to the Project Manager's Representative and / or responsible Authority until the permanent reinstatement is made. In the case of roads and streets the surface shall be necessary to consolidate the filling and keep the surface fit for traffic, suitable material being added to all placed which have sunk or become rough.

(d) Permanent reinstatement shall not be made until the ground ha consolidated permanently and until sanction to do so is received from the Project Manager's Representative. It shall be carried out with materials similar to those that were used in the original work to the entire satisfaction of the Project Manager's Representative and / or responsible Authority.

(e) In verges and other grass surfaces the topsoil shall be removed, stored and replaced after consolidation of the filling and planted or seeded with approved grass. Should subsidence occur, it shall be made good with additional topsoil and be replanted with grass or re- seeded. New grass shall be planted if for any reason the grass fails to grow or is destroyed.

(f) The trenches, channels, gutters and kerbs shall be reinstated to the condition in which they were before excavation was commenced. The final surface of the trench shall be flush with the surrounding ground.

(g) If the work of restoration or reinstatement as carried out by the Contractor is not to the satisfaction of the Project Manager's Representative and/ or the responsible Authority and should the Contractor not remedy the defect forthwith, any remedial work considered necessary may be undertaken by the Project Manager's Representative and /or the responsible Authority and the cost there of shall be borne by the Contractor.

(h) If at any time trench becomes dangerous, the Project Manager's Representative shall be at liberty to call upon the Contractor to restore it to a proper condition at three hours notice and should the Contactor fail to carry out the work. Have it done at the Contractor's expense.

5.11 Handling from Storage to Trench

(a) All pipes shall be handled from storage to trench in accordance with the manufacture's recommendations.

(b) The Contractor shall obtain and keep on site entire manufacture's literature relating to the proper handling, storage, laying, and installation and testing of their products and shall make them or copies there of available to the Project Manager's Representative on site.

5.12 Working Width

Where pipelines are within 20 meters of a motorable track, or through light bush or thicket a way leave clearance of 3 meters plus nominal bore of pipe will be allowed. Where pipelines are through dense bush, thicket or forest a way leave clearance of five meters plus nominal bore of pipe will be allowed. Payments for site clearance will be based upon this width expect that the Project Manager's Representative reserves the right to restrict this width due to the presence of obstructions, roads, houses and the like. Payments will then be according to the actual area cleared. No claims for additional space nor for inconvenience and the like caused by obstructions, will be allowed.

5.13 Location of Underground Services etc.

It shall be the Contractors obligation when trenching, to locate and avoid the damaging of any existing services, be they water, drainage, sewerage, electricity or telephone. Notwithstanding this obligation and should damage occur, it will be the Contractors further obligation and at his own cost to urgently liaise with the utility concerned and to bear the full cost of the repair or replacement of the damaged article to the entire satisfaction of the Utility concerned.

5.14 Concrete Protection

(a) Unless otherwise provided in the Special Specification or Bills of Quantities or directed by the Project Manager's Representative, a 0.15 m concrete surround shall be provided to water mains in the following circumstances:-

i. Water mains with less than 0.6 m or more than 6.0 m of soil cover over the pipes.

ii. Water mains under carriageways if depth of soil cover is less than 1.30m

iii. In the places where shown on the Drawings or directed by the Project Manager's Representative.

(b) All concrete for beds and surrounds shall be class 15 concrete.

(c) Alternatively under carriageways and where indicated on the drawings, the pipeline shall be laid in a stepped trench with the immediate surround backfilled with approved granular material and then across the step shall be laid precast reinforced concrete slabs of class 25 concrete, 150mm thick.

(d) The unit of measurement shall be cubic meter or linear meter as indicated in the Bills of Quantities.

(e) The rate shall include for the provision, transporting and placing of concrete, all strutting and formwork, protection and curing and all labor, tools, plant, supervision overheads and profit.

5.15 Anchor Blocks

(a) Pipelines with mechanical (or flexible) joints shall be adequately anchored at bends, tees, sluice or butterfly valves, tapers, blank ends, etc. Anchor blocks shall be constructed from Class 20 concrete to the dimensions indicated on Drawings unless otherwise directed by the Project Manager's Representative. Support blocks shall be constructed from Class 15 concrete. Soil around anchor blocks shall be compacted thoroughly before the hydraulic testing of the pipeline. Payment for anchor blocks will be per unit volume of concrete in the blocks and shall include for the entire earthwork, formwork and other operations required for their construction. No separable payment shall be made for any temporary or permanent anchor blocks constructed by the Contractor specifically for the testing of the pipeline.

(b) Anchor and Thrust blocks at proposed tie-in points between old and new pipe work will be cast at least 7 days prior to the proposed tie-in works and post tie-in pipeline testing for the affected section.

5.16 Additional Protection to Flexible Couplings and Flange Adaptors in Chambers and/or Above Ground

Such mechanical joints e.g. flexible couplings, flange adaptors, etc. in chambers and/or above ground should first be cleansed by brushing away soil and then shall have a primer applied around the component. Molding around the component shall be with an approved mastic blanket to provide a contour suitable for wrapping the component with an approved petrolatum anti-corrosion tape suitable for tropical climates which shall be done so as to achieve a clean and neat good tape finish.

5.17 Protection to Flexible Couplings and Flanged Adaptors Fitted to Epoxy Coated Pipe Spigots.

Where factory coated flexible couplings have been used on pipes whose exposed surfaces beyond other protection materials have been factory protected using epoxy, and then such joints shall be site protected by a polythene outer wrap sheathing of minimum thickness 200

microns that shall extend beyond the pipe epoxy coating by at least 50 cm. This outer wrap shall be double strapped using a non-metallic strap to each pipe end beyond and not to the epoxy coating.

5.18 In-Situ Welding Of Steel Fittings and Flanges

(a) Wherever it is necessary to undertake in-situ welding of steel fittings and flanges the work shall be undertaken under cover, temporary or otherwise. Outside of buildings, the cost of providing such cover shall be deemed included in the Contractors rates. Only suitably qualified welders shall be employed.

(b) Welding procedures used shall comply with ISO 15607 and EN 188-9.

(c) Prior to deployment of any welder he shall within the preceding 3 months have satisfactorily undergone an 'approved testing' in accordance with EN 287-1 and certification thereof shall be provided to the satisfaction of the Project Manager's Representative. Each welder deployed shall at intervals of not more than 6 months undergo similar approved testing and only those who pass such retesting will be allowed to continue to undertake the in-situ welding works.

(d) All testing and retesting will be deemed to be covered in the Contractors rates.

5.19 Pipe Supports

Pipe supports shall meet the requirements of BS 3974-1.

5.20 Service Pipe Connections

(a) All tapping shall be carried out using tapping saddle clamps (sleeves or collars type- surrounding the pipe). Self tapping directly on pipes shall not be permitted. Ferrules alone shall not be permitted.

(b) The form of the customer connection tapping clamp shall be two equal halves held together by threaded ends, washers and bolts. The tapping clamp shall be double band with a minimum of 1.5 mm thick if made from stainless steel. The body part of the tapping clamp shall be of robust ductile iron or stainless steel with a fusion bonded epoxy coating of not less than 300 microns dry firm thickness. The seal shall be of elastomer or nitrile rubber material and shall surround the pipe circumference completely and shall be suitable for use with potable water. The tapping clamp shall be supplied complete with removable and lockable ferrule.

(c) The customer connection tapping clamp shall have following features:

i. All stainless steel parts shall conform to high corrosion protection grade (AISI 316 L).

ii. The rubber lining shall eliminate metal to metal contact or metal to plastic contact and insulate against galvanic corrosion between two different types of metals.

iii. They should be able to fit range of pipe diameters and also be able to adapt to pipe irregularities and ovality.

iv. Double band or wide bodies to allow large surface area contact with the pipe body for supporting the pipe.

5.21 Hydrostatic Testing Of Pipelines

(a) After laying new pipelines shall be tested under pressure and where in trench, such tests shall be made before it is completely back-filled unless otherwise approved. Unless otherwise approved, during the test, all joints shall be clear of earth, timber, etc to allow visual inspection. Testing shall commence when not more than 20% or 10km of all pipe work has been laid whichever is lesser and at no time may there be more than that amount untested. If, in the view of the Project Manager, the level of failure is unsatisfactory, then the maximum length remaining untested at any one time shall be reduced at his discretion.

(b) Where old pipelines that are yet to be taken into service are involved they shall be similarly tested, except that the Project Manager's Representative may specify at what stage testing is required.

(c) The pipeline shall be tested in lengths between valve locations or in such shorter lengths as the Project Manager's Representative may approve on the understanding that no extra cost will be incurred to the Employer but the maximum length of main to be tested, shall not normally exceed 1km.

(d) The Contractor shall supply all necessary materials to carry out the test in accordance with the requirements including force pumps, water pressure gauges, including tools for the use of the Project Manager's Representative, interconnecting pipe work, feeding tank, blank flanges, temporary stop-ends, struts and water for the test. The test section shall be capped or flanged off at each end and all branches. Testing shall not take place against closed valves.

(e) For a pipeline incorporating flexible joints, testing shall not commence until after all the permanent anchor blocks along the pipeline have been constructed and soil around them backfilled and compacted. Capped or flanged ends along the pipeline shall also be anchored adequately to withstand the force due to test pressure. The Contractor shall submit his proposals for temporary anchoring to the Project Manager's Representative for approval.

(f) After the main has been clear of debris, and all necessary stop-ends and gauges fitted to the Project Manager's Representative's approval, the Contractor shall fill up the pipe with water free from silt, and sand and grit and bring up the pressure steadily to the nominal pressured of the pipe or incorporated fittings, whichever is the lesser, (except for old pipelines where a lower value may be specified by the Project Manager's Representative), and maintain it with a force pump for 24 hours.

(g) The pressure shall then be increased steadily in increments of 1.0 kg/cm2 with a pause of one minute between each increment to the specified test pressure for the section. Unless otherwise specifically mentioned, the applied test pressure shall be measured at the lowest point along the section being tested.

(h) Where the test pressure has not been specified, it shall be assumed to be 50% in excess of the nominal pressure at the lowest point of the section being tested.

(i) After a period of half an hour, the fall in test pressure shall be recorded and sufficient water again pumped into the live under test to bring the pressure back to the test pressure. The procedure shall be repeated every half-an-hour for a total period of 3 hours, or longer, if the Project Manager's Representative so directs, and the amount of water pumped in recorded.

(j) The rate of leakage shall be calculated from the amount of water pumped in during testing and if it is less than 1 liter of water per 10mm diameter of pipe per km of length of pipeline, for each 24hours and for every 30m head, the pipe line will considered to have passed the test.

(k) Leaks exceeding permissible amounts shall be made good. And faulty pipes, fittings, and specials, shall be replaced by the Contract or his own expense and the section tested again before approval is given for backfilling. Payment for the section will not be certified, until the test has been passed and backfilling completed.

5.22 Flushing and Sterilization

(a) This shall be done in accordance with the recommendations set out in BS6700,

(b) All pipe work shall be flushed and cleaned and all treated water pipe work shall additionally be sterilized. The rates inserted are to before the flushing and sterilizing, and where appropriate for cleaning shall be inclusive for, sampling, testing and inclusive of the reports on the bacteriological quality of water.

5.23 Indicator Plates and Mater Posts

(a) Precast concrete indicator plates to the dimensions indicated on the Drawing shall be installed at all sluice valves, single-air valves, double air valves, fire hydrants and washouts, with letters SV, SAV, DAV, FH, WO, respectively indented in them. The plates shall be painted with at least two coats of all-weather plastic emulsion paint of approved colour.

(b) Marker posts to the dimensions indicated on Drawings shall be installed at 500m spacing along the pipelines installed, in open country or as directed by the Project Manager's Representative. Marker posts shall be painted with at least two coats of all weather plastic emulsion paint of approved colour.

5.24 Tie-In Works between Existing and New Pipelines

(a) General

This specification clause shall apply to any tie in works between existing operational and new pipelines which involve closing down of any main which is in service supplying water, either Raw or Treated, within the existing operational pipeline.

The Contractor shall be responsible for the execution of the works except under circumstances where the execution of the tie in operation is assumed by Project Manager's Representative as mentioned under (f) below, from the date of the Project Manager's Representative's instruction to perform described under (g) below. The Project Manager's Representative's instruction to perform the tie in will be given at least 14 days before the date on which the tie in is to be executed.

(b) Fittings

The Contractor shall take delivery of any fittings required at the works not less than 96 hours before the commencement of the tie in operations. He shall provide all the necessary watching to ensure that such fittings do not get misplaced or stolen. The Contractor shall, check the suitability of such fittings including checking of all dimensions, particularly the external diameter or the pipe into which the connection is connection. This shall be done by measuring diameter at 4 positions to a tolerance of 0.25 mm. The Contractor shall certify the suitability of such materials to Project Manager's Representative not less than 48 hours before the commencement of tie-in operations.

The Contractor shall prepare a schedule of fittings including those on existing pipes that are to be used for such tie-in or redeployed elsewhere as instructed on the drawings and shall obtain approval of the Project Manger's Representative not less than 48 hours before the commencement of tie in operations of such schedule.

The Contractor shall ensure that all materials are at the site of the works not less than 24 hours before the commencement of the tie-in operation and shall inform the Project Manager's Representative who shall check the material against the schedule as approved where he deems this necessary.

Any non standard fittings which are required for the execution of the tie-in works shall be fabricated under the Project Manager's Representatives supervision and shall be hydro statically tested to at least one and' a half times the maximum working pressure.

(c) Personnel

The Contractor shall ensure that at least one senior member of his field supervisory staff who has proven experience of such operations and fluent in English and the language of his lobourers is on site throughout the whole duration of the tie in operation.

The Contractor shall also ensure that all necessary skilled artisans for the operation of all his plant are on site for the whole duration of the tie-in operation.

The Contractor shall furnish the Project Manager's Representative's Representative a list of the key personnel to be involved in the tie in exercise at least 48 hours before the commencement of the exercise and shall get the Project Manager's Representative's approval at least 24 hours before the commencement in respect of such personnel. To gain this approval the Project Manager's Representative may require that operative is tested in the performance of his duties in the operation of the plant for which he is in attendance.

In particular this requirement shall apply to all welders, pipe cutters by using either mechanical or flame cutting equipment and lifting plant operators.

The Contractor shall ensure that an adequate number of labourers are in attendance upon the site during the period of the tie in operation.

(d) Pre Tie-in Works

The Contractor shall execute all works possible before the commencement of the operations which shall include: -

- Exaction and supports of the excavation.
- Blinding with concrete the bottom of the excavation and (where instructed by the Project Manager's Representative) immediate working areas.
- Provision of any required drains a sump of adequate size from which any accumulating water is to be pumped out.
- Casting of the floor of any chamber which is to be constructed around such tie-in works.
- Casting of any thrust blocks walls or any other works necessary for effective execution of the tie-in works as may be required by the Project Manager's representative.

The Contractor shall complete these works at least 96 hours before the commencement of the tie-in operation or within a period that may be otherwise set by the Project Manager's Representative upon issue of the Project Manager's Representative's approval not less than 24 hours before commencement of the tie-in operations.

(e) Plant

The coordinator shall prepare a schedule of the plant which he proposes to have on site either to use, or on standby, or for emergency use and shall obtain the approval of the Project Manager's Representative not less than 48 hours before the commencement of the tie-in operations. Such plant shall include:

- Excavation pant
- Cutting equipment
- Lifting equipment
- Pumping equipment (unless a drain is provided)
- Concrete Mixer
- All tools necessary for the erection and assembly of the plant.

The Contractor shall also ensure that all plant is on site not less than 24 hours before the commencement of the tie-in operation or within a period that may be otherwise set by the Project Manager's Representative upon issue of the Project Manager's Representative's instruction to perform the tie-in, works, and obtain the Project Manager's Representative who shall check the plant against the schedule as approved where he deems this necessary.

(f) Actual Tie-in Works

The Contractor shall prepare a programme giving details of the proposed scheduling and sequencing of tie-in works necessary for minimizing the interruption of the existing water supply. Approval of such programme by the Project Manager's Representative shall be obtained not less than 72 hours before commencement of the tie-in operation.

The Contractor, unless relieved of the responsibility by the Client or the Project Manager's Representative, shall first empty the section of the main on which the tie-in is to be made and shall ensure that the nearest air valves and washouts immediately upstream and downstream are all open and the washout dry.

Where the Contractor is relieved of this operation, which shall be notified to him by the Project Manager's Representative not less than 96 hours before the tie-in operation in due to commerce, he shall check that air-valves and washouts mentioned above are in the state described.

When the Project Manager's Representative is also satisfied that the main is empty of water he shall verbally give the order to commence the works from which time the Contractor shall be solely responsible for the execution and completion of the tie-in works unless relieved of such responsibility by the Project Manager's Representative.

In event that the Project Manager's Representative directs that the required tie-in works be carried out during the night for purposes of minimizing the effect of such tie-in ON Municipality consumer community, the Contractor shall make all required preparation for provision of lighting (including standby and emergency) and any other measures as the Project Manager's Representative may direct.

The Contractor shall provide all the insurance normally required by the Project Manager's Representative and the operating F.I.D.I.C. Condition of Contract and shall obtain an endorsement if necessary to ensure that the insurances remain valid in the event that the Project Manager's Representative takes over the direction of the works.

When the Project Manager's Representative is satisfied that the tie-in works are completed he shall give notice for the main to be re-commissioned, when this has been satisfactorily accomplished the Contractor shall re-deploy his staff on the Project Manager's Representative's verbal instructions of completion of the tie-in.

(g) Post Tie-in Works

Within 48 hours of the completion of the tie-in works the Contractor shall have completed all permanent works required to support the plant installed during the tie-in operation, and shall remove all temporary supports within a further 48 hours after the permanent support works have been approved by the Project Manager's Representative. The temporary supports shall not be removed before such approval has been given.

Within 14 days from the date of the completion of the tie-in the Contractor shall have completed all the other permanent works required to allow operation of the plant installed during the tie-in operation, or other plant for which the tie-in executed, and shall obtain the approval of the Project Manager's Representative on the completion of such works.

The Project Manager's Representative shall issue the Contractor with a notice stating the operations for which the plant installed during the tie-in operation may be used, which shall remain in force for a period extending for 28 days from the date of approval of the completion of the Post tie-in works as described above.

Before the expiry of the 28 day period described above the Contractor shall obtain the approval of the Project Manager's Representative for the completed work when the Project Manager's Representative shall issue a notice allowing full operation of the plant on the expiry of the above mentioned period upon which the Contractors responsibility for the works, unless requested otherwise shall cease.

(h) Form to be Used

A copy of the form to be used for each tie-in work is given on the following page.

(PMR-Project Managers Representative)

SCHEDULE OF INSTRUCTION, SUBMISSIONS AND APPROVALS FOR THE TIE-IN WORK	
1) PMR'S INSTRUCTION TO PERFORM TIE – IN	14 DAYS
2) MATERIALS: ACCEPTANCE BY CONTRACTOR	96 HOURS
CERTIFICATE OF SUITABILITY BY CONTRACTOR	48 HOURS
SCHEDULE OF THOSE NEEDED	
SUBMISSION APPROVAL	48 HOURS
ARRIVAL ON SITE CHECKED ON SITE BY THE PMR	24 HOURS
3) WORKS PROGRAMME OF EXECUTION SUBMISSION APPROVAL	72 HOURS
SCHEDULE OF PLANT SUBMISSION APPROVAL	48 HOURS
PLANT ARRIVAL ON SITE CHECKED ON SITE BY PMR	24 HOURS
ARTISANS APPROVED BY PMR	24 HOURS
TESTING OF BY PMR	
4) NOTICE OF RESPONSIBILITY FOR DRAWING MAINS	96 HOURS
5) PRE-TIE IN WORKS COMPLETION OF	96 HOURS
INSPECTION BY PMR	24 HOURS
6) PMR'S VERBAL INSTRUCTION TO COMMENCE WHEN MAIN IS DRY	
7) PMR'S' VERBAL INSTRUCTION TO RECOMMISSION MAIN	
8) PMR'S'S VERBAL APPROVAL OF THE TIE-IN COMPLETION	
9) PMR'S'S NOTICE OF PLANT OPERATIONS ALLOWED	
10) SUPPORT WORKS: COMPLETION	48 HOURS
APPROVAL BY PMR ... REMOVAL OF TEMPORARY	
11) POST TIE-IN WORKS COMPLETION	14 DAYS
APPROVAL BY THE PMR	
12) FINAL APPROVAL BY PMR OF WHOLE WORKS	42 DAYS

NOTE: A) Time given are the latest

B) Where items are not given the Contractor shall ensure execution of that item so as not to cause any other item to be delayed.

5.25 Measurement and Payments for Pipe Laying

(a) The unit of measurement for the excavation of trenches shall be per linear meter. Lengths of pipelines shall be measured along the centerline and shall include lengths occupied by fittings and valves. Where pipes are built into manholes and other chambers, the lengths shall be measured from the inside surface of the chambers.

(b) All pipes shall be deemed to be in trenches unless expressly stated otherwise. No separate payment shall be made for:

i. Exaction of pipe trenches
ii. Backfilling of pipe trenches unless trenches are expressly required to be backfilled with material other than that excavated from the trench.
iii. Provision, cutting, laying, jointing of pipes and fittings in trenches
iv. Temporary supports which are not expressly required to be left in the excavations.
v. Keeping trenches clear of water,
vi. Trimming of trench bottoms
vii. Disposing of excess excavated material
viii. Any additional protection at the time of laying if called for on the drawings or in the specification.

(c) The rates for excavation of trenches in "normal" material shall include removal of all material except "rock", selecting and segregating material to be backfilled in special layers, supporting or sheeting, shoring and strutting, any additional working space or room for timbering or sheeting required, dealing with water, maintenance of the trench, and all labour, tools, materials, plants, supervision, overheads and profit.

(d) Excavation of Rock Class I and Class II, if carried out with the approval of the Project Manager, will be measured per cubic meter excavated. The rate shall be inclusive of provision of pipe bed and compaction of bed and after pipe installation surrounding of the pipe and compaction of the pipe surrounding and partial and later complete backfilling of the trenches, including compaction.

(e) An isolated volume of artificial hard material or rock occurring within other material to be excavated shall not be measured separately unless its volume exceeds one cubic meter.

(f) The location and limits of dredging shall be stated in item descriptions where its extent would otherwise be uncertain. Such excavation classes in the Bill of Quantities shall be measured as dredging, irrespective of the method of excavation adopted by the Contractor. Payment shall be effected per meter length. The rate shall be inclusive of provision of pipe bed and compaction of bed and after pipe installation surrounding of the pipe and compaction of the pipe surrounding and partial and later complete backfilling of the trenches, including compaction.

(g) The Contractors rate will be deemed to include excavation, transportation of pipes and fittings from storage area, laying and jointing including provision of all bedding material backfilling and reinstatement.

Concrete Protection

(a) The unit of measurement shall be linear meter as indicated in the Bills of Quantities.

(b) The rate shall include for the provision, transporting and placing of concrete, all strutting and formwork, protection and curing and all labour tools, plant, supervision overheads and profit.

Anchor Blocks

(a) Payment for anchor blocks will be per unit volume of concrete in the blocks and shall include for the entire earthwork, formwork and other operations required for their construction.

(b) No separable payment shall be made for any temporary or permanent anchor blocks constructed by the Contractor specifically for the testing of the pipeline.

Hydrostatic Testing of Pipelines, Sterilization and Flushing

Unit of measurement shall be meters.

Marker Posts

Unit of measurements shall be number of precast units installed as directed by the Project Managers representative.

TABLE OF CONTENTS SECTION VI PIPEWORK MANHOLES & PIPEWORK ANCILLARIES

6 PIPEWORK MANHOLES & PIPEWORK ANCILLIARIES

Includes: Manholes and other chambers, ducts, metal culverts, crossing and reinstatement, Pipe Supports, Thrust Blocks, Stools.

6.1 Valve Chambers for Water

(a) Valve chambers shall be constructed of solid concrete block work as shown in the drawings. If the Contractor intends to use burnt bricks instead of solid concrete blocks approval in writing must be sought from the Project Manager. The Project Manager may require the Contractor to demonstrate suitability of using such bricks especially in areas prone to inundation.

(b) Five types of valve chambers for this water supply shall be adopted as follows:

Type 1

Valve chamber to accommodate one number of sluice valve with internal dimensions 450 x 600 mm and depth not exceeding 1.0meters for pipe bores not exceeding 65mm.

Type 2

Valve chamber to accommodate one number sluice valve with internal dimensions 750m x 1200mm and depth not exceeding 1.5 meters for pipes bores not exceeding 65mm but less than 300mm.

Type 3

Valve chamber to accommodate two number sluice valves with internal dimension 1200 x 1600mm and depth not exceeding 1.5 meters for pipes bores not exceeding 300mm.

Type 4

Valve chamber to accommodate air valve assembly, internal dimension 750mm x 1200mm and depth not exceeding 1.5 meters for pipes bores not exceeding 300mm.

Type 5

Valve chamber to accommodate a wash-out assembly and line valve, internal dimension 1200mm x 1600mm and depth not exceeding 1.5 meters for pipes bores not exceeding 300mm.

(c) Valve chambers shall be constructed on a concrete slab of grade 10 with one corner having a dia. 100mm seepage outlet for leak water to trickle away. Course gravel of up to one meter depth of thickness of 200mm shall be provided instead of backfilling with soil so as to assist in the rapid percolation of leak water. Valves shall be individually supported by concrete stool of concrete grade 20.

(d) Valve chambers shall protrude at least 150mm above common ground, and precast concrete slab be provided. Chambers shall be plastered inside to give a neat finish and on the outside be plastered at least 200mm from the top in order to avoid wet walls. Cast iron steps will be provided for manholes who depth exceed one meter.

6.2 River, Stream and Canal Crossings

River, stream and canal crossings shall be classified by the widths between banks measured along pipe centre lines. Crossings of streams shall be measured only where their width exceeds one meter. Four categories of crossings shall be adopted as outlined below:

Type 1

Overcrossing River, Canal or Stream of widths 1 – 3 meters for pipe nominal bore not exceeding 300mm.

Type 2

Overcrossing River, Canal or Stream of greater than 3 meters for pipe nominal bore not exceeding 300mm.

Type 3

Undercrossing River, Canal or Stream of widths 1 – 3 meters for pipe nominal bore not exceeding 300mm.

Type 4

Undercrossing River, Canal or Stream of greater than 3 meters for pipe nominal bore not exceeding 300mm.

6.3 Road Crossings

Lengths for breaking up and reinstatement of dirt roads shall be measured along pipe centre lines and shall include lengths occupied by manholes and other chambers.

Types of surface shall be stated in item descriptions for breaking up and reinstatement of roads. Separate items are not required for removal and reinstatement of kerbs.

Surfaced roads denote tarmac, concrete, paving bricks of similar surfaces. The Contractor shall make the relevant payments to the concerned department.

Dirt roads denote only official designated murram roads of at least 6 m width and where specified by the Engineer or his Representative. The Contractor shall make the relevant payments to the concerned department.

6.4 Marker Posts

Sizes and types of marker posts shall be given in item descriptions or given in item drawings. Marker posts inscribed MAJI shall be erected at changes in direction of water mains as directed by the Engineer. Indicator posts inscribed appropriately shall be erected at valves and other fittings as directed.

Marker and indicator posts shall be embedded in concrete as shown on drawings and shall be vibrated precast reinforced concrete as per dimensions shown on drawings. They should be painted in colours as indicated on the drawings.

6.5 Pipe Supports

Principal's dimensions and materials shall be stated in item descriptions for pipe supports. Heights of pipe supports shall be measured from the ground or other supporting surface to the invert of the highest pipe where pipes are supported from below and of the lowest pipe where pipes are supported from above. Two categories of pipe supports shall be adopted as outlined below:

Type 1

Height not exceeding 2 meters for pipe nominal bore not exceeding 300mm

Type 2

Height greater than 2 meters for pipe nominal bore not exceeding 300mm

6.6 Concrete Stool and Thrust blocks

Concrete stools and thrust blocks of pipes shall be carried out using grade 15 mass concrete. In carrying out this work the Contractor shall take care to pack the concrete under the around the pipes to ensure even bedding and solidity in the concrete and the concrete shall not be thrown directly on to the pipes. The under surface of the concrete shall be struck off with a wooden screed or template and neatly finished off. The rates shall include for any formwork that the Contractor requires to use under this item.

Two categories of concrete stools and thrust blocks shall be adopted as outlined below: The unit of measurement will be number (No)

Type 1
For all vertical and horizontal bends volume of concrete not exceeding 0.1 cubic meters for pipe nominal bore not exceeding 300mm

Type 2
For all vertical and horizontal bends volume of concrete exceeding 0.1 cubic but less than 0.3 cubic meters for pipe of nominal bore not exceeding 300mm

Type 3
For all concrete stools or thrust blocks on steep slopes, junctions or tapers and as directed by the Engineer volume of concrete not exceeding 0.1 cubic meters for pipe nominal bore not exceeding 300mm.

Type 4
For all concrete stools or thrust blocks on steep slopes, junctions or tapers and as directed by the Engineer volume of concrete exceeding 0.1 cubic meters but less than 0.3 cubic meters for pipe nominal bore not exceeding 300mm.

6.7 Concrete Surround or Haunching of Pipes with Concrete

Concrete surround or haunching of pipes with concrete shall be carried out using grade 15 mass concrete. In carrying out this work the Contractor shall take care to pack the concrete under the around the pipes to ensure even bedding and solidity in the concrete and the concrete shall not be thrown directly on to the pipes. The upper surface of the concrete shall be struck off with a wooden screed or template and neatly finished off. The rates shall include for any formwork that the Contractor requires to use under this item. The unit of measurement will be meters for concrete surround of pipes whose nominal diameter does not exceed 300mm.

6.8 Wrapping Lagging of Pipes with Polythene Sheeting

Only if requested for by the Engineer. The Contractor will wrap the pipe in Polyurethane sheeting of 1000microns. The unit rate will be meters.

6.9 Measurement and Payments-Pipe work – Manhole & Pipe work Ancillaries

The unit of measurements for the different valve chambers will be number (No) and it will be deemed that the Contractors rates include all excavations, supply of all necessary materials and construction of the same, no separate payment will be made for stool or thrust blocks cast in chambers, it is deemed that the Contractors rate for the Construction of the chamber will have included this item.

The unit of measurement for river or stream crossing will be number (No) and it will be deemed that the Contractors rates include all excavations, supply of all necessary materials and construction of the same.

The unit of measurement for surface roads and reinstatement of the same will be meters (m) and it will be deemed that the Contractors rates include all cutting, excavation, pipe laying, concrete surround, backfilling and reinstatement of the surfaced road.

The unit of measurement for dirt roads and reinstatement of the same will be in meters (m) and it will be deemed that the Contractors rates include all cutting, excavations, pipe laying, concrete surround, backfilling and reinstatement of the dirt road.

The unit of measurement for pipe support will be type and number (No) and it will be deemed that the Contractors rates include all excavations, supply of all necessary materials and construction of the same.

The unit of measurement for stool and thrust blocks will be number (No). The unit of measurement for Concrete Surround or Haunching of Pipes with Concrete will be meters (m) and it will be deemed that the Contractors rates include all excavations, supply of all necessary material and construction of the same.

TABLE OF CONTENTS SECTION VII STRUCTURAL & MISCELLANEOUS METAL WORK

7.0 Structural and Miscellaneous Work

7.1 Steel Quality

Structural steel shall comply with the requirements of B.S.4360 and shall be new and unused. It shall be free of imperfections, distortion, and rust, scales of other deterioration or contamination by grease, paint and similar items.

7.2 Testing

The Engineer may, where he so desires call manufacturer's work test certificates in respect of all steel, which tests shall have been performed in accordance with B.S. 18. The Engineer may also carry out such further tests as he may consider necessary.

7.3 Sections

The dimensions and properties of hot rolled structural steel sections and hollow sections shall be in accordance with B.S.2, part 1 and 2 or B.S.4848 for metric sized sections.

7.4 Minimum Thickness

All steelwork sections other than gauge metal sections, including cleats, gusset plates, etc. shall be not less than 8mm thick unless specifically indicated on the Drawings.

7.5 Forging

All steel for forging and all forgings shall comply with the requirements of B. S. 29 and shall be subjected to inspection and approval of the Engineer.

7.6 Casting

All material used in the manufacture of casting and all castings shall comply with the requirements of B.S. 309, 1452 and 3100 and shall be subject to inspection and approval of the Engineer.

7.7 Gauge Metal Sections

Sections shall be manufactured from continuously hot dipped galvanized steel coil to B.S.2989 using steel to B.S.1449, part 1A and 1B, classification CR4 with a guaranteed minimum yield stress of 280 N/mm2.

The sections shall be cold formed to the basic shapes given in B.S.2994 with the design and details conforming to Addendum No. 1 to B.S.449 (PD4064).

Section shall be sawn and holes may be punched so as to produce a neat round hold with no distortion. Holes and cut ends shall be painted with zinc rich paint as soon as possible after cutting.

7.8 Measurement and Payments-miscellaneous Metal Work

The unit of measurement will be tons whether using rolled sections, plates or flats for fabrications of frames, trusses, braces, purlins, walkways, platforms, stairways, ladders etc. The item descriptions shall state the specifications and thickness of metal used, off-site surface treatments and principal dimensions of miscellaneous metal work assemblies.

The Contractor rate will include erection, fixing including all necessary bolts and nuts.

TABLE OF CONTENTS

SECTION VIII TIMBER COMPONENTS & FITTINGS

8.0 TIMBER

Includes timber components and fittings

8.1 General

All woodwork shall be carried out in accordance with the drawings and the principals of first class joinery construction. Unless specifically stated otherwise, sizes shown on drawings are finished sizes and the Contractor must allow for wrot faces.

8.2 Qualities of Timber

(a) All timber described as prime Grade is to be first Grade (Grade I).

(b) All timber described as selected Grade is to be second Grade (Grade II)

(c) All hardwood is to be prime Grade (Grade I)

(d) All timber for permanent use in the building shall before use, be approved by Project Manager for quality in accordance with the foregoing specification for its respective grade. Any timber not so approved by the Project Manager shall be removed from the site forthwith.

8.3 Insect Damage

All timber, whether graded or ungraded, and including shuttering, scaffolding and the like shall be free of live borer beetle or other insect attached when brought upon the site. The Contractor shall be responsible up to the end of the maintenance period for executing at his own cost all work necessary to eradicate insect attack of timber which becomes evident including the replacement of timbers attacked, or suspected of being attacked, notwithstanding that the timber concerned may have been inspected and passed as fit for use.

8.4 Seasoning of Timber

All carpentry timbers are to be seasoned to an average moisture content of not more than 20%. All joinery timbers are to be seasoned to an average moisture content of not more than 15%. The Contractor is to make available on site a meter of testing moisture content of all timber delivered.

8.5 Pressure Impregnated Timber

(a) All timber described as pressure impregnated shall be impregnated under vacuum and pressure with celcure or Tanalith. Wood preservative with an average absorption of not less than 6.7kgs of dry salt per cubic meter. In case of resistant species where this retention cannot be obtained the timber shall be treated to refusal point. All treated timber shall not be exposed to wet conditions for at least 14 days after treatment has been carried out. All cut ends, drilling or

fabrications on the site producing new surface shall be thoroughly brushed or soaked with celcure B. salt applied in accordance with the manufacturer's instruction.

(b) Any other method of timber impregnations will only be allowed at the Project Manager's approval.

8.6 Hardwood

(a) All hardwood will comply with the requirement of BS 1186 part 1 BS 4047. It shall show a straight and regular grain throughout.

(b) Hardwood shall be free from wooly texture, soft heart, sap wood, splits, shakes, all evidence of insect of fungi attack and rot and all faults caused by compression failure. There shall be no waney edges. Hardwood shall be free from knots on exposed faces. Any hardwood showing visible imperfections will be rejected.

(c) Preservatives shall not be used without the Project Manager's permission. Where indicated on the drawings, internal hardwoods will be treated with clear sealants as specified elsewhere.

8.7 Softwood

(a) Softwood timber for caucusing work shall be either podocarpus or cypress to the approval of the Project Manager and shall be dimensions specified on the drawings.

(b) All softwood shall comply with the requirements of BS 1186 part 1.Timber shall be free from wooly texture, soft heart, sap wood, splits, shakes, pith showing on the surface, sloping grain exceeding one in eight checks, knots exceeding 25mm of diameter, loose knot or knot holes and any evidence of insect or fungi attack. There shall be no waney edges.

(c) Where indicated on the drawings, the softwood will be treated with clear sealer or painted with gloss paint. All softwood is to be pressure impregnated against insect attack before delivery to the site. Any ends cut after treatment shall be given two liberal coats of preservative.

8.8 Chipboard

Chipboard shall be medium density wood particle board complying with BS 2604 part 2, produced in factories by an approved process.

8.9 Timber Doors

Doors are to be designed, manufactured and fixed in accordance with BS 4787 part 8 and BS 1186 part 1.

8.10 Flush Doors

(a) Generally, the requirements for flush doors are that they have a minimum thickness of 40mmm. They shall be faced both sides and there shall be hardwood lippings to all edges. However core and semi-solid types shall contain adequate provision within the core for ironmongery (e.g. lock blocks etc)

(b) Flush doors shall be obtained from a supplier to be approved by the Project Manager. Flush doors shall comply with the requirements of BS 459 part 1, 2 and 3.All edges shall be lipped with hardwood tongued into edge of the door.

(c) The core of solid core flush doors shall be constructed of longitudinal laminations of precision planed timber. Butt joined and glued with resin based adhesive under hydraulic pressure, the whole forming a rigid fire resistant raft

(d) Where doors are indicated as fire resistance they shall be constructed so as to exceed the requirements started when tested in accordance with BS 476 part (1972) section 7.

8.11 Nails and Screws

Nails shall comply with BS 1201, screws shall comply with BS 1494 and bolts shall comply with BS 916.

TABLE OF CONTENTS

SECTION IX BRICKWORK, BLOCKWORK & MASONRY

9 BRICKWORK, BLOCK WORK AND MASONRY

9.1 Materials

9.1.1 Cement

Cement used for making mortar shall be as described in concrete work.

9.1.2 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 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.

9.1.3 Sand

Sand used for making mortal shall be clean well graded siliceous sand of good sharp hard quality equal to samples which shall be deposited with and approved by the Project Manager. 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 Project Manager.

9.1.4 Water

Shall be as described in "concrete work"

9.1.4 Concrete Blocks

(a) Concrete blocks shall comply with the requirements of BS 2028, 1384 except where amended or extended by the following clause. Blocks shall have square arises and corners. For fair faced work damage to arises and corner shall not exceed the removal of 6mm of the blocks depth or thickness.

(b) 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.

9.1.5 Burnt Bricks

The burnt bricks supplies by the Contractor should be of dimensions 100x100x200mm of nearly same hue, Red to brown hue being acceptable. Over-burnt, grey or black tiles shall not be used.

The density of the bricks to be not less than 1800kg/m3 of compressive strength in excess of 15N/mm2 and the average 24hour cold water absorption (porosity) should be less than 14%

It shall be Contractors responsibility to ensure that the supplies bricks meet the Specifications set above.

9.1.6 Wall Reinforcement

Where described walls and partitions shall be reinforced with a 25mm wide strip of No.20S.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 115mm into abutting walls at junctions.

9.1.7 Damp Proof Courses

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

9.2 Measurements and Payments-Brickwork, Block work and Masonry

(a) The unit of measure for walling will be square meters and it shall be deemed that the Contractors rates include jointing, pointing, fixings, reinforcements.

(b) The unit of measurement for rendering using cement sand mortar to the started finish will be square meters.

(c) Areas measures for brickwork, block work and masonry shall include the volumes and areas of joints. No deduction or addition to the volumes and areas measured shall be made for rebates, projecting courses or other surface features each less than 0.054m2 in cross-section area.

(d) No deduction from areas and volumes measured shall be made for holes and openings in walls or surfaces each less than 0.25m2 in cross-sectional area.

(e) Areas shall be measured at the centre lines of brickwork, block work and masonry

TABLE OF CONTENTS

SECTION X PAINTING

10.0 PAINTING

10.1 Materials

Except where stated all materials shall be obtained from approved manufactures. The Contractors shall state the name and address of the manufacturers whose material he proposed to use. Once approval has been given the Contractor shall not obtain materials from other sources without the prior written agreement of the Project Manager.

10.1.1 General

(a) Each succeeding coat of priming, under coating and finishing (pigment) or clear coating shall be sufficiently different in color as to be readily distinguishable.

(b) All primers and paints in one system upon a particular surface shall be obtained from the same manufacturer.

(c) The mixing of paints, etc, of difference brands before or during application will not be permitted.

10.1.2 Emulsion Paints

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

10.1.3 Gloss Paint

Gloss paint shall be hard gloss finish oil paint.

10.1.4 Lead Based Paint

The use of lead based paint will not be permitted.

10.1.5 Clear finishes

Clear finishes internally shall be clear polyurethane varnish (one pack)

10.1.6 Primers and Undercoats

Unless otherwise specified, primers and undercoats shall be the type recommended by the manufacture of the finishing coats specified for a particular surface. Primer for external bare metalwork surfaces shall comply with B.S2523.

10.1.7 Knotting

Shellac knotting shall comply with B.S 1336

10.2 Painting Decoration Specifications

10.2.1 White Sprit

The white spirit shall comply with B.S. 245.

10.2.2 Timber Stain

Timber Stain shall be oil based pigmented stain. The application of this material shall strictly in accordance with the manufacturer's written instruction. Tint and degree of application shall be to approval of the Project Manager.

10.2.3 Stopping

The stopping shall be as follows:-

(a) Plasterwork shall be plaster based filler.

(b) Concrete and brick work shall be similar material to the background and finished in a similar texture

(c) Internal woodwork, plywood and block board shall be putty complying with B.S.544

(d) External woodwork shall be white lead paste complying with B.S. 2029.

(e) Internal clear wood finished: the stopping shall be that recommended by the clear lacquer manufacturer.

10.2.4 Fillers

(a) The fillers for internal journey shall be the type recommended by the paint manufacture for use with his type of paint lacquer

(b) Stopper and fillers shall be tinted to match the under coat, and shall be compatible with both undercoats and primers

(c) All materials shall be used strictly in accordance with manufactures instructions.

10.2.5 Textured Coating

Textured coating is to be of proprietary manufacture approved by the Project Manager and of an approved color.

Technical information concerning the coating is to be submitted to the Project Manager before ordering, but the minimum qualities of the coating are to as follows:-

(a) Suitable for application internally and externally, plastered, rendered, concrete, block stone, brick, asbestos and timber surface.

(b) Minimum durability of 10 years even in exposed conditions

(c) Maintenance free

(d) Built – in mould resistant fungicide

10.3 Workmanship

10.3.1 General

(a) 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, damp, foggy or freezing conditions, where surfaces have attained excessively high temperatures or during dust storms. No new primed or undercoated woodwork and metal work shall be left in an exposed or unsuitable situation for an undue period before completing the process.

(b) No dilution of paint materials shall be allowed except strictly as detailed by the manufacture's own direction, either on the containers, or their literature, or with special permission of the Project Manager. For external work dilution of paints will not be allowed whatsoever. For internal work, where permitted by the Project Manager, undercoats may be thinned by the addition of not more than 5% thinners Gloss finish shall not be thinned at all.

(c) Metal fittings such as ironmongery etc., not required to be painted shall be fitted and then removed before the preparatory processes are commenced. When all paining is completed the fittings shall be cleaned as necessary and re-fixed in position.

10.3.2 Brushwork

Unless otherwise specified, all primers and paints shall be brush applied. Written permission must be obtained from the Project Manager's if an alternative method of application is to be used.

10.3.3 Stopping and Filling

Unless otherwise specified by the manufacture 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.

10.3.4 Stirring

Unless otherwise specified by the paint manufacturer all paint materials shall be thoroughly mixed and / or stirred before and during use, and suitably stained as and when necessary.

10.3.4 Inspection

No priming coats shall be applied until the surfaces have been inspected and the preparatory work has been approved by the Project Manager. No undercoats of finishing coats shall be applied until the previous coat has been similarly inspected and approved.

10.4 Types

10.4.1 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.

10.4.2 Gloss Finish Paint

Surface to be painted shall be primed then painted with two undercoats followed by one coat gloss finish paint.

10.4.3 Clear Polyurethane Varnish

Surface to be clear varnished shall be treated with two coats polyurethane varnish

10.4.4 Textured Coating

(a) The manufacturer's instructions concerning application of the coating are to be strictly followed under the direction of the Project Manager.

(b) All surfaces to receive textured coatings are to be clean and dry with surfaces scrapped and brushed before application of the coating.

(c) Application of the coating is to be with textured roller or fiber brush as directed by the Project Manager with a minimum spreading capacity of 1 kilogram per square meter. Under no circumstances is the coating to be thinned.

10.5 Measurements and Payments Painting

(a) The unit of measurement shall be squire meters and item descriptions for work in this class shall state the materials used and either the number of coats or the film thickness.

(b) Surfaces of width not exceeding one meter shall not be distinguished by inclination.

(c) No deduction from areas measured for painting shall be made for holes and opening in the painted surfaces each less than 0.5 m2 in area isolated groups of surfaces may be classed as such only where the total surface area of each group does not dimensions may be included in one item.

(d) Item descriptions for isolated groups of surfaces shall identify the work to be painted and state its location. Groups of surfaces of the same shape are ignored.

(e) In calculating the painted area of metal sections, the presence of connecting plates, brackets, rivets, bolts nuts and similar projections shall be ignored.

(f) The area measured for painting pipe work shall be the length multiplied by the barrel girth of each length of pipe work. Lengths occupied by valves and other projecting fittings shall not be deducted. Surfaces of flanges, valves and other projecting fittings shall not be measured.

(g) Separate items are not required for preparation of surfaces before painting.

TABLE OF CONTENTS

SECTION XI WATER PROOFING

11 WATERPROOFING

11.1 Damp Proof Sheeting

(a) The Polyurethane damp proof sheeting or membrane supplied by the Contractor will meet the requirements of BS and be of minimum thickness of 500 microns.

(b) A minimum of 150mm laps will be provided at the joints.

(c) The Contractor will exercise due care in laying the sheeting to ensure no damage occurs to the membrane.

11.2 Rendering using cement mortar.

11.2.1 Materials Generally

All materials shall be of high quality, obtained from manufacture's to be approved by the Project Manager. Cement, sand and water shall be as described under concrete work and Block work.

11.2.2 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 Project Manager and are to be used strictly in accordance with the manufacturer's printed instructions.

11.2.3 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 finishes paving or plasterwork.

11.2.4 In-situ Finishing

11.2.5 Plastering

11.2.5a General

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.

11.2.5b Mixes

(a) 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	16mm finish to walls and ceilings, wood, float finish unless otherwise specified.
External Render	1 part cement, 4 parts sand	12mm finish in two coats
Tyrolean finish	Ditto	6mm finished thickness in two coats on 10mm plastered backing.

(b) To obtain greater plasticity a small quantity of lime may be added to the mixes for external plastering at the Project Manager's discretion but in any case this is not to exceed ¼ part lime to 1 part cement.

(c) With regard to the lime mortars gauged with cement, 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 or materials and uniform color and consistency. It is important to note that the quality of water used shall be carefully controlled. Plaster may be mixed either in a mechanical mixing machine or by hand.

(d) 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 color and homogeneous.

(e) The plaster shall be completely used within thirty minutes of mixing and hardened plaster shall not be remixed but removed from the site.

11.2.5c Preparation of Surfaces for Plaster ETC

(a) 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.

(b) 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 disappearing before plaster is applied.

(c) As far as practical plastering shall not be commenced until all mechanical and electrical services, conduits, pipes and fixtures have been installed.

(d) 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 Project Manager. The reinforcement shall consist of a strip of galvanized wire mesh. Exponent or equal approved 15cm wide which shall be plugged nailed or stapled as required at intervals not exceeding 45mm 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.

11.2.5d Application of Plaster and Render

(a) 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 be so 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.

(b) Tyrolean finish shall be applied with an approved machine to give a finish of even texture and thickness. The sprayed finish shall be applied in two separate coats allowing time for dying between coats.

(c) Application in one continuous operation to build up a thick layer will not be permitted. The total finished thickness of the two sprayed coats shall be not less than 6mm.. the sprayed finish shall not be applied until all repairs ad making good to the undercoat are completed. Any plaster which adheres to pipes, doors, windows and the like shall be carefully removed before it has set. Curing shall take place after the application of second coat. The pressed finish as directed by the Project Manager. Where colored Tyrolean is required this shall be obtained by the addition to the mix of any approved color pigment.

(d) All plastering and rendering shall be executed in a neat workman like 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.

(e) 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 piece of martially set material which would tend to regard or accelerate the setting time.

11.2.6 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.

11.3 Screeds

11.3.1 Cement and Sand Screeds

Screed shall be mixed and formed as described

11.3.2 Granolithic Paving

The granolithic paving shall be laid by a specialist floor layer and constructed as follows:-

11.3.2a Vinyl Asbestos Tiles

(a) Vinyl asbestos floor tiles shall comply with B.S 3260 of an approved manufacturer to patterns as directed by the Project Manager. Adhesives are to be recommended by the manufacturer in writing and approved by the Project Manager.

(b) 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.

(c) 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 tilling.

(d) On completion, vinyl asbestos tiles are to be sealed and polished with wax all in accordance with the manufacturer's printed instructions.

11.3.2b Clay Tile Paving

Clay tile paving are to be in 150mm x 150mm 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, wash and clean down. Tiles are to be cut with an electric tile cutting saw.

11.3.2c Glazed Wall Tiles

Glazed wall tiles shall be in accordance with B.S 1281 and shall be 150mm x 150mm x 6mm tiles from the standard color range with cushion edges. Wall tiling shall be carried out in accordance with C.P. 212.

11.3.2d Rates

The rates for tile, slab and block finishing's 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 labors.

11.4.1 Tile Roofing

(a) Tiles are to be uniform in size and shape, free from cracks, twists and other blemishes and are to be true after fixing on the roof.

(b) Unless specified all tile battens are to be 50 x 25 mm fin sawn celcured Podo Carpus or Cypress continuously and securely spiked at raters at such centers up the roof to suit the pitch of the tiles. (In addition Roman tiles Roofs are to have 75 x 50 mm counter battens to suit).

(c) Tiles be the clay or cement shall be purchased from an approved manufacturer acceptable to the Project Manager, and shall be laid in accordance with the manufacturer's instructions and shall be completed with left hand verge tiles and fascia tiles nailed to battens. At the ridge provide and lay 300mm wide felt under the socket less ridging which shall be matching tinted pointed with oxide purchased from the manufacturer.

(d) Where valley tiles are specified, these shall be laid in accordance with manufacturer's instructions.

11.4.2 Polythene Under felting

The thickness of the polythene under felting is to be provided to all tile roofs and fixed under roofing battens will be 500 microns. 150mm laps shall be provided at the joints.

11.5.1 Roofing using Corrugated Iron Sheets

Gauge 28 corrugated iron sheets will be used from a reputable manufacturer.

11.6 Measurements and Payments-Water Proofing and Rendering

The unit of measurement for the damp proof sheeting and rendering using cement sand mortar will be in square meters.

TABLE OF CONTENTS

SECTION XII MISCELLENEOUS WORKS

12 MISCELLANEOUS WORKS

12.1 Fences

Scope

Fencing shall be provided at all intakes to protect the source it from pollution and human activities. Fencing shall also be done at storage tanks and at pumping stations and for storage tanks prevent trespass and to secure the area for future expansion. The following fencing areas are proposed:

(a) Intakes: maximum area of 240 m2 consisting of 50 m length along the stream source and 30mof either side of the stream.

(b) Pump houses – maximum rectangular area of 100m2

(c) Storage tanks 25-100m3 Rectangular area of 500m2

(d) Storage tanks above 100m3- rectangular area of 900m2

12.1.1 Materials

12.1.1a straining posts, stays, standards and droppers

Straining posts shall generally be of concrete. Stays, standards and droppers shall be of the type and size approved by the engineer. Timber posts where approved by the engineer, shall be treated with a preservative.

12.1.1b Barbed wire

Barbed wire shall comply with the requirements of BS 4102-90 or equivalent and shall be Mild-steel –grade double-stand uni -directional twist wire, each strand 2.5 mm diameter, for use at any height above ground. The wire shall be fully galvanized. Barbs shall be manufactured from 2mm galvanized wire and shall be spaced at not more than 152 mm.

12.1.1c Tying wire

Tying wire shall be not less than 2.5mm in diameter mild-steel galvanized wire for tying fencing wire to standards and droppers and 1.6mm mild-steel galvanized wire for tying netting and mesh wire to the fencing wire.

12.1.1d Diamond mesh

Diamond mesh (chain-link fencing material) shall comply with the requirements of BS 1772 or equivalent. The width shall be 180cm and the edge finish shall be both sides clinched or barbed.

The nominal diameter of the wire shall be 2.5 mm and the mesh size shall be 64 mm x 64 mm. The wire shall be fully galvanized.

12.1.1e Gates

Gates shall be manufactured to the dimensions shown on the Drawings. Gates shall be complete in every respect, including hinges, washers, bolts and locking chains attached to the gate. Gate posts shall not be used as straining posts.

12.1.2 Workmanship

12.1.2a Cleaning the Fence Line

The fence line shall be cleared over a width of at least 1.0 m on each side of the centre line of the fence and surface irregularities shall be graded so that the fence will follow the general contour of the ground. Clearing the line shall include the removal of all trees, scrub, stumps, isolated boulders or stones and other obstructions which will interfere with the construction of the fence. Stumps within the cleared space shall be grubbed. The bottom of the fence shall be located at a uniform distance above the ground line in accordance with the requirements sown on the Drawings. All material removed shall be burnt or disposed of in disused borrow pits.

12.1.2b Erecting Straining Posts Standards

Straining posts shall1be erected at all terminal point, low points (as required), corners and bends in the fencing and at all junctions with other fences. Straining posts shall not be spaced further apart than shown on the Drawings. The length of posts above ground shall be such that the correct clearance between the lowest wire and the ground can be obtained.

Straining posts shall be accurately set in hotels and shall be provided with concrete bases to the dimensions shown on the drawings.

Holes shall be dug to the full specified depth.

All Straining post shall be braced by means of stays or anchors as shown on the Drawings or as directed by the Engineer.

Gate posts shall not be used as straining posts but at each gate post a straining post shall be placed as shown on the Drawings.

Standards shall be firmly planted into the ground at the spacing shown on the Drawings or as directed by the Engineer. The spacing of standards between any two successive straining posts shall be uniform and not greater than that shown on the Drawings.

All Straining posts and standards shall be accurately aligned and set plumb.

12.1.2 Erecting Fence Wires

All fencing wire shall be tied to the sided of standards or posts to prevent the wires from being displaced or becoming loose. The wire shall be carefully tensioned without sagging, and true to line, care being exercised not to tension the wire to such an extent that it will break, or that end, corner, straining or gate posts will be pulled out, or that it will be easily damaged during fires.

Each strand of fencing wire shall be securely tied in the correct position hard up to each standard with soft galvanized tying wire. The tying wire for each strand shall pass through a hole or notch in the standard, while the ends of the tying wire shall be wound at least four times around the fencing wire to prevent it from moving in a vertical direction.

At end, corner, straining and gate post the fencing wire shall be securely wrapped twice around the post and secured against slipping by tying the end tightly around the wire by means of at least six neat tight twists.

Splices in the fencing wire shall be permitted if made in the following manner with a splicing tool. The end of each wire at the splice shall be taken at least 75 mm past the splicing tool and wrapped around the other wire by not less than six complete turns with the two separate wire ends being turned on opposite directions.

After the splicing tool has been removed, the space left by it in the splices wire shall be closed by pulling the wire ends together. Unused wire ends shall be cut close so as to leave a neat splice.

The gaps between gate posts and the adjacent straining posts shall be fenced off with short lengths of fencing wires.

Droppers shall be ties to each fence wire with soft tying wire in the required position as specified for standards to prevent slippage in a vertical direction. The spacing of droppers between any two straining posts shall be uniform. Anchoring to structures shall be done as shown on the Drawings.

12.1.2d Erecting Diamond Mesh (Chain Link)

Where vermin-proof, pedestrian or security fences are erected, or where instructed by the Engineer, wire netting or diamond mesh shall be stretched against the fence and properly tied to the fencing wire as shown on the Drawings. The Diamond mesh or wire netting shall be secured by soft tying wire at 1.2 m centers along the top an bottom wires and at 3 m centers along each of the other fencing wires, unless otherwise shown on the Drawings.

In the case of vermin-proof fencing, vermin shall be prevented from creeping under the fence by either one of the two methods described below as ordered by the Engineer.

By folding back the bottom 130mm wire netting so that it lies flat on the ground and by tightly packing stones (having a minimum dimension of 200 mm) end to end on this flat to secure it in position.

By embedding the lower 130 mm of the wire netting in the ground and thoroughly compacting the earth around it on both sides, to secure the netting.

12.1.2e Closing Openings under Fences

At ditches, streams, drainage channels or other depressions where the fence cannot be erected so as to follow the general ground contour, the Contractor shall close the opening under the fence with horizontal barbed wires at 150 mm spacing. Stretched between additional posts or straining posts as shown on the Drawings or as directed by the Engineer. In the case of pedestrian, vermin-proof and security fences the opening shall be covered with strips of wire netting or diamond mesh 1000 mm wide, fixed to the barbed wires.

In the case of larger streams where damming of debris against the fence would constitute a hazard, the opening below the bottom fencing wire shall be closed with loose-hanging wire nets. For this purpose additional straining posts shall be planted on both sides of the stream with a cable consisting of at least five strands of smooth fencing wire stretched between them.

12.1.2f Erecting Gates

Gates shall be erected at the positions indicated by the Engineer. The gates shall be hung on gate fittings in accordance with the requirements shown on the Drawings. Gates shall be so erected as to swing in a horizontal plane at right angles to the gate posts, clear of the ground in all positions. In pedestrian and security fences the double swing gates shall leave a gap not exceeding 25 mm between them when closed and other gates shall not be further than 25 mm from the gate post when closed.

Gates shall be stock-proof to the same extent as the adjoining fence. The clearance below the gates shall not exceed 75 mm with the gates closed.

12.1.3 Measurement and Payment-Fencing

i. Fencing using barbed wire

The unit of measurement shall be meter (m) of each type of fencing wire measured between end posts. Tying wire and wire used for anchoring the posts shall not be measured for payment.

The bid rate shall be in full compensation for clearing the fence line as specified, including the removal of trees, stones, and other obstructions and the disposal of all waste material resulting from clearing operations, as may be directed. The supply of all necessary treated timber posts, straining posts, standards and droppers, gate posts and gate and the supply, delivery and tying in place the 2.5mm Mild-steel-grade double-strand uni-directional twist wire with barbs.

ii. Fencing using Diamond mesh

The unit of measurement shall be the square metre of diamond mesh or wire netting, the quantity of which shall be calculated according to the prescribed width and the length between straining posts or gate posts, or the length of strips used for covering openings under fences, or the length used for covering the gates.

The bid rate shall be in full compensation for clearing the fence line as specified, including the removal of trees, stones, and other obstructions and the disposal of all waste material resulting from clearing operations, as may be directed. The supply of all necessary treated timber posts, straining posts, standards and droppers, gate posts and gate and the supply, delivery and tying in place the Diamond mesh or wire netting inclusive of the necessary straining smooth wire.

12.2 Gabions

12.2.1 Scope

This Section covers the construction of gabion walls and aprons for constructing retaining walls, lining channels, revetments and other anti erosion structures. Gabions shall be flexible galvanized steel – wire mesh cages packed with rock.

12.2.2 Materials

(a) Rock

Rock used as filling for cages shall be clean, hard, unweathered boulders or rock fragments. No rock fragment shall exceed 250mm in size and at least 85% of the rocks shall be of a a size equal to or above the average least dimension of 125mm.

(b) Wire

All wire for making the gabions and for tying during the construction of the gabions shall comply with the requirements of SABS 675 or equivalent for mild- steel wire.

(c) Galvanizing

All wire used in the making of gabions shall be galvanised in accordance with the provisions of SABS 675 or equivalent for Class A heavy galvanized mild steel wire.

(d) Wire mesh

Wire mesh shall comply with the requirements of SABS 1580 or equivalent.

12.2.3 Constructing Gabion Cages

(a) General

Gabion cages shall be made from wire mesh of the 1mx1mx1m size and type and selvedge as specified below.

Other gabions may be supplied, provided that the Engineer's prior permission has been obtained.

(b) Selvedges

The cut edges of all mesh used in the construction of gabions, except the bottom edges of diaphragms and end panels, shall be selvedged with wire with a diameter as specified in SABS 1580 or equivalent.

Where the selvedge is not woven integrally with the mesh but has to be tied to the cut ends of the mesh, it shall be attached by tying the cut ends of the mesh to the selvedge, so that a force of not less than 8.5 kN applied in the same plane as the mesh at a point on the selvedge of a mesh sample of 1.0 m in length will be required to separate it from the mesh.

(c) Diaphragms and end panels

The diaphragms and end panels shall be selvedged on the top and vertical sides only. The end panels shall be attached by the cut ends of the mesh wires at the bottom of the panel being twisted around the selvedge on the base of the gabion. Similarly, the diaphragms shall be attached by the cut ends of the mesh being twisted to the twisted joints of the mesh in the base of the gabion. In each case the force required to separate the panels from the base shall be not less than 6 kN/m.

(d) Binding and connecting wire

Sufficient binding and connecting wire for all the tying to be done during construction of the gabions as specified above shall be supplied with the gabion cages. The diameter of the wire shall be 2.2 mm.

(e) Tolerances

The tolerance on the specified diameter of all wire shall be +2.5%. The length of the cages shall be subject to a tolerance of ±10% and the width of the cages shall be subject to a tolerance of +5% and the depth of the cages shall be subject to a tolerance of +5%.

12.2.4 Constructing Gabions

(a) Preparing the foundation and surface

The surface on which the gabion cages are to be laid prior to their filled with rock shall be leveled to the depth shown on the Drawings or as directed by the Engineer so as to present an even surface.

(b) Assembly

The methods of constructing, stretching, placing in position, wiring and filling the gabions with rock shall generally be in accordance with the manufacturer's instructions which have been approved by the Engineer, but nevertheless sufficient connecting wires shall be tensioned between the vertical sides of all the outer visible cells to prevent the deformation of boxes as they are being filled with stone. It is essential that the corners of gabion cages be securely wired together to provide a uniform surface and ensure that the surface does not resemble a series of block or panels.

The layout and the tolerances for the layout of the boxes shall be as shown on the Drawings or as instructed by the Engineer.

(c) Rock filling

i. **Boxes in retaining walls**

Particular care shall be taken in packing the visible faces of gabion boxes, where only selected stone of the specified size shall be used so as to obtain as even–faced finish. The boxes shall be filled in layers to prevent deformation and bulging. Boxes shall be filled to just below the level of the wire braces, after which the braces shall be twisted to provide tension. Care must be taken to ensure that consecutive layers of cages are filled evenly to a level surface ready to receive the next course.

12.2.5 Measurement and Payment-Gabion Boxes

The unit of measurement shall be the cubic metre of the rock – filled cages and the quantity shall be calculated from the dimensions of the gabions indicated on the Drawings or prescribed by the Engineer, irrespective of any deformation or bulging of the completed gabions.

The bid rates shall include full compensation for excavation, trimming, compacting and leveling and preparing the surfaces for receiving the Gabion, supplying all the materials, including rock fill, wire–mesh cages, tying and connecting wires, loading transporting and off-loading, the assembling and filling of the cages, and any other work necessary for constructing the gabions.

12.3 Filter Media

Scope

Filtration has is recommended where the quality of water in terms of turbidity is higher than recommended for most of the year. Horizontal roughing filters and rapid sand filters have been recommend for adoption in most of the projects.

12.3.1 Material

The filter media for both Rapid sand Filters shall be sand supported on graded gravel on top of an under drain system while the material for horizontal roughing filters shall only be graded gravel. All material for filter media shall generally be clean, free from dust. Only inert material

that will not react easily with chemicals for treatment of water, in particular chlorine, or acidity or alkalinity condition of the water will be approved by the engineer . Material from river beds or of granitic rock origin is generally recommended. The contractor shall take the initiative to demonstrate the inertness of the selected material by exposing the material that he intends to use as filter media to the conditions aforementioned for a period of not less than 1 months. The dry weight of the material before exposure and after exposure shall remain unchanged to within 95% confidence limits for the approval of the engineer.

12.3.1 a) Sand

Sand for rapid sand filters well graded sand o grading 0.7-1.0 mm . Te coefficient f the sand shall be 1.5. The depth of sand in the filter bed shall be 1. m

12.3.1 b) graded Gravel

Graded Gravel shall be used in the Rapid sand filter to support the filter media (sand). The proposed grading of the gravel from top to bottom is as follows:

- 15cm of 2-2.8mm gravel, followed by
- 10cm of 5.6-8 mm gravel,
- 10cm of 16-23mm gravel,
- 20mm 0f38-54 mm gravel

The layers shall not need any form of separation. The construction will be from bottom to top with one layer being packed on top of another in appropriate thicknesses to support the filter sand.

Graded Gravel for horizontal roughing filters where used shall be in three layers of depth 1.5m and in width and length as shown on drawings. The layers shall be arranged such that the courser layers are on the approach side of the flow with finer particles on the outflow side. Separation of the layers will be by means of a perforated stainless steel metal sheet of thickness 3mm. The openings on the sheet metal shall be 3mm holes at 15mm C/c.

The grading of the gravel will be as follows from inlet side:

- 20-30mm graded gravel, followed by
- 15-20m graded gravel , and
- 10-15mm graded gravel

12.3.2 Measurement and Payments Filter Media

Measurement for filter media (sand or graded gravel) shall be cubic meter.

Payment shall be according to the unit rate per cubic meter of filter media installed in filter. The rate shall be inclusive of all costs such excavation, transportation, cleaning, sorting, testing etc as the case may be; and no additional payments shall be made for such services.

12.4 Demo Rainwater harvesting Facility

12.4.1 Scope

Demonstration Rainwater harvesting (RWH) facilities will be constructed in all project villages to encourage communities to resort to RWH as fallback position should anything happen to the water supply facility. Three different RWH demo facilities will be constructed to provide flexibility for adoption according to financial limitation and existing housing condition as follows:

i. Facility 1: 5000 litre Ferrocement tank and the associated works of gutters and down pipes.
ii. Facility 2 : 3000l Plastic Tank with the associated works of gutters and down pipes
iii. Facility3: 1000 l water jar the associated works of gutters and down pipes.
iv. The Locations for construction of the Demo facilities have already been selected.

12.4.2 5m3 Ferrocement tank

The internal dimensions of the 5m3 Ferro-cement tank will be 2100mm and height of 1500mm

100mm of Grade 20 Concrete will be utilized for the floor slab which shall also incorporate square twisted bars placed at 200mm centers for supporting the steel wir54e fabric flame

The frame shall be of steel fabric reinforcement electrical cross welded steel mesh reinforcement complying with BS 4483 and of the size and weight specified and made of wire to B.S. 4482. The frame will be embedded in the floor slab and will also be utilized in the walling and roof of the tank.

The flexible chicken mesh with 12mm openings will be attached to cover the frame on both the inside and the outside, after which the outside walls will be plastered using cement sand mortar in the ratio of 1.2 mm. Both the internal and external and external walls receiving a smooth steel trowel finish of cement and water proof mortar. A dome shaped roof of thickness 50mm will be adopted.

The tank will incorporate a 50mm overflow pipe which should be screened with plastic mosquito gauze to prevent entry of insects into the tank, a 50 mm scour valve pipe and a dia. 25mm outlet pipe complete with bib cock fixed some 100mm above the fixed floor level.

At the fixtures (Score and Outlet) and in a consideration of the thickness of the walls of the Ferro-Cement tank, special care should be taken to ensure leaks or breakages do not occur at these joints will be well fixed to the wall.

12.4.3 Material Gutters

Half round 112mm uPVC gutters fro well known manufacturers with it appropriate fixing bracket, gutter connector, control outlet, stop ends, bends and pipe clips shall be supplied. The rain water gutters supplied should comply with the requirements of either BS EN 607:2004 (Gutters and fittings) or BS EN 12200-1:2000 (Downpipes and Fittings)

The Contractor shall provide and fix to the rafters a fascia board whose dimensions shall be 200mm wide, 25mm thick and of length 6 meters. The face of the fascia board which shall have been knotted and sanded to produce a fine grained surface will receive three coasts of gloss paint prior to the installation of the u PVC Gutters.

Supporting fascia brackets fixed using appropriate screws shall be spaced at space s no more than 800mm or as per the manufacturer's recommendation with an allowance of fall of 1:3050 measured using a string line. Angels and stop ends should have a fascia bracket within 150mm of the fitting.

Supporting pipe clips at maximum intervals of 1200mm shall be used to support and hold the downpipe.

The screws used should be brass or zinc coated of dimensions 25x5mm.

12.4.4 Material for First Flash

The Contractor shall supply push fit fittings complying with the requirements for the half round 112mm gutters. A 40liters plastic container shall be incorporated for trapping and temporary storing the first flush waters.

12.4.5 Materials for the 3m3 capacity Molded Plastic Demo Tank

The 3000litres molded plastic tank supplied should be from a reputable manufacturer and of a known make. The tank supplied complete with cover should be circular and vertical with a flat bottom and be made from medium or high rotationally molded 100% virgin material. The tank should be stabilized against ultra violet rays and have excellent impact resistance.

This tank shall be placed on a 0.5m high 100mm thick concrete slab for ease of drawing water.

The tank will incorporate a 50mm overflow pipe nipple complete with its back nut which should be screened with plastic mosquito gauze to prevent entry of insects into the tank, a 50 mm above the fixed floor level.

At the fixtures (Scour and Outlet) and in consideration of the thickness of the walls of the plastic tank, special care should be taken to ensure leaks or raptures do not occur at these joints. The

Contractor shall provide details demonstrating ability that these joints will be well fixed to the wall.

12.4.6 Material for Gutters

It is proposed that half round gutters made with gauge 28mm plain sheet be utilized for the demo rooftop rain water harvesting facility. In view of the many fabricators of this item it shall be the Contractor's responsibility to obtain several samples, hold discussions and agree with the Project Manager on which fabricator to adopt. The Contractor will ensure that the quality and workmanship agreed jointly will be maintained.

The Contractor shall provide and fix the rafters a fascia board whose dimensions shall be 200mm wide, 25mm thick and of length 6meters.The face of the fascia board which shall have been knotted and sanded to produce a fine grained surface will receive three coats of gloss paint prior to the installation of the gutters.

Supporting fascia brackets fixed using appropriate screws shall be spaces no more then 800 mm or as per the manufacturer's recommendation with an allowance of a fall of 1:350 measured using a string line. Angles and stop ends should have a fascia bracket within 100mm of the fitting.

Supporting pipe clips at maximum intervals of 1200 mm shall be used to support and hold the downpipe.

The screws used should be brass or zinc coated of dimensions 25x5mm.

12.4.7 Material for the 1m3 Water Jar

The Contractor will propose to the Project Manager the methodology he plans to use in construction the 1000 liters water jar. The proposed methodology and materials used should be cheap, easily acquired or commonly found and its construction in simple enough for adoption and acceptance by the rural communities. As an example of an appropriate water jar see pamphlet in the appendix.

12.4.8 Measurements and Payments-Rooftop Rainwater Harvesting Facilities

The unit of measurement shall be lump sum for each of the three tanks.

SECTION VII: DRAWINGS

SEE VOLUME III (Separate Book of Drawings)

SECTION VIII: BILL OF QUANTITIES

SEE VOLUME II (Separate Book of BOQ)

Form of Bid for Construction work of ICU Building

[16/12/2021]

To Regional Administrative Secretary, PO BOX 650, Morogoro.

We, VETA Mikumi offer to execute the Construction work of ICU Building at Morogoro Regional Referal in accordance with the conditions of contract accompanying this bid for the Contract Price of [726,833,390.00], [Seven hundrerd Twenty six million,Eight hundrerd thirty Three thousand ,three hundrerd ninety only] [Tanzanian Shillings] VAT inclusive.

The Construction will be completed within six (6) monthes.

The Contract shall be paid in the following currency.

Currency	Percentage payable in currency	Rate of exchange: one foregn equeals	Inputs for which forreign currency is required.
(a)	Tshs	NA	NA

The advance payment required is

Amount	Corrency
(a) 81,219,075.00	Tshs

We accept the appointment of National Construction Counsil (NCC) as the adjudicator.

We are not partiicipating, as bids, in more than one bid in this bidding process other than alternative bids in accordance with the bidding documents.

Our firm, its affliation of subsidiaries, including any subconstractors of suppliers for any part of the contract has not been declared ineligible by the Government of the United Republic of Tanzania under Tanzania's laws or any other official regulation.

This bids and your written acceptance of it shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any bid you receive.

We hereby confirm that this bid complies with the bid validity and bid security required by the bidding documents and specified in the bid Data Sheet.

Authorized Signature: _____

Name and Title of Signatory: MARYMURCE E. KAROSI, AG. PRINCIPAL

Name of bidder: VETA - MIKUMI VTC

Address: P. O. BOX 110, MIKUMI.

VETA & TRAINING AUTHORITY
P O BOX 110
MIKUMI

GENERAL SUMMARY

BILL NR. 01 PRELIMINARIES	4,500,000/=
BILL NR. 02 PRIME COSTS AND PROVISIONAL SUMS	70,000,000/=
BILL NR. 03 MEASURED WORKS	541,460,500/=
	615,960,500/=
SUB TOTAL TSHS.	-
Condition of contract Clause 18.2(d)	
Allow for the cost of insurance in the joint names of the Employer and contractor, against loss or damage to the Works, plants, materials, equipment etc.	-
Condition of contract clause 4.2	
Allow for cost of providing performance security for 10%	-
	-
ADD: 18% Value Added Tax (VAT)	110,872,890/=
FIXED TENDER CARRIED TO FORM OF TENDER	726,833,390/=

Signed.....for and on behalf of...VETA MIKUMI

The capacity of...Ag: PRINCIPAL Dated this ...16/12/2021...

Day of 2021

VOCATIONAL & TRAINING AUTHORITY P.O BOX 110 MIKUMI

Prepared by:
RAS ENGINNER'S OFFICE

GS

DECEMBER, 2021

PRELIMINARIES

ITEM	DESCRIPTION	TSHS.	Cts
	DESCRIPTION OF SITE:		
A.	The site is located at **MOROGORO REGIONAL REFERRAL HOSPITAL**		
B.	The contractor shall prove and maintain any necessary temporary roads, sleeper tracks, and temporary cross over during the execution of the works, clear away same at completion and reinstate and make good any work disturbed to the satisfaction of the local Authority and the employer.		
	The Contractor shall be deemed to have visited the site and satisfied himself as to:-		
C.	i) The nature of the site		
D.	ii) The amount of bush, rubbish or debris to be cleared away before commencement.		
E.	iii) The nature of proximity and size of adjoining building and property.		
F.	iv) The nature of existing communications by roads or Otherwise.		
G.	v) The means of access to the site.		
H.	vi) The availability of land for the erection and positioning of all temporary structures, plant and materials necessary for the execution of the works.		
I.	vii) The source of adequate supplies of labour, plant and materials for the completion of the works.		
J.	If the contractor wishes to execute trial holes before submitting his tender, he may do so in positions to be agreed with the Employer and at his sole expenses, including the reinstatement of the ground if so required by the Employer.		
K.	The whole of the site will be available to the contractor immediately upon the issue of the order to commence.		
	TO COLLECTION TSHS.		

ITEM	DESCRIPTION	TSHS.	Cts
A.	Any sand, aggregate to or other building materials shall be the property of the Employer and shall not be used in the construction of the works without the written consent of the Employer.		
B.	The contractor is to satisfy himself as to any difficulties that the site may present and to make all necessary enquiries to any point which in his opinion requires further elucidation as no claim for lack of information on any of the above will be entertained.		
	DESCRIPTION OF WORKS:		
C.	The work within this contract comprises of; **The project shall be known as THE PROPOSED CONSTRUCTION OF ICU BLOCK BUILDINGS**		
	TO COLLECTION TSHS.		

Prepared by:
RAS ENGINNER'S OFFICE

DECEMBER, 2021

ITEM	DESCRIPTION	TSHS.	Cts
	SINGULAR AND PLURAL		
A.	Word importing the singular only also includes the plural.		
	LAW GOVERNING CONTRACT		
B.	The contract shall be in all respect to be constructed and operated in accordance with the law of Tanzania.		
	METHOD OF MEASUREMENT:		
C.	These Bills of Quantities have been prepared in accordance with the standard method of measurement of Building Works for East Africa first edition (metric) published by the architectural association of Kenya chapter of Quantity Surveyor Act, 1970, and applied equally to the measurement of proposed works and of variations by Quantity Surveyors.		
D.	Variation of 'Builder's work' will be subject to the same amended rates of percentage of adjustment.		
	DEFINITIONS OF ABBREVIATIONS:		
E.	The contractor should take due notice of the under mentioned abbreviations:-		
F.	The contractor should take due notice of the under mentioned abbreviations:- mm - Millimetres cm - centimetres M^3 - cubic meters M^2 - square metres M - linear metres No. - Number Kg. - Kilograms P.C - Prime cost		
G.	The contractor shall allow for keeping all records appertaining to the work and shall keep on the site a daily diary recording weather conditions, temperature, visitors to the site, etc.		
H.	The contractor is to supply to the employer such information as he may be required in connection with the work, including statement showing the number of men employed in all trades daily, and delivery notes (stating the name of the project) for all materials delivered to the site.)		
	TO COLLECTION TSHS.		

ITEM	DESCRIPTION	TSHS.	Cts
	EMPLOYER'S INSPECTION:		
A.	No work shall be covered up until it is inspected and approved by the employer.		
B.	The employer may at any time go to the end of defects liability period or during any extended time where any defect are being made good, instruct the contractor to open up, pull down, test or expose any part of the works in order to satisfy himself as to the quality of materials or workmanship used. If in the opinion of the employer such parts are not in strict accordance with the contract documents he may order the contractor to remove all defective work, replace with approved materials and reinstate any such part of the works and any other disturbed at his own expenses and to the entire satisfaction of the employer. If any such parts of the works are found to be in accordance with the contract documents the contractor will be reimbursed with the General conditions of contract.		
	DISTURBANCE OR NUISANCE:		
C.	The contractor shall allow for taking all necessary precautions in the order and execution of the work so as to avoid causing disturbance or nuisance to the occupants of existing buildings and those adjacent to the works and for complying with the employer's instructions in this respect. The contractor shall be in tort for such nuisance.		
	TRESPASS, DAMAGE AND CARE OF WORKS:		
D.	The contractor shall prevent any trespass on the opinion adjoining property and he shall take all reasonable precautions during the progress of the contract to prevent any damage to the adjoining property or plant or private roadways and to prevent material, plant, rubbish and debris, etc. collecting on the adjoining property or roadways.		
	TO COLLECTION TSHS.		

ITEM	DESCRIPTION	TSHS.	Cts
A.	Should the contractor wish to erect scaffolding or to make use of adjoining property, he shall obtain prior permission from the employer and clear away of a completion of his work or when directed and make good any damage to his satisfaction. Except as provided for in the General conditions of contract, the contractor, shall be held responsible for the care of works generally until their completion, including all works executed and materials deposited on the site by himself or his sub-contractors or supplier together with all risks arising from weather, carelessness of operatives, damages and he shall make good all such damage or loss at his own expense		
B.	The contractor shall be responsible for the protection of any adjacent building, boundary walls, and fences, services either overhead or underground and for the making good of or paying for all damage thereto, should such be caused in the course of building operations.		
C.	The contractor shall allow for making good all damage to the road, kerbs, surface water channels, etc. Occasioned by heavy traffic, delivery of materials and building operations generally to the entire satisfaction of the employer and shall be responsible for observing any by law of local authority regarding keeping the road free from mud, filth dirt, etc. out of the execution of the works.		
D.	**PROTECTION FROM THE WEATHER:** The contractor shall allow for covering up and protecting all new work from injury by weather or any other cause. Any damage, loss or expense caused by non-compliance with the clause shall be at sole risk of the contractor.		
	TO COLLECTION TSHS.		

ITEM	DESCRIPTION	TSHS.	Cts
	TOOLS, PLANT AND SCAFFOLDING:		
A.	Provide all necessary cranes, hoists, concrete mixer and other plant including ladder, staging, access gangways tackle, tarpaulins, tools, moulds templates and other requisites necessary for proper executing, adapting from time to time as may be necessary and maintain all plant and equipment during the course of the contract.		
B.	The contractor shall allow for providing adapting from time to time as may be necessary and maintaining all scaffolding scaffold boards and temporary staging, etc, necessary for the execution of the works.		
C.	The contractor is to provide everything necessary for the proper execution of the works according to the true intent and meaning of the drawings, etc., whether the same may or may not be particularly shown on the drawings, specifications provided that the same is reasonably to be inferred there from.		
	SITE ACCOMODATION:		
D.	The contractor shall provide and maintain any necessary temporary office accommodation required by him and his sub-contractors suitably equipped with desks, chairs, drawing boards, and electric lighting and telephone.		
E.	The contractor shall provide and maintain for his workers latrine facilities washing and drinking water, first aid equipment's and shelters equipped with tables, benches and checking facilities all to the reasonable satisfaction of the workers and approved by the employer and Health authorities.		
F.	The contractor shall provide and maintain any temporary storage, shed or buildings which in his opinion are necessary for him and his-sub-contractors for the execution of the works.		
	TO COLLECTION TSHS.		

ITEM	DESCRIPTION	TSHS.	Cts
	WATER FOR THE WORKS		
A.	The contractor shall allow for all necessary clean fresh water for the works, including that required by sub-contractors and for any temporary plumbing meters and storage facilities and pay all charges in connection therewith and clear away on completion and make good works disturbed.	3,000,000.00	
	LIGHTING AND POWER FOR THE WORKS		
B.	The contractor shall allow for providing and maintaining a temporary electricity supply for the works including that required by sub-contractor and for any meters and fittings to give artificial lighting and power necessary for the execution of the works and pay all charges, in connection and make all works disturbed.		
	WATCHING AND LIGHTING:		
C.	The contractor shall allow for providing and maintaining any barriers, hoarding, watching, lighting, which must comply with the By-laws of requirements of the local authority and policy regulations and the contractor must give all requisite policies to those authorities and provide everything necessary to protect the general public Workmen, plant, materials and the whole of the works.		
D.	No advertisement will be permitted without the written authority of the employer.		
	SIGN BOARD:		
E.	The contractor shall provide and erect a large sized sign board on the site showing the title of the contract, the name and address of the employer; consultant, nominated suppliers and sub-contractor and such information as may be required by the employer who shall provide the sign layout and colors of the Board. The board shall be repainted when necessary and removed when no longer required.	1,500,000.00	
	TO COLLECTION TSHS.	4,500,000.00	

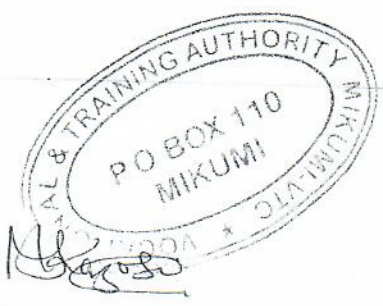
Prepared by:
RAS ENGINNER'S OFFICE

9/1/7

DECEMBER, 2021

ITEM	DESCRIPTION	TSHS.	Cts
	PROTECTION:		
A.	The contractor is required to protect works section until completion.		
	TESTING:		
B.	Allow for testing all the installations required to be tested and provide everything necessary for this purpose and leave the whole in perfect working order to the satisfaction of the employer and local authority.		
	REMOVING RUBBISH AND CLEANING:		
C.	The contractor shall make good all defects and injuries to the works, clean down external faces wash off stains to face work, clean off marks mortar and cement, clean windows inside and out, scrub floors, flush drains run and leave all parts of the works clean, free from rubbish and waste materials and perfect on completion.		
D.	The contractor shall clean and cart away all rubbish as it accumulates and keep the works in orderly condition to the satisfaction of the employer.		
	TO COLLECTION TSHS.		

	PAGE	TSHS.	Cts
	COLLECTION		
	Page No. 9/1/1		
	Page No. 9/1/2		
	Page No. 9/1/3		
	Page No. 9/1/4		
	Page No.9/1/5		
	Page No. 9/1/6		
	Page No. 9/1/7	4,500,000.00	
	Page No. 9/1/8		
	BILL NR.1 - PRELIMINARIES CARRIED TO GENERAL SUMMARY	4,500,000.00	



ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	BILL NR.2 - PC & PROVISIONAL SUMS				
	PRIME COST SUMS				
	The following Prime Cost Sums are for the works to be carried out by the Nominated Sub- Contractors:				
A.	Electrical Installation.		Sum		15,000,000
	Add: for profit.		%		
	Add: for general attendance.		Sum		
B	Data and Voice Installation for computer rooms and library		Sum		15,000,000
	Add: for profit.		%		
	Add: for general attendance.		Sum		
C	Air Condition Installation		Sum		20,000,000
	Add: for profit.		%		
	Add: for general attendance.		Sum		
	The following provisional sums are for the works or costs which can not entirely be foreseen, defined or detailed during the preparation of Bills of Quantities and should be used in whole or in part at the discretion of the Architect:				
D	Landscaping		Sum		20,000,000

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR 1: SUBSTRUCTURE (PROVISIONAL)				
	EXCAVATION AND EARTHWORKS				
A	Clear site of bushes, scrub, undergrowth and the like and grubbing up their roots	1040	m^2	2,000	2,080,000/= ✓
B	Excavate oversite average 150mm deep to remove top soil, convey average 50 linear meters and deposit in temporary spoil heaps	1040	m^2	2,500	2,600,000/= ✓
C	Excavate columns pits commencing at stripped level and not exceeding 1.50meters deep	12	m^3	4,000	48,000/= ✓
D	Excavate foundation trenches commencing at stripped level and not exceeding 1.50meters deep	53	m^3	12,000	636,000/= ✓
E	Extra over any kind of excavation for breaking up rock and the like	0	m^3	—	—
F	Earth backfilling of selected excavated material, well rammed and consolidated around foundations.	23	m^3	50,000	1,150,000/= ✓
G	Earth filling of imported selected excavated material, well rammed and consolidated to make up levels under floors over 150mm thick	800	m^2	9,500	7,600,000/= ✓
H	Load up surplus excavated material and remove from site	56	m^3	18,000	1,008,000/= ✓
	Disposal of water				
I	Allow for keeping all excavations free from general water (except spring or runing water) by pumping, baling or by other means necessary	1	Item	2,400,000	2,400,000/= ✓
	Plunking and Strutting				
J	Allow for the provision and subsequent removal of plunking and strutting to up hold and maintain all faces of excavations	1	Item	1,500,000	1,500,000/= ✓
	Hardcore				
K	200mm bed levelled, compacted and blinded to receive damp proof membrane	800	m^2	15,000	12,000,000/= ✓
	To collection				31,022,000/= ✓

Prepared by:
RAS ENGINNER'S OFFICE

DECEMBER, 2021

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	Soil sterilization				
A	"Gammalin"solution applied at a rate of 7 litres per square metre to hardcore beds	800	m^2	2,500	2,000,000/= ✓
B	Ditto around foundation at 8 litres per square metre	175	m	2,500	437,500/= ✓
C	500Gauge polythene damp proof membrane laid over blinded hardcore bed (measured separately)	800	m^2	1,500	1,200,000/= ✓
	CONCRETE WORK				
	Plain concrete Grade "10"				
D	50mm thick blinding	360	m^2	12,000	4,320,000/= ✓
	Plain concrete Grade "15"				
E	100mm thick bed	1040	m^2	25,000	26,000,000/= ✓
F	100mm thick ramp	5	m^2	25,000	125,000/= ✓
G	Strip foundations	53	m^3	250,000	13,250,000/= ✓
	Reinforced concrete grade '20' including vibrating around reinforcement				
H	Ground beams and the likes	320	m^3	270,000	86,400,000/= ✓
J	Column base	10	m^3	270,000	2,700,000/= ✓
K	Columns	5	m^3	270,000	1,350,000/= ✓
L	Steps	3	m^3	270,000	810,000/= ✓
	High yield strength deformed type 2 steel reinforcement bars to BS 4449:1969				
M	Assorted sizes	2870	kg	2300	6,601,000/= ✓
N	Fabric reinforcement to BS 4483 ref.A252 weighing 3.95kg per square metre laid in bed and ramps.	800	m^2	8,750	7,000,000/= ✓
	Sawn formwork to:				
O	Vertical sides of columns	35	m^2	15,000	525,000/= ✓
P	Vertical sides of column base and the like	25	m^2	15,000	375,000/= ✓
	To Collection				153,093,500/= ✓

Prepared by:
RAS ENGINNER'S OFFICE

DECEMBER, 2021

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	Sawn formwork to:				
A	Vertical sides of ground beam	65	m^2	15,000	975,000/= ✓
B	Vertical sides of bed, 75mm but not exceeding150mm high	0	m	—	—
C	Ditto to sloping ramp	7	m	10,000	70,000/= ✓
	WALLING				
	Solid concrete blocks to BS 2828 type 'A' bedded and jointed in cement mortar (1:3)				
D	230mm wall	506	m^2	30,000	15,180,000/= ✓
E	230mm Wide Hessian based damp proof course laid on block work 150mm laps	275	m	1,200	330,000/= ✓
	Sundries				
F	In-situ finishings; cement and sand render (1:3) ; steel trowelled smooth finishing to blockwork base; externaly 15mm thick	75	m^2	5,500	412,500/= ✓
G	Prepare and apply two coats of black bituminous paint on rendered surface;externally Over 300mm girth	75	m^2	2,500	187,500/= ✓
H	Expansion joint sealent applied in accordance to manufacturer's specification to 150mm deep concrete slab.	25	m	12,000	300,000/= ✓
	To collection				~~17,455,000/=~~ ✓
	COLLECTION				31,022,000/=
	Page 9/3/1/1				153,093,500/=
	Page 9/3/1/2				17,455,000
	Page 9/3/1/3				
	ELEMENT NR.1: SUBSTRUCTURE CARRIED TO SUMMARY				201,570,500/= ✓

Prepared by:
RAS ENGINNER'S OFFICE

DECEMBER, 2021

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR.2: WALLING AND FRAME				
	Concrete work				
	Reinforced concrete grade '20' including vibrating around reinforcement				
A	Columns	5	m^3	270,000	1,350,000/= ✓
B	Horizontal/Ring beams 200 x 150mm thick	5	m^3	270,000	1,350,000/= ✓
	Reinforcement				
	High yield strength deformed type 2 steel bar reinforcement to BS4449:1969				
D	Assorted sizes	1670	kg	2300	3,841,000/= ✓
	Sawn formwork to:				
E	Vertical sides of columns	35	m^2	15,000	525,000/= ✓
F	Sides and soffits of horizontal beams	18	m^2	15000	270,000/= ✓
G	Edges of slab; 75-150mm high	22	m	10,000	220,000/= ✓
	Blockwork				
	Solid concrete blocks to B.S. 2028 type 'A' bedded and jointed in cement mortar (1:4)				
H	230mm wall	845	m^2	30,000	25,350,000/= ✓
	150mm wall	598	m^2	25000	14,950,000/= ✓
	Eaves filling:230mm wide:500mm high extreme including splay cutting	135	m	20,000	2,700,000/= ✓
	ELEMENT NR. 2 - WALLS AND FRAME TOTAL CARRIED TO SUMMARY				52,556,000/= ✓

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR.3 - ROOFING				
	ROOF COVERINGS:				
	Roofing;28 gauge pre -painted any approved Colour with Resin Coated IT5 troughrd Aluzinc sheets;single length;supplied by ALAF or equal and approved;fixed in accordance with the manufacture.				
A	Covering;flat or sloping not exceeding 45 degrees from horizontal;fixing to timber at 500mm general spacing with 16gauge galvanized roofing nails complete with glavanized steel and bituminous washers.	1490	m^2	28,000	41,720,000/=
B	Ridge capping;550mm girth;three times bent;nailed to battens twice fixed at 450mm centres	148	m	25000	3,709,000/=
C	Valley gutter;550mm girth;three times bent;nailed to battens,twice fixed at 450mm centres.	58	m	25,000	1,450,000/=
	Roof Structure				
	Sawn softwood pressure impregnated with preservtive:				
D	100 x 50mm wall plate	225	m	6,000	1,350,000/=
E	150 x 50mm rafter	910	m	8,000	7,280,000/=
F	Ditto tie beam	180	m	8,000	1,440,000/=
G	100 x 50mm struts.	2635	m	6,000	15,810,000/=
H	75 x 50mm purlins	1445	m	4000	5,780,000/=
J	25 x 250mm fascia and barge boards	142	m	12,000	1,704,000/=
K	125mm Gutter as per PLASCO or equal and approved manufacturer; half round screwed to timber back ground includig all necessary holders	150	m	18,500	2,775,000/=
L	Ditto ; 75mm down pipe	8	No.	50,000	400,000/=
M	Gutter support bracket	48	No.	5,000	240,000/=
N	Extra;clamps	135	No.	3,500	472,500/=
P	Extra over for elbow	8	No.	3,500	28,000/=
Q	Extra over for bend	22	No.	3,500	77,000/=
R	Extra over for shoe	23	No.	3,500	80,500/=
	ELEMENT NR. 3 - ROOFING TOTAL CARRIED TO SUMMARY				K4,207,000/=

Prepared by:
RAS ENGINNER'S OFFICE

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR.4 - DOORS				
	FLUSH DOORS				
	40mm thick Solid Core Flush Door;equally divide comprising on both sides;150mm metal kick plate at the bootom;125mm metal bamper plate at the intermediate;top panel with slit having 6mm thick clear sheet glass faced both sides;styles and rails with approved hardwood timber quality;4mm exterior quality plywood;12mm hardwood lipping glued with approved adhesive pinned on all edges to project Manager's instruction				
A	Ditto, Double swing size 1500 x 2100mm high, ditto	8	No.	650,000	5,200,000/= ✓
B	Ditto, Double swing size 1800 x 2100mm high, ditto	1	No.	559,000	559,000/= ✓
C	Ditto, Double swing size 900 x 2100mm high, ditto	20	No.	500,000	10,000,000/= ✓
D	Ditto, Double swing size 1100 x 2100mm high, ditto	14	No.	580,000	8,120,000/= ✓
	Prime quality sawn hardwood door frames,transoms with one labour;fillets,glazing and ground				
E	150 x 45mm Frame	245	m	8,500	2,082,500/= ✓
F	150 x 45mm Transome	26	m	8,500	221,000/= ✓
G	150 x 45mmMullions	50	m	8,500	425,000/= ✓
H	15 x 45mm Moulded Architrave	350	m	8,500	2,975,000/= ✓
J	40 x15mm sprayed glazing bead	146	m	8,500	1,241,000/= ✓
	Sawn hardwood				
K	60 x 15mm grounding	245	m	4,000	980,000/= ✓
	5mm Thick polished clear plate glass:				
L	In panes over 0.10 but not exceeding 0.50square metres.	32	m^2	15.000	480,000/= ✓
	TO COLLECTION				32,274,500/= ✓

TRAINING AUTHORITY P O BOX 110 MIKUMI

Prepared by:
RAS ENGINNER'S OFFICE

DECEMBER, 2021

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	Supply and fix the following HAFELE ironmongery or other and approved make to hard wood or the like with matching screws				
A	Three levers mortise lockset complete with furniture	43	No.	90,000	3,879,000/=
B	Toilet mortise lockset;indicator bolts or any other equal and approved quality;complete with furniture	2	No.	75900	1,500,000/=
C	150 x 75mm Aluminium stainless steel brass butt hinges	99	pairs	6,000	594,000/=
D	38mm diameter,rubber floor mounted door stopper	41	No.	5000	205,000/=
E	Automatic overhead door closer	34	No.	150,000	5,100,000/=
F	Hydraulic door closer hinges for double swing door	9	No	85,000	765,000/=
G	Name plates on doors;gibbons card holder with side entry;sample to be approved	43	No	25,000	1,075,000/=
H	Signage to all potential areas;to be identified by users;(sample to be approved)	43	No	50000	2,150000/=
	TO COLLECTION				15,259,000/=
	COLLECTION				
	Page 9/3/4/1				32,274,500/=
	Page 9/3/4/2				15,259,000/=
	ELEMENT NR. 4 - DOORS TOTAL CARRIED TO SUMMARY				47,533,500/=

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR: 5 - WINDOWS				
	Supply and fix composite, powder coated of approved colour special metal window units with architrave flashing to walls internal as manufactured to Architect's satisfaction finished with 21 microns,4mm thick aluminium profile;100mm wide; with and including openable sliding shutter for fibre glass mosquito gauze; including assembling as necessary, fastening frames with stainless steel screws at 600mm centres and proprietary bedding compound, pointing external with silicone sealant and striping protective taps from aluminium frame, with and including 6mm bronze tinted glass sheet, mullions, transoms, ironmongery to Architect's drawings and unblocking devices where necessary:				
A	1800 x 1800mm high	34	No.	480,000	16,320,000/=
B	Ditto size 900 x 1500mm	6	No.	200,000	1,200,000/=
C	Ditto size 900 x 900mm	6	No.	200,000	1,200,000/=
D	Ditto size 1200 x 900mm	1	No.	200,000	200,000
E	Ditto size 1200 x 1800mm	5	No.	400,000	2,000,000/=
	METAL WORKS				
	Supply and fix mild steel grille comprising of Rectangular hollow section 38 x 38mm framing,5 x 40mm flat bar welded to framing at 148mm centre cross grid to an approved pattern;complete with rust resistant hardware;including fixing to concrete				
F	1800 x 1800mm high	34	No.	240,000	8160,000/=
G	Ditto size 900 x 1500mm	6	No.	150,000	900,000/=
H	Ditto size 900 x 900mm	6	No.	150,000	900,000/=
J	Ditto size 1200 x 900mm	1	No.	150,000	150,000/=
K	Ditto size 1200 x 1800mm	5	No.	200,000	1,000,000/=
	ELEMENT NR. 5 - WINDOWS TOTAL CARRIED TO SUMMARY				32,030,000/=

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR: 6 - FINISHINGS				
	PLASTERING WORKS INTERNALLY AND EXTERNALLY;				
A	15mm Thick plaster in two coats to walls; first coat 12mm Thick cement and sand (1:4) with wooden trowelled, second coat 3mm thick stucco (1:1:6) steel trowelled to smooth surfce, internally.	1178	m^2	5,500	6,479,000/= ✓
B	15mm thick plaster in two coats to walls; first coat 12mm Thick cement and sand (1:4) with wooden trowelled;second coat 3mm thick stucco (1:1:6) steel trowelled to smooth surface ,Externally.	1690	m^2	7,500	12,675,000/= ✓
	TILES SLAB AND BLOCK FINISHINGS				
	Approved non slippery tiles,500 x 500 x 8mm Thick tiles as appproved by Architec; bedding and jointing with cements and sand (1:4) mortar				
C	500 x 500 x 8mm thick to floors and steps pavings	460	m^2	30,000	13,800,000/= ✓
D	Ditto, non sliperly to ramp	20	m^2	30,000	600,000/= ✓
E	Ditto, 150mm high skirting	812	m	5000	4,060,000/= ✓
	EPOXY FLOOR				
F	Grind the concrete floor by eliminating dust,apply frist coat,second coat and third coat as per engineering instruction prime epoxy.	402	m^2	6000	2,412,000/= ✓
	Glazed ceramic wall tiles 200 x 300 x 6mm Thick with cushion edges to BS 1281 fixed to backing with adhesives and pointed with or coloured cement.				
G	200 x 300 x 6mm thick tiling to walls	30	m^2	20,000	600,000/= ✓
H	Iron strip with one rounded edge (provisional) to wall	38	m	3000	114,000/= ✓
	PLAIN SHEET FINISHINGS Suspended ceiling				
J	9mm thick gypsum ceiling screwed to timber background	955	m^2	25,000	23,875,000 ✓
	Sawn softwood pressure impregnated with preservative fixed with nails				
K	50 x 50 mm brandering	2952	m	2000	5,904,000/= ✓
	TO COLLECTION				70,519,000/= ✓

Prepared by:
RAS ENGINNER'S OFFICE

TRAINING AUTHORITY
P O BOX 110

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
A	Eaves finishing as per Architect instruction	60	m^2	18,500	1,110,000/=
B	Plain gypsum cornice	912	m	5000	4,560,000/=
	Beds and backings				
	Cement and Sand (1:3) with wood floated surface finish				
C	9mm thick backing to receive wall tiles	30	m^2	3500	105,000/=
D	30mm thick bed to receive floor tiles	460	m^2	3500	1,610,000/=
	TO COLLECTION				7,385,000
	COLLECTION				
	Page 9/3/6/1				70,519,000/2
	Page 9/3/6/2				7,385,000/=
	ELEMENT NR. 6- FINISHINGS TOTAL CARRIED TO SUMMARY				77,904,000/=

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR: 7 - DECORATIONS				
	INTERNAL WORK				
	Prepare and apply one thinned coat and two full coats of acrylic paint on:				
A	Plastered walls	1178	m^2	6500	7,657,000/=
B	Gypsum ceiling	955	m^2	6500	6,207,500/=
	EXTERNAL WORK				
	Prepare and apply one thinned coat and two full coats of weather guard paint on:				
C	Rendered walls and the like	1690	m^2	6,500	10,985,000/=
	ELEMENT NR. 7- DECORATIONS TOTAL CARRIED TO SUMMARY				24,849,500/=

9/3/7/1

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	ELEMENT NR. 8-PLUMBING AND ENGINEERING INSTALLATIONS:				
	SANITARY APPLIANCES				
	Supply and fix the following sanitary appliances including all connections and fixing to FLOORS or WALLS as necessary, reference; 'Good One'				
A.	White vitreous china wash hand basin Annie C005 size 480 x 420 x200mm complete with CTI69 (HM) self closing; semi pedestal catalogue No. S9110 and chain stay hole; fairline ⅛in pillar taps with clear acrylic handles; 1¼in bead chain waste and plug; 80cm slotted tail bolt stay; isovalve servicing valves.	13	No	420,000	5,460,000/= ✓
B.	Western Type White vitreous WC suite to BS 3402 complete with horizontal outlet flush valve cistern 6 litre plastic seat cover,S orP or turned trap;bottom supply and internal overflow domex screw including all necessary accessories and connection to drain pipe	2	No	650,000	1,300,000/= ✓
C.	Approved Standard Stainless Steel Sluice Trough for surgical theartre room;complete with all accessories.	5	No	850000	4,250,000/= ✓
D.	Vitreous china toilet roll holder with shelf,screwed to wall	2	No	85,000	170,000/= ✓
E.	Wall mounted tissue paper Dispenser	2	No	50,000	100,000/= ✓
F.	Mirror,special quality plate glass size 500 x 1000 x 6mm thick with silver resistant coating one side,fixing with domex screws to background requiring plugging.	13	No	180,000	2,340,000/= ✓
	TO COLLECTION				13,620,000/= ✓

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
	(ALL PIPES AND FITTINGS ARE PROVISIONAL)				
	COLD WATER INSTALLATION:				
	Supply / Distribution pipes: Dizayn pipes including screwed and socketted joints in running length:				
A	Allow item for pipework and all accessories for water supply		Item		
	Flexible piping:				
B	12mm Tube in short lengths; including nuts.	2	No	95,000	190,000/= ✓
	WASTE AND VENT PIPES:				
	PVC pipes;Class 'B'; including fittings in running length.				
B	Allow item for pipework and all accessories for water supply	-	Item		
	SOIL PIPES:				
	UPVC pipes and fittings; Class 'B'; in running lengths; BS 4660 for underground pipes and B.S 3506 for pipes above ground.				
C	100mm. Diameter pipes; laid in trenches	60	M	15000	900,000/= ✓
D	Allow item for all accessories for waste water supply	-	Item		
E	Supply and install water storage tank "SIMTANK"of 5000 liters capacity elevated to structural supports including ball valve; high and low DOMINO float switch, cover, ladder, and all necessary perforations for supply, distribution, overflow and washout pipes all as per Engineers instructions.	1	No	3,000,000	3,000,000/= ✓
	TO COLLECTION				4090,000/= ✓

9/3/8/2

TRAINING AUTHORITY P O BOX 110 MIKUMI

ITEM	DESCRIPTION OF WORK	QTY	UNIT	RATE	AMOUNT
A	Allow sum for building manholes and soakaway pit and septic tank as per Engineer instruction.		Item	4,500,000	4,500,000/= ✓
	BUILDER'S WORK IN CONNECTION WITH PLUMBING WORKS				
	Allow for necessary cutting away holes, chases and the like, make good after				
B	Blockwork chase for small and medium pipes.		Item	150,000	150,000/= ✓
C	Make holes through 230mm thick concrete blockwall		Item	50,000	50,000/= ✓
D	Make holes through 150mm thick concrete blockwall		Item	50,000	50,000/= ✓
E	Make holes through 175mm thick concrete slab and the like		Item	250,000	250,000/= ✓
	TO COLLECTION				5,000,000/= ✓
	COLLECTIONS				
	Page No. 9/3/8/1				13,620,000/=
	Page No. 9/3/8/2				4,090,000/=
	Page No. 9/3/8/3				5,000,000/=
	ELEMENT NR. 9-PLUMBING AND ENGINEERING INSTALLATIONS CARRIED TO SUMMARY OF BILL NR.3				22,710,000/= ✓

SUMMARY OF MEASURED WORK

ELEMENT	DESCRIPTION	PAGE No.	AMOUNT
1	SUBSTRUCTURE	9/3/1/3	201,570,500.-
2	WALLING	9/3/2/1	50,557,000
3	ROOFING	9/3/3/1	84,307,000
4	DOORS	9/3/4/2	47,533,500
5	WINDOWS	9/3/5/1	32,030,000
6	FINISHINGS	9/3/6/3	77,904,000
7	DECORATIONS	9/3/7/1	24,849,500
8	PLUMBING AND INSTALLATION	9/3/8/3	22,710,000
	SUMMARY OF BILL No. 3 CARRIED TO GENERAL SUMMARY		541,460,500/=

SECTION X: FORMS - SECURITY

1. Bid-Securing Declaration

Date: *[insert **date** (as day, month and year)]*
Bid No.: *[insert **number of bidding process**]*
Alternative No.: *[insert **identification No if this is a Bid for an alternative**]*

To: *[insert **complete name of Procuring Entity**]*

We, the undersigned, declare that:

We understand that, according to your conditions, bids must be supported by a Bid-Securing Declaration.

We accept that we will automatically be suspended from being eligible for bidding in any contract with the Purchaser for the period of time of *[insert **number of months or years**]* starting on *[insert **date**]*, if we are in breach of our obligation(s) under the bid conditions, because we:

(a) have withdrawn our Bid during the period of bid validity specified in the Form of Bid; or

(b) having been notified of the acceptance of our Bid by the Purchaser during the period of bid validity, (i) fail or refuse to execute the Contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the ITB.

We understand this Bid Securing Declaration shall expire if we are not the successful Bidder, upon the earlier of (i) our receipt of your notification to us of the name of the successful Bidder; or (ii) twenty-eight days after the expiration of our Bid.

Signed: *[insert signature of person whose name and capacity are shown]* In the capacity of *[insert legal capacity of person signing the Bid Securing Declaration]*

Name: *[insert **complete name of person signing the Bid Securing Declaration**]*

Duly authorized to sign the bid for and on behalf of: *[insert **complete name of Bidder**]*

Dated on 16th day of December, 2021 *[insert **date of signing**]*
Corporate Seal (where appropriate)

2. Performance Bank Guarantee [Unconditional]

[The **bank/successful Bidder** providing the Guarantee shall fill in this form in accordance with the instructions indicated in brackets, if the Employer requires this type of security.]

[insert bank's name, and address of issuing branch or office]

Beneficiary: *[insert name and address of Employer]*

Date: *[insert date]*

PERFORMANCE GUARANTEE No.: *[insert Performance Guarantee number]*

We have been informed that *[insert name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. *[insert reference number of the Contract]* dated with you, for the execution of *[insert name of Contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[insert amount in figures]* (*[insert amount in words]*), such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire no later than twenty-eight days from the date of issuance of the Taking-Over Certificate, calculated based on a copy of such Certificate which shall be provided to us, or on the [*insert number* day of *[insert month]*, *[insert year]*, whichever occurs first. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

[signature(s) of an authorized representative(s) of the Bank]

3. Performance Bond

By this Bond, *[insert name and address of Contractor]* as Principal (hereinafter called "the Contractor") and *[insert name, legal title, and address of surety, bonding company, or insurance company]* as Surety (hereinafter called "the Surety"), are held and firmly bound unto *[insert name and address of Employer]* as Oblige (hereinafter called "the Employer") in the amount of *[insert amount of Bond] [insert amount of Bond in words]*, for the payment of which sum well and truly to be made in the types and proportions of currencies in which the Contract Price is payable, the Contractor and the Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

Whereas the Contractor has entered into a Contract with the Employer dated the *[insert number]* day of *[insert month]*, *[insert year]* for *[insert name of Contract]* in accordance with the documents, plans, specifications, and amendments thereto, which to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

Now, therefore, the Condition of this Obligation is such that, if the Contractor shall promptly and faithfully perform the said Contract (including any amendments thereto), then this obligation shall be null and void; otherwise it shall remain in full force and effect. Whenever the Contractor shall be, and declared by the Employer to be, in default under the Contract, the Employer having performed the Employer's obligations there under, the Surety may promptly remedy the default, or shall promptly:

(1) complete the Contract in accordance with its terms and conditions; or

(2) obtain a Bid or bids from qualified bidders for submission to the Employer for completing the Contract in accordance with its terms and conditions, and upon determination by the Employer and the Surety of the lowest responsive Bidder, arrange for a Contract between such Bidder and Employer and make available as work progresses (even though there should be a default or a succession of defaults under the Contract or Contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract Price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "Balance of the Contract Price," as used in this paragraph, shall mean the total amount payable by the Employer to the Contractor under the Contract, less the amount properly paid by the Employer to the Contractor; or

(3) pay the Employer the amount required by the Employer to complete the Contract in accordance with its terms and conditions up to a total not exceeding the amount of this Bond.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of one year from the date of issuance of the Certificate of Completion.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Employer named herein or the heirs, executors, administrators, successors, and assigns of the Employer.

In testimony whereof, the Contractor has hereunto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its legal representative, this *[insert day]* day of *[insert month], [insert year]*.

Signed by *[insert signature(s) of authorized representative(s)]*
on behalf of *[name of Contractor]* in the capacity of *[insert title(s)]*

In the presence of *[insert name and signature of witness]*
Date *[insert date]*

Signed by *[insert signature(s) of authorized representative(s) of Surety]*
on behalf of *[name of Surety]* in the capacity of *[insert title(s)]*

In the presence of *[insert name and signature of witness]*
Date *[insert date]*

4. Bank Guarantee for Advance Payment

[Bank's Name, and Address of Issuing Branch or Office]

Beneficiary: _____ *[Name and Address of Employer]*

Date: _____

ADVANCE PAYMENT GUARANTEE No.: _____

We have been informed that *[name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. *[reference number of the contract]* dated _____ with you, for the execution of *[name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum *[amount in figures]* (_____) *[amount in words]* is to be made against an advance payment guarantee.

At the request of the Contractor, we *[name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of *[amount in figures]* (_____) *[amount in words]* upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number _____ at _____ *[name and address of Bank]*.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the ___ day of _____, 2___, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

Yours truly,

Signature and seal: _____

Name of Bank/Financial Institution: _____

Address: _____

Date: _____

SECTION XI: INTEGRITY

UNDERTAKING BY BIDDER ON ANTI – BRIBERY POLICY/ CODE OF CONDUCT AND COMPLIANCE PROGRAMME

(1) Each Bidder must submit a statement, as part of the bid documents, in either of the two given formats which must be signed personally by the Chief Executive Officer or other appropriate senior corporate officer of the bidding company and, where relevant, of its subsidiary in the United Republic of Tanzania. If a bid is submitted by a subsidiary, a statement to this effect will also be required of the parent company, signed by its Chief Executive Officer or other appropriate senior corporate officer.

(2) Bidders will also be required to submit similar No-bribery commitments from their subcontractors and consortium partners; the Bidder may cover the subcontractors and consortium partners in its own statement, provided the Bidder assumes full responsibility.

(3) (a) Payment to agents and other third parties shall be limited to appropriate compensation for legitimate services.

(b) Each Bidder will make full disclosure in the bid documentation of the beneficiaries and amounts of all payments made, or intended to be made, to agents or other third parties (including political parties or electoral candidates) relating to the bid and, if successful, the implementation of the contract.

(c) The successful Bidder will also make full disclosure [quarterly or semi-annually] of all payments to agents and other third parties during the execution of the contract.

(d) Within six months of the completion of the performance of the contract, the successful Bidder will formally certify that no bribes or other illicit commissions have been paid. The final accounting shall include brief details of the goods and services provided that are sufficient to establish the legitimacy of the payments made.

(e) Statements required according to subparagraphs (b) and (d) of this paragraph will have to be certified by the company's Chief Executive Officer, or other appropriate senior corporate officer.

(4) Bids which do not conform to these requirements shall not be considered.

(5) If the successful Bidder fails to comply with its No-bribery commitment, significant sanctions will apply. The sanctions may include all or any of the following:

a) Cancellation of the contract;

b) Liability for damages to the public authority and/or the unsuccessful competitors in the bidding possibly in the form of a lump sum representing a pre-set percentage of the contract value (liquidated).

(6) Bidders shall make available, as part of their bid, copies of their anti-Bribery Policy/Code of Conduct, if any, and of their-general or project - specific - Compliance Program.

(7) The Government of the United Republic of Tanzania has made special arrangements for adequate oversight of the procurement process and the execution of the contract, and has invited civil society and other competent Government Departments to participate in the oversight. Those charged with the oversight responsibility will have full access to all documentation submitted by Bidders for this contract, and to which in turn all Bidders and other parties involved or affected by the project shall have full access (provided, however, that no proprietary information concerning a Bidder may be disclosed to another Bidder or to the public).

MEMORANDUM (Format 1)

(Regulation 100(2) of the Public Procurement (Goods, Works, Non-Consultant Services and Disposal of public assets by tender) Regulations, 2005 - Government Notice No. 97 of 15th April, 2005

This company _____ *(name of company)* places importance on competitive bidding taking place on a basis that is free, fair, competitive and not open to abuse. It is pleased to confirm that it will not offer or facilitate, directly or indirectly, any improper inducement or reward to any public officer their relations or business associates, in connection with its bid, or in the subsequent performance of the contract if it is successful.

This company has an Anti-Bribery Policy/Code of Conduct and a Compliance Program which includes all reasonable steps necessary to assure that the No-bribery commitment given in this statement will be complied with by its managers and employees, as well as by all third parties working with this company on the public sector projects, or contract including agents, consultants, consortium partners, sub-contractors and suppliers. Copies of our Anti-Bribery Policy/Code of Conduct and Compliance Program are attached

Authorized Signature: _____

Name and Title of Signatory: _____

Name of Bidder: _____

Address: 16/12/2021

MEMORANDUM (Format 2)

(Regulation 100(2) of the Public Procurement (Goods, Works, Non-Consultant Services and Disposal of public assets by tender) Regulations, 2005 - Government Notice No. 97 of 15th April, 2005

This company _____ *(name of company)* has issued, for the purposes of this bid, a Compliance Program copy attached -which includes all reasonable steps necessary to assure that the No-bribery commitment given in this statement will be complied with by its managers and employees, as well as by all third parties working with this company on the public sector projects or contract including agents, consultants, consortium partners, subcontractors and suppliers')"

Authorized Signature: _____

Name and Title of Signatory: BENITHO J. KIGAVA - S/ENGINEER

Name of Bidder: MIKUMI VTC

Address: 18/12/2021

KIKAO CHA MARIDHIANO BAINA YA WATAALAM WA OFISI YA RAS MKOA WA MOROGORO NA VETA MIKUMI JUU YA UJENZI WA ICU. TAREHE 07/01/2022

MAHUDHURIO·

Na	JINA	WADHIFA	SAHIHI.	PHONE NO.
01	CPA COSMAS M. NTALINDANDA	MKT	[signature]	0768881155
02	Eng. Narembe S. H.	Kafibu RS-MORO	[signature]	0627475616
03	Eng. Kigava, B. J.	VETA MIKUMI	[signature]	0758248360 0625542315
04	PAULO GEREWAY	VETA MIKUMI	[signature]	0762669659

Baada ya mazungumzo ya kina baina ya wajumbe wa ~~Netima~~ ya ~~Fat~~ Maridhiano na wawakilishi kutoka ~~Veta~~ VETA - Mikumi tumekubaliana kwa gharama ya kiasi cha shilingi 55,960,500 kutoka ngazi hiyo wamekubali kupunguza kwa kiasi cha shilingi 560,000,000/=. Punguzo hilo litathibitishwa na Msimamizi wa mradi wakati wa utekelezaji wa mradi.

[signature]
Eng. NAREMBE S.H.
KATIBU - SF - RAS MORO

[signature]
Eng. BENITHO KIGAVA
VETA - MIKUMI

VOCATIONAL EDUCATION AND TRAINING ACT, 1994

ARRANGEMENT OF SECTIONS

PART I

PRELIMINARY

Section *Title*

PART II

THE VOCATIONAL EDUCATION AND TRAINING AUTHORITY

PART III

VOCATIONAL EDUCATION AND TRAINING BOARD AND REGIONAL BOARDS

PART IV

THE VOCATIONAL- EDUCATION AND TRAINING. LEVY

PART V

THE VOCATIONAL EDUCATION AND TRAINING FUND AND FINANCIAL PROVISIONS

THE UNITED REPUBLIC OF TANZANIA

No. 1 OF 1991

I ASSENT.

President

7-3-94

An Act to repeal and replace the Vocational Training Act, 1974, to establish a Vocational Education and Training Authority, to impose vocational training levy and to make further and better provisions for the regulation of vocational education and training.

PART I

PRELIMINARY

Short title and Commencement

1. This Act may be cited as the Vocational Education and Training Act, 1994 and shall come into operation on such date as the Minister may by Notice in the *Gazette* appoint.

Interpretation

2. In this Act unless the context requires otherwise—

"apprentice" means person of at least fifteen years of age, except where a higher minimum age is otherwise required by law, and who is employed to learn an occupation under standards of apprenticeship approved by the Board.

'Authority" means the National Vocational Education and Training Authority established by section 3 of this Act;

'Board" means the Vocational Education and Training Board established by section 5 of this Act;

"committee" means a Trade Advisory Committee established under section 8 of this Act;

'Director" means the Director General of Vocational Education and Training appointed pursuant to section 10 of this Act;

'Fund" means the Vocational Education and Training Fund established by section 20 of this Act;

"indentured trainee" means A person other than an apprentice who is not bound by a written contract but serves an employer for a determined period of time with- a view to acquiring knowledge of a trade, and who attends prescribed course of study leading to trade tests and examination.

"Levy" means the Vocational Education and Training Levy imposed by section 14 of this Act.

"inspector" means an inspector appointed by the Director General.

"Minister" means the Minister for the time being responsible for vocational education and training;

"Regional Board" means a Regional Vocational Education and Training Board established for a Region pursuant to section 11 of this Act;

"Regional Vocational Training and Service Centre" means a centre which has been delegated special regional authority and responsibilities by the Board.

"trade test" means an examination to test the knowledge and the skills acquired by a trainee or any person in a designated trade or occupation";

"Vocational Education and Training" means training leading to a skilled occupation-,

"Vocational Training Centre" means any place or institution where vocational education and training is provided, including a trade school.

PART II

THE VOCATIONAL EDUCATION AND TRAINING AUTHORITY

Establishment of the Authority

3.-(1) There is hereby established an autonomous government agency to be known as the Vocational Education and Training Authority,

(2) The Authority shall be a body corporate and shall-

(a) have perpetual succession and a common seal;

(b) in its corporate name be capable of suing and being sued;

(c) subject to this Act, be capable of purchasing or otherwise acquiring and of alienating movable property.

(3) The Minister may by Order published in the *Gazette* vest in the Authority the management and the assets of any vocational training centre owned by the Government.

C-41) The objectives and the functions of the Authority shall be:- Objectives and Functions of the Authority

(a) to provide vocational training opportunities, and facilities for such training;

(b) to establish a vocational education and training system which includes both basic and specialized training to, meet the needs of both the formal and the informal sectors;

(c) to satisfy the demands of the labour market for employees with trade skills in order to improve production and productivity of the economy;

(d) to ensure that the system of vocational education and training is based on demand, is cost effective and given a gradually decentralized planning and implementation authority to the regions to ensure maximum utilisation of resources and relevance of training programmes.

(e) to foster and to promote entrepreneurial values and skills, as, an integral part of all training programmes.

(f) to promote on-the-job training in industry for both apprenticeship training and for skill up-dating and upgrading;

(g) to promote access to vocational education and training for disadvantaged groups;

(h) to secure adequate and stable financing of the vocational education and training system;

(i) to raise the quality. of vocational education and training being provided;

(j) to promote or provide vocation education and training according to -needs, within the framework of overall national socio-economic development plans and policies;

(k) to promote the balancing of supply and demand for skilled labour in both wage-employment and for. skills needed for self-employment in rural and urban areas;

(1) to promote and to provide short tailor-made course programmes and in-service training in order to improve the performance both of quality and productivity of the national economy;

(m) to provide a dual vocational education and training system, combining broad basic training, gradual specialization and practical experiences from work, and

(n) to promote a flexible training approach and appropriate teaching methodologies.

(2) Without prejudice to subsection (1) the Authority may establish or manage vocational training "institutions including vocational teacher training college, Regional Vocation Training and Services Centres and Vocational Training Centres.

PART III

VOCATIONAL EDUCATION AND TRAINING BOARD AND REGIONAL BOARDS

Establishment of Vocational Education and Training Board

5.-(1) There is hereby established for the Authority, a Board to be known as a the Vocational Education and Training Board.

(2) The Board shall be composed of eleven members to be appointed as follows:-

(a) Me chairman who shall be appointed by the President;

(b) ten other members to be appointed by the Minister upon being nominated as follows:-

(i) two members to be nominated by the organizations for the time being representing employers;

(ii) two members to be nominated by trade unions movement;

(iii) three members to be nominated by each of the ministries responsible for industries, education and labour;

(iv) three members to be nominated by a non-governmental organi. sations which manage vocational education and training institutions.

(3) The persons to be nominated and appointed members of the Board shall be those who are qualified to contribute to the development of vocational education and training.

(4) Every member of the Board shall, unless he sooner resigns or otherwise ceases to hold office, hold office for a period of three years and may be eligible for re-appointment.

Functions and powers of the Board

6.--(1) The Board shall be responsible for the performance of the functions and management of the affairs of the Authority.

(2) For the proper discharge of the functions of the Authority the Board shall, subject to any directions on matters of general policy which the Minister may give in that behalf, have the responsibility and power-

(a) to develop policies on vocational, education and training and to supervise their implementation on a national level;

(b) to set the policies and procedures for the use of the Vocational Education and Training Fund including:

(i) approval of allocation criteria and budget norms for Regional Vocational Training and Service Centres, and other training providers;

(ii) appointment of external auditors to audit the accounts of any receiver of funds from the Vocational Education and Training Fund;

(c) to approved the plans and the annual budgets of the Authority;

(d) to establish a personnel policy and administration of the Author ity.

(e) to approve Regulations and Guidelines for Regional Boards and Trade advisory Committees;

(f) to approve the registration of Vocational Training Centres accora- ing to laid down standards and regulations by the Board.

(9) to issue regulations and guidelines concerning the following train- ing matters:

(i) syllabi;
(ii) the trade testing system, examination and certification;
(iii) inspection and registration of vocational training education and institutions;
(iv) student selection and vocational guidance or counseling;
(v) vocational teacher education and training;
(vi) apprenticeship training;
(vii) other regulations which may be necessary for the implemen- tation of the objective and provisions of the Act;

Meetings and decisions of the Board

7.--(I) The Board shall hold four regular meetings- every year and may hold more meetings if the business of the Authority so requires;

(2) the first meeting of the Board shall be held at such time and such place as the Chairman may determine. Any subsequent meetings of the Board shall be held at such time and place as the Board may determine.

(3) five members shall constitute a quorum for a meeting of the Board;

(4) the Chairman-shall preside at all meetings of the Board at which he is present;

(5) if the Chairman is absent, the members present-shall elect one of their numbers to be the chairman of that meeting;

(6) the decision of the Board shall be by majority votes of the members present and voting, and in the event of an equality of votes, the Chairman of the meeting shall have a casting vote.

Establishment Trade of Advisory Committees

8.-(I) The Board may establish committees, to be known as Trade, Advisory Committees, to assist it in the performance of its functions.

(2) A Trade Advisory Committee may be established in respect of such industry, trade or occupation as the Board may determine.

(3) Each Trade Advisory Committee shall consist of such number of members, being not more than seven, as the Board may determine of whom:

(a) one members shall be representing the interests of the vocational education and training institutions;

(b) one member who is a training specialist, to be appointed by the Board.

(c) two members shall be chosen to represent the interests-of employers in the industry concerned;

(d) two members shall be chosen to represent the interests of employees in the industry concerned;

(4) The Board shall appoint one of their numbers to be the Chairman of the Trade Advisory Committee.

(a) Every member of the committee shall, unless he sooner resigns or otherwise ceases to hold office, hold office for a period of three years and may be eligible for re-appointment;

(b) Subject to any general or specific directions by the Board and subject further to the provisions of this Act or any regulations made under it, committee may regulate its own proceedings;

(c) A representative of the Director shall act as the secretary to any committee established under this section.

Functions of the Trade Advisory Committees are

9.--(1) It is the responsibility of the Trade Advisory Committees to tonsure that vocational education and training programmes offered are according to the needs of the employment market.

(2) Without prejudice to subsection (1) Trade Advisory Committees shall. perform the following specific functions-

(a) advise the Board on the establishment of new vocational trades training and education programms and abolition of existing ones.

(b) assess training needs and determine training standards for the area of trades the committee is covering;

(c) to draw up training specifications and job descriptions for the trades to be taught;

(d) to ensure coordination of related trade training activities;

(e) to approve log-books and trade testing standards for the trades related to its activities;

(f) to ensure that the employment market is informed about training activities under the committees to promote placements for students; and

(g) to form sub-committees to work with particular training issues as may be necessary.

Director General and other employees

10.-(1) The Board shall after consultations with the Minister appoint a Director-General of the Authority -an. such terms and conditions as the Board may determine.

(2) The Director-General shall be the Chief Executive of the Authority and shall be directly responsible to the Board for the day to day administration of the affairs of the Authority.

(3) The Director-General shall be the Secretary of the Board and may participate in its deliberations, but. shall not be entitled to vote on any resolution or other matter before, the Board.

(4) The Board may appoint or employ Regional Directors and other employees of the Authority on such terms and conditions as the Board may approve.

Establishment of Regional Vocational Education and Training Board

11.-(1) The Board shall establish for, any region a Regional Vocational Education and Training Board.

(2) The Regional Board shall be composed of not more than seven members to be appointed as follows:-

(a) a Chairman to be appointed by the Board;

(b) three members to be nominated by the organizations for the time being representing employees;

(c) two member to be nominated by trade union movements representing employees;

(d) one member to be nominated by the Regional Administration;

(e) one member to be nominated by a non-governmental organisation, representing a training institution.

(3) The Regional Director shall be Secretary to the Regional Board.

Functions of the Regional Boards

12. --(1) The Regional Boards shall-

(a) coordinate vocational education and training activities within the Region;

(b) provide direct supervision and serve as the governing board for all vocational training centres within the Region;

(c) provide guidelines and supervision on budget preparations by vocational education and training institutions within the Region;

(d) evaluate budget proposals for vocational training centres managed by the Authority within the Region education and forward the budgets to the Board;

(e) determine regional priorities. for vocational education and training;

(f) authorize vocational training centres managed by the Authority within the region to utilise any funds raised from fees or other activities of the centres;

(g) carry out inspection of Vocational Training Centres according to regulations and guidelines laid down by the Board;

(h) prepare an annual report to the Board on training and related activities in the region.

(i) advise the Board on any matter redated to the improvement of vocational education and training in the region.

(j). The Board may designate any Vocational Training Centre to be a Regional Vocational Training and Service Centre;

Functions of the Regional Vocational Training and Service Centres

13-. (2) The Regional Vocational Training and Service Centres shall have the following functions:-

(a) selection of trainees in accordance with trade standards and admission requirements as approved by the Board;

(b) conduct regionally based tracer studies and disseminate information on vocational education and training;

(c) implement programmes approved by the Regional Board;

(d) conduct trade test according to laid regulations down by the, Board;

(e) monitor training log-books and issue certificates;

(f) act as a nucleus for vocational education and training system\ development in the Region;

(g) subject to guidelines and regulations issued by the Board, generate funds to supplement the operational costs of the centre.,

(h) to promote and to support the development entrepreneurial skills and attitudes.

PART III

THE VOCATIONAL EDUCATION AND TRAINING LEVY

Imposition of a Vocational Education and Training Levy

14.-() Subject to the provisions of this Part, there shall bet charged levied and payable into the Fund,'. at the end of every month, from every employer who has in his employment four or more employees, a levy to be known as the vocational education and training Levy.

(2) The Levy shall be the sum of money equal to two per centum Of the total gross monthly emoluments payable by the employer to all his employees in respect of that month.

(3) Where in any case an employer pays emoluments to any employee at intervals of less than a month or at intervals of greater than a month, the provisions of this Act shall apply as if such employee was entitled

to monthly payments and the monthly chargeable emoluments of such employee in respect of any month shall be deemed to be the chargeable - emoluments that would have accrued to the employee had the emoluments been payable, monthly.

(4) Where in any case the monthly chargeable emoluments in respect . of any employee cannot be ascertained with any reasonable accuracy, the Director may, in writing require the employer to pay the levy in respect of such employee at such intervals as the Director may specify, where such order is made in respect of any employee, the employer shall pay the levy for any period so specified on the last day of such specified period.

"(5) The levy imposed and paid pursuit to this Act, shall be deducted for the purpose of ascertaining the taxable income in accordance with section 16 of the Income Tax Act, 1973".

Penalty upon failure to pay levy

15.-(1) Where any employer who is by this Act liable to pay levy, fails to pay the whole or any part of such levy within twenty-one days from the date on which such levy is required to be paid, an additional sum equal to twenty-five per centum of the unpaid levy shall become due and be payable by such employer by way of penalty. collected and recoverable accordingly.

. (2) Any sum payable by way of penalty under this section shall, for the purposes of this Act, be deemed to be a training levy and shall be

(3) The Director may, if in any case he thinks just and equitable so to do, remit the whole or any part of the penalty payable under this section.

Summary Recovery of unpaid levy etc

16.-(1), Any levy or penalty payable by any employer under the provisions of this Act shall be a debt due to the Authority and may be recovered from such employer as a civil debt by way of a summary suit at the instance of the Director or any Person authorized by the Director in that behalf.

(2) Without prejudice to the method of recovery of levy and penalties prescribed by subsection (1), where any amount of levy or penalty is due from any employer, the Director may file in a court of a resident magistrate having jurisdiction over he area in which such employer resides or carries on business, a certificate stating-

(a) the name and address of the employer from whom the levy is due and

(b) the amount due.

(3) A certificate lodged under this section shall be deemed to be a decree of the court against the person named in the certificate for payment by such person to the Authority of the amount stated in the certificate together with interest at ten per centum per month from the date on which such certificate is filed until the date of payment, and every such decree may be executed in the same manner as a decree passed by a court of a resident magistrate in a civil suit.

(4) The provisions of subsection (2) shall apply notwithstanding that the amount involved exceeds the pecuniary jurisdiction of a court of a resident magistrate.

(5) Every certificate filed in a court of a resident magistrate pursuant to the provisions of subsection '(2) of that section shall be conclusive evidence of the truth of-the statements contained in such certificate.

Exemption from levy

17.--(1) The provisions of section 14 shall not apply to any Government departments and to any public institution which is non profit making and wholly financed by the Government.

(2) The Minister may- by order published in the Gazette exempt any employers or category of employers from payment of levy.

Giving False information etc. to evade levy

18. Any person who-
with intent to evade payment of any levy or with penalty due under this Act-

(a) makes any false statement to the Director; or

(b) fails or omits to give any information or to submit any return required to be given or submitted under this Act or under regulations made under this Act; or

(c) gives any information or submits any return which is false in any material particular;

shall be guilty of an offence and shall be liable on conviction to a fine not exceeding twenty thousand shillings or to imprisonment for a term not exceeding three years or to both such fine and imprisonment.

Collection of levy

19.-(1) The Levy payable under this Act may be paid directly to the Authority or collected by the Authority or by such other agency as the Minister may after consultations with the Minister responsible for Finance, appoint;

(2) The Minister may after consultations with the Minister responsible for Finance, make regulations relating to the collection of levy;

PART IV

THE VOCATIONAL EDUCATION AND TRAINING FUND AND FINANCIAL PROVISIONS

Establishment of the Vocational Education and Training Fund

20. There is hereby established a fund to be known as the Vocational Education Training Fund which shall be managed by the Board.

Resources of the Fund

21. The resources of the Fund shall be-

(a) all assets currently owned by the National Vocational Training Division;

(b) such sums as may be paid as levy imposed by section 14 of this Act;

(c) such sums as may be provided for the Fund by Parliament.

(d) Such sums as may be paid to the Authority by way of grants or donations from any source within or outside the United Republic.

Management and auditing of the Fund

22.--(l) The Authority shall maintain with such bank as the Board may approve, a designated account into which shall. be paid the levy and all the money paid into the Fund.

(2) The Board shall cause to be provided and to be kept proper books of account of the payments made into and out of the Fund.

(3) The accounts relating to the Fund shall be audited annually by such authorized auditor duly registered under the Auditors and Accountants (Registration) Act, 1972, as, the Board may with the approval of the Minister, appoint.

Exchequer and Audit Ordinance etc. not to affect application of Act Cap. 439

23. The provisions of this Act shall apply and have effect notwithstanding any provisions to the contrary in the, Exchequer and Audit Ordinance or any other law.

Report and Audited accounts to be laid be-

24. --(1) The Board shall within six months after the close or every financial year of the Authority, cause tq,be prepared and submitted to the Minister, a report on the activities and operations of the Authority during that year together with,

(a) a copy of the audited accounts of the Authority; and

(b) a copy of the auditors' report on the accounts.,

(2) The Minister shal) as soon as practicable and in any case not later than twelve months after the closing of the financial year of the Authority, lay before the National Assembly:-

(a) a copy of the annual report of the Authority;

(b) a copy of the audited accounts; and

(c) a copy of the auditors' report.

PART V

MISCELLANEOUS PROVISIONS

Remuneration of members of the Boards etc.

25. —(1) The members of the Board shall be entitled to such remuneration, fees and allowances for expenses as the Minister may upon recommendation of the Board, prescribed from time to time.

(2) the members of Regional Boards and of a committee shall be entitled to such remuneration, fees and allowances for expenses as the Board may prescribe from time to time.

Regulations

26. —(1) The Minister may after consultations with the Board make regulations for giving better effect to the provisions of this Act.

(2) Without prejudice to the generality of subsection (1) of this section the Minister may make regulations—

(a) establishing an interim Board to give advice on transitional provisions,

(b) establishment of a new personnel system including a possible transfer of present staff into the Authority;

(c) vesting of all assets and liabilities of the existing organisation into the new Authority;

(d) any other area related to a smooth and safe transformation of the present organization into the Authority.

Penalties

27. Any person who commits an offence under this Act in respect of which no penalty has been specifically provided shall be liable on conviction to a fine not exceeding one hundred thousand shillings or to imprisonment for a term not exceeding three years or to both such fine and imprisonment.

Repeal and Savings Act No. 28 of 1974

28. —(1) The Vocational Training Act, 1974, is hereby repealed.

(2) Notwithstanding the provisions of subsection (1) every training scheme and every contract of apprenticeship existing immediately before the commencement of this Act shall continue in force and be executed as if this Act had not been made until completion.

Passed in the National Assembly on the first day of February, 1994.

Clerk of the National Assembly

Printed by the Government Printer, Dar es Salaam—Tanzania

CARRICULUM VITAE (CV):

1. PERSONAL PARTICULARS:

Sir Name:	KIGAVA
First Name:	BENITHO
Middle Names:	JACOB
Sex:	MALE
Date of birth:	25th November, 1966
Place of birth:	IRINGA
Tribe:	HEHE
Nationality:	TANZANIAN
Marital Status:	MARRIED
Religion:	CHRISTIAN
Language:	ENGLISH & KISWAHILI, (Both Written and Spoken)
Occupation:	VOCATIONAL TUTOR & CIVIL ENGINEER
Address:	P. O. Box 110. MIKUMI.
	Mob. +255 758 248 350
E-mail:	benithokigava@yahoo.com & kigavabenitho@gmail.com

2. EDUCATIONAL PROFILE:

No	*INSTITUTION*	*YEAR*	*EDUCATION LEVEL*	*AWARD*
1	Mbeya University of Science & Technology	2012 - 2015	Bachelor's Degree in Civil Engineering	Bachelor's Degree in Civil Engineering
2	Institute of Development Management (IDM) Mzumbe	1995 - 1998	Advanced Diploma in Materials Management	Adv. Dipl. (procurement & supplies)
3	Mbeya Technical College	1989 - 1993	Full Technician	FTC in Architectural Engineering
4	Lugalo Secondary School (Iringa)	1985 - 1988	O - level	Certificate in Secondary School
5	Tanangozi Primary School	1979 - 1984	Primary School	Certificate in Primary Sch.

3. WORK EXPERIENCE:

PLACE	WORK & POSITION	POSITION	YEAR
TAZARA MBEYA	Field practical in construction of Locomotive Workshop at Iyunga Deport	Trainee	1990
MBEYA CITY	Design & Construction of 3 Storey commercial building at Forest Maghorofani area; (NDIYO MINI SUPER MARKET)	Chief Project Technician	1991 - 1992
MBEYA CITY	General Site Foreman & Stores in charge in RESCO Construction Co. Ltd	Technical Manager	1994 - 1995
DSM	Design and Construction of one Storey Residential building at Tabata Kisukuru, Dar es salaam.	Private Contractor	1998 - 1999
MPANDA	Procurement and Stores Officer at VETA Mpanda	Procurement and Supplies Officer	2000 - 2010
MPANDA	Design and Construction of Mpanda District Council Conference Hall (MDC) at MUWASA.	Project Supervisor	2004 - 2008
MPANDA	Renovation and Construction of new Building facilities for Mpanda VTC Extension (ADB Project)	Clark of Works (Client-VETA)	2006 - 2008
MPANDA	Design and Construction of Mpanda Airport Lounge under UNHCR and REDESO as financier.	Project Supervisor	2008 - 2009
MPANDA	Construction of Katavi National Park Head Quarters' Armory Building.	Project Supervisor	2007
MPANDA	Design and Construction of Mpanda District Hospital Mortuary	Project Supervisor	2009 - 2010
MPANDA	Supervision of various civil Engineering projects executed by Mpanda District Council.	Project Supervisor	2004 - 2012
MBEYA CITY	Full Engineering Supervision in Construction of four storeys Male Dormitory at Teofilo Kisanji University Mbeya Campus.	Site Engineer	2013 - 2015 (`Degree Course)
MPANDA	Design and construction of Katavi Regional Security Office's fencing wall	Site Engineer	2016 - 2017
MPANDA	Heavy Rehabilitation of Mpanda Municipal Primary Court, in Katavi Region	Site Engineer	2016 - 2017
MPANDA	Design and construction (Design & Build) of Katavi Regional Stadium Main Platform which used for National inauguration of Uhuru Torch for the year 2017	Site Engineer	January - March 30th, 2017
MPANDA	Construction of Mpanda Urban Water and Sanitation Authority (MUWASA) New Offices	Consultant	April 2017 todate

4. OTHER EXPERIENCES:

- School Head Prefect at Lugalo Secondary School Iringa, 1987 to 1988.
- Minister for Transport & Campus Affairs in College Student's Government (MIDIMSO) at IDM - Mzumbe, 1997 - 1998.
- Construction of various Classrooms, Domitories and Teacher's Houses for Primary and Secondary Schools within Mpanda District, for instance; Usevya, Kibaoni, Magamba, Ifukutwa, Karema, Nsimbo, etc.
- Seminar on Public Procurement and Finance Act (PPA), Dodoma, 2004, 2006 & 2008.
- Seminar on Competence Based Education Training (CBET), Mikumi, 2011.
- Setting out and supervision of construction of Makete DVTC Buildings at Makete District.
- Acting Human Resource Officer at Mpanda VTC from March to August, 2012
- Design of Ground water Reservoir Tank for Mpanda VTC, as my final Project for award of Degree in Civil Engineering.
- RAAWU-VETA Zonal Workers' Council representative, 2010 - 2015
- RAAWU-VETA National Workers' Council representative, 2010 - 2015
- RAAWU Centre Chairperson, 2016 -
- RAAWU Zonal Secretariat Member, (SOUTH West Zone), 2016 -
- South West Zone RAAWU General meeting Member, 2016 -
- Board Member and Chairperson of Planning and Finance Committee for Mpanda Urban Water and Environmental Sanitation (MUWASA) 2016 - 2018.
- Clerk of Works Njombe RVTSC at Ludewa District from June 2018 to date.
- Site Engineer for Arusha (Oljoro) VTC, fom May, 2018 to 2019.
- Interim Project Coordinator for 25 DVTCs, November 2019 to March, 2020.
- Site Engineer for Iringa DVTC at Pawaga from June 2020 to October, 2021.

NTA Level 8 No: 0002462

THE UNITED REPUBLIC OF TANZANIA
MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

It is hereby certified that

Benitho Kigava

of Registration No: B124/011 has been awarded

a Bachelor Degree in

Civil Engineering

After having fulfilled all the requirements for

Level 8

at Lower Second class

Issued this 19th day of December in the year 2015

Deputy Vice Chancellor
(Academic, Research and Consultancy)

Vice Chancellor

(This certificate is not valid without embossed seal)

MBEYA TECHNICAL COLLEGE

MBEYA

COLLEGE LEAVING CERTIFICATE

This is to certify that KIGAVA BENITHO

Has followed a FULL TECHNICIAN CERTIFICATE COURSE IN ARCHITECTURAL ENGINEERING

(Specialization) ARCHITECTURE

Course of study at Mbeya Technical College for

a period of FOUR years

from JULY 1989 to MAY 1993

REGISTRAR

PRINCIPAL

The course included instructions in the following subjects:
(see overleaf)

INSTITUTE OF DEVELOPMENT MANAGEMENT
MZUMBE * TANZANIA

ADVANCED DIPLOMA

This is to certify that

BENITHO KIGAVA

having completed the prescribed course of study and having passed the required examinations has been awarded an Advanced Diploma in

MATERIALS MANAGEMENT

9600	LOWER SECOND
Reg. Number	*Classification*

20th November, 1998
Date

Abel Mwaluko
Chairman of the Governing Body

INDT
Principal

Director of Studies

INSTITUTE OF DEVELOPMENT MANAGEMENT MZUMBE

Telephone: Morogoro 4253, 4259, 4380-4
Telegrams "IDM" Morogoro

P.O. Box 1,
Mzumbe, Morogoro
Tanzania

Ref.No:IDM/OF/E.2/2

Date: October, 1998

TO WHOM IT MAY CONCERN

STATEMENT OF RESULTS FOR THE IDM ADVANCED DIPLOMA IN MATERIALS MANAGEMENT [ADMA] COURSE

This is to certify that *BENITHO KIGAVA* was a full time student of this Institute in the Department of Business Studies pursuing a three-year Advanced Diploma Course in Materials Management from October 1995 to July 1998.
His/Her performance in the Course was as follows:

FIRST YEAR 1995/96

1st Semester	GRADE
Mathematics	B-
Principles of Management	B+
Economics	C
Commercial Law	C+
Communication Skills	B

2nd Semester	GRADE
Statistics	C+
Basic Accounting	C
Materials Management	B+
Introduction to Marketing	C+
Development Studies I	A-
Year Mean	B-

THIRD YEAR 1997/98

1st Semester	GRADE
Research Paper	A

2nd Semester	GRADE
Supplies Management	B+
Strategic Business Management	C
International Procurement	B+
Supplies & Stock Audit	C+
Production Management	C
Year Mean	B+

SECOND YEAR 1996/97

1st Semester	GRADE
Cost & Management Accounting	C+
Quantitative Methods	A
Purchasing Techniques	B-
Stores & Warehouse	B-
Business Communication Skills	B+

2nd Semester	GRADE
Advanced Macro-Comp. & MIS	B-
Basic Financial Management	C
Physical Distribution Management	B-
Inventory Management & Control	B
Research Methodology	B-
Year Mean	B-

KEY TO GRADING

A+	:	100 - 75
A	:	74 - 70
A-	:	69 - 65
B+	:	64 - 60
B	:	59 - 55
B-	:	54 - 50
C+	:	49 - 45
C	:	44 - 40
FAIL	:	39 - 0

FINAL COURSE RESULT: *B*

AWARD: *Advanced Diploma in Materials Management*

CLASS: *Lower Second*

(M. J. F. Bakari)
for REGISTRAR

The National Examinations Council of Tanzania

National Technical Examinations
Full Technician Certificate

in ARCHITECTURAL ENGINEERING

This is to certify that KIGAVA BENITHO

Index No. U007-0960

of MBEYA TECHNICAL COLLEGE

sat for the above Examination which was held in MAY 1994

and was awarded this certificate

after attaining the following performance:-

Subject	Grade
MATHEMATICS	D
QUANTITY SURVEY & PLANN. CONST	C
URBAN AND RURAL PLANNING	A
BUILDING STRUCTURES	D
ARCHITECTURAL DESIGN & DRAWING	C
ARCH STRUCTURES & BLD CONST	C

****

Chairman

Executive Secretary

Date 19 AUG 1994

FTC No 006292

The National Examinations Council of Tanzania

Certificate of Secondary Education

This is to certify that

Index No.

sat for the Certificate of Secondary Education Examination

at in NOVEMBER 1988

and qualified for the award of a

CERTIFICATE OF SECONDARY EDUCATION

in Division

after attaining the following performance:-

Subject	Grade

Chairman

Executive Secretary

Date: 18 MAR 1989

CS No 061218

CURRICULUM VITAE

1. PERSONAL DETAILS

Surname:	Qambesh
Middle name:	Boay
First name:	Paulo
Sex:	Male
Date of Birth:	04th June 1989
Place of Birth:	Manyara
Nationality:	Tanzanian.

2. CONTACTS

Postal Address:	P. O. Box 110
	Mikumi, Morogoro.
Mobile phone:	+255762669659/+255658846402
E-mail Address:	pqambesh6@gmail.com

3. LANGUAGE PROFICIENCY.

Language	Read	Write	Speak	Understand
English	Excellent	Excellent	Very Good	Very good
Swahili	Excellent	Excellent	Excellent	Excellent

4. ACADEMIC PROFILE

Duration	Academic Institution	Award
2013-2016	Misungwi Community Development Technical Training Institute - Mwanza	Ordinary Diploma in civil engineering & community Development.
2007-2010	Laghanga secondary school	Certificate of Secondary Education Examination(CSEE)
2000-2006	Gawidu primary school	Certificate of primary Education

5. ACADEMIC WORK EXPERIENCE

January 2017 – 2018 working at Hyscon Engineering Limited and Msukwa General Enterprises CO.LTD as the site technician, duties assigned were supervision on the following projects;

NAME OF PROJECT	PROJECT DURATION
VOCATIONAL TEACHER II AT MIKUMI VTC TEACHING MASONRY AND BRICKLAYING	AUGUST 2020 -TO DATE
PROPOSED CONSRUCTION OF RESIDENTIAL BUILDING 3 STOREY AT MBEZI- MAKONDE	SEPTEMBER 2019 – JULY 2020
PROOPOSED CONSTRUCTION OF ROADSIDES WELLNES CENTRE TO BE BUILT AT DUMILA KILOSA IN MOROGORO REGION	OCTOBER 2018 – JULY 2019
PROPOSED CONSTRUCTION OF RAW MATERIAL STORE MWANZA TBL	MAY 2018 – OCTOBER 2018
PROPOSED CONSTRUCTION OF COMMERCIAL BUILDING LOCATED AT PLOT NO 12 BLOCK "KK " NYAKATO ,MWANZA CITY	JANUARY 2017 – MAY 2018

PRACTICAL TRAINING .

- JUNE 2014 – AUGUST 2014 practical training at TANROADS - Singida assigned at the position of craftsman and duties assigned were
  i. Highway material test
  ii.In situ material test

- JUNE – AUGUST - 2015 Practical Training at Hyscon Engineering Limited assigned the duties of Site Technician on construction of residential/ commercial building (MONGO HOUSE) at plot No. 6 Nyerere road - Mwanza

- AUGUST 2016 – JANUARY 2017 Practical Training at Mwanza Urban Water and Sanitation Authority (MWAUWASA) assigned the position of Technician, duties assigned were

  I. Water Laboratory works tests
  II. Investigation on the problem of water shortage in various areas in Mwanza municipality
  III. Extension of water supply system in Kisesa township

6. PERSONAL SKILLS

- Self-motivated leaner and efficient worker.
- Time management to accomplish tasks in time.
- Good communication skills.
- Working in a team.
- Ability to work under pressure with minimum supervision.
- Good in computer application(MS Word, Ms Excel and Internet, Auto CAD,)
- Leadership skills.

7. HOBBIES.

- Travelling.
- Listening to music.
- Reading knowledge books.

8. REFEREES

Full Name:	JACOB H. ANDREW
Occupation:	STRUCTURAL ENGINEER
Organization:	KIBAHA DISTRICT
Address:	P. O Box
Mobile	+255764202197
Email – address :	jacobhandrew@gmail.com
Name.	GODSON A GODSON
Occupation;	CIVIL TECHNICIAN
Organization;	MKALAMA DISTRICT
Address ;	P.O.BOX. 240 SINGIDA
Mobile ;	0758214699
Email address;	godsonamoss@gmail.com

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN

NTA Level 6 No.....00680.....

National Technical Awards (NTA)

It is hereby certified that

.....**PAULO....B....QAMBESH**.....

Registration No. **MIS/07/DCECD/818** ..... *of*

MISUNGWI Community Development Technical

Training Institute has been awarded

An Ordinary Diploma in Civil Engineering and Community Development

...Accredited by National Council for Technical Education (NACTE)

after having fulfilled all the requirements for NTA Level 6

at the level of

UPPER Second Class

Issued this **30th** *day of* **November** *in the year* **2016**

.....

CHAIRPERSON

.....

EXECUTIVE SECRETARY

MINISTRY OF HEALTH, COMMUNITY DEVELOPMENT, GENDER, ELDERLY AND CHILDREN

MISUNGWI COMMUNITY DEVELOPMENT TECHNICAL TRAINING INSTITUTE

ORDINARY DIPLOMA IN CIVIL ENGINEERING AND COMMUNITY DEVELOPMENT

ACADEMIC PERFORMANCE STATEMENT

SURNAME	OTHER NAMES	SEX	DATE OF BIRTH	REG NUMBER	HOME ADDRESS
QAMBESHI	PALLO R.	MALE	06-04-89	MIS/07/023	P. O BOX 255, MANYARA

NTA LEVEL 4
2013/2014

SEMESTER I

CODE	MODULE	MK	GRADE
GST 04101	ALGEBRA	54	C
GST 04102	COMPUTER BASICS AND WORD PROCESSING	72	B
GST 04103	INTRODUCTION TO COMMUNICATION SKILLS	65	B-
CET 04101	INTRODUCTION TO BUILDING AND CIVIL ENGINEERING MATERIALS	60	C
CET 04102	INTRODUCTION TO BUILDING CONSTRUCTION	59	A
CET 04103	FUNDAMENTALS OF MECHANICS	66	B
CET 04104	INTRODUCTION TO ENVIRONMENTAL MANAGEMENT	57	C
CDT 04101	INTRODUCTION TO COMMUNITY DEVELOPMENT	68	B
CDT 04102	GENDER AND HIV AIDS	66	B
CDT 04103	INTRODUCTION TO SOCIOLOGY	59	A
	SEMESTER GPA		3.0
	CGPA		3.1

SEMESTER II

CODE	MODULE	MK	GRADE
GST 04204	TRIGONOMETRY SEQUENCE AND SERIES	79	B
CET 04204	TECHNICAL DRAWING	94	A
GST 04205	COMPUTER APPLICATIONS	92	A
CPT 04203	BUILDING CONSTRUCTION PRACTICE	57	C
GST 04206	COMMUNICATION SKILLS	83	A
GST 04207	INTRODUCTION TO ENTERPRENEURSHIP	64	C
CET 04206	BASIC SOIL MECHANICS	79	B
CET 04207	ROAD CONSTRUCTION	74	B
CET 04208	LINEAR SURVEYING	75	B
CET 04209	INDUSTRIAL TRAINING	90	A
	SEMESTER GPA		3.2

NTA LEVEL 5
2014/2015

SEMESTER I

CODE	MODULE	MK	GRADE
GST 05101	STATISTICS AND PROBABILITY	56	C
GST 05102	ADVANCED COMPUTER APPLICATION	90	A
GST 05103	ENGINEERING METROLOGY	85	B
GST 05104	ENTREPRENEURSHIP AND DEVELOPMENT	72	B
CET 05501	BUILDING AND CIVIL ENGINEERING MATERIALS	72	B
CET 05502	BUILDING CONSTRUCTION	68	B
CET 05503	ARCHITECTURAL DRAWING	78	B
CET 05504	LAND SURVEYING	75	B
CET 05505	STRUCTURAL ANALYSIS	62	C
CET 05506	FLUID MECHANICS AND HYDRAULICS	90	A
	SEMESTER GPA		3.0
	CGPA		3.2

SEMESTER II

CODE	MODULE	MK	GRADE
GST 05201	ETHICS	92	A
GST 05202	COMPUTER AIDED DESIGN	87	B
GST 05203	PRESENTATION AND NEGOTIATION SKILLS	90	A
GST 05204	ENTREPRENEURSHIP AND BUSINESS MANAGEMENT	76	B
GST 05205	PROPERTIES OF MATERIALS	78	B
CET 05201	ROAD CONSTRUCTION AND MAINTENANCE	75	B
CET 05202	MEASUREMENTS OF BUILDINGS AND CIVIL WORKS	61	C
CET 05203	SOIL MECHANICS	79	B
CET 05204	APPROPRIATE TECHNOLOGY	75	B
CDT 05201	COMMUNITY DEVELOPMENT	96	A
CET 05211	INDUSTRIAL TRAINING	87	B
			3.4

NTA LEVEL 4
2015/2016

SEMESTER I

CODE	MODULE	MK	GRADE
GST 06101	CONICS AND ORDINARY DIFFERENCIAL EQUATIONS	94	A
CDT 06101	MANAGEMENT OF COMMUNITY DEVELOPMENT PROJECTS	88	B+
CET 06101	QUANTITY SURVEYING	85	B+
CET 06102	REINFORCED CONCRETE DESIGN	82	B
CET 06103	ROUTE LOCATION AND DESIGN	78	B+
CET 06104	STEEL AND TIMBER DESIGN	69	C
CET 06105	CONSTRUCTION MANAGEMENT	65	B-
	SEMESTER GPA		
	CGPA		

SEMESTER II

CODE	MODULE	MK	GRADE
GST 06201	ENGINEERING MATHEMATICS	99	A
CDT 06202	BEHAVIOR AND PROFESSIONAL ETHICS	85	B+
CET 06203	TRANSPORTATION ENGINEERING	96	A
CET 06204	PAVEMENT DESIGN	94	A
CET 06211	INTRODUCTION TO CONTRACT MANAGEMENT	87	B+
CET 06212	SOIL AND FOUNDATION ENGINEERING	76	B
CET 06213	SANITARY ENGINEERING	70	B-
		75	B
	SEMESTER GPA		3.2

RESULTS PASS AND AWARDED AS ORDINARY DIPLOMA IN CIVIL ENGINEERING AND COMMUNITY DEVELOPMENT AT THE LEVEL OF LOWER SECOND CLASS

NOTES:

1. RM MEANS RAW MARK
2. GRADE MEANS MODULE GRADE ACHIEVED
3. GPA MEANS GRADE POINT AVERAGE
4. CGPA MEANS CUMULATIVE GRADE POINT AVERAGE

5. FOR NTA LEVEL 4 AND 5:
   - A= EXCELLENT (80%-100%)
   - B= GOOD (65%-79%)
   - C= SATISFACTORY (50%-64%)
   - D= PASS (40%-49%)
   - F= FAIL (BELOW 40%)

   CLASSES OF AWARD:
   - CGPA(3.5-4.0)=FIRST CLASS
   - CGPA(3.0-3.4)=SECOND CLASS
   - CGPA(2.0-2.9)=PASS

6. FOR NTA LEVEL 6:
   - A= EXCELLENT (75% - 100%)
   - B= VERY GOOD (65%-74%)
   - B+= GOOD (60%-64%)
   - C= SATISFACTORY (45%-59%)
   - D= PASS (35%-44%)
   - F= FAIL (BELOW 35%)

   CLASSES OF AWARD:
   - CGPA(4.4-5.0)=FIRST CLASS
   - CGPA(3.5-4.3)=UPPER SECOND CLASS
   - CGPA(2.7-3.4)=LOWER SECOND CLASS
   - CGPA(2.0-2.6)= PASS

Issued by:

VICE PRINCIPAL ACADEMIC

Certified by:

THE PRINCIPAL

COMMUNITY DEVELOPMENT TECHNICAL TRAINING INSTITUTE MWANZA

The National Examinations Council of Tanzania

Certificate of Secondary Education

This is to certify that PAULO B QAMBESH

Index No. S2090-0051

sat for the Certificate of Secondary Education Examination

at LAGHANGA SECONDARY SCHOOL in OCTOBER 2010

and qualified for the award of a

CERTIFICATE OF SECONDARY EDUCATION

in Division TWO

after attaining the following performance:-

Subject	Grade
CIVICS	C (PASS)
HISTORY	C (PASS)
GEOGRAPHY	C (PASS)
KISWAHILI	D (PASS)
ENGLISH LANGUAGE	C (PASS)
PHYSICS	D (PASS)
CHEMISTRY	C (PASS)
BIOLOGY	C (PASS)
BASIC MATHEMATICS	C (PASS)

****

Chairperson

Executive Secretary

This is a secure document using special inks and paper.
Hold this document to the light to verify the NECTA watermark and security thread can be seen through the paper.
Any alteration or amendment to this document invalidates it.

CS10 0040129

ED REPUBLIC OF TANZANIA

CERTIFICATE OF BIRTH

BB/No. 2595377

Where born	Name (Last)	Sex	Name and Surname of father	Father's occupation and residence	Father's Nationality	Name and maiden name of mother	Mother's occupation and residence	Mother's Nationality	Signature, description and residence of informant	Date of Birth	Date of registration	Signature of registering officer	Baptismal name if added or altered after registration of birth
(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
AT HOME GAMIDU KATI STREET HANANG DISTRICT	PAULO	MALE	BOAY GAMBESH GEREWAY	PEASANT GAMIDU VILLAGE HANANG DISTRICT	CITIZEN OF TANZANIA	MARIAM GIDARJA DAPEMNG'AJEGA	PEASANT GAMIDU VILLAGE HANANG DISTRICT	CITIZEN OF TANZANIA	AS PER APPLICATION IN WRITING DATED 11.3.2011 AND SIGNED BY BOAY GAMBESH GEREWEY FATHER OF THE CHILD OF KATESH	FOURTH JUNE 1989	FOURTEENTH MARCH 2011	TILUBUZYA J.M. DISTRICT REGISTRAR	

I under the Births and Deaths Registration Ordinance (Cap. 108 of the Laws), to be a true copy of an entry in the register in my custody of Births
trict of HANANG in Tanzania.

Dated this 15TH day of MARCH 20 11

e Paid Shs. 2,000/=

DISTRICT REGISTRAR OF BIRTHS & DEATHS - HANANG DISTRICT

DISTRICT REGISTRAR

CURRICULUM VITAE (CV)

1.0 PERSONAL PARTICULARS

FIRST NAME: Athumani
MIDDLE NAME: Selemani
BIRTH DATE: 12/01/1994
NATIONALITY: Tanzanian
SEX: Male
MARITAL STATUS: Single
LANGUAGE: Swahili and English
CONTACT: 0657071437/0682280406
EMAIL: othsuleyman6@gmail.com

PERSONAL ATTRIBUTES

- ✓ High achiever and always ready to take up challenges
- ✓ Self-confidence, good interpersonal relations and language fluency.

3.0 EDUCATIONAL BACKGROUND

YEAR	SCHOOL	AWARD
2014 to 2016	Ifunda Technical Secondary School	Advanced Certificate for Secondary Education Examination(ACSEE)
2010 to 2013	Mafisa secondary school	Certificate for Secondary Education Examination(CSEE)
2003 to 2009	Mafisa primary school	Certificate for primary Education Examination

4.0 PROFESSIONAL BACKGROUND

YEAR	INSTITUTION	AWARD
2016-2019	Arusha Technical College	Ordinary Diploma in Civil and Irrigation Engineering

5.0 WORKING EXPERIENCE

YEAR	ORGANIZATION	POSITION
2016/2017	Soil, bitumen and aggregate laboratory	Industrial Practical Training(IPT)
2017/2018	Soil, bitumen and aggregate laboratory	Industrial Practical Training(IPT)
2018/2019	Mapaki General Enterprises ltd	Industrial Practical Training(IPT)

OTHER SKILLS

- ✓ Computer literacy
  - Microsoft-word, excel and power point presentation
  - AutoCAD

HOBBIES

- ✓ Playing and watching football
- ✓ Reading religious books
- ✓ Reading and listening sport news

REFEREES

1. Mariam Mohamed Kidagho
   Bank of Tanzania
   P.O Box 3043
   Arusha
   0754365364/0785043489.

2. Ramadhani Mohamed Kunguti
   Acting District Water Engineer
   P.O Box 89
   Pangani
   0785272271/0625704041.

3. Selemani Athumani Kongomelo
   Kilindi-Tanga
   0688895478

NTA Level 6 No: 000003834

ARUSHA TECHNICAL COLLEGE

This is to certify that

Athumani Seleman

Registration No: 16020412017
Having satisfied the requirements for the award of the

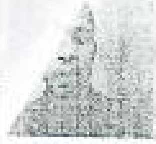
Ordinary Diploma in Civil and Irrigation Engineering with Upper Second Class

Was conferred at a congregation held in Arusha
on the eighteenth of January in the year two thousand and twenty

Board Chairperson

Rector

17/02/2020



ARUSHA TECHNICAL COLLEGE

ARUSHA,TANZANIA

CIVIL ENGINEERING DEPARTMENT

ACADEMIC TRANSCRIPT

Serial No. 003/??

...me of Candidate		ATHUMANI SELEMANI									
...gramme		ORDINARY DIPLOMA IN CIVIL AND IRRIGATION ENGINEERING						Admission No		16020412017	
...nder	Male	Date of Birth	12/01/1994	Date of Entry	01/08/2016	Date of Completion	10/01/2020	Citizenship	Tanzanian		

NTA LEVEL 4 SEMESTER I - 2016/2017

Code	Credits	Module Name	Grade
...T 04101	9	Basic Civil Engineering Materials	A
...T 04102	11	Soil Mechanics	B
CET 04103	9	Basic Engineering Drawing	B
...T 04104	12	Construction Technology	A
...T 04101	5	Algebra And Trigonometry	A
GST 04102	8	Mechanics And Nuclear Physics	B
...T 04103	4	English Language Basics	B

SEMESTER I GPA : 3.4

NTA LEVEL 4 SEMESTER II - 2016/2017

Code	Credits	Module Name	Grade
CET 04205	9	Basic Structural Mechanics	B
CET 04206	12	Installation And Maintenance Of Services	B
CET 04207	5	Building Construction And Maintenance	B
CET 04208	9	Basic Engineering Survey	B
GST 04201	5	Series And Boolean Algebra	A
GST 04202	4	Gender And HIV	A
GST 04203	5	Microcomputer Application	A
IPT 04	10	Industrial Practical Training (ipt)	A

SEMESTER II GPA : 3.5

FIRST YEAR GPA : 3.4/4

NTA LEVEL 5 SEMESTER I - 2017/2018

Code	Credits	Module Name	Grade
CE... 05110	12	Engineering Surveying	B
...T 05111	6	Civil Engineering Drawing (cad)	C
... 05112	9	Civil Engineering Materials	C
...T 05113	6	Road Design, Construction And Maintenance	A
CET 05114	6	Water Supply And Sanitation	A
...T 05101	5	Differentiation And Integration	B
...T 05102	6	Thermal Energy, Waves And Organic Compounds	B
GST 05103	6	Introduction To Programming Using C Language	B

SEMESTER I GPA : 2.9

NTA LEVEL 5 SEMESTER II - 2017/2018

Code	Credits	Module Name	Grade
CET 05215	8	Structural Mechanics	B
CET 05216	9	Quantity Surveying	C
CET 05217	11	Workshop And Construction Practices	B
CET 05218	8	Construction Management	A
GST 05201	5	Matrices, Complex And Vectors	A
GST 05202	4	English Language Skills	A
GST 05203	4	Basics Of Entrepreneurship	B
GST 05204	4	Introduction To Networking	B
IPT 05	10	Industrial Practical Training	B

SEMESTER II GPA : 3.0

SECOND YEAR GPA : 3.0/4

NTA LEVEL 6 SEMESTER I - 2018/2019

Code	Credits	Module Name	Grade
...D 06121	9	Reinforced Cement Concrete Design	A
CED 06122	9	Soil Mechanics And Foundations	A
...D 06125	6	Hydraulics And Fluid Mechanics I	A
... 06101	3	Introduction To Irrigation Engineering	A
...T 06102	6	Irrigation Water Supply	A
... 06103	4	Collection And Analysis Of Hydrological Data	B+
... 06104	4	Soil Analysis For Irrigation	B
... 06105	6	Irrigation Surveying	B+
GSD 06101	6	Coordinate Geometry And Differential Equations	A
...D 06102	4	Correspondence And Report Writing Skills	A
...-I	5	Project I	C

SEMESTER I GPA : 4.4

NTA LEVEL 6 SEMESTER II - 2018/2019

Code	Credits	Module Name	Grade
CED 06226	6	Hydraulics And Fluid Mechanics II	B+
C...T 06201	6	Computer Aided Drawing	B+
C...T 06202	4	Design Of Simple Irrigation Scheme	B+
C...T 06203	4	Construction Planning Of Irrigation Scheme	B
C...T 06204	6	Construction Management Of Irrigation Scheme	A
C...T 06205	4	Design Of Irrigation Schedules	B
C...T 06206	6	Operation And Maintenance Of Irrigation Systems	B
C...T 06207	4	Social And Environmental Management	A
GST 06201	6	Linear Programming, Statistics And Probability	B+
GST 06202	6	Enterprise Management	B
IPT 06	10	Industrial Practical Training (ipt)	B+
P06-II	2	Project II	C

SEMESTER II GPA : 3.7

THIRD YEAR GPA : 4.0/5

Signature ______

16/01/2020

Dr. Baraka Richende

REGISTRAR

17/02/2020

The National Examinations Council of Tanzania

Certificate of Secondary Education

This is to certify that ATHUMANI SELEMANI

Index No. S3790-0051

sat for the Certificate of Secondary Education Examination

at MAFISA SECONDARY SCHOOL in NOVEMBER 2013

and qualified for the award of a

CERTIFICATE OF SECONDARY EDUCATION

in Division TWO

after attaining the following performance:-

Subject	Grade
CIVICS	C (PASS)
HISTORY	B (PASS)
GEOGRAPHY	B (PASS)
KISWAHILI	B+ (PASS)
ENGLISH LANGUAGE	B+ (PASS)
PHYSICS	C (PASS)
CHEMISTRY	B (PASS)
BIOLOGY	B (PASS)
BASIC MATHEMATICS	B (PASS)

Chairperson

Executive Secretary

17/02/2020 Agreed

NTA Level 6 No: 0002022

THE UNITED REPUBLIC OF TANZANIA
MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

It is hereby certified that

Jones J. Hokororo

of Registration No: 201131129 has been awarded

an Ordinary Diploma in

Electrical And Electronic Engineering

at Lower Second class

(Accredited by National Council for Technical Education)

Issued this 20th day of December in the year 2014

Deputy Vice Chancellor
(Academic, Research and Consultancy)

Vice Chancellor

(This certificate is not valid without embossed seal)

THE UNITED REPUBLIC OF TANZANIA

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

DIPLOMA EXAMINATIONS

CONSOLIDATED STATEMENT OF MARKS

(ELECTRICAL DEPARTMENT)

Serial No.:014441

Name of the Candidate	Birth Date	Sex	Registration No.	Date of Entry	Programme	NTA Level
JONES J. HOKORORO	05/01/1966	M	201131129	2011/2012	DIPLOMA IN ELECTRICAL & ELECTRONIC ENGINEERING	4 – 6

Semester	Module Code	Module Name	Grade	Date Appeared
I	EET 04101	BASICS OF ELECTRICAL ENGINEERING I	B	2011
I	EET 04102	ELECTRICAL INSTALLATION SAFETY & MAINTENANCE I	C	2011
I	EET 04103	ELECTRICAL MATERIALS I		
I	EET 04104	WORKSHOP TECHNOLOGY & PRACTICE I	C	2011
I	EET 04105	TECHNICAL DRAWING I	B	2011
I	EET 04106	ELECTRICAL MEASUREMENTS I	C	2011
I	EET 04107	ELECTRONICS I	C	2011
I	GST 04101	ADVANCED MATHEMATICS I	C	2011
I	GST 04102	PHYSICAL SCIENCE I	C	2011
I	GST 04103	COMMUNICATION SKILLS I	B	2011
I	GST 04104	ENTREPRENEURSHIP DEV. EDUCATION I	C	2011
I	GST 04105	BASIC COMPUTER APPLICATION I	C	2011
II	EET 04201	BASICS OF ELECTRICAL ENGINEERING II	C	2012
II	EET 04202	ELECTRICAL INSTALLATION SAFETY & MAINTENANCE II	C	2012
II	EET 04203	ELECTRICAL MATERIALS II	C	2012
II	EET 04204	WORKSHOP TECHNOLOGY & PRACTICE II	B	2012
II	EET 04205	TECHNICAL DRAWING II	B	2012
II	EET 04206	ELECTRICAL MEASUREMENTS II	C	2012
II	EET 04207	ELECTRONICS II	B	2012
II	GST 04201	ADVANCED MATHEMATICS II	C	2012
II	GST 04202	PHYSICAL SCIENCE II	B	2012
II	GST 04203	COMMUNICATION SKILLS II	B	2012
II	GST 04204	ENTREPRENEURSHIP DEV. EDUCATION II	B	2012
II	GST 04205	BASIC COMPUTER APPLICATION II	A	2012
II	IPT 04	IPT		
I	EET 05101	MATLAB	C	2012
I	EET 05102	ELECTRONICS III	B	2012
I	EET 05103	ELECTRICAL INSTALLATION I	B	2012
I	EET 05104	ELECTRICAL MAINTENANCE	C	2012
I	EET 05105	FUNDAMENTAL OF AUTOMATION I	C	2012
I	EET 05106	POWER PLANT ENGINEERING I	B	2012
I	EET 05107	DC MACHINES II	B	2012
I	EET 05108	ELECTRICAL POWER UTIRAZATION I	C	2012
I	EET 05109	WORKSHOP TECHNOLOGY & PRACTIE IV	C	2012
I	GST 05101	ADVANCED MATHEMATICS IV	B	2012
I	GST 05102	PHYSICAL SCIENCE IV		
I	GST 05103	COMMUNICATION SKILLS IV		
I	GST 05104	ENTRPRENEURSHIP DEV. EDUCATION IV		
	GST 05105	BASIC COMPUTER APPLICATION IV		

Semester	Module Code	Module Name	Grade	Date Appeared
II	EET 05201	AUTO CAD	B	2013
II	EET 05202	POWER ELECTRONICS	C	2013
II	EET 05203	ELECTRICAL EQUIPMENTS	B	2013
II	EET 05204	POWER TRANSMISSION & DISTRIBUTION	C	2013
II	EET 05205	FUNDAMENTALS OF AUTOMATION II	C	2013
II	EET 05206	AC MACHINES I (TRANSRMERS0	C	2013
II	EET 05207	DC MACHINES II	B	2013
II	EET 05208	ELECTRICAL POWER UTILIZATION II	B	2013
II	EET 05209	WORKSHOP TECHNOLOGY &PRACTICE IV	A	2013
II	GST 05201	ADVANCED MATHEMATICS IV	B	2013
II	GST 05202	PHYSICAL SCIENCE IV	C	2013
II	GST 05203	COMMUNICATION SKILLS IV	C	2013
II	GST 05204	ENTRPRENEURSHIP DEV. EDUCATION IV	C	2013
II	GST 05205	BASIC COMPUTER APPLICATION IV	C	2013
	IPT 05	IPT	A	2013
I	EED 06101	A.C MACHINES II	C	2013
I	EED 06102	DIGITAL ELECTRONIS I	C	2013
I	EED 06103	ELECTRICAL DRIVES I	B+	2013
I	EED 06104	ELECTRICAL INSTALLATION II	B	2013
I	EED 06105	FUNDAMENTAL OF AUTOMATION III	C	2013
I	EED 06106	POWER TRANSMISSION AND DISTRIBUTION II	B	2013
I	EED 06107	TRANSFORMER REWINDING I	B+	2013
I	EED 06108	POWER PROTECTION I	B	2013
I	EED 06109	PROJECT I	B+	2013
I	GSD 06101	ADVANCED MATHEMATICS V	B	2013
I	GSD 06102	PHYSICAL SCIENCE V	C	2013
I	GSD 06103	COMMUNICATION SKILLS V	C	2013
I	GSD 06104	ENTRPRENEURSHIP DEV. EDUCATION V	C	2013
I	GSD 06105	BASIC COMPUTER APPLICATION V	B+	2013
II	EED 06201	A.C MACHINES III	B	2014
II	EED 06202	DIGITAL ELECTRONIS II	B+	2014
II	EED 06203	ELECTRICAL DRIVES II	C	2014
II	EED 06205	FUNDAMENTAL OF AUTOMATION IV	B	2014
II	EED 06208	POWER PROTECTION II	A	2014
II	EED 06209	PROJECT II	A	2014
II	EED 06210	RENEWABLE ENERGY	A	2014
II	EED 06211	MOTOR REWENDING	B	2014
II	GSD 06201	ADVANCED MATHEMATICS VI	C	2014
II	GSD 06202	PHYSICAL SCIENCE VI	B+	2014
II	GSD 06203	COMMUNICATION SKILLS VI	C	2014
II	GSD 06204	ENTRPRENEURSHIP DEV. EDUCATION VI	B+	2014
II	GSD 06205	BASIC COMPUTER APPLICATION VI		

Cumulative Grade Point Average: 3.3

Class of Award: Lower Second Class

Dr. N. Mbende

Director of Undergraduate Studies

Date of Issued: 31-12-14

THE INSTITUTION OF ENGINEERS TANZANIA

(Established 1975)

This is to certify that

JONES HOKORORO

was on **12TH JUNE, 2014** admitted

Student

(Membership number **ST/6115/2014**)

of

The Institution of Engineers Tanzania

a Society constituted to promote the general advancement of the Science and Practice of Engineering and its applications

WITNESS our hands and Seal on

This **10TH** day of **OCTOBER, 2014**

INSTITUTION OF ENGINEERS TANZANIA

Executive Secretary

President

10

MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

PROVISIONAL CERTIFICATE

This is to certify that:

Jones J. Hokororo

Registration No:

201131129

Has qualified for the award of

Ordinary Diploma in Electrical Engineering

He/she having passed Ordinary Diploma Examinations held in

July 2014

NTA: *Level: 6*

Class Award: *Lower Second Class*

Vice Chancellor

Deputy Vice Chancellor –ARC

(Official Seal)

Issued on: 20th December 2014

(This Provisional Certificate is only valid 2 month from the issued date)

THE
INSTITUTION OF ENGINEERS TANZANIA

(Established 1975)

This is to certify that

JONES HOKORORO

was on **12TH JUNE, 2014** admitted

Student

(Membership number **ST/6115/2014**)

of

The Institution of Engineers Tanzania

a Society constituted to promote the general advancement of the Science and Practice of Engineering and its applications

WITNESS our hands and Seal on

This **10TH** day of **OCTOBER, 2014**

INSTITUTION OF ENGINEERS TANZANIA

Executive Secretary

President

THE INSTITUTION OF ENGINEERS TANZANIA

JONES HOKORORO

12TH JUNE, 2014

Student

ST/6115/2014

a Society constituted to promote the general advancement of the Science and Practice of Engineering and its applications

WITNESS our hands and Seal on

This 10TH day of OCTOBER, 2014

INSTITUTION OF ENGINEERS TANZANIA

Executive Secretary

President

The National Examinations Council of Tanzania

Vocational Teacher's Certificate

This is to certify that JONES J HOKORORO

Index No. E546-0024

of MOROGORO-VOCATIONAL

sat for the Vocational Teacher's Examination held in MAY 1997

and qualified for the award of this certificate

after attaining the following performance:

Subject	Grade	
METHODOLOGY	D	(PASSED)
EDUCATIONAL STUDIES	B	(PASSED)
COMMUNICATION METHODS	D	(PASSED)

****

Chairman

Executive Secretary

VTC No 000104

No valid without a hologram.
This is a secure document using special ink and paper.
Hold this document to the light to verify a Citizen can be seen through the paper.

NTA Level 6 No: 0002022

THE UNITED REPUBLIC OF TANZANIA
MBEYA UNIVERSITY OF SCIENCE AND TECHNOLOGY

It is hereby certified that

Jones J. Mkocorero

of Registration No. 20131129 has been awarded

an Ordinary Diploma in

Electrical And Electronic Engineering

at Lower Second class

As credited by National Council for Technical Education

Issued this 20th day of December in the year 2014

Deputy Vice Chancellor
Academic, Research and Consultancy

Vice Chancellor

This certificate is not valid without embossed seal

VOCATIONAL EDUCATION AND TRAINING AUTHORITY

VETA

EASTERN ZONE

Certificate of Attendance

This is to certify that

Mr./Ms/Miss JONES J. HOKORORO

has successfully attended a two-weeks

Instructional Techniques Course

in

Competence Based Education and Training Approach (CBET)

that was conducted by

VETA Eastern Zone

from 10/7/2006 to 21/7/2006 at Kibaha FDC

A.T. Mmbaga
VTCs Coordinator

21/7/2006
Date

G.F. Lewis
Ag. Zonal Director
VETA Eastern Zone

Ministry of Energy and Minerals

Tanzania

Transformation of the Rural Photovoltaic (PV) Market in Tanzania

Certificate

This is to certify that

Mr./ Mrs./ Ms. Jones J. Hokororo .

Attended and completed a Training of Trainer Course on

Sizing, Installation, Maintenance and Repair of Photovoltaic System

Conducted at

Mwanza Regional Vocational Training

and

Service Centre

From 7Th to 19Th May, 2007.

Mzumbe Mussa
PROJECT MANAGER

19th May 2007
Date

Prof. R. T. Kivaisi
COURSE INSTRUCTOR

Regional Administration Block, Off Regional Drive Access Road
P. O Box 136, MWANZA, Tanzania, East Africa
Telephone: +255 (0) 28 2500857
Telefax/tele: +255 (0) 28 2500857
E-mail: solar@regcom.mwz.co.tz

TRPV 2004

VOCATIONAL EDUCATION AND TRAINING AUTHORITY

VETA

SKILLED LABOUR FORCE - THE FUTURE OF TANZANIA

914

Certificate of Attendance

This is to certify that

Jones J. Kokoroo

Has attended a Training of Trainers (ToT) in **Preventive Maintenance** for Vocational Teachers conducted at Morogoro Vocational Teachers Training College from 02nd March - 8th March, 2009

Director
VET

Principal
MVTTC

TANZANIA SOLAR ENERGY ASSOCIATION

TASEA

CERTIFICATE OF ATTENDANCE

This is to certify that

Mr Jones Hokororo

has attended a two- week long TOT course on

Solar Photovoltaic Technology: Sizing, Installation and Maintenance

which was held on August 9-20, 2010

Morogoro, TANZANIA

Prof. R. T. Kivaisi
Photovoltaic Specialist and
Course Coordinator

Prof C. Kimambo
TASEA. Chairman

Trade ELECTRICAL INSTALLATION

Category GRADE ONE

Date of issue 11TH MARCH 1988

Place of issue MVTD DAR ES SALAAM

Endorsement

This is to certify that the holder whose photograph and signature appear hereon has passed a Trade test qualifying him as shown

Signature of Trade Certification Panel

Signature of the Director of Vocational Training

Name of Holder JOYCE JOSEPH

Registered Number EL/333/87

Signature of Holder

№ 00000074

UNITED REPUBLIC OF TANZANIA

NATIONAL VOCATIONAL TRAINING COUNCIL

VOCATIONAL TEACHER'S CERTIFICATE

This is to certify that

JOHN J. KOKORO

is awarded this certificate after having satisfactorily completed the TWO year(s) vocational teacher training course at THE VOCATIONAL TEACHERS TRAINING COLLEGE, MOROGORO, and is a qualified vocational teacher in

ELECTRICAL INSTALLATION

Given under the common seal of the college

This 17TH day of DECEMBER, 1982

Secretary
National Vocational
Training Council

Principal

MEM/ELB/320/3127

THE UNITED REPUBLIC OF TANZANIA

The Tanganyika Electricity Ordinance
(Cap 131)

CLASS C

ELECTRICAL CONTRACTOR'S LICENCE

LICENCE No. 718

This is to certify that (full name) JONES JOSEPH HOKORORO

of (Address) P.O. BOX 110

MIKUMI-MOROGORO

has been examined by the Electricity Licensing Board on 05TH

day of DECEMBER year 2000 and licensed as an
ELECTRICAL CONTRACTOR CLASS C

The Electrical Contractors licence class C is issued to a person with the necessary knowledge and practical experience in carrying out all low voltage electrical installation works in buildings and premises NOT USE OR INTENDED TO BE USED FOR FACTORIES OR INDUSTRIAL PURPOSES AND WHERE POWER AND VOLTAGE DO NOT EXCEED 30 KVA AND 500 VOLTS RESPECTIVELY.

Condition: The Licence Holder must have a Valid Pass Card

Signature
Member of the Licensing Board

Signature
Chairman of the Licensing Board

Date: 07.03.2001

Certificate of achievement

This certificate is awarded to

Name: Jones J. Hokororo, Electrical Installation

In order to certify that above mentioned instructor is competent and able to instruct and disseminate the principles of competence based education and training

Vocational Education and Training Authority, Dar es Salaam

Director General

Signature

Date

Director of Vocational Education and Training

Signature

Date

VOCATIONAL EDUCATION AND TRAINING AUTHORITY

No: 0078

Certificate of Attendance

ISSUED UNDER THE AUTHORITY OF THE VOCATIONAL EDUCATION AND TRAINING BOARD

This is to certify that ... JONES J. HOKORORO ...
has successfully completed 2 (TWO) ..... week(s) course in
..... INTRODUCTION TO COMPUTERS ..... conducted at the
REGIONAL VOCATIONAL TRAINING AND SERVICE CENTRE MOROGORO - MIKUMI
from ....20/08/2001.... to 04/09/2001..
During this period he/she has been trained in the following areas

	Subject
1.	INTRODUCTION TO WINDOWS 95/98/2000
2.	D.O.S.
3.	PACKAGES: - WORD PROCESSING, SPREADSHEET, DATA BASE
4.	DISK CONTROLS

REG NO VTC/130/SC/74/2001

Date of issue 28 AUG 2001

SHORT COURSE COORDINATOR

TRAINING MANAGER

UNIVERSITY OF DAR ES SALAAM

BICO

No. 04715

Bureau for Industrial Cooperation

PROFESSIONAL DEVELOPMENT PROGRAMME

This is to certify that

JONES HOKORORO

has attended the course titled

Skills Upgrading in:
Entrepreneurship and Management SMME, CBET and Pedagogical, Workshop Management, Finance Management, Project Management, Maintenance and Safety Engineering

held from October 18, 2004 *until* October 29, 2004

and is hereby awarded this

Certificate

SIGNED:

Dr. A.J. Kyando
Director, BICO

Prof. B.C.M. Mkamilla
Chairman, Committee of the
for Engineering and Technology

THE NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

Certificate

OF SECONDARY EDUCATION

This is to certify that [redacted]

Index No [redacted] *of* [redacted]

Secondary School, has successfully completed Secondary Education in [redacted]

and qualified for the award of a

CERTIFICATE OF SECONDARY EDUCATION IN DIVISION [redacted]

after attaining the following performance:-

Subject	*Grade*
[redacted]	C
[redacted]	D
[redacted]	F
[redacted]	D
[redacted]	D
[redacted]	F
[redacted]	D
[redacted]	D
[redacted]	D
[redacted]	D
* * * * * * * * * * *	* * *

Chairman

8 MAR 1984
Date

Secretary

CURRICULUM VITAE (CV)

PERSONAL INFORMATION

First name	:	Jones
Middle name	:	Joseph
Surname	:	Hokororo
P.O. BOX	:	110 Mikumi , Morogoro - Tanzania
Mobile phone	:	**0765737583 / 0785938383 / 0765897073 / 0673035236**
E-mail Address	:	hockyj@yahoo.co.uk
Sex	:	Male
Nationality	:	Tanzanian
Date of birth	:	05/01/1966
Marital Status	:	Married
Place of domicile	:	Ndanda – Masasi – Mtwara

CAREER OBJECTIVE

To work as a productive Engineer and Professional Trainer in Vocational Training Centre where I will be able to my skills and experience in the areas of academic , research and consultancy with all necessary expertise .

EDUCATION BACKGROUND

Year	: 2013/2014
University	: **Mbeya University of Science and Technology (MUST)**
Award	: Ordinary Diploma (OD) in Electrical and Electronics engineering
Year	: **2012/2013**
University	: **Mbeya University of Science and Technology (MUST)**
Award	: Full Technician Certificate (FTC) in Electrical and Electronics engineering
Year	: **2011/2012**
University	: **Mbeya University of science and technology (MUST)**
Award	: Basic Technician Certificate in Electrical and Electronics engineering
Year	: **Sep 1996 - Jun 1997**
College	: **Morogoro Vocational Teachers Training College (MVTTC)**
Award	: Vocational Teachers Certificate (NECTA)
Year	: **Jan 1991-Dec 1992**
College	: **Morogoro Vocational Teachers Training College (MVTTC)**
Award	: Vocational Teachers Certificate in Electrical Installation (NVTC)
Year	: **Jan 1984 - Dec 1987**
College	: **Benedictine Abbey Ndanda**
Award	: Trade Test Grade One Certificate in Electrical Installation
Year	: **Jan 1980 - Nov 1983**
College	: **Ndanda Secondary School**
Award	: Certificate of secondary Education

WORKING EXPERIENCE

Aug 2014 – up to date : Vocational Teacher and Maintenance Coordinator , VETA - MIKUMI .

Nov 1998 – Sept 2011 : Vocational Teacher and Head of Section (Electrical) ,VETA - MIKUMI .

Jul 1997 – Oct 1998 : Vocational Teacher , VETA DAKAWA – MOROGORO .

Jan 1993 - Aug 1996 : Vocational Teacher and Head of Section (Electrical) , VETA - LINDI .

Nov 1989 – Dec 1990 : Vocational Teacher and Head of Section (Electrical) , LINDI VTC

WORKING EXPERIENCE FROM INDUSTRIAL PRACTICAL TRAINING (IPT)

DURATION	LOCATION	POSITION HELD	ACTIVITIES
July 23 – Sept 30 2012	VETA - MIKUMI	Vocational Teacher	✓ Removing windings from slots of induction motor, ✓ Rewinding motors, ✓ Install new fluorescent lamps, ✓ Install new armored cable/underground, ✓ Servicing different types ✓ Of AC and DC motors
4th August 2013-28th September 2013	VETA - MIKUMI	Vocational Teacher	✓ Installation of Hydraulic Press Brake Machine (W67Y) ✓ Installation of Series Hydraulic Guillotine Shear Machine (QC11Y ✓ Rewinding of Arc Weldir machine

PRACTICAL EXPERIENCE

Up to now I have acquire the knowledge and skills on the practical experience I have done comprises in are of wiring and maintenance safety of motors, Air conditioning, domestic installation, motor rewinding, measurements of electrical quantities, metal welding, Testing of installation and appliances.

SKILLS

- ✓ Computer Application
- ✓ Introduction to Auto CAD
- ✓ Introduction to Industrial Automation
- ✓ Industrial Refrigeration and Air Conditioning

Language	Reading	Writing	Speaking
English	Excellent	excellent	Very good
Kiswahili	Excellent	excellent	excellent

HOBBIES

- ✓ Exchanging idea with different people
- ✓ Playing football
- ✓ Cooperation
- ✓ Reading newspaper and novels
- ✓ Watching movies

SEMINAS ATTENDED

DATE	TITTLE	PLACE
August 09 – 20, 2010	Photovoltaic Technology	Morogoro (VTTC)
March 02 – 08, 2009	Preventive Maintenance	Morogoro (VTTC)
May 07 – 19, 2007	Photovoltaic system	Mwanza (VETA)
July 10 – 21, 2006	Instructional Techniques	Kibaha (VETA)
October 18 – 29, 2004	Professional Development Programme	UDSM
August 20 – Sept 04, 2001	Computer Application	Mikumi (VETA)
November 13 – 17, 2000	Principles of CBET	DSM (VETA)

ABILITY

- ✓ To work in dynamic environment
- ✓ Flexibility as situation demand
- ✓ To learn new environment/technique/technology fast
- ✓ To work under minimum supervision
- ✓ To ensure safety and comply with applicable regulatory objectives
- ✓ To ensure all safety and environmental conditions are maintained and followed.
- ✓ To participate and deriver results in all the continual improvement programs
- ✓ To meet high work pressure
- ✓ Ability to learn fast and adapt to situations
- ✓ To produce high quality works with attention to details
- ✓ Able to work by considering cultural and religious awareness and tolerance of each member as team player
- ✓ Able to work safety and not create or ignore hazards
- ✓ Hard working and risk taker
- ✓ High degree of patience and tolerance
- ✓ Good analytical skills

REFEREES

Eng. Br Yohanes Mango +255-713432120
Eng. Michael F. Michael +255-769328274

INTRNAL MEMO

HLO

RE: VETTING OF DRAFT CONTRACT FOR TENDER NO. MRRH/052/2021/2022/W/01-3 PROPOSED CONSTRUCTION OF EMERGENCY MEDICAL DEPARTMENT (EMD), INTENSIVE CARE UNIT (ICU) AND STAFF HOUSE.

I do submit the draft contract for the above named contract for your vetting in accordance with the requirements of the Public Procurement Act No. 7 of 2011, Public Procurement (amendment) Act 2016 and its Regulations. With this letter, our entity confirms the following:

1. We have observed all requirements of the Public Procurement Act, Cap 410 and its Regulations in arriving at this contract.
2. The draft contract has arises out of a tender processes and its threshold is below Tanzania Shillings TShs. 1,000,000,000/- per Contract.
3. "The draft contract has been prepared based on the Standard Tender Documents issued by the Authority in line with the mandate given under PPA 2011 and PPR 2013"
4. We have attached the following information with this draft contract:
   (a) Tender Document issued to Bidder.
   (b) Letter of acceptance for this contract;

Constantino P. Balua

HPMU

03/01/2022

MINUTE SHEET

Kumbukumbu/Pendekezo No. 28

PMU F. 231

Kitengo cha Sheria kimepitia na kuvetle Mikataba No. MR/052/2021-2022/W/03
MRRH/052/2021-2022/W/03
MRRH/152/2021-2022/W/01
MRRH/052/2021-2022/B/02

Tumeridhia na kuirejesho kwako kwa hatua unayofuata.

[signature] PLO 08/01/22

120