

HOMELINK (Pvt) Ltd



STRATHMORE HOUSING DEVELOPMENT

**CONSTRUCTION OF RESIDENTIAL ACCESS ROADS
INCLUDING ASSOCIATED STORMWATER DRAINAGE,
CONSTRUCTION OF A WATER RETICULATION SYSTEM, AND
SEWERAGE RETICULATION SYSTEM**

(TENDER. No. HL/COMP/BLDG/02/2024)

TENDER DOCUMENTS



S.G Musoni Consulting Engineers & Project Managers Pvt Ltd, 1 Vancouver Rd, Braeside,
Harare, Zimbabwe:
[Tel:+263](tel:+263775004369) 775 004 369

April 2024

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<p style="text-align: center;">SECTION 1A INSTRUCTIONS TO TENDERERS</p>

1 Scope and Description of the Works

This Contract comprises the following Works:

- a) Construction of residential access roads and associated stormwater drainage system;
- b) Construction of a water reticulation system; and
- c) Construction of a sewerage reticulation system including, an emergency pond and sewage pumping station and a rising main.

2 Location of the Site and Access

The site of the works is located on the right bank of Marimba River approximately 2.5km upstream of Lake Chivero tail waters and falls under the jurisdiction of Zvimba Rural District Council, Zvimba, Zimbabwe.

3 Cost of Tendering

Tenderers shall bear all costs associated with preparation and submission of tenders and HOMELINK Pvt Ltd, hereinafter referred to as “the Employer” will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the tendering process.

4 Site Visit

Tenderers are advised to visit and examine the site of the works and its surroundings and obtain for themselves at their own expense, all information that may be necessary for preparing the tender and entering into a Contract. The Cost of the Site Visit shall be borne by the Tenderer.

An official Pretender Site Visit will be conducted on 3 May 2024 at 1200hours. All Tenderers to assemble at the site main entrance 1km from the Harare Safari Access Road.

5 Source of Funds

The project is funded by **HOMELINK (PRIVATE) LIMITED**.

6 Eligibility and Qualifications of Bidders

- 6.1 The invitation is open to Construction Companies who are registered with CIFOZ/ZBCA in *Categories A and B for Civil works.*
- 6.2 Registration with Procurement Regulatory Authority of Zimbabwe (PRAZ)
- 6.3 Bidders shall be required to provide proof of their experience, financial and equipment resources, and manpower capacities, for the complete execution of the project to the satisfaction of the Employer.

7 Compliance with instructions

Bids shall be submitted in accordance with these instructions. Bids that are not substantially responsive to the requirements of the Bidding Documents will be rejected. Tenders will not be considered unless they fully comply with specifications.

8 Contents of Bidding Documents

The set shall consist of:

Section I: Instructions to Bidders and Appendices

Section II: Conditions of Contract (ZGCC4). These conditions are not part of the documents issued since Bidders are expected to obtain their own copy from The Zimbabwe Institution of Engineers, Conquerar House, 256 S.Machel Avenue East, Eastlea, P.O Box 660, Harare.

Section III: Specifications

Section IV: Bills of Quantities & Drawings

9 List of Drawings

The following drawings will be attached to the bid documents:

1. Proposed Road and Stormwater Drainage Layout;
2. Road and Stormwater Standard Details;
3. Proposed Water Reticulation Layout;
4. Water Reticulation Standard Details;
5. Proposed Sewerage Reticulation Layout;
6. Proposed Sewerage Reticulation Longitudinal Sections;
7. Sewerage Reticulation Standard Details; and
8. Raw Sewage Pumpstation and Rising Main.

Bidders shall check to their satisfaction that all documents are complete and the submission of the bid shall be accepted as confirmation that the Bidder has been in possession of all documents and that his Bid is based on these documents.

10 Bid Procedure and Preparation

The language of the Bid shall be English.

11 Completion of Bidding Documents

Bidders shall sign and witness all bids and all information required in bid documents and schedules thereto shall be filled-in. The Bills of Quantities, Summary and Appendices shall be filled-in, signed and fully priced where applicable.

12 Authority to Bid

The Bid must be signed by one duly authorised to do so, and evidence of the authority of the signatory authenticated by a Notary Public must be provided. A bid submitted by a corporation must bear the seal of the corporation and must be attested by its secretary.

13 Incomplete Bids

Bidders must submit offers for the whole of the works. Bids submitted for separate sections only, or bids that are incomplete, will not be considered.

14 Currency of Bids

The currency of bids shall be, United States Dollars.

15 Clarifications and Amendments of Bidding Documents

Any bidder requiring clarification of bid documents must list any such queries in writing on the appropriate query sheets provided and submit them either via e-mail to amuzvuru@homelink.co.zw/rfq@homelink.co.zw, or by hand to the Assistant Manager-Procurement:

**Homelink (Private) Limited, 4th Floor Hardwicke House,
72-74 Samora Machel, Avenue , Harare, Zimbabwe**

Queries submitted will be considered at intervals and responded to in writing and copies sent to all bidders. The queries and responses issued will give no indication of which bidder raised the query. Queries and responses may form part of the Bid. If, arising from a query, it is necessary to vary bidding documents, then an Addendum will be issued which shall form part of bidding documents. Arising from clarification and/or amendments, Homelink may, at his discretion, extend the deadline for submission of bids, and inform all Bidders of having done so.

All queries must reach the **Assistant Manager-Procurement at least seven working days before the closing date of tenders.**

16 Claims

No claims for increases of rates tendered or otherwise determined under the Contract will be entertained, nor shall the Contractor be entitled to make any claims on the grounds that he was supplied with information or given a promise or guarantee by a representative or employee of the Employer or their agents, the Engineer or his employees or any other person.

17 Insertion in Bidding Document

All insertions by Bidders shall be made in **INK**. Bidders shall clearly form the figures and shall check the Bills of Quantities arithmetically before submission.

18 Sealing and Marking of Bids

“Original” bidding documents shall be bound in such a way that no pages can be misplaced.

19 Bid Submission

Bid documents shall be submitted in one envelope, containing:

- Instructions to Bidders and Appendices
- Other Clarifications and amendments requested by bidders and/or supplied by the Employer
- A list of documents submitted by the bidder
- Bills of Quantities – All forms and schedules duly filled and signed.

Bids must be enclosed in sealed envelopes, endorsed on the outside with the tender number and description, and must be delivered to: **The Assistant Manager-Procurement, Homelink Pvt Ltd, Hardwicke House, 72-74 Samora Machel Ave. P.O Box 628, Causeway, Harare, Zimbabwe.**

Bids that are not received by **1000hours** on the closing date whether by hand or post will be treated as late bids. These bids will not be accepted and they will be returned to the respective Tenderers unopened.

20 Bid Form

Bids are to be made on the Bid Form attached hereto which must be fully completed by the bidder and must not be removed from this Document. The fully completed Bills of Quantities must be returned with the bid and the completed bidding documents.

21 Qualifications

Bid Documents should be priced as they are issued, without qualifications or alterations of form, additions, conditions or assumptions, erasures or irregularities of any kind, failing which the bid may be rejected. Incomplete pricing of Bills of Quantities, qualified bids or conditional offers may lead to disqualifications. Examples of qualifications that may lead to rejection of bids include the following:

- a) Form of tender alteration
- b) Bidder imposed Terms of payment
- c) Variation of Contract Period
- d) Validity of Tender

- e) Format of retention
- f) Change of NEC rates and other statutory instruments of prices.

Alternative proposals for the time for completion, use of alternative materials, construction techniques or construction details may be submitted subject to the provision of Clause 22 below.

22 Alternative Proposals

Bidders may make proposals for the time for completion, use of alternative materials, construction techniques or construction details. Comprehensive details, explanations and cost of alternative proposals shall be detailed in a letter accompanying the bidding documents.

Alternatives will be considered provided that:

- a) Should an alternative be accepted, and subsequently for any reason whatsoever the Contractor is unable to construct it to the satisfaction of the Engineer, he shall then be bound to construct the original scheme for which the alternative was submitted but at the Contract price accepted for the alternative.
- b) All materials proposed for use shall be in accordance with Specifications included hereinafter.

The approval of alternatives shall be at the discretion of Homelink.

23 Realistic Prices

It is expected that all items in the Bills of Quantities and Schedules are realistically priced. A nil price is not considered a realistic price. Should the bidder fail to comply with this requirement, Homelink reserves the right to set aside the bid.

24 Correction of errors

There shall be no erasing or overwriting and the bidder shall initial any mistake that is corrected.

25 Errors of Extensions or addition

Homelink reserves the right to adjust arithmetical or other errors in the bid. Any adjustments made by Homelink to a bid will be stated to the bidder prior to the acceptance of the bid, and will be made on the basis that rates in the priced Bills of Quantities are taken as correct and all extensions and additions will be adjusted accordingly.

In such cases, the effect will be that the total amount of the bid will be altered so that this amount agrees with the amount arrived at after the errors of extension or additions have been corrected.

26 Schedules and Attachments

Bidders shall complete all schedules that shall be submitted as part of the bidding documents. Failure to do so may render such bids liable to rejection without further consideration.

27 Information to be submitted with bids

Bidders must submit with their bids the following information:

- a) Details of the anticipated number of workmen and administrative staff the bidder proposes to employ during the execution of the works. Any expatriate personnel should be indicated separately in such details.
- b) Details of any work proposed to be sub-let together with names and experiences of the sub-contractors proposed.
- c) Completed bill of quantities.
- d) The name and address of the proposed insurance company referred to in Clauses 23 and 24 of the Conditions of Contract.
- e) A list of materials, suppliers and basic prices of materials at the time of bidding. The country of origin and/or manufacturer of such materials must be clearly stated.
- f) Certified financial statements/ stamped bank statement for the past 6 months
- g) Declaration of Fair practice
- h) Certificate of Site Visit
- i) Proof of registration with the following;
 - i. VAT registration certificate
 - ii. Valid tax clearance certificate
 - iii. Valid NSSA registration certification
 - iv. Valid PRAZ registration certificate
 - v. Valid registration with ZBCA/CIFOZ

28 Evaluation and Comparison of bids

Homelink will evaluate and compare only those bids determined to be substantially responsive to the requirements of the bidding documents in accordance with clause 39.

29 Acceptance of Bids

The employer does not bind himself to accept the lowest or any bid and reserves the right to accept any bid in whole or in part.

30 Rejection of Bids

The bid of any bidder who has not conformed to the foregoing may not be considered.

31 Surety

The successful bidder will be required to provide, within the time stated in the Appendix to the Form of Bid, a surety equal to 10% (ten percent) of the contract sum, in the form of a cash deposit or a surety deed from the Bank, Insurance Company, limited Company of good standing or other source approved by the Employer.

Sureties provided by any person, company or contractor employed by the Bidder will not be accepted.

32 Validity of Bids

The bid may not be amended or withdrawn and shall remain in full legal force for a period of 90 days from the closing date.

33 Gross Price

The bid amount is to include all costs and charges such as customs and import duties, ocean freight, marine risk insurance, landing charges, dock dues, railage, value added tax, and dumping duties and the amount quoted should be the full gross price payable by the Employer.

Bidders submitting quotations for the supply of materials or equipment subject to value added tax must show such tax separately on the Bid Form. Bids specially shown as being exclusive of any of the above charges will not be considered.

34 Adjustment of the Extent of the Works

The Employer may vary the extent of measured works prior to the award of Contract to suit available finances. Bidders' attention is drawn to the Preamble to the Bills of Quantities in respect of pricing to allow for this possible variation.

35 Return of Documents

- a) Bidding documents shall be submitted complete and intact; otherwise the bid may be rejected.
- b) Tenderers shall submit original tender document and two copies of the original clearly labelled '*Original Copy*', *Copy 1 and Copy 2*. Failure to submit the copies will lead to automatic disqualification.

BID OPENING AND EVALUATION

36 Opening

Envelopes containing bids shall be opened by the presiding officer in the presence of bidders' representatives who choose to attend on the bid closing date and time at:

**Homelink Pvt Ltd, Hardwicke House, 72-74 Samora Machel Ave. P.O Box
628, Causeway, Harare, Zimbabwe**

Present bidders' representatives shall sign a register of attendance.

37 Clarification of Bids after Opening

In order to assist in the Bid Evaluation, the Employer may, at his discretion, ask any bidder in writing for clarifications on his bid. The bidder shall respond in writing and no change of price, or substance of the bid shall be sought, offered or permitted.

38 Examination of Bids

38.1 After opening the envelope and prior to any detailed bid evaluation, the Employer will determine:

- i) Whether all information requested in the documents has been provided.
- ii) Whether the Bid Form is correctly filled and signed
- iii) Whether required warranties have been furnished
- iv) Whether all documents have been duly initialled and signed
- v) Whether the bid contains computation errors in which case the Employer will proceed to rectify pursuant to clause 38.2 below.

38.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected. If the bidder does not accept the correction of the errors, his bid will be rejected. If there is a discrepancy between words and figures, the amount in words will prevail.

38.3 Prior to the detailed evaluation, pursuant to Clause 40 below, the Employer will determine the substantial responsiveness of each set of bidding documents. For purposes of these Clauses, a substantially responsive bid is one that conforms to all the terms and conditions of the bidding documents without material deviations. The Employer's determination of bid's responsiveness is through extrinsic evidence.

38.4 A bid determined as not substantially responsive will be rejected by the Employer and may not subsequently be made responsive by the bidder by correction of the non-conformity unless if it is connection with historic documents.

38.5 The Employer may waiver any minor infirmity or non-conformity or irregularity in a bid that does not constitute any material deviation, provided such waiver does not prejudice or affect the relative ranking of other bidders.

39 Evaluation and Comparison of Bids

Technical Evaluation

The Employer will establish if each bid is substantially responsive to the bidding documents. Technical acceptance shall be adjudged on the following criteria:

- i) Undertaking by Insurance Company and/or Bank to provide Sureties and/or Guarantees on acceptance of the bid

- ii) At least three Stamped, dated, signed on letterhead trade references from Clients for civil works (Roads and water reticulation) done within the past 5 years.
 - iii) Schedule of Construction Plant and equipment (Provide proof of ownership in form of registration book or lease agreement)
 - j) A list of ongoing Contracts and those previously completed by the bidder to include the nature of the work, the location, the client, the dates of construction and the value of the completed works.
 - k) A schedule of names, qualifications, experience and physical addresses of the Contractor's senior personnel who will be controlling the project, both on and off site. (Relevant Qualifications and experience to be considered)
- NB: Any bidder failing to provide the above will be disqualified

Financial Evaluation

The evaluation of bids by the Employer will take into account, in addition to the bid amounts, the following factors.

- a) Arithmetical errors corrected in accordance with Clause 39.2
- b) Priced alternative offers in accordance with clause 22
- c) Availability of favourable bank references and lines of credit from material suppliers.

- 39.1 The monetary costs to the Employer of quantifiable factors in the bid evaluation with future timing implications shall be assessed and discounted to present values at current rates of interest for bid comparison purposes.
- 39.2 Offers, deviations and other factors which are in excess of the requirements of the bidding documents, or otherwise result in accrual of unsolicited benefits to the Employer, shall not be taken into account in bid evaluation.
- 39.3 The price adjustment provisions applying to the period of execution of the contract shall not be taken into account in bid evaluation.
- 39.4 Compliance with Occupational Health and Safety requirements, Compliance with the Labour Relations Act and any training Programmes and policies for staff shall be taken into account during the bid evaluation process.
- 39.5 The ability by the bidder to avail plant and equipment for the execution of the contract will be considered during the evaluation process. The

bidder must therefore furnish information with regards to the adequacy, ownership, age and state of plant and equipment.

- 39.6 Tenderers must give details of litigation that they may have been involved in, and any that they are involved in.

AWARD OF CONTRACT

40 Award Criteria

Subject to Clause 43 below, the Employer will award the contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and has offered the bid which is evaluated as lowest, provided that the bidder has the capability, capacity and resources to effectively carry out the works.

41 Employer's Right to Accept or Reject any Bid or all Bids

Notwithstanding Clause 40 above, the Employer reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to award of contract, without thereby incurring any liability to the affected bidder or bidders, or any obligations to inform the affected bidder or bidders, of the grounds for the Employer's action.

42 Notification of Award

Prior to the expiration of the period of bid validity the Employer will notify the successful bidder in writing that his bid has been accepted and the bidder will be invited to the Employer's offices for completion of the necessary formalities.

43 Signing of Contract Agreement`

- 43.1 Subsequent to notification of award the Employer will send the successful bidder a contract document incorporating all agreements between the parties.
- 43.2 Upon receipt of the contract documents and at a stipulated time and venue, the Employer and the successful bidder shall sign the Form of Contract Agreement.

44. Performance Guarantee

44.1 The successful bidder shall furnish a security in the form of a performance bond or bank guarantee of contract in an amount equal to 10% of the accepted bid sum within 14 days of notification of the acceptance of the bid. The performance Security shall comply in all respects with the requirement of sub-clause 10.1 of the General Conditions of Contract as amended by the Conditions of Particular Application (Section II of these documents).

44.2 Failure by the successful bidder to lodge the required performance bond or bank guarantee may constitute sufficient grounds for the annulment of the award and forfeiture of the bid bond in which event the Employer may make the award to the next lowest evaluated bidder, or call for new bids.

45. Advance Payment/Material Pre-purchase

The invitation to tender makes provision but not an obligation to grant advance payment for pre-purchase of materials. Such arrangements and agreements are subject to bank guarantees and genuine pro-forma invoices being supplied by Tenderers. Bidders shall make provisions for the financing of the project using their own resources at the prevailing market conditions.

SECTION IB
Appendices, Forms and Schedules

APPENDIX A1

FORM OF BID

(Note: The Appendix and Annexure form part of the Bid)

Tender No: -----

Description:

Construction of civils Infrastructure which includes; Residential Access Roads and Storm-water Drainage, Water Reticulation, Sewerage Reticulation and Pumpstation.

To:

GENTLEMEN,

Having examined the site and studied the Project layout drawings for the proposed works, we offer to construct, complete and maintain the whole of the said works in conformity with the Drawings, Conditions of Contract, Specifications and Bill of Quantities, save as amended by the agreed modifications, for the sum of;

US\$.....

...

(in words)

.....

.....

.....

Or some other sum as may be ascertained in accordance with the said Conditions of Contract.

In the event of there being errors of extension or addition in the priced Bills of Quantities, we agree to their being corrected, the rates being taken as correct.

We undertake to commence, complete and deliver the whole of the works comprised in the Contract within the time stated in the Appendix hereto.

If our bid is accepted, we will, when required and within the time stipulated, provide good and sufficient Sureties or obtain the guarantees of a Bank or Insurance Company to be jointly and severally bound with us in a sum not exceeding 10% of the named bid sum for Suretyship in the form annexed hereto.

Unless and until a formal Agreement is prepared and executed, this bid, together with the written acceptance thereof by yourself or the Engineer acting on your behalf shall constitute a binding Contract between us.

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

This Bid shall remain valid and binding upon us for a period of 90 days after the last date of bid submission.

We are, gentlemen,

Yours Faithfully,

.....

Address:

.....
.....

Signed.....

Witnessed.....

Name.....

Name.....

Date

Date.....

APPENDIX A2**APPENDIX TO FORM OF CONTRACT**

	Clause	
Special Conditions	1 (G)	See Special Conditions Of Contract
Percentage of tendered sum in respect of deed of suretyship	10	10 (Ten) Percent
Time within which sureties to be required	10	14 (Fourteen) Days
Duration Of Deed Of Suretyship	10	Until Issue Of Final Certificate
Minimum Amount Of Third Party Insurance	23 (2)	US\$50 000.00 (fifty thousand dollars)
Time Within which Works to be Commenced	41	6 days after order to commence
Time For Completion	43	(24) months
Amount Of Liquidated Damages	47	US\$2 500.00 Per Working Day
Period Of Maintenance	49	12 months
Percentage Retention	62 (1) (a)	10 (Ten) Percent of value of measured works
Limit Of Retention Money	62 (1) (a)	10 (Ten) Percent of value of measured works
Advances for Design and construction of Temporary Works and Constructional Plant	62 (1) (a)	Client's discretion
Advance Payments on Materials on site	62 (1) (b)	100 percent
Payments Certificates	62 (4)	Monthly payment upon approval and satisfactory completion of portion of the works.
Time within which payment is to be made	62 (4)	14 (Fourteen) Days after receipt of certificate by client
Price Variation: Direct Cost Variation on materials, items or portion of the Works concerned	70a (3) Basic prices on which variations shall be determined	Rate or price for the base month
Period of validity of tender from date of closing		90 days

APPENDIX A3

FORM OF PERFORMANCE BOND

We, the undersigned,

Of

And

Of

Do hereby bind ourselves as sureties in solidum and co-principal debtors unto and in favour of Homelink (Pvt) Ltd, their heirs, executors, administrators, successors and assigns (hereinafter referred to as “the Employer”) for the due and faithful performance and fulfilment by

.....

.....

(hereinafter referred to as “Contractor) of all the terms, conditions and stipulations contained in a certain Contract (hereinafter referred to as the “the Contract”) entered into or about to be entered into between the Contractor and the Employer for the construction and maintenance of the said works in accordance with the provisions of the contract, and for all losses, damages and expenses that may be suffered or incurred by the Employer as a result of non-performance or breach by the Contractor of the contract or any of the terms, conditions or stipulations therein contained, provided that our liability hereunder shall be limited to the sum of:

US\$.....

We hereby acknowledge that we are fully acquainted with the Contract, with all terms, conditions and stipulations therein contained and with all annexures thereto, including the Bid, Alterations by Bidder, Special Conditions, Specifications and Bills of Quantities.

And we declare it to be a condition of deed that the same shall be and remain in full force and effect notwithstanding any variation to or extension of the Contract in accordance with the provisions thereof nor shall any forbearance, granting of time or latitude by the Employer or the Engineer in respect of any matter or thing release us in any way from any liability hereunder.

The law of Zimbabwe shall in all respects govern this Deed and we hereby submit to the jurisdiction of the Courts of Zimbabwe in relation thereto.

We hereby bind ourselves firmly by these presents.

IN WITNESS Whereof we have hereunto set our hand at

On thisday of20--

In the presence of the under mentioned witnesses.

WITNESS:

1.
2.

APPENDIX A4

CERTIFICATE OF INSURANCE COVER

THIS IS TO CERTIFY THAT the under-mentioned insurance is held by

Messrs

In terms of Conditions of Contract and that the Policies cover the full duration of the contract, together with any extensions thereof and for the Period of Maintenance where required.

INSURANCE OF WORKS ETC

.....
.....

DAMAGE TO PERSONS AND PROPERTY

.....
.....

THIRD PARTY INSURANCE

.....
.....

ACCIDENT OR INJURY TO WORKMEN NOT COVERED BY THE WORKMEN'S COMPENSATION ACT

.....
.....

Date..... Signed

Insurer/Insurance Broker

Name

Position

Address

.....

APPENDIX A5

FORM OF AGREEMENT

THIS AGREEMENT made by and between:

.....
(hereinafter called “the Employer”) of the one part and

.....
(hereinafter called “the Contractor”) of the other part.

WHEREAS the Employer is desirous that certain Works should be constructed viz the **CONSTRUCTION OF RESIDENTIAL ACCESS ROADS AND STORMWATER DRAINAGE, WATER RETICULATION, SEWERAGE RETICULATION AND PUMPSTATION INCLUDING A RISING MAIN**, and has accepted a Tender by the Contractor for the construction, completion and maintenance of such works.

NOW THIS AGREEMENT WITNESSED as follows:

1. In this agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz;
 - (a) The said Bid dated 20--
 - (b) The general and any Special Conditions of Contract
 - (c) The Specifications
 - (d) The Priced Bills of Quantities
 - (e) The Schedule of Rates and Prices
 - (f) The drawings
 - (g) The Letter of Acceptance
3. In consideration of payments to be made by the Employer to the Contractor as hereinafter mentioned the Contractor agrees with the Employer to construct, complete and maintain the Works in conformity in all respects with provisions of the Contract.
4. The Employer hereby agrees to pay the Contractor in consideration of the construction, completion and maintenance of the works as per agreed Contract price and in the manner prescribed hereunder:
 - (i) 10% Advance payment (To be paid at the Employer’s discretion and subject to submission of satisfactory guarantees by the contractor)

- (ii) Progress/interim payments of not less than 10% of project value or as to be agreed between Employer and Contractor

IN WITNESS Whereof the parties hereto have set their hands and seals (if any) in the presence of the subscribing witnesses:

AT.....

on this _____ day of _____ 20--.

NAME: _____

Signed: _____

For and on behalf of the EMPLOYER

AS WITNESSES:

1. _____

AT.....

on this _____ day of _____ 20--.

NAME: _____

Signed: _____

For and on behalf of the CONTRACTOR

AS WITNESSES:

1. _____

NOTE: where either party is a Company, the authority for the person signing on behalf of the Company should be annexed to this Agreement, or the seal of the Company should be impressed on the Agreement, in place of the signature and witnessed by the proper officers of the Company in terms of the Articles of the Company.

APPENDIX A6

LIST OF PROPOSED SUB-CONTRACTORS

DESCRIPTION OF WORKS	PROPOSED SUB-CONTRACTOR	VALUE OF WORKS
----------------------	----------------------------	-------------------

NOTE: The value of Sub-contracted works shall not exceed 50% of the total bid Sum

APPENDIX A7

SCHEDULE OF CONSTRUCTIONAL PLANT

The Bidder shall state below, or on an additional sheet, under three categories what constructional plant will be provided on the contract.

Contractors are to note that it is a specific requirement that the contractor gives notice well in advance before he intends to remove plant and equipment from site, and the Engineer's written approval to do so must be obtained prior to any such plant movement.

CATEGORY 1: **CONSTRUCTIONAL PLANT BELONGING TO THE CONTRACTOR**

NO. OF UNITS	DESCRIPTION	YEAR OF MANUFACTURE	POWER
---------------------	--------------------	--------------------------------	--------------

CATEGORY 2: **CONSTRUCTIONAL PLANT HELD UNDER AN AGREEMENT
FOR HIRE**

NO. OF UNITS	DESCRIPTION	YEAR OF MANUFACTURE	POWER
---------------------	--------------------	--------------------------------	--------------

CATEGORY 3: **CONSTRUCTIONAL PLANT HELD UNDER AN AGREEMENT
FOR HIRE PURCHASE**

NO. OF UNITS	DESCRIPTION	YEAR OF MANUFACTURE	POWER
---------------------	--------------------	--------------------------------	--------------

APPENDIX A8

SUMMARY OF KEY PERSONNEL

DESIGNATION	NAME	YEARS EXPERIENCE
--------------------	-------------	-------------------------

Signed
(Bidder)

Date

APPENDIX A9

EXPERIENCE: All projects in Progress (Attach additional sheets if necessary)

Name of Client	Value	Description of Works	Year Completed
-----------------------	--------------	-----------------------------	-----------------------

APPENDIX 10

SCHEDULE OF DAYWORK RATES

1. This Schedule shall be used to calculate the payment due for work ordered as Dayworks, and for which no rates appear in the Bill of Quantities.
2. The description of work, quality of materials and standard of workmanship shall be as described in the Specification document.
3. The prices quoted in the Schedule shall cover all the necessary insurance, use and maintenance of ordinary plant (e.g. barrows, running planks, hand pumps, hand tools and appliances generally), superintendence, overhead charges and profit, and in the case of mechanically operated plant, the wages of the operator and assistant, consumable stores, fuel and maintenance.
4. The time of gangers, overseers, or charge hands working with their gangs, is to be paid for under appropriate items, but the time of Foreman is not to be included but is to be covered by superintendence.
5. The price quoted for labour shall be for straight time only and no overtime rates shall be payable. Rates shall only be paid for artisans working at their trade.
6. Rates for heavy plant shall apply to plant which the Contractor has available on site.
7. Rates for materials shall cover delivery to and distribution within the site.
8. Cost of additional watching and lighting specially necessitated by dayworks shall not be paid for separately but shall be included in overhead charges.
9. All labour, material and plant hire rates not given in the schedule shall be paid at the gross remuneration for labour or the net value for material or plant plus the percentages shown on the Appendix to the Form of Tender.
10. The rates given in the Schedule shall be taken to be operative at the time of Tender.
11. Any variation of price agreed under Clause 70 of the General Conditions of Contract and affecting rates given in the Dayworks Schedule, shall be applied.

DAYWORKS SCHEDULE**(i) LABOUR**

Labour Type	Provisional	Daywork Rates	Amount
	No. of hours	per Hour	
		\$/Hr	
Gangers, Overseers,	R/o		
Charge-hands			
Skilled Artisan	R/o		
Semi-skilled	R/o		
Unskilled Labour	R/o		
Other, Specify	R/o		

(ii) MATERIALS

Allow a Provisional% on the basic price of dayworks materials and
 ----- % on cost for dayworks to cover administration charges and profit.

(iii) PLANT

The Contractor shall indicate below hire prices of all plant that he would expect to use on dayworks. For each item the make, mark, capacity or horsepower should be stated. Prices shall include for operators, fuel, maintenance and all overheads.

TYPE	Provisional	Daywork Rate	AMOUNT
	Number of	per Hour	\$
	Hours	\$/Hr	
(a) Dozer	R/o		
(b) Compressor and Tool	R/o		
(c) Grader	R/o		
(d) Vibrating Roller	R/o		
(e) Vibrating Plate Compactor	R/o		
(f) Lorry Tipper	R/o		
(g) Towed Bowser (5m ³)	R/o		
(h) Wheeled Loader (F.E.L)	R/o		
(i) Concrete mixer	R/o		
(j) Other Plant	R/o		

APPENDIX A11

DECLARATION OF FAIR PRACTICE

I

(Name of signatory to this bid) hereby undertake that the Company hereby bidding to undertake the works described in this document will not participate in any agreement either directly or indirectly which might prejudice the completion or increase the cost of the project to which this bid relates.

Date thisDay of20--.

Signed

On behalf of

Address

.....

.....

CONDITIONS OF CONTRACT

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SECTOIN II

PART 1 : GENERAL CONDITIONS OF CONTRACT

The Conditions of Contract shall be the General Conditions of Contract, FOURTH edition, (1984), (ZGCC4) prepared jointly by the Zimbabwe Institution of Engineers, the Federation of Civil Engineering Contractors and the Zimbabwe Association of Consulting Engineers. Except in-so-far as they are modified, qualified or added to in the Special Conditions of Contract as set out in Part 2.

Part 2: SPECIAL CONDITIONS OF CONTRACT

Schedule of Clauses

The Employer undertakes that the only variations from the attached Standard Form of General Conditions of Contract are as follows, or set out in the memorandum attached hereto marked “Special Conditions of Contract”.

Where there are no such Special Conditions, the Schedule hereunder is marked NIL by the Employer.

PAGE	CLAUSE OR ITEM
40	Clause 1 : Definitions
40	Clause 14 : Programme to be furnished
40	Clause 15 : Contractor’s Superintendence
40	Clause 17 : Setting Out
41	Clause 29.2 : Support and diversion of services
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43	Clause 54 : Variation exceeding 15%

PAGE	CLAUSE OR ITEM
43	Clause 58 : Works to be measured
44	Clause 60 : Provisional and Prime Cost Sums
45	Clause 62 : Certificates and Payments
46	Clause 63 : Approval only by Terminal Certificate
46	Clause 64 : Terminal Certificate
47	Clause 70 : Variation of Price
48	Clause 73 : Latent or other Defects

(The Clause numbers given below correspond to the Clause numbers of the General Conditions of Contract, 4th Edition – 1984).

CLAUSE 1 : DEFINITIONS

Sub-clause 1 (a) and (c) shall be completed as follows:

- 1 (a) : “Employer” means **Homelink (Pvt) Ltd.**
- 1 (c) : “Project Engineer” means **S.G Musoni Consulting Engineers.**

CLAUSE 14 : PROGRAMME TO BE FURNISHED

The following paragraph shall be added:

When compiling his programme, the Contractor shall make adequate allowances for any public holidays, which may occur during the period of the Contract.

The contract period given in the Appendix to the Form of Tender or as shown on the programme will therefore, be deemed to include for all public holidays and Christmas shut down period and no further allowances for holidays will be permitted.

The programme referred to in this Clause, is to be submitted by the Contractor to the Project Engineer as soon as possible, but in any case not later than three (3) weeks after the commencement of the Contract. The programme to be submitted shall indicate item number, description of item/operation, quantity and adjustments thereto, start and end of operation in weeks and months.

CLAUSE 15 : CONTRACTOR’S SUPERINTENDENCE

The following paragraph shall be added:

The Contractor’s authorised agent or representative shall be fluent in the English Language.

CLAUSE 17 : SETTING OUT

The following paragraph shall be added:

The Contractor shall provide and maintain a set of survey Instruments for the sole use by the Employer/Engineer and his Representative for the duration of the Contract. Instruments shall be in good condition and properly adjusted and shall comprise a total station/theodolite, precision level, a staff, two thirty metre and two five metre tapes, ranging rods, tripods and ancillary equipment. A Contractor’s Survey Assistant shall be available

to assist the Employer/Engineer's Representative when required for checking the setting out.

Bench Marks and Setting Out

The Employer/Engineer may choose to carry out some setting out in which case the Contractor shall check and satisfy himself as to the correctness of such setting out before commencing work.

Any setting out undertaken by the Employer/Engineer shall in no way absolve the Contractor of any of his responsibilities or obligations under the Contract.

The Contractor shall locate and preserve all survey markers in the location of the Works. Where such survey markers will be unavoidably destroyed the Contractor shall make appropriate arrangements with the relevant Authority or Department, for them to be accurately referenced to permanent concrete markers before work is commenced.

CLAUSE 29.2: SUPPORT AND DIVERSION OF SERVICES

The following paragraph shall be added:

This Contract may include certain work involved in the moving, reinstatement or protection of existing services, which may be affected by the construction of the Works. Whenever possible, information regarding the location of existing utility services is shown on the plans but the Employer does not accept responsibility for the accuracy of this information and the Contractor must take whatever precautions he considers necessary to accurately locate any services affected by the construction of the Works.

The Contractor shall indemnify and keep indemnified the Employer against all losses and damage to property which may arise out of or in consequence of any damage to services and against all claims, damages, proceedings, cost, charges and expenses whatsoever in respect thereof or related thereto.

CLAUSE 45 : NIGHT, SUNDAY AND HOLIDAY WORK

The following paragraph shall be added:

Should the Employer/Engineer request, by written instructions, that any work be executed outside normal working hours, then payment of overtime for this work shall be made in accordance with the Conditions of Employment of the Industrial Agreement in force at the commencement of the Contract.

The Contractor will be allowed the NET extra paid by way of overtime plus a 10% allowance, which will be deemed to cover overheads and profit. The same applies to all Sub-contractors including Nominated and the Main Contractor will not be allowed any profit on the extra cost.

Overtime is to apply to work located on the actual construction site only. The Employer/Engineer has the right to inspect the Contractor's records before making payment. These records must be signed by the General Foreman and countersigned by the Employer/Engineer. Should the working of overtime be necessary in order to complete the Contract by the Completion Date, the Contractor may, with the prior written consent of the Employer/Engineer, work such overtime provided that the extra cost shall be borne by the Contractor.

CLAUSE 48 : CERTIFICATE OF COMPLETION OF WORKS AND EMPLOYER'S POWER TO TAKE OVER COMPLETED PORTIONS OF THE WORKS

The following paragraph shall be added:

The period of Maintenance of any part of the Works completed before the completion of the whole of the Works shall commence from the date of the Certificate of Completion of the whole of the Works.

CLAUSE 49 : PERIOD OF MAINTENANCE WORK OF REPAIR AND COST THEREOF, FAILURE TO CARRY OUT WORK REQUIRED AND TEMPORARY REINSTATEMENT

Add a further Sub-Clause:

The period of Maintenance of any portion of the Contract, unless specified otherwise in the Contract Documents, shall not be less than twelve months from the completion of the whole of that portion and must include at least three months of the official wet season, defined as being from 1st November to 30 April.

Delete "...or in the event of more than one certificate. Shall be construed accordingly".

CLAUSE 51 : VARIATIONS

Any Works ordered by the Employer/Engineer to be carried out by Dayworks shall be paid for at the actual cost of labour, materials and plant plus the mark-up entered against the appropriate items in the Bills of Quantities, subject to the following Conditions:

- i. The mark-up entered for labour shall be deemed to include overhead charges and profits, site supervision and staff, insurances, use and maintenance of small hand tools and appliance, non-mechanical plant and equipment (such as ladders, trestles, stages, bankers, scaffolding, temporary track, wagons, skips, tarpaulins, and similar items);
- ii. The time for gangers or charge hands working with their gangs will be paid for under Day works, but the cost of foreman and other supervisory personnel shall be deemed to be covered by the mark-up entered for the labour under their supervision;
- iii. No separate payment will be made in respect of travelling allowances, travelling costs (travelling in contractor's own vehicles between residence or lodgings and Site), lodging allowances or similar emoluments payable to workmen which costs will be deemed to be included in day works rates;
- iv. The cost of watching and lighting that is especially necessitated by day work will be paid for separately;
- v. The mark-up for plant shall be deemed to include overhead charges and profit, site supervision and staff, wages of drivers and operators, hire charges, consumable stores, fuel, maintenance and insurances;
- vi. Mechanically operated plant will be paid for only for the net working hours during which the plant is engaged on dayworks and excluding any standing or idle time;
- vii. The mark-up for materials shall cover delivery to any point on the Site which in the opinion of the Employer/Engineer can be safely reached by lorry, but the costs of conveying materials from such points to points which cannot be so reached will be paid for separately.

CLAUSE 54 : VARIATIONS EXCEEDING 15 PERCENT

Delete all references to 15% and substitute with 20%.

CLAUSE 58 : WORKS TO BE MEASURED

This Clause shall be deleted entirely and the following substituted:

The Employer/Engineer shall ascertain and determine the value of the work done in accordance with the Contract. He shall, when he requires any part or parts of the Works to be measured, give notice to the Contractor who shall forthwith attend or send a qualified agent to assist the Employer/Engineer's Representative in making such measurement and shall furnish all particulars required by either of them.

Should The Contractor not Attend or neglect or omit to send such agent, then the measurement made by the Employer/Engineer or approved by him shall be taken to be the correct measurement of the Work. The contractor shall not, unless by arrangement with Employer/Engineer's Representative be entitled to use the Employer/Engineer's measurement for purposes of Clause 62.

The Contractor shall be required to ascertain and determine the final value of work done and submit this to the Employer/Engineer for approval purposes of agreeing the final measurement of the completed Works.

All measurements shall be done in a measurement book.

CLAUSE 60 : PROVISIONAL AND PRIME COST SUMS

The following paragraphs shall be added:

The Engineer shall have the power to obtain estimates and select firms to carry out the Works covered by P.C. items and Provisional Sums. The Contractor must serve due notice to all Sub-Contractors including Nominated Sub-Contractors and Suppliers and no delays occasioned by his having failed to do so shall be considered to justify extension of the Contract time.

The Contractor shall be required to ascertain from all Sub-Contractors all particulars relating to their works with regard to the positions in which chases, holes, mortises and similar items will be required to be formed or left before the works is put in hand and this will be deemed to be included for as part of Contractor's attendance. No claim will be considered for extra cost for cutting away work already built in consequence of any neglect on the part of the Contractor to ascertain these particularly beforehand.

The contractor is to allow at all times during the construction of the works and the maintenance period, for proper access to all parts of the Works for all sub-contractors and their workmen employed in executing specialist work or specialist fittings and they must be given reasonable space in the buildings for the storage of their materials, etc. Prime Cost and Provisional

Sums are NET and exclude all trade and cash discounts, which shall be to the Employer's account.

Discounts obtained for early payment or full payment without retention shall only be allowed to the Contractor following proof that these moneys were paid by the Contractor before receipt of same from the Employer.

These amounts are to be used as directed by the Engineer and are to be deducted in whole or in part if not required. The Employer may pay all or any portion of these sums direct.

Provisional Sums are for Works to be executed completely by Nominated Sub-Contractors. Prime Cost Sums are for goods delivered to site, unless otherwise described, by Nominated Suppliers.

The Contractors must include for profit, if required, for unloading receiving same and returning empty packing cases, carriage paid, to maker's works in good condition where applicable.

Attendance upon Nominated Sub-contractors is to include for erection, use and maintenance of proper sufficient and if necessary, special scaffolding and plant, taking delivery, offloading, storing, protecting from damage, hoisting, watching, lighting, making good in all trades, etc., as may be necessary.

The Contractor shall furnish receipted invoices to the Employer/Engineer if required.

CLAUSE 62 : CERTIFICATE AND PAYMENT

In Clause 62 (1), (4), (6), (7), and (8) – wherever the words “Certificate” or “Certificates” as the case may be, occur, they shall be preceded by the word “Payment”.

62 (1) : Add the following paragraph:

The Contractor's Statement shall be accurate, clearly presented and acceptable to the Employer/Engineer in all respects. If after perusal of the Statement, which may take several days, the Employer/Engineer finds it unacceptable, it shall be rejected and returned to the Contractor.

62 (3) : Third paragraph delete: “different maintenance periods” and insert “Different Certificates of Completion”.

The Employer will not accept surety or guarantee to cover Retention Money.

CLAUSE 63 : APPROVAL ONLY BY TERMINAL CERTIFICATE

Clause 63 shall be deleted and the following substituted.

No certificate other than the Terminal Certificate referred to in Clause 64 hereof shall be deemed to constitute approval of any work or other matter in respect of which it is issued or shall be taken as an admission of the due performance of the Contract or any part thereof of the accuracy of any claim made by the Contractor or of additional or varied work having been ordered by the Employer/Engineer, nor shall any other certificate conclude or prejudice any of the powers of the Employer/Engineer.

CLAUSE 64 : TERMINAL CERTIFICATE

Clause 64 shall be deleted and the following substituted

(1) The Contract shall not be considered as complete until a Terminal Certificate shall have been signed by the Engineer and delivered to the Employer stating that the Works have been completed and (where specified), maintained to his satisfaction. The Terminal Certificate shall be given by the Engineer within fourteen days of completion of the entire Works or the expiration of the Period of Maintenance or latest Period of Maintenance, as the case may be, or as soon thereafter as any works ordered during such period pursuant to Clause 49 and 50 hereof shall have been completed to the satisfaction of the Employer/Engineer, and full effect shall be given to this Clause.

(2) CESSATION OF EMPLOYER'S LIABILITY

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or the execution of the Works unless the Contractor shall have made a claim in writing in respect thereof before the giving of the Terminal Certificate under this Clause.

(3) UNFULFILLED OBLIGATIONS

Notwithstanding the issue of the Terminal Certificate the Contractor and (subject to Sub-Clause (2) of this Clause) the Employer shall remain liable for the fulfilment of any obligation incurred under the provisions of the Contract prior to the issue of the Terminal Certificate which remains unperformed at the time such certificate is issued, is used, and for purposes of determining the nature and extent of any such obligation the Contract shall be deemed to remain in force between the parties hereto.

CLAUSE 70 : VARIATION OF PRICE

The following paragraph shall be added:

Fluctuation of Wages and cost of Living Allowances:

The Contractor is to pay not less than the recognised Standard Rates of Wages and Allowances to all employees.

If at any time between the date seven (7) days prior to the tender Date and the date for completion of the Works, any Statutory Fluctuation (i.e. any specific increases or decrease stipulated by Government Gazette) takes place in the Standard Rate of Wages, Cost of Living Allowances, or other Statutory compulsory contribution to the people employed on the Works covered by this Contract, whether on the site or in the workshops or yards of the Contractor or his Sub-Contractors (but not in respect of merchants or suppliers) the Contractor is to submit MONTHLY to the Employer/Engineer or Quantity Surveyors receipted time sheets together with a weekly return of the number of hours worked, signed by the foreman, and countersigned by the Employer/Engineer or his representative, and the Final Contract. Amount shall be adjusted in accordance with the Statutory fluctuations. Variations if any, made under this Clause shall be the net increase or decrease plus a 5% administration charge and will NOT include for any variations of overheads, profit or indirect costs of the Contractor or his Sub-Contractors.

No claims will be admitted in respect to labour employed after the expiration of the Contract Completion date under clause 43 of the Conditions of Contract or any amendments thereto.

Fluctuations in Price of Materials

a. Statutory Fluctuations

Statutory fluctuations shall be any specific direct increase or decrease in the delivered prices of materials incorporated in the Works including variations in customs duty or other Government tax, duty or surcharge detailed in the relevant Acts of Parliament or Statutory Notices published in the Government Gazette on specified building materials and items to be incorporated in the Contract.

Should any statutory fluctuation take place between the date seven (7) days prior to the Tender Date to the completion of the works in accordance with clause 43 of the Conditions of Contract, the final contract amount will be adjusted as later described.

b. Non-Statutory Fluctuations

If the Contractor or any of his Sub-Contractors wish to be protected against fluctuations in the delivered cost of any basic materials incorporated in the Works other than as provided for in (a) above, he is to attach to the Form of tender a list of such materials and prices in respect of which he wishes to be protected. Such prices to be those upon which he bases his Tender and to be basic prices, that he received not more than seven (7) days prior to the Tender closing date.

In support of these prices, the Contractor is to furnish either with his tender, bona fide merchants' quotations (for quantities required for the whole Contract).

Where a Contractor or any of his Sub-Contractors, in the normal course of their business uses their own transport to deliver all or some materials to the Site and he wishes to be protected against fluctuations in both materials and transport costs he is to submit separate prices for these materials, at source, and the delivery charges on such materials.

Orders for materials as listed shall be placed within a reasonable time after the date of acceptance of the Tender otherwise no adjustment will be made. The time will be mutually agreed when the Tender is provisionally accepted.

WHERE NO MATERIALS HAVE BEEN LISTED, THE TENDER SHALL BE TREATED AS A FIRM TENDER, SUBJECT ONLY TO STATUTORY FLUCTUATIONS

The following additional Clause shall apply:

CLAUSE 73 : LATENT OR OTHER DEFECTS

The Engineer or his representative's periodical visits to the Works, and the working and detailed drawings, have reference only to the Engineering accuracy and the literal fulfilment of the leading articles of the Contract Documents as affecting the construction generally and Employer/Engineer and representative are not employed as operative builders or Clerks of Works, and are not liable for latent defects in materials or workmanship or for the breach of any local or other bye-laws, or work done contrary to good construction practice.

The Employer/Engineer or his representative not being the responsible parties, the Contractor shall remain responsible for default or wilful deviation from the Drawings, Specifications and Bills of Quantities whether the same shall be discovered before or after the issue of the final or any other certificate.

SECTION III CIVILS SPECIFICATIONS

1. Preliminary and General

1.1 Documents

The Specification and Bills of Quantities contained in the Contract Documents shall be read in conjunction with the Form of Tender and Appendix, Form of Agreement, Form of Deed of Suretyship, General Conditions of Contract and Contract Drawings. All these documents and Drawings are to be regarded as mutually explanatory and in the event of any discrepancy or assumed discrepancy being found between them, the Contractor shall immediately inform the Employer/Engineer of the matter in writing and the Employer/Engineer will issue his instructions on the matter in accordance with Clause 6 of the Conditions of Contract.

Notwithstanding the sub-division, the Specification under different headings, every part of it is to be deemed supplementary to every other part and is to be read with it so far as it may be practicable to do so.

1.2 Sequence of works

The Contract Drawings for the works are listed under List of Drawings.

The Contractor shall programme and execute the Works so as to cause the minimum amount of disruption to rail or road traffic or any other operations being undertaken by the Employer or other Authorities and shall at all times act in accordance with any safety measures and instructions required by the Employer or any other Authority.

1.3 Other works

During the continuance of the Contract, the Employer may cause other works to be carried out on, through, or adjacent to the Site.

The Contractor shall at all times comply with the requirements of Clause 31 of the Conditions in respect to these, and other works not included in the Contract, and shall allow reasonable access as approved by the Employer/Engineer, on, through or adjacent to the Site of the Works, to any other contractors or workmen who may be working on, through or adjacent to the Site.

1.4 Contractor's work area

The Contractor's Works Area shall be designated by the Employer/Engineer. This shall be the Contractor's Works Area for his offices, stores, plant, yard, and, only if permitted by the Employer and relevant Authorities, as an accommodation. The area for his employees, latrines and messing accommodation shall be indicated by the Engineer. The Contractor will not be permitted to erect temporary buildings or structures elsewhere on the Site without the specific permission in writing of the Employer/Engineer, including approval of the dimensions of such buildings or structures. The Contractor shall be deemed, during the preparation of his tender, to have found out whether or not he will be permitted to accommodate employees on Site or whether they are required to be housed off Site.

On completion of the Works, the Contractor shall remove all buildings and restore the area to the satisfaction of the Employer/Engineer.

1.5 Weather condition

The Contractor shall be deemed to have taken all normal weather conditions into account when preparing his tender, and he shall not be entitled to extra payment, or an extension of time, by reason of the occurrence of, or effect of, any meteorological phenomena which are considered normal by the appropriate Authority for the particular time of year.

Without limiting his liabilities under the Contract, the Contractor shall make suitable arrangements to protect the Works, temporary and Constructional Plant against the effects of weather.

1.6 Protection from weather:

All materials shall be stored on Site in a manner approved by the Engineer's Representative and the Contractor shall carefully protect from the weather all work and materials which may be affected thereby.

1.7 Programme of Works:

As soon as possible after acceptance of his Tender, and before any permanent construction of the Works commences, the Contractor shall submit in triplicate, the programme and particulars under Clause 14 of the Conditions of Contract. In the programme and particulars, the Contractor shall provide details of the sequence in which he proposes to carry out the works and he shall provide a detailed statement of the methods he proposes to adopt. He shall state and allow a reasonable margin of time for contingencies. He shall also state his intentions regarding shift work. Once approved by the Engineer, the programme shall be strictly adhered to unless any alterations are to be found to be necessary during construction of the Works, and are confirmed in writing by the Engineer.

1.8 Drawings:

The design of the services complies with the requirements of the Local Authority and the drawings are clearly presented on a reasonable scale. Therefore, the Works shall agree in all particulars with the Drawings.

1.9 Setting Out:

The Contractor shall set out the Works in accordance with drawings and as agreed by the Employer/Engineer in order to suit local conditions.

The Employer/Engineer may choose to carry out some setting out in which case the Contractor shall check and satisfy himself as to the correctness of such setting out before commencing work.

Any setting out undertaken by the Employer/Engineer shall in no way relieve the Contractor of any of his responsibilities or obligations under the Contract.

The Contractor shall locate and preserve all survey markers in the location of the Works. Where such survey markers will be unavoidably destroyed, the Contractor shall make appropriate arrangements with the relevant Authority or Department, for them to be accurately referenced to permanent, concrete markers before work is commenced. Thereafter, levels of survey markers shall be checked once per month.

1.10 Dimensions:

All dimensions and levels shown on the Drawings or referred to in the Documents forming part of or issued under the Contract shall be verified by the Contractor on the Site, and he will be responsible for pointing out, promptly, errors or discrepancies in such dimensions and levels.

1.11 Record of Surveys

The Contractor shall take and record levels, in the manner directed by, and in the presence of, the Employer/Engineer's Representative, of any portion of the Site and the Works before the surface of any such portion is interfered with or the Works thereon are begun. Such levels, when approved and checked by the Employer/Engineer, shall be recorded on drawings, shall form the basis of the measurements for the Employer/Engineer's Certificates. Should this procedure not be carried out by the Contractor, the Employer/Engineer reserves the right to base the measurement on information he considers to be relevant.

1.12 Measurements and Quantities

The measurement of all completed Works shall be as specified in the Bills of Quantities.

The quantities of work satisfactorily completed shall be agreed between the Contractor and the Employer/Engineer. Failing such agreement, the quantities as determined by the Employer/Engineer and measured in the presence of the Contractor, shall be final and binding on the Contractor and payment will be made accordingly.

1.13 Services for Carrying Out works:

The Contractor shall at his own expense make arrangements for a 24-hour day supply of electricity for power and light and of other services, including telephones, required for carrying out the Works.

1.14 Water Supply:

The Contractor shall at his own expense make arrangements for a water pipeline to connect to existing water lines to the nearest developed area which is adjacent to the site. The contractor will use the pipeline for water for domestic purposes. The Contractor will have to make his own arrangements for water for construction.

Contractor shall comply with any regulations laid down by the Employer or relevant Authority and shall, at his own expense, pay for such supply, stand pipes, connections, rent and all other charges as required. The Employer is not liable for low water pressure. Water drawn from existing reticulation shall be approved by the Local Authority and shall be such that the requirements of the local population in respect of water for irrigation, drinking purposes and all other purposes are not interfered with or prejudiced in any manner.

Should the Contractor construct temporary water retaining structures, he shall first obtain written authority from any affected landowner and the relevant Authorities before constructing such structures and he will be held responsible for any damage caused by the overflow or collapse of such temporary water retaining structures and for any consequential compensation.

1.15 Damage to Services:

The Contractor shall locate all services from existing drawings where available and /or through liaison with the Local Authorities.

The Contractor shall be held liable for all damage to roads, irrigation ditches, mains, pipes, electrical cables, communication cables, lines or services of any kind caused by him or his Sub-Contractor in the execution of the works.

The Contractor must make good or arrange to make good any damage to services at his own expense without delay and, if necessary, carry out any further work ordered by the Employer/Engineer.

1.16 Disposal of Waste and Keeping the Site Clear:

The Contractor shall make adequate arrangements to the satisfaction of the Employer/Engineer for the disposal of all waste, rain and sub-soil water, sewage and all other waste materials arising from, or connected with, the execution of the Works. The Contractor shall ensure that his employees do not foul the Site. All toilet facilities erected by the Contractor shall be in accordance with the requirements of the Employer and Local Authority.

1.17 Works to be Dry:

Unless otherwise specified, all the Works are to be carried out in the dry, and they shall be kept free from water coming from any source whatsoever, to the satisfaction of the Employer/Engineer and at the Contractor's expense.

1.18 Notice Boards:

The Contractor shall provide and erect notice boards on the Site as directed. The minimum dimensions of the boards shall be 3 metres by 2 metres. The boards shall be prepared, primed and painted out and lettered as directed. The wording, script and method of mounting shall be subject to the approval of the Employer/Engineer.

1.19 Contractor's Progress:

The Contractor shall report weekly progress to the Employer/Engineer on charts submitted in triplicate and showing actual work done superimposed upon copies of the approved programme.

He shall furnish in writing an explanation of any deviation from the programme stating his proposals for improving progress should this be lacking in any respect.

1.20 Access to the Site:

The Contractor shall make at his own expense all arrangements for providing safe and expeditious access to the various parts of the Site, and where necessary, shall construct, maintain, safeguard and reinstate, all to the satisfaction of the Employer/Engineer, all temporary roads and other access works which may be required for this purpose.

The Contractor shall ensure that none of the aforementioned works (whether of a permanent or temporary nature) shall obstruct or impede services, drainage or irrigation systems or have other avoidable adverse effects on surrounding land, property and natural watercourses.

1.21 Fouling of Drains:

The Contractor shall take such measures as the Employer/Engineer's Representative may require, to prevent the entry of spillage from concrete mixing operations, oils or other deleterious materials into any new or existing drainage systems or watercourses.

Nevertheless, should any drainage system or watercourse be fouled by such materials, the Contractor shall clean the drainage system or watercourse at his own expense to the satisfaction of the Employer/Engineer.

1.22 Prevention of Erosion:

In addition to any other requirements referred to elsewhere in the Contract Documents, the Contractor shall take all necessary measures to ensure effective drainage during construction of the Works and Temporary Works. The Contractor shall implement all necessary measures to prevent erosion of partially completed earthworks, pavements and land and to prevent construction debris from entering into natural watercourses and onto land within and adjoining the Site.

The Contractor shall carry out at his own expense all such measures and any additional measures the Engineer may from time to time require, to improve the effectiveness of erosion control measures.

In conforming with the requirements of this Clause the Contractor shall in no way be absolved from any of his obligations under the Contract.

1.23 Sources of Materials:

For the purposes of the Contract, borrow areas and quarry areas shall mean and include all such areas which are shown on the Drawings or others that may be approved in writing by the Employer/Engineer as sources from which the Contractor may excavate or obtain materials for use in the Works.

At the commencement of the Works, or as soon thereafter as is practicable, the Contractor shall submit to the Employer/Engineer for approval, details of: -

- a) The sources from which he proposes to obtain sand, gravel, stone aggregates and filling for the Works;
- b) The Period during which he proposes to obtain materials from each of the several sources;
- c) The means and routes by which he proposes to obtain and transport these materials to site.

1.24 Use of Public and Other Works:

The Contractor shall ensure that all vehicles he intends to use on public highways comply with and are used in accordance with all relevant statutory regulations currently in force.

The Contractor shall take every precaution and shall make adequate provisions to prevent excavated material or other debris being deposited on the public highway from his vehicles, and shall promptly comply with any instructions issued by the relevant Authority or the Employer/Engineer to remove at his own expense any material which is so deposited.

1.25 Use of Public and Other Works: Passing of Traffic:

The Contractor shall be responsible for safely maintaining traffic using roads and railway lines through or around any part of the Works included in this Contract, with the maximum practical convenience for the public and others for the full twenty-four hours of each day, whether or not work has ceased temporarily. The Contractor will be held responsible for the proper direction of traffic in a manner approved by and to the requirements of the relevant Authority and the Employer/Engineer.

Stored materials shall be so placed and the work at all times be conducted so as to cause as little obstruction to the travelling public as possible. No road shall be closed to the public by the Contractor except by permission in writing by the Employer/Engineer.

When the road under construction is being used by the travelling public, special attention shall be paid to such conditions that the public can travel over the same in comfort and safety and in accordance with the requirements of the relevant Authority and the Engineer. No work that will in any way inconvenience the travelling public shall be started until adequate provision, satisfactory to the Employer/Engineer, has been made to divert or bypass traffic in safety and comfort.

All road diversions shall be maintained in good condition at all times by the Contractor and shall be at least 6 metres wide and surfaced as required by the Employer/Engineer.

All diversions shall be to the satisfaction of the Employer/Engineer, and where existing public or private roads are used as diversions, they shall be maintained in good condition at all times by the Contractor, and on completion of the Contract such roads shall be left in a condition approved by the Employer/Engineer.

The cost of construction and maintenance of diversions and any work carried out under this Clause shall be deemed to be included in the tendered rates and prices. Similarly, the cost of repairs and reinstatement of any road necessitated by the Contractor's activities shall be deemed to be included in his tendered rates and prices.

1.26 Barricades, Warnings and Diversion Signs:

The Contractor shall at all times during the Contract provide, erect and maintain such barricades, warning lights, danger signs and provide such watchmen as may be necessary. Barricades and signs shall be constructed and used in accordance with the requirements of the relevant Authority and the Employer/Engineer.

The Contractor shall illuminate at night by reflectors and/or red lanterns all barricades, obstructions and such other facilities as are necessary to protect the public, or as required by the relevant Authority and the Employer/Engineer.

1.27 Duties in Regard to the Public:

The Contractor shall order the Works so that safe and free access to properties for both pedestrians and vehicles is preserved at all times. To this end, he shall provide temporary bridges over the trenches wherever necessary. He shall not deposit plant, materials or spoil in such a manner as to interfere unnecessarily with the convenience of the public.

At night all open trenches shall be surrounded with fencing or tow strands of rope, the top rail or strand being at least 0,8 metres above the ground level, and an ample supply of light shall be provided around all trenches, spoil heaps, plant, materials or other obstructions.

When working on roads or footpaths, the Contractor shall provide such barricades, warning signs and automatic or hand operated traffic control signal as may be necessary for the protection and warning of the public or required by the relevant Authority or the Police. No road shall be closed to traffic without the written permission of the relevant Authority and or the police. The Contractor shall save harmless and indemnify the Employer in respect of any claims, demands, proceedings, damages, and cost of expenses whatsoever arising out of any denial of access or obstruction of the Works.

Throughout the period of maintenance, the Contractor shall notify the engineer what work or operation he intends to carry out on the Site and he shall obey any instructions which the Employer/Engineer may give as to times and manner of working so that any inconvenience to the general public is kept to a minimum.

1.28 Safety Precautions in Regard to Site Personnel

In addition to satisfying the provision of the Conditions of Contract, the Contractor shall take such measures as may be necessary in the opinion of the Employer/Engineer to ensure the safety of persons on the Site.

These measures shall include the fencing of holes and excavations, the checking of strength and security of all shuttering, shoring, the provision of protection from electricity cables and other services, etc., such measures not being limited to the minimum necessary to comply with legal obligations.

1.29 Privately Owned Land:

Where it is necessary for the Contractor to enter on privately owned land for the purpose of making temporary road, diversions, collecting materials or for any other reasons, the land owner or occupier shall first be consulted by the Contractor and his written permission obtained.

Under no circumstances shall the Contractor enter upon or interfere with privately owned land until such permission is received and compensation, if any, has been paid.

Care shall be taken by the Contractor that no unnecessary damage is caused to the land and that all reasonable precautions are taken to prevent soil erosion. On completion of the work he shall leave the land in a tidy condition, to the satisfaction of the Employer/Engineer.

No extra payment will be made to the Contractor for delays due to negotiation, or for compensation or other costs paid for the use and reinstatement of such land.

1.30 Damage to Property:

The Contractor shall reinstate promptly all properties affected in consequence of the construction and maintenance of the works, to a condition as specified hereafter and at least equal to that existing before the commencement of the Works. If, in the opinion of the Employer/Engineer, the Contractor shall have failed to take reasonable and prompt action to reinstate such properties, and the Engineer shall have informed the Contractor in writing to that effect, then the Employer shall be entitled to make payments to the owners and occupiers of such properties and shall fairly represent the cost of such reinstatements and such payments will be deducted from any money due or which shall become due from the Employer to the Contractor.

1.31 Use of Explosives:

Blasting shall be restricted to the hours laid down by the Local Authorities or by the Employer/Engineer, and complete precautions shall be taken by the Contractor to ensure that traffic and pedestrians are kept at a safe distance during blasting operations.

Proper and timely warning shall be given to all persons on, or near or passing the Site. No charges shall be prepared during thunderstorms.

The Contractor shall permit the handling and use of explosives only by fully licensed personnel, experienced and competent in the storage, handling and use of each explosive concerned, and shall be responsible for preventing the unauthorised issue, and improper use of explosives. Any regulations regarding the handling of explosives, which have been laid down by Government or any other Authority, shall be strictly observed.

Drilling and blasting shall be done in such a manner as will most nearly complete the excavation to the regarded grade lines, and produce the least disturbance to material to be left in place.

The Contractor shall have readily for use where necessary and where directed by the Engineer, heavy mesh blasting mats or nets, or equally effective materials for protection purposes.

If any railway line is within 200 metres of any blasting operations, the Contractor shall be responsible for notifying the Chief Civil Engineer, National Railways of Zimbabwe, or his representative, at least 24 hours in advance that the blasting will be taking place in that area, and he shall obtain instructions from the railways Representative about the hours during which blasting may take place, and any special arrangements required by him.

If, in certain circumstances, the Employer/Engineer considers that blasting is inadvisable, he may order that rock be removed by other methods.

Neither the provision of this clause nor any acceptance of the Contractor's proposals by the Employer/Engineer shall relieve the Contractor of his obligations and responsibilities, and sole liability under the Contract for any injury or damage to the Works or property resulting from the storage, handling and use of explosives.

1.32 Prevention of Fires:

The Contractor shall take all necessary precautions against the risk of fire of whatever kind, and shall keep an adequate supply of extinguishers, (properly charged at all times) of the appropriate types for any type of fire likely to occur in the vicinity. Sand (including shovels and wet receptacles shall be kept in suitable locations and maintained solely for the purpose of fire-fighting.

The Contractor shall do all in his power to prevent the starting of grass or other fires on or adjacent to the Site, and in the event of a fire starting from whatever cause, he shall take immediate steps to extinguish it.

1.33 Recognised Address:

The Contractor's site office shall be the recognized address for any Notices or Instructions passing between the Employer/Engineer and the Contractor.

1.34 Construction Records:

The Contractor shall keep full and accurate records of the dimensions and positions of all new work and all the excavations made, including the location of any relevant soil and geological features, details of grouting and any other information which is necessary for the purpose of measurement, or which may be required by the Employer/Engineer. Such records shall be made available to the Employer/Engineer for inspection.

1.35.1 First Aid:

The Contractor shall provide an adequate number of first aid kits for use on site and in the offices.

1.36 Survey Equipment and Site Office:

The Contractor shall have available at all time, for use by the Employer/Engineer, a precision level, total station/theodolite, tapes and other equipment, with such necessary attendance as to enable the Employer/Engineer or his representative to carry out such measurement or other duties as may be required.

The Contractor shall also provide a site office with a table and chairs in which meetings can be conducted.

In addition, the Contractor shall supply an office complete with 2 desks, filing cabinet and chairs, to be used only by the Employer/Engineer for the duration of the Contract.

The office shall have a minimum floor area of 16 square metres, adequate windows and burglar bars and a lockable door, and shall be maintained in a clean and tidy condition by the Contractor during all normal working hours.

The Contractor shall also make available for the Employer/Engineer suitable toilet facilities, which may be the same as the one used by the Contractor.

Suitable residential accommodation will be required to be provided by the Contractor for the Employer/Engineer's Representative.

1.37 Laboratory:

For the duration of the Contract, the Contractor shall arrange for the company hired to carry out laboratory testing to provide staff, laboratory equipment and a vehicle for the testing of site materials.

Staff for the site testing shall at all times comprise of a Materials Technician with sufficient experience to the satisfaction of the Employer/Engineer to carry out all testing procedures on site for the duration of the construction contract. Laboratory assistants and laboratory hands will assist the materials Technician.

The Materials Technician will be required to report all results of tests to the Employer/Engineer's representative as required and test results will be recorded and filed with summaries being completed at least at monthly intervals.

The laboratory staff shall be accessible to the Employer/Engineer's Representative at all times for the duration of the contract.

2. **Materials**

2.1 **Standards and Codes of Practice:**

The initials SAZ (CAS), BS, BSCP, SABS, and BSS, where used shall be deemed to mean Standards Association of Zimbabwe (formerly Central African Standards), British Standards, British Standard Code of Practice, South African Bureau of Standards, British Standards Specification, respectively, and shall mean the issue of Standards or Codes current at the time of tender unless some other edition is specifically referred to herein or referred to in instructions issued subsequent to the signing of the Contract.

2.2 **Quality of Materials and Workmanship**

The whole of the materials used in the Permanent Works shall be new, of good quality and typical of their respective kinds appropriate to the class of work involved and be in full accord with the Contract requirements. Similarly, the workmanship in every case shall be of the best character and shall be subject to the approval of the Engineer. Where an applicable specification issued by the Central African Standards Association is currently in existence, execution of Works, shall comply with that specification unless otherwise ordered by the Employer/Engineer.

2.3 **Submission of Samples:**

In addition to any specified provisions in the Specification and the Bills of Quantities contained in the Contract Document for sampling and testing of materials, the Contractor shall submit to the Employer/Engineer as may be required, samples of all materials and goods which he proposes to use or employ in the Works. Such samples, if approved, will be retained by the Employer/Engineer. No materials or goods of which samples have been submitted shall be used in the Works, unless and until such samples have been approved in writing by the Employer/Engineer.

The Employer/Engineer may reject any materials and goods which in his opinion are inferior to the samples thereof previously approved and the Contractor shall promptly remove such materials and goods from site.

2.4 **Tests Generally:**

The Employer/Engineer may examine and order to be tested materials or goods required in or for the Works such as he may decide from time to time. The Contractor shall arrange for the Employer/Engineer to have unrestricted access to the Contractor's Sub-Contractors and Suppliers' premises for such purposes at all times. In the case of steel reinforcement such tests if so ordered shall be carried out at an independent laboratory nominated by the Engineer.

The Contractor shall afford the Employer/Engineer all facilities, assistance, labour and appliances necessary for the convenient examination, testing, weighing or analysis of all such materials or goods. The Contractor shall provide and prepare such test pieces of any material or goods as the Employer/Engineer may require.

Notwithstanding any tests which may have been carried out off Site, the Employer/Engineer shall be empowered to order further tests of any materials or goods to be made on the Site and to reject any such materials or goods should they fail to pass such tests on Site.

2.5 Test Certificates:

Should the Engineer not inspect any materials or goods at the place of manufacture, the Contractor shall obtain Certificates of Tests from the suppliers of such goods and shall send two copies of certificates to the Employer/Engineer. Such certificates shall certify that the material or goods concerned have been tested in accordance with the requirements of the Specifications and shall give the results of all tests carried out.

The Contractor shall provide adequate means of identifying the materials and goods delivered to the Site with the corresponding certificates.

2.6 Removal of Condemned Material:

The Employer/Engineer may require the Contractor to remove and dispose of any materials employed in the execution of the Works which in the opinion of the Employer/Engineer are unsuitable or have been incorrectly deposited or have suffered damage by exposure to the weather or otherwise for such materials. The Contractor shall not be entitled to any payment whatsoever in respect of the removal and disposal of such materials.

2.7 Concrete:

Relevant standards are SAZ 170, BS 1881 and BS 3148. Aggregates for concrete shall comply with SAZ 233: 1978, SAZ A33, SAZ A34. Concrete materials shall comply with the following: -

a) Aggregate –Coarse:

General: To comply with SAZ 233(CAS No. A34).

Grading: To comply with the following envelopes for single sized Aggregates: -

Nominal Size (mm)	B. S. Sieve (mm)- % Passing						
	37,5	26,5	19	13,2	9,5	6,7	4,75
37,5	100-85	50- 0	25-0	5-0			
26,5	100	100-85	50-0	25-0	5-0		
19		100	100-85	50-0	25-0	5-0	
13,2			100	100-85	55-0	25-0	10-0

Shape: Flakiness Index - not more than 30.
Elongation Index - Not more than 40.
Voids (comp. bulk density) - not more than 48%

Water Absorption: Not more than 1% by mass.
Fine Material: Not more than 2% smaller than 75 microns.
Light material: Not more than 1% by mass.
Strength: Aggregate Crushing Value – not greater than 30
10% Fines Value (dry) – not less than 100KN.
10% Fines Value (wet) – not less than 75% of its dry value.

b) Aggregate – Fine:

General: To comply with CAS No. A33 and CAS No. A34
Grading: Fineness Modulus to be between 2,0 and 3,5.
Shape: Voids (comp. Bulk density) – not more than 48%
Fine Material: Not more than 5% smaller than 75 microns.
Light Material: Not more than 1% by mass.
Soluble Organic Impurities: pH₂₀ value to be 12,40 or greater
(SAZ No. A33).

c) Cement:

General: To comply with SAZ No. A46.

d) Water:

General: To be clear, and free of all substances that may be deleterious to concrete. Sources other than mains supply may be required to be tested in accordance with BS 3148 before use.

2.8 Storage of Aggregates:

Each size of aggregate shall be stored separately either in metal hoppers, suitable bins or on approved hard standings. Mixing of the different sizes of aggregate shall not take place prior to their being in a concrete mixer.

Stockpiles of aggregate shall be capable of draining freely. No aggregate shall be used until it has drained.

The aggregate shall not become contaminated with any deleterious or extraneous material and shall be delivered to each concrete mixing plant and used in an unsegregated condition.

2.9 Portland Cement:

Cement shall comply with SAZ A46: 1972 for Portland Cement. The Contractor shall not receive extra payment for using Rapid Hardening Portland Cement unless he does so under the written instructions of the Employer/Engineer.

Cement of different kinds shall not be mixed at any stage. Types and sources of cement shall not be varied from those used for the approved trial mixes; should a change be unavoidable, the Contractor shall submit his proposals for prior approval by the Employer/Engineer and then carry out new trial mixes unless otherwise directed by the Employer/Engineer.

2.10 Delivery of Cement:

Cement shall be delivered either in bags or by bulk delivery. When cement is delivered in bags these shall be inspected and any split bags condemned. When cement is delivered in bulk it shall be carried in a vehicle with suitable equipment for discharging into the storage container. Deliveries shall be made with sufficient frequency to ensure that cement is not more than 3 months old when used in the Works.

2.11 Storage of Cement:

Each kind of cement shall be stored separately. Cement shall be stored in dry waterproof silos or waterproof stores, all to the approval of the Employer/Engineer.

Cement shall be stored in such a manner that consignments will be used in the order in which they are received at each store.

2.12 Water stops:

Water stops; sealing compounds and joint filler shall be to the approval of the Employer/Engineer.

2.13 Bitumen:

The grades of bitumen shall be as stated in the Specifications and shall comply with SAZ 144 or SAZ 145 or BS 434 for bitumen emulsion.

2.14 Tar:

Tar Binder shall comply with the latest issue of SAZ 105.

Any tar delivered in leaking container or which may have deteriorated in the containers will be rejected.

2.15 Burnt Bricks:

All bricks must be new and shall be 250 mm long x 112 mm wide x 80 mm high. They shall be sound, hard, square, well burnt and of uniform size, shape and colour, with sharp straight arises. The bricks shall comply with SAZ. 221 and shall produce a clear ringing sound when struck against one another.

No brick shall absorb more than twenty per cent of its dry weight during twenty-four hours' immersion.

Bricks shall be free from flaws, stones and lumps especially of lime and shall be equal to samples which shall be deposited with and approved by the Engineer's Representative before deliveries commence.

2.16 **Precast Concrete Units:**

Precast concrete units shall, where appropriate, be constructed in accordance with the following standards and be hydraulically pressed where possible:

TYPE OF UNIT	STANDARDS
Concrete Blocks	SAZ 119
Cement Bricks	SAZ A41
Concrete Cylindrical Sections	BS 556
Concrete Kerbs	BS 1237

2.17 **Concrete Pipes:**

Concrete pipe culverts for surface water drainage shall be factory manufactured pipes having Ogee joints and conforming with the requirements of SAZ A17, "Concrete Pipes: Non-pressure". Pipes shall be Class S or X (reinforced), as specified on the Drawings.

2.18 **Test Certificates:**

The Employer/Engineer may require copies of the test certificate of the material from which the pipes are made to be submitted with the first deliveries. If approved, all subsequent deliveries shall be of a similar mixture and texture.

3. **Excavations and Earthworks**

3.1 **Surface Stripping:**

The Contractor shall remove all grass, bushes, trees, stumps, roots and other vegetation, hummocks, boulders, all huts dwellings, walls, fences or other obstructions occurring within the entire width of the road reserve, or to 2 metres beyond the excavations for drains or toes of embankments or elsewhere within the boundaries of the Permanent Works as described in Specifications or Bills of Quantities or where shown on the Drawings and as directed by the Employer/Engineer.

Unless excavation is to be carried out, cavities left by reason of removing stumps, roots or boulders or any other cavities within the areas of clearance shall be backfilled with approved material and compacted by power rammers to a density not less than 91% Mod AASHTO. Trees, which do not affect the construction of the Permanent Works, shall be left standing as instructed by the Employer/Engineer.

Cleared material shall be burnt or disposed of as directed by the Employer/Engineer.

Rock and boulders required by the Contractor for future use in the Works, shall be neatly stacked where required within the boundaries of the Permanent Works unless otherwise approved or directed.

3.2 **Removal of Topsoil:**

Topsoil shall be regarded as soil which on Visual examination can be seen to have been broken down by agricultural cultivation and/or is seen to be capable of supporting vegetation.

After surface stripping topsoil shall be excavated and removed to a depth and over an area within the area occupied by the Permanent Works both to be specified by the Employer/Engineer.

Unless otherwise directed by the Employer/Engineer, all topsoil shall be removed from the areas to be excavated or filled and stockpiled neatly for re-use for any purpose such as reinstating pipe trenches and soiling slopes of cuttings and embankments or verges and borrow areas.

The Contractor shall make his own arrangements for temporary storage sites for topsoil either inside or outside the Site to suit his convenience subject to the written approval of the Employer/Engineer. Where topsoil is to be spread on areas, which are to be grassed, it shall not contain any stone larger than 75 mm nominal size.

Where directed by the Engineer and where topsoil is not required to be left on site, it shall be picked up and carted to an approved dumping ground off Site and disposed of neatly to the satisfaction of the Employer/Engineer.

No earthworks shall be carried out until surface stripping and the Employer/Engineer has approved removal of topsoil.

After removal of topsoil and before any excavation work is commenced, the Contractor shall agree on ground levels with the Engineer. Should this procedure not be adopted the Employer/Engineer reserves the right to base the final measurement on the survey information available.

3.3 Removal of Unsuitable Material:

Where the Employer/Engineer so directs, the excavation and disposal of unsuitable material or anthills shall take place under embankments, prior to filling, or in cuttings after the earthworks have been excavated down to formation level.

Where anthills fall within the limits of an embankment, all that portion of the anthill, which lies above the natural ground, shall be removed. In addition, no ant earth shall be allowed to remain within one metre of the finished formation level of any embankment.

Where cuttings are made through anthills, all traces of ant earth shall be excavated and disposed of to a minimum depth of one metre below the finished formation levels within the limits of the formation and drains.

After excavation, termite poison shall be added in accordance with the Manufacturer's recommendations or as specified by the Employer/Engineer.

Cavities formed by the removal of unsuitable material, anthills or ant earth shall be backfilled with approved material and compacted by power rammers to a density of not less than 91% Mod AASHTO.

All excavated material shall be disposed of and dumped, spread and levelled in worked out borrow area or to a suitable location to the approval of the Employer/Engineer.

3.4 Earthworks:

All earthworks shall be constructed as shown on the Drawings or directed by the Employer/Engineer and shall adhere to the specified slopes, levels, depths, widths and heights.

Should any excavation be made beyond the specified slope level, width or height, the Contractor shall make well the area affected in a manner satisfactory to the Employer/Engineer.

3.5 Excavation and Disposal of Rock:

“Soft Rock” or hard material shall mean all classes of material, which have to be removed by the use of pneumatic tools. This classification does not include rock which is well fissured and layered and which can be economically removed without the aid of the pneumatic tools, nor does it include boulders less than 0,28 cubic metres in volume.

“Hard Rock” shall mean all classes of material, which can only be economically removed by either blasting or feather wedging and includes solid unweathered rock and boulders exceeding 0,28 cubic metres in volume. This classification does not include rock, which can be removed with the aid of pneumatic tools.

The Employer/Engineer’s decision as to what is measurable as soft or hard rock within the meaning of this clause shall be final.

Rock taken from any excavation shall be disposed of in the following order of preference:

Stockpiles within the Site in an area to be approved by the Employer/Engineer; or removed from the Site and dumped, spread and levelled in a worked out quarry or other suitable location to the approval of the Engineer. If the rock is stockpiled, it shall be used elsewhere in the Works where rock-piling or lining is specified.

3.6 Waterways:

Care should be taken that a free waterway in streambeds, gutters or temporary waterways is maintained at all times.

Special precautions shall be taken by the Contractor not to change the existing conditions by leaving spoil in waterways or diverting the water on to private ground in any other way.

Should flooding of private or public property occur through the waterway being obstructed or through water being diverted in any other way by excavated or other material or through any other cause occasioned by the construction of the Works, the Contractor shall settle all claims and make good any damage at his own expense.

3.7 Compaction of Existing Ground:

On completion of the excavation for road formation and before any fill is superimposed, the top 150 mm of the existing ground shall, where shown on the Drawings or directed by the Employer/Engineer, be compacted to not less than 91% Mod AASHTO. Where excavation is taken to a greater depth than shown on the Drawings the Contractor shall at his own expense fill the voids with granular fill compacted to 91% Mod AASHTO.

3.8 Placing and Compaction of Fill:

Fill material shall be placed in layers not exceeding 250 mm thick before compaction. Each layer shall extend over the full width of the embankment or area to be filled and water shall be added as necessary so that the material is compacted at the optimum moisture content.

All fill in the Works shall be compacted to 91% Mod AASHTO or higher density if so specified in the Bills of Quantities.

When filling is used to form an embankment for the road, the Contractor shall control and direct construction traffic uniformly over the full width of the embankment.

The Contractor shall obtain the approval of the Engineer to each successive layer of compacted fill before spreading a further layer on top.

Where directed, the Contractor shall excavate benching on natural side slopes prior to the construction of embankments.

The existing slope shall be benched by cutting steps at right angles to the slope as directed by the Employer/Engineer. The material so excavated shall be disposed-off.

The manner of transport and spreading of fill shall be subject to the approval of the Employer/Engineer and unsuitable material shall be removed and disposed of as directed at the Contractor's expense.

3.9 Water for Compaction:

It is essential that all material used in the formation of embankment has the correct amount of moisture, or Optimum Moisture Content (OMC) before it is compacted.

Sufficient water shall be added to bring the moisture content of the material up to within + 0% or -2% of the Optimum Moisture Content of the material.

The addition of water, if necessary, shall be made by successive applications of water from approved water sprinklers and the water shall be evenly applied over the whole area to be compacted and it shall then be thoroughly mixed with the material until a homogenous mixture is obtained before compaction is commenced.

3.10 Inclement Weather:

No placing of soil in embankments or compaction of embankments or subgrade will take place where the ground is water-logged nor shall such operations be recommended until, in the opinion of the Employer/Engineer, the ground is dried out sufficiently to permit such operations to be carried out promptly.

3.11 Selection of Fill Material from Site Excavation:

A maximum quantity of material excavated from the Site shall be placed in embankment filling and the Contractor shall ensure that suitable and approved material for filling is kept separate for use and is not contaminated with unsuitable material.

The Contractor shall arrange such tests in advance of excavation and during compaction as he considers necessary, to determine the suitability of material to be excavated for use as fill.

Material taken from excavations on the Site shall only be used for fill if it is inorganic and free from vegetable matter and it is deemed to be suitable by the Engineer and in no case, unless specifically permitted by the Engineer in writing, shall it be used unless 100% passes the 75 mm sieve and not more than 65% passes the No. 200 (75 microns) sieve and the plasticity index for the material passing No. 36 sieve (425 microns) shall not be greater than 18.

3.12 Borrow Area:

Fill material which is required in addition to that provided by the excavations on Site shall be obtained from borrow areas approved by the Engineer. The Contractor shall not use any other source of fill without prior written permission of the Employer/Engineer.

The Contractor shall clear and remove all vegetation, trees etc. from the borrow area. Adequate supervision shall be provided in every borrow area to ensure that approved material is not contaminated with unsuitable material.

Borrow pits must at all times be maintained and operated in such manner that there is no danger to persons, livestock or property.

The Contractor shall provide and maintain access roads capable of carrying construction traffic to the borrow areas.

The Contractor shall reinstate to an even surface all borrow areas and re-spread the topsoil and provide such drainage if required as the Employer/Engineer may direct at the completion of the Contract.

3.13 Trimming of Slopes and Tolerances:

The slopes and embankment shall be trimmed by hand or by approved mechanical means to uniform batters as shown on the Drawings or as directed by the Employer/Engineer.

Any rock or boulders appearing in the face of the cutting shall be trimmed back to within the tolerances specified, and in addition, any such rock or boulders, which in the opinion of the Employer/Engineer is unstable, shall be completely removed and the resulting void filled with compacted material to the approval of the Employer/Engineer.

The tolerances that will be allowed in width on banks is plus 150 mm only on either side of the centre line. In cuttings the tolerances will be minus 75mm and plus 150 mm on either side of the centre line.

Slope tolerances will be as follows:

Specified slope	1 in S
Steepest slope	1 in (S – 0,1)
Flattest slope	1 in (S + 0,1)

A tolerance of plus zero and 25 mm will be allowed in relation to the specified finished formation level provided that allowable rate of variation from the specified grade shall not exceed 25 mm in 6 metres.

The tolerances allowance in respect of cambers or crossfalls shall be as follows, where the crossfall or camber is specified as 1 vertical to “H” horizontal:

Maximum	Crossfall	Minimum	Crossfall
H < 25	H > 25	H < 25	H > 25
1: H - 2	1: H - 4	1: H + 2	1: H + 4

3.14 **Finishing off to the Formation:**

For the full width of formation along the road centre line, the top 150 mm of embankment immediately below the formation or sub grade levels specified will be required to be constructed of selected superior quality material.

In cuttings, where the material at the required finished level is unsuitable, over-cutting shall be carried out to a depth specified by the Employer/Engineer and refilling carried out using selected superior materials.

The top 150 mm of formation, termed the sub grade, whether in cutting or on embankments, is required to be finished to the specified levels and shapes and compacted to the density in the Bills of Quantities.

3.15 **Grassing:**

Where shown on the Drawings or as directed by the Employer/Engineer, any areas including slopes of cuttings and embankments shall be planted with suitable grass to the approval of the Employer/Engineer.

The rhizomes shall be planted at 250mm centres and shall be watered at regular intervals to ensure quick and constant growth. The Contractor shall be responsible for the

preparation of the area for planting the grass and for making all necessary arrangements for obtaining the grass. The Contractor shall also be responsible for the watering, cutting, fertilizing and maintenance of all grassing during the period of the Contract.

3.16 Excavation for Drainage Channel and in Trenches for Pipe Culverts, Pipelines and other Works:

A maximum amount of the material excavated in the construction of drainage channels and in trenches shall be re-used as backfill or used as embankment fill and the Contractor shall ensure that suitable and approved material for filling is kept separate for use and not contaminated with unsuitable material.

All drainage channels shall be excavated to the specified line, levels and falls and trimmed to the required cross-section as shown on the Drawings.

Any unsuitable or surplus material shall be disposed as specified.

Excavations shall be carried out to the net outline of the structure or lining to be placed in the excavated area or, in the case of pipes or culverts without a concrete surround, to a width equal to the outside diameter of the pipe (or equivalent structure) plus 300 mm with a minimum excavation width of 600 mm.

If, without prior permission having been obtained, any excavation that is wider than that set out above, the Contractor shall immediately stop work on that section of excavation until he has received the Employer/Engineer's permission in writing to proceed. The granting of such permission may be dependent on the provision of concrete protection or other measures, and the Contractor shall carry out these at his own expense and to the satisfaction of the Employer/Engineer.

3.17 Support of Excavations:

The Contractor shall provide the necessary support of excavations. If in the opinion of the Employer/Engineer the support used by the Contractor is insufficient, then the Contractor shall provide stronger support as ordered by the Employer/Engineer.

3.18 Maintaining and Supporting Services and Structures:

The Contractor shall be responsible for determining the position and maintaining all watercourses, sewage drains and water pipes, electricity and telecommunication cables, other services and structures encountered during the construction of the Works and for any remedial measures necessary to make good any damage arising out of the construction of the Works. He shall temporarily support or divert and subsequently reinstate all such services and structures to the satisfaction of the Employer/Engineer and the appropriate Authority.

3.19 Slips and Falls and Excess Excavation:

Every precaution shall be taken by the Contractor to prevent slips and falls of earth and other material in the excavations. In the event of slips or falls occurring or in the event of excavation being made in excess of the minimum necessary or practicable for the construction of the Works, the voids so formed shall be filled. In all cases where the voids so formed may in the opinion of the Employer/Engineer affect the stability of the ground for the support of permanent works or of adjacent structures and services, then such voids shall be filled solid with Grade 10 concrete. In all other cases the voids shall be packed with selected excavated material and thoroughly compacted.

In the event of slips, falls and over-excavation in trenches resulting in trench widths exceeding the maximum widths specified, the Contractor shall alter the form of construction and provide additional concrete or lining material over the lengths affected as the Employer/Engineer may direct.

3.20 Excavation to be Kept Free from Water:

The Contractor shall keep all excavation free from water and sewage whether affected by floods, storms or otherwise, to enable the Works to be constructed in dry conditions.

3.21 Excavated Material:

Material from the excavation suitable for backfilling and for forming embankments shall be selected and removed to temporary dumps to be stored until required. Where necessary to preserve its suitability for backfilling, such material shall be protected from rain.

Where trenches are excavated within road reserves, no material shall be stored beside the trenches or over previously backfilled trenches without the prior permission of the Employer/Engineer. Such permission if granted, will set a limit on the height of such spoil heaps and the minimum distance from the toe of the heap to any open excavations.

All hollow and uneven places caused by inaccurate or unnecessary excavation in the bottom of trenches shall be completely filled in with concrete (Grade 10) or at the Employer/Engineer's discretion, with rammed selected fill material or river sand, all at the Contractor's expenses.

Hollows left at the bottom of trenches caused by the excavation of boulders shall be filled-in with similar cement concrete or selected fill and will be measured and paid for.

In pipe trenches excavation shall be to the depth of the underside of the barrel of all pipes in such a way that the pipe barrels rest on a solid foundation from joint to joint. The tendered price for trench excavation shall include for the excavation of all joint holes in the bottom of the trench.

Where the bottom of the trench is composed of rock the excavation shall be taken out to 75 mm below the underside of the barrel of the pipe, and the pipes shall be laid on a firm bed of approved soft material, unless the Employer/Engineer shall direct, in special cases, the use of river sand or concrete Grade 10 for bedding.

The permissible length of trench opened up ahead of pipe laying is to be subjected to the approval of the Employer/Engineer.

Excavated material which in the opinion of the Employer/Engineer, is unsuitable for backfilling, shall be removed from the Site.

3.22 Disposal of Spoil:

No backfilling shall be commenced until the Employer/Engineer has inspected and approved the Works that will be covered up.

Backfilling shall be carried out in 300 millimetre layers, each layer being thoroughly compacted to a density of not less than 91% Mod AASHTO before the next is placed. Mechanical rammers shall be used except where, to safeguard property and services, the Engineer directs otherwise. In such cases hand rammers of at least 7-kilogram mass shall be used and there shall be at least two rammers working to one person filling. In suitable materials a vibratory compactor may be used in place of rammers.

Any backfilling carried out in sub-base layers (i.e. within the depth of the pavement) shall be compacted to the same standard, and with the same quality of material as specified for the particular pavement layer (refer to pavement specification).

On completion of backfilling, all surplus material shall be promptly disposed-off.

4. Pavements

4.1 Definitions:

Sub-grade:

Shall be the uppermost 150mm thick (compacted thickness) layer of insitu or fill material immediately underlying any gravel layer which forms a sub-base, base, or when gravel layers are omitted, the layer immediately beneath a concrete wearing surface.

(BASE 2)

Shall be a gravel layer constructed immediately above the sub-grade and immediately under a gravel base layer, or where the base is omitted, the layer immediately beneath a concrete floor slab or concrete wearing surface.

(BASE 1)

Shall be a gravel layer constructed immediately above the sub-base, or where sub-base is omitted, immediately above the sub-grade, and immediately beneath an asphaltic wearing course layer.

Where the asphaltic wearing layer is omitted the base layer shall be called a gravel-wearing course.

4.2 Employer/Engineer's Approval of Method:

The Contractor shall not commence work on the sub-grade, sub-base, base, surfacing or shoulders until he has obtained the Employer/Engineer's approval in writing of the plant and method that he proposes for each and every operation.

The foregoing provisions shall not prevent the Engineer from requiring the Contractor to vary his plant or methods at any time during the execution of the Works, should the Employer/Engineer consider this essential for carrying out the Contract. The Contractor shall not vary plant or methods, which have been approved by the Employer/Engineer, without previously obtaining the Engineer's approval of such variation in writing.

4.3 Prevention of Damage to Partially Completed Pavements:

The Contractor shall ensure that the passage of vehicles or plant over partially completed sub-grades, sub-base, pavement or shoulders shall not occasion any rutting or other damage or disturbance or rutting or other damage or disturbance to occur. The Contractor shall make good any damage or imperfections as directed by the Employer/Engineer's Representative.

Vehicles and plant passing over the partially complete sub-grade, sub-base pavement or shoulders shall not be allowed to travel in a single track but such traffic shall be spread out over as great a width as practicable. There shall be no storage or stock piling of material on top of partially completed pavements or shoulders.

4.4 Water for Pavement Construction:

The Contractor shall provide all water necessary for the construction of pavements and shoulders. Such water shall be clean and free from organic matter, waste matter and other harmful or obnoxious substances. The Contractor shall provide all plant necessary for conveying and distributing water and the water shall be evenly sprinkled on the surface of material by machine of a type or types to be approved by the Engineer, such machines being capable of uniformly distributing the water at a known, predetermined and constant rate.

4.5 Roller and Mixing Equipment:

Smooth –wheeled, vibratory and pneumatic tyred rollers where employed for compaction on the road works as detailed in subsequent clauses shall be of a type approved by the Engineer. The distribution of wheels on any roller shall be such that the whole of the ground surface within the width of the roller is loaded during each pass of the roller.

Equipment necessary for the thorough mixing of the gravel in order to achieve a uniform moisture content throughout the material, shall be tractor-drawn disc harrow type machines (or similar to the Employer/Engineer's approval) and the Contractor shall supply sufficient of such units to ensure adequate mixing of the material, taking into account any time limitations and weather conditions.

4.6 Pavement and Shoulder Levels and Tolerances:

The pavement and shoulder levels as shown on the Drawings or as directed shall be the finished surface levels or the levels before the application of any bituminous surface dressing. The level at any point on the surface of each course shall conform to that shown in Column 2 of Table 1. In addition, the surfaces of the finished sub grade, sub-base, base and shoulders shall, when tested with a 3 metre straight edge placed in any position on the finished surface parallel to the centre line, have no depressions greater than that shown in Column 3 of Table 1.

Table 1

1	2	3
Surface of Course	Tolerance True Surface Level	Maximum Depression Tested with 3 Metre Straight
Sub-grade	+ 0 mm - 25 mm	10 mm
Bases: 2,3,4 & 5	+ 0 mm - 25 mm	10 mm
Base 1	+ 20 mm - 0 mm	5 mm
Shoulder	+ 20 mm - 5 mm	10 mm

Sub-grade or		
Sub-base under	+	6 mm
concrete	-	6 mm
		5 mm

The tolerances in the thickness of materials for the construction of pavements shall be as follows:

Base 2 : thickness + 20 mm to – 20 mm

Base 1 : thickness + 20 mm to – 15 mm

Shoulder : thickness + 20 mm to – 15 mm

The surface of the shoulder where it joins the base, shall in no case be at a higher level than, nor more than 5 mm lower than the level of the adjacent surface of the base.

4.7 Trial Lengths of Pavements:

The Contractor shall submit in writing to the Employer/Engineer's Representative his proposals for grading, mixing, transporting, placing, spreading, and compacting materials comprising the gravel pavements before the construction of the trial lengths. The Contractor shall construct a trial length of at least 400 square metres of each type of pavement as required by, and in the presence of, the Engineer's Representative.

If, in the opinion of the Employer/Engineer, the results of the trial length of pavement indicate that the Contractor's proposed plant or method will complete the pavement adequately and in accordance with Specifications, the Contractor may proceed with the work.

Otherwise the contractor shall submit in writing proposals for modifying his plant or methods and shall, if the Engineer so requires, construct further trial lengths of pavement until the specified results are obtained. The location of this trial length shall be as directed by the Employer/Engineer's Representative. During the construction of the trial length or pavement, the Contractor shall employ such types and weights of rollers or other compacting equipment in such a manner as the Employer/Engineer's Representative may require.

4.8 Preparation of Sub-grade:

Any sub-grade material which in the opinion of the Employer/Engineer's Representative fails to comply with this Specification due to being inadequately compacted or being unsuitable as directed or approved by the Employer/Engineer's Representative shall be removed and replaced by suitable material at the Contractor's expense.

Any irregularities or depressions which develop in the surface of sub-grade during compaction shall be corrected by loosening the surface of the places affected and adding, removing, or replacing material and re-compacting as specified herein so that the surface is smooth and uniform. At all times the surface of the sub-grades shall be kept in such condition that they will drain quickly and effectively, and to this end small drainage grips shall be dug through the sub-grade of the verges wherever required. Any erosion that may develop on the surfaces of sub-grades shall be made good by the Contractor at his own expense.

No sub-grade shall be covered up until it has been inspected, tested for density and level and approved by the Employer/Engineer's Representative.

4.9 Sources and Supply of Gravel:

The Employer/Engineer shall approve the sources of supply for gravel to be used for each part of the Works, and the Contractor shall not use any other sources of gravel without the written permission of the Employer/Engineer.

In the use of naturally occurring gravels, the Contractor shall be responsible for winning gravel that complies with the required Specification.

Gravel borrow pits must at all times be maintained and operated in such a manner that there is no danger to persons or livestock and shall be restored to the satisfaction of the Engineer on completion.

Pavement layers shall comply with the following specifications:

a) Base 2 layers

i)

- Material-		Natural Gravel	Stabilised Gravel
Reject Index	1R	Max 20	Max 10
Coarseness Index	1C	50 to 70	
Fineness Index	1F	5 to 15	
Plasticity Index	1P	Max 12	
Liquid Limit	WO	Max 30	
C.B.R. Value –soaked		Min 30 @ 95% HCE	Min 50 @ 95% HCE
U. C. Strength @ 7 days		N/A	Min 1,0MPa

ii) Grading Specification

B S Sieve Size (mm)	% Passing		
37,5			100
19,0	80	-	100
9,5	55	-	80
4,75	40	-	64
2,36	30	-	50
1,18	22	-	40
0,6	15	-	30
0,3	10	-	23
0,15	8	-	19
0,075	5	-	15

Any oversize material in excess of 50 mm shall be removed from the Works prior to processing if so directed by the Employer/Engineer.

b) **Base 1 Layer**

- Material-		Natural Gravel	Crushed Stone	Stabilised Gravel
Reject Index	1R	Max 15	Max 5	Max 10
Coarseness Index	1C	50 to 70	50 to 70	50 to 70
Fineness Index	1F	5 to 15	5 to 20	5 to 15
Plasticity Index	1P	Max 6	Max 6	Max 6
Liquid Limit	WO	Max 25	Max 25	Max 25
C.B.R. Value –soaked		Min 80 @ 96 to 98% H C E		
U. C. Strength @ 7 days		N/A	N/A	Min 1,5MPa

ii) Grading Specification

Crushed Stone		Natural Gravel
37,5	100	100
19,0	80 – 100	80 – 100
9,5	55 – 80	55 – 80
4,75	39 – 60	40 – 64
2,36	28 – 45	22 – 40
1,18	20 – 37	15 – 30
0,6	15 – 31	10 – 23
0,3	10 – 26	8 – 19
0,15	7 – 23	5 – 15
0,075	4 – 20	

Any oversize material in excess of 50 mm shall be removed from the works prior to processing if so directed by the Employer/Engineer.

c) **Shoulder and Fill Layers**

- Material-		Shoulder	Fill
Reject Index	1R	Max 10	Max 5
Coarseness Index	1C	20 to 60	10 to 70
Plasticity Index	1P	Min 12	Min 12 and Max 30
Plasticity Product	PP	Min 300 & Max 80	Min 250 & Max 900
Particle Size		To be continuously graded	
Distribution			
C.B.R. Value –Soaked		N/A	Min 10 @ 93% HCE

IF CALCULATED FOR TOTAL SAMPLE – 250 mm

d) **Wearing Coarse Gravel**

For a given grading modules (GM); the acceptable IP will be in the envelope enclosed by

$$\begin{aligned}\max I_p &= 15 (GM - 0,25) \text{ and} \\ \min I_p &= 10 (GM - 0,25)\end{aligned}$$

The acceptable range of the grading modules will be 1,5 – 2,5

A variation of the IP from the above may be allowed by the Employer/Engineer.

4.10 Laying and Compaction of Gravel Base 2:

The lower Base (Base 2) shall be deposited and spread in a uniform layer across the road, so that the final base layer as shown on the Drawings, correct to line, slope, widths and level is obtained. The base layer shall be compacted in one layer in a methodical and orderly manner. It shall be compacted throughout to a minimum dry density as shown on drawings, and at moisture content in the range –3% to +1% of Optimum Moisture Content for the compaction plant being employed.

Compaction shall be carried out by approved compactors or rollers, which follow a regular route such that each track slightly overlaps the adjacent previous track and the entire area of each layer is covered. Compaction shall progress from the sides to the centre of the section under construction, or from one side towards previously compacted work.

The surface of the finished base layer shall be smooth and free from irregularities to the approval of the Employer/Engineer. Any parts of the surface of the base layer which do

not comply with the above requirements shall be corrected by being scarified, reshaped, remixed and re-compacted as may be necessary, or shall be otherwise treated as the Employer/Engineer may require, at the Contractor's expense.

4.11 Laying and Compaction of Base 1:

Laying of and compaction of base 1 shall be the same as for base 2 except that the compaction effort will be higher as indicated on the drawings.

4.12 Stabilized Gravel:

Where shown on the Drawing or instructed by the Employer/Engineer, the base or sub-base, shall be stabilized with cement or lime. Cement shall comply to SAZ A46 and lime to SAZ A19.

The gravel for stabilization shall comply with the requirement for gravel base or sub-base, whichever the case may be, in all respects except those for Texas Triaxial Strength, Plasticity Index and Plasticity Product, all of which shall have values which in the Employer/Engineer's opinion render the gravel suitable for use as base (or sub-base) with stabilization using cement or lime.

The rate of addition of the stabilizing agent (expressed as the percentage by weight of the dry material to which it is to be added) shall be as instructed by the Employer/Engineer, following the results of tests on samples from the stockpiles which the Contractor proposed to use for stabilized gravel base or sub-base and when planning his operations, the Contractor must make due allowance for the delay between stockpiling and the material becoming available for use.

Before the stabilizing agent is applied, the material to be stabilized shall be spread, mixed, shaped true to line, grade and across section and lightly compacted. The loose thickness shall be such as to give the specified thickness after the full compaction has been carried out. The instructed percentage of stabilizing agent shall be uniformly spread over full widths to be stabilized as shown on the Drawings. Only sufficient stabilizer for immediate use shall be spread ahead of the mixing operation and any stabilizer which, in the opinion of the Employer/Engineer, becomes defective shall be replaced at the Contractor's expense.

No traffic or plant not actually used in the spreading or mixing operations shall be allowed to pass over the stabilizing agent, when so spread, until it has been mixed into the material to be stabilized.

Immediately after the stabilizing agent has been spread, the agent and the material to be stabilized shall be thoroughly mixed to form a fine tilth for the full depth of the layer, and mixing shall continue for as long as is necessary to ensure that the resulting mixture is homogenous.

Care shall be taken both during this and during subsequent watering operations that the layer underlying that being stabilized is not disturbed and that no material from the underlying layer or shoulders is mixed with that being processed.

Water shall be added where necessary, and thoroughly mixed in successive increments, to obtain the required moisture content uniformly throughout the depth of the layer. Care shall be taken to avoid either a concentration of water at any point, or any flow of water over the surface.

Any portion of the work, which becomes saturated after the stabilizing agent has been added, shall be rejected; this shall apply equally to saturation by rainfall.

The base shall be compacted in one layer and shaped on completion of the mixing and watering operations. Compaction shall be to a minimum dry density of 96% Mod AASHTO and at a moisture content in the range -3% to +1% of Optimum Moisture Content.

The gravel layer shall be shaped in accordance with the correct lines, slopes, widths and levels shown on the Drawings.

The surface finish after compaction shall be free from ridge compaction planes, laminations or other surface irregularities.

All work required to produce the finished pavement layer shall be completed within five hours of spreading the stabilizing agent with exception of rolling to reduce cracking.

The Contractor shall roll the finished layer once, not less than six and a half hours, nor more than seven hours, after spreading the stabilizing agent, with a 12 tonne or 18 tonne smooth wheeled roller to reduce cracking of the layer.

All construction joints with previous work shall be cut cleanly and vertically at right angles to the road centre line, for the full width of the work, the previous work. Previous work must be fully compacted at all times. Test holes shall be backfilled by the Contractor at his expense, with fully stabilized and compacted material, to the same standard as the base course.

The stabilized base shall be continuously kept damp for a period of seven days after construction. All traffic other than that required for watering shall be kept off the completed base course for this period. The prime coat shall then be applied as soon as practicable.

The stabilizer content shall not be less than 60% nor more than 140% of the specified amount and the average stabilizer content over 20 samples shall not be less than 90% nor more than 120% of the specified amount.

4.13 **Testing:**

Testing of compaction shall be in accordance with the Statistical Control of Compaction in use by the Ministry of Transport.

5. **Stone Pitching**

5.1 **Stone for Pitching:**

Stone for pitching shall be clean, sound, hard and un-weathered, selected from excavations of hard rock on Site or brought onto the Site from an approved source.

No stone with dimensions less than 150 mm in any direction shall be used except for the filling of small gaps between stones that may be unavoidable due to the irregular shape of the stones.

5.2 **Construction of Stone Pitched Surfaces:**

Pitching stones shall be set in contact and firmly bedded into the surface on which they are to be laid and spaces between the stones filled with cement mortar with addition of smaller wedging stones where necessary.

The mortared joints shall be struck off flush and trowelled to a neat and tidy finish.

The stones shall be laid such that the minimum thickness of completed surfaces shall be 150 mm when measured normal to the finished surface.

The most suitable faces of stones shall be laid uppermost in order to achieve the smoothest, most even and tight surface possible. The profile of the completed pitched surface shall be true to line, level and shape.

Where necessary or directed by the Employer/Engineer, a foundation trench shall be excavated to firm ground along the toe of the area to be pitched and shall be packed with stone and grouted to the approval of the Employer/Engineer.

Before any stone pitching commences the Contractor shall discuss with the Employer/Engineer and receive a directive about the requirements for weep holes to be formed through the stone pitched surface.

6. **Bituminous Surfacing**

6.1 **Binders**

Tar may be used only for prime

The following are recommended binders together with their uses and spraying/ mixing temperatures.

6.2 **Aggregates:**

All aggregate must be free of clay and organic matter.

Binder	Type –Grade	Usage	Recommended Temperature. Degrees Celsius Mixing Spraying
Bitumen	150/200 Pen	Surface	150
Bitumen (cutback)	MC 30	Prime	60
Tar	TP7	Prime	70

6.3 **Prime Coat:**

The tenderer may use a cut back bitumen or tar prime to comply with SABS 1260 – 1979 and SAZ No. 105 (Road Tars) respectively. The following rates of prime application are to be used for materials currently in use.

Approved tar prime - 0,6 l/m² –as sprayed
Approved bitumen prime- 0,80 l/m² – as sprayed

6.4 **Bituminous Material used for Surfacing:**

The bitumen binder used in surfacing work shall be 150/200-penetration grade bitumen to conform to SAZ No. 144.

The bitumen shall be of the ‘straight run’ type and cutting back with fluxing oils of any nature will NOT be permitted.

The Contractor shall supply a complete schedule of the physical characteristics of the bituminous material offered, together with the trade name and the manufacturer’s name.

The Contractor shall provide free of charge samples for testing.

Surfacing materials shall comply to the following:

a) **Binders**

- Bitumen - To comply with SAZ No. 144
 Bitumen (Emulsion) - To comply with B.S. 434
 Tar (All Grades) - To comply with SAZ No. 105

b) **Aggregate –Coarse**

- Flakiness Index - Max 30
 Ten Percent Fact (Dry) - Min 120 KN
 Ten Percent Fact (Wet) - Not more than Dry Result plus 30%
 Grading - single sized aggregate

Size	B.S. Total % Passing						
(Normal)	Sieve:						
	26,5	19,0	13,2	9,5	6,7	4,75	2,3
- 19 + 13,2 (Tack)	100	90-100	0-20	0-5	0-1	-	-
-13,2 + 6,7 (Tack/Seal)	-	100	85-100	0-55	0-10	0-2	-
-9,5 + 3,55 (Seal)			100	85-100	0-50	0-10	0-2

c) **Aggregate -Fine**

GRADINGS –GRIT & SLURRY SEAL AGGREGATE

Size	B.S. Total % Passing								
(Normal)	Sieve:								
	6,7	4,75	3,35	2,36	1,18	0,60	0,30	0,15	0,075
- 6,7 + 1,18 (Grit Seal)	100	0-85	0-50	0-30	0-6	-	-	0-2	-
Slurry Seal (Fine)					55-95	35-70	20-50	10-30	5-15
Slurry Seal (Coarse)	100	70-100	-	45-90	30-70	20-50	12-30	7-20	5-15

d) **Fillers**

Portland Cement	-	To comply with SAZ No. A46
Hydrated Lime	-	To comply with SAZ No. A19

e) **Slurry Seal**

Grading	-	As above
Agg. Quantity	-	81 to 83 % by Mass
Cement Quantity	-	1 to 3% by Mass
Emulsion Quantity	-	16 to 18% by Mass
Emulsion Quantity	-	Min 55% by Mass Bitumen
Water Addition	-	To give Viscosity (Colas Viscometer) of 6 to 7 for Mechanical spreading.

6.5 **Workmanship:**

Surfacing must not be undertaken when the base is wet, or during wet or misty conditions, when rain appears imminent or when the air temperature is below 15⁰ C.

a) **Application of Prime Coat**

The finished base course shall be checked and passed by the Employer/Engineer before any surfacing work is undertaken by the Contractor.

After receiving the approval of the Employer/Engineer, the surface shall be swept thoroughly by hand or approved plant until all loose particles have been removed and a mosaic of the base course aggregate has been exposed.

The surface shall then receive a very light spray of water only sufficient to assist the penetration of the prime.

Prime shall preferably be MC30 cutback bitumen sprayed at 60⁰C, or may be tar prime grade TP7 sprayed at 70⁰C. The above temperatures are not to be exceeded by more than 10⁰C nor maintained for longer than six hours.

Arrangements for longitudinal overlaps and for entrance and exit paths for the distributor shall be by approval.

After spraying, the road shall be closed to traffic for at least 3 days and may not be opened without the Employer/Engineer's approval.

7. **Associated Works - Roads**

7.1 **Kerbing and Channelling:**

Precast concrete work shall be of an approved manufacture. All in situ-work shall be in accordance with the concreting specification

All kerbing and channelling shall be true to line and grade, and precast sections shall be jointed with 1: 4 cement and mortar. All kerbing shall be haunched with Grade 10 concrete to the Employer/Engineer's approval.

7.2 **Pipe Culverts:**

Pipe culverts will be constructed using two classes of pipes as follows:

- a) Where the depth of cover over a pipe and surround is less than one metre, culverts shall be constructed using Class S concrete pipes with a Grade 20 concrete surround in accordance with the Drawings.
- b) Where the depth of cover over a pipe exceeds one metre, culverts shall be constructed using Class X concrete pipes in accordance with the Drawings.

If the Contractor wishes to construct pipe culverts using removable formers, he shall submit details to the Employer/Engineer for approval at the time of submitting his Tender.

7.3 **Road Markings:**

All road markings shall be carried out using an approved PVA paint. The paint shall be applied in two coats to the exact dimensions as shown on the Drawings.

Before any paint is applied the road surface shall be dry and swept clean. The template used shall be in good condition and shall be sufficiently flexible to make continuous contact with the road surface throughout its length.

7.4 **Road Signs:**

Road signs shall be of standard pattern reflective on metal base, Bolted or otherwise securely fixed to 50 mm mild steel tubular supports.

From the lowest point of the sign and commencing with black, Give –Way signs shall be painted in alternate black and white bands 300 mm in width. Paint shall be enamel.

The tubular supports shall be set 600 mm into the ground in concrete Grade 15 bases approximately 230 mm square in plan. The bottom ends of the supports shall be crimped to prevent the post being rotated in the concrete.

8. **Public Utilities**

8.1 **Protection:**

All water, sewer, electricity and telephone services and road lighting will be identified, located and protected from damage during construction.

8.2 **Relocation:**

Where it is necessary to remove and relocate any services, this shall be done in accordance with the requirements and specifications of the Employer.

9. **PIPE BEDDING**

9.1 **Asbestos Cement Water Pipes:**

Unless otherwise directed, asbestos cement pipes are to be bedded where practicable as illustrated and described in the Drawings.

Where the trench passes through rock, or through any material such as clay that cannot economically be trimmed to an even bed, or is otherwise unsuitable for bedding, bedding shall be provided below the pipe and be well rammed leaving a compacted thickness of not less than 100 mm of such material below the pipe barrel.

9.2 **Galvanised Mild Steel Water Pipes,**

Galvanised steel screwed and socketed pipes shall in general be bedded as illustrated and described in the Drawings. Flexure of pipes to accommodate changes in grade and direction will be permitted within the manufacturer's recommended limits.

9.3 **Unplasticised Polyvinyl Chloride Water Pipes:**

The pipe bed and the material used for backfilling around and for 150 mm above the pipe shall generally not exceed 20 mm. The presence of particles between 20 mm and 40 mm will be acceptable provided that the total quantity of such particle does not exceed 5 % of the total. Materials containing particles in excess of 40 mm size will not be acceptable.

9.4 **Earthenware and Concrete Sewer Pipes:**

Unless otherwise directed, earthenware or concrete sewer pipes are to be bedded as illustrated and described in the Drawings.

9.5 Stormwater Pipes:

Unless otherwise directed, stormwater pipes are to be bedded as illustrated and described in the Drawings.

10. Laying Pipes:

Pipe laying shall commence as soon as possible after the trench bottom or bedding has been inspected and passed by the Employer/Engineer.

Pipe laying shall commence at the lower end of a line, and proceed in an uphill direction.

Where spigot and socket pipes are used the sockets shall be facing uphill.

Pipes shall be laid to uniform grades as possible, and in straight lines between bends in plan, commencing where practicable, at the lowest end and working uphill. Whole lengths of pipe shall be used except where necessary to make up distance, at specials and as may be directed by the Employer/Engineer.

At all abrupt changes of direction or where there are unbalanced forces generated, the pipeline shall be provided with anchors, thrust blocks or surrounds formed of Grade 15 concrete.

Pipes shall be lowered into the trench in a manner that they will not be damaged and shall be carefully examined for cracks and flaws immediately before laying. Pipes exhibiting any defects shall be immediately removed from the Site.

Extraneous material shall be prevented from entering the pipeline during laying or subsequently. When laying is interrupted, approved caps or plugs shall be used to cover open ends. A suitable badger shall remain in the pipeline and be drawn through as work proceeds to ensure that pipes are completely clear before testing.

Each pipe shall mate concentrically with the next to ensure that the invert is completely free of "lips". Valves, connections and other fittings shall be incorporated into pipelines as the work proceeds. Branch ends at junctions shall be sealed with caps except where the branch pipeline is to be laid immediately.

On completion of laying, trenches shall be backfilled as described in the section on "Excavations and Earthworks" of this Specification and as shown on the Drawings, and where concrete has been placed allowing sufficient time for the concrete to set adequately to safely permit backfilling.

Completed pipelines shall not be left unprotected for more than 24 hours.

11. Manholes

Unless otherwise directed, manholes shall be constructed so as to conform with the Drawings supplied. Full details of any alternative design which the Contractor wishes to use must be submitted for consideration. Drawings and full technical details must be furnished. Normally, step irons shall be supplied with the manholes unless specifically noted in the Bills of Quantities.

Where there is a change of direction at a manhole, the channel shall be formed with the greatest practicable horizontal radius of curvatures so as to ease the flow. In general, the slope of the channel invert shall be that of the outgoing pipe.

The lower part of the manhole base slab shall be poured to pipe invert level before pipelaying, and the upper part after pipelaying. In clay or similar soils, the Engineer may direct that backfilling in contact with the manhole shaft shall be of crusher dust or other approved material for such thickness not less than 75 mm as may be directed.

The permissible tolerance in the level of a manhole invert shall be 15 mm above or below that specified on the Drawings, provided that where the specified sewer gradient between two manholes is 1,25 % (1 in 80) or less, the “as built” gradient shall not be less than 9/10ths of that specified.

12 Rodding Ways:

Where indicated on the Drawings 100 mm sewers will terminate with two medium 1/8th bends and a cast iron rodding way as detailed.

13. Jointing Pipes:

Jointing of pipes shall be carried out using approved jointing rings or other materials appropriate to the type of pipe and in a manner recommended by the manufacturer and approved by the Employer/Engineer.

13.1 Galvanised Mild Steel:

Water Pipes Screwed joints between pipes and sockets or fittings shall be effected using an approved pipe jointing compound, complying with B.S. 217 or B.S. 1737, and yarn.

Flanges used for flanged joints shall be in accordance with B.S. 4504 drilled to Table “D” for working pressures up to 6,9 and 13,8 bars as required. Rubber insertion rings shall comply with B.S. 1737.

13.2 Unplasticised Polyvinyl Chloride pipes (UPVC):

UPVC pipe jointing can be carried out by the compression-ring push-fit joint method or the solvent welded joint type.

Where treading may be required, it is important that sealing pastes harmful to UPVC are not used.

Connections to non-UPVC fittings shall be by use of adaptors.

13.3 Earthenware and Concrete Sewer Pipes:

Earthenware and Concrete sewer pipes shall be effected using rubber rings and shall be carried out in all respects in accordance with the Manufacturer's recommendations.

13.4 Stormwater Pipes:

Pipes shall be laid with ogee joints fully home.

Unless otherwise directed by the Engineer jointing of stormwater piping shall be in accordance with the Drawings, and to the satisfaction of the Employer/Engineer.

14. General Backfill:

Backfilling of trenches shall be carried out in accordance with the section on "Earthworks and backfilling" of this Specification, as soon as possible after the pipes have been laid.

Thermal expansion of UPVC pipe is high. For this reason, it is essential that the pipe is backfilled in its contracted state. Backfilling should therefore only take place in the morning, late afternoon or while cold water is passing through the pipe.

For UPVC pipes and fittings the maximum particle size shall generally not exceed 20 mm. The presence of a particle between 20 mm and 40mm will be acceptable provided the total quantity of such particle does not exceed 5% of the total. Materials containing particles in excess of 40 mm size will not be acceptable.

15. Testing Pipe Lines:

Testing shall be carried out after initial backfilling and necessary concrete work.

The Contractor shall conduct the tests prescribed as construction work progresses, repeating any test as often as may be necessary to achieve a satisfactory result.

All testing apparatus shall be provided by the Contractor. Tests shall only be conducted in daylight and in the presence of the Employer/Engineer.

15.1 **Water Reticulation:**

Water pipes shall be tested in lengths not exceeding 300 metres unless agreed by the Employer/Engineer and not before concrete has cured for at least 48 hours.

Valves shall be opened and the end caps removed prior to filling with water to allow for maximum emission of trapped air.

Pressure mains, service pipes across roads and underground house connection pipework are to be simultaneously tested after installation, before any bedding material or backfilling is placed around the joint or the service connections.

All permanent thrust blocks in the section to be tested shall be in position.

The ends of the mains in the test section are to be closed off for test purposes with temporary blank end-caps which are to be adequately strutted to prevent movement whilst testing. The ends of underground connection pipework are to be closed off with galvanized steel double socket union plugs which are to be left in position until the house connections are completed at a later date. Stopcocks may be substituted for socket unions if shown on the Drawings.

Clean water is to be introduced into pipework and any trapped air released as far as is practicable. Where appropriate, the water is to be allowed to stand in the pipeline for long enough in accordance with the pipe manufacturer's recommendations, to allow for water absorption by the pipes and joints.

The test pressure to be applied to the mains and other pipework shall be as specified, in the section on "Materials" of this Specification or as specified by the Engineer, measured at the lowest point of the section under test.

The line shall be brought slowly to 100% of the required test pressure and held in that state for 1 hour, further water being pumped in to maintain pressure at 10 minute intervals or when the test pressure shall be reapplied to 100% of designated test pressure for a further one hour.

A test shall be considered satisfactory if:

- a) There is no drop in the test pressure at the end of the one-hour period;
- b) Not more than 0.1 litres of make-up water per millimetre of pipe diameter per hour per kilometre length of pipeline, is required to maintain the test pressure, and that this quantity of make-up water progressively decreases in three successive tests of 30 minutes each.

Where a satisfactory test is not achieved and no source of leakage can be established, either by inspection or by isolation of pipe lengths for individual testing, then the

Employer/Engineer may call for a longer test period extending up to 72 hours to establish whether the applied pressure will stabilize

Unless otherwise instructed, the Contractor shall proceed expeditiously with the back-filling of any length satisfactorily tested.

15.2 Gravity Sewers:

Gravity Sewers house connections will normally be tested by applying internal air pressure or as specified by the Employer/Engineer.

When pipework is to be bedded in material other than concrete, the test is to be conducted after the pipe has been bedded, but before any back-filling is placed.

Where concrete is specified in the bedding, the test is to be conducted when the pipe has been laid true to line and level but before any concrete is placed in contact with the pipe barrels.

Sewer mains will normally be tested between manholes. The section of pipe to be tested to be suitably plugged at all open ends and an internal air pressure equivalent to 150 mm head of water as indicated on a U-tube situated approximately on a metre above the trench surface.

This pressure is to be maintained for a period sufficient to allow for the stabilization of the air temperature. The system shall then be sealed off at this pressure, and the test shall commence.

For a satisfactory test, no discernible drop in pressure as indicated by a U-tube shall occur over a period of 5 minutes.

If the Employer/Engineer considers that conditions at the time of the proposed test are unsuitable, because of temperature or other factors, for a reliable air test to be conducted, he may order that the test be deferred until he considers conditions are favourable.

Unless otherwise instructed, the Contractor shall proceed expeditiously with the backfilling of any length satisfactorily tested.

15.3 Sewer Manholes:

Completed manholes shall be subjected to water tightness test. The manhole shall be filled with water to the top of the cover level and left for 24 Hours. Thereafter, the water level shall be restored to top cover level. After the elapse of one hour, there shall be no signs of leakage or weeping and there shall be no discernible drop in the water level.

15.4 Stormwater Pipes:

Stormwater pipes shall not normally be tested for water-tightness.

16. Sterilization of Water Pipelines

Upon the satisfactory completion of all testing and cleaning, water pipelines shall be sterilized using a chloride solution.

The solution shall be applied at the charging point as the pipeline is being filled with clean, potable water and dosing shall be continued until the pipeline is full. At least 50 parts per million of free chloride shall be distributed evenly.

The treated water shall be left in the pipeline for a period as directed by the Employer/Engineer but not exceeding 24 hours and all valves in the system shall be operated at least once during this period.

Chlorine residual tests shall be taken at various approved points along the pipeline. The sterilization process shall be repeated until the chlorine residual is not less than 10 parts per million at all sampling points.

After testing, the waste chlorine solution shall be disposed of in such a manner as to avoid pollution, and the system emptied and refilled with fresh water.

17. Brickwork

17.1 General Standards and Specifications:

All brick elements and brick walls shall comply with the Central African Standard 221: 1978, and with any other specification the Engineer may require.

SECTION IV

PREAMBLE TO BILLS OF QUANTITIES

1. Rates to be Inclusive:

These Bills of Quantities have been prepared in the manner following and the rates shall be deemed to include, inter alia, the following works, duties, liabilities, risks and expenses of the Contractor whether they are separately itemized or specifically referred to in the Bills of Quantities or not:

- a) all the liabilities, obligations, contingencies and risks imposed by each and every Contract document, namely;
The Agreement, the Conditions of Contract, the Specifications, the Tender, the Drawings, and the Bills of Quantities; the Schedules of Rates and Prices (if any); the Circular Letters (if any);
- b) strict compliance with each and every provision of the Specification in the execution of the Works;
- c) the cost and expenses of all Works and of all services necessary for the due execution and maintenance of the Works including, inter alia;
 - i) The provision, storage, transport, use and maintenance of all materials, plant, equipment, machinery and tools.
 - ii) The provision and maintenance of all the Contractor's staff and labour and their accommodation, transport etc. and the supply of all immigration permits, work permits and other related requirements.
 - iii) Surveying, setting-out, measuring, inspection and supervision.
 - iv) Temporary Works.
 - v) The provision, transport, use and maintenance of all consumable stores, fuel and water, drainage, electricity and telephone, including those required under the Contract for the Employer/Engineer's Representative and his staff.
 - vi) Sampling, testing the trials, and checking information given by the Employer/Engineer.
 - vii) Injury caused to the Works under construction, plant, materials and consumable stores by weather conditions.
 - viii) Repairs to the Works during the Period of Maintenance.
 - ix) Overheads, insurance, on costs and profits.

- x) The provision and maintenance of First Aid facilities

2 Unpriced Items:

Payment of items in the Bill against which no rate or price has been entered by the Contractor shall be deemed to be included in the rates and prices entered against other items in the Bill.

3. Description Not Repeated:

General directions and descriptions of work or material given in the Specification are not necessarily repeated in the Bills of Quantities. Reference shall be made to the Specification for this information.

4. Quantities Approximate:

The quantities of the various items given in the Bills of Quantities whether marked provisional or not are approximate only and in no case shall such quantities be considered as limiting or extending the amount of work to be executed by the Contractor under the Contract. The Contractor shall ascertain the quantities of materials required by reference to the Drawings before placing orders for the same.

5. Lump Sum Items:

Payment against all Lump Sums entered in the Bills of Quantities, other than Provisional Sums, will be made by instalments in the proportion to the extent to which, in the opinion of the Employer/Engineer the relevant work has been executed, except where other specific provisions are given in the Bills of quantities.

6. Provisional Items:

Items described in the Bills of Quantities as provisional shall represent work to be carried out only at the direction of the Employer/Engineer, and shall be measured in accordance with such direction.

7. Costs to be Included in the Rates:

Without affecting the generality of the foregoing provisions, the respective rates and prices inserted by the Contractor in the Bills of Quantities shall be deemed to include costs set out in the following clause number 8 to 34 inclusive.

8. Cost in Rates for Clearance of Site:

Site Clearance shall be deemed to include for the cost of : felling trees and removal of all stumps and roots however deep , removal of rocks and boulders encountered in the depth of soil stripped that can be dislodged with the excavation plant in use, backfilling and

compacting cavities as directed; loading , hauling up to 1 km free haul and disposal of stripped material to approved areas on Site (except where separate items are included in the Bill for the carting away and disposal off the Site of surplus or unsuitable material including burning of vegetable matter). Trees with a girth greater than 1 metre shall be measured separately.

9. **Cost in Rates for Removing Top Soil:**

Removing topsoil shall be deemed to include for the cost of excavating topsoil over the area to be occupied by the Permanent Works to depth specified by the Employer/Engineer, loading, hauling and disposing it in neat and tidy stockpiles on Site (except where items are included in the Bill for excavating, carting topsoil away and disposal off the Site).

10. **Cost in Rates for Excavation:**

Excavation shall be deemed to include for the cost of: excavation in any material other than rock ; the making good of slips and falls ; the trimming and levelling of the excavated surfaces to the required lines and levels as shown on the drawings or instructed by the Engineer, and in the case of items for pipe trenches , the cost of the additional excavation below the pipe invert to allow for the thickness of the pipe sockets and any bedding materials, the backfilling of trenches and foundations, (except where separate items are included in the Bill for backfilling); the keeping of the excavations dry by pumping or by other means in order to prevent any injurious effect to the reinforcement ; the prevention of floatation of structures occurring during construction; the provision , maintenance and the refilling of material; the loading , hauling within 1 km free-haul and disposal of surplus and unsuitable material to approved areas on Site (except where separate items are included in the Bill for the carting away and disposal off the Site of surplus or unsuitable material).

Separate items shall be provided for the cost of any additional excavation and subsequent backfilling and compaction required to working space, sheeting, timbering , battering , strutting or for excavation that can only be carried out other than by the use of the mechanical plant if the position of the works as set out will not allow the use of the mechanical plant , or the Employer/Engineer has issued a written order in accordance with the Specification to the effect that mechanical plant shall not be used ; and any additional support provided by the contractor in compliance with an order of the Employer/Engineer.

11. **Cost in Rates for Surplus Excavated Material:**

Where billed as separate items the disposal of surplus or unsuitable material shall be deemed to include for the cost of loading, hauling up to 1 km and disposal of materials to a tip to be provided by the Contractor and approved by the Employer/Engineer's Representative.

12. **Cost in Rates for Fill:**

Fill shall be deemed to include for the cost of: selection, loading, hauling up to 1km, placing and compacting in layers; working and trimming as necessary to achieve any profiles, dimensions or embankments as shown on the drawings or as directed by the Employer/Engineer; adjustment of moisture content; testing of materials, and protection of surfaces. Imported fill shall be deemed to include in addition, the cost of purchasing the material where applicable, separate items shall be provided for the construction and maintenance of access roads to borrow areas, removing overburden and subsequent restoration.

13. Cost in Rates for Concrete:

Concrete shall be deemed to include for the cost of: supplying of all materials, mixing, transporting, placing to the outlines shown on the Drawings; compacting, curing and protecting against the weather; forming all construction joints; the finishing of exposed concrete surfaces (except where a separate item is given) and the cutting out and replacing of defective concrete.

14. Cost in Rates for Shuttering:

Shuttering shall be deemed to include for the cost of : all false work, centering, fabricating, assembling , cutting, fitting and fixing in position and all necessary measurements to produce the shapes of concrete shown on the drawings; forming cambers and falls; taking measures to obtain the required concrete finish; cutting and fitting around steel-work, ironwork, pipes, bolts, and other built-in items, (except where separate items are given in the Bill), individual fillets, chamfers, splays, drips, rebates, recesses, grooves, and the like of 100 mm total girth or less when the faces in concrete construction joints are measured overall; maintaining in place until struck and allowing for any variation from the minimum period for striking arising from prevailing weather conditions; striking, taking down and removing.

15. Cost in Rates for Reinforcement:

Reinforcement shall be deemed to include for the cost of: supplying materials, cleaning, cutting and bending with soft iron wire; supports and spaces (except for steel bar supports to reinforcement where shown on the Drawings); extra fabric reinforcement at laps.

16. Cost in Rates for Building into Concrete:

Building into concrete shall be deemed to include for the cost of cleaning contact surfaces and roughening to obtain a good bond; boxing out in concrete and building in later or cutting and shuttering and building in as work proceeds; supporting and holding in position and ensuring correct orientation.

17. Cost in Rates for Fixing:

Fixing shall be deemed to include for the cost of: all mortices, pockets, channels, chases, bolt holes and the like; brackets; nuts; bolts; washers and other jointing materials; painting metal contact surfaces; supporting and holding places; shuttering; grouting and making good; and all cutting and waste.

18. Cost in Rates for Water Stops:

Waterstops shall be deemed to include for the cost of: supplying material, securing in position and building in; making and welding all works and site joints; shuttering and all cutting and waste.

19. Cost in Rates for Joint:

Joint sealant shall be deemed to include for the cost of: supplying materials, cleaning and preparation of all surfaces, priming, gunning, towelling or pouring in place; and all waste.

20. Cost in Rates for Saw Cutting:

Saw cutting of concrete shall be deemed to include for the cost of: supplying all necessary equipment, cutting the concrete at the required time and at the correct position to the specified width and depth, and making good the defects to the approval of the Employer/Engineer.

21. Cost in Rates for Subgrade Construction:

Subgrade construction shall be deemed to include for the cost of: scarifying as necessary, adjustment of moisture content, mixing, removing any vegetation and large stones and clods of unsuitable material, trimming to achieve the required levels and profiles as shown on the drawings or directed by the Engineer, placing and compacting to the specified density for a compacted depth of 150 mm; the protection of surface and additional costs of trials.

22. Cost in Rates for Sub-Bases in Road Pavements and Under Floor Fill:

Sub-base shall be deemed to include for the cost of: supply of all materials including providing access to borrow area, removing overburden and subsequent restoration, selecting, stockpiling, mixing as necessary, loading, hauling, placing and compaction in layers: adjustment of moisture content; working; and trimming as necessary to achieve the profiles shown on the Drawings or as directed by the Employer/Engineer; the protection of surfaces; testing of materials and the additional cost of trials.

23. Cost in Rates for Bases in Road Pavements:

Bases in road pavements shall be deemed to include for the cost of: supplying of all materials including providing access to borrow areas, removing overburden and subsequent restoration; selecting, stock-piling, mixing as necessary, loading, hauling,

placing and compacting in layers; adjustment of moisture content; working; trimming as necessary to achieve the profiles shown on the Drawings or as directed by the Employer/Engineer; the protection of surfaces.

24. Cost in Rates for Surface Dressing:

Surface Dressing shall be deemed to include for the cost of: supply of materials, preparation of surfaces and protection to edges; heating; transporting and spraying bitumen, blinding of prime coats with sand; rolling; testing and the additional costs of trials.

25. Cost in Rates for Soiling and Grassing:

Soiling and Grassing shall be deemed to include the cost of: excavation of Surface soil from stockpiles; loading, transportation, spreading, levelling, rolling or compaction and trimming to specified surface finish, the cost of watering, purchasing, planting grasses as separately itemized; cutting and maintenance as necessary but at least six times during the period of the Contract.

26. Cost in Rates for Pipe Culverts (Or Equivalent):

Pipe culverts shall be deemed to include the cost of the supply and delivery of pipes or similar sections, offloading, placing true to line and level and jointing in accordance with the Manufacturer's recommendations including cutting ends of culverts to required length, angle of skew and shape to follow embankment profile if necessary.

27. Cost in Rates for Stone Pitching:

Stone pitching shall be deemed to include the cost of: any minor excavation for purposes of bedding the stones adequately, supplying all materials, selecting suitable stone and building stone pitched surfaces to line and level including all corners, jointing and filling of voids with mortar, striking off flush and trowelling mortar in joints, forming any temporary or permanent holes or cavities and provision for making good all temporary openings, the finishing off of the topmost part of the stone construction to the required lines and levels, the protection of newly built work from low temperatures and rain, the cost of preserving all work in a clean and undamaged condition, and the provision where necessary, of 30 mm diameter weep-holes at the rate of one per square metre of stone pitched surface.

28. Cost in Rates for Brickwork:

Brickwork shall be deemed to include the cost of: the supply of bricks, materials for mortar and any other materials, the treatment of all material as described in the Specifications; the construction of the brick-wall, true to line, level and plumb, to a height and thickness indicated on the drawings in the Bills of Quantities; the preparation of the surfaces including the treatment of joints as described in the Bills of Quantities; the supply

and building in of lintels, cills and air bricks where indicated on the Drawings ; the supply and building in of ties where required by the Specification ; building in of door frames , window frames and other frames as detailed on the Drawings; provision of scaffolding where required; the supply and building in of brick reinforcement; the building of corners and projections; and for provision of apertures as detailed on the Drawings.

29. **Cost in Rates for Brick Piers:**

Brick Piers shall be deemed to be as for Brickwork as defined in Clause 28 hereof.

30. **Cost in Rates for Corbelled Brickwork:**

Corbelled brickwork shall be deemed to include all costs as if it were brickwork as described in 28 above.

31. **Cost in Rates for Plastering:**

Plastering shall be deemed to include for the costs of preparation of the surface in accordance with the Specifications ; supply and mixing of materials; application of plaster to the prepared surface; finishing of the plastered surface as detailed on the Drawings or the Bills of Quantities ; keeping cement plaster damp until properly set; forming all corner , apertures , recesses and reveals ; protection from damage and leaving perfect on completion ; making good all defects to the satisfaction of the Employer/Engineer, forming 'V' joints ; provision of scaffolding where required ; protection of surroundings to prevent damage caused by the plastering operation.

32. **Cost in rates for Skimming:**

Skimming shall be deemed to include for the cost of: preparation of the surface; supply and mixing of materials; application of the skimmed surface; finishing with a high quality smooth surface; matching with adjoining surfaces where necessary; forming joints where required; making good all defects to the satisfaction of the Engineer; protection of surrounding; provision of scaffolding where required.

33. **Cost in Rates for Miscellaneous Items:**

Miscellaneous items shall be deemed to include for all costs under the relevant billed items including costs of the supply, installation, erection or application of the specified fittings, fixtures or materials together with all other costs relevant thereto.

34. **Cost in Rates for Pipework:**

The laying of pipes shall be deemed to include for the cost of supplying and storing the pipes on Site , handling and transporting them to the side of the excavation, providing and preparing the bedding layer, laying and jointing the pipes, inspecting the pipes , ensuring that they are kept clean during laying, cleaning or swabbing the inside of the pipe , and in

the case of water pipes , filling the pipelines with water and carrying out the pressure test to the approval of the Employer/Engineer, including the installation and removal of all temporary anchorages; sterilizing and flushing of tested pipelines and then filling them with potable water ready for use.

The installation of calves, fittings and specials shall include for: the supply, delivery, and storage of all items on Site, handling, transportation to Site of installation, installation, including making up of joints to adjacent pipework, cleaning and sterilizing of all items as specified.

35. Measurement to be Net:

The quantities for each item shall be measured net and no allowances will be made for bulking, cutting or waste.

36. Method of Measurement:

In particular, and without affecting the generality of the previous clauses of the Preamble, the quantities and costs of the completed work shall be determined in accordance with the following clauses numbers 39-73 and as described in the Bills of Quantities.

37. General Formation Level:

The ground levels formed after the Site has been cleared (the surface stripped and topsoil removed where applicable), shall be termed general formation level for the purpose of these documents and shall be used for determining the measurements for all types of excavation contained therein.

38. Measurement of Excavation General:

The measurement of removing topsoil shall be taken as the net plan area of that portion of the Works where topsoil is to be removed.

39. Measurement of Excavation General:

The measurement of excavation other than excavation for road formation and excavation for drainage channels shall be taken as the horizontal area of the bottom of the structure as measured on the Drawings, or as given in the Specification or ordered by the Engineer in writing, multiplied by the mean depth measured from general formation level or ground level whichever is applicable, without allowance for bulking or for any excess excavation, whether due to slips, falls, over-excavation or over-break, or required for timbering, shuttering or working space or otherwise for the Contractor's convenience (e.g. to utilize standard excavator buckets or to avoid shearing by benching or sloping excavation sides) or from any other cause. The volume of excavation shall be measured for successive increments of depth as detailed in the Bills of quantities. The total excavation measured under separate items for each successive increment of depth.

40. Measurement of Excavation for Surface Water Drainage Channels:

The measurement of excavation for drainage channels (other than excavations for culverts) including culvert outfalls shall be taken as the volume between the completed drain profile and general ground level, general formation level, railway formation level, railway formation level after taking cross falls into consideration, or the level to which any overcutting is carried out in cuttings where directed by the Engineer, whichever is the lower. There shall be no allowance for bulking, or any excess excavation whether due to slips, falls over-excavation or outbreak, or from any other name.

41. Measurement of Excavation for Construction of Road:

The measurement of excavation for construction of road formation shall be taken as the volume contained between the general formation level and the completed excavated profile specified. In the case where drainage channels with a base width of under 2.5 metres are to be excavated below the level and on either side of the formation in cuttings, the measured profile shall be to the full width of the cutting and depth determined by the specified level and cross-fall to which excavation is to be taken before excavation of the drainage channels.

In the case of drainage channels with base width of 2.5metres or more the excavation profile shall include the drainage channels and no separate items shall be included in the bills of quantities for excavation of drainage channels with a base width of 2,5 metres or greater.

42. Measurement of Excavation in Unsuitable Material:

Excavation in unsuitable material (including consequent back-filling with any materials) ordered by the Employer/Engineer will be measured only if it is not, in his opinion, the consequence of any neglect or default of the Contractor.

43. Measurement of Surplus Excavated Material:

The measurement of surplus excavated material shall be obtained by subtracting the quantity of fill from the total of the quantities of excavation, with no allowance for bulking or material excavated beyond the net width of the structure.

44. Measurement of Excavation in Rock:

Excavation in rock shall be taken to be excavation in materials defined as rock in the Specification and shall be measured as the product of the plan area and mean depth of the rock in its original position.

45. **Measurement of Fill:**

The measurement of fill shall be obtained by calculating the volume contained between the general formation level and the finished levels and required widths of the compacted fill.

46. **Measurement of Concrete:**

In the description in the Bills of Quantities, 'Concrete' means in-situ reinforced concrete. Separate items are given for mass concrete, and different grades of reinforced concrete.

The quantity of concrete shall be measured from the dimensions shown on the Drawings without allowance for concrete used resulting from excavation in excess of that shown on the Drawings unless ordered by the Employer/Engineer in writing.

No allowance shall be made in the measurement of concrete for holes or items built in with a volume of 0,1 cu.m or less, or nosing, chamfers or fillets not exceeding 50 x 50 mm.

47. **Measurement of Shuttering:**

Measurement of shuttering shall be taken as the net area of the finished structure that requires supporting during concreting. No allowances shall be made for extra shuttering required to form construction joints, stop ends, bonding, chases, fillets and chamfers not exceeding 50 x 50 mm and the like. No deduction shall be made for openings with an area of 0,5 sq.m or less; shuttering shall be measured as fair faced on exposed surfaces to 200 mm below finished ground level.

48. **Measurement of Reinforcement:**

Bar or rod reinforcement shall be measured by calculating the weight of reinforcement as shown on Drawings. The basis of the calculation weights shall be that steel weighs 7,85 kg per 1 000 sq. mm of nominal cross sectional area per linear metre; no allowances shall be made for waster or rolling margin.

Fabric reinforcement shall be measured as the net area covered: no allowances shall be made for waste and extra material at lapped joints.

49. **Water Bars in Construction:**

Payment for water bars in construction joints will only be made when the provision of the joint and the inclusion of the water bar are approved by the Employer/Engineer in writing.

50. **Measurement of Culverts:**

The measurement of culverts shall be the effective length as laid measured along the invert of the barrel of the culvert.

51. Measurement of Saw Cut:

The measurement of saw cuts in concrete shall be the linear metre of cut for each size of the cut.

52. Measurement of Sub-Grade:

The measurement of sub-grade shall be taken as the area calculated by taking the length and multiplying by the width defined by the dimensions shown on the Drawings.

53. Measurement of Pavement:

Measurement of base 1 and base 2 shall be taken as the volume calculated by taking the length and multiplying by the cross-sectional area defined by the dimensions shown on the Drawings.

54. Measurement of Road Surfacing:

Measurement of road surfacing shall be taken as the area calculated by taking the length of road and multiplying by the width of road surfacing shown on the Drawings.

55. Measurement of Soiling and Grassing:

Measurement of soiling and grassing shall be taken as the net plan area so treated where slope is 10% or less, or the net area so treated measured on the slope if the slope exceeds 10%.

56. Measurement of Stone Pitching:

Measurement of stone pitching shall be taken as the area of compacted surface 150 mm thick.

57. Measurement of Brickwork:

Measurement of Brickwork shall be taken as the surface area of the one side of the brick wall, excluding the projection sides of piers, and sides of aperture. The area of brickwork shall be measured for successive increments of height as detailed in the Bills of Quantities. Different thickness of wall shall be measured separately.

58. Measurement of Brick Piers:

Measurement of Brick Piers shall be as for Brickwork as described in Clause 57 hereof

59. Measurement of Corbelled Brickwork:

The measurement of corbelled brickwork shall be as for brickwork, but measured as separate item.

60. Measurement of Plastering:

The measurement of plastering shall be taken as the net area of surfaces plastered. Separate items are given for different thickness of plaster.

61. Measurement of Skimming:

The measurement of skimming shall be taken as the net area of the surface skimmed.

62. Measurement of Pipework:

The measurement for pipe laying shall be the total length of pipe laid without deducting for the lengths occupied by valves and fittings. Different pipe diameters shall be measured separately.

Specials and fittings shall be measured by number.

Replacement parts such as rubber rings and collars for couplings to be used with old asbestos cement pipes will be measured by number.

Concrete shall be measured separately in accordance with the relevant clauses of this Preamble. Except where items have been specifically provided in the Bills of Quantities, the cost of formwork shall be deemed to be included in the rates for the relevant concrete item.

Excavation and backfill shall be measured in accordance with the relevant clauses of this Preamble. Chambers and markers shall be measured by number.

63. Measurement of Dayworks:

Any works ordered by the Employer/Engineer to be carried out by Dayworks shall be paid for at rates entered against the appropriate items in the schedule, subject to the following conditions:

- i) the rates entered for labour shall be deemed to include overhead charges and profit, site supervision and staff, insurances, use and maintenance of small hand tools and appliances, non-mechanical plant and equipment (such as ladders trestles, stages, bankers, scaffolding, temporary track, wagons, skips, tarpaulins and similar items) unless these are used or set up exclusively for dayworks;
- ii) the time for gangers or charge hands working with their gangs will be paid for under the appropriate items, but the cost of foremen and

walking gangers shall be deemed to be covered by the rates entered for the labour under their supervision.

- iii) No separate payments will be made in respect of travelling allowances, travelling costs (travelling in the Contractor's own vehicles between residence or lodgings and Site), lodging allowances or similar emoluments payable to workmen which costs will be deemed to be included in daywork rates;
- iv) The cost of watching and lighting which is specially necessitated by daywork will be paid for separately;
- v) The rates for plant shall apply only to plant which the Contractor has available on the Site. Such rates shall be deemed to include overhead charges and profit, site supervision and staff, wages of drivers and operators, hire charges, consumable stores, fuel, maintenance and insurances;
- vi) Mechanically operated plant will be paid at the rates entered only for the net working hours during which the plant is engaged on dayworks and excludes any standing or idle time;
- vii) The rate for materials shall cover delivery to any point on the Site which in the opinion of the Employer/Engineer can be safely reached by lorry, but the cost of conveying materials from such points to points which can be so reached will be paid for separately.
- viii) The rates entered against the various items of dayworks shall apply to any work which may be ordered to be carried out by Dayworks before the issue of the Certificate of Completion for the whole of the Works. If Tenders require higher rates for Dayworks ordered after the issue of such certificate they shall enter in the space provided the percentage which they require to be added.

64. Units of Measurement:

All units of measurement shall be based on the S.I Units of Weights and Measures. The common units of weights and the measurements to be employed and the abbreviations used in the Bills of Quantities are given below:

Millimetre	mm	Square Metre	sq m
Metre	m	Cubic Metre	m ³
Kilometre	km	Nominal Diameter	dia
Kilogram	kg	Percent	%

Hectare	ha	Number	No.
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