



KENYA URBAN ROADS AUTHORITY

Efficient & Safe Urban Roads

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY

TENDER NO.: KURA/DEV/HQ/311/2019-2020

TENDER DOCUMENT

1. FORM OF BID
2. APPENDIX TO FORM OF BID
3. STANDARD FORMS & SCHEDULES OF SUPPLEMENTARY INFORMATION
4. INSTRUCTIONS TO BIDDERS
5. QUALIFICATION CRITERIA
6. CONDITIONS OF CONTRACT
7. STANDARD SPECIFICATIONS
8. SPECIAL SPECIFICATIONS
9. BILLS OF QUANTITIES
10. DRAWINGS

March 2020

**DIRECTOR
URBAN ROADS DEVELOPMENT
KENYA URBAN ROADS AUTHORITY
P.O. Box 41727 – 00100,
NAIROBI.**

**DIRECTOR GENERAL
KENYA URBAN ROADS AUTHORITY
P.O. Box 41727 - 00100
NAIROBI.**

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie
Overpass And Associated Road Networks In Nairobi County*

*CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE
SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY CONSTRUCTION OF KENYATTA AVENUE-
NGONG ROAD INTERCHANGE, HAILE SELLASIE OVERPASSAND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY
Tender No.: KURA/.DEV/HQ/311/2019-2020*

TABLE OF CONTENTS

SECTION 1: FORM OF BID	2
SECTION 2: APPENDIX TO FORM OF BID	5
SECTION 3: STANDARD FORMS AND SCHEDULES OF SUPPLEMENTARY INFORMATION	10
SECTION 4: INSTRUCTIONS TO BIDDERS	40
SECTION 5: QUALIFICATION CRITERIA.....	62
SECTION 6: CONDITIONS OF CONTRACT	73
SECTION 7: STANDARD SPECIFICATIONS	124
SECTION 8: SPECIAL SPECIFICATIONS.....	126
SECTION 9: BILLS OF QUANTITIES.....	227
SECTION 10: DRAWINGS	295

SECTION 1: FORM OF BID

FORM OF BID

(NOTE: The Appendix forms part of the Bid. Bidders are required to fill all the blank spaces in this form of Bid and Appendix)

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY CONSTRUCTION OF KENYATTA AVENUE-NGONG ROAD INTERCHANGE, HAILE SELLASIE OVERPASSAND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY

TENDER No.: KURA/DEV/HQ/311/2019-2020

TO: The Director General
Kenya Urban Roads Authority
P. O. Box 41727 - 00100,
NAIROBI.

Sir,

Having examined the Conditions of Contract, Specifications, Bills of Quantities, and Drawings for the execution of the above named works we, the undersigned, offer to construct and install such works and remedy any defects therein in conformity with the said Bills of Quantities, Conditions of Contract, Specifications and Drawings for the sum of

(Insert amount in words)

.....
.....
.....
.....

(Insert amount in figures).....

.....

as specified in the Appendix to Bid or such other sums as may be ascertained in accordance with the said Conditions.

We undertake, if our bid is accepted, to commence the works within twenty-eight (28) days of receipt of the Engineer's Order to Commence, and to complete and deliver the whole of the works comprised in the contract within the time stated in the Appendix to Form of Bid.

If our bid is accepted, we will, when required, obtain the guarantee of a Bank or other sureties (to be approved by you) to be jointly and severally bound with us in a sum not exceeding 10% of the above-named sum for the due performance of the contract under the terms of a Bond to be approved by you.

We agree to abide by this bid for the period of one hundred and twenty (120) days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

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

On the basis of our previous experience we are fully experienced and competent in the type of work included in this BID and we have adequate financial resources to carry out the works described within the period for completion. We are in a position to fulfil the contract for which we have Bided.

Dated this Day of 20

Name:.....

Signature:.....in the capacity of

Duly authorized to sign bids on behalf of (Name of Bidder)

(Address of Bidder):

(Name of Witness):
.....

(Signature of Witness):

(Address of Witness):
.....

(Occupation of Witness):

SECTION 2: APPENDIX TO FORM OF BID

APPENDIX TO FORM OF BID

(This appendix forms part of the bid)

DESCRIPTION	Conditions of Contract Clause	DETAILS
Bid Security (Bank Guarantee Only)		Kshs. 2,000,000.00
Employer	1.1 (a) (i)	Director General Kenya Urban Roads Authority.
Engineer	1.1 (a) (iv)	Director Urban Roads Development Kenya Urban Roads Authority.
Engineer's Authority to Issue Variations	2.1 (d) (ii)	5% of the Contract Price
Contract Documents	5.1 (a)	The language of the contract is English
	5.1 (b)	The law in force is that of the Republic of Kenya
Amount of Performance Security (Unconditional Bank Guarantee)	10.1	The performance security shall be in the form of an unconditional bank guarantee in the amount of ten (10%) percent of the Contract Price
Access to Data	11.1	Data made available by the Employer under Subclause 11.1 is open for inspection at the offices of the Director, Urban Roads Development, Kenya Urban Roads Authority, Nairobi.
Programme to be submitted	14.1	Not later than 21 (twenty one) days after issuance of Order to Commence
Cash Flow Estimate	14.3	Not later than 21 (twenty one) days after issuance of Order to Commence
Minimum Amount of Third Party Insurance	23.2	KShs. 10,000,000 (Kenya Shillings Ten Million only) per occurrence, with the number of Occurrences unlimited.
Period for commencement, from Engineer's Order to Commence	41.1	Not later than 28 (Twenty Eight) days after Notice of Order to Commence
Time for Completion	43.1	Thirty-Six (36Months).
Amount of Liquidated Damages	47.1	0.05% of the Contract Price per day
Limit of Liquidated Damages	47.1	10% (ten percent) of the Contract Price.
Taking over of Sections or Parts	48.2(a)	Applicable as per the Stipulation of Clause 107 Of the Special Specifications.
Defects Liability Period	49.1	Twenty-Four (24) Months
Advance Payment	60.1	Upto a maximum of five percent (5%) of the Contract Sum
Minimum Amount of Interim Payment Certificates	60.2	Kshs. 120,000,000.
Retention Money	60.2	5% (five percent) of Interim Payment Certificates

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

DESCRIPTION	Conditions of Contract CLAUSE	DETAILS
Limit of Retention Money	60.2	5% (five) percent of the Contract Price less Provisional Sums and Contingencies
Number of Copies of monthly Statement and statements of Completion and Final Statement	60.2	6 copies
	60.3	
	60.11	
	60.12	
Time within which payment to be made after Interim Payment Certificate signed by Engineer	60.4	90 days
Time within which payment to be made after Final Payment Certificate signed by the Engineer	60.4	90 days
Currency of Payment	60.6	Kenya Shillings only
Appointer of Arbitrator	67.3	The Chartered Institute of Arbitrators (Kenya)
Notice to Employer and Engineer	68.2	The Employer's address is: Director General Kenya Urban Roads Authority Barabara Plaza (Block D), Mazao Road-Off South Airport Road, JKIA P.O. Box 41727 – 00100 NAIROBI. Tel. +254 020 8013844 Email: info@kura.go.ke, Web:www.kura.go.ke The Engineer's address is: Director, Urban Roads Development Kenya Urban Roads Authority Barabara Plaza (Block D), Mazao Road-Off South Airport Road, JKIA P.O. Box 41727 – 00100 NAIROBI. Tel. +254 020 8013844 Email: info@kura.go.ke, Web:www.kura.go.ke
Sources of Indices	70.4	Kenya National Bureau of Statistics
Weightings	70.7	To be submitted by the Contractor with his bid and these shall be those at 28 days prior to the latest date of submission of the bid.

Signature of Bidder.....

Date

The items on the following pages are to be filled in by the bidder as part of its bid, except for the items marked*.

Approximate Weightings for Price Adjustment Formulae		* 70.3	<i>[See table immediately below]</i>
<i>Description of index</i>		<i>% range of weighting^a</i>	
a. Fixed		10	
b. Labour		10 to 12	
c. Fuels and Lubricants		12 to 20	
d. Plant and Spares		25 to 35	
e. Cement		15 to 20	
f. Reinforcement and Steel products		5 to 8	
g. Explosives		3 to 5	
h. Bitumen and Bitumen Products		12 to 20	
Total		100%	

a. As guidance to bidders and for the purpose of checking their submissions, the Employer has estimated and provided a range of acceptable weightings for related major construction inputs in accordance with potential range of construction methodologies, based on estimated cost in a common currency.

Weightings and	70.3	In the tables immediately below, bidders shall (a) indicate their amounts of local currency payment, (b) indicate their proposed source and base values of indices for the different foreign currency elements of cost, (c) derive their proposed weightings for local and foreign currency (if applicable) payment as indicated below, and (d) list the exchange rates used in the currency conversion. If payment is to be made in more than one foreign currency, the bidder shall complete a similar table of source indices for each currency.
Indices	70.4	

Table A. Local Currency

<i>Material code</i>	<i>Material</i>	<i>Base Price of Material</i>	<i>Bidder's related currency amount</i>	<i>Bidder's proposed weighting</i>
—	Non- adjustable	—	—	a: 0.1 b: c: d: e: f: g: h:
Total				

Signature of Bidder.....

Date

SECTION 3: STANDARD FORMS AND SCHEDULES OF SUPPLEMENTARY INFORMATION

STANDARD FORMS & SCHEDULES OF SUPPLEMENTARY INFORMATION

STANDARD FORMS

.....	1
2	
3.1 BANK GUARANTEE FOR ADVANCE PAYMENT.....	13
3.2 FORM OF BANK BID SECURITY.....	15
3.3 FORM OF INVITATION FOR BIDS.....	17
3.4 LETTER OF ACCEPTANCE.....	18
3.5 FORM OF AGREEMENT.....	19
3.6 PERFORMANCE BANK GUARANTEE (UNCONDITIONAL).....	21
3.7 FORM OF LETTER OF NOTIFICATION OF AWARD.....	22
3.8 SCHEDULES OF SUPPLEMENTARY INFORMATION.....	23
3.8 BID QUESTIONNAIRE.....	24
3.9 CONFIDENTIAL BUSINESS QUESTIONNAIRE.....	25
3.10 SCHEDULE OF MATERIALS BASIC PRICES.....	27
3.11 MAJOR ITEMS OF CONSTRUCTION PLANT AND EQUIPMENT.....	28
3.12 SCHEDULE OF LABOUR BASIC RATES.....	29
3.13 DETAILS OF SUBCONTRACTORS.....	29
3.14 CERTIFICATE OF BIDDER'S VISIT TO SITE.....	31
3.15 FORM OF WRITTEN POWER OF ATTORNEY.....	32
3.16 KEY PERSONNEL.....	32
3.17 SCHEDULE OF COMPLETED CIVIL WORKS CARRIED OUT BY THE BIDDER IN THE LAST FIVE YEARS.....	34
3.18 SCHEDULE OF PROJECTS CURRENTLY IN PROGRESS.....	35
3.19 FINANCIAL STANDING.....	36
3.20 OTHER SUPPLEMENTARY INFORMATION.....	37
3.21 DECLARATION FORM.....	38
3.22 WORK METHODOLOGY.....	39

STANDARD FORMS

3.1 BANK GUARANTEE FOR ADVANCE PAYMENT

To: Director General,
Kenya Urban Roads Authority,
Barabara Plaza (Block D), Mazao Road
Off South Airport Road, JKIA
P.O. Box 41727 - 00100
NAIROBI

_____ (Date)

Sir,

Ref: CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD
INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD
NETWORKS IN NAIROBI

TENDER No.: KURA/DEV/HQ/311/2019-2020

In accordance with the provisions of the Conditions of Contract of the above-mentioned Contract,

We, _____ [name and Address of
Contractor] (hereinafter called "the Contractor") shall deposit with
_____ [name of Employer] a bank guarantee to guarantee
his proper and faithful performance under the said Contract in an amount of
KShs. _____ [amount of Guarantee in figures] Kenya
Shillings _____ [amount of Guarantee in words].

We, _____ [bank or financial institution], as instructed by the Contractor,
agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety
merely, the payment to _____ [name of Employer] on his first
demand
without whatsoever right of objection on our part and without his first claim to
the Contractor, in the amount not exceeding
Kshs _____ [amount of Guarantee in figures] Kenya
Shillings _____

[amount of Guarantee in words], such amount to be reduced periodically by the amounts
recovered by you from the proceeds of the Contract.

We further agree that no change or addition to or other modification of the terms of the
Contract or of the Works to be performed there under or of any of the Contract documents
which may be made between

_____ [name of Employer] and the Contractor, shall in any way
release us from any liability under this guarantee, and we hereby waive notice of any such
change, addition or modification.

No drawing may be made by you under this guarantee until we have received notice in
writing from you that an advance payment of the amount listed above has been paid to the
Contractor pursuant to the Contract.

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____ (*name of Employer*) receives full payment of the same amount from the Contractor.

Yours faithfully,

Signature and Seal _____

Name of the Bank or financial institution _____

Address

Date _____

Witness: Name:

Address: _____

Signature: _____

Date: _____

3.2 FORM OF BANK BID SECURITY

Note: The bidder shall complete only this Form of Bank guarantee. No other Form of Bid Bond or any other forms of security will be accepted. Bidders who fail to comply with this requirement will be disqualified.

WHEREAS [Name of bidder]

.....
.....

(herein after called “the Bidder”) has submitted his bid dated

for the CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD
INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS
IN NAIROBI

TENDER No.: KURA/DEV/HQ/311/2019-2020

hereinafter called “the bid”

KNOW ALL MEN by these presents that we [Name of Bank]

.....
.....

of [Name of Country]

.....
having our registered offices at

.....
(hereinafter called the Bank) are bound unto the Director General, Kenya Urban Roads Authority
(hereinafter called “The Employer”) in the sum of

(in words KShs).....
.....

(In figures KShs).....

for which payment will be well and truly made to the said Employer the Bank binds itself, its successors
and assigns by these presents.

Signed for the said Bank thisday of20.....

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

THE CONDITIONS of this obligation are:

1. If the bidder withdraws his Bid during the period of bid validity specified by the Bidder on the Bid Form; or

or

2. If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid Validity fails or refuses to execute the Form of Agreement in accordance with the Instructions to Bidders when required or fails or refuses to furnish the Performance Security, in accordance with the Instructions to Bidders.

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

This guarantee will remain in force up to and including thirty (30) days after the date of expiration of the bid validity, as stated in the Instructions to Bidders.

At the request of the Employer the Bid validity period may be extended by mutual agreement between the Employer and the Bidder and we undertake to extend the validity of this surety accordingly without you having to inform us of such an extension of the Bid validity period if within this period the Bidder has been notified of the acceptance of his Bid. This Surety shall remain valid up to the time the Contract Agreement has been executed.

AUTHORIZED SIGNATURE OF THE BANK

.....

NAME OF SIGNATORY

.....

DATE.....

TITLE OF SIGNATORY

NAME OF THE WITNESS

SIGNATURE OF THE WITNESS DATE

ADDRESS OF THE WITNESS

3.3 FORM OF INVITATION FOR BIDS

See www.kura.go.ke/tender notices

3.4 LETTER OF ACCEPTANCE

[Letter head paper of the Employer]

_____ *[date]*

To: _____ *[name of the Contractor]*

_____ *[address of the Contractor]*

Dear Sir,

This is to notify you that our Bid dated _____ for the execution of
**CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE
ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND
ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY
TENDER No.: KURA/DEV/HQ/311/2019-2020**

For the Contract Price of Kshs. _____
[amount in figures] Kenya
Shillings _____ *(amount in words)* in
accordance with the Instructions to Bidders is hereby accepted.

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents.

Authorized Signature

.....

Name and Title of Signatory

.....

Attachment: Agreement

3.5 FORM OF AGREEMENT

THIS AGREEMENT, made the _____ day of _____ 20____ between the **Director General, Kenya Urban Roads Authority, Barabara Plaza (Block D), Mazao Road-Off South Airport Road, JKIA ,, Nairobi** (hereinafter called “the Employer”) of the one part AND _____ of [or whose registered office is situated at]

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

WHEREAS THE Employer is desirous that the Contractor executes **CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY TENDER No.: KURA/DEV/HQ/311/2019-2020**

(hereinafter called “the Works”) located in Nairobi County and the Employer has accepted the bid submitted by the Contractor for the execution and completion of such Works and the remedying of any defects therein for the Contract Price of Kshs. _____[*Amount in figures*], Kenya Shillings _____[*Amount in words*].

NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and shall be read and construed as part of this Agreement:
 - (i) Letter of Acceptance
 - (ii) Form of Bid and Appendix to Form of Bid
 - (iii) Conditions of Contract, Part I
 - (iv) Conditions of Contract, Part II
 - (v) Specifications
 - (vi) Drawings
 - (vii) Priced Bill of Quantities

All aforesaid documents are hereinafter referred to as "The Contract".

3. In consideration of the payment to be made by the Employer to the Contractor, the Contractor hereby covenants with the Employer to execute, complete and maintain the works in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution, completion and maintenance of the works the Contract Price at the times and in the manner prescribed by the Contract.

IN WITNESS WHEREOF the parties hereto have caused their respective common seals to be hereto affixed (or have hereunto set their respective hands and seals) on the day and year first above written.

SIGNED AND DELIVERED

By the said Employer:
(Director General, Kenya Urban Roads Authority)
For and on behalf of the said Employer.

In the presence of:
(Name and Designation of Witness)

.....
(Signature of Witness)

.....
(Address of witness)

By the said Contractor:

In the presence of:
(Name and Designation of Witness)

.....
(Signature of Witness)

.....
(Address of witness)

3.6 PERFORMANCE BANK GUARANTEE (UNCONDITIONAL)

To: Director General
Kenya Urban Roads Authority
P.O. Box 41727 - 00100
NAIROBI

Dear Sir,

WHEREAS _____ (hereinafter called “the Contractor”) has undertaken, in pursuance of Contract No. dated _____ to execute **CONSTRUCTION OF VALLEY ROAD~KENYATTA AVENUE/NGONG /NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY**
TENDER No.: KURA/DEV/HQ/311/2019-2020

(hereinafter called “the Works”);

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognised bank for the sum specified therein as security for compliance with his obligations in accordance with the Contract;

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of Kshs. _____ (*amount of Guarantee in figures*) Kenya Shillings _____ (*amount of Guarantee in words*), and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of Kenya Shillings _____ (*amount of Guarantee in words*) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change, addition or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this Guarantee, and we hereby waive notice of any change, addition, or modification.

This guarantee shall be valid until the date of issue of the Certificate of Completion / End of Defects Liability Certificate.

SIGNATURE AND SEAL OF THE GUARANTOR _____

Name of Bank: _____

Address: _____

Date: _____

3.7 FORM OF LETTER OF NOTIFICATION OF AWARD

Director General
Kenya Urban Roads Authority
P.O. Box 41727 - 00100
NAIROBI

To:
.....
.....
.....

RE: Bid No.

Tender Name **CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG
/NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS
AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY**
TENDER No.: KURA/DEV/HQ/311/2019-2020

This is to notify that the contract (s) stated below under the above mentioned Bid have been awarded to you.

.....
.....
.....

a. Please acknowledge receipt of this letter of notification signifying your acceptance.

The contract/contracts shall be signed by the parties within 30 days of the date of this letter but not earlier than 14 days from the date of the letter.

You may contact the officer(s) whose particulars appear below on the subject matter of this letter of notification of award.

b.

(FULL PARTICULARS):

Director, Urban Roads Development
Kenya Urban Roads Authority
P. O. Box 41727 - 00100
Nairobi

Telephone: +254 020 8013844

Email: info@kura.go.ke, Web: www.kura.go.ke.

.....
SIGNED FOR DIRECTOR GENERAL

SCHEDULES OF SUPPLEMENTARY INFORMATION

3.8 BID QUESTIONNAIRE

Please fill in block letters.

- c. Full names of Bidder.....
.....
- d. Full address of Bidder to which Bid correspondence is to be sent (unless an agent has been appointed below).....
- e.
- f.
- g. Telephone number (s) of Bidder.....
- h.
- i.
- j. Telex address of Bidder.....
- k.
- l. Name of Bidder's representative to be contacted on matters of the Bid during the Bid period.....
- m.
- n. Details of Bidder's nominated agent (if any) to receive Bid notices. This is essential if the
- o. Bidder does not have his registered address in Kenya (name, address, telephone, telex).....
- p.
- q.
- r.
- s. Signature of Bidder

Make copy and deliver to *the Director General, Kenya Urban Roads Authority.*

3.9 CONFIDENTIAL BUSINESS QUESTIONNAIRE

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

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

Part 1 – General:

Business Name:

Location of business premises:Country/Town.....

Plot No.....Street/Road

Postal Address..... Tel No.....

Nature of Business.....

Current Trade Licence No..... Expiring date.....

Maximum value of business which you can handle at any time: Kshs.

Name of your bankers.....

Branch.....

Part 2 (a) – Sole Proprietor:

Your name in full..... Age.....

Nationality..... Country of Origin.....

*Citizenship details

Part 2 (b) – Partnership:

Give details of partners as follows:

	<u>Name in full</u>	<u>Nationality</u>	<u>Citizenship Details</u>	<u>Shares</u>
1				
2				
3				

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

Part 2(c) – Registered Company:

Private or public.....

State the nominal and issued capital of the Company

Nominal Kshs.....

Issued Kshs.....

Give details of all directors as follows:

	<u>Name in full</u>	<u>Nationality*</u>	<u>Citizenship Details</u>	<u>Shares**</u>
1				
2				
3				
4				

Part 2(d) – Interest in the Firm:

Is there any person/persons in **Kenya Urban Roads Authority** who has interest in this firm?

Yes/No..... (*Delete as necessary*)

I certify that the information given above is correct.

.....		
(Title)	(Signature)	(Date)

t. Attach proof of citizenship.

u. Attach certified copy of Form CR12 (Issued within 12 Months).

3.10 SCHEDULE OF MATERIALS BASIC PRICES
(Ref: Clause 70 of Conditions of Contract)

Item No.	Description	Country of Origin	Name of Supplier	unit	Unit Price Kshs.
1.	Cut-back Bitumen MC 30 in bulk			Litre	
2.	Cut-back Bitumen MC 30 in drums			Litre	
3.	Bitumen 80/100 in bulk			Kg	
4.	Bitumen 80/100 in drums			Kg	
5.	Bitumen Emulsion K1-60 in bulk			Litre	
6.	Bitumen Emulsion K1-60 in drums			Litre	
7.	Cut-back Bitumen MC 70 in bulk			Litre	
8.	Cut-back Bitumen MC 70 in drums			Litre	
9.	Petrol, Regular Grade			Litre	
10	Petrol, Premium/ super Grade			Litre	
11	Automotive Diesel Fuel			Litre	
12	Industrial Diesel Oil			Litre	
13	Kerosene Fuel			Litre	
14	Cement			Tonne	
15	Flex beam Guardrail			Metre	
16	Gabion Mesh			M ²	
17	Reinforcing Steel			Tonne	
18	Lime			Tonne	

I certify that the above information is correct

.....
(Title)

.....
(Signature)

.....
(Date)

The prices inserted above shall be those prevailing 28 days before the submission of Bids and shall be quoted in Kenya Shillings using the exchange rates specified in the Appendix to Form of Bid.

Prices of imported materials to be quoted Cost Insurance and Freight (CIF) Mombasa or Nairobi, as appropriate, depending on whether materials are imported by the Bidder directly or through a local agent.

Transportation costs for imported materials to be quoted from Mombasa or Nairobi as appropriate to mid point of **CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY**

TENDER No.: KURA/DEV/HQ/311/2019-2020

Depending on whether materials are imported directly by the Bidder or through a local agent.

3.11 MAJOR ITEMS OF CONSTRUCTION PLANT AND EQUIPMENT

Date of Arrival on Project (Days after commence)	
Power Rating	
Owned/ Leased/ Imported	
Source	
Estimated CIF Mombasa Value (If to be imported)	
Capacity	
New or Used	
Year of Manufacture	
No. of each	
Description Type, Model, Make	

The Bidder shall enter in this schedule all major items of plant and equipment which he proposes to bring to site. Only reliable plant in good working order and suitable for the work required of it shall be shown on this Schedule. Summary of the same shall be entered in Section 5: Qualification Criteria, Part 7.

I certify that the above information is correct.

.....
(Title)

.....
(Signature)

.....
(Date)

3.12 SCHEDULE OF LABOUR BASIC RATES
(Reference: Clause 70 of Conditions of Contract)

LABOUR CATEGORY	(MONTH/SHIFT/HOUR)	RATES

Categories to be generally in accordance with those used by the Kenya Building Construction and Engineering and Allied Trades Workers' Union and as per the prevailing labour laws.

.....
(Title)

.....
(Signature)

.....
(Date)

3.13 DETAILS OF SUBCONTRACTORS

If the Bidder wishes to sublet any portions of the Works under any heading, he must give below details of the subcontractors he intends to employ for each portion.

Failure to comply with this requirement may invalidate the bid.

v. Portion of Works to be sublet:

Full name of Subcontractor and address of head office:

.....

Subcontractor's experience of similar works carried out in the last 3 years with contract value:

	<u>Similar Works</u>	<u>Contract Value</u>
1		
2		
3		

w. Portion of Works to sublet:

Full name of sub-contractor and address of head office:

.....

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

	<u>Similar Works</u>	<u>Contract Value</u>
1		
2		
3		

.....
 [Signature of Bidder]

.....
 (Date)

3.14 CERTIFICATE OF BIDDER’S VISIT TO SITE

This is to certify that

[Name/s].....

Designation

Being the authorized representative/Agent of [Name of bidder]

.....

.....

Voluntarily inspected the works for the **CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG /NYERERE ROAD INTERCHANGE AND UPPER HILL HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY**
TENDER No.: KURA/DEV/HQ/311/2019-2020

.....day of.....20.....

3.15 FORM OF WRITTEN POWER OF ATTORNEY

The Bidder shall state here below the name(s) and address of his representative(s) who is/are authorized to receive on his behalf correspondence in connection with the Bid.

(The Bidder consisting of a joint venture shall state here below the name and address of his representative who is authorised to receive on his behalf correspondence in connection with the Bid.)

.....

(Name of Bidder's Representative in block letters)

.....

(Address of Bidder's Representative)

.....

(Signature of Bidder's Representative)

Alternate:

.....

(Name of Bidder's Representative in block letters)

.....

(Address of Bidder's Representative)

.....

(Signature of Bidder's Representative)

Note

Attach certified copy of Identification Documents for Signatories.

3.16 KEY PERSONNEL

DESIGNATION	NAME	NATIONALITY	SUMMARY OF QUALIFICATIONS AND EXPERIENCE
Headquarters: 1. Director 2. 3. Etc.			
Site Office: 1. Site Agent 2. Site Engineer 3. Site Superintendant 4. Concrete Foreman 5. Pilling Foreman 6. Earthworks Foreman etc.			

The Bidder shall list in his Schedule the Key Personnel he will employ from the Contractor's headquarters and Contractor's Site Office to direct and execute the work together with their qualifications, experience, position held and nationality in accordance to clause 15.2 and 16.3 of the Conditions of Contract Part II (Where required, use separate sheets to add extra data for column 4). Bidders shall attach signed and certified CVs and academic credentials of all key staff.

I certify that the above information is correct

.....
(Signature of Bidder)

.....
(Date)

3.17 SCHEDULE OF COMPLETED SIMILAR SCOPE OF CIVIL WORKS CARRIED OUT BY THE BIDDER IN THE LAST FIVE YEARS

DESCRIPTION OF WORKS AND CLIENT	TOTAL VALUE OF WORKS (KSHS)*	CONTRACT PERIOD (YEARS)	YEAR COMPLETED
A. <u>Non-completed Works</u>			
B. <u>Completed Works</u>			
C. <u>Specific Construction Experience</u>			

I certify that the above Civil Works were successfully carried out and completed by ourselves.

.....
(Signature)

.....
(Date)

*Value in Kshs. using Central Bank of Kenya mean exchange rate at a reference date 28 days before the date of bid opening.

3.18 SCHEDULE OF PROJECTS CURRENTLY IN PROGRESS

DESCRIPTION OF WORK AND CLIENT	CONTRACT PERIOD	DATE OF COMMENCE- MENT	DATE OF COMPLETION	TOTAL VALUE OF WORKS (KSHS.)	PERCENTAGE COMPLETED TO DATE

I certify that the above Civil Works are being carried out by ourselves and that the above information is correct.

.....
(Signature of Bidder)

.....
(Date)

3.19 FINANCIAL STANDING

- 1) Submit copies of audited profit and loss statements and balance sheet for the last five (5) calendar years and estimated projection for the next two years with certified English translation where appropriate.
- 2) Give turnover figures for each of the last three (3) financial years. Quote in millions and decimal thereof.

	Year	Year	Year
	KShs.	KShs.	KShs.
Road works			
Other civil Engineering works			
Other (specify)			
Total			

SUMMARY OF ASSETS AND LIABILITIES OF THE AUDITED FINANCIAL STATEMENTS OF THE LAST THREE (3) FINANCIAL YEARS.

	Year	Year	Year
	KShs.	KShs.	KShs.
1. Total Assets			
2. Current Assets			
3. Bank Credit Line Value			
4. Total Liabilities			
5. Current Liabilities			
6. Net Worth (1-4)			
7. Working capital (2+3-4)			

- a) Name/ Address of Commercial Bank providing credit line

.....

- b) Total amount of credit line KShs.....

Attach certified copies of financial bank statements of the last six (6)
 months. Attach a certified copy of Undertaking of the Bank to providing
 the credit.

3.20 OTHER SUPPLEMENTARY INFORMATION

- 1) Financial reports for the last three years, balance sheets, profit and loss statements, auditors' reports etc. List them below and attach copies.

.....
.....
.....
.....
.....
.....

- 2) Evidence of access to financial resources to meet the qualification requirements. Cash in hand, lines of credit etc. List below and attach copies of supporting documents

.....
.....
.....
.....
.....
.....

- 3) Name, address, telephone, telex, fax numbers of the Bidder's Bankers who may provide reference if contacted by the Employer.

.....
.....
.....
.....
.....
.....

- 4) Information on current litigation in which the Bidder is involved.

OTHER PARTY (IES)	CAUSE OF DISPUTE	AMOUNT INVOLVED (KSHS)

I certify that the above information is correct.

.....
(Signature of Bidder)

.....
(Date)

3.21 DECLARATION FORM

Date:

To: Director General
Kenya Urban Roads Authority
P.O. Box 41727 - 00100
NAIROBI

The Bidder (name and address)
.....
.....
.....
.....

declares the following:

- a. Has not been debarred from participating in public procurement.
- b. Has not been involved in and will not be involved in corrupt and fraudulent practices regarding public procurement.

.....
(Signature of Bidder)

.....
(Date)

Official Stamp:

(To be signed by authorized representative and officially stamped)

3.22 WORK METHODOLOGY

Give a brief description of how you intend to carry out the work including traffic management, quality assurance of works and any designs to be carried out by the bidder in not less than three (3) pages and not more than seven (7) pages.

The above methodology should be more detailed on bridge/interchange/viaduct construction methodology by providing a logical step by step construction and associated quality control sequencing.

SECTION 4: INSTRUCTIONS TO BIDDERS

SECTION 4: INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

A.	GENERAL	42
1.	Scope Of Bid	42
2.	Source of Funds	42
3.	Eligible Bidders	42
4.	Qualification of the Bidder	42
5.	One Bid per Bidder	43
6.	Cost of Bidding	43
7.	Site Visit	43
B.	BIDDING DOCUMENTS	44
8.	Content of Bidding Documents	44
9.	Clarification of Bidding Documents	45
10.	Amendment of Bidding Documents	45
C.	PREPARATION OF BIDS	45
11.	Language of Bid.....	45
12.	Documents Comprising the Bid	45
13.	Bid Prices	46
14.	Currencies of Bid and Payment	46
15.	Bid Validity	46
16.	Bid Security	47
17.	Alternative Proposals by Bidders	48
18.	Pre-Bid Meeting	48
19.	Format and Signing of Bid	48
D.	SUBMISSION OF BIDS	48
20.	Sealing and Marking of Bids	49
21.	Deadline for Submission of Bids	50
22.	Late Bids	50
23.	Modification and Withdrawal of Bids	50
E.	BID OPENING AND EVALUATION	50
24.	Bid Opening	51
25.	Process to Be Confidential	51
26.	Clarification of Bids and Contacting the Employer	51
27.	Examination of Bids and Determination of Responsiveness.....	52
28.	Correction of Errors	52
29.	Conversion to Single Currency for Comparison of Bids	53
30.	Evaluation and Comparison of Bids	53
F.	AWARD OF CONTRACT.....	54
31.	Award	54
32.	Employer's Right to Accept Any Bid and to Reject Any or All Bids	54
33.	Notification of Award	54
34.	Signing of Agreement	54
35.	Performance Security	55
36.	Disputes Review Method	56
37.	Corrupt & Fraudulent Practices.....	56

SECTION 4: CONDITIONS OF BID AND INSTRUCTIONS TO BIDDERS

A GENERAL

- | | |
|---------------------------------------|---|
| 1. Scope Of Bid | <p>1.1 The Employer, as defined in the Conditions of Contract, Part II and Appendix to Form of Bid, hereinafter referred to as “the Employer,” wishes to receive bids for the construction of Works, as described in Section 1, Clause 102 of the Special Specifications (Location and extent of the works).</p> <p>1.2 The successful bidder will be expected to complete the Works within the period stated in the Appendix to Form of Bid from the date of commencement of the Works.</p> <p>1.3 Throughout these bidding documents, the terms “bid” and “tender” and their derivatives (“bidder/tenderer”, “bid/tendered,” “bidding/tendering,” etc.) are synonymous, and day means calendar day. Singular also means plural.</p> |
| 2. Source of Funds | <p>2.1 The source of funding is the Government of Kenya through the Development Vote</p> |
| 3. Eligible Bidders | <p>3.1 This invitation to bid is open to any bidder (including all members of a joint venture and all subcontractors of a bidder) meeting all three of the following requirements:</p> <ul style="list-style-type: none">(a) A bidder shall not be affiliated with a firm or entity<ul style="list-style-type: none">(i) That has provided consulting services related to the Works to either the Employer during the preparatory stages of the Works or of the Project of which the Works form a part,(ii) That has been hired (or is proposed to be hired) by the Employer as an Engineer for the contract. <p>3.2 Bidders shall provide such evidence of their continued eligibility Satisfactory to the Employer as the Employer shall reasonably request.</p> |
| 4. Qualification of the Bidder | <p>4.1 Bidders shall, as part of their bid:</p> <ul style="list-style-type: none">(a) Submit a written power of attorney authorizing the signatory of the bid to commit the bidder; and(b) Update any information submitted with their applications for prequalification, which has changes, and update in any case the Information indicated in the Bidding Data, and continue to meet the minimum threshold criteria set out in the prequalification documents. |

As a minimum, bidders shall update the following information:

- (a) Evidence of access to lines of credit and availability of other financial resources
- (b) Financial predictions for the current year and the two following years, including the effect of known commitments
- (c) Work commitments acquired since prequalification.
- (d) Current litigation information, and
- (e) Availability of critical equipment.

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

- (a) The bid shall include all the information listed in Sub-Clause 4.1 above.
- (b) The bid and, in case of a successful bid, the Agreement shall be signed so as to be legally binding on all partners.
- (c) One of the partners shall be nominated as being in charge and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners.
- (d) The partner in charge shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the contract including payment shall be done exclusively.
- (e) All partners of the joint venture shall be liable jointly and severally for the execution of the contract in accordance with the contract terms, and a statement to this effect shall be included in the authorization mentioned under Sub-clause 4.2 (c) above as well as in the bid and in the Agreement, in case of successful bid, and
- (f) A copy of the agreement entered into by the joint venture partners shall be submitted with the bid.

4.3 Bidders shall also submit proposals of work methods and schedule in sufficient details to demonstrate the adequacy of the bidders' proposals to meet the technical specifications and the completion time referred to in Sub-clause 1.2 above.

5. One Bid per Bidder

- 5.1 Each bidder shall submit only one bid either by himself or as a partner in a joint venture. A bidder who submits or participants in more than one bid, other than alternatives pursuant to Clause 17 below, will be disqualified.

6. Cost of Bidding

- 6.1 The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or

liable for those costs regardless of the conduct or outcome of the bidding process.

7. Site Visit.

7.1 The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the Site shall be at the bidder's own expense.

7.2 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.

7.3 The Employer will conduct a Mandatory Site visit concurrently with the pre-bid meeting referred to in Clause 18 as per the Tender Notice. **Failure to attend the Site Visit by any bidder shall lead to disqualification of his / her bid.**

7.4 The bidder's representative should be technically qualified with at least a degree in civil engineering. He must also be one of the key persons listed in the schedule of key personnel.

B BIDDING DOCUMENTS

8. Content of Bidding Documents 8.1 The bidding documents are those stated below and should be read in conjunction With any Addenda issued if any in accordance with Clause 11 below.

1. Form of Bid
2. Appendix to Form of Bid
3. Bid Security
4. Instructions to Bidders
5. Bidding Data
6. Conditions of Contract, Part I
7. Conditions of Particular Application, Part II
8. Standard Specifications
9. Special Specifications
10. Form of Contract Agreement
11. Bill of Quantities
12. Drawings
13. Tender addenda [tender notices]

8.2 The bidder is expected to examine carefully all instructions, conditions, forms, terms, specifications and drawings in the bidding documents. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Bids that are not substantially responsive to the requirements of the bidding documents will be rejected

- 9. Clarification of Bidding Documents** of 9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing or by cable (hereinafter, the term “cable” is deemed to include telex and facsimile) at the Employer’s address indicated in the Appendix to the Form of Bid.
- The Employer will respond to any request for clarification that he receives earlier than fourteen (14) days prior to the deadline for submission of bids. Copies of the Employer’s response will be forwarded to all purchasers of the bidding documents, including a description of the inquiry but without identifying its source.
- 10. Amendment of Bidding Documents** of 10.1 At any time prior to the deadline for submission of bids, the Employer may amend the bidding documents by issuing Addenda.
- 10.2 Any Addendum thus issued shall be part of the bidding documents pursuant to Sub-clause 9.1 above and shall be communicated in writing or by cable to all purchasers of the bidding documents. Prospective bidders shall promptly acknowledge receipt of each Addendum by cable to the Employer.
- 10.3 To give prospective bidders reasonable time in which to take an Addendum into account in preparing their bids, the Employer, in accordance with Clause 21.2, may extend as necessary the deadline for submission of bids.

C PREPARATION OF BIDS

- 11. Language of Bid** 11.1 The bid, and all correspondence and documents related to the bid exchanged by the Bidder and the Employer, shall be written in English Language. Supporting documents and printed literature furnished by the bidder may be in another language provided they are accompanied by an accurate translation of the relevant passages in the above stated language, in which case, for purposes of interpretation of the bid, the English Language shall prevail.
- 12. Documents Comprising the Bid** 12.1 The bid submitted by the bidder shall comprise the following: duly filled-in Form of Bid and Appendix to Form of Bid, Bid Security, priced Bill of Quantities, alternative offers where invited, and any information or other materials required be completing and submitting by bidders in accordance with these Instructions to Bidders. The documents in this bidding process shall be filled in without exception, subject to extensions thereof in the same format and to the provisions of Sub-clause 16.2 regarding the alternative forms of bid security.
- 13. Bid Prices** 13.1 Unless stated otherwise in the bidding documents, the Contract shall be for the whole Works as described in Sub-clause 1.1, based on the unit rates and prices in the Bill of Quantities submitted by the bidder.
- 13.2 The bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.
- 13.3 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 days prior to the deadline for submission of bids, shall be included in the rates and prices and the total Bid Price submitted by the bidder.
- 13.4 Unless otherwise provided in the Bidding Data and Conditions of Particular Application, the rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the

provisions of Clause 70 of the Conditions of Contract. The bidder shall furnish the indices and weightings in the Appendix to Form of Bid for the price adjustment formulae, and shall submit with its bid such other supporting information as required under Clause 70 of the Conditions of Contract. The Employer may require the bidder to justify its proposed weightings.

14. Currencies of Bid and Payment 14.1 The currency (ies) of the bid shall be in Kenya Shillings.

15. Bid Validity

15.1 Bids shall remain valid and open for acceptance for a period of 120 Days from the specified date of bid opening stated under Clause 21 below.

15.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders to extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing or by cable. A bidder may refuse the request without forfeiting its bid security. A bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to extend the validity of its bid security for the period of the extension and in compliance with Clause 16 below in all respects.

15.3 In the case of contracts in which the Contract Price is fixed (not subject to price adjustment), if the period of bid validity is extended beyond eight weeks, the amounts payable in local and foreign currency to the bidder selected for award, shall be increased by applying to both the local and foreign currency component of the payments, respectively, the factors specified in the Bidding Data or in the request for extension, for the period of delay beyond eight weeks after the expiry of the initial bid validity, up to the notification award. Bid evaluation will be based on the bid prices without taking into consideration the above correction.

16. Bid Security

16.1 The bidder shall furnish, as part of its bid, a Bid Security in the amount stipulated in the Appendix to the Form of Bid in the currency of the Employer's country, or the equivalent amount in a freely convertible currency.

16.2 The bid security shall be in the form of a bank guarantee from a reputable bank selected by the bidder and located in Kenya. The format of the bank guarantee shall be in accordance with the form of bid security included in Section 3 of this Volume I bidding document. Bid security shall remain valid for a period of 30 days beyond the original validity period for the bid, and beyond any period of extension subsequently requested under Sub-clause 15.2 above.

16.3 Any bid not accompanied by an acceptable bid security shall be rejected by the Employer as non-responsive. The bid security of a joint venture must be in the name of the joint venture submitting the bid.

16.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than 30 days after the expiration of the period of bid validity.

16.5 The bid security of the successful bidder will be returned when the bidder has signed the Agreement and furnished the required performance security.

16.6 The bid security may be forfeited:

(a) If the bidder withdraws its bid, except as provided in Sub-clause

23.2 below

- (b) If the bidder does not accept the corrections of its Bid Price, pursuant to Sub-clause 28.2 below.
- (c) In the case of a successful bidder, if he fails within the specified time limit to
 - (i) Sign the Agreement, or
 - (ii) Furnish the required Performance Security.

17. Alternative Proposals by Bidders

17.1 When alternative times for completion are explicitly invited, a statement to that effect will be included in the Bidding Data Sheet and Conditions of Contract, as will the method of evaluating different times for completion.

17.2 Except as provided under Clause 17.3 below, bidders wishing to offer technical alternatives to the requirements of the bidding documents must first price the Employer's design as described in the bidding documents and shall further provide all information necessary for a complete evaluation of the alternatives by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated bidder conforming to the basic technical requirements shall be considered by the Employer.

17.3 When bidders are permitted to submit alternative technical solutions for specified parts of the Works, such parts shall be described in Section 8, Technical Specifications.

18. Pre-Bid Meeting

18.1 The bidder's designated representative is invited to attend a pre-bid meeting, which, if convened, will take place at the venue and time in the Tender Advert.

18.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

18.3 The bidder is requested, as far as possible, to submit any questions in writing or by cable, to reach the Employer not later than one week before the meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted in accordance with Sub-clause 18.4 below.

18.4 Minutes of the meeting, including the text of the questions raised and the responses given, together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the bidding documents. Any modification of the bidding documents that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 10.1 above and not through the minutes of the pre-bid meeting.

18.5 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

19. Format and Signing of Bid

19.1 The bidder shall prepare one original of the documents comprising the bid as described under Clause 8 of these Instructions to Bidders, bound with the section containing the Form of Bid and Appendix to Form of Bid, and clearly marked 'original'. In addition, the bidder shall submit copies of the bid, in the number specified in the Bidding Data and Appendix to Form of Bid and clearly marked 'copies'. In the event of discrepancy between them,

the original shall prevail.

19.2 The original and all copies of the bid shall be typed or written in indelible ink (in the case of copies, photocopies are also acceptable) and shall be signed by a person or persons duly authorized to sign on behalf of the bidder, pursuant to Sub-clauses 4.1 (a) or 4.2 (c) above, as the case may be. All pages of the bid where entries or amendments have been made shall be initialled by the person or persons signing the bid.

19.3 The bid shall contain no alterations, omissions, or additions, unless such corrections are initialled by the person or persons signing the bid.

D SUBMISSION OF BIDS

- 20. Sealing and Marking Bids** 20.1 The bidder shall seal the original and each copy of the bid in separate envelopes, duly marking the envelopes as “original” and ‘copies’. The envelopes shall then be sealed in an outer envelope.
- 20.2 The inner and outer envelopes shall:
- (a) Be addressed to the Employer at the address provided in the Appendix to Form of Bid
 - (b) Bear the name and identification number of the Contract.
 - (c) Provide a warning not to open before the time and date for bid opening, as specified in the Tender Advert.
- 20.3 In addition to the identification required under Sub-clause 20.2 above, the inner envelopes shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared “late” pursuant to Clause 22.1 below, and for matching purposes under Clause 23 below.
- 20.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the bid. If the outer envelope discloses the bidder’s identity, the Employer will not guarantee the anonymity of the bid submission, but this shall not constitute grounds for rejection of the bid.
- 21. Deadline Submission of Bids** 21.1 Bids must be received by the Employer at the address specified under Sub-clause 20.2, not later than the time and date stipulated in the Tender Advert.
- 21.2 The Employer may, in exceptional circumstances and at its discretion, extend the deadline for submission of bids by issuing an Addendum in accordance with Sub-clause 10.1 above, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.
- 22. Late Bids** 22.1 Any bid received by the Employer after the deadline for submission of bids prescribed under Sub-clause 21.1 will be returned to the bidder unopened.
- 23. Modification and Withdrawal of Bids** 23.1 The bidder may modify, substitute, or withdraw its bid after bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.
- 23.2 The bidder’s modification, substitution, or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with the provisions of Clause 20 above, with the outer and inner envelopes additionally marked ‘modification’ or “withdrawal,” as appropriate.
- 23.3 No bid may be modified by the bidder after the deadline for submission of bids, except in accordance with Sub-clause 28.2 below.
- 23.4 Except as provided under Sub-clause 23.2 above, withdrawal of a bid during the interval between the deadline for submission of bids and expiration of the period of bid validity specified under Clause 15 above may result in the forfeiture of the bid security pursuant to Sub-clause 16.7 above.

E OPENING AND EVALUATION

- 24. Bid Opening** 24.1 The Employer will open the bids, including withdrawals and modification made pursuant to Clause 23 above, in the presence of bidders’ designated representatives who choose to attend, at the time, date and location stipulated in the Letter of Invitation to Bid. The bidders’ representatives who would be present shall sign a register evidencing their attendance.
- 24.2 Envelopes marked “withdrawal” and ‘substitution’ shall be opened first, and the name of the bidder shall be read out. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 23 above shall not be opened.

24.3 The bidders' names, the bid prices, including any alternative Bid Price or deviation, any discounts, bid modifications and withdrawals, the presence (or absence) of bid security, will be announced by the Employer at the opening. Further, other details as the Employer, at its discretion, may consider appropriate, shall also be announced and recorded. Subsequently, all envelopes marked 'modification' shall be opened and submission therein read out in appropriate detail. No bid shall be rejected at bid opening except for late bids pursuant to Clause 22 above.

24.4 Bids not opened and read out at bid opening shall not be considered further for evaluation, irrespective of the circumstances. In particular, any discount offered by a bidder which is not read out at the bid opening shall not be considered further for evaluation.

24.5 The Employer shall prepare minutes of the bid opening, including the information disclosed during the bid opening to those present in accordance with Sub-clause 24.3 above.

25. Process to Be Confidential

25.1 Information relating to the examination, clarification, evaluation, and comparison of bids, and recommendations for the award of a contract, shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of the bidder's bid.

26. Clarification of Bids and Contacting the Employer

26.1 To assist in the examination, evaluation, and comparison of bids, the Employer may, at its discretion, ask any bidder for clarification of its bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by e-mail, but no change in the price or substance of the bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause 28 below.

26.2 Subject to Sub-clause 26.1, no bidder shall contact the Employer on any matter relating to its bid from the time of the bid opening to the time the contract is awarded. If the bidder wishes to bring additional information to the notice of the Employer, he should do so in writing.

26.3 Any efforts by the bidder to influence the Employer in the Employer's bid evaluation, the bid comparison or contract award decisions may result in the rejection of the bidder's bid.

27. Examination of Bids and Determination of Responsiveness

27.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid (a) has been properly signed; (b) is accompanied by the required securities; (c) is substantially responsive to the requirements of the bidding documents as set out in the Bidding Documents and (d) provides any clarification and/or substantiation that the Employer may require to determine responsiveness pursuant to Sub-clause 28.2 below. Furthermore, the bidder shall, if required, provide substantiation that the Employer may require, pursuant to Sub-clause 14.5 above.

27.2 A substantially responsive bid is one that conforms to all the terms, conditions, and specifications of the bidding documents without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the bidding documents, the Employer's rights or the bidder's obligations under the contract; or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.

27.3 If a bid is not substantially responsive, it will be rejected by the Employer

and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

28. Correction of Errors

28.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors in the computations and summations. Errors will not be corrected by the Employer. Any bid with an error shall be disqualified.

29. Conversion to Single Currency for Comparison of Bids.

29.1 There will be no conversion as all bids shall be indicated in Kenya shillings, the currency of payment as indicated in the appendix to form of Bid

30. Evaluation and Comparison of Bids

30.1 The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clauses 27 and 28 above.

30.2 In evaluating the bids, the Employer will determine for each bid the Evaluated Bid Price by adjusting the Bid Price as follows:

- Making any correction for errors pursuant to Clause 28 above.
- Excluding Provisional Sums and the provision, if any, for Contingencies in the Summary Bill of Quantities, but including Day works, where priced competitively.
- Converting the amount resulting from applying (a) to (b) above to a single currency in accordance with Clause 29 above.
- Making an appropriate adjustment on sound technical and/or
- financial grounds for any other quantifiable acceptable
- Variations, deviations, or alternative offers.
- Making an allowance for varying times for completion offered by bidders, if permitted in the Bidding Data and in the manner prescribed therein; and

30.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, alternative offers, and other factors that are in excess of the requirements of the bidding documents shall not be taken into account in bid evaluation.

30.4 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall

not be taken into account in bid evaluation.

30.5.If the bid, which results in the lowest Evaluated Bid Price, is seriously unbalanced or front loaded in relation to the Engineer's estimate of the items of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the performance security set forth under Clause 35 below be increased at the expense of the bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract

F AWARD OF CONTRACT

- | | |
|---|--|
| 31. Award | 31.1 Subject to Clause 33 below, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest Evaluated Bid Price pursuant to Clause 30 above, provided that such bidder has been determined to be (a) eligible in accordance with the provisions of Sub-clause 3.1 above and (b) qualified in accordance with the provisions of Clause 4 above. |
| 32. Employer's Right to Accept Any Bid and to Reject Any or All Bids | 32.1 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 obligation to inform the affected bidder or bidders of the grounds for the Employer's action. |
| 33. Notification of Award | 33.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in a letter stating that his bid has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall specify the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works and the remedying of any defects therein by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called "the Contract Price"). |
| 34. Signing of Agreement | 34.1 At the same time that the Employer notifies the successful bidder that his bid has been accepted, the Employer will send the bidder the Agreement in the form provided in the bidding documents, incorporating all agreements between the parties.
34.2 Within 28 days of receipt of the Agreement, the successful bidder shall sign the Agreement and return it to the Employer, together with the required performance security. |
| 35. Performance Security | 35.1 Within 28 days of receipt of the Letter of Acceptance from the Employer, the successful bidder shall furnish to the Employer a performance security in the form stipulated in the Bidding Data and the Conditions of Contract. The form of performance security provided in Section 7 of the bidding documents may be used or some other form acceptable to the Employer.
35.2 If it is stipulated in the Contract that the performance security is to be provided by the successful bidder in the form of a bank guarantee, it shall be issued either at the bidder's option, by a bank located in the country of the Employer or by a foreign bank through a correspondent bank located in the country of the Employer.
35.3 If it is stipulated in the Bidding Data that the performance security may also be provided in the form of a bond, it shall be issued by a bonding or insurance company that has been determined by the successful bidder to be acceptable to the Employer.
35.4 Failure of the successful bidder to comply with the requirements of Clause 35 above shall constitute a breach of Contract, cause for annulment of the award, forfeiture of the bid security and any such other remedy the Employer may take under the Contract, and the Employer may resort to awarding the Contract to the next ranked bidder. |
| 36. Disputes Review Method | 36.1 The method of dispute resolution is indicated in the Bidding Data. If the selected method is a Dispute Review Board or Disputes Review Expert, the Employer proposes the person named in the Bidding Data to be appointed as |

Board member. If the Bidder disagrees with this proposal, the bidder should state so in the bid. If the Employer and the selected bidder cannot agree to the appointment of the two initial Board members, then the appointments will be made by the Appointing Authority designated in the Conditions of Contract at the request of either party.

37. Corrupt & Fraudulent Practices

- 37.1 The Employer requires the bidders/suppliers/contractors to observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the Employer:
- (a) Defines, for the purposes of this provision, the terms set forth below as follows:
 - (i) “Corrupt practice” means the offering, giving, receiving, or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution, and
 - (ii) “Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Employer.
 - (b) Will reject a proposal for award if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the Contract in question.
 - (c) Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded the Contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, the Contract.
- 37.2 Furthermore, bidders shall be aware of the provision stated under Sub-clauses 26.2 and 63.5 of the Conditions of Contract.

APPENDIX TO INSTRUCTION TO TENDERERS

TABLE 1: PRE- QUALIFICATION CHECKLIST FOR COMPLETENESS AND RESPONSIVENESS

S/No.	Completeness and Responsiveness Criteria	References	Requirement
1.	Form of Bid	Section 4 :Clause 19.2	- Amount must be indicated - Properly fill and sign
2.	Appendix to Form of Bid	Section 4 :Clause 19.2	- Form properly sign
3.	Bid Security	Section 3 Item 3.2	- Unconditional bank guarantee - In the format provided with all conditions
4.	Confidential Business Questionnaire	Section 3; Item 3.9	- Properly fill and sign - Provide all required information
5.	Form of Power of Attorney	Section 3; Item 3.14	- Properly fill and sign - Provide copies of National Identification card or Passport.
6.	Tax Compliance Certificate	Employer's notice	- Copy of certificate Certified by Commissioner of Oaths - Valid
7.	Registration with National Construction Authority	Employer's notice & Section 5; Item 5.1.4	- Category 1, Copy of certificate Certified by Commissioner of Oaths
8.	Certificate of Incorporation	Employer's notice & Section 5; Item 5.1.4	- Copy of certificate Certified by Commissioner of Oaths
9.	Priced Bill of Quantities	Section 4: Item 13.2 Section 9	- Fill all rates, prices and amounts
10.	Eligibility	Section 3; Schedule 3.21	- Copies of National ID or passport for all directors - latest Certified copy of Form CR12 (twelve months)
11.	Conflict of interest	Section 3; Schedule 3.9	- to state explicitly
12.	Debarment	Section 3; Schedule 3.21 Section 5 ; Schedule 5.1	- Properly fill and sign
13.	Pending Litigation	Section 3: Schedule 3.20 Section 5;Item 5.2.2	- Provide Sworn affidavit
14.	Litigation History		- Fill in information and sign
15.	Non-completed works beyond completion date	Section 3; Schedule 3.17	- Fill information on non-completed works
16.	Certificate of Tenderers Visit to Site	Section 3; Schedule 3.13	- Attend pre-bid meeting/visit - Bidders to sign attendance register - Certificate must be signed by the Employer's representative
17.	Schedule of Major Items of Plant	Section 3; Schedule 3.11	- Properly fill and sign
18.	Schedule of Key Personnel	Section 3; Schedule 3.16	- Properly fill and sign
19.	Bridges/viaducts/intrechanges and Roadworks Completed Satisfactorily	Section 3; Schedule 3.17	- Properly fill and sign
20.	Schedule of Ongoing Projects	Section 3; Schedule 3.17	- Properly fill and sign

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

S/No.	Completeness and Responsiveness Criteria	References	Requirement
21.	Schedule of other Supplementary Information / Financial Standings	Section 3; Schedule 3.20	- Properly fill and sign
22.	Schedule of Materials Basic Prices	Section 3; Schedule 3.10	- Properly fill and sign
23.	Schedule of Labour Basic Rates	Section 3; Schedule 3.12	- Properly fill and sign
24.	Copies of Bid Document	Section 4; Item 20.1	- 2 No. & Replica of the original
REMARKS			

TABLE 2: TECHNICAL EVALUATION

ITEM	DESCRIPTION	MUST MEET CRITERIA
1	FINANCIAL CAPACITY	
a	Audited Statements	Yes/No
b	Cash flow statement (forecasts)	Yes/No
c	Financial position/Ratios	Yes/No
d	Bank statement	Yes/No
e	Turnover	Yes/No
2	EXPERIENCE	
	General Experience	Yes/No
	Specific experience in related works	Yes/No
3	CURRENT COMMITMENTS	
	On-going works	Yes/No
4	KEY PERSONNEL	
	Site Agent	Yes/No
	Deputy Site Agent / Site Engineer	Yes/No
	Surveyor	Yes/No
	Foremen - 4 No. (General, Earthworks, Concrete, Bituminous Works)	Yes/No
	Materials Technologist	Yes/No
5	PLANT AND EQUIPMENT	
	Equipment capabilities	Yes/No
6	WORK METHODOLOGY	Yes/No
	REMARKS	Yes/No

Bidders must achieve YES in all the measured parameters to qualify.
The bidders who pass the technical criteria will be subjected to financial evaluation

SECTION 5: QUALIFICATION CRITERIA

SECTION 5: QUALIFICATION CRITERIA

This Section contains all the factors, methods and criteria that the Employer shall use to evaluate applications. The information to be provided in relation to each factor and the definitions of the corresponding terms are included in the respective Application Forms.

Contents

5.1	ELIGIBILITY	60
5.2	HISTORICAL CONTRACT NON-PERFORMANCE	61
5.3	FINANCIAL SITUATION	62
5.4	EXPERIENCE.....	63
5.5	CURRENT COMMITMENTS	64
5.6	PERSONNEL CAPABILITY	64
5.7	SCHEDULE OF THE MAJOR ITEMS OF PLANT TO BE USED ON THE PROPOSED CONTRACT.	67

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
5.1	Eligibility						
5.1.1	Nationality	Nationality in accordance with ITB Subclause 3.2.	Must meet requirement	Existing or intended JV must meet requirement	Must meet requirement	N / A	Section3; Schedule 3.9
5.1.2	Conflict of interest	No conflicts of interest as described in ITB Subclause 3.1(a) i & ii	Must meet requirement	Existing or intended JV must meet requirement	Must meet requirement	N / A	Section3; Schedule 3.9
5.1.3	Debarment	Not having been declared ineligible by the Employer, as described in Subclause 3.1(a) i & ii	Must meet requirement	Existing JV must meet requirement	Must meet requirement	N / A	Section 3: Schedule 3.21
5.1.4	Incorporation & Registration	Applicant required to meet Conditions of ITB Clause 4. Pursuant to Clause 4, the following shall be submitted; Certified copies of; • Certificate of Incorporation to show that the applicant is a registered company and legally authorized to do business in Kenya. • Proof of registration with the National Construction Authority Category as per Tender Notice as a Road Works Contractor.	Must meet requirement	Must meet requirement	Must meet requirement	N / A	Section3; Schedule 3.9

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
		• Tax Compliance Certificate • VAT Registration Certificate • PIN number Certification must be by a Commissioner of oaths.					
5.2	Historical Contract Non-Performance						
	History of Non-Performing Contracts	Non-performance of a contract did not occur within the last five (5) years prior to the deadline for application submission based on all information on fully settled disputes or litigation. A fully settled dispute or litigation is one that has been resolved in accordance with the Dispute Resolution Mechanism under the respective contract, and where all appeal instances available to the applicant have been exhausted.	Must meet requirement by itself or as party to past or existing JV	N / A	Must meet requirement by itself or as party to past or existing JV	N / A	Section 3; Schedule 3.17
5.2.2	Pending Litigation	All pending litigation shall in total not represent more than Fifty percent (50%) of the Applicant's net worth and shall	Must meet requirement by itself or as	N / A	Must meet requirement by itself or as party to past or	N / A	Section 3; Schedule 3.20

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
		be treated as resolved against the Applicant.	party to past or existing JV		existing JV		
5.3	Financial Situation						
5.3.1	Financial Performance	Submission of audited financial statements or if not required by the law of the applicant's country, other financial statements acceptable to the Employer, for the last three [3] years to demonstrate: a) The current soundness of the applicants financial position and its prospective long term profitability, and b) Capacity to have and meet the construction cash flow of minimum KShs. 1 billion or equivalent Working Capital.	Must meet Requirement (a) Must meet requirement (b) Must meet requirement	N / A (a) N / A (b) Must meet requirement	Must meet requirement (a) Must meet Requirement (b) N / A	N / A (a) N / A (a) N / A	Section 3; Schedule 3.19 a) All pages must be initialized and stamped by both a practicing Auditor registered with ICPAK and one of the Directors. Auditor's practicing membership number from ICPAC must be indicated. Non-adherence to this to part a, b and c leads to disqualification. (b) All pages in the bank statement must be initialized and

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
							stamped by the issuing bank.
5.3.2	Average Annual Construction Turnover	Minimum average annual construction turnover calculated as total certified payments received for contracts in progress or completed, within the last three (3) years: KShs. 4 Billion.	Must meet requirement	Must meet requirement	Must meet requirement	N/A	Section 3; Schedule 3.19
5.4	Experience						
5.4.1	General Construction Experience	Experience under construction contracts in the role of contractor, subcontractor, or management contractor for at least the last four (4) years prior to the applications submission deadline and with activity in at least six (6) months in each year	Must meet requirement	Must meet requirement	N / A		

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
5.4.2 (a)	Specific Construction Experience	(a) Participation as contractor, management contractor or subcontractor, in at least two (2) contracts within the last five (5) years with each with a value of ksh 4Billion and above that have been successfully and substantially completed and that are of Similar magnitude and scope to the proposed works. The similarity shall be based on the physical size, complexity, methods/technology or other characteristics as described in Section 8, of Special Specification.	Must meet requirement	Must meet requirement	N / A	Must meet Requirement	Section 3, Schedule 3.17
5.4.2 (b)		(b) For the above or other contracts executed during the period stipulated in 5.4.2; (i) Works of similar magnitude being within large busy city such as Nairobi (ii) Experience of similar magnitude above a minimum construction experience in the following key activities: (1) At least one road work should include bridge experience of minimum	Must meet requirement	Must meet requirement	N / A	Must meet requirement	Section 3, Schedule 3.17

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
		span of 500m. (2)Earthworks per month: 80,000 m ³ (3)Asphalt Concrete: 30,000 m ³ per month (4)Drainage culverts, slabs and Channels: 200 m per month (5)Concrete Works for bridges: 1,100 m ³ per month. (6)Subsurface drains: 50 m per month. (iii) an already Established yard with plants for Asphaltic Concrete and Concrete within a radius of 30 km from the project location is mandatory					
5.5	Current Commitments						
5.5.1	On-going contracts	There is no limit on the total value of the on-going Contracts.	Must meet requirement	Must meet requirement	Must meet [100-]/n-1]% of the requirement where n= no of joint venture members	N/A	Section 3: Schedule 3.18
5.6	Personnel Capability						
5.6.1	The site staff shall possess minimum levels set below NB: Attachment of CVs and certified copies of Annual Practicing Licenses (for Engineers) and Academic Certificates for all staff is mandatory;						

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
(a)	Site Agent	Qualification: BSc. Civil Eng and/or equivalent, Be Registered by EBK and/or Professional Bodies Registration (attach current practising licence). General Experience: 15 years Specific Experience in similar works:: 10 years Specific Experience as manager of similar works: 5 years	Must meet requirements	Must meet requirements	N/A	Must meet requirements	Section 3: Schedule 3.16
(b)	Deputy Site Agent and Site Engineer	Qualification: B.Sc. Civil Eng and/or equivalent, Be Registered by ERB and/or Professional Bodies Registration (attach current practising licence), General Experience: 10 years Specific Experience in similar works: 5 years	Must meet requirements	Must meet requirements	N/A	Must meet requirements	Section 3: Schedule 3.16
(c)	Site Surveyor	Qualification: B.Sc. Surveying and/or equivalent, Be Registered as a full member by ISK (attach current certificate of good standing), General Experience: 10 years Specific Experience in similar works: 5 years	Must meet requirements	Must meet requirements	N/A	N/A	Section 3: Schedule 3.16

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

No.	Subject	Requirement	Single Entity	Joint Venture		One Party	Submission Requirements
				All Parties Combined	Each Party		
(d)	Site Superintendent	Qualification: Minimum of Higher National Diploma in Civil Engineering. General Experience: 20 years Specific Experience in similar works: 10 years	Must meet requirements	Must meet requirements	N/A	N/A	Section 3: Schedule 3.16
(e)	Concrete Foremen	Qualification: Diploma in Civil Engineering. General Experience: 15 years Specific Experience in similar works: 7 years	Must meet requirements	Must meet requirements	N/A	N/A	Section 3: Schedule 3.16
(f)	Earthworks Foremen	Qualification: Minimum of Diploma in Civil Engineering. General Experience: 15 years Specific Experience in similar works: 7 years	Must meet requirements	Must meet requirements	N/A	N/A	Section 3: Schedule 3.16
(g)	Piling Foremen	Qualification: Minimum of Diploma in Civil Engineering. General Experience: 15 years Specific Experience in similar works: 7 years	Must meet requirements	Must meet requirements	N/A	N/A	Section 3: Schedule 3.16

BIDDERS ARE INFORMED THAT APART FROM THE ABOVE THEY MUST MEET THE REQUIREMENTS OF THE PUBLIC PROCUREMENT AND DISPOSAL ACT 2015 ESPECIALLY SECTION 55 OF THE ACT.

Section 4: Clauses 14.1 and 14.2

The currency of the bid shall be Kenya Shillings

Section 4: Clause 17.1

There will be no alternative times for completion.

Section 4; Clause 19.1

The number of copies of the bid to accompany the original shall be two (2).

Section 4: Clauses 29.2 (a) and 29.2 (b)

The currency of the Employer's country at the selling rates established for similar transactions by the Central Bank shall be on the date 28 days prior to the date of opening the bids.

Section 4: Clause 35.1

The Performance Security shall be in the form given in Section 3, Item 3.6.

Section 4: Clause 35.3

Apart from the stipulation of Clause 35.1 of these Instructions to Bidders, there shall be no other form of Performance Security submission.

Section 4: Clause 36.1

The method of dispute resolution shall be arbitration and the arbitrator shall be a person to be agreed between the parties or failing agreement. The arbitrator shall be appointed by The Chairman Institute of Arbitrators of Kenya

5.7 Schedule of the Major Items of Plant to Be Used On the Proposed Contract.

The Bidder must indicate the core plant and equipment considered by the company to be necessary for undertaking the project together with proof ownership.. (* Mandatory minimum number of equipment required by the Employer for the execution of the project that the bidder must make available for the Contract).

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

tem No.	Equipment Details	Minimum number required for Contract Execution	No of Equipment Owned by the Bidder	No. of equipment to be hired/ purchased by the Bidder	No. of equipment to be made available for the Contract by theBidder
1	(A) General Plant				
	Primary/Secondary Crusher Unit/Power /Screen Min capacity – 60 Tonnes/hr.	1			
	Batching Plant – 120 Tonnes/hr.	1			
2	(B) Bituminous Plant				
	1.Bitumen Pressure distributor	1			
	2.Self propelled chip spreader				
	3.Asphalt Plant	1			
	4. Pavers	1			
3	(C) Compactors				
	1.Vibrating compaction plate 300 mm wide	1			
	2.Vibrating compaction plate 600 mm wide	2			
4	(D) Mobile Compressors				
	1.Single tool (1.8 m3/min)	2			
	2.Two tool (2.8 – 7.3 m3/min)	1			
5	(E) Concrete Equipment				
	1.Mobile concrete mixers	1			
	2.Concrete poker vibrators	3			
	3.Concrete Plate vibrators	4			
6	F)Transport (Tippers, dumpers, water tankers, Truck Concrte Mixer)				
	1. 4X2 tippers payload 7 – 12 tonnes	4			
	2. 6X4 tippers payload 16 – 20 tonnes	6			

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

tem No.	Equipment Details	Minimum number required for Contract Execution	No of Equipment Owned by the Bidder	No. of equipment to be hired/ purchased by the Bidder	No. of equipment to be made available for the Contract by theBidder
	3. Flat bed lorries	3			
	4. Truck Concrete mixer – (7 – 9 M3)	4			
	5. Water tankers (18,000 – 20,000 lits capacity)	4			
7	G) Earth – Moving Equipment				
	1.Tractor dozers with dozer attachment (D6-D9 equivalent				
	2. Tracked loaders	1			
	3.Wheeled loaders	2			
	4.Motor graders (93 - 205kW)	4			
	5.Trench excavator	2			
8	(H) Diesel Generators				
	1.Diesel generators (15 – 200Kva)	1			
9	(I)Excavators				
	1. Hydraulic crawler mounted (7 – 16 tonnes) – 0.25 – 0.6 m3 SAE bucket.	4			
10	J)Rollers				
	1.Self propelled single drum vibrating (various types)	1			
	2.Pneumatic rubber tyre (1-2 tonnes/wheel	2			
	3.Sheep's foot roller	2			
	4.Double drum vibrating roller	1			
11	K) Lifting Equipment				
	1. Mobile Cranes – 25 to 80T capacity	4			

We hereby certify that not withstanding the list of plant detailed above, we will provide sufficient, suitable and adequate plant in good working order for the successful completion of works.

.....
(Signature of Contractor)

.....
(Date)

SECTION 6: CONDITIONS OF CONTRACT

SECTION 6A ~ CONDITIONS OF CONTRACT PART I: GENERAL

CONDITIONS OF CONTRACT

The Conditions of Contract, Part I: General Conditions shall be those forming Part I of the “Conditions of Contract for Works of Civil Engineering Construction,” fourth edition 1987, reprinted in 1992 with further amendments, prepared by the *Fédération Internationale des Ingénieurs-Conseils* (FIDIC). These Conditions are subject to the variations and additions set out in Part II hereof entitled “Conditions of Particular Application.”.

Copies of the FIDIC Conditions of Contract can be obtained from:

FIDIC Secretariat
P.O. Box 86
1000 Lausanne 12
Switzerland
Facsimile: 41 21 653 5432
Telephone: 41 21 653 5003

SECTION 6B ~ CONDITIONS OF CONTRACT PART II: (CONDITIONS OF PARTICULAR APPLICATION)

The following Conditions of Particular Application shall supplement the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the

General Conditions of Contract. The Particular Condition is preceded by the corresponding clause number of the General Conditions to which it relates.

TABLE OF CONTENTS

Clause and Description	Page
DEFINITIONS AND INTERPRETATION	85
1.1 Definitions	85
1.6 Gender Specific Words.....	85
ENGINEER AND ENGINEER'S REPRESENTATIVE	85
2.1 Engineer's Duties and Authority	83
ASSIGNMENT AND SUBCONTRACTING	86
4.1 Subcontracting.....	86
CONTRACT DOCUMENTS	86
5.1 Language and Law.....	86
5.2 Priority of Contract Documents	87
6.6 Metric Units	87
6.7 Intent of Drawings and Specifications.....	87
6.8 Design, Drawings and Specifications Prepared by the Contractor	87
6.9 Submissions of Designs and Drawings	87
6.10 As-Built Drawings	88
7.4 Drawings for Temporary Works.....	88
7.5 Size of Drawings.....	88
7.6 Submission to the Engineer.....	88
GENERAL OBLIGATIONS	89
8.1 Contractors General Responsibilities	89

8.3	General Requirements	89
10.1	Performance Security	90
10.2	Period of Validity of Performance Security	90
10.3	Claims under Performance Security	90
10.4	Cost of Performance Security.....	90
11.1	Inspection of Site.....	90
11.2	Access to Data	89
14.1	Programme to be Submitted	89
14.2	Revised Programme	92
14.3	Cash Flow Estimate to be Submitted.....	93
15.1	Contractor's Superintendence	93
15.2	Contractor's Agent or Representative	93
16.2	Engineer at Liberty to Object	93
16.3	Language Ability of Superintending Staff.....	93
16.4	Employment of Local Personnel.....	93
17.1	Setting Out.....	93
17.2	Notice to Engineer.....	93
19.1	Safety, Security and Protection of the Environment	94
20.4	Employer's Risks.....	95
21.1	Insurance of Works and Contractor's Equipment	96
21.2	Scope of Cover.....	96
21.4	Exclusions	96
21.5	Insurance of Goods	96
23.1	Third Party Insurance (Including Employer's Property)	96
23.2	Minimum Amount of Insurance	96
25.1	Evidence of Terms of Insurance	96
25.5	Source of Insurance.....	96
25.6	Insurance Notices	97

25.7	Insurance in Kenya	97
25.8	Notification to Insurers	97
26.2	Compliance with Statutes, Regulations.....	97
26.3	Inspection and Audit by the Funding Agency	97
28.2	Royalties.....	97
29.2	Passage and Control of Traffic.....	97
29.3	Reinstatement and Compensation for Damage to Persons or Property	97
29.4	Protection of Existing Works and Services	98
29.5	Protection of Survey Beacons.....	98
30.2	Transport of Contractor's Equipment or Temporary Works	98
30.5	Complying with State Laws and Regulations	98
30.6	Effects of other Concurrent Construction Projects	98
34.2	Labour Regulations	99
34.3	Engagement of Local Labour.....	99
34.4	Rates of Wages and Conditions of Labour	99
34.5	Repatriation of Labour.....	99
34.6	Housing for Labour.....	99
34.7	Accident Prevention Officer.....	99
34.8	Health and Safety	99
34.9	Life Saving Appliances and First Aid Equipment	100
34.10	Measures against Insect and Pest Nuisance.....	100
34.11	Epidemics.....	100
34.12	Burial of the Dead.....	100
34.13	Supply of Foodstuffs.....	100
34.14	Supply of Water	100
34.15	Alcoholic Liquor or Drugs	100
34.16	Arms and Ammunition.....	100
34.17	Festivals and Religious Customs	100

34.18	Disorderly Conduct	100
34.19	Records of Labour	101
34.20	Trade Unions	101
34.21	Default in payment of Wages	101
34.22	Breach and Removal from List.....	101
34.23	Observance by Subcontractors	101
35.2	Maintenance of Records.....	101
35.3	Reporting of Accidents	101
MATERIALS, PLANT AND WORKMANSHIP		101
36.1	Quality of Materials, Equipment, Supplies, Plant, and Workmanship	101
COMMENCEMENT AND DELAYS		100
41.1	Commencement of Works	101
41.2	Definition of Commencement	101
42.1	Possession of Site and Access Thereto	102
42.4	Possession of Site and Access thereto	102
45.1	Restriction on Working Hours.....	102
45.2	Overtime Hours	102
47.2	Reduction of Liquidated Damages.....	102
47.3	Currency of Liquidated Damages.....	103
DEFECTS LIABILITY		103
49.2	Completion of Outstanding Work and Remedying Defects.....	103
49.5	Defects Liability Period Replacements	103
ALTERATIONS, ADDITIONS AND OMISSIONS		103
52.1	Valuation of Variation	103
52.2	Power of Engineer to Fix rates	103
52.3	Daywork	103
PROCEDURE FOR CLAIMS.....		104
53.1	Notice of Claims	104

CONTRACTOR'S EQUIPMENT, TEMPORARY WORKS AND MATERIALS.....	104
54.1 Contractor's Equipment, Temporary Works and Materials	104
54.2 Employer not Liable for Damage.....	104
54.5 Conditions of Hire of Contractor's Equipment.....	104
54.9 Contractor's Responsibilities for Licenses	104
54.10 Equipment and Plant	104
MEASUREMENT.....	103
55.1 Quantities	104
55.2 Bill of Quantities with no Rates	104
56.1 Works to be Measured	105
57.1 Method of Measurement.....	105
PROVISIONAL SUMS.....	105
58.4 Prime Cost Sum	105
NOMINATED SUBCONTRACTORS.....	105
59.5 Certification of Payment to Nominated Subcontractors.....	105
CERTIFICATES AND PAYMENTS	106
60.1 Advance Payment.....	106
60.2 Interim Payment Certificate.....	106
60.3 Final Account and Final Payment Certificate	107
60.4 Payment of Certificates.....	107
60.5 Retention Money.....	108
60.6 Currency of Payment.....	108
60.7 Overdue Payments	108
60.8 Correcting and Withholding	108
60.9 Completion by Sections	108
60.10 Statement at Completion	108
60.11 Final Statement.....	108
60.12 Discharge.....	109

60.13	Final Payment Certificate	109
60.14	Cessation of Employer's Liability	109
62.1	Defects Liability Certificate	109
REMEDIES		109
63.1	Default of Contractor	109
63.2	Valuation of Date of Expulsion	109
63.3	Valuation of Date of Expulsion	109
63.4	Assignment of Benefit of Agreement	109
63.5	Corrupt or Fraudulent Practices	110
SPECIAL RISKS		110
65.2	Special Risks	110
65.4	Projectile, Missile	110
65.9	Special Risks	110
SETTLEMENT OF DISPUTES		110
67.1	Dispute Review Expert	110
67.2	Amicable Settlement	111
67.3	Arbitration	111
67.4	Failure to Comply with Recommendations	111
68.1	Notices to Contractor	111
68.2	Notices to Employer and Engineer	111
DEFAULT OF EMPLOYER		112
69.1	Default of Employer	112
69.3	Payment on Termination	112
69.9	Suspension of Funding Agency Loan	112
70	CHANGES IN COST AND LEGISLATION	113

72.2	Currency Proportions	115
ADDITIONAL CLAUSES		115
73.1	Foreign Taxation	115
73.2	Local Taxation	115
73.3	Income Tax on Staff	115
73.4	Duties on Contractor's Equipment	115
73.5	Declaration against Waiver	116
73.6	Employer's Officials	116
74.1	Illegal Payments	116
75.1	Termination of Contract for Employer's Convenience	116
76.1	Restriction on Eligibility	116
77.1	Joint and Several Liability	116
78.1	Details to be Confidential	117
78.2	Drawings and Photographs of the Works	117
79.1	Official Visitors	117
80.1	Substantial Completion of the Works	117
81.1	Monthly Site Meetings	117
81.2	Minutes of Site Meetings	117
82.1	Legal Provisions	117
83.1	Noise and Disturbance	117
83.2	Pollution	117

CONDITIONS OF CONTRACT PART II (CONDITIONS OF PARTICULAR APPLICATION)

NOTES:

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

DEFINITIONS AND INTERPRETATION

1.1 Definitions

(i)The “Employer” shall be The Director General, Kenya Urban Roads Authority.

The “Engineer” shall be The Director Urban Roads Development, Kenya Urban Roads Authority or any other competent person appointed by the Employer, and notified to the Contractor, to act in replacement of the Engineer.

(i)Insert in line 2 after “the Bill of Quantities”, the following,”the rates entered by the Contractor (Whether or not such rate be employed in computation of the Contract Price)”.

The word “Tender” and its derivatives are synonymous with the word ‘Bid,’ and its derivatives, and the words ‘Tender Documents’ with ‘Bidding Documents’. The words “Appendix to Tender” and the words “Appendix to Bid” shall have the same meaning as the words ‘Appendix to the Form of Bid’.”

Add the following paragraph at the end of Subclause 1.1 (f) (vii):

The aforesaid includes lands waters, river beds and other places on, under, in through which the Works are to be carried out including all offices, workshops or places where materials are to be stored or used for the purposes of the Contract. It also includes quarries; borrow pits, stock pile areas and spoil areas”

Add Subclause 1.1 (g) (v):

Dates shall be construed in accordance with the Gregorian calendar.

Add the following Subclause 1.6:

1.6 Gender Specific Words

Wherever in the Contract Documents the word ‘man’ or ‘men’ is used directly or as a suffix it means ‘woman’ or ‘women’ also. The Word ‘he’ includes ‘she’ also.

ENGINEER AND ENGINEER’S REPRESENTATIVE

2.1 Engineer’s Duties and Authority

With reference to Sub-Clause 2.1(b): Add the following

The Engineer shall obtain specific approval of the Employer before taking any of the following actions specified in the General Conditions of Contract:

- Consenting to the sub-letting of any part of the Works under Clause 4.
- Certifying additional cost determined under Clause 12
- Determining an extension of time under Clause 44
- Issuing a variation under Clause 51 except:

- In an emergency situation as reasonably determined by the Engineer, or
 - If such variation would increase the Contract Price by less than the amount stated in the Appendix to Bid.
- Certifying payment if the Contract Price will be exceeded
 - Authorising the use of provisional sums in excess of the monetary limit for variations
 - Issuing any Taking-over Certificate
 - Certifying additional payment/costs under Clause 65;
 - Issuing a Defects Liability Certificate under Clause 62
 - Fixing rates or prices under Clause 52.

Notwithstanding the provisions set out above, to obtain approval of the employer, if in the opinion of the Engineer, an emergency occurs affecting the safety of life or of the Works or of adjoining property, he may, without relieving the Contractor of any of his duties and responsibilities under the Contract, instruct the Contractor to execute all such work or to do all such things as may, in the opinion of the Engineer, be necessary to abate or reduce the risk. The Contractor shall forthwith comply, despite the absence of approval of the Employer, with any such instruction of the Engineer. The Engineer shall determine an addition to the Contract Price, in respect of such instruction, in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer.”

ASSIGNMENT AND SUBCONTRACTING

4.1 Subcontracting

Delete the second and third sentence and substitute:

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

Add the following:

The Engineer should satisfy whether:

The circumstances brought out warrant such subcontracting; and

The subcontractors so proposed for the Work possess the necessary experience, qualifications and equipment for the job proposed to be entrusted to them in proportion to the quantum of work to be subcontracted.

If the contractor proposes payments to be made directly to that subcontractor, this should be subject to specific authorization by the Contractor so that such consent does not relieve him from any liability or obligations under the contract.

CONTRACT DOCUMENTS

5.1 Language and Law

The language governing this Contract shall be English.

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

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

5.2 Priority of Contract Documents

Delete the documents listed as (1) to (6) and substitute with the following:

- The Contract Agreement (signed)
- The Letter of Acceptance
- Minutes of Pre-Contract Award Discussion
- Bid and Appendix to Form of Bid
- The Conditions of Contract, Part II; Conditions of Particular Application
- The Conditions of Contract, Part I; General Conditions of Contract
- The Special Specifications
- The Standard Specifications for Road and Bridge Construction, Ministry of Transport and Communications, 1986
- Clarifications and Rectifications accepted by the Employer
- The Drawings
- The priced Bill of Quantities
- Schedules and other documents forming part of the Contract.

Add to Clause 6 the following Subclauses 6.6 to 6.10:

6.6 Metric Units

All units used in the Contract shall be metric and for measurement of angles the 360 degrees circles systems shall be used

6.7 Intent of Drawings and Specifications

The intent of Drawings and Specifications is to describe the details for the complete construction and maintenance of the Works which the Contractor undertakes to perform in accordance with the terms of the Contract.

Where the Drawings or Specifications describe portions of the Works in general terms, but not in complete detail, it is understood that only materials and workmanship of the first quality are to be used. First quality refers to the quality as approved by the Engineer.

Unless otherwise specified, the Contractor shall furnish all labour, material, tools, equipment and incidentals, and do all the work involved in executing the Contract in a satisfactory and workman-like manner.

6.8 Design, Drawings and Specifications Prepared by the Contractor

No payment will be made to the Contractor for undertaking any kind of design work, preparation of drawings and specification, other than that specifically required by the terms of the Contract. Payment for design work, preparation of drawings and specifications, specifically required by the terms of the Contract shall be deemed to be included in the Rates and Lump Sums entered in the Bill of Quantities.

6.9 Submissions of Designs and Drawings

All detailed working drawings/shop drawings, design calculations and fabrication drawings for Temporary Works (such as formwork, staging, centring, scaffolding, specialized constructional, handling and launching

equipment and the like) as well as bar bending and cutting schedules for reinforcement, material lists for structural fabrication including detailed drawings for templates, end anchorage and temporary support details for pre-stressing cables shall be prepared by the Contractor at his own cost and forwarded in triplicate to the Engineer at least six weeks in advance of actual constructional requirements. The Engineer will check and return one copy of the same for the Contractor's use with amendments, if any, noted in red ink. Such approval shall not relieve the Contractor of any of his responsibilities in connection with temporary works.

The Contractor will supply four copies of the approved drawings for the Engineer's use. The cost of preparing all such items of work shall be deemed to have been included in the respective rates/prices quoted by the Contractor in the Bill of Quantities.

6.10 As-Built Drawings

On completion of the Works, the Contractor shall arrange to furnish to the Employer two (2) bound sets of all "As Built" drawings for every component of the Works at his own cost, all such copies being on Polyester film of quality to be approved by the Engineer or his Representative and digitized copy (2 No.) in a USB Disk and Compact Discs (CDs) of quality approved by the Engineer or his Representative. The Taking-over Certificate of the Works, as per the provisions of Clause 48.1 herein, shall not be issued by the Engineer in the event of the Contractor's failure to furnish the aforesaid "As Built" drawings for the entire works."

Add to Clause 7 the following Subclauses 7.4 to 7.6:

7.4 Drawings for Temporary Works

Drawings for Temporary works to be carried out by the Contractor shall be submitted to the Engineer for approval.

Working drawings of concrete or steel structures consisting of such details as may be reasonably required for the successful execution of the work and which are not included in the plans furnished by the Employer, shall be prepared by the Contractor. Three sets of working drawings shall be submitted to the Engineer for approval.

7.5 Size of Drawings

All drawings submitted by the Contractor shall for convenience in filing be as far as possible of a uniform size, and not more than 1010 mm x 680 mm. The drawings shall be numbered and dated, and shall include the title of the Contract at the bottom of the drawing followed by the title of the drawing. All drawings shall have the appropriate scales drawn on them and notes shall be in English. All amendments to such drawings shall be noted and dated on the drawing.

7.6 Submission to the Engineer

Whenever the Contractor is required to submit to the Engineer proposals, details, drawings, calculations information, literature, materials, test report and certificates, the Engineer will consider each submission and, if appropriate, will reply to the Contractor in accordance with the relevant provision of the Conditions of Contract. Unless a defined period of time is stated in the contract, each submission shall be made by dates to be agreed with the Engineer having regard to the approved programme and the need to give the Engineer adequate time to consider each submission.

The approval of the Engineer of any submission shall not relieve the Contractor of his responsibilities under the Contract.

GENERAL OBLIGATIONS

Add to Subclause 8.1 the following:

8.1 Contractors General Responsibilities

Add to Subclause 8.1 the following:

Within 28 days after receipt of the Engineer's Order to Commence the Works, the Contractor shall establish an office at the Site duly equipped for the Contractor's representative and his superintending personnel.

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

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

Add to Clause 8 the following Subclause 8.3:

8.3 General Requirements

- (a) Materials delivered to the site by Contractor or materials made available or supplied by the Employer shall be used solely for the execution of the Works.
 - (b) The Contractor shall minimise the pollution of and disturbance of lands, roads and other places on and around the Site. No trees or other vegetation shall be removed except to the extent necessary for the works.
 - © The Contractor shall comply with the current Government regulations with regard to the transport, storage and use of explosives and radio-active materials and use of radio communication equipment.
 - (d) The Contractor shall take all reasonable precautions:
 - (i) In connection with any rivers, streams, waterways, drains, water courses, lakes and the like to prevent as a consequence of the works, silting, erosion of beds and banks and pollution of the water that may adversely affect the quality or appearance thereof or cause injury or death to human, animal or plant life.
 - (ii) In connection with underground water resources, including percolating water, to prevent any interference as a consequence of the work with the supply to or abstraction from such sources and to prevent pollution of water that may adversely affect the quality thereof.
- The Contractor shall provide, maintain and remove on completion of the Works, settling lagoons and other facilities to minimise pollution due to the Contractor's operations including but not limited to quarrying, aggregate washing, concrete mixing and grouting.
- (f) The Contractor shall provide, maintain and remove on completion of the Works, fencing around the site installations including housing, camps, offices and laboratories, providing free access to the Employer, the engineer, other Contractors and any other persons entitled to such access and provide appropriate security measures on such access roads.
 - (g) All buildings erected by the Contractor upon the site and camp sites, and the layout of the buildings and the sites, shall comply with the Laws of the country and all local By-laws in so far as they are applicable.
 - (h) The Contractor shall be absolutely and solely responsible for the safety and security of Temporary Works including, but not limited to, all work yards, pilings, staging, dams, coffer dams, trenches, fencing or other works and for the Plant and Contractor's Equipment in connection therewith which may be erected or provided for the execution of the Contract Works.

This provision shall be applicable to all temporary Works, Plant and Contractor's Equipment whenever provided and erected by the Contractor or his Subcontractor(s) for the purpose of or in connection with the Contract Works.

(i) The contractor shall keep in close contact with the police, Labour officers and all other officials as appropriate regarding their requirements for the control of workmen, restricted area permits or other matters and shall provide all assistance and facilities which may be required by such officials in the execution of their duties.

10.1 Performance Security

Replace the text of Subclause 10.1 with the following:

The Contractor shall provide security for his proper performance of the Contract to the Employer within 28 days after the receipt of the Letter of Acceptance. The Performance Security shall be as stipulated in the Appendix to the Form of Bid. The Performance Security shall normally be in the currency or currencies requested for payment by the Contractor and in the same proportions as those requested for payment in the Contract. The Contractor shall notify the Engineer when providing the Performance Security to the Employer.

The Performance Security shall be a bank guarantee which shall be issued either:

By a bank located in Kenya or a foreign bank through a correspondent established and reputable bank located in Kenya or;

Without limitation to the provisions of the preceding paragraph, whenever the Engineer determines an addition to the Contract Price as a result of a change in cost and/or legislation or as a result of a variation amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor, at the Engineer's written request, shall promptly increase the value of the Performance Security in that currency by an equal percentage.

The performance security of a joint venture shall be in the name of the joint venture.

10.2 Period of Validity of Performance Security

The performance security shall be valid until a date 28 days from the date of issue of the Taking-Over Certificate for the last section in case of partial handover. The security shall be returned to the Contractor within 28 days of expiration.

10.3 Claims under Performance Security

Delete sub-clause 10.3

Add the following Subclause 10.4:

10.4 Cost of Performance Security

The cost of complying with the requirements of this clause shall be borne by the Contractor.

11.1 Inspection of Site

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

Delete the last paragraph completely and replace with the following:

The Employer in no way guarantees completeness nor accuracy of the soil, materials, subsurface and hydrological information made available to the Contractor at the time of bidding or at any other time during the period of the Contract, and the Contractor shall be responsible for ascertaining for himself all information as aforesaid for the execution of Works and his bid shall be deemed to have been priced accordingly.

Add a new Subclause 11.2:

11.2 Access to Data

Data made available by the Employer in accordance with Subclause 11.1 shall be deemed to include data listed elsewhere in the Contract as open for inspection at the address stipulated in Appendix to the Form of Bid.

14.1 Programme to be submitted

Delete Subclause 14.1 and replace with the following:

The time within which the Programme shall be submitted shall be twenty eight (28) days .This detailed Programme shall be based upon the programme submitted by the Contractor as part of his bid and shall, in no material manner, deviate from the said programme.

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

- New Year's Day (1st January)
- Good Friday
- Easter Monday
- Labour Day (1st May)
- Madaraka Day (1st June)
- Idd-ul-Fitr
- Moi Day (10th October)
- Mashujaa Day (20th October)
- Jamhuri Day (12th December)
- Christmas Day (25th December)
- Boxing Day (26th December)

The Contractor should also allow per calendar year for a further two (2) unspecified public holidays which may be announced by the Government of Kenya with no prior notification, and upon which he shall not be permitted to work.

The Programme shall be submitted in two copies in the form of a Critical Path Method Network (CPM Network) showing the order of procedure and description of the construction methods and arrangements by which he proposes to carry out the Works. In addition, the aforesaid critical path programme should be supplemented by:

(i) A Gantt/time-bar chart detailing each construction activity, showing for each construction activity; the periods of construction activity planned; the percentage completion anticipated per month; the total estimated quantity of work; the average monthly production planned, and

(ii) A detailed work method statement in respect of each construction activity. It should also be supplemented by a time-bar chart of the same programme. The programme shall be coordinated with climatic, groundwater and other conditions to provide for the completion of the works in the order and by the time specified. The Programme shall be revised at quarterly intervals and should include a chart of the principal quantities of the forecast for execution monthly.

The detailed work method statement of each particular construction activity shall list by category/type and quantity the labour, skilled labour, supervisors, plant, equipment and materials to be employed on the particular construction activity; together with: the estimated average daily production anticipated, the estimated equipment availability and utilisation factor anticipated and a detailed step description of the way in which resources are to be utilised to achieve the required rate of construction/production.

The Contractor's attention is particularly drawn to the need to familiarise himself with customs procedures in connection with importation and to allow sufficient time in its programme for these to be completed.

During the execution of Works, the Contractor shall submit to the Engineer detailed particulars of any proposed amendments to the arrangements and methods submitted in accordance to the foregoing.

If details of the Contractor's proposals for Temporary Works are required by the Engineer for his own information the Contractor shall submit such detail within fourteen days of being requested to do so.

The various operations pertaining to the Works shall be carried out in such a progressive sequence so as to achieve a continuous and consecutive output of fully completed road works inclusive of bridge works and culverts within the time limits specified in the Contract.

The Contractor shall, wherever required by the Engineer, also provide in writing for information a detailed description of the arrangements and methods which the Contractor proposes to adopt for the execution of any particular part of the Works as directed by the Engineer.

Progress reporting by the Contractor should be supported on a monthly basis with an up-to-date analysis of the progress including a statement on items which are or are about to become critical to the Progress of Works, along with proposals on how the Contractor intends to address the situation.

The consent by the Engineer on any programme shall have no contractual significance other than that the Engineer would be satisfied if the work is carried out according to such programme, and that the Contractor undertakes to carry out the work in accordance with the programme, nor shall it limit the right of the Engineer to instruct the Contractor to vary the programme should circumstances make this necessary. The above shall not be taken to limit the right of the Contractor to claim for damage or extension of time to which he may be fairly entitled to in terms of the General Conditions of the Contract for delay or disruption of his activities.

Notwithstanding the General Conditions of Contract Clause 14.1, the programme to be submitted for the execution of the Works shall, in addition to the programme of pure construction activities, include an alleviation programme for Site staff and labour in respect of Sexually Transmitted Disease (STD) including HIV/AIDS. The STD and HIV/AIDS alleviation programme shall indicate when, how and what cost the Contractor plans to satisfy the requirements of Subclause 19.1 herein and the related Technical Specifications. For each component, the programme shall detail the resources to be provided or utilized and any related sub-contracting proposed. The programme shall also include provision of a detailed cost estimate with supporting documentation.

14.2 Revised Programme

Add the following at the end of this subclause:

The Contractor shall, when instructed by the Engineer, amend, correct or modify the Programme of the Works so as to take into account any delays and/or advances and modifications designs or for other reasons considered necessary by the Engineer.

If, during the progress of the work, the quantities of work performed per month fall below those shown in the Programme, or if the sequence of operations is altered, or if the Programme is deviated from in any other way, the Contractor shall, within two weeks after being notified by the Engineer, submit a revised Programme necessary to ensure completion of the Works or any part thereof within the Time for Completion, or any extended time granted pursuant to Clause 43 and Clause 44 of the General Conditions of Contract or so as to take into account any delays or advances or for other reasons considered necessary by the Engineer without prejudice to the Employer's right under Clause 63 of the General Conditions of Contract.

Any proposal to increase the tempo of work must be accompanied by positive steps to increase production by providing more labour and plant on Site, or by using the available labour and plant in a more efficient manner.

Should the Employer request and the Contractor undertake to finish the whole or part of the Works ahead of the time originally required by the Contract, payment for accelerating the work shall only be made if agreed to beforehand in writing and according to the terms of such agreement.

If the Programme is to be revised by reason of the Contractor falling behind his Programme, he shall produce a revised Programme showing the modifications to the original Programme to complete the Works within the time as defined in Clause 43 of the General Conditions of Contract.

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

14.3 Cash Flow Estimate to be submitted

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

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

A schedule of Payments for both local and foreign currency expected to be made to the Contractor by the Employer, shall be provided.

The cash flow estimate submitted with the bid shall be revised each time the construction Programme is submitted, and revised, under Subclauses 14.1 and 14.2 above.

15.1 Contractor's Superintendence

Add the following at the end of the first paragraph of Subclause 15.1:

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

15.2 Contractor's Agent or Representative

Add the following Subclause 15.2:

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

16.2 Engineer at Liberty to Object

At the end of this clause add "by a competent substitute approved by the Engineer at the Contractor's own expense".

Add the following Subclauses 16.3 and 16.4:

16.3 Language Ability of Superintending Staff

A reasonable proportion of the Contractor's superintending staff shall have a working knowledge of the language specified in the Appendix to Form of Bid pursuant to Subclause 5.1(a), or the Contractor shall have available on site at all times a number of competent interpreters, as required by the Engineer, to ensure proper transmission of instructions and information.

16.4 Employment of Local Personnel

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

17.1 Setting Out

The following additional paragraph shall apply to the provisions of the Subclause 17.1:

- (d) The checking of all the setting-out of the proposed works relative to existing ground features, to be undertaken prior to the commencement of fabrication of structural steelworks for superstructures. This preparation is to include providing the facility for the Engineer to undertake a timely check on this setting-out and alerting the Engineer to any likely problems foreseen.

The contractor shall give to the Engineer not less than 48 hours of notice of his intention to set out or give layout for any part of the works so that timely assignment can be made for checking the same.

Add the following new Subclause 17.2:

17.2 Notice to Engineer

The Contractor shall give to the Engineer not less than 48 (Forty eight) hours notice of his intention to set out or give levels for any part of the works so that timely arrangement may be made for checking or issuing instructions. He shall indicate therein by which date the information, if any, is required by him."

19.1 Safety, Security and Protection of the Environment

Add Subclauses 19.1 (d), (e), (f), (g), (h), (i), (j), (k), (l) and (m) and the subsequent text as follows:

- (d) Notwithstanding the Contractor's obligation under Subclauses 19.1 (a), (b) and (c) of the Conditions of Contract, the Contractor shall carry out, without limitation, the following measures with a view to reducing or eliminating adverse environmental effects by the site Works:
- (i) All quarries, borrow pits, diversions and detours shall be filled and landscaped, as far as practical, to their original condition after extraction of construction material.
- (ii) Soil erosion and sedimentation due to the surface runoff or water from culverts or other drainage structures should be avoided by putting in place proper erosion control measures.
- (iii) Long traffic diversion roads shall be avoided so as to minimise the effect of dust on the surrounding environment. In any case, all diversions shall be kept damp to reduce dust.
- (iv) Haulage routes shall be kept as short as possible and watered as necessary.
- (v) Spillage of oil, fuel, and lubricants shall be avoided. If spilt, they shall be collected and disposed of in such a way that there do not adversely affect the natural environment.
- (vi) Rock blasting near settlement areas shall be properly coordinated with the relevant officers of the Kenya government in an attempt to minimise levels of noise pollution and community interference.
- (e) The formulation and enforcement of an adequate safety programme shall be the obligation of the Contractor with respect to all the works under this Contract, regardless of whether performed by the Contractor or his Subcontractors. The Contractor shall, within 14 days after commencement of the Works, meet the Engineer to present and discuss his plan for the establishment of such safety measures as may be necessary to provide against accidents, unsafe acts, and so forth.

Within 28 days after commencement of the Works, the Contractor shall submit a written safety, security and environmental protection programme to the Engineer covering the overall works and based on the laws and regulations of Kenya. In addition, he shall prepare special safety programmes for blasting and handling of explosives as may be stipulated in the Specifications.

- (f) The Contractor shall take all due precautions to avoid soil and water contamination by spillage of oil, grease, fuel and paint in the equipment yard, workshop or the site of works. Lubricants should be recycled.
- (g) The Contractor shall install pollution control device in his asphalt plant.
- (h) The Contractor shall implement re-plantation and grading of steep slopes in quarries and borrow pits to prevent disfiguration of landscape.
- (i) The Contractor shall implement compensatory afforestation plan to counteract destruction of vegetation when required to do so by the Engineer. The Contractor shall pay proper attention to the aspect of borrow pit drainage to prevent formation of stagnant pools of water and incidence of mosquito vectors. All borrow pits will be provided with efficient drains which shall be connected to the natural outfalls.
- (j) Notwithstanding implementation of any other provision contained in the Conditions of Contract, the failure on the part of the Contractor or his staff in the cases listed below will be considered default on the part of the Contractor and will attract the terms of Subclause 63.1 for remedies.

Poor sanitation and solid waste in the workers camp

Possible transmission of communicable diseases, including HIV/AIDS, between local people and the Contractor's workers

Poaching by the Contractor's workers

Illegal invasion of indigenous people by the Contractor's labour.

- (k) All lights provided by the Contractor shall be screened so as not to interfere with any signal light on the railways or with any traffic or signal lights of any local or other authority.

(l) The Contractor shall be deemed to be in possession of, and ensure that the Contractor's personnel are fully aware of, relevant safety regulations.

(m) The Contractor shall ensure that all equipment, tools and other items used in accomplishing the Works, whether purchased, rented or otherwise provided by the Contractor are in safe, sound and good condition for performing the intending function.

Notwithstanding the terms of Clause 19.1 of the General Conditions of Contract, the Contractor shall throughout the contract (including the Defects Liability Period):

(i) Conduct Information, Education and Consultation (IEC) campaign, at least every other month, addressed to all the Site staff and labour (including all Contractor's Employees, all Subcontractors and Consultant's employees, and all truck drivers and crew marketing deliveries to Site) and to the immediate local communities, concerning the dangers and impact of Sexually Transmitted Diseases (STD) in general and HIV/AIDS in particular;

(ii) Provide male or female condoms for all Site staff and labour as appropriate; and

(iii) Provide for STD and HIV/AIDS professional screening, diagnosis, counselling and full treatment (except that in the case of HIV/AIDS cases treatment shall be limited to referral to a dedicated national or regional HIV/AIDS programme) of all Site staff and labour.

Amend Subclause 20.4 to read as follows:

20.4 Employer's Risks

The Employer's risks are:

(a) Insofar as they directly affect the execution of the Works in Kenya where the Permanent Works are to be executed:

(i) War and hostilities (whether war be declared or not), invasion, act of foreign enemies

(ii) Rebellion, revolution, insurrection, or military or usurped power, or civil war

(iii) Ionising radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof;

(iv) Pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds

(v) Riot, commotion or disorder, unless solely restricted to the employees of the Contractor or of his Subcontractors and arising from the conduct of the Works.

(b) Loss or damage due to the use or occupation by the Employer of any section or part of the Permanent Works, except as may be provided for in the Contract

© Loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible, and

(d) Any operation of the forces of nature (insofar as it occurs on the Site) which an experienced contractor:

(i) Could not have reasonably foreseen, or

(ii) Could reasonably have foreseen, but against which he could not reasonably have taken at least one of the following measures:

Prevent loss or damage to physical property from occurring by taking appropriate measures, or

Insure against such loss or damage."

21.1 Insurance of Works and Contractor's Equipment

Delete the first sentence of this clause and replace with the following:

“Prior to commencement of the Works the Contractor shall, without limiting his or the Employer's obligations and responsibilities under Clause 20, insure to the satisfaction of the Employer.”

Add the following words at the end of subparagraph (a) and immediately before the last word of subparagraph (b):

“it being understood the insurance shall provide for compensation to be payable in the types and proportions of the currencies required to rectify the loss or damage incurred.”

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

21.2 Scope of Cover

(a) Delete the words “from the start of Work at the Site” and substitute with the words “from the first working day after the commencement date”

Add the following Subclause 21.2 (c):

© It shall be the responsibility of the Contractor to notify the insurance company of any change in the nature and extent of the Works and to ensure the adequacy of the insurance coverage at all times during the period of the Contract.

Amend Subclause 21.4 to read as follows:

21.4 Exclusions

There shall be no obligation for the insurances in Subclause 21.1 to include loss or damage caused by the risks listed under Subclause 20.4 subparagraphs (a) (i) to (v) above.

Add the following Subclause 21.5:

21.5 Insurance of Goods

The Contractor shall insure or cause to be insured all imported goods financed out of the proceeds of the Contract against marine and other hazards incidental to the acquisition, transportation and delivery thereof to the place of use or installation and where appropriate against all usual risks pertaining to the construction of the Works.

23.1 Third Party Insurance (Including Employer's Property)

Add the following at the beginning of this Subclause:

Prior to commencement of the Works ...

23.2 Minimum Amount of Insurance

Add the following at the end of this subclause:

... with no limits to the number of occurrences

25.1 Evidence of Terms of Insurance

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

Add the following Subclauses 25.5 to 25.8:

25.5 Source of Insurance

The Contractor shall be entitled to place all insurance relating to the Contract (including, but not limited to, the insurance referred to in Clauses 21, 23, and 24) with insurers from any eligible source country which has been determined to be acceptable to the Employer.

25.6 Insurance Notices

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

25.7 Insurance in Kenya

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

25.8 Notification to Insurers

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

Add the following Subclauses 26.2 and 26.3

26.2 Compliance with Statutes, Regulations

The Employer will repay or allow to the Contractor all such sums as the Engineer shall certify to have been properly payable and paid by the Contractor in respect of such fees, provided always that, without prejudice to Subclause 26.1, nothing contained in this sub clause shall be deemed to render the Employer liable to all claims which may be considered to fall within the provisions of Subclause 22.1.

26.3 Inspection and Audit by the Funding Agency

The Contractor shall permit the funding agency to inspect the Contractor's accounts and records relating to the performance of the Contract and to have them audited by auditors appointed by the agency, if so required by the agency.

28.2 Royalties

Add the following at the end of Subclause 28.2:

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

Add the following Subclauses 29.2 to 29.5:

29.2 Passage and Control of Traffic

The Contractor's attention is drawn to Specifications covering the Passage and Control of Traffic and in particular to the requirement for the submission of a detailed Programme for Passage of Traffic as required following the award of the Contract.

In case any operation connected with traffic which necessitates diversion, obstruction or closure of any road, railway or any other right of way, the approval of the Engineer or the Engineer's Representative and the concerned authorities shall be obtained well in advance by the Contractor.

29.3 Reinstatement and Compensation for Damage to Persons or Property

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

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

the necessary work of reinstatement and to deduct the cost thereof from any money due or to become due to the Contractor.

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

29.4 Protection of Existing Works and Services

The Contractor shall acquaint himself with the position of all existing services, such as sewers, surface water drains, cables for electricity, data and telephone, telephone and lighting poles, water mains, and the like before commencing any excavation or other works likely to affect the existing services.

The Contractor will be held liable for all damage to roads, irrigation ditches, mains pipes, electric cables, lines or services of any kind caused by him or his subcontractors in the execution of the Works. The Contractor must make good any damage without delay and, if necessary, carry out any further work ordered by the Engineer or Engineer's Representative, all at the Contractor's cost. Where work is to be carried out in the vicinity of overhead power lines, the Contractor shall ensure that all persons working in such areas are aware of the relatively large distance that high voltage electricity can "short" to earth when crane, or other large masses of steel, are in the vicinity of power lines. The Contractor's attention is drawn to appropriate standards which gives safe clearances for the various voltages.

The Contractor shall be held responsible for damage to existing works or services, and shall indemnify the Employer against any claims in this respect (including consequential damages). The Contractor shall be responsible for the reinstatement of the services, so affected, to the satisfaction of the Engineer.

In all cases where such works or services are exposed, they shall be properly shored, hung up or otherwise protected. Special care must be exercised in filling and compaction of the grounds under mains and cable. The exposed water meters, stopcock boxes and similar items shall be left uncovered.

As soon as any such existing works or services or structures are encountered on, over, under, in or through the Site during the performance of the Contract, the Contractor shall make a record of the location and description of such service or structure and shall send the same forthwith to the Engineer.

Installations adjacent to the Works shall be kept securely in place until the work is completed and shall then be made as safe and permanent as before.

Notwithstanding the foregoing requirements, and without reducing the Contractor's responsibility, the Contractor shall inform the Engineer immediately if any existing works or services are located, exposed or damaged.

29.5 Protection of Survey Beacons

The Contractor shall not remove, damage, alter or destroy in any way plot beacons. Should the Contractor consider that any beacons will be interfered with by the Work he shall notify the Engineer who, if he considers it necessary, will make arrangements for the removal and replacement of the beacons.

30.2 Transport of Contractor's Equipment or Temporary Works

Add the following at the end of this subclause.

If it is found necessary for the Contractor to move one or more loads of heavy constructional plant and equipment, materials or pre-constructed units of work over roads, highways, bridges on which such oversized and overweight items are not normally allowed to be moved, the Contractor shall obtain prior permission from the concerned authorities. Payments for complying with the requirements, if any, for protection of or strengthening of the roads, highways or bridges shall be made by the Contractor and such expenses shall be deemed to be included in his Contract Price.

Add the following Subclauses 30.5 and 30.6.

30.5 Complying with State Laws and Regulations

Nothing contained above shall excuse the Contractor or any of his Subcontractor(s) from complying with state laws regulating traffic on highways and bridges.

30.6 Effects of other Concurrent Construction Projects

The Contractor shall be deemed to have fully familiarised himself with planned construction operations or any other concurrent construction projects in Kenya which may have any material effect on the Contractor's own operations. In particular, the Contractor shall be deemed to have allowed for the effects of other concurrent construction contract(s) on any necessary transportation operations in connection with the Contract(s).

LABOUR

Add the following Subclauses 34.2 to 34.23

34.2 Labour Regulations

The Contractor and his Subcontractors shall, at all times, during the Contract period abide fully by the governing local laws and regulations.

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

34.3 Engagement of Local Labour

The Contractor is encouraged to the extent practicable and reasonable to employ staff and labour with the required qualifications and experience from sources within Kenya, particularly in the vicinity of the Site.

34.4 Rates of Wages and Conditions of Labour

The Contractor shall pay rates of wages and observe conditions of labour not less favourable than those established for the trade or industry where the work is carried out. In the absence of any rates of wages or conditions of labour so established, the Contractor shall pay rates of wages and observe conditions of labour which are not less favourable than the general level of wages and conditions observed by other employers whose general circumstances in the trade or industry in which the Contractor is engaged are similar.

34.5 Repatriation of Labour

The Contractor shall be responsible for the return to the place where they were recruited or to their domicile of all such persons as he recruited and employed for the purposes of or in connection with the Contract, and shall maintain such persons as are to be so returned in a suitable manner until they shall have left the site or, in the case of persons who are not nationals of and have been recruited outside the Republic of Kenya shall have left Kenya or the site, as appropriate.

34.6 Housing for Labour

Save insofar as the Contract otherwise provides, the Contractor shall provide and maintain such accommodation and amenities as he may consider necessary for all his staff and labour, employed for the purposes of or in connection with the Contract, including all fencing, water supply (both for drinking and other purposes), electricity supply, sanitation, cookhouses, fire prevention and fire-fighting equipment, cookers, refrigerators, furniture, and other requirements in connection with such accommodation or amenities. On completion of the Contract, unless otherwise agreed with the Employer, the temporary camps or housing provided by the Contractor shall be removed and the site reinstated to its original condition, all to the approval of the Engineer.

34.7 Accident Prevention Officer

The Contractor shall have on his staff on Site an officer dealing only with questions regarding the safety and protection against accidents of all staff and labour. This officer shall be qualified for this work and shall have the authority to issue instructions and shall take protective measures to prevent accidents.

34.8 Health and Safety

Due precautions shall be taken by the Contractor, and at his own cost, to ensure the safety of his staff and labour and, in collaboration with and to the requirements of the local health authorities, to ensure that medical staff, first aid equipment and stores, sick bay and suitable ambulance services are available at the camps, housing, and on the Site at all times throughout the period of the Contract and that suitable arrangements are made for the prevention of epidemics and for all necessary welfare and hygiene requirements. Workers shall always be transported using vehicles that meet the current transport regulations.

34.9 Life Saving Appliances and First Aid Equipment

The Contractor shall provide and maintain upon the Works sufficient, proper and efficient life-saving appliances and first-aid equipment to the approval of the Engineer. The appliances and equipment shall be available for use at all times.

34.10 Measures against Insect and Pest Nuisance

The Contractor shall at all times take the necessary precautions to protect all staff and labour employed on the Site from insect nuisance, rats, and other pests and reduce the dangers to health and the general nuisance caused by the same. The Contractor shall provide his staff and labour with suitable prophylactics for the prevention of malaria, and shall take steps to prevent the formation of stagnant pools of water. He shall comply with all the regulations of the local health authorities in these respects and shall in particular arrange to spray thoroughly with approved insecticide all buildings erected on the Site. Such treatment shall be carried out at least once a year or as instructed by the Engineer. The Contractor shall warn his staff and labour of the dangers of bilharzias and wild animals.

34.11 Epidemics

In the event of any outbreak of illness of an epidemic nature, the Contractor shall comply with and carry out such regulations, orders, and requirements as may be made by the Government or the local medical or sanitary authorities for the purpose of dealing with and overcoming the same.

34.12 Burial of the Dead

The Contractor shall make any necessary arrangements for the transport, to any place as required for burial, of any of his expatriate employees or members of their families who may die in Kenya. The Contractor shall also be responsible, to the extent required by the local regulations, for making any arrangements with regard to burial of any of his local employees who may die while engaged upon the Works.

34.13 Supply of Foodstuffs

The Contractor shall arrange for the provision of a sufficient supply of suitable food at reasonable prices for all his staff, labour, and subcontractors for the purposes of or in connection with the Contract.

34.14 Supply of Water

The Contractor shall, so far as is reasonably practicable, having regard to local conditions, provide on the Site an adequate supply of drinking and other water for the use of the Engineer and his staff, the Contractor's staff and labour.

34.15 Alcoholic Liquor or Drugs

The Contractor shall not, otherwise than in accordance with the Statutes, Ordinances, and Government Regulations or Orders for the time being in force, import, sell, give, barter, or otherwise dispose of any alcoholic liquor or drugs, or permit or suffer any such importation, sale, gift, barter, or disposal by his subcontractors, agents, staff, or labour.

34.16 Arms and Ammunition

The Contractor shall not give, barter, or otherwise dispose of, to any person or persons, any arms or ammunition of any kind or permit or suffer the same as aforesaid.

34.17 Festivals and Religious Customs

The Contractor shall, in all dealings with his staff and labour, have due regard to all recognised festivals, days of rest, and religious and other customs.

34.18 Disorderly Conduct

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous, or disorderly conduct by or among his staff and labour and take all reasonable precautions for the preservation of peace and protection of persons and property in the neighbourhood of the Works against the same.

34.19 Records of Labour

The Contractor shall keep proper wages books, in the language stipulated in the Appendix to the Form Bid, pursuant to Sub-Clause 5.1 (a) showing the time worked and wages paid to all employees in and about the execution of the Works, together with such other records as are required by any Statute, Ordinance, Law, Regulation or Bye-Law in force in Kenya governing the employment of labour. He shall be bound, whenever required, to produce such wages books and other records for the inspection of any persons authorized by the Engineer.

34.20 Trade Unions

The Contractor shall recognize the freedom of his employees to be members of trade unions.

34.21 Default in payment of Wages

In the event of default in payment of wages of any workmen employed on the Contract, and if a claim thereafter is filed in the office of the Engineer and satisfactory proof thereof is furnished, the Employer shall be notified forthwith and may, failing payment of such claim by the Contractor, arrange the payment out of monies at any time payable under the Contract and the amount so paid shall be deemed payment to the Contractor under the Contract.

34.22 Breach and Removal from List

Should the Contractor or any subcontractor be found to be in breach of any of the provisions of Clause 34, the Employer may recommend to the Government for his removal from the list of approved Contractors.

34.23 Observance by Subcontractors

The Contractor shall be responsible for the observance by his subcontractor of the foregoing provisions.

Add the following Subclauses 35.2 and 35.3:

35.2 Maintenance of Records

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

35.3 Reporting of Accidents

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

MATERIALS, PLANT AND WORKMANSHIP

Rename Subclause 36.1 as below.

36.1 Quality of Materials, Equipment, Supplies, Plant, and Workmanship

Add the following paragraph at the end of this subclause.

The Contractor is encouraged, to the extent practicable and reasonable, to use materials, Contractor's Equipment, Plant, and supplies from sources within Kenya.

COMMENCEMENT AND DELAYS

41.1 Commencement of Works

Replace the words "as soon as reasonably possible" with the words "on Site within 28 days".

Add the following subclause:

41.2 Definition of Commencement

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

The approved competent and authorized agent or representative of the Contractor is resident in the project area and is giving his whole time to the superintendence of the Works.

The provision by the Contractor of evidence that all insurances required by the Contract are in force.

The Contractor has an established an office in the project area with postal address for receipt of correspondence.

The principal items of constructional plant have been brought to Site and put to work in the execution of the permanent Works.

42.1 Possession of Site and Access Thereto

At the end of Subclause 42.1, add the following:

The Contractor shall bear all costs and charges for such lands as the Contractor may reasonably require for camps, offices, workshops, diversion roads, borrow pits, and quarries and any additional facilities outside the site required by him for the purpose of works.

Add the following subclause:

42.4 Possession of Site and Access thereto

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

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

45.1 Restriction on Working Hours

Delete Subclause 45.1 and substitute with the following:

If the Contractor requests for permission to work by day and night and if the Engineer shall grant such permission, the Contractor shall not be entitled to any additional payment for so doing.

All such work at night shall be carried out without unreasonable noise or other disturbance and the Contractor shall indemnify the Employer from and against any liability for damages on account of noise or other disturbance created while carrying out night work and from against all claims, demands, proceeding, costs, charges and expenses whatsoever in regard or in relation to such liability. In addition, the Contractor shall be required to provide, for any work carried out by night or recognised days of rest, adequate lighting and other facilities, so that the work is carried out safely and properly.

45.2 Overtime Hours

Working hours shall be observed by the Contractor as stipulated in the Labour Laws of Kenya. However when deemed necessary to expedite the Works, overtime, night time or holiday working may be allowed by the Engineer in accordance with the provisions of Subclause 46.1. The Contractor, in these cases, shall pay all costs of the Engineer and his staff for such overtime, night time or holiday working at site as stipulated under Subclause 46.1 of the General Conditions of Contract.

47.2 Reduction of Liquidated Damages

The following supplements this subclause.

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

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

The sum stated in the Appendix to Form of Bid as liquidated damages shall be increased by a sum equivalent to any amount payable by the Employer to the Contractor under clause 70.1 in respect of an increase in costs in such period that would not have been incurred by the Contractor if the Works had been completed by the due date for completion prescribed by Clause 43. Add the following Subclause 47.3:

47.3 Currency of Liquidated Damages

Liquidated damages shall be paid by the Contractor to the Employer in the types and proportions of currencies as shall be payable to the Contractor under the Contract.

DEFECTS LIABILITY

49.2 Completion of Outstanding Work and Remedying Defects

Add at the end of this subclause the following sentence:

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

Add Subclause 49.5 as follows:

49.5 Defects Liability Period Replacements

The provisions of this clause shall apply to all replacements or renewals of Plant and equipment to be provided with respect to the utilities under the Contract, carried out by the Contractor to remedy defects and damages as if the replacements and renewals had been taken over on the date they were completed. The Defects Liability Period for the Works shall be extended by a period equal to the period during which the Works can not be used by reason of the defect or damage. If only part of the Works is affected the Defects Liability Period shall be extended only for that part.

ALTERATIONS, ADDITIONS AND OMISSIONS

52.1 Valuation of Variation

Add the following final sentences to this subclause:

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

Where the Contract provides for the payment of the Contract Price in more than one currency, and varied work is valued at, or on the basis of, the rates and prices set out in the Contract, payment for such varied work shall be made in the proportions of various currencies specified in the Appendix to Form of Bid for payment of the Contract Price. Where the Contract provides for payment of the Contract Price in more than one currency, and new rates or prices are agreed, fixed, or determined as stated above, the amount or proportion payable in each of the applicable currencies shall be specified when the rates or prices are agreed, fixed, or determined, it being understood that in specifying these amounts or proportions the Contractor and the Engineer (or, failing agreement, the Engineer) shall take into account the actual or expected currencies of cost (and the proportions thereof) of the inputs of the varied work without regard to the proportions of various currencies specified in the Appendix to Form of Bid for payment of the Contract Price.

52.2 Power of Engineer to Fix rates

Add a final sentence to the first paragraph as follows:

Where the Contract provides for the payment of the Contract Price in more than one currency, the amount or proportion payable in each of the applicable currencies shall be specified when the rates or prices are agreed, fixed, or determined as stated above, it being understood that in specifying these amounts or proportions the Contractor and the Engineer (or, failing agreement, the Engineer) shall take into account the actual or expected currencies of cost (and the proportions thereof) of the inputs of the varied work without regard to the proportions of various currencies specified in the Appendix to Form of Bid for payment of the Contract Price.

52.3 Daywork

Add the following at the end of this subclause:

The Work so ordered shall immediately become part of the Works under the Contract. The Contractor shall, as soon as practicable after receiving the Daywork Order from the Engineer undertake the

necessary steps for due execution of such Work. Prior to commencement of any work to be done on a Daywork basis, the Contractor shall give a notice to the Engineer stating the exact time of such commencement.

PROCEDURE FOR CLAIMS

53.1 Notice of Claims

Add the following at the end of this subclause:

The Contractor shall also state the references of the Contract Clauses and Subclauses on which he has based his claims.

CONTRACTOR'S EQUIPMENT, TEMPORARY WORKS AND MATERIALS

For the purpose of these subclauses, the term "Equipment" shall be read as "Contractor's Equipment" where the context so requires.

54.1 Contractor's Equipment, Temporary Works and Materials

Amend Subclause 54.1 as follows:

Line 5; add "written" between "the" and "consent".

Add a final sentence to this subclause as follows:

The Contractor shall every month give to the Engineer a statement showing the amount of plant and Contractor's equipment, which has been brought to the Site.

54.2 Employer not Liable for Damage

Delete this subclause entirely.

54.5 Conditions of Hire of Contractor's Equipment

Delete this subclause entirely.

Add Subclauses 54.9 and 54.10 as follows:

54.9 Contractor's Responsibilities for Licenses

The Contractor shall obtain his own information with regard to the granting of import and export licenses for materials, equipment and plant. The Contractor shall bear all expenses for Plant, Materials, Equipment and Maintenance required for the completion and maintenance of the works and shall be deemed to have satisfied himself with regard to all his liabilities under the laws and regulations governing the granting of these licenses. The Contractor shall ensure that requests for import and export licenses are submitted in sufficient time to clear all formalities before the said licenses are required.

54.10 Equipment and Plant

The Contractor shall identify each piece of his equipment, other than hand tools, by means of an identification number plainly stencilled or stamped on the equipment at a conspicuous location, and shall furnish to the Engineer a list giving the description of each piece of equipment and its identification number. In addition, the make, model number and empty gross weight of each unit of compaction equipment shall be plainly stamped or stencilled in a conspicuous place on the unit. The gross weight shall be either the manufacturer's rated weight or the scale weight. The make, model, serial number and manufacturer's rated capacity of each scale shall be clearly stamped on the load-receiving element and its indicator or indicators. All meters shall be similarly identified, rated and marked.

MEASUREMENT

55.1 Quantities

Add the following to this subclause:

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

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

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

Add the following new sub clause:

55.2 Bill of Quantities with no Rates

Any item of Work described in the Bill of Quantities for which no rate or price has been entered in the Contract shall be considered as included in other rates and prices in the Contract and will not be paid for separately by the Employer.

56.1 Works to be measured

Delete Subclause 56.1 and replace with the following:

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

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

The documents submitted for measurement and payment shall become the property of the Employer and shall be used to the extent necessary to determine the monthly progress payment to be made to the Contractor under the Contract. Direct survey, if conducted, shall be subject to checking and verification by the Engineer and all errors in the said survey work and related computations as found during such checking shall be immediately corrected by the Contractor.

In case of any disagreement on an item of measurement, the Engineer's opinion will prevail during the assessment of the statement for monthly interim payments. Should the Contractor consider himself entitled to any form of claim with respect to the disagreement in measurement, the procedure for such is detailed under Clause 53 of the Conditions of Contract.

57.1 Method of Measurement

Delete this subclause and substitute with the following:

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

PROVISIONAL SUMS

Add the following Subclause 58.4:

58.4 Prime Cost Sum

Wherever an item in the Bill of Quantities has been referred to as a "P.C. Sum" (Prime Cost Sum), that item shall be construed as a Provisional sum and the provisions of Subclauses 58.1 to 58.3 will apply.

NOMINATED SUBCONTRACTORS

59.5 Certification of Payment to Nominated Subcontractors

Add the following paragraph at the end of Subclause 59.5:

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

CERTIFICATES AND PAYMENTS

Delete Subclauses 60.1 to 60.10 entirely and substitute with the following:

60.1 Advance Payment

In the event that an Advance Payment is granted, the following shall apply:

(a) On signature of the Contract, the Contractor shall at his request, and without furnishing proof of expenditure, be entitled to an advance of upto maximum of 5% (5 percent) of the original amount of the Contract Sum. The advance shall not be subject to retention money.

(b) No advance payment may be made before the Contractor has submitted proof of the establishment of deposit or of a directly liable guarantee satisfactory to the Employer in the amount of the advance payment. The guarantee shall be in the same currency as the advance.

© Amortization of the advance shall be effected by deductions from monthly interim payments.

(d) Amortization of the lump sum advance shall be made by deductions from the Interim payments and where applicable from the balance owing to the Contractor.

The amortization shall begin when the amount of the sums due under the Contract reaches 20% of the original amount of the Contract. It shall have been completed by the time 80% of this amount is reached.

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

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

Where:

R = Amount to be amortized

A = Amount of the advance which has been granted

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

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

With each amortization, the counterpart of the directly liable guarantee may be reduced accordingly

.

60.2 Interim Payment Certificate

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

(i) The materials are in accordance with the specifications for the Works.

(ii) The materials have been delivered to Site and are properly stored and protected against loss, damage or deterioration.

(iii) The Contractor's record of the requirements, orders, receipts and use of materials are kept in a form approved by the Engineer, and such records are available for inspection by the Engineer.

- (iv) The Contractor has submitted a statement of his cost of acquiring and delivering the materials and goods to the Site, together with such documents as may be required for the purpose of evidencing such cost.
- (v) The materials are to be used within a reasonable time.

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

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

The Engineer shall not unreasonably withhold certifying an Interim Payment Certificate and where there is a dispute regarding an item for payment, the Engineer may delete this disputed item from the Interim Payment Certificate and certify the remainder for payment provided the said payment is in accordance with the preceding paragraph. In cases of difference in opinion as to the value of any item, the Engineer's view shall prevail.

60.3 Final Account and Final Payment Certificate

As soon as possible after the issue of Taking - Over Certificate or the termination of the Contract and not later than the time of issue of Defects Liability Certificate, the Contractor shall prepare and submit to the Engineer (with a copy to the Employer), a Statement of Final Account showing in detail the total value of work done in accordance with the Contract together with all sums paid in previous payments. Within thirty

after receipt of such further information as may be reasonably required from the Contractor for its verification, the Engineer shall check the said statement, prepare and submit a Final Payment Certificate to the Employer (with a copy to the Contractor).

The Final Payment Certificate shall state:

- (a) The (final) total value of all Work executed in accordance with the Contract

- (b) After giving credit to the Employer for all amounts previously paid to the Contractor, the balance, if any, due from the Employer to the Contractor or the Contractor to the Employer, as the case may be.

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

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

- (i) To the extent that fraud or dishonesty relates to or affects any matter dealt with in the Certificate, or
- (ii) If any arbitration or court proceedings under the Contract have been commenced by either party before the expiry of 90 days after the issue of the Final Certificate of Payment.

60.4 Payment of Certificates

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

Payment upon the Engineer's Final Payment Certificate shall be made by the Employer within the time stated in the Appendix to Form of Bid from the date of issue of the Final Certificate of Payment signed by the Engineer and countersigned by the Contractor or his authorised agent or representative.

Payments to the Contractor by the Employer shall be made in the currencies in which the Contract Price is payable into a bank account or accounts nominated by the Contractor.

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

60.5 Retention Money

One half of the retention money shall become due upon the issue of a Taking – Over Certificate and shall be paid to the Contractor when the Engineer shall certify in writing that the last section of the whole of the Works has been substantially completed and the other half shall be paid to the Contractor after the expiration of the Defects Liability Period and the issue of a Certificate under Clause 62. Provided always that if such time there shall remain to be executed by the Contractor any Works ordered during such period pursuant to Clauses 49 and 50 thereof, the Employer shall be entitled to withhold payment [until the completion of such Works] of so much of the second half of the Retention Money as shall in the opinion of the Engineer represent the Costs of the Works so remaining to be executed. Provided further that in the event of different Defects Liability Periods having become applicable to different parts of the Works pursuant to clause 48 hereof the expression “expiration of the Defect Liability Period” shall for the purpose of this subclause be deemed to mean the expiration of the latest of such periods.

60.6 Currency of Payment

The Contract price shall be stated in Kenya Shillings. All payments to the Contractor shall be made in Kenya shillings.

60.7 Overdue Payments

Unless otherwise stated in the Appendix to the Form of Bid interest shall be paid on the overdue amounts and the interest to be paid shall be based on the rates of the Central Bank of Kenya 28 days prior to the opening of the bids.

60.8 Correcting and Withholding

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

60.9 Completion by Sections

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

60.10 Statement at Completion

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

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

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

60.11 Final Statement

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

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

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

60.12 Discharge

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

60.13 Final Payment Certificate

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

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

Final Certificate shall be issued for any sum due to the Contractor even if such is less than the sum named in the Appendix to the Form of Bid.

60.14 Cessation of Employer's Liability

Unless the Contractor notifies the Engineer of his objection to the Final Certificate within 14 (fourteen) days of delivery thereof he shall be deemed to have agreed that he accepts the total Contract Price as set out in the Final Certificate as full settlement for all work executed under the Contract including any variations and omissions thereof.

62.1 Defects Liability Certificate

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

REMEDIES

63.1 Default of Contractor

Delete the last paragraph of this subclause and substitute with the following:

then the Employer may, after giving 14 days' notice to the Contractor, enter upon the Site and expel the Contractor there from without thereby avoiding the Contract, or releasing the Contractor from any of his obligations or liabilities under the Contract, or affecting the rights and powers conferred on the Employer or the Engineer by the Contract, and may himself complete the Works or may himself complete the work or may employ any other contractor to complete the Works. The Employer or such other contractor may use for such completion so much of the Contractor's Equipment, Plant, Temporary Works and materials, which have been deemed to be reserved exclusively for the execution of the Works, under the provisions of the Contract, as he or they may think proper, and the Employer may, at any time, sell any of the said Contractor's Equipment, Temporary Works and unused Plant and materials and apply the proceeds of sale in or towards the satisfaction of any sums due or that may become due to him from the Contractor under the Contract."

63.2 Valuation of Date of Expulsion

Modify the heading of Subclause 63.2 by substituting "Valuation at Date of Termination" for "Valuation at Date of Expulsion." In Subclause 63.2, delete the word "termination" on the second and fifth lines and substitute "expulsion".

63.3 Valuation of Date of Expulsion

Modify the heading of Subclause 63.3 by substituting “Payment after Expulsion” for “Payment after Termination.” In Subclause 63.3, delete the words “terminates the Contractor’s employment” on the first line and substitute “shall enter and expel the Contractor”.

63.4 Assignment of Benefit of Agreement

In Subclause 63.4, delete the word “termination” on the second line, and substitute “expulsion”.

Add the following at the end of this subclause:

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

Add the following subclause 63.5:

63.5 Corrupt or Fraudulent Practices

If in the judgment of the Employer the Contractor has engaged in corrupt or fraudulent practices, in competing for or in executing the Contract, then the Employer may, after having given 14 days notice to the Contractor, terminate the Contractor’s employment under the Contract and expel him from the Site, and the provisions of Clause 63 shall apply as if such expulsion had been made under Subclause 63.1.

For the purpose of this Subclause:

“Corrupt practice” means the offering, giving, receiving or soliciting of any thing of value to influence the action of a public official in the procurement process or in contract execution.

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

SPECIAL RISKS

Subclause 65.2 is amended to read as follows:

65.2 Special Risks

The Special Risks are the risks defined under paragraph (a), subparagraphs. (i) to (v) of Subclause 20.4 of the Conditions of Contract”.

65.4 Projectile, Missile

Delete “whenever and wherever occurring” under line 2 and add “on or near the site” after “explosive of war” under line 3.

Add Subclause 65.9 as follows:

65.9 Special Risks

(a) In the event of the Employer unilaterally ordering the final cessation of performance of the Contract for reasons not specified elsewhere in the Conditions of Contract the Contract shall be considered to be frustrated and the Contractor shall be indemnified as provided for under Clause 65.1.

(b) In the event of the Employer ordering the adjournment of the Contract before or after commencement of the Works for reasons not specified elsewhere in the Conditions of Contract, the Contractor shall be entitled to indemnity for any injury which he may have suffered as a consequence of such adjournment.

The Engineer shall award the Contractor payment of such sum as in his opinion shall be reasonable giving regard to all material and relevant factors including the Contractor’s on costs and overheads, and the nature of the instruction to adjourn the Contract.

SETTLEMENT OF DISPUTES

67.1 ENGINEERS DECISION which inter alia states that

“If a dispute of any kind whatsoever arises between the Employer and the Contractor in any connection with, or arising out of, the Contract or the execution of the works, whether during the execution of the works or after their completion and whether before or after repudiation or other termination of the Contract including any dispute as to any opinion, instruction, determination, certificate or valuation of the Engineer, the matter in dispute shall, in the first place, be referred in writing to the Engineer, with a copy to the other party. Such reference shall state it is made pursuant to this clause. No later than 28 (twenty eight) day after the day on which he received such reference the Engineer shall give notice of his decision to the Employer and the Contractor. Such decision shall state it is made pursuant to this clause.

Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the works with all due diligence and the Contractor and the Employer shall give effect forthwith to every such decision of the Engineer unless and until the same shall be revised, as hereinafter provided, in an Amicable Settlement, Adjudicator’s or Arbitrator’s award.

If either the Employer or the Contractor be dissatisfied with the decision of the Engineer, or if the Engineer fails to give notice of his decision on or before the 28th (twenty eighth) day after the day on which he received the reference, then either the Employer or the Contractor may, on or before the 28th (twenty eighth) day after the day on which he received notice of such decision, or on or before the 28th (twenty eighth) day after the day on which the said period of 28 days expired, as the case may be, give notice to the other party, with a copy for information to the Engineer, of his intention to commence Adjudication, as hereinafter provided, as to the matter in dispute. Such notice shall establish the entitlement of the party giving the same to commence Adjudication, as hereinafter provided, as to such dispute; no adjudication in respect thereof may be commenced unless such notice is given.

If the Engineer has given notice of his decision as to a matter in dispute to the Employer and the Contractor and no notice of intention to commence adjudication as to such dispute has been given by either the Employer or the Contractor on or before the twenty eighth day after the day on which the parties received notice as to such decision from the Engineer, the said decision shall become final and binding upon the Employer and the Contractor. “

67.2 Amicable Settlement

“Where notice of intention to commence adjudication as to a dispute has been given in accordance with sub clause 67.1, the parties shall attempt to settle such dispute amicably before the commencement of Adjudication; provided that, unless the parties otherwise agree, Adjudication may be commenced on or after the 14th (fourteenth) day after the day on which notice of intention to commence adjudication of such dispute was given, even if an attempt at amicable settlement thereto has been made.”.

67.3 Arbitration

"Any dispute which has proceeded to Arbitration shall be settled under the Arbitration Laws of the Republic of Kenya. For the purposes of this sub clause, the Arbitrator shall be persons to be agreed upon between the parties or failing agreement to be nominated on the application of either party by the appointee designated in the Appendix to Form of Bid for the purpose and any such referee shall be deemed to be a submission to arbitration within the meaning of the Arbitration Laws of the Republic of Kenya.

67.4 Failure to Comply with Recommendations

Delete the entire sub - clause

NOTICES

68.1 Notices to Contractor

Add the following at the end of this subclause:

Notwithstanding the foregoing, the Contractor shall either maintain an address close to the Works or appoint an agent residing close to the Works for the purpose of receiving notices to be given to the

Contractor under the terms of the Contract. This obligation shall be terminated upon the issue of the Certificate of Completion.

68.2 Notices to Employer and Engineer

Delete the words “nominated for that purpose in Part II of these Conditions” in this subclause and substitute with “given in the Appendix to Form of Bid”.

DEFAULT OF EMPLOYER

Under Subclause 69.1, 69.4 and 69.5, substitute “Subclause 60.4 for “Subclause 60.10”.

69.1 Default of Employer

In Subclause 69.1 (a), delete the words “28 days” in the second sentence and substitute with the words “60 days”.

Delete Subclause 69.1 (d).

69.3 Payment on Termination

Delete from “, but in addition to the payments specified...” to the end of the Subclause.

69.4 Contractor’s Entitlement to Suspend Work

Delete the words ‘28 days’ and substitute with ‘60 days’.

Delete sub-clause 69.4 (b) and substitute with the following:

the amount of such cost, which shall be added to the Contract Price. However, the costs due to idle time for plant, equipment and labour shall not be included in the said costs and shall be borne by the Contractor.

Add to Subclause 69.4 as follows:

Without prejudice to the Contractor’s entitlement to interest under Subclause 60.7 (of these Conditions of Particular application) and to terminate under Subclause 69.1, the Contractor may suspend work or reduce the rate of work within 56 days after notification by the Foreign Funding Agency to the Kenya Government that the Financier has suspended disbursements from its loan, which finances in whole or in part the execution of the Works.

Add Subclause 69.6 as follows:

69.6 Suspension of Funding (if applicable)

In the event that the Foreign Funding Agency suspends the loan or credit to the Employer from which part of the payments to the Contractor are being made:

- a) The Employer shall notify the Contractor, with a copy to the Engineer, of such suspension within 7 days of having received the suspension notice from the Funding Agency, provided that:
 - (i) The Employer shall state in such notification whether sufficient funds in the appropriate currencies are expected to be available to the Employer to continue making payments to the Contractor beyond a date 60 days after the date of the Funding Agency's notification of the suspension, and
 - (ii) If such funds are not expected to be available, the Employer shall immediately inform the Engineer to instruct the Contractor to suspend progress of the Works pursuant to Subclause 40.1 of the General Conditions of Contract.
- b) If the Contractor has not received sums due to him upon the expiration of the 14 days from the time when the Foreign Funding Agency's loan or credit, from which part of the payments to the contractor is being made under Interim Certificates, is suspended, the Contractor may, without prejudice to the Contractor's entitlement to interest under Subclause 60.7, immediately take one or both of the following actions:
 - (i) Suspend work or reduce the rate of work, and/or
 - (ii) Terminate his employment under the Contract by giving notice to the Engineer. Such termination Shall take effect 14 days after giving of the notice

70 CHANGES IN COST AND LEGISLATION

Delete Clause 70 in its entirety, and substitute by 70.1 – 70.8 (inclusive):

70.1 Price Adjustment “The amounts payable to the Contractor, in various currencies pursuant to Sub-Clause 60.1, shall be adjusted in respect of the rise or fall in the cost of labour, Contractor's Equipment, Plant, materials, and other inputs to the Works, by applying to such amounts the formulae prescribed in this Clause.

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

70.3 Adjustment Formulae The adjustment to the Interim Payment Certificates in respect of changes in cost and legislation shall be determined from separate formulae for each of the currencies of payment and each of the types of construction work to be performed and Plant to be supplied. The formulae will be of the following general type:

$$pn = A + \left(b \frac{Ln}{Lo} \right) + \left(c \frac{En}{Eo} \right) + \left(d \frac{Fn}{Fo} \right) + \left(e \frac{Bn}{Bo} \right) + \left(f \frac{Cn}{Co} \right) + \left(g \frac{RSn}{RSO} \right)$$

Where:

pn is a price adjustment factor to be applied to the amount in each specific currency for the payment of the work carried out in the subject month, determined in accordance with Sub-Clause 60.1 (d), and with Sub-Clauses 60.1 (e) and (f), where such variations and Daywork are not otherwise subject to adjustment;

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

b, c, d, etc., are weightings or coefficients representing the estimated proportion of each cost element (labour, materials, equipment usage, etc.) in the Works or sections

thereof, net of Provisional Sums, as specified in the Appendix to Bid;

Ln, En, Fn, Bn, Cn and RSn are the current cost indices or reference prices of the cost elements in the specific currency for month “**n**,” determined pursuant to Sub-Clause 70.5, applicable to each cost element; and

Lo, Eo, Fo, Bo, Co and RSo are the base cost indices or reference prices corresponding to the above cost elements at the date specified in Sub-Clause 70.5.

If a price adjustment factor is applied to payments made in a currency other than the currency of the source of the index for a particular indexed input, a correction factor **Zo/Zn** will be applied to the respective component factor of **pn** for the formula of the relevant currency. **Zo** is the number of units of currency of the country of the index, equivalent to one unit of the currency of payment on the date of the base index, and **Zn** is the corresponding number of such currency units on the date of the current index.

- 70.4 Sources of Indices and Weightings** “The sources of indices shall be those listed in the Appendix to Bid, as approved by the Engineer. Indices shall be appropriate for their purpose and shall relate to the Contractor’s proposed source of supply of inputs on the basis of which his Contract Price and expected foreign currency requirements shall have been computed. As the proposed basis for price adjustment, the Contractor shall have submitted with his bid the tabulation of Weightings and Source of Indices in the Appendix to Bid, which shall be subject to approval by the Engineer.
- 70.5 Base, Current and Provisional Indices** The base cost indices or prices shall be those prevailing on the day 28 days prior to the latest date for submission of bids. Current indices or prices shall be those prevailing on the day 28 days prior to the last day of the period to which a particular Interim Payment Certificate is related. If at any time the current indices are not available, provisional indices as determined by the Engineer will be used, subject to subsequent correction of the amounts paid to the Contractor when the current indices become available.
- 70.6 Adjustment after Completion** If the Contractor fails to complete the Works within the time for completion prescribed under Clause 43, adjustment of prices thereafter until the date of completion of the Works shall be made using either the indices or prices relating to the prescribed time for completion, or the current indices or prices, whichever is more favourable to the Employer, provided that if an extension of time is granted pursuant to Clause 44, the above provision shall apply only to adjustments made after the expiry of such extension of time.
- 70.7 Weightings** The weightings for each of the factors of cost given in the Appendix to Bid shall be adjusted if, in the opinion of the Engineer, they have been rendered unreasonable, unbalanced or inapplicable as a result of varied or additional work already executed or instructed under Clause 51 or for any other reason.
- 70.8 Subsequent Legislation** If, after the date 28 days prior to the latest date for submission of bids for the Contract, there occur in the country in which the Works are being or are to be executed changes to any National or State Statute, Ordinance, Decree, or other Law or any regulation or by-law of any local or other duly constituted authority, or the introduction of any such State Statute, Ordinance, Decree, Law, regulation or by-law which causes additional or reduced cost to the Contractor, other than under the preceding sub-clauses of this clause, in the execution of the Contract, such additional or reduced cost shall, after due consultation with the Employer and the Contractor, be determined by the Engineer and shall be added to or deducted from the Contract Price and the Engineer shall notify the Contractor accordingly, with a copy to the Employer. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same shall already have been taken into account in the indexing of any inputs to the Price Adjustment Formulae in accordance with the provisions of Sub-Clauses 70.1 to 70.7.”

CURRENCY AND RATES OF EXCHANGE

72.2 Currency Proportions

Delete the words from “prevailing, as determined by the Central Bank...” to the end of the subclause and substitute with “stated by the Contractor in the standard forms, included with his Original Bid.”

Add Subclause 72.4 as follows:

72.4 Substantial Changes in Currency Requirements

The foreign and local currency portions of the Contract Price shall be amended by agreement between the Employer and the Contractor to reflect any substantial changes in the expected foreign and local currency requirements of the Contractor during the execution of the Works, provided that:

(a) The Contractor shall inform the Employer and the Engineer whenever any such substantial change occurs; or

(b) The Engineer may recommend a review of such expected requirements if in his judgement there is evidence of a change in the country of the origin of materials, Plant, or services to be provided under the Contract which should result in any substantial change of such expected requirements.

ADDITIONAL CLAUSES

73.1 Foreign Taxation

The prices bid by the Contractor shall include all taxes, duties, and other charges imposed outside Kenya on the production, manufacture, sale, and transport of the Contractor's Equipment, Plant, materials, and supplies to be used on or furnished under the Contract, and on the services performed under the Contract.

73.2 Local Taxation

The prices bid by the Contractor shall include all customs duties, import duties, business taxes, and income and other taxes that may be levied in accordance with the laws and regulations, being on the date 28 days prior to the latest date for submission of bids, in Kenya, on the Contractor's Equipment, Plant, materials, and supplies (permanent, temporary and consumables) acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in Kenya on profits made by him in respect of the Contract.

73.3 Income Tax on Staff

The Contractor's staff and labour will be liable to pay personal income taxes in Kenya in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

73.4 Duties on Contractor's Equipment

Notwithstanding the provisions of Subclause 73.2, the Contractor's Equipment, including essential spare parts therefore, imported by the Contractor for the sole purpose of executing the Contract shall be temporarily exempt from the payment of import duties and taxes upon initial importation, provided the Contractor shall post with the customs authorities at the port of entry and approved export bond or bank guarantee, valid until the time of completion of the Contract plus six months, in an amount equal to the full import duties and taxes which would be payable on the assessed imported value of such Contractor's Equipment and spare parts, and callable in the event that the Contractor's Equipment is not exported from Kenya on completion of the Contract plus six months.

A copy of the bond or bank guarantee endorsed by the customs authorities shall be provided by the Contractor to the Employer upon the importation of individual items of Contractor's Equipment and spare parts. Upon export of individual items of Contractor's Equipment or spare parts, or upon completion of the Contract, the Contractor shall prepare, for approval by the customs authorities, an assessment of the residual value of the Contractor's equipment and spare parts to be exported, based on the depreciation scale(s) and other criteria used by the customs authorities for such purposes under the provisions of the applicable law. Import duties and taxes shall be due and payable to the customs authorities by the Contractor on:

(a) The difference between the initial imported value and the residual value of the Contractor's Equipment and spare parts to be exported; and

(b) The initial imported value of that Contractor's Equipment and spare parts remaining in Kenya after completion of the Contract.

Upon payment of such dues within 28 days of being invoiced, the bond or bank guarantee shall be reduced or released accordingly; otherwise the security shall be called in the full amount remaining.

For equipment imported by the Contractor for the sole use of the Engineer and which will revert to the ownership of the Employer, import duties and taxes shall be paid upon initial importation.

73.5 Declaration against Waiver

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

73.6 Employer's Officials

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

74.1 Illegal Payments

If the Contractor, or any of his Sub-Contractors, agents or servants gives or offers to give to any person any payment, gift, gratuity or commission as an inducement or reward for doing or forbearing to do any action in relation to the Contract or any other contract with the Employer, or for showing or forbearing to show favour or disfavour to any person in relation to the Contract or to any other contract with the Employer, then the Employer may enter upon the Site and the Works and expel the Contractor and the provisions of Clause 63 hereof shall apply as if such entry and expulsion had been made pursuant to that Clause.

75.1 Termination of Contract for Employer's Convenience

The Employer shall be entitled to terminate this Contract at any time for the Employer's convenience after giving 56 days prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor:

(a) Shall proceed as provided in Subclause 65.7, and

(b) Shall be paid by the Employer as provided in Subclause 65.8.

76.1 Restriction on Eligibility

(a) Any Plant, materials, or services which will be incorporated in or required for the Works, as well as the Contractor's Equipment and other supplies, shall have their origin in any of the countries and territories eligible under the Foreign Financier's Rules for Procurement.

(b) For the purposes of this clause, 'origin' means the place where the materials and equipment were mined, grown, produced, or manufactured or from which the services are provided.

© The origin of goods and services is distinct from the nationality of the supplier.

77.1 Joint and Several Liability

If the Contractor is a joint venture of two or more persons, all such persons shall be joint and severally bound to the Employer for the fulfilment of the terms of the Contract and shall designate one of such persons to act as a leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

78.1 Details to be Confidential

The Contractor shall treat the details of the Contract as private and confidential, save insofar as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the previous consent in writing of the Employer or the Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract the same shall be referred to the Employer whose determination shall be final.

78.2 Drawings and Photographs of the Works

The Contractor shall not disclose details of drawings furnished to him and works on which he is engaged without the prior approval of the Engineer in writing. No photograph of the work or any part thereof or equipment employed thereon shall be taken or permitted by the Contractor to be taken by any of his employees or any employees of his Subcontractors without the prior approval of the Engineer in writing and no such photographs shall be published or otherwise circulated without the approval of the Engineer in writing.

79.1 Official Visitors

The Contractor shall at all times when authorized by the Engineer give free and undisputed access of all facilities to any authorized employee of the Kenya Government or other authorized person wishing to view or inspect any part of the Site or Works or the materials therein.

80.1 Substantial Completion of the Works

The Contractor shall note that the Engineer reserves the right to certify the Works to be “substantially completed” in accordance with the provisions of Clause 48 of the General Conditions of Contract, unless the following portions of the Works are completed according to the Specifications:

- (a) Works up to and including the bituminous wearing courses,
- (b) All drains and drainage structures including bridges,
- (c) Construction of the shoulders,
- (d) Finishing of medians and slopes of cuts and fills and
- (e) Reinstatement and environmental treatment of quarries and borrow pits.

81.1 Monthly Site Meetings

The Contractor or his authorised representative shall attend monthly meetings on the site with representatives of the Employer and the Engineer at dates and times to be determined by the Engineer. Such meetings will be held for evaluating the progress of the Contract and for discussion of matters pertaining to the Contract which any of the parties represented may wish to raise. Such meetings are not intended for discussing matters concerning the normal day-to-day running of the Contract.

The Contractor shall prepare and submit to the Resident Engineer one week before the meeting a monthly report in the format approved by the Engineer giving all the information and details regarding its accomplishment against the prevailing approved programme.

81.2 Minutes of Site Meetings

Agreements recorded in the Minutes of the Site Meetings are binding to all parties, if objections to the minutes have not been given in due time.

The Minutes of the Site Meetings shall be issued within 7 days and shall be numbered consecutively. Minutes shall be deemed to have been received by the Contractor unless the Contractor gives notice at the following meeting that the Minutes were not received.

Any objections to the Minutes of the Site Meetings shall at the latest be raised at the succeeding Site Meeting or presented to the Engineer in writing not later than 2 weeks after the meeting. If the Contractor at this time has not received the Minutes of the Site Meeting, the objection must be given in writing to the Engineer not later than 2 working days after the subsequent receipt of the said Minutes.

82.1 Legal Provisions

The Contractor shall keep himself fully conversant with the latest enactment's, provisions and regulations of all legislative and statutory bodies, and, in all respects and at all times, shall comply with such enactment's, provisions and regulations in regard to executing the Contract.

83.1 Noise and Disturbance

All works shall be carried out without unreasonable noise and disturbance. The Contractor shall indemnify and keep indemnified the Employer from and against any liability for damages on account of noise or other disturbances created while or in carrying out the work and from and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in regard to or in relation to such liability.

83.2 Pollution

Subject, and without prejudice, to any other provision of the Contract and the law of the land and its obligations as applicable, the Contractor shall take all reasonable precautions in connection with:

- (a) The rivers, streams, waterways, drains, water-course, lakes, reservoirs and the like to prevent:
 - (i) Silting
 - (ii) Erosion of their beds and banks, and
 - (iii) Pollution of the water so as to affect adversely the quality or appearance thereof or cause injury or death to animal and plant life.
- (b) The underground water resources including percolating water to prevent:
 - (i) Any interference with the supply to or obstruction from such sources, and
 - (ii) Pollution of the water which may adversely affect the quality thereof.

The Contractor shall further comply with any and all laws, rules and regulations of governmental agencies having jurisdiction which now exist or which may be promulgated during the course of the works contracted for herein, relating to the control, regulation and prevention of pollution. Not by way of limitation of the foregoing, but in furthermore thereof, the Contractor shall use the highest prevailing and approved standards of care and diligence to prevent and to take care of all waste, oil, water and other waste materials that may accumulate and be caused by the Contractor's operations and performance of this Contract so as to prevent pollution of any nature or kind resulting from the Works performed under this Contract.

ANNEX A

DISPUTE REVIEW REGULATIONS AND PROCEDURES

ANNEX A: ~ DISPUTE REVIEW REGULATIONS AND PROCEDURES

Disputes Settlement Procedures

(See Clause 67 of the Conditions of Particular Application)

1. Except for providing the services required hereunder, the DRE shall not give any advice to either party or to the Engineer concerning conduct of the Works. The Disputes Review Expert (DRE) shall:
 - (a) Have no financial interest in any party to the Contract, or the Engineer, or a financial interest in the Contract, except for payment for his services.
 - (b) Have had no previous employment by, or financial ties to, any party to the Contract, or the Engineer, except for fee-based consulting services on other projects, all of which must be disclosed in writing to both parties prior to selection for the position of DRE.
 - (c) Have disclosed in writing to both parties prior to selection as DRE any and all recent or close professional or personal relationships with any director, officer, or employee of any party to the Contract, or the Engineer, and any and all prior involvement in the project to which the Contract relates.
 - (d) Not, while serving as DRE, be employed whether as a consultant or otherwise by either party to the Contract, or the Engineer, except as a DRE, without the prior consent of the parties.
 - (e) Not, while serving as DRE, engage in discussion or make any agreement with any party to the Contract, or with the Engineer, regarding employment whether as a consultant or otherwise either after the Contract is completed or after service as DRE is completed.
 - (f) Be and remain impartial and independent of the parties and shall disclose in writing to the Employer, the Contractor, and the Engineer, any fact or circumstance that might be such as to cause either the Employer or the Contractor to question the continued existence of the impartiality and independence required of a DRE; and
 - (g) Be fluent in the language of the Contract; English
2. Except for his participation in DRE's activities as provided in the Contract and in this Agreement, none of the Employer, the Contractor, or the Engineer shall solicit advice or consultation from the DRE on matters dealing with the conduct of the Works.
3. The Contractor shall:
 - (a) Furnish to the DRE a copy of all documents that the latter may request. These shall include Contract documents, progress reports, variation orders, and other documents pertinent to the performance of the Contract.
 - (b) In cooperation with the Employer, coordinate the Site visits of the DRE, including conference facilities, and secretarial and copying services.
4. The DRE shall begin his activities following the signing of a DRE's Declaration of Acceptance, and he shall terminate these activities as set forth below:
 - (a) The DRE shall terminate his regular activities when either:
 - (i) The Defects Liability Period referred to in Subclause 49.1 (or, if there are more than one, the Defects Liability Period expiring last) has expired, or
 - (ii) The Employer has expelled the Contractor from the Site pursuant to Subclause 63.1, and when, in either case, the DRE has communicated to the parties and the Engineer his Recommendations on all disputes previously referred to him.
 - (b) Once the DRE has terminated his regular activities as provided by the previous paragraph, the DRE shall remain available to process any dispute referred to him by either party. In case of such a referral, the DRE shall receive payments as provided in Paragraphs 7 (a) (ii), (iii) and (iv) below.
5. The DRE shall not assign or subcontract any of his work under these Rules and Procedures. However, the DRE may in his/her discretion decide to seek independent expert advice on a particular specialized issue to assist in reaching a Recommendation, and the cost of obtaining any

such expert opinion(s) shall be shared equally by the Employer and the Contractor in accordance with the procedure specified in paragraph 7 (d) below.

6. The DRE is an independent contractor and not an employee or agent of either the Employer or the Contractor.
7. Payments to the DRE for his services shall be governed by the following provisions:
 - (a) The DRE will receive payments as follows:
 - (i) A retainer fee per calendar month equivalent to three times the daily fee established from time to time for arbitrators under the Administrative and Financial Regulations of the International Centre for Settlement of Investment Disputes (the ICSID Arbitrator's Daily Fee), or such other retainer as the Employer and Contractor may agree in writing. This retainer shall be considered as payment in full for:
 - (i.1) Being available, on seven days' notice, for Site visits requested by either party.
 - (i.2) Being conversant with all project developments and maintaining relevant files.
 - (i.3) All office and overhead expenses such as secretarial services, photocopying, and office supplies (but not including telephone calls, faxes, and telexes) incurred in connection with the duties as a DRE.
 - (i.4) All services performed hereunder except those performed during the days referred to in paragraph (ii) below.
 - (ii) A daily fee equivalent to the ICSID Arbitrator's Daily Fee or such other daily fee as the Employer and Contractor may agree in writing. This daily fee shall only be payable in respect of the following days and shall be considered as payment in full for:
 - (ii.1) Each day up to a maximum of two days of travel time in each direction for the journey between the DRE's home and the Site.
 - (ii.2) Each day on Site.
 - (iii) Expenses in addition to the above shall be all reasonable and necessary travel expenses (including less than first-class air fare, subsistence, and other direct travel expenses) as well as the cost of telephone calls, faxes, and telexes incurred in connection with the duties as DRE shall be reimbursed against invoices. Receipts for all expenses in excess of US\$ 25.00 (U.S. Dollars Twenty Five) shall be provided.
 - (iv) Reimbursement of any taxes that may be levied in Kenya on payments made to the DRE (other than a national or permanent resident of Kenya) pursuant to Paragraph 8.
 - (b) Escalation. The retainer and fees shall remain fixed for the period of the DRE's term.
 - (c) Phasing out of monthly retainer fee. Beginning with the next month after the Taking-Over Certificate referred to in Clause 48 (or, if there are more than one, the one issued last) has been issued, the DRE shall receive only one-third of the monthly retainer fee. Beginning with the next month after the Board has terminated its regular activities pursuant to paragraph 4 (a) above, the DRE shall no longer receive any monthly retainer fee.
 - (d) Payments to the DRE shall be shared equally by the Employer and the Contractor. The Contractor shall pay the DRE's invoices within 30 calendar days after receipt of such invoices and shall invoice the Employer (through the monthly statements to be submitted in accordance with Subclause 60.2 of the Conditions of Contract) for one-half of the amounts of such invoices. The Employer shall pay such Contractor's invoices within the time period specified in the Construction Contract for other payments to the Contractor by the Employer.
 - (e) Failure of either the Employer or the Contractor to make payment in accordance with this Agreement shall constitute an event of default under the Contract, entitling the non-defaulting party to take the measures set forth, respectively, under Clause 63 or Clause 69.
 - (f) Notwithstanding such event of default, and without waiver of rights therefrom, in the event that either the Employer or the Contractor fails to make payment in accordance with these Rules and Procedures, the other party may pay whatever amount may be required to finance the activities of the DRE. The party making such payments, in addition to all other rights arising from such default, shall be

entitled to reimbursement of all sums paid in excess of one-half of the amount required to finance the activities of the DRE plus all costs of obtaining such sums.

8. DRE Site Visits:

(a) The DRE shall visit the Site and meet with representatives of the Employer and the Contractor and the Engineer at regular intervals, at times of critical construction events, at the written request of either party, and in any case not less than three times in any period of 12 months. The timing of Site visits shall be as agreed among the Employer, the Contractor, and the DRE, but failing agreement shall be fixed by the DRE.

(b) Site visits shall include an informal discussion of the status of the construction of the Works, an inspection of the Works, and the review of any Requests for Recommendation made in accordance with Paragraph 10 below. Site visits shall be attended by personnel from the Employer, the Contractor, and the Engineer.

(c) At the conclusion of each Site visit, the DRE shall prepare a report covering his activities during the visit and shall send copies to the parties and to the Engineer.

9. Procedure for Dispute Referral to the DRE:

(a) If either party objects to any action or inaction of the other party or the Engineer, the objecting party may file a written Notice of Dispute to the other party with a copy to the Engineer stating that it is given pursuant to Clause 67 and stating clearly and in detail the basis of the dispute.

(b) The party receiving the Notice of Dispute will consider it and respond in writing within 14 days after receipt.

(c) This response shall be final and conclusive on the subject, unless a written appeal to the response is filed with the responding party within seven days after receiving the response. Both parties are encouraged to pursue the matter further to attempt to amicably settle the dispute.

(d) When it appears that the dispute cannot be resolved without the assistance of the DRE, or if the party receiving the Notice of Dispute fails to provide a written response within 14 days after receipt of such Notice, either party may refer the dispute to the DRE by written Request for Recommendation to the DRE. The Request shall be addressed to the DRE, with copies to the other party and the Engineer, and it shall state that it is made pursuant to Clause 67.

(e) The Request for Recommendation shall state clearly and in full detail the specific issues of the dispute to be considered by the DRE.

(f) When a dispute is referred to the DRE, and the DRE is satisfied that the dispute requires his assistance, the DRE shall decide when to conduct a hearing on the dispute. The DRE may request that written documentation and arguments from both parties be submitted to him before the hearing begins. The parties shall submit insofar as possible agreed statements of the relevant facts.

(g) During the hearing, the Contractor, the Employer and the Engineer shall each have ample opportunity to be heard and to offer evidence. The DRE's Recommendations for resolution of the dispute will be given to the Employer, the Contractor, and the Engineer as soon as possible and in any event not less than 56 days after receipt by the DRE of the written Request for Recommendation.

10. Conduct of Hearings:

(a) Normally hearings will be conducted at the Site, but any location that would be more convenient and still provide all required facilities and access to necessary documentation may be utilized by the DRE.

(b) The Employer, the Engineer, and the Contractor shall be given the opportunity to have representatives at all hearings.

(c) During the hearings, the DRE shall not express any opinion concerning the merit of the respective arguments of the parties.

(d) After the hearings are concluded, the DRE shall formulate his Recommendations and shall submit them in writing, together with an explanation of his reasoning, to both parties and to the Engineer. The Recommendations shall be based on the pertinent Contract provisions, applicable laws and regulations, and the facts and circumstances involved in the dispute.

11. In all procedural matters, including the furnishing of written documents and arguments relating to disputes, Site visits and conduct of hearings, the DRE shall have full and final
12. After having been selected, the DRE shall sign two copies of the following declaration and make one copy available each to the Employer and to the Contractor:

Disputes Review Expert's Declaration of Acceptance

WHEREAS

(a) A Construction Contract (the Contract) for the **CONSTRUCTION OF KENYATTA AVENUE-NGONG ROAD INTERCHANGE, HAILE SELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI COUNTY, TENDER No.: KURA/DEV/HQ/311/2019-2020** Project has been signed on[fill in date] between the Director General, Kenya Urban Roads Authority (the Employer) and[name of Contractor] (the Contractor);

(b) Clause 67 of the Conditions of Particular Application of the Construction Contract provides for the selection of a Disputes Review Expert (DRE);

(c) The undersigned has been selected to serve as the DRE;

NOW THEREFORE, the undersigned DRE hereby declares as follows:

1. I accept the selection as a DRE and agree to serve in this capacity and to be bound by the provisions of Clause 67 of the Conditions of Contract and the Disputes Review Expert's Rules and Procedures attached to these Conditions of Contract.

2. With respect to paragraph 1 of said Disputes Review Expert's Rules and Procedures, I declare that I have:

(a) No financial interest of the kind referred to in Subparagraph (a);

(b) Had no previous employment nor financial ties of the kind referred to in Subparagraph (b); and

(c) Made to both parties any disclosures that may be required by Subparagraphs (b) and (c).

DISPUTES REVIEW EXPERT

Signature:

Name:(print name of DRE)

Date:

SECTION 7: STANDARD SPECIFICATIONS

SECTION 7: STANDARD SPECIFICATIONS

Standard Specifications refers to the Standard Specifications for Road and Bridge Construction,
1986 Edition

SECTION 8: SPECIAL SPECIFICATIONS

SECTION 8: SPECIAL SPECIFICATIONS

TABLE OF CONTENTS

Clause and Description	Page
100 GENERAL	127
101 LOCATION AND EXTENT OF SITE	127
102 EXTENT OF CONTRACT	127
102.1 PROJECTS COMPONENTS	127
102.2 SCOPE OF WORK	128
103 DRAWINGS	128
104 PROGRAMME FOR EXECUTION OF THE WORKS	128
105 ORDER OF EXECUTION OF THE WORKS	129
107 CERTIFICATE OF COMPLETION	129
108 METHOD OF CONSTRUCTION	129
109 NOTICE OF OPERATIONS	129
109.2 NOTIFICATION TERMS	129
117 HEALTH, SAFETY AND ACCIDENTS	130
119 USE OF EXPLOSIVES	130
120 PROTECTIONS OF EXISTING WORKS AND SERVICES	130
121 DIVERSION OF SERVICES	131
123 LIAISON WITH GOVERNMENT OFFICIALS AND POLICE	131
124 PROVISION OF LAND	131
125 WATER SUPPLY	132
127 INFORMATION FROM EXPLORATORY BORING AND TEST PITS	132
131 SIGNBOARDS	132
132 ENGINEER'S ACCOMMODATION, OFFICE, LABORATORY, EQUIPMENT & FURNITURE	132
132.1 HOUSING ACCOMMODATION FOR THE ENGINEER AND HIS STAFF	132
132.2 ENGINEER'S SENIOR STAFF HOUSING – HOUSE TYPES I, II AND III	134
132.3 ENGINEER'S JUNIOR STAFF HOUSING-HOUSING TYPES IV AND V	134
132.4 ENGINEER'S OFFICE	134
132.5 ENGINEER'S MAIN LABORATORY.....	135
132.7 ENGINEER'S OFFICE AND LABORATORY FURNITURE	136
132.8 ENGINEER'S LABORATORY AND SURVEY EQUIPMENT	136
132.9 WIRELESS COMMUNICATION FOR THE ENGINEER.....	140
133 TIME FOR ERECTION OF THE ENGINEER'S STAFF HOUSES, OFFICES/LABORATORIES	140
137 ATTENDANCE UPON THE ENGINEER AND HIS STAFF	140
137.1 STAFF EMPLOYED AND PAID BY THE CONTRACTOR FOR ATTENDANCE UPON THE ENGINEER	140
137.2 STAFF AND HOUSING TO BE PROVIDED BY THE CONTRACTOR FOR ATTENDANCE UPON THE ENGINEER	
138 PROVISION OF VEHICLES.....	141
139 MISCELLANEOUS ACCOUNTS	141
140 PAYMENT OF OVERTIME FOR ENGINEER'S JUNIOR STAFF	142
141 MEASUREMENT AND PAYMENT	142
142 LIQUIDATED DAMAGES	143
143 PROTECTION OF THE ENVIRONMENT	144
144 OFF ROAD ENVIRONMENTAL MEASURES	144
145 STAFF TRAINING	144
200 MATERIALS AND TESTING OF MATERIALS	145
205 SOILS AND GRAVELS	145
211 BITUMINOUS BINDERS.....	145
300 SETTING OUT AND TOLERANCES	146
301 SETTING OUT	146

400	SITE CLEARANCE AND TOP SOIL STRIPPING.....	147
401	SITE CLEARANCE	147
500	EARTHWORKS.....	147
502	GENERAL	147
502.2	DEFINITIONS FOR EARTHWORKS	147
504	PREPARATION PRIOR TO FORMING EMBANKMENTS	147
504.2	BENCHING	147
504.3	GROUND COMPACTION.....	147
505	CONSTRUCTION OF EMBANKMENTS	148
507.2	ROCKFILL IN CARRIAGEWAY, EMBANKMENT AND BEHIND STRUCTURES.....	148
508	COMPACTION OF EARTHWORKS	149
509	MASS HAUL DIAGRAM	150
511	BORROW PITs.....	150
514	TOP SOILING AND GRASSING.....	150
514.2	HYDRO-SEEDING	150
514.3	APPLICATION OF CHEMICAL FERTILIZERS	150
515	SIDE DRAINS	151
517	MEASUREMENT AND PAYMENT.....	151
600	QUARRIES, BORROW PITs, STOCKPILE AND SPOIL AREAS	155
601	GENERAL	155
602	DEFINITIONS.....	155
700	EXCAVATION AND FILLING FOR STRUCTURES.....	156
703	EXCAVATION OF FOUNDATIONS FOR STRUCTURES.....	156
703.1	PREPARATION OF FOUNDATION AND APPROVAL	156
703A	EROSION PROTECTION WORKS AT UPSTREAM AND DOWNSTREAM OF CULVERTS/BRIDGES	156
703A.1	SCOPE	156
703A.2	MATERIALS	156
703A.3	CONSTRUCTION OPERATIONS.....	157
707	BACKFILLING OF EXCAVATIONS AND FILLING FOR STRUCTURES	157
708	PROTECTION OF STRUCTURES.....	157
709	EXCAVATIONS FOR RIVER TRAINING AND NEW WATERCOURSES	157
710	STONE PITCHING	157
800	CULVERT AND DRAINAGE WORKS	159
804	EXCAVATION FOR CULVERTS AND DRAINAGE WORKS.....	159
805	EXCAVATION IN HARD MATERIAL.....	159
809	BEDDING AND LAYING OF PIPE CULVERTS	159
810	JOINTING CONCRETE PIPES	159
812	BACKFILL	159
816	MINOR DRAINAGE STRUCTURES	160
MITRE DRAINS, CUT-OFF DRAINS, CATCH WATER/DRAINS, OUTFALL DRAINS AND EARTH DAMS .		162
817.2	CLEANING EXISTING DRAINS	160
817.3	CLEANING OF HYDRAULIC STRUCTURES	160
817.4	REMOVAL OF EXISTING PIPES, INLET AND OUTLET STRUCTURES	160
817.5	EXTENSION OF EXISTING PIPES	160
817.6	CHUTE DRAIN FOR HIGH EMBANKMENT SECTIONS	163
817.7	STONE MASONRY AND CONCRETE PAVING	163
819.1	REPAIR OF DRAINAGE SPOUTS.....	163
820	MEASUREMENT AND PAYMENTS FOR ADDITIONAL ITEMS.....	165
821	CEMENT MORTARED STONE MASONRY WALLS	165
822	SUBSOIL FILTER DRAINS	165
823	GULLEY POTS AND CHAMBERS	166
824	PEDESTRIAN CROSSINGS	166
825	MEASUREMENT AND PAYMENT FOR FURTHER ADDITIONAL ITEMS.....	166
900	PASSAGE OF TRAFFIC	167

903	MAINTENANCE OF EXISTING ROAD	167
903.1	MAINTENANCE OF RIGHT OF WAY	167
904	CONSTRUCTION OF DEVIATIONS	167
906	PASSAGE OF TRAFFIC THROUGH THE WORKS	167
912	MEASUREMENT AND PAYMENT	168
1200	NATURAL MATERIAL FOR SUB-BASE AND BASE.....	170
1201	HANDPACKING	170
1300	GRADED CRUSHED STONE SUB-BASE AND BASE.....	171
1303	MATERIAL REQUIREMENTS171	171
1306	LAYING AND COMPACTING GRADED CRUSHED STONE SUB-BASE AND BASE171T.....	171
1311	IN SITU REPROCESSING OF GRADED CRUSHED STONE.....	171
1400	CEMENT TREATED MATERIALS.....	172
1403	CEMENT TREATMENT.....172	172
1500	BITUMINOUS SURFACE TREATMENTS AND SURFACE DRESSING.....	175
1502B	MATERIALS FOR PRIME COAT AND TACK COAT.....	175
1504B	SPRAYING OF PRIME COAT AND TACK COAT.....	175
1502C	MATERIALS FOR SURFACE DRESSING	175
1503C	RATE OF APPLICATION OF BINDER AND CHIPPINGS.....	175
1505C	PRE-COATED CHIPPINGS.....	175
1508C	APPLICATION OF SURFACE DRESSING.....	175
1509C	AFTERCARE AND CONTROL OF TRAFFIC.....	176
1511C	MEASUREMENT AND PAYMENT.....	176
1600	BITUMINOUS MIX BASES, BINDER COURSES AND WEARING COURSES.....	173
1600A	GENERAL	177
1603A	CONSTRUCTION PLANT	177
1606A	SITE TRIALS	177
1607A	MIXING OF AGGREGATES AND BITUMEN.....	177
1608A	TRANSPORTING THE MIXTURE	177
1609A	LAYING THE MIXTURE	178
1610A	COMPACTION	178
1611A	FINISHING JOINTS AND EDGES	178
1614A	TOLERANCES	179
1600B	ASPHALT CONCRETE FOR SURFACING.....	179
1602B	MATERIALS FOR ASPHALT CONCRETE	179
1603B	GRADING REQUIREMENTS	180
1604B	REQUIREMENTS FOR ASPHALT CONCRETE	181
1605B	MIXING AND LAYING ASPHALT CONCRETE	182
1606B	COMPACTION	182
1608B	SEALING BITUMINOUS SURFACE	182
1700	CONCRETE WORKS	183
1703	MATERIALS FOR CONCRETE	183
1703A	LEVELLING OF CONCRETE FOR BOTTOM SLAB INCLUDING FORMWORK COST	184
1703B	REINFORCEMENT BARS FOR WALLS AND SLABS	185
1703C	FORMWORK FOR VERTICAL WALLS AND SLABS	186
1703D	CONCRETE WORKS TO VERTICAL WALLS AND SLABS	187
1704	CONCRETE WORKS OF THE BEAMS AND DECK SLABS	190
1704.1	DESCRIPTION	190
1704.2	CONCRETE MATERIALS	190
1704.2.1	CONCRETE CLASS 30/20	191
1704.2.2	PROPORTIONING CONCRETE	191
1704.2.3	CONCRETING WORK	191
1704.3	CONCRETE CLASS 35/20	192

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

1704.4	MEASUREMENT AND PAYMENT	192
1705	MIXING CONCRETE	192
1740.2	INTERLOCKING CONCRETE PAVING BLOCK	193
1741	MEASUREMENT AND PAYMENT	193
1742	PLANT AND EQUIPMENT FOR AGGREGATES AND CONCRETE	193
1742.1	AGGREGATE PROCESSING PLANT	193
1742.2	CONCRETE PLANT	193
2000	ROAD FURNITURE	193
2001	ROAD RESERVE BOUNDARY POSTS	193
2004	PERMANENT ROAD SIGNS	193
2004.1	POSTS AND ROAD SIGNS.....	193
2004.2	COLOUR AND CONFIGURATION	193
2004.3	MATERIAL	193
2004.4	STRUCTURAL DETAILS	194
2004.5	RETRO-REFLECTIVE SHEETING	194
2004.6	MESSAGES AND BORDERS	195
2004.7	COLOUR	195
2004.8	ADHESIVES	195
2004.9	FABRICATION	196
2004.10	WARRANTY AND DURABILITY	196
2004.11	INSTALLATION.....	197
2004.12	FOUNDATION FOR SUPPORT.....	197
2004.13	MEASUREMENT FOR PAYMENT	197
2004.14	RATE	197
2005	ROAD MARKING	197
2006	GUARDRAILS	197
2006.1	REMOVING, RENOVATING AND RE-ERECTING GUARDRAILS	197
2006.2	PEDESTRIAN RAILING	198
2007	KERBS	198
2007.2	EXISTING KERBS	198
2007.3	REPAIR OF DAMAGED RAILING AND KERBS	198
2010	TREES	199
2010.1	PLANTATION OF TREES AND HEDGES	199
2012	SERVICE DUCTS BENEATH ROADS	201
2013	DUCT MARKERS	202
2014	ROAD BUMP AND RUMBLE STRIPS	202
2015	BOLLARDS	202
2016	RETRO-REFLECTIVE ROAD STUDS	202
2017	MEASUREMENT AND PAYMENT	202
2200	DAY WORKS	205
2201	SCOPE	205
2202	STANDARDS	205
2203	MEASUREMENT AND PAYMENTS	205
2300	ENVIRONMENTAL MANAGEMENT PLAN	205
2400	TRAFFIC MANAGEMENT AND DIVERSION	217
2401	GENERAL.....	217
2402	TRAFFIC ROTARY	217
2403	ROAD DELINEATES	217
2404	SIGNS, LIGHTS, BARRIERS AND OTHER TRAFFIC CONTROL DEVICES	217
2405	BARRICADES	217
2406	PASSAGE THROUGH WORKS	217
2406.1	ONE-WAY TRAFFIC OPERATION	217
2406.2	TWO WAY TRAFFIC OPERATION	217
2406.3	TRAFFIC CONTROL DEVICES	217
2500	HIV/AIDS, GENDER, SOCIAL ISSUES AND LOCAL PARTICIPATION	218
2501	SCOPE	218
2502	INTERPRETATION AND DOCUMENTATION	218

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

2503	HIV/AIDS AWARENESS CAMPAIGN	218
2504	AIDS PREVENTION CAMPAIGN	218
2505	HIV/AIDS TRAINING	218
2505.1	OBJECTIVE	218
2505.2	SCOPE OF ACTIVITIES	218
2505.3	COLLABORATION	218
2505.4	CONTRACTOR'S RESPONSIBILITIES	218
2505.5	INPUTS.....	218
		21
2505.6	REPORTING	8
		21
2506	TIMING	8
		21
2507	MEASUREMENT AND PAYMENT	8
2600	HIV/AIDS, GENDER, SOCIAL ISSUES AND LOCAL PARTICIPATION	221
2601	SCOPE.....	221
2602	INTERPRETATION AND DOCUMENTATION.....	221
2603	HIV/AIDS AWARENESS CAMPAIGN.....	221
2604	AIDS PREVENTION CAMPAIGN.....	221
2605	HIV/AIDS TRAINING.....	221
2605.1	OBJECTIVE.....	221
2605.2	SCOPE OF ACTIVITIES.....	221
2605.3	COLLABORATION.....	222
2605.4	CONTRACTOR'S RESPONSIBILITIES	223
2605.5	INPUTS.....	223
2605.6	REPORTING.....	ERROR! BOOKMARK NOT DEFINED.
2606	TIMING	ERROR! BOOKMARK NOT DEFINED.
2607	MEASUREMENT AND PAYMENT.....	ERROR! BOOKMARK NOT DEFINED.

100 GENERAL

Special Specification is supplementary to the Standard Specification and the two must be read in conjunction. In any case where there appears to be conflict between the two then the Special Specifications will take precedence.

In the absence of any definite provisions on any particular issue in the aforesaid Specifications, reference may be made to the latest codes and specifications of Design Manual for Roads and Bridges of the Ministry of Transport and communication of the Republic of Kenya, Kenya Bureau of Standards (KeBS), BS, ASTM, AASHTO and in that order. Where even these are silent, the construction and completion of the works shall conform to sound engineering practice as approved by the Engineer and in case of any dispute arising out of the interpretation of the above, the decision of the Engineer shall be final and binding on the Contractor.

Where reference is made in the Contract to specific standards codes to be met by the materials, plant, and other supplies to be furnished, and work performed or tested, the provisions of the latest current edition or revision of the relevant standards as on the date of the bid and codes/design manual in effect shall apply, unless otherwise expressly stated in the contract. Where such standards and codes/design manual are national, or relate to a particular country or region, other internationally recognised standards which ensure a substantially equal or higher performance than the standards and codes/design manual specified will be accepted subject to the Engineer's prior review and written approval. The difference between the standards specified and the proposed alternative standards must be fully described in writing by the Contractor and submitted to the Engineer at least 28 days prior to the date when the Contractor desires the Engineer's approval. In the event that the Engineer determines that such proposed deviations do not ensure substantially equal performance, the Contractor shall comply with the standards specified in the documents.

101 Location and Extent of Site

The main project works is approximately 7km long dual carriageway and adjoin road network with intermittent service roads/slip roads and construction of 2 No. overpasses situated in Upper Hill Region in Nairobi County.

It consists of Improvement works of Part of State House Road, dualling of Nyerere Road, Ngong road, and part of Haile Selassie Road and Construction of 2 No. Overpasses one along valley- Kenytaa Avenue being approximately 0.7km .

Drawings and all relevant details pertaining to the associated works shall be issued during construction of the main works; however, the quantities for these works are incorporated in the Bills of Quantities.

The site of the works shall be within the road reserve and any other places as may be designated in the Construction Contract. The main project works involve the removal of the existing bituminous lanes and/or new construction of additional bituminous lanes in order to upgrade the existing 2 lane roads to dual carriageways and Construction of 2 No. Overpasses as shown in the Book of Drawings.

102 Extent of Contract

The main Project Roads under this Contract are 7 km long dual carriageway and Construction of 2 No. Overpass and other adjoining roads. The works consists of improvement of selected Link roads to dual carriageways, construction of footpaths and drainage works and Construction of 2 No. Overpasses, one being a viaduct starting from near integrity centre and ending after Serena as indicted in the drawings.

The improvement works consists of the removal of the existing 2 lane bituminous road and widening of the same to a 2 lane 2-way carriageway with a median separator, cycle tracks, footpaths, drain and street lighting.

Bituminous construction works also include construction of service roads, slip roads and acceleration and deceleration lanes at specific stretches and median breaks. Concrete works include rehabilitation of existing cross drainage works and construction of new drainage structures.

102.1 Projects Components

The works proposed in this Contract include but not limited to the following;

- 2 lane 2-way 7.0m wide carriageway at-grade road with raised central median
- 2.0 m wide footpaths/cycle track on each side of the road
- 1.5 m wide open drain with Invert Block Drain and side slabs.
- 1 No. Viaduct along Valley road from integrity Center to Kenyatta Avenue terminating after Serena.

- I No Overpass starting on upper hill (Milimani court corridor) over Haile salasse to join midian of halliesallse at
- Road furniture and markings
- Bus bays
- Utility relocation
- Safety provisions and protection works
- Street Lighting
- Landscaping
- Protection works

102.2 Scope of Work

The scope of the work shall include but not limited to the following:

- Facilitation of the supervision staff
- Relocation of utilities as necessary
- Site clearance
- Earthworks to Formation Level
- Regular maintenance of passage of traffic during construction including diversion works as necessary to meet regulatory requirements.
- Construction of Overpasses (2 No.) on Valley - Kenyatta Avenue road and Haile Sellasie Avenue/Upperhill road Junction
- Construction of the pavement structure along the existing alignment on sections of Valley road, Kenyatta avnnue, ngong road , state house road and Nyerere road as follows:
 - ✓ Preparation of the original ground surface to receive the earthworks
 - ✓ Preparation of the sub-grade to receive the pavement layers with benching to widen the roads.
 - ✓ Milling / Scarification of the existing bituminous surfacing and removal to spoil or reuse, as instructed.
 - ✓ Scarification of 150 mm of existing pavement, mixing the gravel/GCS with suitable material and spreading it as top sub-grade up to the benched area.
 - ✓ Provision and laying of 225mm cement improved GCS as instructed for sub-base throughout the length of the road.
 - ✓ Placing of 125mm Dense Bitumen Macadam (DBM), (O/30) binder course for the whole length of the roads.
 - ✓ Placing of 50mm AC type I, (O/20) wearing course for the whole length of the roads.
 - ✓ Placing of 35 mm AC wearing course on the walkways cycle tracks and road sections as instructed
 - ✓ Widening of the existing carriageway to 2x2 lane carriageway with 2.0m width footpaths on either side.
 - ✓ Application of Asphalt Concrete to bumps, bus bays, junctions, accesses as directed by the Engineer.
 - ✓ Construction of 2.0 m footpaths on either side of the carriageway.
- Drainage and Protection works shall be as follows:
 - ✓ Remove existing inadequate and defective cross and access culverts, inlets and outlet structures and replace as directed by the Engineer.
 - ✓ Construction of pipe culverts, headwalls, wing walls and aprons to culverts.
 - ✓ Construction of side and mitre drains to the whole road including improvement of other drainage and soil erosion protection works. The side ditch shall be trapezoidal with its invert level being at least 0.6m below the road formation level.
 - ✓ Carry out protection works (scour checks, stone pitching) as directed by the Engineer.
- Carry out any miscellaneous works that is not included above but may be deemed necessary by the Engineer for the execution and completion of the works.
- Road Furniture
 - ✓ Provide and erect all the road signs and markings as directed by the Engineer.
 - ✓ Provide, lay and joint raised kerbs, precast concrete channels and invert block drains as Directed by the Engineer.
 - ✓ Plant selected grass on slopes of embankments and cuttings.

- ✓ Provide and fix flex beam guardrail to bridge approaches and vehicle/pedestrian guardrail at bridges.
- ✓ Provide and fix in position approved drain pipes on bridge deck, abutments, wing walls and Mechanically Stabilised Earth (MSE) Wall to retain fill material adjoining to overpasses.
- ✓
- Bridge Works
 - ✓ Construction of 2 No. Overpasses.
- Concrete Works
 - ✓ Provide and place concrete class 15/20 blinding to foundations of structures or as instructed
 - ✓ Provide and place concrete class 35/20 to foundations of structures or as instructed
 - ✓ Provide and place concrete Class 35/20 to substructure/superstructure on bridges, bridge wing walls, abutments and slab as instructed
 - ✓
 - ✓ Provide and place concrete Class 35/20 to superstructure on bridges, bridge wing walls, abutments and slab.
 - ✓ Provide and place to detail reinforcements to concrete structures as per design
- Installation of Street lighting Scheme for entire length of the roads.
- Other works ancillary to the main works shall be as follows: -
 - ✓ Construction of guardrail barriers as directed by the Engineer
 - ✓ Improvement of major junctions as directed by the Engineer

Any other activity not listed above but may be deemed necessary and instructed by the Engineer.

Maintenance of the works during the construction period. The defects liability period shall be 24 months.

103 Drawings

This clause shall be read as under:

The drawings provided for bidding purpose shall be as contained in the Bid documents. The Engineer may from time to time, in order to enable satisfactory completion of works, revise, amend, or supersede any of these drawings. It shall be the Contractor's responsibility to construct the works in conformity with the latest revision and amendment to the drawings provided that the Engineer has given the Contractor in writing such reasonable prior notices of intention to revise, amend, or supersede as the nature of the intended change required and relevant drawings have been issued to the Contractor.

104 Programme for Execution of the Works

The Contractor shall provide the works programme, required under Clause 14.1 of the Conditions of Contract, within 28 days of receipt of the Engineer's Order to commence work.

The programme shall be coordinated with climatic and other conditions to provide for the completion of the works in the order and by the time specified.

The Contractor shall carry out the Works of the Contract in accordance with the programme agreed with the Engineer, but he shall in no manner be relieved by the Engineer's approval of the programme, of his obligation to complete the works in the prescribed order and by the prescribed completion date and he shall from time to time review his progress and make such amendments to his rate of execution of the works as may be necessary to fulfil his obligations.

The Contractor shall allow in his programme for construction of trial sections and carrying out tests upon them as directed by the Engineer in accordance with the provisions of Clause 129 of the Standard Specification. The time for completion of the Contract shall not be extended because of the time taken to carry out tests and evaluate trial sections.

105 Order of Execution of the Works

In addition to Clause 105 of the Standard Specification, the Contractor shall carry out the Works such that a continuous and consecutive output of fully completed work is achieved. Generally, the Contractor shall commence the works at the beginning of the road package and progress continuously towards the other end without leaving any isolated section or sections of road uncompleted.

107 Certificate of Completion

Wherever the “Certificate of completion” and “Period of Maintenance” are stated in the specification, these shall be read respectively as the “Taking Over Certificate” and “Defects Liability Period”.

The Taking-Over Certificate for these works shall be issued upon application by the Contractor under Clause 48.2 of the Conditions of Contract on substantial completion of the construction works. The Defect Liability Certificate will be issued after the end of the Defects Liability Period. Release of Retention Money will be on issuance of the said certificates.

108 Method of Construction

Add the following to this clause:

The submissions of work programme, Order of Work and the General Description of works shall be consistent in presentation and content when handed over for the Engineer’s approval and in accordance with programmes and schedules as stated in Clause 14.1 of Conditions of Contract.

Notwithstanding any contrary provision contained in the last paragraph of Clause 108 of the Standard Specification, the Engineer’s normal working hours shall be defined as 8:00 a.m. to 5:00 p.m. on weekdays, including lunch break from 1.00 p.m. to 2.00 p.m. and 8:00 a.m. to 1:00 p.m. on Saturdays, with Sunday being set aside as a day of rest. If the contractor wishes to execute permanent works outside these hours, he shall request for and obtain written permission from the Engineer at least one full working day in advance to enable the Engineer to make necessary provision for the supervision of such work. The contractor shall meet any costs arising thereof.

109 Notices of Operations

Name the existing text as 109.1 and add the following:

109.2 Notification Terms

It shall be the Contractor’s responsibility to notify the Engineer when any items of the Works scheduled are completed and ready for approval, and the contractor shall give a notice of one full working day to allow control tests to be performed.

117 Health, Safety and Accidents

Insert Sub-clause (i):

In accordance with the laws of Kenya, the Contractor shall make arrangement for awareness programme for public health education and particularly for HIV/AIDS as detailed under Section 26 of this specification.

119 Use of Explosives

Add the following to Clause 119:

The Contractor shall not use explosives without prior written consent of the Engineer. Where the use of explosives is so provided or ordered or authorised, the Contractor shall comply with the requirements of the following beside the law of the land as applicable:

(a) The Contractor shall at all times make full liaison with and inform well in advance and obtain such permission as is required from all Government Authorities, public bodies and private parties whatsoever concerned or affected or likely to be concerned or affected by blasting operations.

(b) The Contractor shall pay all license fees and charges, which may be, required for storage of explosives or in respect of any other matters whatsoever.

© The contractor shall be solely responsible for provision, supply, handling, storage and transportation of all explosive ancillary materials and stores and all other things of every kind whatsoever required for blasting operations and shall not delegate or subcontract these activities without the approval of Engineer.

(d) Before the beginning of the Defects Liability Period the Contractor shall remove all unused explosives from the site on completion of the Works or which are ordered by the Engineer, and submit to the Engineer written confirmation of compliance with the instruction.

(e) The Contractor shall submit to the Engineer monthly returns detailing the quantity of explosives brought to the site together with the quantities used during the month and the location and quantity of rock blasted.

120 Protections of Existing Works and Services

Add the following to this Clause:

The cost of determining the location of the existing services together with making good or repairing of any damage caused all to the satisfaction of the Engineer shall be included in the tender rates by the Contractor.

Any damage to, or interference with, existing utilities, caused by the Contractor's operations during the progress of the Works, shall be deemed to be the responsibility of the Contractor who shall undertake to make good at his own expense any damage so caused to the existing underground utilities or other features. The Contractor shall be liable in respect of all claims arising from such damages or interference that may occur.

The Contractor shall be responsible for arranging in liaison with the relevant authorities as soon as the requirements are known for the moving of or alterations to services including power lines, telephone lines, data cables, water mains, sewers and surface water drains which are affected by the works. The arrangements for such moving or alteration shall be subject to the agreement of the Engineer and the relevant authorities.

121 Diversion of services

Add the following to the existing text:

(a) The Contractor shall acquaint himself with the position of all existing services including sewers, water pipes, underground drains, cable for electricity and telephone lines, telephone and lighting poles before commencing any excavation or other work likely to affect these existing services.

(b) The Contractor shall pay any charges arising from the moving of such services for which Provisional Sums have been included in the Bill of Quantities. Subject to the agreement of the Engineer and upon production of receipts, the Contractor shall be reimbursed in Interim Certificates the net cost of such moving or alteration plus the percentage inserted in the Bill of Quantities for all costs and profits in making the payments.

© The Contractor shall be entirely responsible for and shall repair at his own cost, any services that may be damaged by his plant, equipment or personnel for not following the laid down procedure of locating and shifting services or damage that may occur subsequent to alteration of such services. The Contractor shall indemnify the Employer against claims arising from damages to existing services or works.

123 Liaison with Government Officials and Police

Add the following to the existing text:

In addition to the requirements of maintaining liaison with Government Officials and Police, the Contractor shall be responsible for acquainting himself with all current and valid ordinances or regulations which may affect the work.

The Contractor's attention is also drawn to his obligations with regard to inspection and examination of the site as stipulated under Clause 11 of the Conditions of Contract.

124 Provision of land

Notwithstanding the provisions of Clause 124 of the Standard Specification, all requirements of land for deviations, quarries, stockpiles, spoil areas and borrow pits when not in the road reserve but required for the construction purposes shall be approved by the Engineer, but the Contractor will make necessary arrangements with the property owners concerned and pay all charges arising thereof on or before completion of the Contract. However, the Employer shall not provide any land for the Quarries, stockpiles, spoil areas and borrow pits and access roads there to.

The Contractor shall remove all temporary works and shall restore all such land to the condition in which it was immediately prior to the occupation thereof as is reasonable and practicable. No separate payment shall be made to the Contractor on account of these items and the contractor shall make due allowances for them in his rates elsewhere.

Any encroachment of the road reserve, for example by kiosks, shall be brought to the Engineer's attention by the Contractor at the earliest opportunity.

125 Water Supply

Add the following to this clause:

The Contractor at his own cost shall obtain necessary permissions from both relevant Government authorities and private parties to draw water from natural sources and private sources respectively.

127 Information from Exploratory Boring and Test Pits

Delete the contents of Clause 127 and substitute with the following:

The Materials Report prepared by the Employer does not form part of the bid documents. However, the report will be made available for the Contractor's verification only and any conclusions in regard to suitability of material, location of borrow pits and material quantities made by the Contractor based on this information, will be his own responsibility.

The Contractor shall allow in his programme for construction of trial sections and carrying out tests upon them as directed by the Engineer. Trials would normally be required at the start of each pavement layer and if change of method or equipment deems it necessary as directed by the Engineer. The time for completion of the Contract shall not be extended because of the time needed to construct trial sections and evaluate the test on them.

At least fourteen (14) days before the work of laying any pavement layer is commenced the Contractor shall construct a trial at least 100 m in length and to the full construction width and shall be laid to the specified depth for the material. For each trial the contractor shall use the materials in proportions, mixing, laying, compaction plants and construction procedure that he proposes to use for the main work. The main work of laying the pavement layer shall not be commenced until this trial has been tested and approved by the engineer.

No variation in the construction procedure, mix proportions, size, grading or source of any of the constituents shall be made without the agreement of the Engineer who may first require new trial sections to be carried out.

131 Signboards

Add the following to this clause:

At the commencement of works, the Contractor shall provide and erect four signboards; two on each end of the proposed Project Roads and enroute at least two as instructed by the Engineer. The signboards shall comply with the requirements and detail shown in the Book of Drawings. Any amendments to the details in the Book of Drawings, prior to the signboards being erected, shall be with the approval of the Engineer.

132 Engineer's accommodation, Office, Laboratory, Equipment & Furniture

The Contractor shall provide, erect and maintain for the duration of the Contract, the Engineer's housing, offices and laboratories. A description of the accommodation, offices and laboratories is given below.

In all cases the Contractor shall furnish, equip and maintain the buildings until the expiry of the Defects Liability Period.

At the end of the Contract, all Engineer's offices, houses and laboratory shall revert to the Contractor. The office furniture/equipment and laboratory furniture shall revert to the Contractor while the laboratory equipment shall revert to the Contractor at the end of the Contract.

132.1 Housing accommodation for the Engineer and his staff

Housing accommodation shall consist of one or more combinations of the five types of houses shown on the drawings. The houses shall be of semi-permanent construction. All materials shall be new, strong, durable and weather/termite proof with walls, ceilings, windows, doors and floors

outside with two coats of paints approved by the Engineer. Each house shall be provided with a portable water supply and water borne sewerage system and shall be furnished and equipped in accordance with details in Table 1.1 below.

The houses shall be wired for mains electricity and connected to a main power supply. In addition the Contractor shall provide a standby generator of approved type to serve Type I, II and III housing and it shall be located to the satisfaction of the Engineer. The contractor shall be responsible for rubbish disposal by providing outside bins and a daily collection service to an approved central disposal area.

The houses and furniture shall revert to the Contractor at the end of the Contract.

Alternatively, the Contractor shall explore the possibility of providing the Engineer's staff houses accommodation on a rental basis but of similar type specified and shown in the Bill of Quantities. The accommodation shall be to the approval of the Engineer prior to negotiation and finalisation of the rental process.

The accommodation shall be available for the full duration of the project, upon commencement of the project.

Furniture requirements for the Engineer's houses are as shown in the schedule below.

Furniture Requirements for Engineers' Houses

Description	No for each house unit			
	House Type I & II	House Type III	House Type IV	House Type V
Double bed with mattress	1	1	NIL	NIL
Single bed with mattress	2	2	2	2
Dining table 0.90 m by 1.5m	1	1	2	2
Carver chairs	2	2	NIL	NIL
Settee	1	1	NIL	NIL
Dining chairs	6	4	8	4
Bedroom chairs	4	2	NIL	NIL
Arm chairs with cushions	4	NIL	NIL	NIL
Dressing table with mirror and stool	1	1	NIL	NIL
Bathroom stool	1	1	NIL	NIL
Cupboard (hanging and shelved)	2	1	NIL	NIL
Desk (8 drawers)	1	1	NIL	NIL
Coffee table	2	1	NIL	NIL
Occasional table	2	1	NIL	NIL
Book case	2	1	NIL	NIL
Kitchen table	1	1	2	2
Side board	1	1	NIL	NIL
Kitchen chairs	2	1	NIL	NIL

Description	No for each house unit			
	House Type I & II	House Type III	House Type IV	House Type V
Chest of drawers	2	1	NIL	NIL
Table lamp	1	1	NIL	NIL
Set of sheets for double bed	4	1	NIL	NIL
Set of sheets for single bed	4	2	NIL	NIL
Dinner service (set)	1	1	NIL	NIL
Set of cutlery	4	1	NIL	NIL
Set of pots and pans	1	1	NIL	NIL
Set of kitchen utensils	1	1	NIL	NIL
Table cloth	2	1	NIL	NIL
Set of house cleaning utensils	1	1	NIL	NIL

Description	No for each house unit			
	House Type I & II	House Type III	House Type IV	House Type V
Electric or gas cooker with 4 plates and oven	1	1	NIL	NIL
Waste paper basket	4	2	2	2
Dustbin	1	1	2	2
Refrigerator with freezer capacity 180 litres	1	1	NIL	NIL
Gas or Electric hot water for kitchen & bathroom	1	1	NIL	NIL
2 Kw Air conditioners	3	2	NIL	NIL
Washing machine	1	1	NIL	NIL
Table fans	4	2	NIL	NIL
Carpet, 2.0m x 1.0m	3	NIL	NIL	NIL
Carpet, 3.0m x 4.0m	1	NIL	NIL	NIL
Curtains to all windows	YES	YES	YES	NO

132.2 Engineer's Senior Staff Housing – House Types I, II and III

The Contractor will be instructed by the Engineer as to the Number and type of new houses to be provided. Items are included in the Bill of Quantities for this purpose. The houses shall be 2, 3 or 4 bed-roomed as shown on the drawings.

Each house shall be erected on a separate adequately drained plot of at least 1,000 m². A chain-link dog proof fence with lockable gate shall be provided round each house plot.

The main access road to the Campsite shall be at least 5 m wide, adequately drained and surfaced with a minimum of 150 mm thick compacted gravel

The house shall be provided with a cold water storage tank, kitchen sink, wash hand basins, baths with shower attachments and showers. The plumbing shall be arranged such that hot and cold water supply is available at the kitchen sink, wash hands basins, bath showers. Standpipes with lockable taps shall be provided outside every house.

The Engineer's House Type 1 shall be provided with a direct line telephone.

The number of houses to be provided shall be as follows:

- Type I – 1 No.
- Type 2 - 3 No.
- Type 3 – 2 No.
- Type 4 – 6 No.

Each type I and II house shall be provided with day and night watchmen and security lights, the cost of which shall be deemed to have been included in the rates for these houses. The houses with the furniture shall revert to the Contractor at the end of the Contract.

132.4 Engineer's office

The Contractor shall provide, erect and maintain for the duration of the Contract, an office for the Engineer of weather proof construction, with windows, and doors suitably insulated against heat and cold, all to the satisfaction of the Engineer in respect of the condition, design and siting. The office shall be partitioned as shown on the drawings or as directed by the Engineer, with a clear inside height of 2.7 m. The floor shall be of steel floated concrete adequately damp and ant proofed. The walls shall be plastered and, if necessary, painted with two coats of emulsion paint. The ceiling shall be soft board with 2 coats of paint. The layout requirement is shown on the drawings.

The office of the Engineer shall be completely separate from that of the Contractor. The Plot shall be not less than 2,500 m² in area and shall be fenced with a 2 m high barbed wire fence and gate with padlock and chain.

Two telephones shall be provided for the sole use of the Engineer and the offices shall be provided with Electric lighting and wall sockets all to the satisfaction of the Engineer.

A portable water supply shall be provided and all latrines shall have water borne sewage disposal system. A standby pipe with a lockable tap shall be provided outside the latrine.

The offices shall be wired for main electricity and connected to a main supply. In addition, a stand by generator of approved type shall be provided, located to the satisfaction of the Engineer.

Furniture and equipment for the Engineers Office shall be as listed in the Special Specifications.

The Engineer's office, furniture and equipment shall revert to the Contractor at the end of the contract.

132.5 Engineer's Main Laboratory

No Laboratory is required to be provided under the contract, as all control testing will be carried out at the Ministry of Roads Materials Laboratory in Nairobi.

132.6 Engineer's Office

Furniture and equipment for the Engineer's office shall be as listed in the Bill of Quantities. It shall also be the Contractor's responsibility to replenish consumables when instructed by the Engineer. The Engineer's office will revert to the Employer on completion of the contract.

132.7 Engineer's Office

Furniture and equipment for the Engineer's Office shall be as listed in the Special Specifications. It shall also be the Contractor's responsibility to replenish consumables when instructed by the Engineer. The Engineer's office furniture will revert to the Employer on completion of the contract. Rate for provision of the Engineer's main office shall include provision of all furniture, consumables and equipment listed in the Special Specifications.

132.8 Engineer's Survey Equipment

(a) General

The Contractor shall provide install and maintain in a good state of repair for the duration of the Contract, such survey and other equipment as listed in the Special Specifications. Such equipment shall be of approved manufacturer and shall be made available to the Engineer within the following time periods:

Survey equipment, not more than 30 days after the Engineer's Order to Supply

Any delays to the Contractor or the Contractor's activities caused by the Engineer being unable to perform survey work, field or laboratory test due to the Contractor's failure to supply and/or maintain

the said equipment shall be deemed to have been caused by the Contractor's own actions and any consequences of such delays shall be interpreted as such.

The survey equipment shall revert to the Employer on completion of the Contract.

132.9 Wireless Communication for the Engineer

(a) Mobile phones

The Contractor shall, if so instructed by the Engineer, provide, connect and maintain mobile phones for the exclusive use by the Engineer and for the duration of the Contract. The Contractor shall provide airtime for these mobile phones as directed by the Engineer.

Details of the numbers of mobile phones to be provided are included in the Bill of Quantities. Payment for complying with these requirements is also included in the Bill of Quantities.

133 Time for Erection of the Engineer's Staff Houses, Offices/Laboratories

The time for completion of all housing for the Engineer's office, laboratory, senior and junior staff shall be as specified in the Standard Specification.

During the duration from the commencement of period of performance until taking over of the Engineer's houses and office the Contractor shall provide suitable hotel or rented accommodation and appropriately located temporary office space all adequately furnished and equipped to the approval of the Engineer. The contractor shall be deemed to have allowed in his rates for the temporary accommodation of the Resident Engineer, Materials Engineer, Senior Surveyor and three support staff during this mobilization period and no separate payment will be made.

137 Attendance upon the Engineer and His staff

Further to the provisions of Clause 137 of the Standard Specification, the Engineer may instruct the Contractor to provide the staff for attendance to the Resident Engineer in accordance with the following Sub-Clauses:

137.1 Staff employed and paid by the Contractor for attendance upon the Engineer

The Engineer **may** instruct employment of staff listed below by the Contractor for attendance upon the Resident Engineer. The Contractor shall provide housing as described under Clause 132 of this Specification and pay the salaries, allowances and benefits as determined by the Engineer and claim reimbursement under the BOQ. These shall be subject to the statutory deductions, namely PAYE, NSSF and NHIF which the Contractor shall remit to the relevant authorities every month with copy of each remittance being submitted to the Engineer for his records.

- 2 Assistant Engineers
- 4 No Inspector of Works
- 2 No Laboratory technician
- 4 No Assistant Laboratory technician
- 1 No CAD Assistant
- 1 No. Assistant Quantity Surveyor
- 1 No. General Clerk
- 3 No. Survey assistant
- 2 No Secretary
- 2 No Office Assistant
- 6 No Chainmen
- 8 No General Attendants

The Engineer shall interview, select and recommend for employment all the positions listed above. Upon employment, the Contractor shall provide each with an Employment Contract in accordance with the Employment Act, 2007 or the latest amendment of the Act, stating therein the conditions of employment. At the end of the Contract Period or termination of services, whichever comes earlier, each employee shall be issued with a Certificate of Service as provided for in the foregoing Act. Use of documents drafted by the Engineer shall not relieve the Contractor of his duties and obligations under this Clause.

As guidance to bidders, the minimum wages excluding allowances, statutory deductions and Contractor's overheads and profit is as indicated below;

(a) Assistant Engineers	200,000
(b) Inspector of Works	164,450.00
(c) Laboratory Technologist	164,450.00
(d) Lab Assistants	92,874.71
(e) Administrator	64,000.00
(f) General Clerk	49,303.00
(g) Survey Assistant / Leveler	107,303.00
(h) Secretary	64,000.00
(i) Chainmen	56,589.00
(j) General Attendants	56,589.00
(k) Liaison Officer	164,446.14

The Contractor shall have factored in the possible allowances Contractor's overtime, statutory deductions, overheads and profits while filling in the Lump Sum rate. The Contractor shall ensure that the proposed wages are not lower than the current minimum rates provided for in the labour and employment Acts and their amendments and relevant collective bargaining agreements.

137.2 Staff and housing to be provided by the Contractor for attendance upon the Engineer

The Contractor shall provide housing for staff listed below for attendance upon the Resident Engineer and be responsible for paying the salaries, allowances and benefits at rates not lower than the current rates approved in the latest Collective Agreement for the Kenya Building Construction and Engineering and Allied Trade Workers Union issued by the Industrial Court of Kenya or any other court duly established under provisions of the Constitution of Kenya. In addition, the Contractor shall provide all housing or housing allowance and other amenities for these staff within close proximity to the Engineer's office and laboratory to the same standard as those provided under Clause 132.

2 Assistant Engineers
 4 No Inspector of Works
 2 No Laboratory technician
 4 No Assistant Laboratory technician
 1 No CAD Assistant
 1 No. Assistant Quantity Surveyor
 1 No. General Clerk
 3 No. Survey assistant
 2 No Secretary
 2 No Office Assistant

6 № Chainmen

8 № General Attendants

The remuneration shall be reviewed periodically as stipulated in the approved documents on which the package is based. No additional payment will be made for provision of the staff, including housing and remuneration as specified in this Sub-Clause, and the cost will be deemed to be included in the rates for other items.

138 Provision of vehicles

In addition to provisions of the Clause 138 of the Standard Specification, the Contractor shall when instructed, provide and maintain in good working condition for the exclusive use of the Engineer and his staff throughout the Contract, the following types and numbers of brand new vehicles. The Engineer shall approve the type of vehicles and confirm the number of each type to be provided. The Contractor shall insure the vehicles comprehensively for any licensed drivers and shall provide competent drivers during normal working hours and whenever required by the Engineer. The cost of provision of the vehicle shall be inclusive of the first 4,000 kilometers travelled in any month.

Should any vehicle supplied not be in roadworthy condition, the Contractor shall provide an acceptable equivalent replacement vehicle until such a time as the original vehicle is repaired to the satisfaction of the Engineer and returned for use.

All vehicles to be supplied will be brand new, right hand drive, diesel powered and fitted with air-conditioner and power steering as described below.

Two (2) Type 1: minimum 2.8-3.0 litre turbo charged diesel 4-wheel drive or similar approved, 5 door sports Utility Vehicle or similar approved.

Four (4) Type 2: Minimum 2.8-litre turbo charged diesel 4-wheel drive, or similar approved twin-cab pick-up.

One (1) Type 3: Minimum 2.8 litre 4-wheel drive, single cabins or similar approved with Fibre Glass or Sheetmetal rear covered body.

One (1) Type 4: Minimum 1.8 small sport utility vehicle or similar approved.

One (1): Minimum 3.0 litre diesel engine 15-seater executive minibus with High roof body or similar approved.

Ownership of the vehicles supplied to the Engineer shall revert to the Contractor upon completion of construction

Two Type 1 and One Type 2 vehicles will be supplied and maintained throughout the 24 month Defects Liability Period. Payment will be made as for the vehicles to be supplied during the construction period. Ownership of these vehicles will revert to the Contractor at the end of the Defects Liability Period.

139 Miscellaneous Accounts

The Contractor maybe instructed by the Engineer to make payments of general miscellaneous accounts for such items as stationary, stores and equipment and miscellaneous supervision personnel and claims or the Engineer may direct the Contractor to purchase or pay for the above. The Contractor will be paid on a prime cost basis plus a percentage for overheads and profits under appropriate items in the Bills of Quantities.

140 Payment of Overtime for Engineer's Junior Staff

In addition to the support staff provided by the contractor, the following shall also constitute part of the Engineer's junior staff:

- a) 2 Assistant Engineers
- b) 4 № Inspector of Works
- c) 2 № Laboratory technician
- d) 4 № Assistant Laboratory technician
- e) 1 № CAD Assistant

- f) 1 No. Assistant Quantity Surveyor
- g) 1 No. General Clerk
- h) 3 No. Survey assistant
- i) 2 No Secretary
- j) 2 No Office Assistant
- k) 6 No Chainmen
- l) 8 No General Attendants

If the Contractor wishes to execute the works on regular basis outside the Engineer's normal working hours as given in Clause 108, over a prolonged period, the Engineer may if he deems it necessary, employ additional supervisory staff for which the required salaries shall be in full by the contractor at his own cost through the Engineer's office. In addition, the Contractor shall provide the required accommodation for such staff at his own cost. The Contractor shall not be reimbursed any of this cost.

141 Measurement and Payment

Item: Mobile Telephones

The provision of mobile phones units for the Engineer shall be measured and paid for by the number. The rate entered in the Bill of Quantities shall include for the costs of providing the mobile units complete with charger unit, a "hands free" headset, connection to the network and all service charges applicable.

Add the Following clauses:

142 Protection of the Environment

Liquidated Damages

Liquidated Damages at the rate indicated in the Appendix to Form of Bid shall apply in the event of the work not being completed within the time for completion plus any extension of time which may be determined by the Engineer. The limit of liquidated damages shall be as indicated in the Appendix to Form of Bid.

142 Protection of the Environment

Further to the requirements of Sub-clause 19.1 of the Conditions of Contract, the Contractor shall be responsible for the following measures to protect the environment.

(a) Compliance with national and local statutes and regulations relating to protection of the environment. The Contractor will be responsible for familiarizing himself with all existing national and local legislation in this regard.

(b) All construction activities shall be carried out using the best possible means to reduce environmental pollution such as noise, dust and smoke. All vehicles and plant shall be regularly serviced in accordance with the manufacturer's recommendations to ensure that they operate efficiently and without excessive noxious emissions. The Engineer will have the authority to instruct the Contractor to temporally cease operations and/or remove from the site vehicles or plant which do not comply with this requirements, until such time that he is satisfied that the best practicable means to reduce environmental pollution to a minimum are being used.

© The Contractor shall at all times maintain all sites under his control in a clean and tidy condition and shall provide appropriate and adequate facilities for the temporary storage of all waste prior to disposal.

(d) The Contractor shall be responsible for the safe transportation and disposal of all waste generated as a result of his activities in such a manner as will not give rise to environmental pollution in any form or hazard to human or animal health. In the event of any third party being employed to dispose of waste, the Contractor shall be considered to have discharged his responsibilities under this Clause from the time at which waste leaves sites under his control, providing that he has satisfied himself that the proposed transportation and disposal arrangements are such as will not give rise to pollution or health hazard.

(e) The Contractor shall be responsible for the provision of adequate sanitary facilities for his workforce, and that of his subcontractors at all construction and ancillary sites. The Contractor shall not allow the discharge of any untreated sanitary waste to ground water or any water of ground surface watercourse.

(f) All concrete and asphalt plants shall be operated and maintained in accordance with the original manufacturers specifications and manuals, and in such a manner as to minimize emissions of hydrocarbons and particulate if in the opinion of the Engineer the operation of such plant is causing or is likely to cause nuisance or health problems to the site staff or the general public. The Contractor shall carry out such work as is necessary to reduce emissions to an acceptable level within a time-scale agreed with the Engineer.

(g) The Contractor shall regularly spray with water all exposed dirt surfaces to reduce dust levels.

(h) The Contractor shall take all responsible measures, at all sites under his control to prevent spillage and leakage of material likely to cause pollution of water resources. Such measures shall include but not be limited to the provisions of bunds around fuel, oil and bitumen storage facilities and provision of oil and grease traps for servicing and fuelling areas. Prior to construction of such facilities the Contractor shall submit details of pollution prevention measures to the Engineer for his approval.

(i) The Contractor shall be responsible for ensuring that exposed surfaces are re-vegetated as construction progresses all to the satisfaction of the Engineer.

(j) The removal of trees shall be kept to the minimum necessary to accommodate the permanent works. Prior to the removal of any trees the contractor shall inform the Engineer of the intended operation and obtain the permission of the Engineer for the removal of the trees. If any tree is removed without permission the Contractor shall replace it with an approved tree at no additional cost to the Employer.

(k) The Contractor shall ensure that fires, except for controlled fires for burning rubbish, do not start within the Site or in the environs thereto as a result of the works or from the actions of his employees. The burning of waste, such as vehicle tyres causing noxious emissions is prohibited. The contractor shall have available at all times trained fire-fighting personnel provided with adequate fire-fighting equipment to deal with all fires. The contractor shall additionally at all times provide sufficient fire protection and fighting equipment locally to parts of the works which constitutes particular fire hazards.

No separate payment shall be made in respect of this Clause 142 and the Contractor shall be deemed to have allowed in his general rates and prices for the costs of complying with the requirements of this clause.

143 Off Road Environmental Measures

In addition to the provisions of Clause 142 above and all other requirements of the Conditions of Contract, Standard and Special Specifications, the Employer and the National Environmental Management Authority (NEMA) may order certain environmental measures to be carried out which are off the road and not specifically covered under these provisions. The Contractor shall carry out such works with equipment, labour and plant provided under the Contract or shall make such arrangements for specialized works to be carried out by a specialized subcontractor.

The Contractor shall be paid for all direct expenses under a provisional Sum in the Bill of Quantities and a percentage (%) for his handling costs and profits.

144 Staff Training

The Contractor shall allow for training of engineers, technicians and other support staff as may be instructed by the Engineer.

The payment of the allowances of such staff shall be made as instructed by the Engineer under the relevant item of the Bills of Quantities.

200 MATERIALS AND TESTING OF MATERIALS

205 Soils and Gravels

Whenever in the Contract Document a minimum California Bearing Ratio (CBR) is specified, the CBR of the material shall be determined at the specified state of compaction.

- (i) After four days soaking in the case of virgin materials, and
- (ii) After seven days curing plus seven days soaking in the case of cement improved materials.

211 Bituminous Binders

Requirements

Straight run bitumen

The ash content of penetration grade bitumen shall not exceed 0.5% by weight.

300 SETTING OUT AND TOLERANCES

301 Setting Out

General

If traverse points to be used for setting out are close to the existing carriageway and interfere with the construction works, the Contractor shall relocate them to a location where they will not be disturbed. The coordinates and heights of all transverse points so relocated shall be listed and provided to the Engineer for checking and/or approval. The Contractor shall also reference with monuments the new road centrelines every 200 m long straight sections and at all salient points along curves, consisting of a pin in a concrete beacon, before commencement of any works.

The roads reserve boundary posts shall have 12 mm diameter steel pins, 200 mm long embedded in concrete with 25 mm exposed and sticking from the top surface. This pin shall be coordinated and heightened and details of the same shall be provided to the Engineer for approval.

(b) Detailed setting out

Reference pegs shall be 50 mm x 50 mm in cross section, 600 mm long driven 400 mm firmly into the ground and painted white above ground level. The offset from the centreline shall be indicated by a small nail, 20-25 mm long, with its head driven flush with the top of the peg. Chainages, chainage offsets and reference elevation shall be clearly marked on the sides of the peg to the satisfaction of the Engineer.

400 SITE CLEARANCE AND TOP SOIL STRIPPING

401 Site Clearance

Add the following as the last paragraph of Sub-clause (a).

Site clearance is not required over the paved width of the existing road and shoulders. No measurements and payment for site clearance will be made for this width. The remaining area within the road reserve including the sides of the existing embankments and cutting should be cleared as instructed by the Engineer. This operation shall also include the removal of selected trees as directed by the Engineer. The Contractor shall provide paint and all the assistance the Engineer may require to mark the trees which should not be removed during site clearance.

The Contractor shall take care not to uproot or damage trees which are within the road reserve but outside the construction width. After the contractor has staked out the extent of the road, the Engineer with assistance of the Contractor shall mark out the trees to be removed. After removal the trunk and branches of these trees shall be cut into pieces not more than 2.0 m in length, transported and neatly stored at the nearest Kenya Urban Authority camp at a position to be indicated by the Engineer. Payment for this work shall be as detailed in the Bill of Quantities. The rate inserted by the Contractor for this work shall include the cost of complying with all the requirements of this clause.

500 EARTHWORKS

502 General

Renumber the existing text as 502.1 and add the following Sub-clause 502.2 to this clause:

502.2 Definitions for Earthworks

Formation level is defined as the lower (bottom) level of sub-base. Sub-grade is the material within 300 mm or such other thickness as may be shown on the drawings, below the formation level. Earthworks are defined as the works below the sub-grade level.

504 Preparation Prior to Forming Embankments

Renumber the existing text as 504.1 and add Sub-clauses 504.2 and 504.3 as follows;

504.2

504.2 Benching

Where shown on the drawings or instructed by the Engineer, the Contractor shall, where fill is required, excavate benches where the ground to receive the fill has a slope greater than 1 (vertical): 5 (horizontal).

Where benching is required, the existing ground, after removal of top soil in accordance with the requirements of Section 4 of the Specification, shall be benched by cutting steps such that the horizontal width between the cut face of the bench and the instructed final embankment slope is not less than 1.5 m .Each slope shall be graded to a slope of 1 in 40 from the centreline of the road so as to avoid the pounding of water. The minimum width of 1.5 m shall generally be required for each bench and the Contractor shall allow working in narrow widths.

All earthworks in widening shall be compacted to 100% MDD (AASHTO T99).

The volume of material cut from benches and its re-utilization shall not be measured for payment but is deemed to be included in the Contractor's rates for earthworks.

504.3 Ground Compaction

After top soil stripping in accordance with Section 4 of the Specification and benching in accordance with Clause 504 of the Specification, the existing ground, including benches, under embankments shall be compacted to a dry density of at least 95% MDD (AASHTO T99) to a depth of 150 mm below ground level unless otherwise directed by the Engineer. Compaction of benches other than the first bench will not be separately measured and is deemed to be included in the Contractor's rates for earthworks.

505 Construction of Embankments

Only material approved by the Engineer shall be used in embankments. Material with high swelling characteristics or high organic matter content and other undesirable material shall not be used, unless specifically authorized by the Engineer. Unsuitable material shall include:

Material containing more than 5% by weight of organic matter, such as topsoil , humus, material from swamps, mud ,log stumps and perishable material

Material with a swell of more than 3% Clay with a liquid limit exceeding 50%

Material having moisture content greater than 105% of optimum moisture content (standard compaction) in its naturally occurring state.

Material for sub-grade shall meet the following requirements:

CBR of not less than 15% measured after 4 day soak on a laboratory mix compacted to a dry density of 100% MDD(T99)

Swell less than 1% on the laboratory mix sample

Maximum dry Density (MDD) not less than 1500 kg/m²

Add the following:

In case the Contractor has in his possession heavy compaction equipment, he may opt to construct the sub-grade in a single layer of 300 mm thickness, following compaction trials and upon the Engineer's approval.

Rename the existing text of the Standard Specification as 507.1 and add the following to this clause:

507 Rockfill in Carriageway, Embankment and Behind Structures

507.1 Scope of Application

With the approval of the Engineer, the rock fill Material can be used only in the following circumstances:

- (i) Where the height of embankment is more than 3 m, including formation level, the lowest 1.0 m thickness can be constructed using rockfill.
- (ii) For all heights, the sloped portion beyond shoulder can be constructed using with provision that, under all circumstances, a minimum of 500 mm thick earthen cushion shall be available between formation level and top level of rockfill.
- (iii) Behind the structures irrespective of the height of embankment up to the bottom of sub-grade.

507.2 Material

The maximum size of stones shall not exceed 300 mm in any direction. The voids between rocks shall be filled by smaller rock fragments.

507.3 Spreading and Compaction

The method of compaction as specified under Clause 507.1 of the Standard Specification and/or as directed by the Engineer, should ensure that no boulders are loosely packed and can move or rock after compaction. The top layer as well as the sides of the retaining normal earth fill on one side shall be fully blinded with filter media comprising crushed aggregate and sand. The grading and layering of filter media shall be such as to form effective filter layer through which particles of inner soil fill of embankment are not able to migrate into the rock fill layer in the process of settlement/consolidation or due to movement of water. The layer work shall combine with the layers of the adjacent rockfill so as to facilitate simultaneous compaction.

507.4 Rates

The rates are applicable to completed construction as measured by taking levels before and after compaction up to the top of blinding/filter media 300 mm thick and are inclusive of all materials, void filling materials, blinding materials and filter media.

The preload material shall be removed from any stage of the construction when, in the opinion of the Engineer, based on settlement monitoring records, the required primary consolidation of the soft silts has been achieved.

Based on consolidation properties of soil, expected preload time shall be estimated for each stage. However, this time can be influenced, not only by settlement, but also by the rains. The Contractor will not be entitled to extra payment should these times be varied due to the site conditions or the rains.

507.5 Settlement Monitoring

Continuous monitoring of settlement will be necessary to check the efficiency of the system. The instruments for monitoring settlement and stability shall include settlement platforms, Piezometers to determine if pore pressures are exceeding limits that might endanger stability, and Inclinometers to determine if lateral movement occurs.

Settlement monitoring devices shall be installed at the Contractor's cost to monitor the settlement behaviour of ground under fill, to establish the effectiveness of the drainage system. The Contractor

shall carry out the settlement monitoring works, including the installation of all the required equipment, in accordance with Standard Specification.

508 Compaction of Earthworks

Fill above ground level adjacent to pipe culverts shall be compacted in layers not exceeding 150 mm in thickness to a field density of 100% MDD (AASHTO T99) up to the level of the top of the pipes or top of surround. The compaction shall extend for a width equal to the internal diameter of the pipe on either side of the pipe (s) or surround (s).

Adjacent to the structures, all fill above ground level up to the underside of the sub-grade shall be compacted in layers not exceeding 150 mm in thickness to a field density of 100% MDD (AASHTO T99). In case of fill around box culverts, this shall be carried out for the full width of the fill and for a length bounded by the vertical plane passing through the ends of wing walls.

Where the formation in cut areas is formed of hard material, the Contractor shall remove the hard material to a depth of 200 mm or such other depth as may be directed by the Engineer. The void so formed shall be backfilled with sub-grade quality material and compacted to the same standard and tolerances as for sub-grade in fill.

Improved sub-grade, where required as part of the embankment construction shall be compacted and finished to the same standards and tolerances as those required for normal sub-grade.

509 Mass Haul Diagram

No mass haul diagram has been provided with the Contract documents. The Contractor shall locate suitable materials for constructing earthworks along the alignment and elsewhere.

509 Borrow Pits

Delete the first paragraph and substitute with the following;

Fill material which is required in addition to that provided by excavation shall be obtained from borrow pits to be located and provided by the Contractor but to the approval of the Engineer.

514 Top Soiling and Grassing

Consider the existing text to be Sub-clause 514.1

The embankments and cut faces referred to in Clause 514.1 of the Standard Specification are synonymous with fill slopes and cut slopes defined in Clause 110 (c) of the same specification.

The guiding dams referred to in Clause 514.1 of the Standard Specification are synonymous with the guiding dams referred to in Clause 817 of the same specification.

Add the following Sub-clause 514.2

514.2 Hydro-seeding

Where it is specified that hydro-seeding should be carried out on topsoil, the thickness of the topsoil shall be 100 mm unless, where suitable soil is present, the Engineer orders the topsoil to be omitted or applied in reduced thickness.

The Engineer and the Contractor shall agree the types and mixtures of seeds to be used on before the Contractor orders any seed he may wish to use. The variety of resulting grass or plants should not be attractive to livestock or grass eating animals.

The Contractor shall be solely responsible for establishing an acceptable grass cover and any approval by the Engineer of seed or seed mixtures intended for use by the Contractor shall not relieve him of this responsibility. All areas to be hydro-seeded or hand seeded shall be scarified forming horizontal drills running parallel to the contours. The drills are to be spaced at intervals of 150 to 250 mm apart. Seeding to Mulch shall be added to the hydro-seeding mix at an approved rate.

Hydro-seeding shall be carried out with an approved hydro-seeding machine at a rate of application of not less than 20 gm/m² for fill and cut slopes and 10 gm/m² for other areas. When the use of anti-erosion compounds is required and such compound is to be applied simultaneously with the hydro-seeding, it shall be mixed with the hydro-seeding mixture before application.

514.3 Application of Chemical Fertilizers

For all areas to be grassed the Contractor shall have the top 150 mm of the prepared surface analyzed to determine the quantity and type of fertilizer that may be required for establishing proper growth conditions for the grass. The locations of soil samples taken shall be indicated on plans by the Contractor. The Contractor shall furnish the Engineer with the soil analysis and subsequent fertilizer recommendations. Only after approval by the Engineer of the nature and quantity of fertilizer may the application proceed.

Soil improvement chemicals and fertilizers shall be made available for application of chemical fertilizer. As such no separate reimbursement to the Contractor shall be made. The Contractor shall be deemed to have included his costs in the rates for top soiling and grassing.

515 Side drains

Whenever excavation works inside drains constitutes a separate operation from the bulk earthworks such excavations shall be classified as catch water drains under Section 8 of the Specification.

517 Measurement and payment

(a) Fill in soft material

Add the following at the end of this item:

Quantities for embankment widening shall be measured using the final compacted volume of filled material over the existing embankment after removal of top soil. No separate payment shall be made to the Contractor for any additional earthworks resulting from his construction methods or for working space for his construction plant and equipment or for complying with the requirements of Clause 504.2 of this specification with respect to benching where necessary. The Contractor shall take this into consideration when preparing his rates.

© Spoil in soft material

Add the following at the end of this Item:

The rate for spoil in soft material shall also allow for removal and disposal of material in waterlogged areas. No separate payment shall be made for overhaul.

Add the following:

(n) Item: Providing an approved seed mixture for hydro-seeding

Unit: Kilogramme (kg)

The Unit of measurement shall be the kilogramme of seed of the specified or approved seed mixture provided. The rate shall include the full compensation for procuring and furnishing certified seeds and compliance with Clause 514.2 of this specification.

Item: Hydro-seeding Unit: Hectare

(ha)

The unit of measurement for hydro-seeding shall be the area, measured in hectares of grass established by hydro-seeding which has an acceptable cover. The rate shall include full rate for furnishing cellulose pulp, mixing it with seed, water and with any anti-erosion compound, if required, applying

the mixture, watering weeding, reseeding bare patches, and for any other work which may be necessary for establishing an acceptable cover and maintaining the grass.

Add the following to this section. The details apply to both the activities for the quarries and road works.

518 Blasting

518.1 Control Blasting

The rock blasting shall be controlled so that vibration generated during the blasting do not cause damage to the building and installation around built up areas as given in the table below. Similarly, the rock pieces should not fly off the pits and thus damage the buildings, installation, life and limb of people around. Apart from the general precautions mentioned in the Standard Specification, the protective measures and limits, stated under Clause 518.2 below for use of explosives are suggested as guidelines. The Contractor shall carefully check the site conditions and submit to the Engineer the details of the scheme he proposes to adopt for controlling the blast.

518.2 Protective Measures

The following precautionary measures, single or in combination, as required by site conditions shall be adopted by the Contractor while carrying out controlled blasting.

- (i) Short delay blasting with light charges shall be used.
- (ii) The blast hole shall be covered with 0.6 m² to 1.0 m² mild steel plate of minimum 6 mm thickness.
- (iii) Reinforcement rod mesh not less than 20 mm dia. at 150 mm centres in both directions shall be placed over the steel plates. Steel plate and reinforcements shall be inspected after every blasting operation and all twists shall be removed before reuse to the satisfaction of the Engineer.

The thickness of the covering plate and the kind of dead weight is to be duly approved by the Engineer.

When blasting is necessary adjacent to partially or completely built structures the Contractor shall take all precautions necessary to prevent flying rock from causing damage to the structures.

518.3 Blasting Within Certain Limit

No blasting shall be allowed for any of the excavation until freshly placed concrete of nearby structures has reached a minimum strength of 7 N/m².

Normally blasting shall be resorted to only after 7 days of concreting work in case of OPC (10 days in case of PPC) in adjacent structures.

In no case shall blasting be allowed closer than 15 m to any structure after concrete placing has started.

The Contractor shall submit the scheme with charges and delay detonators he proposes to use for blasting for the approval of the Engineer.

(a) Permissible Standards

Depending on the type of structures and the dominant excitation frequency, the permissible peak particle velocity (ppv) due to blast induced ground vibrations adjacent to the structures shall not exceed the values given in the table below.

Permissible Peak Particle Velocity (PPV) at the Foundation Level of Structures in Blasting Areas in mm/s

Type of Structure	Frequency Hz.	PPV (mm/sec)
(a) Buildings/Structures not belong to the owner:		
(i) Domestic houses / Structures (temporary, Brick and Cement)	5	
(ii) Industrial Buildings (RCC and Framed Structures)	10	
(iii) Objects of historical importance and sensitive structures	2	
(b) Buildings belonging to owner with limited span of life:		
(i) Domestic houses/structures (Temporary, brick and Cement)	10	
(ii) Industrial building (RCC and framed structures)	6	

It is generally recommended that where the blasting is to be carried out, within 20 metres of the nearest point of permanent building, the area shall be line drilled on periphery before blasting.

The Contractor shall be responsible for all damage caused by blasting whether to permanent or temporary structures and shall replace or repair the structures at his own cost. The Contractor will have to design the charge per delay to restrict the PPV as indicated above.

518.4 Precautions after Blasting

After the blast, the Contractor's works superintendent must carefully inspect the work and satisfy himself that all the charges have disappeared from the face.

If it is suspected that part of the blast has failed to fire or is delayed, sufficient time shall be allowed to elapse before entering the danger zone. When fuse and blasting caps are used, a safe time should be allowed and then the superintendent alone shall leave the shelter to inspect the blasting zone.

None of the drillers is to work near the misfired hole until one of the two following operations has been carried out by the superintendent:

- (i) The supervisor should very carefully, when the tamping is of damp clay, extract the tamping with a wooden scraper or jet of water or compressed air, Using a pipe of soft material, and withdraw the fuse with the primer and a fresh detonator with fuse should be placed in these holes and fired out, or
- (ii) The hole may be cleared or 30 m of tamping and its direction then be ascertained by placing a stick in the hole. Another hole may then be drilled at least 600 mm away and parallel to it and about 300 mm less in depth. This hole shall then be charged and fired. The balance of the cartridges and detonators found in the muck shall be removed.

Before leaving his work, the superintendent of the concluding shift shall inform the superintendent of the relieving shift of any case of misfires and should point out the position with a red cross denoting the same and also stating what action, if any, he has taken in the matter.

The superintendent should also at once report at the office of the Contractor and the Engineer all cases of misfire, the cause of the same and what steps were taken in connection with these.

The names of the day and night shift superintendents must be noted daily in the Contractors office.

If a misfire has been found to be due to a defective detonator or dynamite the whole quantity or box from which the defective article was taken, must be thoroughly inspected by the Contractor.

Drilling in holes not completely exploded by blasting shall not be permitted.

518.5 Personnel

Excavation by blasting will be permitted only under the personal supervision of competent and licensed blasters and trained workmen.

All superintendents and workmen in-charge of preparation, handling storage and blasting work shall be adequately insured by the Contractor.

Storage shall be under a very reliable person approved by the Engineer, who may, if necessary conduct police enquiries as to his reliability and antecedents. The Contractor shall have to produce a security for the person in-charge of the explosive, if and when required by the Engineer, or the civil authorities of the project road location.

The Contractor shall make sure that his superintendents and workmen are fully conversant with all the rules to be observed in storing, handling and use of the explosives. It shall be imperative that the superintendent in charge is thoroughly acquainted with the details of the handling of explosive and blasting operations.

518.6 Rate of Charge

To establish the safe charge per delay the Contractor will have to demonstrate by necessary instrumentation for the approval of the Engineer.

600 QUARRIES, BORROW PITS, STOCKPILE AND SPOIL AREAS

601 General

The Employer will not make available to the Contractor any land for quarries, borrow pits, stockpile and spoil areas, except for those in the road reserves and specifically approved by the Engineer.

The Contractor will be entirely responsible for locating and providing suitable sources of materials complying with the specifications and for procurement, winning, haulage to site of these materials, rehabilitating the borrow pits, quarries, stockpile and spoil areas, and all costs involved therein. Similarly, the Contractor will be responsible for provision of areas for stock piling materials and disposal of spoil dumps or stockpiling within the road reserve. The Contractor may utilize them subject to the approval of the Engineer.

No additional payment will be made to the Contractor to cover costs arising from the requirement of this clause. The Contractor shall include the costs of complying with this clause in the rates and prices inserted elsewhere in the Bill Of Quantities.

601 Definitions

Add the following to Clause 602:

(d) Materials Report

The information on possible material sites is given for the general guidance of bidders. However, bidders are advised to conduct their own investigation as the information contained therein is neither guaranteed nor warranted.

700 EXCAVATION AND FILLING FOR STRUCTURES

703 Excavation of foundations for structures

Make amendments to this clause as follows: -

Read the second paragraph as “unless otherwise instructed by the Engineer, all excavated surfaces in material other than hard material, on which foundations for structures shall be placed, shall be compacted to 100% MDD (AASHTO T.99) immediately before structures are constructed.

Paragraph 4, last line: - Replace "95%" with "100%".

Add the following to this clause:

703.1 Preparation of Foundation and Approval

(a) Preparation of Foundation

The bottom of foundations shall be levelled both longitudinally and transversely or stepped as directed by the Engineer. Where the material met with is other than rock, the same shall be compacted to at least 95% MDD. Where rock and soil are met with in part widths, the area in the soil portion shall be sub-excavated to a depth of 100 mm and backfilled with Class 15/20 concrete. All rock faces shall be freed of soft and loose material, cleared and cut to a firm surface, level, stepped or serrated as directed by the Engineer. All seams shall be cleared out and filled with cement mortar, to the satisfaction of the Engineer.

(b) Approval of Foundation

After excavation in each location is completed, the Contractor shall notify the Engineer, and no foundation concrete shall be placed until the Engineer has approved the depth of the excavation and the character of the foundation material.

703a Erosion Protection Works at Upstream and Downstream of Culverts/Bridges

703a.1 Scope

The work shall consist of provision of erosion protection works in the form of bed flooring and curtain or cut-off walls at the upstream and downstream ends of the new as well as the existing box/pipe culverts. The work shall be carried out to such designs and at such locations as indicated on the Drawings or as directed by the Engineer.

The erosion protection works shall consist of dry rubble stone bed flooring and random rubble masonry curtain (cut-off) wall at the upstream and downstream ends of box/pipe culverts.

703a.2 Materials

The material for bed flooring shall be dry rubble stone, each stone weighing not less than 40 kg.

The curtain wall shall be constructed of random rubble masonry in cement mortar of 1:3.

703a.3 Construction Operations

(a) Curtain Wall

The trench for the curtain wall shall be excavated as per Clause 703 of the Standard Specification at such locations and to such depths shown on the Drawings or as directed by the Engineer. After preparing the foundation bed, the curtain wall shall be constructed to the thickness shown on the Drawings and to levels up to top of the bed flooring.

(b) Floor Paving

The bed for the flooring shall be prepared by excavation in accordance with Clause 703 of the Standard Specification or filling in accordance with Clause 707 of the same specification, levelled and compacted to at least 98% MDD. The top of bed shall be prepared to such levels that after construction of the bed flooring, it is in line with the invert of the culvert barrel and sloping away. The bed flooring shall end before the curtain wall.

703a.3 Backfilling of Excavations and Filling for structures

Make amendments to this clause as follows

Delete “95% where ever it appears and insert “100%”.

708 Protection of Structures

Add the following to Clause 708.

Unless specific provisions for any structure in respect of cofferdams has been made in the Bill of Quantities, no payment will be made for the erection, maintenance and removal of cofferdams and the Contractor's rates shall be deemed to be all inclusive.

709 Excavations for River Training and New Watercourses

Add the following to Clause 709:

For culvert widening the Contractor shall inspect the structures to be widened and allow for any river training works he deems necessary in his rates for excavation.

710 Stone Pitching

Add the following to Clause 710:

Stone pitching to drains, inlets and outlets of culverts to embankments and around structures shall consist of sound un-weathered rock approved by the Engineer.

All stone for pitching shall be capable of withstanding a crushing stress of 20 N/mm² when soaked. The source of stone shall be free from overburden, mudstone, cracks, sand holes, veins, laminations or other imperfections as may be identified by the Engineer during the approval process.

The surface to receive the pitching shall be compacted and trimmed to slope and the stone laid, interlocked and rammed into the material to give an even finished surface.

In areas where stone pitching has been damaged, the Contractor shall identify such areas and notify the Engineer for his agreement of the extent of the Works required and his approval and instructions to proceed with the Works. Stone pitching repair and reconstruction shall be carried out in accordance with Clause 710 of the Standard Specification. The Works shall involve removal of the damaged stone pitching and reconstruction of the said areas in accordance with Clause 710 of the Standard Specification by the use of the sound salvaged material together with any necessary additional material where all such materials shall comply with Section 7 of the Standard Specification

711 Gabions

Where instructed by the Engineer the Contractor will install gabions as protection works to washout areas or bridge Piers and or Abutments. Gabions shall be constructed in accordance with Clause 711 of the Standard Specification.

In cases where existing gabions have been damaged, the Contractor shall identify them and notify the Engineer for his agreement of the extent of the Work required and his approval and instructions to proceed with the Works.

The Works shall involve removal of the damaged gabions / rocks, excavation to the correct levels and grades as directed by the Engineer, and in accordance with Clause 711 of the Standard Specifications and reconstruction with new gabions and other necessary materials as necessary. The damaged gabions shall be recovered and transported to the nearest D.W.O's Yard or MoR Department depot.

712 Rip-Rap Protection Work

Quarry waste or similar approved material shall be used to backfill scoured and eroded side, outfall and cut-off drain. The material shall be compacted to form a flat or curved surface preparatory to stone pitching of drainage channels, existing and new scour checks as directed by the Engineer.

The surface to receive the pitching shall be compacted and trimmed to slope and the stone hand laid, interlocked and rammed into the material to give an even finished surface. The interstices of the Pitching shall be rammed with in-situ material. The in-situ material immediately behind the pitching shall be compacted to minimum density of 100% MDD compaction (AASHTO T.99)

712 Backfill Below Structures

Where instructed this shall be carried out in compliance with the requirements of Clause 507 and 804 of the Standard Specification.

800 CULVERT AND DRAINAGE WORKS

804 Excavation for Culverts and Drainage Works

In the Standard Specification make the following amendments on this clause:

In paragraph 6, line 3, in paragraph 7, line 5 and in paragraph 11, line 6, delete reference to “95%” and insert “100%”.

804 Excavation in Hard Material

In the Standard Specification, sub-clause 805 (a) and (b) delete reference to “95%” and insert “100%”.

809 Bedding and Laying of Pipe Culverts

In the Standard Specification, sub-clause 809 (a), delete reference to “95%” and insert “100%”.

Add the following to Clause 809:

(d) Laying, Bedding and Surround for Culverts Cast In-situ

In addition to the requirements of the Standard Specification, where inflatable balloon method of casting culverts in-situ is used, it is essential that thorough pre-construction trials are carried out and necessary adjustments made to ensure that:

All concrete used for surround and the top 50 mm or 80 mm of bedding for culverts size 600 mm and 900 mm internal diameters respectively shall be Class 30/20 while the rest of the concrete shall be class 20/20.

The inner concrete barrel surface immediately in contact with the inflated balloon form during placing shall achieve Class F3 finish.

810 Jointing Concrete Pipes

In addition to the requirement of Clause 810 of the Standard Specification, all precast concrete pipes shall be ogee jointed pipes laid with a 1:2 (cement: sand) mortar and provided with fillets on the outside and as described in the Standard Specification.

810 Backfill

In the Standard Specification make the following amendments to this clause:

(a) Wherever the expression “dry density of 95% (AASHTO T99)” occurs, this expression shall be deleted and replaced with “dry density of 100% (AASHTO T99)”.

(b) Delete paragraph 6: “For pipes culverts...depth of 150 mm”, entirely.

814.1 Subsoil Drains

In the event of excavation for repairs exposing local seepage, springs or unacceptably high water table, the Engineer may instruct the provision of counter fort or French drains.

These drains shall consist of a trench excavated to the alignment, width, depth and gradient instructed by the Engineer, and backfilled with approved compacted clean hard crushed rock material as specified in clause 815 of the standard specification. Where these drains lie within the carriageway the carriageway shall be reinstated with compacted stabilised gravel and surfaced with hot asphalt or a surface dressing as instructed by the Engineer.

814.2 Filter Fabric To Subsoil Drains

A filter fabric shall be placed under, around and over rock fill of the subsoil drains. The provisions and placing of the fabric shall be in accordance with manufacturer's instructions and complying with Clause 804 and 814 of the Standard Specification. Payment shall be in metre square of the fabric used.

813 Invert Block Drains and Half round Channels

Invert Block Drains and Half Round Channels shall be constructed as shown in the drawings provided in accordance with the Standard Specifications where directed by the Engineer.

816 Minor Drainage Structures

Add the following to this clause:

Concrete Lined Drains

The exposed surfaces of concrete lined drains shall be a class UF2 finish. Concrete lined drains shall be constructed to the same standard as the minor drainage structures.

Cast in situ chutes on side slopes

Where pre cast chutes are provided, refer to Section 1 of this the specifications.

816 Mitre Drains, Cut-off Drains, Catch Water/Drains, Outfall Drains and Earth Dams

Rename the existing text as 817.1 and add the following sub-clauses:

817.2 Cleaning Existing Drains

Where instructed by the Engineer, the Contractor shall clear blocked side drains and/or outfall drains to a free flowing condition. The work shall consist of but not be limited to:

Stripping and removal of extraneous material including vegetation and roots to spoil
Carting away and spreading any spoil to the satisfaction of the Engineer, and
Reshaping the drains to a free flowing profile.

817.3 Cleaning of Hydraulic Structures

Where instructed by the Engineer, the Contractor shall clean the existing hydraulic structures by removing all undesirable material in the structures to ensure they are clean and free flowing. The Contractor shall dispose of all the silt and other undesirable material to spoil. After the cleaning out of structures, the Contractor shall be responsible for maintaining the hydraulic structures in a clean condition for the duration of the Contract.

817.4 Removal of Existing Pipes, Inlet and Outlet Structures

The Contractor shall remove existing concrete pipes where instructed by the Engineer including bedding, surround, inlet and outlet structures. Concrete shall be disposed of as directed by the Engineer. Masonry structures where in a good condition shall be preserved to reuse as may be directed by the Engineer. Additional material shall be added to the void left after removal of these pipes and structures and shall be carefully compacted to 100% MDD (T99). The void shall then be preserved for placement of any new pipes or construction of new structures.

The existing inlet and outlets structures, where in good condition, and reusable as beds to pipe extensions, shall not be removed. Any such structures removed without the Engineer's approval shall be restored to the original condition at the Contractor's expense.

817.5 Extension of Existing Pipes

Where shown on the drawings or instructed by the Engineer, the Contractor shall extend the existing concrete pipes. Part of the existing pipe surround shall be broken and concrete collar constructed as shown on the drawings. The extension shall be backfilled to the same standards as for new pipes.

817.6 Chute drain for High Embankment Sections

(a) Scope

This work shall consist of construction of chute drain on the slope of the road embankment including erosion protection works at the locations and to dimensions shown on the Drawings or as directed by Engineer. The schedule of works shall be so arranged that the drains are completed in proper sequence with roadway to ensure that no damage is caused due to lack of drainage.

(b) Materials

The drains shall be of half round pipe of 600 mm dia. formed by joining pre-cast semicircular RCC sections at site as shown in the drawings. The RCC work shall conform to the relevant clauses of these specifications.

The toe wall below ground level shall be of brick masonry in cement mortar 1:4 or plain cement concrete of class 15/20, as shown on the Drawings.

Dumped riprap for erosion protection at ground level shall be hard, unweathered and durable rubble stone of size 150 mm to 250 mm.

(c) Construction Operations

Excavation for fixing drain sections at the locations where the chute drains are to be installed, a semi-circular cut on the side slope of the embankment along the line of the chute drain shall be made in such a way that the RCC drain sections could be fixed snugly with their edges flush with the adjoining embankment slope. The sloping bed of the drain shall be to a regular line and suitably compacted to provide a firm bed.

817.7 Stone Masonry and Concrete Paving

(a) Description

The work shall consist of construction of lined ditches, stone paved shoulders, hard strips, chutes, toe walls, retaining walls, slab culvert walls, head walls, wing walls, aprons and slope protection works using natural stones for stone related masonry and precast concrete blocks for concrete block masonry set in cement mortar.

(b) Materials

(i) Stones

Stones used shall be hard and durable without weak seams or cracks and of rectangular shape. The Los Angeles Abrasion Value shall not exceed 50. The apparent specific gravity shall not be less than 2.2 and water absorption when tested in accordance with AASHTO T85 shall not exceed 5 percent.

(ii) Concrete Blocks

Concrete blocks for concrete block masonry shall be precast from Class 20/20 concrete while those used for paving shall be in Class 25/20 concrete. The blocks shall, in general, have the length, width and height in the proportion of 3:1.5:1 or as

ordered by the Engineer. The blocks shall be moist cured for at least 7 days, and kept under cover for another 21 days in the casting bed before being lifted for use in the works. The blocks when tested flat after 28 days of casting shall have a compressive strength not less than 125 percent of the cylindrical compressive strength specified for the class of concrete used.

(iii) Mortar

The mortar shall be made of a mixture of cement and sand in the proportion of one cement to three sand. Cement shall be Portland cement conforming to AASHTO M85, Type I or II. The sand shall be crushed stone or natural sand or a combination thereof conforming to AASHTO M45. Water added shall be just adequate for making a workable mix and shall be subject to the approval of the Engineer.

(c) Construction Requirements

(i) Stone Masonry

The stone masonry shall be used for walls of different types above the ground level. The stones shall be of regular shape with length of any stone not exceeding 3 times its height, with the breadth on the bed not less than 150 mm nor greater than three quarters of the thickness of the wall. Unless otherwise directed, the stone shall have thickness not less than 150 mm.

All stone possessing bedding planes shall be laid with its natural bed as nearly as possible at right angles to the direction of the load, and in case of arch rings, the natural bed shall be radial.

Each course shall present a uniform horizontal line of more or less equal height. Vertical joints shall be broken by the adjoining courses. All joints shall be sufficiently thick to prevent stone to stone contact and shall be completely filled with mortar. On the exposed face no part of the masonry shall deviate from the general line of the wall by more than 20 mm.

Walls of stone masonry shall be provided with weep holes as shown on the Drawings or directed by the Engineer. In continuous long structures, expansion joints shall be formed as shown on the Drawings subject to a minimum spacing of 10 m.

All face joints shall be finished almost flush with the surface of the work without covering the stones. The top surface of all walls shall be provided with 20 mm thick cement mortar coping with a crossfall for shedding rainwater.

Newly laid masonry shall be protected against the harmful effects of weather and cured for a minimum period of 4 days. All visible surfaces of the masonry shall be clean and free from mortar stains and other blemishes.

Backfill behind the stone masonry walls shall be placed only after the masonry work has been in place for at least 14 days or as directed by the Engineer.

(ii) Grouted Stone Riprap

This type of masonry that is constructed in a single layer over a bed of mortar shall be used for shoulder paving, hard strips, aprons, drainage chutes, lined ditches and slope protection. The stone shall be of regular shape and uniform thickness. Prior to laying of the stone, the base shall be brought to regular shape and levels, watered and well compacted. Where this type of masonry is to be used for paving shoulders or for carriageway widening of the existing roads, the base shall be slightly loosened, watered and compacted to 95% MDD prior to application of the riprap. The stone shall be placed over a bed of mortar about 20 mm thick. After placement of the stones by hand, all the joints shall be completely filled with cement mortar. The finished work shall present a uniform surface with no point deviating from the general line by more than 10 mm in the case of shoulder paving, and hard strips, and not more than 25 mm in other cases. The finished work shall be protected against the adverse effects of weather and cured for at least 4 days.

(iii) Dry Stone Riprap

This work shall consist of placing 150 mm to 300 mm size rubble stone on the front side of cut-off walls of culverts and Irish Crossings as erosion protection measure. The dimensions of the riprap construction shall be as shown on the drawings or as directed by the Engineer. The stone used shall be of hard and durable type as are used for stone/boulder masonry. The stone shall be so placed that major hollow spaces are avoided.

(d) Measurement and Payment

(i) Stone Masonry

The quantity to be paid will be measured by volume in m³ of stone masonry complete in place and accepted. In computing the volume for payment, the dimensions used will be limited to those shown on the Drawings or ordered in writing by the Engineer.

No deductions will be made for weep holes, drainpipe or other openings of less than 0.2 m² in the area. The cement mortar coping on top of the wall shall be included in the measurement for stone masonry.

If the masonry is for heightening or lengthening an existing wall, the work of removing the plaster, if any, on the old wall including roughening of the surface to effect good bonding shall be considered incidental to the work and shall not be paid for separately.

The quantities of excavation below ground level and backfilling will be measured as structural excavation.

(ii) Grouted Stone and Dry-Stone Riprap

Grouted Stone Riprap shall be measured by m² of completed and accepted work placed to the specific thickness. Measurement shall be limited to the dimensions shown on the Drawings or as otherwise authorised by the Engineer. No measurement shall be made of unauthorised areas or for extra thickness. Toe walls and cut-off walls below ground level shall be measured in m³ and paid for as Boulder Masonry.

Where the rip-rap is used for shoulder paving or for widening carriageway of existing road, the bed preparation shall be measured as sub-grade preparation in accordance with Clause 508 of the Standard Specification. In all the other cases, slope and bed preparation shall not be measured for payment but will be considered subsidiary to the pay item.

Dry Stone Riprap shall be measured as placed in position in m³. Any excavation for making space for placing the riprap shall be measured as common excavation in accordance to Clauses 504 and 505 of the Standard Specification.

(iii) Payment

The amount of completed and accepted work as measured will be paid for at the bid unit prices per m³ for “Stone Masonry”, “Dry Stone Riprap” and “Grouted stone riprap”, used for shoulder paving, hard strips, ditch lining, aprons, drainage chutes and slope paving. These prices shall be in full compensation for furnishing and placing all materials, and for all labour, equipment, tools and incidentals necessary for completion of the work complying with the specifications.

Add the following to Clause 819 of the Standard Specification:

819.1 Scour Checks

Scour checks are to be constructed in mass concrete in accordance with clause 818 of the standard Specifications and the drawings as shall be provided.

819.2 Repair of Drainage Spouts

The repair of drainage spouts shall be made by cleaning of the existing drainage pipes of all muck and replacing the broken pipes or by providing new drainage spouts in cases where the same have not been provided.

(a) Materials

Ordinary Portland cement KS 1825
Aggregates conforming to BS 5328
GI Pipes
Paint.

(b) Equipment

Welding equipment
Painting brushes
Miscellaneous construction equipment

(c) Procedure

The existing drainage spouts shall be cleaned of all muck. The new GI drainage spouts shall then be replaced for the damaged spouts as per the detailed drawings.

In case where drainage spouts have not been provided, the RCC kerb shall be cast after fixing new pipes as per the detailed drawings. The casting of concrete and fixing of pipes shall be made as per the standard practice.

The GI drainage spouts shall be painted with black anticorrosive paint of approved brand and manufacture to give an even shade.

The existing reinforcement shall be realigned and additional reinforcement shall be provided as per the drawings or as directed by the Engineer.

Concrete shall be mixed and laid as per the standard practice and as per the drawings. For bonding old concrete with the new concrete, the old concrete surface shall be painted with epoxy bonding agent or polymer cement slurry before the concreting is cast.

820 Measurement and Payments for Additional Items

(a) Item: Concrete for top 50 mm or 80 mm bedding and surround for culverts cast in situ.

Unit: m³

The rate for concrete for each size of culverts instructed shall include for the cubic metre of the top 50 mm or 80 mm of concrete for bedding and surrounds, as instructed, calculated from the dimensions on the drawings or as directed by the Engineer.

The rate for concrete for bedding and surrounds for culverts cast in situ shall include for the cost of providing and placing the concrete and complying with Clauses 809, 810, 814, 819 and 1713 of the Standard Specification.

No extra payment shall be made for provision of inflatable forms and other requirements for casting culverts in-situ and the Contractor shall be deemed to have provided for these in his rates.

(b) Item: Cleaning and grading the existing outfall and metre drains

Unit: m³

Cleaning the existing drains shall be measured by the volume instructed. The volume shall be the product of the cross sectional area of the material to be removed from the drain and the length instructed.

(c) Item: Removal of material from existing side drains

Unit: m³

Cleaning of the existing drains shall be measured by the volume instructed. The volume shall be the product of the cross sectional area of the drain to be cleaned and the length instructed. Payment will not be made under this item where the material can be removed in conjunction with bulk earthworks.

(d) Item: Removal of the existing pipes

Unit: m³

Removal of the existing pipes shall be measured by the length of culvert removed. It shall include for breaking out where necessary and carting of the removed culvert and surrounds to spoil or stockpile as shall be directed by the Engineer. It shall also include all the costs of complying with the requirements of Clause 817.3.

(e) Item: Demolition of inlet and outlet structures

Unit: m³ of concrete or masonry

Demolition of inlet and outlet structures shall be measured by the volume of concrete or of masonry structures demolished. There will be no distinction between reinforced and un-reinforced concrete structures. The rate shall include for disposal of concrete and reuse of masonry as directed by the Engineer. Stone pitching shall not be measured separately and where it is to be removed shall be treated as normal site clearance.

(f) Item: Cleaning the existing hydraulic structures

Unit: m³

Cleaning of the existing hydraulic structures shall be measured by the volume of material removed. The rate shall include for the cost of removing all undesirable material, transporting and disposing off as well as the additional costs of gaining access to the structures as specified and maintaining the structures in a clean condition.

(f) Item: Concrete Collar

Unit: m³

Reinforced concrete collars shall be measured by the volume of concrete placed as shown on the drawings or instructed by the Engineer.

Where the existing culvert which is to be extended has a concrete surround, the rate shall also include for removal of this surround for the length of the collar to be placed around the existing culvert.

In all cases the rate shall also include for excavation below the culvert and the preparation and compaction of the in situ material to form a bed for the collar.

821 Cement Mortared Stone Masonry Walls

Masonry walling shall be constructed with sound clean stone with a minimum width of 200 mm. The stone shall have a fair finish. The stone shall be individually placed to break joint and to provide a minimum of voids. The stone shall be wetted and jointed in a 3:1 (sand: cement) mortar. Exposed stone on the wall faces shall be cleaned of mortar by washing or wire brushing. The mortar shall be flush pointed to the approval of the engineer.

Weep holes shall be provided as instructed and shall be cleaned of mortar and any other clogging material that may have entered during construction.

The walling shall be protected from the weather and kept moist for a minimum of seven (7) days after completion.

822 Subsoil Filter Drains

The Contractor shall lay subsoil filter drains where shown on the drawings or instructed by the Engineer. The drain shall extend to the underside of the sub-grade or sub-base and shall consist of a perforated pipe wrapped in geotextile fabric as specified in the Standard Specifications and shown on the drawings. The pipe and fabric shall be laid on and backfilled with granular filter materials. The granular material shall comply with the requirements given in the table below.

BS Sieve Size (mm)	Percentage by mass Passing Sieve	
	Minimum	Maximum
37.5	100	100
20	85	100
10	50	100
5	35	90
1.18	15	50
0.600	5	35
0.150	0	5

823 Gulley Pots and Chambers

Where shown on the drawings or instructed by the Engineer, the existing roadside gulleys and gulley pots shall be adjusted before laying final wearing course such that there are no depressions around man holes, gulleys or chambers. The beds, frames and haunches shall be adjusted with concrete Class 20/20 true to line and level and to the satisfaction of Engineer.

824 Pedestrian Crossings

Where shown on the drawings or instructed by the Engineer, the Contractor shall construct pedestrian crossings across open drains. The crossing will be 2 m wide, with culverts located as directed by the Engineer. The pedestrian crossing shall be finished to the same standards as the adjacent footpath. Where there is no footpath, the crossing shall be finished with approach path comprising 150 mm gravel base with surface dressing similar to the adjacent shoulder as directed by the Engineer.

824 Measurement and Payment for Further Additional Items

(a) Item: Preparation of bed for concrete lined open drains

Unit: m²

The unit of measurements shall be the square metre of excavation trimmed to receive concrete lining. The rate shall include for all the excavation below the finished line of the drain, providing and laying of gravel bed, and compacting and shaping to the line and level required to receive the concrete lining.

(b) Item: Cast in situ concrete chutes

Unit: m³

Cast in situ shall be read as "Pre-cast". Pre Cast concrete chutes shall be measured by the volume of concrete cast. The rate shall include for preparation of sides, laying, fixing and for complying with the requirements of Sections 8 and 17 of the Standard Specification.

900 PASSAGE OF TRAFFIC

903.1 Maintenance of Existing Road

Amend as follows:

The Engineer shall hand over the existing road to the contractor, in sections, at the commencement of the Contract for construction purpose. However, the Contractor shall be responsible for all repairs and maintenance of the entire road package for the duration of the Contract. The existing road is bituminous and the Contractor shall maintain it with asphalt materials or other materials similar to those of the existing pavement layers. The Contractor shall regularly inspect the road and carry out such repairs and maintenance to the satisfaction of the Engineer. If at any time the Engineer draws the Contractor's attention to a road section which requires maintenance the Contractor shall promptly repair the section. The Contractor shall be legally responsible for any accident or damage attributable to his failure to maintain the road.

Add the following to this clause:

903.1 Maintenance of Right of Way

Throughout the period of the Contract the Contractor shall at all times maintain public vehicular access to the right of way, within the right of way and from the right of way to all public and private land, as it was immediately prior to his commencement of the Works.

The Contractor may, on submission of written request to the Engineer, including a drawing, programme and specification, be given approval to operate:

- (a) A road diversion suitable for the road traffic and suitable width or
- (b) Traffic on a one way system using manual coordinated direction control or automatic traffic lights having a secure source of power.

Applications for approval shall show every detail of the proposals including road construction cross section including pavement, surfacing, profile and drainage, road signing, communication between the ends of the controlled section lighting and the proposed period of operation.

One way systems shall be provided with adequate sign posting and the Contractor shall limit delays to any traffic to the minimum and with the approval of the Engineer. The travelling public shall be notified by signs, of exceptional delay well in advance of the site of delay, as required by the Engineer.

Payment for temporary diversions, traffic provisions and maintenance of roadways shall be as provided in the Contract and as instructed by the Engineer.

904 Construction of Deviations

Add the following paragraph between the second and the third paragraphs of Item (a):

The Contractor shall programme his works in such a way that traffic shall not be required to pass over more than 1.5 km at any one time unless otherwise approved by the Engineer.

906 Passage of Traffic through the Works

Add the following to this Clause.

The Contractor shall be deemed to have inspected the site and satisfied himself as to the adequacy of his bid for these works and no additional payments will be made for any expenditure on traffic control. Should the Contractor propose any other method of passage of traffic including construction of traffic deviations and use of the existing roads the Contractor shall investigate the alternatives, construct and maintain them to the satisfaction of the Engineer. The Employer shall

not be liable for investigations or costs arising from the alternatives methods of traffic control proposed by the Contractor. Deviations or other measures for traffic control where proposed by the Contractor shall meet the requirements of the specifications and drawings and be approved by the Engineer.

The Contractor shall ensure that the workforce and site supervisory staff at all times wear high visibility garments when work is carried out on or adjacent to a section of the road open to traffic. The Contractor shall ensure that the supervisor or person in charge of the work force is readily recognized from the rest of the workforce. In addition, the Contractor shall provide a full time traffic safety officer to coordinate aspects of road safety for the whole site.

The Contractor shall be deemed to have included all costs related to employing the traffic safety officer and for all the duties performed by him in his rate for passage of traffic.

906 Measurement and payment

Item: Construction of Deviation

Amend as follows:

The rate for construction of deviation shall include provision, placing, forming and compaction of gravel sub-base, stone base and bituminous wearing courses.

Item: Provide and Maintain Road Signages

Unit: Lump Sum

Payment of the lump sum shall be through equal monthly instalments over the period of the Contract on a pro rata basis subject to the approval of Engineer.

(c) Item: Maintain existing Roads and deviations

Unit: Lump Sum

Payment of the lump sum shall be paid per kilo metre length the period of the Contract, excluding the Defects Liability Period provided that the total sum of instalments paid shall not exceed the lump sum; and

If any month the Engineer is not fully satisfied that the Contractor has fully complied with all the provisions of this sub-section, the Employer shall withhold the whole of the instalments due to the Contractor and the Engineer shall, in addition, deduct from any monies due to the Contractor a sum of Kshs 150,000 per day for the period of non compliance from the date of the Engineer's notice for that month.

Where notified by the Engineer the contractor shall complete maintenance on a section or sections of the road so notified within 14 days. Provided further that, if the Contractor fails to complete maintenance on any section within 14 days of the Engineer's notification thereof, the Engineer shall deduct Kshs. 200,000 for delay per day.

(d) Item: Reinstatement of Deviations

In the first paragraph of Clause 912 (h), delete the words "by the lump sum stated in the Special Specification" and replace with 'as described under Item 9.04 of the Bill of Quantities'.

1100 SHOULDERS AND FOOTPATHS

Add the following to this section:

1107 Footpaths

Where shown on the drawings or directed by the Engineer, footpaths shall be constructed. The Footpaths shall be constructed using the precast concrete paving blocks as the finish or asphalt or gravel wearing course. The line of the footpaths shall be as shown on the drawings or as directed by the Engineer.

1107.1 Pre-cast Concrete Paving Blocks

Precast concrete blocks shall be hydraulically pressed, complying with BS 7263: Part 1.

Block

s

shall be laid in accordance with BS 7263: Part 2 to the required cross fall.

1107.2 Flexible Surfacing for Footpaths and other Paved Areas

Flexible surfacing for footpaths and paved areas shall be laid in compliance with section 16 of the Standard Specification.

Surfacing shall be laid true to level and cross fall as shown on the drawing or instructed by the Engineer. Payments for flexible surfacing on footpaths will be measured and paid in accordance with the provisions of section 16 of Standard Specification.

1108 Measurement and Pavement

(a) Item: Precast Concrete Paving Blocks

Unit: m²

Precast concrete blocks shall be paid by the area measured on plan. The rate shall include for supplying, laying the bedding, jointing, compacting, laying at kerbs and radii and all the Contractor's obligations with respect to this clause.

1200 NATURAL MATERIAL SUB-BASE AND BASE

1201 General

The Contractor shall, as directed by the Engineer, bench and compact the subgrade to 100 % MDD (AASHTO T99), provide, lay and compact material for sub-base and base as directed by the Engineer and in accordance with Sections 5 and 15 of the Standard Specifications

1203 Material Requirements

Natural materials for base and sub-base shall conform to the specifications given in Section 12 of the Standard Specifications for Road and Bridge Construction for cement and lime improved base and sub-base.

1209 Measurement and Payment

Natural material for sub-base and base shall be measured by the cubic metre placed and compacted upon the road calculated as the product of the compacted sectional area laid and the length.

1300 GRADED CRUSHED STONE SUBBASE AND BASE

1303 Material requirements

The material for graded crushed stone Sub-base/base shall comply with requirements for Sub-base stone Class B 0/40 and that for the Base stone Class B. 0/30. After compaction and compliance with the requirements of Clause 1403 of this specification below, the Sub-base/Base graded crushed stone material shall have a maximum of 8% of particles smaller than 0.075 mm and the resultant layer shall comply with all requirements of Section 13 of the Standard Specification.

The crushing ratio for all graded crushed stone pavement materials shall be minimum 100%.

1306 Laying and Compacting Graded Crushed Stone Sub-base and Base

Graded crushed stone shall be laid by a paving machine.

Add the following to this section:

1311 In Situ Reprocessing of Graded Crushed Stone

In pavement reconstruction sections with an existing graded crushed stone base, the existing graded crushed stone shall be used in pavement and shoulder construction. The bituminous layer shall be removed to spoil or for recycling as instructed by the Engineer, leaving in place the existing graded crushed stone base in situ. After removal of surfacing, the graded crushed stone shall be jointly inspected by the Engineer and Contractor and any contaminated material re-used in earthworks, deviations or disposed off in manner approved by the Engineer. Where the contaminated layer extends into a lower pavement layer, the Existing sub-base or sub-grade layer shall be reworked and re-compacted before reprocessing the graded crushed stone layer. Before addition of any stone material the existing surface shall be lightly compacted to remove undulations and levels taken. The Contractor shall confirm the grading of the stone material and shall add imported material, mixed in such a manner that the reprocessed material shall comply with the requirements of Clause 1303 of the Standard Specification. The material shall be scarified, mixed, watered, spread and compacted as sub-base or base in the carriageway and/or shoulders as shown on the drawings or directed by the Engineer.

1400 CEMENT TREATED MATERIALS

1403 Cement Treatment

Cement for improvement shall be Ordinary Portland Cement complying with Clause 207 of the Standard Specification. The cement content of the improved graded crushed stone material will be in the range of 1% to 2% by weight. The actual cement content requirement will be determined on site as directed by the Engineer after laboratory and site trials.

1500 BITUMINOUS SURFACE TREATMENTS AND SURFACE DRESSING

1502B Materials for Prime Coat and Tack Coat

- (i) The binder for prime coat shall be MC 70 cutback bitumen. This shall be applied over granular surface to receive any bituminous layer.
- (ii) The binder for tack coat shall be K1-60 bitumen emulsion. This shall be applied over bituminous surface to receive further bituminous layer. A tack coat shall also be applied on prime coat, which has lost its adhesive properties due to contamination, long exposure or weathering before receiving bituminous layer. Such an application shall be made without additional expenditure by the Employer, unless it is required due to reasons outside the Contractor's control.

1504B Spraying of Prime Coat and Tack Coat

- (i) The rate of application of prime coat shall be from 1.0 to 1.2 litres/m². The exact quantity to be applied may be varied within these limits to suit field conditions and will be determined from trials by the Contractor and approved by the Engineer.
- (ii) The rate of application of the tack coat on bituminous surface shall be 0.3 to 0.8 litres/m². The exact quantity to be applied may be varied within these limits to suit field conditions and will be determined from trials by the Contractor and approved by the Engineer.

1600 BITUMINOUS MIX BASES, BINDER COURSES AND WEARING COURSES

1600A GENERAL

1603A Construction Plant

(a) Compaction Plant

To achieve specified densities, it is expected that vibrating rollers will be required to achieve satisfactory results. It is essential that thorough pre-construction trials be carried out to ensure that the vibrating rollers are set up at the optimum amplitude and frequency for the material being laid that they do not break down aggregate particles and that the optimum compaction temperatures are established to allow compaction without creating ripple effects or other distortions of the surfacing.

1606A Site trials

Delete the second paragraph and insert the following:

The trials shall be carried out to:

Test materials designed in the laboratory so that a workable mix, which satisfies the specified requirements can be selected.

Enable the Contractor to demonstrate the suitability of his mixing and compaction equipment to provide and compact the material to the specified density and to confirm that the other specified requirements of the completed asphalt pavement layer can be achieved.

Renumber paragraph 5 from “(v)-(vi)” to read “(v)-(viii)”.

1607A Mixing of Aggregates and Bitumen

Delete the second and third paragraphs and then add the following:

The aggregates minus the filler prepared as specified above shall be accurately weighed and conveyed into the mixer in proportionate amounts of each aggregate size required to meet the job-mix formula. The required amount of bitumen for each batch shall be introduced into the mixer in batch mixing. The bitumen shall be added after the aggregates have been introduced into the mixer and mixed for 5 to 10 seconds. The filler shall be added after the bitumen and mixing shall continue after addition of the filler for at least the time recommended by the plant manufacturer or as much extra time as is necessary to obtain a homogenous mixture but for no longer.

The Aggregates and bitumen shall each be heated to enter the mixing chamber at temperatures selected within the range 150 °C to 170 °C. The temperature of the stone at entry to the mixing chamber shall not be more than 15 °C higher than that of the bitumen; the temperature of the bitumen shall be such that on entry to the mixer its Kinematic viscosity is in the range of 150-300 centistokes. The temperature of the aggregate and bitumen at entry into the mixing chamber shall be chosen within the above limits and having regard to the prevailing air temperature and haulage distance to ensure that the temperature of the mix is not less than 135 °C when it is laid and not less than 120 °C when rolling is commenced. If excessive displacement occurs under the roller the minimum rolling temperature may be reduced at the sole discretion of the Engineer.

The volume of the aggregates and bitumen shall not be so great as to extend above the tips of the mixer blades when the blades are in vertical position. All overheated and carbonized mixtures which form or show indication of moisture will be rejected. When moisture is detected in the finished mixture, all aggregates in the bins shall be removed and returned to the stockpiles.

1608A Transporting the Mixture

Delete the entire clause and replace it with the following

The mix shall be transported from the mixing plant to the spreader in truck having tight, clean smooth beds, which have been treated to prevent adhesion of the mixture to the truck bodies. Gasoline, Kerosene, diesel fuel or other solvent shall not be used for this purpose. Loads shall be covered by

waterproof canvas or metal sheets during wet weather. Vehicles shall be insulated when the air temperature and/or length of haul make this necessary to maintain the temperature between specified limits. Any loads wetted excessively by rain will be rejected. Hauling over freshly laid material will not be permitted.

1609A Laying the Mixture

Add the following paragraphs:

Mixtures that have a temperature of less than 135°C when dumped into the paver will be rejected. The paver shall be adjusted and the speed regulated so that the surface of the course will be smooth and the course of such depth shall be such that, when compacted, it will conform to the cross-section shown on the drawings. Lanes shall be parallel to the road centreline.

All joints shall present the same texture, density and smoothness as other areas of the surfacing. The joints between old and new lanes or sections shall be carefully formed in such a manner as to ensure a continuous bond between the old and new pavement. All contact surfaces at cold joints, and joints with structures including manholes and pits shall be coated with a thin and uniform coat of MC 70 or other medium curing bitumen.

1610A Compaction

Add the following paragraphs:

Tests for conformity with the smoothness and levels specified shall be made by the Contractor immediately after initial compaction and any deviations in excess of the specified tolerances shall be corrected by loosening the hot surface with rakes and removing or adding materials as necessary before continuing the rolling. The speed of the rollers shall not exceed 5 km/h and shall at all times be slow enough to avoid displacement of the hot mixture. Any displacement of the mixture, occurring as results of reversing the direction of the rollers, or from any other cause, shall be corrected at once by loosening the surface with rakes and re-rolling. Rolling of the surfacing shall be continued until all roller marks are eliminated and the required density is obtained.

The rollers shall not be permitted to stand on surfacing which has not been fully compacted. Precautions shall be taken to prevent the dropping of oil, grease, gasoline or other foreign matter on any layer.

The Contractor shall provide competent workmen who are capable of performing all work incidentals to the correction of all surfacing irregularities.

After final rolling, no vehicular traffic of any kind shall be permitted for at least 24 hours.

1611A Finishing Joints and Edges

Add the following to this clause:

Construction joints in the various pavement layers shall be staggered by at least the following distances

Joints in Binder Course relative to joints in Wearing Course: 500 mm

Joints in Dense Bitumen Macadam base relative to joints in Wearing Course: 400 mm

The contractor shall produce a plan showing all pavement construction joints for approval by the Engineer before pavement construction commences.

Transverse joints in Dense Bitumen Macadam Base Binder and Wearing Course shall be staggered by at least 500 mm. The roller shall pass over the unprotected end of the freshly laid mixture only when laying of the surfacing is to be discontinued for such length of time as to permit the mixture to become cold. Otherwise 500 mm at the end of the lane shall be left uncompacted.

Cold transverse joints shall be cut back to expose an even, vertical surface for the full compacted thickness of the course and painted with medium curing cutback bitumen as specified above. The fresh

mixture shall be raked uniformly against the joint and carefully compacted to ensure a good bond with the cold material.

The Contractor shall adjust any kerbs, gully pots and chambers in accordance with final finished road level before laying the final Wearing Course.

1614A Tolerances

Add the following at the end of the second paragraph:

Passing sieves between 1.0 mm and 0.075 mm sizes, +3% by total weight of dry aggregate including mineral filler

Passing 0.075 mm sieve, +2% by total weight of dry aggregate including mineral filler

1600B ASPHALT CONCRETE FOR SURFACING

1602B Materials for Asphalt Concrete

(a) Penetration grade bitumen

Delete sub-section (a) and replace with the following:

Bitumen shall be penetration grade, and shall meet the requirements of Table 4.3 in ORN 19 as summarized below:

Table 4.3 (ORN 19) Minimum requirements for penetration grade bitumen

Test, based on Original Bitumen	Test Method (ASTM)	Penetration Grade		
Penetration at 25°C	D5	40/50	60/70	80/100
Softening point (°C)	D36	49-59	46-56	42-51
Flash point (°C) (Min)	D92	232	232	219
Solubility in trichloroethylene (%) (min)	2042	99	99	99
TFOT heating for 5h at 163°C:				
(a) Loss by mass (% (Max)	D1754	0.5	0.5	0.8
(b) Penetration (% of original), (Min)	D5	58	54	50
(c) Ductility at 25°C, (Min)	D113	-	50	75

The bitumen for asphalt concrete works shall 80/100 grade.

(b) Mineral Filler

Under this sub-clause in the Standard Specification, rename Table 16B-1 as 16B-1 (a)

Add the following

The coarse aggregate shall entirely be crushed rock from a source known to give high values of stability (>9 kN) in the Marshall Test. Crushed river gravel shall not be used. Aggregate shall be Class “a” meeting the requirements given in Table 16B-1 (b) below.

Table 16B-1 (b) Requirements for coarse aggregate (retained on 6.3-mm sieve)

Property	Test	Property
Cleanliness	Sand equivalent for <4.75 mm fraction (Material passing 0.425 sieve)	>40
	Plasticity index ²	<4
	Linear shrinkage	<2
Particle shape	Flakiness index (FI) ³	<25
Strength	Aggregate Crushing Value	<25
	Aggregate Impact Value (AIV) ⁴	<25
	10% FACT (dry) KN ⁴	<160
Abrasion	Los Angeles Abrasion (LAA) ⁴	<30
Soundness ⁷	Aggregate Abrasion Value ⁴	<12
	Sodium Sulphate Soundness (SSS)	
	Coarse Aggregate	<10
	Fine Aggregate	<16
	Magnesium Sulphate Soundness (MSS)	
	Coarse Aggregate	<15
	Fine Aggregate	<20
Polishing	Polished Stone Value	<60
Water Absorption	Water Absorption ⁶	<2
Bitumen Affinity	Immersion Mechanical Test: Index of Retained	<75
	Marshal Stability ⁸	<95% coating retained
	Static Immersion Test ⁹	<79% (at 75% VIM)
	Retained indirect Tensile Strength ¹⁰	

Key

1. AASHTO 1176
2. British standard 1377, part 2
3. British standard 812, part 105
4. British standard 812, parts 110 to 114
5. ASTM C131 and C535
6. British standard 812, part 2
7. AASHTO T104
8. D whiteoak (1990) (shell bitumen handbook)
9. AASHTO T182
10. AASHTO T283

The aggregates for bituminous mixes shall be stored in single sizes in separate bins or in areas covered with tightly laid wood planks, sheet metal, hard compact gravel, concrete or other hard and clean surfaces. The surfaces shall be self-draining, and in such a manner that will preclude the inclusion of foreign material. Aggregates of different grades and sizes and from different sources shall be stored in separate piles and if these piles are close together they shall be separated by bulkheads.

1603B Grading Requirements

The grading mixture of a coarse and fine aggregate shall be within and approximately parallel to the grading envelopes as given in table 16B-1(a) for O/20 binder coarse. In addition, the material shall comply with the requirements below.

The Contractor shall investigate a number of gradings so that a worktable mix, which also retains a minimum of 3% voids in mix (VIM) at refusal density, is identified. As guidance towards identifying a suitable grading, recommendations are provided in Tables 16B-1(c) and (d)

Table 16B-1 (c): Superpave aggregate grading control point

Nominal Maximum Size (mm), (Note 1 below)	Sieve size (mm)	Control point (%passing)	
37.5	0.075	0	6
	2.36	15	41
	25.0		90
	37.5	90	100
	50	100	~
25.0	0.075	1	7
	2.36	19	45
	19.0		90
	25.0	90	100
	37.5	100	~
19.0	0.075	2	8
	2.36	23	49
	12.5	~	90
	19.0	90	100
	25.0	100	~
12.5	0.075	2	10
	2.36	28	58
	9.5	~	90
	12.5	90	100
	19.0	100	~

Table 16B-1 (d): Superpave boundaries of aggregate restricted zone

Sieve size within restricted zone	Minimum and maximum boundaries of Sieve size for nominal maximum aggregate size (minimum / maximum % passing)			
	37.5	25.0	19.0	12.5
4.75	34.7-34.7	39.5-39.5	~	~
2.35	23.3-27.3	26.8-30.8	34.6-34.6	39.1-39.1
1.18	15.5-21.5	18.1-24.1	22.3-29.3	25.6-31.6
0.6	11.7-15.7	13.6-17.6	16.7-20.7	19.1-23.1
0.3	10.0-10.0	11.4-11.4	13.7-13.7	15.5-15.5

Note (1): The definition of Nominal Maximum Size of aggregate is one sieve larger than the first sieve to retain more than ten per cent of the aggregate. It is also recommended that where possible that largest particle size should not be more than 25 mm so that the requirements of the marshal test can be complied with.

Mixes identified for compaction trials shall be manufactured to the laboratory design bitumen content and two other bitumen contents of + 0.5 % and 1.0% additional bitumen. Cores will be cut to

determine the density of compacted material. The core will then be re-heated to $145 \pm 5^\circ\text{C}$ in the appropriate mould and compacted to refusal in the vibrating hammer test. The cores cut from the compaction trial must have a density equivalent to 95% refusal density.

The compaction trials will identify a workable mix which can be made to bitumen content which gives 3% voids in mix (VIM) at refusal density.

1604B Requirements for Asphalt Concrete

The nominal binder content shall be 5.0% - 5.5% in addition to the requirements given in Table 16B-2 Of the Standard Specification. The maximum Marshall stability of the mix for 2x75 blows shall be 9 kN and, at compaction to refusal, it shall have 3% voids in mix (VIM).

In order to determine the suitability of a coarse aggregate source, a Marshall Test programme shall be carried out. It will be advantageous to use a crushed rock which is known from past experience to give good results in the test procedure. A grading conforming to the type I binder course detailed in Table 16B-1(a), 0/20, of the Standard Specification should be tested (but with 100% passing the 25 mm sieve) and it shall meet the requirements of Table 16B-2 of this specification.

Having established the suitability of the aggregate source several gradings shall be tested in the laboratory, including that used for the Marshall Test, to establish relationships between bitumen content and VIM at refusal density. For each mix, samples will be made up to a range of bitumen contents and compacted to refusal using a gyratory compactor and a vibratory hammer in accordance with BS 598 (Part 104:1989) with the following revision.

“It should first be confirmed that compaction on one face of the sample gives the same refusal density as when the compaction cycle is applied to both faces of the same sample. The procedure which gives the highest results shall be used”

From the bitumen content –VIM relationship, bitumen content which corresponds to VIM of 3% shall be identified. Compaction trial shall be undertaken to confirm the workability of the mix. At least two or more grading will be required for compaction trials. The compaction trials will identify a workable mix which can be to a bitumen content which gives 3% voids mix (VIM) at refusal density.

1605B Mixing and laying asphalt concrete

The temperature of the bitumen and aggregates when mixed shall be $110 \pm 3^\circ\text{C}$ above the softening point (Ring and Ball) of the bitumen.

Compaction shall commence as soon as the mix can support the roller without undue displacement of material and completed before the temperature of the mix falls below 90°C .

The minimum thickness of individual layers shall be as follows:

- | | | |
|-----|---------------------|-------|
| (a) | For 37.5 mm mix | 65 mm |
| (b) | For 25.0 mm mix | 60 mm |
| (c) | For 19.0 mm mix | 50 mm |
| (d) | For the 12.5 mm mix | 40 mm |

1606B Compaction

Rolling shall be continued until the voids measured in the completed layer are in accordance with the requirement for a minimum compacted density of 98% of Marshall Test Maximum Density or a minimum mean value of 95% of refusal density (with no value less than 93%) as appropriate.

1608B Sealing bituminous surface

After the Wearing Course has been trafficked and bitumen has hardened, the Wearing Course shall be sealed with 10/14 mm pre-coated chippings in accordance with Clause 1505C. The period of hardening will depend on the traffic level and should be such that the chippings will not become embedded in the wearing surface. The Contractor will propose and the Engineer will approve a section to be ready for sealing.

PART C – DENSE BITUMEN MACADAM FOR BASE

1601C DEFINITION

Dense bitumen macadam produced from fresh materials shall comply with the “Superpave” requirements given in clauses 1602B, 1603B, 1604B and 1605B of these Special Specifications, except where modified below.

1603C REQUIREMENT FOR DENSE BITUMEN MACADAM

The nominal binder content shall be as stated in the Bill of Quantities and the aggregate size shall be 0/30.

1606C COMPACTION

Delete the entire paragraph and insert the following:

“Compaction shall be continued until voids measured in the completed layer are within the range specified in Table 16C-1, or to a mean value of 95 per cent of refusal density (with no value less than 93 per cent) as appropriate.

1700 CONCRETE WORKS

1703 Materials for Concrete

This work shall consist of placing selected approved material of 250 mm minimum diameter on the foundation put after excavation to receive levelling concrete in accordance with these specifications and in conformity with the lines, grades and cross sections shown on the Drawings as directed by the Engineer.

(a) Materials

Selected rock: The selected rock boulders to be placed for this work shall be hard, sound and durable quarry stones as approved by the Engineer. Samples of the stone to be used shall be submitted to and approved by the Engineer before any stone is placed.

The maximum size of the stone boulders shall be 300 mm.

(b) Construction Method

After completion of the structural excavation the surface of the loose soil shall be levelled and compacted. Then the stone of the above sizes shall be placed in one layer of 250 mm over the compacted bed where the bottom slab will rest. Coarse sand shall spread to fill up the voids in the stone boulders, and compaction with vibratory compactors should be performed to make this layer dense whereon a concrete of levelling course shall be placed.

(c) Measurement and Payment

Measurement for the bedding materials shall be made in cubic metres for the completed and accepted work, measured from the dimension shown on the Drawings, unless otherwise directed by the Engineer.

Payment for the bedding Materials for Levelling Concrete Works shall be full compensation for furnishing and placing all materials, all labour equipment, tools and all other items necessary for proper completion of the work in accordance with the Drawings and specifications and as directed by the Engineer.

Add the following for fine aggregate

It shall also meet the following requirements.

Test	Test Method	Requirement
Fineness Modulus	AASHTO M6	2.0-3.5
Sodium Sulphate Soundness loss on 5 cycles	AASHTO T104	10% Max.
Friable particles content	AASHTO T112	1% Max.
Test for organic impurities	AASHTO T21	Lighter than standard
Sand equivalent	AASHTO T17	75% Min.
Fraction passing 75 microns sieve	AASHTO T27	5% by weight max. (10% max. for crusher dust)

Add the following for course aggregate

The coarse aggregate shall conform to the following quality requirements:

Test	Test Method	Requirement
Sodium Sulphate Soundness loss on 5 cycles	AASHTO 104	12% max.
Los Angeles Abrasion	AASHTO T96	40% Max.

Test	Test Method	Requirement
Content of Friable Particles	AASHTO T112	1% by weight Max.
Soft Fragments and Shale	AASHTO M80	Max. 5% by weight
Flaky Pieces	BS 812	20% Max.
Elongated pieces	BS 812	20% Max.
Combined quantity of chlorides calculated as sodium chloride and sulphates as sodium sulphate	ASTM D1411	1000 ppm, Max.

Add the following to Clause 1703(g):

The water for mixing and curing concrete shall not contain solids and impurities more than the following permissible limits:

Impurities	Permissible Limits
Organic, mg/l	200
Inorganic, mg/l	3000
Sulphates (as SO ₄), mg/l	500
Chlorides (as Cl), for plain cement concrete work and 1000 mg/l for reinforced concrete work mg/l	2000

The pH value of work shall generally be between 6 and 8.

Add the following to Clause 1703:

Limits for Total Chemical Impurities in concrete

For reinforced concrete work the total chemical impurities collected from aggregates, cement, admixtures and water shall not exceed the following limits:

Impurities	Permissible limits of undesirable chemicals in concrete in percentage by weight of cement
Chlorides (as Cl ion), (%)	0.06
Sulphates (as SO ₃), (%)	4.0

1703a Levelling of Concrete for Bottom Slab Including Formwork Cost

This work shall consist of placing and levelling lean or blinding concrete Class 15/20 over the prepared bed of stone boulders in the foundation for bottom slab and wing walls in accordance with these specifications and in conformity with the lines, grades, thickness and typical cross-sections shown on the drawings unless otherwise directed by the Engineer.

(a) Materials for levelling concrete

Requirement for the concrete class 15/20 is specified as follows:

Design compressive strength, 28 days : 15 N/mm²
Maximum size of coarse aggregate : 20 mm

Maximum cement content : 300 kg/m³
Maximum water/cement ratio of 50% with slump of 80 mm

(b) Construction Method

The bed of stone boulders upon which the levelling concrete will be placed shall be smooth, compacted and true to the grades and cross-section shall be set to the required lines and grades.

(c) Measurement and payment

Measurement for levelling concrete (Class 15/20) shall be made in cubic metres completed and accepted levelling concrete work measured in place and which has been executed in accordance with the drawings and the Specifications.

Payment for this work shall include furnishing and placing all materials, labour, equipment and tools, and other incidentals to specifications and as directed by the Engineer.

1703b Reinforcement Bars for Walls and Slabs

This work shall consist of furnishing, fabricating and placing in the concrete of the bottom slab, top slab, median wall, sidewalls, wing walls and aprons, reinforcing bars of the quality, type and size in accordance with these specifications and in conformity with the requirements shown on the Drawings.

(a) Material

Reinforcement bars shall be deformed and shall meet the requirements of British Standard BS 4461, unless otherwise called for on the drawings or approved by the Engineer.

No reinforcement bar shall be delivered without a certificate guaranteeing the yield stress. The reinforcement bars shall be kept off the ground, free from dirt, oil, grease, or avoidable rust and stored within a building or provided with suitable covers.

If it is necessary for the Engineer to ascertain the quality of the reinforcement bars, the Contractor shall test the reinforcement bars, at his own expense, by the means as directed by the Engineer.

(b) Construction Method

Bar Bending Schedule

The Engineer shall provide the Contractor with bending schedules showing the location types, sizes, bending dimensions and cut lengths of the reinforcement bars required to be fixed in the works.

Cutting and bending

Qualified men shall be employed for the cutting and bending and proper application shall be provided for such work.

Bars shall be cut and bent cold to the dimensions indicated and with equipment and methods approved by the Engineer.

Stirrups and tie bars shall be bent around a pin having a diameter not less than 15 times the minimum diameter of the bars. Bends of other bars, where full tension in

the bar may occur, shall be made around a pin having a diameter not less than 7.5 times the bar diameter as shown on the drawing.

Reinforcing bars shall be accurately formed to the shapes and dimensions indicated on the Drawings, and shall be fabricated in a manner that will not be injurious to the materials.

(c) Placing

Reinforcing bars shall be accurately placed in proper position so that they be firmly held during placing of concrete.

Bars shall be tied at all intersections by using annealed iron wire 0.9 m or larger diameter or suitable clips.

Distances from the formwork shall be maintained, corrected by means of metal hangers, metal blocks, metal supports or other supports approved by the Engineer.

The Engineer shall inspect the formwork and reinforcement bars after placing. When a long time has elapsed after placing reinforcement bars, they shall be cleaned and inspected again by the Engineer before casting concrete.

(d) Splicing and Joint

When it is necessary to splice reinforcement bars at points, position and methods of splicing shall be determined based on strength calculations and approved by the Engineer.

In lapped splices, the bars shall be lapped by the required length, and wired together at several points by using annealed iron wire larger than 0.9 mm.

When a long time has elapsed after placing reinforcement bars, they shall be cleaned and inspected again by the Engineer before placing concrete.

(e) Joint

Exposed reinforcement bars intended for bonding with future extensions shall be effectively protected from injury and corrosion.

Oxyacetylene welding joint of reinforcing steel shall be carried out only if authorized by the Engineer in writing.

(f) Measurement and Payment

Bending and installation of reinforcement bars of piers and abutments shall be measured in terms of tonnes. The length of steel bar of each size will be shown on the drawings in which the bar length for splicing is excluded. In computing the weight to be measured, the theoretical weights of bars of the cross-section shown on the Drawings or authorized shall be used. These weights are given in the table below.

Bar Type and the Nominal Diameter in Millimetres	Weight of Bar in Kilograms per 12 m length of bar
T10	7.40
T12	10.66
T16	18.95
T20	29.60
T25	46.30
T32	75.80

1703c Formwork for Vertical Walls and Slabs

This work shall consist of all temporary moulds for forming the concrete for culvert walls and slabs together with all temporary construction required for their support. Unless otherwise directed by the Engineer all formwork shall be removed on completion of the walls and slabs.

Materials

Formwork shall be made of wood or metal and shall conform to the shape, lines and dimensions shown on the Drawings.

All timber shall be free from holes, loose material, knots, cracks, splits and warps or other defects affecting the strength or appearance of the finished structure.

Release agents shall be either neat oils containing a surface activating agent, cream emulsions, or chemical agents to be approved by the Engineer.

(b) Construction Method

(i) Formworks

Formwork shall be designed to carry the maximum loads, which may be imposed and so be rigidly constructed as to prevent deformation due to load, drying and wetting, vibration and other causes. After formwork has been set in correct location it shall be inspected and approved by the Engineer before the concrete is cast.

If requested, the Contractor shall submit to the Engineer working drawings of the formwork and also calculations to certify the rigidity of the formwork.

Unless otherwise described in the Contract, all form joints for exposed surfaces of concrete shall form a regular pattern with horizontal and vertical lines continuous throughout each structure and all construction joints shall coincide with these horizontal and vertical lines. PVC pipes of 50 mm diameter for weep holes shall be arranged as shown on the Drawings.

Unless otherwise specified, formwork shall be designed to form chamfers at all external corners whether or not such chamfers are shown on the Drawings to prevent cracks and other damage from arising.

The inside surface of forms shall be cleaned and coated with a releasing agent to prevent adhesion of the concrete. Release agents shall be applied strictly in accordance with the manufacturer's detailed instructions. The release agent shall be applied to the formwork prior to erection. Release agent must not come into contact with reinforcement. Immediately before concrete is cast, the formwork shall be thoroughly cleaned and freed from sawdust, shavings, dust, mud or other debris by hosing with water. Temporary openings shall be provided in the formwork to drain away the water and rubbish.

(ii) Scaffolding

All scaffolding required to support the formwork shall be designed and constructed to provide necessary rigidity and support the loads without appreciable deflection or deformation.

Details, plans and structural and flexural calculations for scaffolding shall be submitted to the Engineer for approval, but in no case shall the Contractor be relieved of his responsibility for the results obtained by use of these details.

(iii) Removal of formwork

The time at which the formwork is removed shall be the Contractor's responsibility and the formwork shall not be removed until the concrete strength has reached the strength to the approval of the Engineer.

(c) Measurement and Payment

No measurement shall be allowed for formwork of temporary construction joints.

Payment for the formwork shall be incidental to the pay items of particular grade of concrete for furnishing, erecting, jointing all the formwork for the concrete including furnishings and applying release agent, and construction of the required scaffolding to support the formwork all conforming to the shape, lines, grade and dimensions of the structure as shown on the Drawings, all in accordance with the Drawings and as directed by the Engineer.

1703d Concrete Works to Vertical Walls and Slabs

This work shall consist of furnishing, mixing, delivering and placing of the concrete for the construction of culvert walls and slabs in accordance with these specifications and in conformity with the requirements shown on the Drawings.

Concrete class 25/20 shall be used for Culvert walls and slabs.

(a) Concrete Materials

(i) Cement:

Cement shall be of Portland type and shall conform to the requirements of BS 12 or equivalent.

The Contractor shall select only one type or brand of cement. Changing of the type or brand of cement will not be permitted without a new mix design approved by the Engineer. All cement is subject to the Engineer's approval. However, approval of cement by the Engineer shall not relieve the Contractor of his responsibility to furnish concrete of the specified compressive strength requirements.

Conveyance of cement by jute bags shall not be permitted. Storage in the Contractor's silo or storehouse shall not exceed more than two (2) months and age of cement after manufacture at mill shall not exceed more than four (4) months. The Contractor shall submit to the Engineer for his approval the result of quality certificate prepared by the manufacturer.

Whenever it is found out that cement has been stored too long, moist or caked, the cement shall be rejected and removed from the project.

(b) Aggregates

Fine and coarse aggregates must be clean, hard, strong and durable, and free from absorbed chemicals, clay coating or materials in amounts that could affect hydration, bonding, strength and durability of concrete.

Grading of aggregates shall conform to the requirements in the tables below.

(i) Grading of Fine Aggregate

Sieve Size (mm)	Percentage by Weight Passing
10	100
5	89– 100
2.5	60– 100
1.2	30– 100
0.6	15 – 54
0.3	5– 40
0.15	0– 15

(ii) Grading of Coarse Aggregates

Size Coarse Aggregate	Amounts finer than each standard sieve percentage by weight							
	40	30	25	20	15	10	5	2.5
	100	~	~	90 ~ 100	~	30 ~ 69	0 ~ 10	~

Other requirements for aggregates are as detailed below.

(iii) Fine Aggregates

Fitness Modulus, AASHTO	M – 6
Sodium Sulphate Soundness, AASHTO T104:	Max. 10% loss

Content of Friable Particles AASHTO 112:	Max 1% by weight
Sand Equivalent, AASHTO T176:	Min. 75

(iv) **Coarse Aggregate**

Abrasion, AASHTO T96	Max 405 loss
Soft Fragment and shale, AASHTO M80:	Max. 5% by weight
This and elongated Pieces, AASHTO M80:	Max. 15%

(v) **Water**

All sources of water to be used with cement shall be approved by the Engineer. Water shall be free from injurious quantities of oil, alkali, vegetation matter and salt as determined by the Engineer.

(vi) **Admixture**

Only admixture, which have been tested and approved in the site laboratory through trial mixing for design proportion shall be used.

Before selection of admixture, the Contractor shall submit to the Engineer the specific information or guarantees prepared by the admixture supplier. The Contractor shall not exclude the admixture from concrete proportions.

Chemical admixtures where permitted shall conform to the requirements of AASHTO M194. Unless otherwise specified, only Type A (Water reducing), Type B (Retarding), Type D (Water reducing and retarding), Type F (Water reducing, high range) or Type G (Water reducing, high range and retarding) shall be used.

Admixtures containing Chloride ion (Cl) in excess of one percent by weight of the admixture shall not be used in reinforced concrete.

A Certificate of Compliance signed by the manufacturer of the admixture shall be furnished to the Engineer for each shipment of the material used in the works.

(c) **Concrete class 25/20**

Concrete Class 25/20 shall be used for culvert walls and slabs. The requirements of concrete Class 25/20 are provided as follows unless otherwise the Engineer will designate any alteration.

Design compressive strength, 28 days:	25N/mm ²
Maximum size of coarse aggregates:	20 mm
Maximum water/cement ratio of 45% with slump of 80 mm	

(d) **Proportioning Concrete**

The Contractor shall consult with the Engineer as to mix proportions at least thirty (30) days prior to beginning the concrete work. The actual mix proportions of cement, aggregates, water and admixture shall be determined by the Contractor under supervision of the Engineer in the site laboratory.

The contractor shall prepare the design proportions which has 120% of the strength requirement specified for the designated class of concrete.

No class of concrete shall be prepared or placed until its job-mix proportions have been approved by the engineer.

(e) **Concrete Work**

(i) **Batching**

Batching shall be conducted by weight with accuracy of:

Cement	:	0.5 %
Aggregate	:	0.5 %
Water and Admixture	:	1 %

Equipment should be capable of measuring quantities within these tolerances for the smallest batch regularly used as well as for larger batches.

The accuracy of batching equipment should be checked every month in the presence of the Engineer and adjusted when necessary.

(ii) Mixing and delivery

Slump of mixed concrete shall be checked and approved at an accuracy of +25 mm against designated slump in these specifications.

(iii) Concrete in hot weather

No concrete shall be placed when the ambient air temperature is expected to exceed thirty three degrees Celsius (33°C) during casting operations.

(iv) Concreting at night

No concrete shall be mixed, placed or finished when natural light is insufficient, unless an adequate approved artificial lighting system is operated; such night work is subject to approval by the Engineer.

(v) Placing

In preparation of the placing of concrete, the interior space of formwork shall be cleaned and approved by the Engineer prior to casting concrete. All temporary members except tie bars to support formwork shall be removed entirely from the formwork and not buried in the concrete. The use of open and vertical chute shall not be permitted unless otherwise directed by the engineer.

The Contractor shall provide a sufficient number of vibrators to properly compact each batch immediately after it is cast in the formwork.

(f) Measurement and Payment

Measurement for the Concrete Works Class 25/20 of culvert walls and slabs shall be made in cubic metres for the walls and slabs actually constructed, measured from their dimensions shown on the drawings. Payment for the Concrete Works (Class 25/20) of culvert walls and slabs shall be the full compensation for furnishings all materials of the concrete mixing, delivering, placing and curing the concrete, equipment and tools, labour and other incidentals necessary for the completion of the work in accordance with the Drawings and these specifications and as directed by the Engineer.

1704 Concrete Works of the Beams and Deck Slabs

1704.1 Description

This work shall consist of furnishing, mixing, delivering and placing of the concrete for the construction of the in situ beams and deck slab, including form F3 type finish, in accordance with Standard Specifications and in conformity with the requirements shown on the Drawings.

Concrete Class 35/20 shall be used for beams and slabs.

1704.2 Concrete materials

(a) Cement

Cement shall be of Ordinary Portland type and shall conform to the requirements of BS or equivalent.

The Contractor shall select only one type or brand of cement or others. Changing of the type of cement will not be permitted without a new mix design approved by the Engineer. All cement is subject to the Engineer's approval. However, approval of the cement by the Engineer shall not relieve the Contractor of the responsibility of furnishing concrete of the specified compressive strength requirements.

Conveyance of cement by chute bags shall not be permitted. Storage in the Contractor's silo or store house shall not exceed more than two (2) months, and the age of cement after submitting to the Engineer the result of quality certificate prepared by the manufacturer for his approval.

Whenever it is found out that cement have been stored too long, moist, or caked, the cement shall be rejected and removed from the project.

(b) Aggregates

Fine and coarse aggregates must be clean, hard, strong and durable, and free from absorbed chemicals, clay coating, or materials in amounts that could affect hydration, bonding, strength and durability of concrete. The aggregates should conform to BS 882.

Grading of aggregates shall conform to BS 812. Other requirements for aggregates are as given below.

(i) Fine Aggregates

Fitness Modules	AASHTO M-6	2.3 to 3.1
Sodium Sulphate Soundness	AASHTO T104	Max. 10% loss
Content of Friable Particles	AASHTO 112	Max. 1% by weight
Sand Equivalent	AASHTO T176	Min. 75

(ii) Coarse Aggregate

Abrasion	AASHTO T96	Max. 40% loss
Soft Fragment and Shale	AASHTO M80	Max. 5% by weight
Thin and elongated pieces	AASHTO M80	Max. 15%

(c) Water

All sources of water to be used with cement shall be approved by the Engineer. Water shall be free from injurious quantities of oil, alkali, and vegetable matter and salt as determined by the Engineer.

(d) Admixture

Only admixture which have been tested and approved in the site laboratory through trial mixing for design proportion shall be used.

Before selection of admixture, the Contractor shall submit to the Engineer the specific information or guarantees prepared by the admixture supplier.

The Contractor shall not exclude the admixture from concrete proportions.

1704.2.1 Concrete class 30/20

Concrete Class 30/20 shall be used for foundations and piles. The requirements of concrete Class 30/20 are as detailed below unless otherwise the Engineer will designate any

alteration.

Design compressive strength, 28 days: 30N/mm^2

Maximum size of coarse aggregates: 20 mm

Minimum cement content: 300 kg/m^3 , and

Maximum water/cement ratio of 45% with slump of 80 mm

1704.2.2 Proportioning Concrete

The Contractor shall consult with the Engineer as to the mix proportions at least thirty (30) days prior to beginning the concrete work. The actual mix proportions of cement, aggregates, water and admixture shall be determined by the Contractor under supervision of the Engineer in the site laboratory.

The contractor shall prepare the design proportions which has 120% of the strength requirements specified for the designated class of concrete.

No class of concrete shall be prepared or placed until its job-mix proportions have been approved by the Engineer.

1704.2.3 Concreting Work

(a) Batching

Batching shall be conducted by weight with accuracy of

Cement: $\frac{1}{2}\%$

Aggregate: $\frac{1}{2}\%$

Water and Admixture: 1%

Equipment should be capable of measuring quantities within these tolerances for the smallest batch regularly used as well as for larger batches.

The accuracy of batching equipment should be checked every month in the presence of the Engineer and adjusted when necessary.

(b) Mixing and Delivery

Slump of mixed concrete shall be checked and approved against designated slump in these specifications. The time elapsing from when the water is added to the mix until the concrete is deposited in place at the site of the work shall not exceed thirty (30) minutes in case that the concrete is hauled in non agitative type trucks or carriers, or more than sixty (60) minutes in case that it is hauled in truck mixers or other carriers with agitators.

(c) Concrete in Hot Weather

No concrete shall be placed when the ambient air temperature is expected to exceed thirty three degrees Celsius (33°C) during casting operations.

(d) Concreting at Night

No concrete shall be mixed, placed or finished when natural light is insufficient unless an adequate approved artificial lighting system is operated, and such night work is subjected to approval by the Engineer.

(e) Placing

In preparation of the casting of concrete, the interior space of formwork shall be cleaned and approved by the Engineer prior to casting concrete. All temporary members except tie bars to support formwork shall be removed entirely from the formwork and not buried in concrete. The use of open and vertical chute shall not be permitted unless otherwise directed by the Engineer. The Contractor shall provide a

sufficient number of vibrators to properly compact each concrete batch immediately after it is cast in the formwork.

1704.3 Concrete class 35/20

Concrete Class 35/20 shall be used for in situ beams and deck slabs. The requirements of concrete Class 35/20 are as detailed below unless otherwise the Engineer will designate any alteration.

Design compressive strength, 28 days: 35N/mm^2
Maximum size of coarse aggregates: 20 mm
Minimum cement content: 300 kg/m^3 , and
Maximum water/cement ratio of 45% with slump of 80 mm

1704.4 Measurement and Payment

Measurement for the Concrete Works for beams and deck slabs shall be made in cubic metres for the walls and slabs actually constructed, measured from their dimensions shown on the Drawings. Payment for the concrete works of beams and deck slabs shall be full compensation for furnishing all materials of the concrete mixing, delivering, placing and curing the concrete, equipment and tools, labour and other incidentals including form F3 type, necessary for the completion of the work in accordance with the Drawings and these specifications and as directed by the Engineer.

1705 Mixing Concrete

Add the following to Clause 1705 of the Standard Specification.

Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or other approved containers. The time elapsing from the time water is added to the mix until the concrete is deposited in place at the site of the work shall not exceed 30 minutes when the concrete is hauled in non-agitating trucks, or more than 90 minutes when hauled in truck mixers or truck agitators.

Where concrete is supplied from a central plant, there shall be sufficient transporting equipment to ensure continuous delivery at the rate required. The rate of delivery shall be such as to provide for the proper handling, casting, and finishing of the concrete. The method of delivery and handling the concrete shall be in a way which will facilitate casting with a minimum of re-handling and without damage to the structure or the concrete. The methods of delivery and handling for each site shall be approved by the Engineer. The Engineer may suspend the mixing and casting of concrete at any site for which he considers the Contractor's delivery equipment inadequate until such a time as the Contractor provides additional approved delivery equipment.

Concrete shall be allowed to be placed only when the Engineer or his representative is present at the site and has previously checked and approved in writing the positioning, fixing and condition of the reinforcement, and the alignment and suitability of the formwork.

Concrete shall be placed so as to avoid segregation of the materials and displacement of the reinforcement. When casting involves dropping the concrete by more than 1.5 metres, it shall be conveyed through sheet metal troughs, chutes or other approved pipes. The chutes, troughs and pipes shall be kept clean and free from coating of hardened concrete by thoroughly washing with water after each operation.

1741 Measurement and Payment

Delete Clause 1741(c).

Add the following to Clauses 1741 (d), (e) and (f):

Read Clause 1741(l) as follows:

The precast unit of measurement shall be m^3 of particular grade of concrete.

Add the following to this section:

1742 Plant and Equipment for Aggregates and Concrete

1742.1 Aggregate Processing Plant

Aggregate processing plant to be provided by the Contractor shall conform to the following:

(a) Type of Plant

Except where aggregates are supplied from commercial sources, a modern and dependable aggregate plant capable of producing satisfactory concrete aggregates in sufficient quantities and the rate necessary to meet the requirements of the construction schedule shall be provided at a location acceptable to the Engineer. Complete facilities shall be provided for proper crushing, washing, classifying, storing, reclaiming and delivering the aggregates to the mixing plant.

(b) Samples and Test

The aggregate plant shall be operated for a sufficient time in advance of the dates set for first placement of concrete to permit the development of procedures which result in high capacity production of aggregates proven by tests to meet all the requirements of this specification.

(c) Fines in Sand

The facilitation for fine aggregate production shall be so designed and operated as to retain the necessary quantity of finer fractions. An excess of fines will not be permitted. If natural sand is from marine source, the sand shall be cleaned of clayey material and washed with potable water before use. All crushing, washing, screening, classifying, blending, batching, or other properties of fine aggregate necessary to meet these specifications shall be performed so as to produce acceptable gradation complying with this specification.

(d) Drainage of Sand

Aggregates shall not be removed directly from the washing or classifying operations to the aggregate bins in the concrete mixing plant, but shall be stored as required, to permit drainage of excess water and in such a manner as to avoid contamination by foreign materials. Sand shall remain free-draining storage for at least 48 hours prior to use.

(e) Segregation

The stockpiles for aggregates shall be formed so as to prevent segregation, and as approved by the Engineer. The deposition and removal thereof shall be conducted in a manner to maintain the uniformity of grading. The side slopes of stockpiled aggregates shall be kept flatter than the angle of repose to prevent accumulation of coarser material at the bottom of the slope.

(f) Volume of Storage

Sufficient live storage of all size fractions of processed aggregates shall be maintained at all times, to permit continuous placing of concrete at the rates so as to meet the scheduled requirements. If aggregates are stockpiled on the ground, the bottom portion of the stockpile within 300 mm of ground shall not be used. The Contractor may also plan to store sufficient quantity of coarse and fine aggregate so that concreting during the rains can proceed without hindrance as the collection of the same during the rains may be difficult.

(g) Approval of Aggregate Plant Layout

Plans and written specifications for the aggregate processing plant including description and capacity data on the processing equipment, and flow charts of the whole processing operation which shall show rates of flow of material at the various crushing and separation points in the processing, as well as the volumes of the stockpiles and the number and types of equipment to be used in transporting the aggregates from aggregate plant to the mixing plant, shall be submitted to the Engineer in advance of plant erection for his approval.

1742.2 Concrete Plant

A modern dependable batch type mixing plant capable of producing concrete of specified quality and at the rate of output required to meet the specified requirements, and a balanced complement of transporting, handling and placing equipment shall be provided at locations and in a manner approved by the Engineer. The concrete mixing plant shall be completely installed for a sufficient length of time prior to scheduled date for placement of first concrete, to enable the Engineer to make the necessary physical tests, prior to use of the plant for the production of concrete.

(a) Standby Arrangement

As a standby arrangement to the batching and mixing plant, the stationary mixer/mixers of capacity 700 litres of mixed concrete and other appropriate equipment shall be provided.

(b) Type of Plant

The type of plant to be furnished shall be fully automatic. The term “automatic” is used to define a plant in which:

Batch weights are set manually on a mix selector
Mixes are charged automatically by mix selector
Materials are batched automatically

Ice flaking machine of sufficient capacity shall be installed as a part of batching plant.

(c) Batchers

Individual weigh batchers shall be provided for all works, requiring the use of more than two separate size groups of coarse aggregates. Cumulative weight batchers may be used for work requiring the use of not more than two separate size groups of coarse aggregates provided that the cement is weighed and batched separately from the aggregates. The batchers shall be arranged to permit the convenient addition or removal of material. Batching equipment shall be so constructed and arranged that the sequence and time of discharge can be controlled to produce a re-blending and mixing of the aggregates and, wherever possible, mixing of the cement with the aggregates as the materials pass through the charging hopper in to the mixer. This control shall be affected by the controls of the

batcher discharge gates. Batcher controls shall be so interlocked that a new batching cycle cannot be started until all batchers are completely empty.

(i) Weighing Units

Every delivering point of aggregates and cement into the mixer, charging hopper shall have a weighing unit and each weighing unit shall include a visible, springless direct reading dial which shall indicate the scale load at all stages of the weighing operation from zero to full capacity.

The scale dials and the weighing equipment shall be in full view of the operator, so that he may conveniently observe the operation of the batcher gates and the discharge of the materials. Provision shall be made for adjustment and change in weights of materials being charged in the hopper.

(ii) Measuring Water

Water shall be measured by weight except in situations for which written approval is given by the Engineer to measure by volume. The mechanism for measuring and delivering water to the mixers shall not permit leakage when the valves are closed.

The filling and discharge shall be measured by weight. The filling shall be capable of ready adjustment to permit varying the quantity of the admixtures to be batched. The equipment shall be kept in a clean and fully operating condition.

(iii) Tolerance in Batching

Weighing devices shall be capable of measuring the various ingredients of the following accuracy.

<u>Materials</u>	<u>Percent (by weight)</u>
Cement	1
Water	1
Aggregate smaller than 40mm size	2
Admixture	1 (or volume)

(iv) Records & Charts

An accurate record shall be maintained at the batching plant by the Contractor for the following:

The weight of the cement, water and admixture
The weight of the aggregate for each size shall be recorded separately.
Temperature of the concrete immediately after mixing
Mixing time of each batch when all the materials are loaded into the mixer
Time when the concrete is delivered from the mixer
Ambient temperature

(v) Recorders

A recorder shall be provided for each set of units measuring each of the materials delivered to the mixer. The recorder shall produce a continuous visible record, on a single ruled chart, of the weight of the cement, water and each size of aggregates, of the mixing time of each batch after all materials are in the mixer, of the temperature of the concrete and of the time of day at intervals of not more than fifteen (15) minutes. The recorder shall be completely housed and shall be capable of being locked and shall be placed in a position convenient for observation by the plant operator and the

Engineer. Each chart shall be so ruled and printed that it may be readily and permanently identified, so that the quantities and time may be read directly without scaling or calculation. A portion of the recorder chart equivalent to at least thirty (30) minutes of plant operation shall be visible after recording. This portion of the chart shall be supported over its entire width on a smooth, firm backing so that notes can be made without puncturing the paper. The recorders and scale dials shall be housed in a room, box or compartment visible at all times and sufficiently tight to exclude objectionable dust coming from the plant operation.

1706: Mechanically Stabilized Earth (MSE) Structures

1706 (a): Scope

This section covers the design and construction of mechanically stabilized earth (MSE) structures. In broad terms this consists of a fill material with horizontal layers of reinforcing elements which may take the form of sheets, grids, meshes, strips, bars, rods etc. The reinforcing elements, which are either metallic or polymeric, are capable of sustaining tensile loads and the effects of deformation developed in the fill. The outer, clad face of the fill may consist of concrete, welded wire mesh or steel. Soft, wrap-around facing can also be used if appropriate.

All cladding, soil reinforcement and fastener materials shall be sourced from a single MSE supplier who will be responsible for the internal stability of the structure, designed in accordance with the latest edition of BS 8006. The MSE supplier shall have suitable professional indemnity insurance cover. The Engineer assumes overall responsibility for the structure regarding foundation analysis and design criteria.

The system tendered shall be the system built. No substitution will be allowed. All mechanically stabilized earth structures shall be constructed in accordance with the approved drawings for the proposed system.

1706 (B) Materials

- (a) **Concrete Panels**
Concrete panels shall be manufactured from materials which comply with the relevant requirements of the latest edition of BS 8006. The panels may be manufactured from either un-reinforced or reinforced concrete. The panels should be positively attached to the reinforcements. The panels should be flexible enough to accommodate at least 1.5% differential settlement over the length of the structure and 0.5% internal settlement of the MSE mass.
- (b) **Steel panels**
Steel panels shall be manufactured from materials which comply with the relevant requirements of the latest edition of BS 8006.
- (c) **Welded wire mesh panels**
Welded wire mesh panels shall be manufactured from materials which comply with the relevant requirements of the latest edition of BS 8006. In order to ensure the durability of the cladding the wire diameter should have a diameter of at least 8mm.
- (d) **Metallic soil reinforcements**
Metallic soil reinforcement shall be made from materials having a certain resistance to corrosion when buried and may take the form of sheets, grids, meshes, strips, bars, rods, ladders etc. and shall comply with the latest edition of BS 8006. The reinforcements should have an elongation before failure of at least 15%. Galvanizing shall comply with the requirements of BS 729 for bars and BS 2569.
- (e) **Fasteners between the facing and reinforcing elements**
The fasteners between the facing and the reinforcing elements shall comply with section 6.4 of the latest edition of BS 8006.
- (f) **Polymeric soil reinforcements and joints**
Polymeric soil reinforcements and joints shall comply with section 6.2.3 and section 6.2.4 of the latest edition of BS 8006.
- (g) **Accessory proprietary products**
Any accessory proprietary products, elements or fittings necessary for the construction of the MSE structure shall comply with the appropriate, accepted standards or specifications.
- (h) **Fill material in MSE structures**
The fill material in the MSE structure shall comply with the greater requirements of either Section 6.1 of the latest edition of BS 8006 or the requirements of the supplier of the MSE wall system.

1706 (c) Manufacturing and handling the cladding panels

- (a) **Concrete panels**
Concrete panels shall be manufactured in accordance with the dimensions and details shown on the Drawings, and where necessary these details shall be adapted to suit joining onto existing structures, inclined foundations, varying heights or other similar conditions.
The date of manufacture and the classification of every panel shall be clearly marked on the panel. The concrete panels may be removed from the mould once the concrete has attained a cube compressive strength of 14MPa. The panels shall be stacked according to the supplier's recommendations.
- (b) **Steel panels**
Steel panels shall be manufactured in accordance with the dimensions and details shown on the Drawings. The panels shall be handled in accordance with the supplier's recommendations.

(c) Welded wire mesh panels

Welded wire mesh panels shall be manufactured in accordance with the dimensions and details shown on the Drawings. The panels shall be handled in accordance with the supplier's recommendations.

(d) Accessories

Any accessory proprietary products, elements or fittings shall be manufactured in accordance with the dimensions and details shown on the Drawings. The accessories shall be handled in accordance with the supplier's recommendations.

1706 (d) Construction

(a) Foundation

The foundation plane for the MSE structure shall be graded for a width equal to the length of soil reinforcement and to the heights shown on the drawings, and compacted to a minimum of 90% modified AASHTO density in accordance with the requirements of these specifications. All foundation soils found to be unsuitable shall be removed and replaced with compacted, approved granular material. Measurement and payment for this work will be paid for under the relevant items of the earthworks section of these specifications.

Where specified a concrete levelling course, conforming to the correct line and level, shall be provided in accordance with the details shown on the Drawings, or as may be directed by the Engineer.

(b) Construction of the MSE structure

The construction of the MSE structure shall conform to the procedures specified by the MSE suppliers. All the necessary safety precautions shall be strictly adhered to.

The bottom row of cladding panels shall be carefully aligned on the foundation footing in accordance with the details provided. These panels shall be properly braced to prevent movement during the placing of the first layers of fill. Each cladding panel shall be individually checked after having been placed to confirm that the panel is correctly aligned within the stipulated tolerance.

The fill material behind the cladding panels shall be placed and compacted in accordance with the provisions of the relevant section of these Specifications to at least 93% modified AASHTO density, except that the layer thickness may vary slightly to suit the position of the soil reinforcement. The fill should be deposited, spread, levelled and compacted in horizontal layers of appropriate thickness. The deposition and compaction should be carried out so that all layers of soil reinforcing elements are fixed at the specified levels on top of compacted fill.

The fill should be placed such that it slopes away from the face to ensure that rainwater is kept away from the face of the MSE structure during construction.

The deposition, spreading, levelling and compaction of the fill should be carried out generally in a direction parallel to the facing and should be executed in stages to alternate with the placing and fixing of the reinforcing elements and facing. Fill shall not be placed right up to the cladding panels before the underlying reinforcing has been covered, for sufficient length from the center of the fill, with compacted earth so as to anchor the reinforcement adequately to keep the cladding panel in position. The filling shall be made from the end of the reinforcement to the cladding panels.

Care should be taken to ensure that the reinforcing elements are not damaged or displaced beyond the specified tolerance during the process of filling and compacting. Filling should be arranged so that no track machines run on the reinforcing elements. All vehicles and construction equipment weighing more than 1500 kg should be kept at least 2 m away from the cladding. Suitable compaction equipment weighing less than 1500 kg can be used within 2 m of the cladding.

(c) Fabricating and construction tolerances:

- Individual concrete panels:
 - Surface regularity: When tested with a 1.5 m straight-edge, the deviation shall not exceed 5 mm.
 - Leading dimensions shall not exceed ± 5 mm
- Completed concrete cladding walls:

- When tested with a 3 m straight-edge, the deviation shall not exceed 20 mm.
- No point of the structure shall be out of position horizontally by more than 50mm.

1706 (e) Quality Assurance

(a) General

The quality of the various materials covered in this section of the Specifications must be monitored and the results recorded to ensure that they comply with the requirements of the latest edition of BS 8006. The standards given on the wall system supplier's drawings need to be checked for compliance.

(b) Cladding panels

The quality of the various cladding panels covered in this section of the specifications must be monitored to ensure that they comply with the requirements of the latest edition of BS 8006. All results should be recorded for quality assurance purposes.

(c) Soil reinforcement

The quality of the applicable soil reinforcement must be monitored to ensure that they comply with the relevant requirements of the latest edition of BS 8006. All results should be recorded for quality assurance purposes.

(d) Fill in MSE

The frequency of sampling backfill material and compaction density shall be in accordance with the requirements of the earthworks section of these Specifications. The fill shall be tested to see that it meets the requirements relating to shear strength, chemical characteristics, durability and hydraulic requirements.

Fill material properties are covered in the latest edition of BS 8006. Refer to any other specific requirements that the MSE service provider may prescribe. All results should be recorded for quality assurance purposes.

(e) Materials and components not covered in the specifications

Refer to the provisions of the latest edition of BS 8006 for testing procedures not covered in these specifications.

1706 (f) Design Check

A design check shall be carried out by the Engineer and shall include:

- The geometry of the structures established from the drawings and cross sections of the proposed works.
- The stability of the foundation soils under the weight of the surcharge (dead and live load), and the factor of safety for potential failure along slide planes or surfaces external to the MSE structure.
- The design criteria and specifications applicable to the MSE structure.

The Contractor carries overall responsibility to the Employer for the structure including foundation analysis. The Engineer shall approve all the relevant MSE drawings before construction of any MSE structure commences.

1706 (g) Measurement and Payment

Item 10.01 Supply and erection of MSE structure

- (a) Structure as shown on the Drawings (Type, cladding and reinforcement indicated) **square meter (m²)**
- (b) Additional structures as appropriate and shown on the Drawings (Type, cladding and reinforcement indicated)..... **square meter (m²)**

The unit of measurement shall be the square meter face of the MSE material supplied and erected as shown on the Drawings. The quantity shall be calculated from the dimensions of the front face of the Structure including embedment and the surface area of nominal panel joint openings and cladding penetrations such as pipes and other utilities.

The tendered rate shall include full compensation for all materials in the structure as supplied by a MSE system supplier and shall include but not be restricted to:

- Technical assistance costs;

- Storing, loading, transporting and off-loading;
- Quality Assurance;
- Surface preparation for bedding and cladding panels;
- All labor, materials, formwork and construction equipment necessary for the erecting the MSE structure complete and to the specifications;
- Excavation for concrete footings as specified in the relevant items of the standard project specification except that no additional excavation shall be measured where formwork is required;
- Concrete footings for structures in accordance with the net approved dimensions for the concrete footings and including the specified concrete class and strength;
- The installation of jointing materials, the connecting of soil reinforcement to the cladding panels, the installation of monitoring test strip samples and settlement and tolerance monitoring;
- Infill concrete to the specified class and strength placed on top of the wall in accordance with the supplier's detail;
- Supply and installation of precast concrete coping units, including any required concrete backing, steel reinforcement or a soft-board bond breaker;
- Rockfill behind the welded mesh cladding panels;
- Synthetic fiber filter fabric.

Item 10.02 Extra over standard fill items for the construction of fills with soil reinforcement..... cubic meter (m³)

The unit of measurement shall be the cubic meter of fill placed between the soil reinforcement in accordance with the approved dimensions of the reinforced soil bounded by the reinforcement. The tendered rate shall include full compensation for the additional cost of sourcing and constructing the fills containing reinforcement, and for adjustment to normal backfilling methods as may be necessary for placing backfill materials as specified in this Division.

2000 ROAD FURNITURE

2001 Road Reserve Boundary Posts

The Contractor shall establish a reference point on top of each boundary post.

2004 Permanent Road Signs

Rename the existing text with the heading “2004.1 Posts and Road Signs”

2004.1 Posts and Road Signs

Posts for road signs shall be vandal-proofed

Add the following to this clause:

2004.2 Colour and configuration

The colour, size and location of all traffic signs for the project road shall be as specified on the drawings and in the absence of any details or any missing details, the signs shall be provided as directed by the Engineer.

The sign shall be reflectorised as shown on the drawings or as directed by the Engineer. The signs shall be of retro-reflective type and made of prismatic reflected sheeting fixed over aluminium sheeting as per these specifications.

The cautionary and mandatory signs shall be fabricated through the process of screen-printing. With regard to informatory signs with inscriptions, the message shall be of cut out letters made in the transparent overlay film pasted over the base sheeting with pressure sensitive adhesive or as the base sheeting with pressure sensitive adhesive or as instructed by the manufacturers or as directed by the Engineer.

2004.3 Material

The various materials and fabrication of the traffic signs shall conform to the following requirements:

(a) Concrete

Concrete shall be of the grade shown on the Contract drawings or otherwise as directed by the Engineer.

(b) Reinforcing Steel

Reinforcing steel shall conform to the requirement of the relevant codes as directed by Engineer unless otherwise shown on drawing.

(c) Bolts, nuts, washers

High strength bolts, precision bolts and nuts shall conform to the relevant specifications. The bolts and nuts shall be galvanised (zinc coated, 0.55 kg/m² minimum single spot) and galvanising shall conform to the relevant specifications.

(d) Plates and supports

Plates and support sections for the signposts shall conform to the relevant specifications. The plates and supports shall be galvanised (zinc coated, 0.55 Kg/m². minimum single spot.) and galvanising shall conform to the relevant specifications.

(e) Aluminium

Aluminium sheets used for sign boards shall be of smooth, hard and corrosion resistant aluminium alloy conforming to the relevant specification. The back of the sheet shall be painted with two coats of Epoxy paint.

The thickness of the sheet shall be 3 mm for all types of signs.

2004.4 Structural Details

The structural details for supports shall be as per the Contract drawings and/or as directed by the Engineer.

2004.5 Retro-reflective Sheeting

(a) General Requirements

The retro-reflective sheeting used on the sign shall consist of the white or coloured sheeting having a smooth outer surface, which has the property of retro-reflective over its entire surface. It shall be unused and shall show no evidence of cracking, scaling, pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having tested the sheeting for these properties in an unprotected outdoor exposure facing the sun for two years and its having passed these tests shall be obtained from a reputed laboratory of the manufacturer of the sheeting, for each lot separately.

The reflective sheeting shall be of prismatic lens type of ASTM - Type-IX.

(b) Lens Type

The retro-reflective sheeting shall be of Prismatic lens type, consisting of cube corner lenses and pressure sensitive adhesive and should be applied to the sign substrate at room temperature of 18 °C, transparent, waterproof plastic having smooth surface. The coefficient of retro-reflective as determined in accordance with ASTM Standard E- 810 shall give the minimum values as indicated in table given below.

**Minimum Coefficient of Retro-reflection for Retro-reflective sheeting Prismatic Lens Type
(candelas/lux/m²)**

Obtuse Angle (°)	Entrance Angle (°)	White	Yellow	Green	Red	Blue
0.1	-4	660	500	66	130	30
0.1	+30	370	280	37	74	17
0.2	-4	380	285	38	76	17
0.2	+30	215	162	22	43	10
0.5	-4	240	180	24	48	11
0.5	+30	135	100	14	27	6
1.0	-4	60	60	8	16	3.6
1.0	+30	45	34	4.5	9	2

When totally wet, the sheeting shall not show less than 90% of the values of retro-reflectance indicated in table above. At the end of 7 years, the sheeting shall retain at least 75% of its original retro-reflectance.

2004.6 Messages and Borders

The messages (legends, letters and numerals) and borders of Cautionary/Regulatory sign boards shall be screen printed. Screen printing shall be processed and finished with materials in a manner specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer.

The messages (legends, letters and numerals) and borders of information signs shall be of cut letters made in transparent overlay film pasted over the base sheeting with pressure sensitive adhesive or as instructed by the manufacturers or as directed by the Engineer.

For screen printed transparent coloured areas on white sheeting, the co-efficient of retro-reflection shall not be less than the values of corresponding colour in the table above.

Cut-out messages and borders, wherever used, shall be made in transparent film applied on base sheeting with pressure sensitive adhesive with the coefficient of retro-reflection which shall not be less than the values of corresponding colour in the table above. For the background colour of the sign the coefficient of retro-reflection shall not be less than that specified in the table above for the respective colours.

2004.7 Colour

The colour shall be as specified and shall conform to the requirements of the table below. Conformance to colour requirements shall be determined spectrophotometrically in accordance with ASTM E 1164, with instruments utilizing either 45/0, or 0/45 illumination/viewing conditions and tolerances as described in ASTM E 1164 for retro-reflective materials.

Conformance to Colour Requirements

								Reflectance		
								Limit (y)		
Colour	x	y	x	y	x	y	x	y	Min	Max.
White	.30	.3	.35	.35	.33	.37	.28	.32	40.0	
Yellow	.48	.42	.54	.45	.46	.53	.42	.48	24.0	45.0
Red	.69	.31	.59	.31	.56	.34	.65	.34	3	15
Blue	.07	.17	.15	.22	.21	.16	.13	.03	1.0	10.0
Green	.03	.39	.16	.36	.28	.44	.20	.79	3.0	9.0

The four pairs of chromaticity coordinates determine the acceptable colour in terms of CIE 1931 standard colorimetric system measured with standard illumination source D65. These colours are equivalent to those listed in ASTM D4956 using source C.

The colour shall be durable and uniform in acceptable hue when viewed in daylight or under normal headlights at night.

2004.8 Adhesives

The sheeting/film shall have a pressure sensitive adhesive of the aggressive tack type requiring no heat, solvent or other preparation for adhesion to a smooth clean surface. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type material of the base plate such that it shall not be possible to remove the sheeting from the sign base in one piece by use of sharp instrument. The adhesive shall form a durable bond to smooth, corrosion and weather resistant surface of the base plate. In case of pressure sensitive adhesive sheeting, the sheeting shall be applied in accordance with the manufacturer's specifications.

2004.9 Fabrication

The surface to be reflectorised shall be effectively prepared to receive the retro-reflective sheeting. The aluminium shall be de-greased either by acid or hot alkaline etching and all scale/dust removed to obtain a smooth plain surface before the application of retro-reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, the metal shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for the metal to come in contact with any contaminants prior to the application of retro-reflective sheeting.

Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure sensitive adhesives shall be overlapped not less than 5 mm. Where screen printing with transparent colours is proposed, only butt jointing shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. The transparent overlay film in which cut-out messages have been made shall be bonded with sheeting in the manner specified by the manufacturer.

2004.10 Warranty and Durability

The Contractor shall obtain from the manufacturer a seven year warranty for satisfactory field performance including stipulated retro-reflectance of the retro-reflective sheeting of Prismatic lens type and that of transparent film and submit the same to the Engineer. In addition, a seven year warranty for field satisfactory performance of the finished signs with retro-reflective sheeting of Prismatic lens type, inclusive of the screen printed or cut out letters/legends, transparent film and their bonding to the retro-reflective sheeting shall be obtained from the contractor/Supplier and submitted to the Engineer. The Contractor/Supplier shall also furnish a certification that the signs and materials supplied against the assigned work meets all the stipulated requirements and carry the stipulated warranty.

Warranties shall be given in original and shall have legal jurisdiction in Kenya. Warranties given by power of attorney holders will not be acceptable. Processed and applied in accordance with recommended procedures, the reflective material shall be weather resistant and, following cleaning, shall show no appreciable discoloration, cracking, blistering or dimensional change and shall not have less than 50 % of the specified minimum reflective intensity values, given in the table under Clause 2004.4 (b) above, when subjected to accelerated weathering for 1000 hours, using type E or EH weatherometer (AASHTO Designation M-268).

2004.11 Installation

Sign posts, their foundation and sign mountings shall be so constructed as to hold these in a proper and permanent position. Sign supports shall be of galvanised structural steel and shall be firmly fixed to the ground by means of properly designed foundation or as shown on the Contract Drawings. The work of the foundation shall conform to the relevant clauses of the Standard Specification. All components of the signs and supports, excluding the back side of aluminium sheet and the reflective portion, shall be thoroughly scaled, cleaned and galvanised (zinc coated, 0.55 Kg/m². minimum single spot.) and shall conform to the relevant specifications. The signs shall be fixed to the posts by welding and/or bolts and washers as shown on the drawing. After the nuts have been tightened, the tails of the bolts shall be furred over with a hammer to prevent removal.

2004.12 Foundation for Support

The foundation for the supports of the sign boards with single support shall be by making excavation in all type of strata to the sizes and level as shown on the relevant drawings and fixed with class 20/20 cement concrete during installation. The foundation for the supports of the sign boards with two or more supports shall be made by boring holes in all types of strata to the sizes levels as shown on the relevant drawings and fixed with class 20/20 cement concrete during installation. All concrete works shall be carried out as per the relevant specifications.

2004.13 Measurement for Payment

The measurement of standard cautionary and mandatory sign boards shall be in numbers of sign boards supplied and fixed and this shall constitute full payment for the supply of all materials for the sign board and its supports and foundations, fabrication and installation in the ground or embankment as per the specifications. Informatory sign boards with board area exceeding 1.0 m² shall be measured by area of the reflectorised sheet in square meters.

2004.14 Rate

The Contract unit rate shall be payment in full for the cost of making the road sign including supports and foundations, including all materials, installing it at the site and incidentals to complete the work in accordance with the specifications. In case of overhead sign boards supported on overhead gantry the rate shall not include the support gantry, its foundation and erection which shall be paid separately.

2005 Road Marking

Road marking paints shall be hot applied thermoplastic materials as specified under Clause 219 of the Standard Specification.

2006 Guardrails

Add the following to this clause:

2006.1 Removing, Renovating and Re-erecting Guardrails

Where the existing guardrails have to be removed, or removed and re-erected, or removed, renovated and re-erected, the three processes of removal, renovation and re-erection shall be carried out as follows:

(a) Removing the Guardrails

All guardrails and end units shall be loosened. Posts shall be carefully dug out and the holes shall be filled and compacted in 150 mm layers. Items used for fixing, including bolts, nuts, washers, shall be placed in bags, after which all materials shall be transported to a store approved by the Engineer and all stored in-groups by type.

Where material is intended for re-use, it shall first be unpacked for inspection by the Engineer. The Engineer will decide which material that shall be disposed off if, on inspection it is found unsuitable for re-use.

(b) Renovating the Guardrails

Guardrails and end pieces suitable for re-use shall be taken to the workshop for cleaning and painting. Rust and the existing paint shall be completely removed and minor indentations hammered out. The guardrails shall receive surface treatment in accordance with Clause 2006 of the Standard Specification.

Timber posts suitable for re-use shall be cleaned and treated with an approved timber preservative. Bolts nuts and washers to be re-used shall be cleaned and all dust removed, and shall then be oiled.

(c) Re-erection

The guardrails shall be erected in positions as shown and all the removed materials suitable for re-use and as much supplementary new materials as may be necessary shall be used. Re-erection shall be as specified for new guardrails.

2006.2 Pedestrian Railing

Pedestrian safety barriers shall comply with the requirement of BS 3049. The steel tubing and wire mesh shall be primed with zinc chromate or equal suitable for galvanizing, undercoat and finished with not less than two coats of permanent outdoor enamel of white paint.

2007 Kerbs

Name the existing text with the head as “2007.1 Installation”.

Add the following to this clause:

2007.2 Existing Kerbs

Where shown on the drawing or directed by the Engineer, the Contractor shall remove the existing road kerbs and channel, including bed and haunches. Care shall be taken to minimize over break into the existing pavement.

The Contractor shall reinstate any over break with a lean concrete or such other materials as may be approved by the Engineer.

2007.3 Repair of Damaged Railing and Kerbs

The repair of damaged railing shall be done by replacement of damaged pipes and posts. The damaged kerbs shall be repaired by cement mortar.

(a) Materials as per Relevant Codes

Ordinary Portland cement
Coarse aggregate and fine aggregate T or steel
Water suitable for concreting MS steel sections and pipes
Zinc rich epoxy primer like Nitrozinc primer or any approved equivalent and epoxy coal tar.

(b) Equipment

Welding equipment
Painting/white washing brushes
Other miscellaneous equipment

(c) Procedure

The damaged portion of steel/RCC rating shall be removed up to the unaffected portion of the railing and the parent remaining parts which have to be connected with new components shall be thoroughly cleaned. If RCC railing, the necessary of the newly shall be repaired RCC components. It shall be cured as per standard practice of curing by water. The dried up and cured concrete shall be white/colour-washed with proper care to match with the existing colours. In case of MS pipe railing, the new components or repaired components shall be fixed with necessary care keeping in consideration the alignment and level. The railing components shall then be painted with zinc rich epoxy based primer and finishing with two coats tar epoxy or paint to match the existing colour including cleaning and surface preparations as directed by the Engineer.

The damaged kerbs shall be repaired with cement mortar and the cement mortar shall be cured as per the standard practice. The kerbs shall then be painted black and yellow in alternative bands with reflecting paint of specification and quality approved by the Engineer to give an even shade on work as per the Standard Specification.

2010 Trees

Add the following to Clause 2010 of the Standard Specification:

2010.1 Plantation of Trees and Hedges

(a) Scope

The work shall consist of: Planting of tree saplings in median or other designated locations, and Planting of hedges within median area.

(b) Materials

(i) Dump Manure

Dump manure shall be of well decayed (at least six months) organic or vegetable matter, obtained in the dry state from the municipal dump or other similar sources approved by the Engineer. The manure shall be free from earth, stone, brickbats or other extraneous matter.

(ii) Farmyard Manure

saplings shall be prepared with necessary manuring, and the live saplings shall be planted in lines parallel to the median edge to the directions of the Engineer. Spacing between saplings in a row shall be such that a thick hedge can be grown, and this shall generally be not farther away than 300 mm.

The planting shall be completed soon after completion of the medians.

(iv) Grassing of Median Area

The area of the median between the hedges shall be seeded and mulched to develop grass cover as directed by Engineer.

(d) Maintenance

The saplings of trees and hedges planted shall be watered and maintained by the Contractor till issuance of the final certificate at the end of the Defects Liability Period. This shall also include watering, weeding out of undesirable plants and replacement of dead plant, manuring and trimming of the hedges.

Add the following clauses to this section:

2012 Service Ducts beneath Roads

Where instructed by the Engineer, the Contractor shall construct service ducts beneath the carriageway and shoulders/footpaths. The ducts shall consist of 100 mm to 300 mm diameter ogee precast concrete pipes surrounded by a minimum of 100 mm thickness of Class 15/20 concrete. The minimum clearance between the road formation and the top of the concrete surround shall be 100 mm.

The ducts shall be provided with draw cords fabricated from strong man-made fibre such as nylon and each duct shall be sealed at each end with a tight fitting plastic plug. In the existing pavement, the duct shall be at least 250 mm below the road surface measured from the top of the concrete pipes and all back filling shall be in Class 15/20 concrete. The concrete pipes shall conform to the requirements of Clause 215 of the Standard Specification.

2013 Duct Markers

Duct markers shall be installed by the Contractor at each end of the services ducts provided under Clause 2012 above. The duct marker shall be located immediately beyond the outer edge of the shoulder or footpath and as close to the line of the duct as physical constraints permit. Where several ducts are laid side by side, only one duct marker post will be necessary. The duct marker posts shall be constructed as shown on the drawings and shall be clearly and durably marked on the side facing away from the road. The marker shall be inscribed 'X DUCTS' where X is the number of ducts stated in the group marked by the marker posts.

2014 Road Bump and Rumble Strips

Where shown on the Drawings or instructed by the Engineer, the Contractor shall provide, place trim to line and level bumps and/or rumble strips on the carriage way, connecting roads or shoulders. Where instructed, the road bumps shall extend the full width of carriageway and shoulders. The bumps shall be constructed in asphalt concrete to the dimensions shown on the Drawings and to the same standard as the wearing course on the main carriageway.

2015 Bollards

Where shown on the Drawings or instructed by the Engineer, the Contractor shall construct permanent bollards.

The bollards shall be steel pipe filled with concrete and fixed on ground as shown on the Drawings.

2016 Retro-Reflective Road Studs

All retro-reflective road studs shall comply with BS 873: Part 4. The Contractor shall submit details of the reflective road studs he proposes to use in the works to the Engineer for approval. The Contractor shall submit also a Certificate of approval from an approving authority. The reflective road studs shall be installed in the locations shown on the drawings or instructed by the Engineer.

2017 Measurement and Payment

(a) Item: Remove existing guardrail

Unit: m

Removal of guardrail shall be measured by the metre as the length of guardrail instructed to be removed, measured between terminal points of the sections removed. The rate shall include for loading, transporting to any point on the site, off-loading and stacking the material and disposing off material unsuitable for re-use.

(b) Item: Renovate and re-erect guardrails

Unit: m

The unit of measurement shall be the length of single guardrail, whether straight or bent, or end pieces renovated as specified. The rate shall include for all works as specified and storage as required. The rate shall also include for erecting the guardrails in accordance with Clause 2006 and any new poles, nuts, bolts and accessories that may be required.

(c) Item: Pedestrian railing

Unit: m

Pedestrian railing shall be paid by the length instructed by the Engineer. The rate shall include for supplying and erection in accordance with the drawings. It shall also include for any bending of end pieces as may be required, disposal of excess materials and tidying up the site after completion of installation.

(d) Item: Service ducts

Unit: m

Service ducts shall be measured by the metre as the length of duct installed as per the Engineer's instructions. The rate shall include for providing all materials, excavation, and installation of concrete pipes with concrete surround, backfilling to formation level, compaction, draw-cords and plugs, all in accordance with Clause 2012 above.

(e) Item: Duct markers

Unit: N_o

Duct markers posts shall be measured by the number installed. The rate shall include for provision and installation of posts, all excavation and backfill, compaction to the satisfaction of the Engineer and removal of surplus materials.

(f) Item: Bollards

Unit: N_o

Bollards shall be measured by the number installed. The rate shall include for provision and installation of bollards, all excavation and backfill, compaction to the satisfaction of the Engineer and removal of surplus material.

(g) Item: R effective road studs

Unit: **№**

Retro-reflective road studs shall be measured by the number installed. The rate shall include for provision and installation of studs to the manufacturer's recommendations and satisfaction of the Engineer.

(h) Item: Road Bumps

Unit: **m³ of each type**

SECTION 21 – MISCELLANEOUS BRIDGE WORKS

2102 BRIDGE BEARINGS

Bridge bearings shall be elastomeric bearings as shown on the drawings and installed in accordance with the manufacturer's details and the standard specifications.

2103 MOVEMENT JOINTS AND SEALANTS

Add the following

(e) Roofing felt

Bitumen roofing felt shall be in accordance with **BS EN 13707**. The under-layer shall consist of one or more layers, as specified, of fine granule surface felt Type 1B (nominal weight 1.8 or 2.5 kg/m²). Top layer shall be mineral surfaced felt Type 3E, (nominal weight 2.8 kg/m²). Rolls shall be delivered to Site bearing the trade mark and certification as to BS type. Bitumen primer shall be selected to suit the type of bonding compound. Bonding compound shall be bitumen based.

Measurement and payment: The roofing felt shall be paid by the net area covered. The rate shall include for preparation, priming, overlaps and incidental costs.

(f) Bitumen impregnated fibre board

Bitumen impregnated fibre board shall comply with ASTM D1751 – Compression & Recovery Test, BS 1142: 1989 (SBI Grade), D.o.T. Specification for Highway Works Part 3: Clause 1015: 1991 (application EJJ) Weathering Test Method 800/V.C 1.3. The fibre board joint filler shall be free from dirt or other substance which would impair its bond to concrete. No damaged pieces of filler material shall be installed. Unless otherwise specified joint filler shall be placed normal to the finished surface of the concrete. Filler strips shall be placed so that their edges are flush with the finished surface capping as specified. Special accessories such as dowel bars, reinforcing rods and other concrete accessories shall be installed in conjunction with concrete joint filler strips as shown on the plans.

Measurement and payment: The fibre board shall be paid per metre length laid to the full thickness of the slab.

2105 GUARDRAILS TO BRIDGES

Guardrails shall be done as in accordance with clause 2006 of these specifications and as per the drawings.

2106 SURFACING TO BRIDGES

Surfacing to bridges shall be 30mm asphalt concrete type I done in accordance with the Standard Specifications

Add new clauses as follows:

2109 BRIDGE FOUNDATIONS AND SITE INVESTIGATIONS

This Section covers all foundation work, which for the purposes of these Specifications, shall comprise those elements of construction below the level of the bottom surface of the footings, the pile-capping slabs or the caisson cover slabs, collectively hereinafter referred to as bases or bases, which shall also include all the associated temporary works.

2109.1 Site investigations

The Contractor may be required to arrange to carry out geotechnical investigations in accordance with CP 2001 at the proposed bridge locations and in liaison with the Engineer prior to commencing construction works. This is to verify the accuracy and reliability of the original site investigations upon which the substructure designs and construction details have been based.

The investigations are to include assessment of safe design parameters for the proposed piled and spread foundations by an independent approved geotechnical testing laboratory. For each bridge location, the Contractor shall supply three copies of the results of the investigations to the Engineer in an approved standard reporting format.

In the event the report indicates that changes in the original designs and construction details are necessary due to the prevalent site conditions, the Engineer will revise/update substructure designs and construction details to suit the site conditions indicated by the investigations. Revised structural drawings will be issued and other related details will then be issued during the construction period.

2109.2 Scope of site investigations

The scope of the site investigations at each location may include trial pits, core drilling and some of the following tests on recovered soil samples depending on the prevalent sub-soil conditions:

- Standard penetration test (SPT)
- Unconfined Compression Tests on rock core samples
- Moisture, density, shear box and plasticity index tests
- Ground water monitoring

2109.3 Payment for additional site investigations

A Provisional Sum has been provided in the Bill of Quantities to cover the cost this work. The work authorised by the Engineer shall be for in accordance with the provisions of the Conditions of contract.

2110 Concrete Piling Works

2110.1 Materials

(a) General

Material used in the permanent foundation work shall comply with the requirements specified for the particular material under this clause.

(b) Rock (for rock fill)

Stones shall be hard, angular, natural or quarry stones of such quality that they will not disintegrate on exposure to water or weathering. The stones shall be free from soil, clay or organic material. Neither the breadth nor thickness of a single stone shall be less than one-third its length. Not more than 10% of the total volume of rock fill shall consist of stones with a mass of less than 0.5 times the specified mass and not more than 10% of the total volume of rock fill shall consist of stones with a mass of more than 5 times the specified mass. At least 50% of the total volume of rock fill shall consist of stones the mass of which exceeds the specified mass.

(c) Crushed stone

Crushed stone used for the construction of crushed stone fill shall originate from sound unweathered rock approved by the Engineer.

(d) Granular fill

Granular material used for constructing the compacted granular fill shall be approved granular material of at least gravel subbase quality.

(e) Sand fill

Sand used for filling the caissons shall be clean, hard sand free from lumps of clay or organic or other deleterious matter.

(f) Structural steel

Steel in the steel piles shall comply with the requirements of BS 4360 or SABS 1431 or equivalent, BS EN 10113 and BSEN 10155 for the grade of steel specified on the Drawings. I and H sections shall comply with the requirements of BS 4:Part 1.

Fabricated sections shall comply with the details shown on the Drawings.

(g) Permanent pile casings

Permanent pile casings shall be sufficiently rigid so as not to deform permanently or damage during handling and construction. The casings shall be sufficiently dense to prevent the fluid components of the concrete from leaking during the placing of the concrete or thereafter. Where steel casings contribute to the strength of the pile, the casings shall have a minimum wall thickness of 4.5 mm and shall comply with the requirements of ASTM A 252-68.

(h) Driven pile casings

Driven pile casings shall have sufficient strength to permit their being driven and not being distorted by the driving of adjacent piles, and they shall be sufficiently watertight to prevent water leaking through the casing walls during the placing of concrete.

(i) Grouting

(i) Cement grout

Unless otherwise agreed by the Engineer, the grout shall consist of only Portland cement and water. The water/cement ratio shall be as low as possible consistent with the necessary workability.

(ii) Proprietary-brand grout

Proprietary-brand grout shall be prepared and used strictly in accordance with the instructions of the manufacturer.

2110.2 General

(a) Subsurface data

If it is found during the course of excavating, founding pile or caisson work that the soil or founding conditions differ greatly from those shown on the Drawings, the Contractor shall immediately notify the Engineer.

The Engineer shall, as often as he may deem necessary during the course of excavation, be entitled to call on the Contractor to conduct additional foundation investigations and/or tests at or below the respective founding levels in view of establishing safe bearing pressures and founding depths.

(b) Channel preservation

The flow of the stream and the conservation of marine and freshwater life shall be maintained at all times. Access to cofferdams, artificial islands and piling platforms shall be effected without unnecessarily disrupting to the flow of the stream at the point of crossing, unless otherwise specified.

Precautions shall be taken by the Contractor to maintain water quality standards. Water contaminated with silt shall be settled in ponds before being pumped into streams. Water contaminated with chemicals shall be purified before being returned to the stream or disposed of in an appropriate manner as directed by the Engineer.

Precautions shall be taken by the Contractor to ensure that the natural pH and electrical conductivity are not raised or lowered.

On completion of the work, surplus excavated materials including materials excavated from caisson compartments and holes for piles, materials used in cofferdams and other temporary works, as well as in-situ material, shall be removed and disposed of by the Contractor to the level of the original bed or such elevation as agreed to by the Engineer or required for stream channelisation.

2110.3.1 Access and Drainage

(a) General

This clause covers the provision of access, including the construction of cofferdams, and draining the excavations. Where it is unnecessary to provide access, as detailed in (b) below, the Contractor shall be paid separately for draining the excavations.

After completion of the permanent works, all temporary works shall be completely removed, the ground levelled and the site left neat. Where this is impracticable, such portions as have not been removed, shall be dealt with in accordance with the Engineer's instructions.

(b) Access

Where temporary banks or artificial islands are constructed in view of affording access to the location where structural members, piles or caissons are to be constructed, the banks or islands shall be adequately compacted in view of supporting any plant and material without any undue settling which may have a harmful effect on the end product.

The Contractor may use any material deemed by him to be suitable for constructing the islands, but no separate payment will be made for any obstructions, hard or unsuitable material occurring in the material used for constructing temporary banks or artificial islands.

Designing and constructing any cofferdams shall comply with the requirements of BS 8004. Before starting with construction, the Contractor shall submit drawings to the Engineer, which show details of the cofferdams and the method of construction.

(c) Drainage

The Contractor shall apply suitable, effective drainage methods for preventing the ingress of water into excavations and to keep them dry.

The drainage measures, with the exception of pumping, shall be maintained until the backfilling has been completed. Between the various construction stages pumping may be employed in consultation with the Engineer.

Any draining or pumping of water shall be done in a manner that will preclude the concrete or materials or any part thereof from being carried away.

2110.4 Excavation

(a) General

This work shall include excavations not provided for elsewhere in this Specification, which are required for founding the structures as well as for the excavating required in respect of the demolition, extension or modification of existing bridges and culverts.

(b) Surface levels agreed on for excavations

Prior to commencing with any excavation, the Contractor shall notify the Engineer in good time to ensure that levels be taken of the undisturbed ground surface for determining the ground surface from where the excavation can be measured, and this ground surface shall be agreed on by the Engineer and the Contractor.

(c) Excavation

Where in the opinion of the Engineer the casting of concrete against the excavated earth faces is not permissible, or where formwork has to be provided, the extremities of the excavation, for purposes of measurement and payment, shall be deemed to be the vertical planes parallel to and 0.5 m outside the perimeter of the member for which formwork is to be provided.

Where suitable and stable material is encountered during excavating, that part of the trench or foundation pit shall be excavated to the neat dimensions of the base unless otherwise directed by the Engineer. Over-excavation (overbreak) in hard material shall be backfilled with the same class of concrete as that in the base or with mass concrete fill as specified or as directed by the Engineer.

Where blasting is required, the Contractor shall complete the entire foundation excavation before he commences with the construction of any permanent concrete work, unless otherwise approved by the Engineer.

Boulders, logs or any other unsuitable material excavated shall be carted away to designated spoil areas.

When hard material suitable for founding is encountered at the founding level, it shall be cut and trimmed to a firm surface, either level, stepped or serrated, as may be required.

Where, in the opinion of the Engineer, unsuitable material is encountered at founding level, such material shall be removed and replaced with foundation fill to the approval of the Engineer.

(d) Classification of excavated material

For payment purposes distinction shall be made between common excavation in soft material and rock excavation. All excavation for the foundations of structures shall be classified as summarised as follows:

(i) Rock excavation:

Rock excavation shall be excavation in material, which requires drilling and blasting, or the use of hydraulic or pneumatic jackhammers to be loosened and to be loaded for transportation.

(ii) Common excavation:

Common excavation shall be excavation in all material other than rock as defined above.

(e) Blasting

Where blasting is permitted, it shall be carried out to the approval of the Engineer.

(f) Deterioration of foundation excavations

Where soft material, or hard material which quickly deteriorates when exposed, is found at foundation level, the material shall be excavated to the final slope and level immediately before the screed is placed.

Where the bottoms or sides of excavations, in which bases are to be cast, are softened on account of negligence on the part of the Contractor in allowing storm or other water to enter the excavations, the softened material shall be removed and replaced with foundation fill as directed by the Engineer and at the Contractor's expense.

(g) The safety of excavations

The Contractor shall take the necessary precautions to safeguard the stability and safety of the excavations and adjacent structures.

The personal safety of any person shall not be jeopardised neither shall any situation be allowed to arise which may result in damage of whatsoever nature. Precautionary measures taken by the Contractor shall comply with the appropriate legal provisions.

(h) Inspection

No concrete shall be placed before the excavation has been properly cleaned by the Contractor and inspected and approved by the Engineer.

(i) Excavation by hand

Where circumstances prevent the use of mechanical excavators and material can be removed only by hand implements, the cost of such miscellaneous excavation shall be deemed to have been included elsewhere in the Bill of Quantities.

2110.5 Founding

In consequence of possible variations of the anticipated founding conditions, the dimensions and founding levels specified or shown on the Drawings may have to be varied during construction as stated in Clause 2109 of this Special Specification.

No bases, caissons or piles shall be founded unless authorised by the Engineer. Each founding level shall be accurately measured and recorded and agreed on. The term "founding level" used in these Specifications shall be deemed to have the following meanings in respect of:

(a) Foundation fill

The surface of the in-situ material that has been prepared to receive foundation fill.

(b) Bases

The underside of the base.

(c) Piles

The underside of the under-ream, bulbous base or rock socket; the tip of the pile shoe or lower pile end, as may be relevant.

(d) Caissons

The underside of the cutting edge.

2110.6 Utilisation of Excavated Materials

Excavated material and material recovered from temporary works shall, if suitable, be utilised for backfill. Material unsuitable for use as backfill or in excess of the required quantity shall be carted away to designated spoil areas or utilised as directed by the Engineer.

Excavated material not used for backfill or not carted away to spoil areas but used in the construction of embankments or other parts of the work, as directed by the Engineer, will be paid for under foundation excavation or under the relevant item for the purpose for which it is used.

The free haul distance on excavated material and imported material for backfill shall be 1.0 km.

Excavated and stockpiled material shall be so dumped as not to endanger the uncompleted structure either by direct pressure or indirectly by overloading the fills contiguous to the structure, or in any other way.

2110.7 Foundation Fill

If it is found during the course of excavation that the material at the indicated founding depth does not have the required bearing capacity as specified on the Drawings, the excavations shall be extended at the discretion of the Engineer until satisfactory founding material is encountered. The Engineer may order the Contractor to make up the difference in levels with foundation fill.

Where the foundation fill consists of rock or crushed stone, it shall be constructed in accordance with the requirements of these Specifications or as directed by the Engineer. Foundation fill consisting of granular material shall be constructed in layers not exceeding 150 mm in thickness after compaction. Each layer shall be moistened or dried to the optimum moisture content for the material and compacted to a density of not less than 100% MDD (AASHTO T-99). Mass concrete fill to be used shall be of the class or mix of concrete fill as specified or directed by the Engineer.

Unless otherwise specified or directed by the Engineer, the foundation fill constructed from rock, crushed stone or compacted granular material shall be defined by a prism with vertical sides. The base of the prism lies in the founding plane and coincides with the base of a prismoid with trapezium-shaped inclined sides which extend downwards and outwards at an angle of 60° with the horizontal from each outer edge of the underside of the footing down to the founding level.

The upper plane of the prism lies in the plane of the underside of the footing.

A concrete screed which complies with the requirements shown on the Drawings shall be placed underneath all bases except where mass concrete fill is used or where authorised by the Engineer that this need not be done.

Where mass concrete fill is constructed under a base it shall be constructed accurately to the final levels of the underside of the base.

2110.8 routing of Rock Fissures

Where specified, fissures in the rock below and around the bases shall be sealed by pressure grouting with a neat cement or sand-cement grout or with a proprietary brand grout as specified. The cement water ratio of the grout shall be approved in advance by the Engineer.

The extent of the fissuring shall be established by means of water testing under pressure. Holes of at least 40 mm in diameter shall be drilled at places shown by the Engineer and grout shall then be pumped into these holes under suitable pressures. Grouting shall be done in 3 m stages to the maximum depth ordered. Care shall be taken to avoid further fracturing of the rock strata by excessive grouting pressures.

Grouting of the rock fissures shall be done by specialised operators with adequate experience in this class of work.

2110.9 Foundation Dowels

Where required, foundation dowels of specified material, diameter and length shall be installed at the positions and to the dimensions shown on the Drawings or as directed by the Engineer. After exposing, clearing and trimming the rock formation, holes with specified diameters and depths shall be drilled in the rock.

After the holes have been cleared and pre-wetted, they shall be filled with grout. Within 15 minutes of having been filled with grout, the dowels shall be carefully driven into the holes. The cement and water in the grout shall be mixed in the ratio of 50 kg of cement to 20 litres of water, and an approved expanding additive, to the Engineer's approval, shall be added.

The dowels shall be to the Engineer's approval.

2110.10 Foundation Lining

Where specified or directed by the Engineer, foundation linings shall be installed as described hereafter. The Engineer shall have the right to order the use of linings against the sides of excavations and the undersides of bases and slabs in lieu of formwork and concrete blinding.

All surfaces to be lined shall be covered with approved sheeting to provide a clean impervious layer. The material shall be of sufficient strength to provide a durable working surface and to support the concrete and reinforcement without tearing. The joints of the material between strips shall have a 150 mm overlap and the lining shall be held firmly in position by nails, pegs, etc.

Polyethylene sheeting with a thickness of 0.150 mm is generally considered to be adequate for use below bridge approach slabs and bases.

2110.11 Foundation Piling

- (a) This work shall consist of performing all operations in connection with furnishing, driving, boring, excavating, concreting, and cutting off of piles to obtain the specified bearing value complete in place and strictly in accordance with these Specifications.
- (b) The Contractor shall carry out the work in accordance with a method statement, which has been submitted to and approved by the Engineer. This method statement shall include as appropriate, under-reaming or driving, the length or set to be obtained, details of the constituent materials of any drilling fluid used for stabilisation, the method of inspection, details of the concrete mix, the minimum time between the completion of one pile and the commencement of the next, and the pattern of construction.
- (c) Alternative designs for piling and piling layouts
 - (i) Submission

The priced Bill of Quantities submitted for alternative designs shall be compiled strictly in accordance with the relevant measurement and payment clauses of this Specification.

Where pay items defined in this Specification have been omitted, it shall mean either that the items do not apply, or that where the Engineer requires work falling under such items to be done, it shall be done without any cost to the Employer. The inclusion of 'rate-only' items will not be permitted.

Where pay items not defined in this Specification are used, the measurement and payment requirements for such items shall be specified in detail by the Contractor. In the absence of such definitions, or in the case of any ambiguity, the interpretation of the Engineer shall be final and binding.

Except in piling-only Contracts or where otherwise provided in these Specifications, the Contractor shall price the Bill of Quantities for the original design irrespective of whether or not an alternative design is offered.

(ii) Design

The critical design-load combinations acting upon the underside and the centre of gravity of the pile capping slab, the maximum permissible set of the pile-capping slab, and the technical data required for designing alternative piles and/or piling layouts will be indicated on the Drawings. Alternative designs shall be to the Engineer's approval and the prescriptions set out below.

For alternative designs submitted, the Contractor shall submit with his bid a detailed description of the method of analysis used in the design of the piles and the pile group layouts. The average length of pile and/or of the piles per group on which the quantities in the Bill of Quantities for the alternative designs are based shall be stated in each case.

The type of pile offered shall be defined in terms of size, materials, working and breaking load. The Contractor shall be responsible for and shall bear the cost for redesigning, drafting and submitting the detail drawings for any structural element affected by the alternative pile design. Any economy or incidental caused by constructing such element as compared to the original design shall be to the account of the Contractor.

The Contractor shall submit to the Engineer at least three months prior to work being commenced, drawings detailing the piling-group layout and piles, incorporating such amendments to his original design as may be required by the Engineer, and pile-capping slab dimensions and reinforcement as a result of the layout of the piles, all as applicable. No work of whatsoever nature shall be commenced on the piling until the Drawings have been submitted to and have been approved by the Engineer, in writing.

Where the alternative piles fail in regard to the load test specified in this section the Contractor shall be responsible for the cost of the work required for improving the piles and pile layout so as to comply with the design requirements.

(iii) Basis of payment

Where the quantities in the Bill of Quantities differ from the number of piles and the average pile length given in the submission for the alternative pile design the Engineer shall accept the sum in the Bill of Quantities, correct the quantities, and adjust the rates for the applicable pay items accordingly.

2110.12 Code of Practice

All workmanship, materials, tests and performance in connection with the piling work are to be in conformity with the B.S. Code of Practice CP 8004: Foundations.

2110.13 Access to Site

The Contractor is to make allowance in his rates for any methods or other means of support to his piling machines which he may require to travel and work on the site and he is to make every allowance in his rates for bringing plant and materials on and off the site.

2110.14 Setting Out

The Contractor will be responsible for setting out the substructure bases and the positions of piles and shall maintain the setting out of the substructure bases, whilst carrying out his work. No separate payment shall be made for this work and the Contractor must make allowance for this in his rates for piling.

2110.15 Lengthening of Piles

Where it becomes necessary to lengthen a pile at the top, the Contractor shall submit his proposal to the Engineer for his approval.

2110.16 Piling ~ General

Full details of the Contractor's proposed piling method, giving the number and type of rigs, type of tools and equipment as well as details of supervisory staff and their previous experience, should be submitted to the Engineer, for his approval at least 21 days before the Contractor proposes to commence piling. The Contractor shall not be permitted to commence piling until he has received written approval from the Engineer covering all aspects of the piling. This approval shall not relieve the Contractor of his responsibilities for the piles. Should the Contractor subsequently wish to change any aspect of his proposals, the written approval of the Engineer shall be obtained prior to such changes being effected.

The following notes are general and should be construed in the light of any special requirements for the piling system.

- (a) During concreting, care should be taken to prevent the formation of voids in the piles. A record shall be kept of the volume of concrete placed and the calculated volume of each pile.
- (b) In the case of all piles, care shall be taken not to damage previously formed piles.
- (c) Ingress of water, into excavations shall be prevented. However, where subsoil water, which cannot be sealed off, is encountered, the water in the borehole shall be maintained above the standing level of the subsoil water.
- (d) The Contractor shall, at his expense, dispose of all spoil from boreholes to a spoil area provided by himself to the satisfaction of the Engineer. As each borehole is excavated, the Contractor shall, if required by the Engineer, take samples of the strata and test them or carry out site tests, as required in accordance with B.S. Code of Practice 2001.
- (e) If the Contractor proposes to use bentonite slurry, this shall also be described in his method statement.
- (f) Work on piling shall not commence until the Engineer has approved the Contractor's proposals.
- (g) The requirements herein are minimum. Compliance with these requirements will not relieve the Contractor of the responsibility for adopting whatever additional provisions may be necessary to ensure the successful completion of the Works.
- (h) The kind and type of piles shall be as shown on the Contractor's shop drawings. The type of piling shall require the written approval of the Engineer.
- (i) The Contractor shall ensure that damage does not occur to completed piles through his method of working. The Contractor shall submit to the Engineer a programme of his proposed sequence and timing for driving or boring piles having regard to the avoidance of

damage to adjacent piles or unfilled pile excavations. Piling shall not commence until approval by the Engineer has been obtained for these proposals.

- (j) The Contractor shall report immediately to the Engineer any circumstance, which indicates that in the Contractor's opinion the ground conditions differ from those expected from his interpretation of the site investigations reports.

2110.17 Materials Requirements

- (a) The diameter and length of reinforced concrete piles shall be detailed by the Contractor as shown on the shop drawings and may or may not have permanent lining. Drawings shall be submitted to the Engineer for approval.
- (b) Concrete shall meet all the specified requirements for Class 30/20.
- (c) A permanent lining of at least 10 mm thickness shall be provided in all cast in-situ bored piles constructed over water or very soft ground, or as directed by the Engineer.

2110.18 Position and Cut-off Levels of Piles

All piles are to be formed to within 75 mm of the position shown on the drawings, and no pile shall deviate from the vertical alignment by more than one half (0.5) degree. If any pile deviates from the required position by more than this amount, the Contractor will be required to provide two further piles free of charge, or alternatively, will be required to pay the additional cost of enlarging the pile caps. No method of forcible correction will be permitted.

2110.19 Obstructions

Should the Contractor encounter, in the driving or boring of piles or linings any unnatural obstructions which cannot be removed or displaced by normal methods, he shall immediately inform the Engineer who may order the obstruction to be removed, payment being made by Dayworks rates, or the pile to be relocated. If a bored pile is to be relocated, the hole for the original pile shall be cleaned out and backfilled, to the satisfaction of the Engineer, with Class 30/20 concrete to the level approved by the Engineer. The Contractor will be paid for the work at the same rate as for the good piles, the payment length being from the cut-off level directed by the Engineer to the base of the hole. For steel piles, the Contractor may be asked to pull out the abandoned pile or cut it off at a suitable level as directed by the Engineer. In the event that the Engineer orders the obstruction to be removed, then the standing time for the piling rig in excess of two hours from the time of informing the Engineer of the obstruction shall be paid by the rig hour rate. This rate shall be deemed to cover all the costs incurred by the rig standing. Standing time less than 2 hours from the time of informing the Engineer of the obstruction will not be paid for.

2110.20 Construction Requirements

- (a) Cast-in-Place Piles

Cast-in-place piles shall consist of driven or bored cast-in-place concrete piles or continuous flight auger concrete or grout piles.

Driven cast-in-place piles apply to piles for which a permanent casing of steel or concrete is driven, reinforcement placed within it where required, and the casing filled with concrete. It also applies to piles in which a casing is driven, reinforcement placed within it and the pile formed in the ground by filling the temporary casing with concrete before and during its extraction.

Bored cast-in-place piles apply to piles in which the pile bore is excavated by rotary and/or percussive means using short augers, buckets, grabs or other boring tools to advance the open bore. Where the open bore is unstable, temporary or permanent casing or bentonite suspension may be used to support the wall of the bore prior to concreting, subject to the approval of the Engineer.

Continuous flight auger concrete or grout piles apply to bored piles which employ a continuous flight auger for both advancing the bore and maintaining its stability. The spoil-laden auger is not removed from the ground until concrete or grout is pumped into the pile bore from the base of the hollow-stemmed auger to replace the excavated soil.

Where piles are to be driven or bored through water or unstable ground, the Contractor shall provide a platform, temporary embankment, pier, pontoon, cofferdam or suitable approved alternative working access. The Contractor shall submit for the approval of the Engineer details of these proposed temporary works together with all precautions to ensure their stability during all operations to avoid any deformations and settlement.

(b) Fabrication and Driving of Permanent Lining

- (i) Where agreed with the Engineer, the Contractor shall provide a permanent lining suitably formed of ten (10) mm minimum thickness mild steel plate complying with SABS 1431 or equivalent, BS EN 10113 and BS EN 10155 for the grade of steel specified in the Drawing. The plates shall be cut and rolled to the inner diameter not less than the nominal diameter of the pile or such larger diameter as to allow the requisite pile diameter hole in the unlined length of pile. The rolled plates shall be connected by full penetration butt welds generally complying with BS 5133. Not more than three (3) longitudinal seam welds shall be employed in any one cross-section and such welds shall be staggered in position in the cross-section between one length and the next. The dimensional accuracy of the lining shall be as stated on the Contractor's shop drawings.
- (ii) A permanent lining of at least 10 mm thickness shall be provided in all cast in-site bored piles constructed over water or very soft ground, as directed by the Engineer. The top of the lining shall extend to the cut-off level of the pile.
- (iii) In the case of steel shells or pipes, after being driven and prior to placing reinforcing steel and concrete therein, the steel shells or pipes shall be examined for collapse or reduced diameter at any point. Any shell or pipe which is improperly driven or broken or shows partial collapse to such an extent as to materially decrease its bearing value will be rejected. Rejected shells or pipes shall be removed and replaced, or a new shell or pipe shall be driven adjacent to the rejected one.

The Contractor at his own expense shall fill rejected shells or pipes, which cannot be removed, with lean concrete.

- (iv) Casings of driven cast-in-place piles shall be installed to the approved set or prescribed depth, and in the sequence of driving approved by the Engineer, unless otherwise agreed in writing.
- (v) Each casing of driven cast-in-place piles shall be driven continuously, unless otherwise agreed by the Engineer, until the approved set or prescribed depth has been reached.
- (vi) When required by the Engineer, the Contractor shall demonstrate that the final set obtained in driving the casings is maintained after a minimum period of 24 hours.
- (vii) Levels shall be taken immediately after the final set is obtained and before concreting each pile. When a pile has risen as a result of driving adjacent piles, the Contractor shall submit to the Engineer his proposals for remedial work and shall carry out remedial work as agreed by the Engineer.
- (viii) Where a permanent casing is to be made from a series of short sections, it shall be designed and installed so as to produce a continuous watertight shaft. The dimensions and quality of the casing shall be adequate to withstand the stresses caused by handling and installation without damage or distortion.
- (ix) Protective coatings and anti-friction bitumen coatings shall be applied to all casings as indicated in the Drawings.

The bitumen coating shall be 'bituseal liquid' – heavy duty bituminous coating by 'abe' or approved equal. The coatings shall be sprayed on to the casings in the specified thickness after the necessary surface preparation/treatment all in accordance with the coating manufacturers.

Damaged coatings shall be made good as specified for structural steel work.

(c) Bored Cast-in-Place and Continuous Flight Auger Piles

(i) Boring Procedure

- The method of boring shall be one that maintains stability, verticality or batter of the walls and base of borehole by the use of temporary casing and/or bentonite slurry. The variation from alignment shall not exceed plus or minus one half (0.5) degree.
- All holes shall be drilled to the tip elevation determined from investigations and approved by the Engineer. Rejected boreholes shall be filled with class 25/20 concrete by the Contractor at his own expense.

- The piling method shall be such that it allows soil samples to be taken and in-situ soil tests, if required, to be carried out during or ahead of boring operations. The method/procedure used in the execution of the borehole and other operations shall not be such as to cause vibrations resulting in damage to completed or partially completed piles or to adjacent structures, services or other property. The procedure shall not be such as to cause harmful loosening or softening of soil outside the pile that has to be filled with concrete.

The equipment used for the execution of the borehole shall be adequate to ensure that each pile penetrates to the required founding level.

- Suitable casings shall be furnished and placed when required to prevent caving of the hole before concrete is poured. Casing, if used in drilling operations shall be removed from the hole as concrete is poured, unless otherwise specified. The bottom of the casing shall be maintained not less than one hundred and fifty (150) cm below the top of the concrete during withdrawal and pouring operations, unless otherwise permitted by the Engineer. Segregation of the concrete during withdrawal operations shall be avoided.
- The steel shells/pipes shall be of sufficient strength and rigidity to permit driving to the required bearing value depth without damage. The steel may be either cylindrical or tapered, step tapered or a combination of plain, circular or fluted. All types shall conform to ASTM standards. The minimum average tensile strength of steel shall be 3500 kg/cm^2 .
- When required by the Engineer, the steel shells/pipes shall be factory coated on both interior and exterior surfaces by red lead paint conforming to AASHTO M-72 or as stated in the Specifications. The coating shall not cause any hindrance while assembling the pile section during welding operations.

(ii) Temporary Casing

- The temporary casing shall be of appropriate diameter for locating the pile and piloting the borehole and shall be pitched at the exact specified locations to ensure that the casing when sunk is within the specified tolerances. The casing shall be sunk to a sufficient depth by approved methods. The depth shall be at least sufficient to prevent the ingress of alluvium or other loose materials into the bore when encountered below the bottom level of the casing. In addition, the depth shall be such as the Contractor considers necessary for the stability of the casing and/or temporary works systems during construction in general and for the following conditions and operations in particular during all conditions of river flow which may occur during the period of works:
 - a. Open temporary casing to ensure against blow-in of soil.
 - b. Concreting of the pile, until the temporary casing is extracted.

- The Contractor shall take all such measures and provide such strengthening and bracing as is necessary and to the approval of the Engineer to ensure that the temporary casing is not disturbed, overturned, over-stressed or under-eroded in any condition and shall be such that it will not disturb the freshly cast concrete and/or permanent lining and/or reinforcement.
- Where the use of temporary casing is approved for the purpose of maintaining the stability and over-rapid withdrawal of the boring tools which could lead to excessive removal of soil and water and disturbance of the surrounding ground and when boring through any permeable stratum (including silt), the water level in the boring shall be maintained between one (1) metre and two (2) metres above the external water level, unless the Engineer directs otherwise.
- The temporary casing shall be free from significant distortion and/or shall be uniform cross-sections throughout each continuous length. During concreting they shall be free from encrusted concrete or any internal projections which might prevent the proper formation of the pile.

(iii) Bentonite Slurry

- Where the use of bentonite slurry is required for the purpose of maintaining the stability of the walls and base of the pile bore, the Contractor's proposals shall be submitted to the Engineer for approval describing all details of the slurry. These shall include inter-alia:
 - a. The source of the bentonite
 - b. The constitution of the slurry
 - c. Specific gravity, viscosity, sheer strength and pH value of slurry.
 - d. The methods of mixing, storing, placing, removal and re-circulating the slurry, and
 - e. The provision of stand-by equipment.
- Tests shall be carried out to ensure that the proposed constitution of the slurry is compatible with the ground water. Proposals for the constitution and physical properties of the slurry shall include average, minimum and maximum values. The specific gravity of the slurry shall not be less than one and three tenth (1.3) in any case at any time. The Contractor shall use additives, where necessary, to ensure the satisfactory functioning of the slurry.
- A manufacturer's certificate showing the properties of the bentonite powder shall be delivered to the Engineer for each consignment delivered to site. Independent test shall be carried out at laboratory approved by the Engineer on samples of bentonite as frequently as the Engineer considers appropriate.

- The Contractor shall carry out tests during the course of the piling to check the physical properties of the bentonite slurry in the works. These tests shall include, inter-alia, density, viscosity, shear strength and pH tests. The test apparatus and test methods shall be those given in “Recommended practice” Standard by American Petroleum Institute, New York City, 1957, reference API RP29, Section-I, II and VI, or as otherwise agreed with the Engineer.
- The frequency of tests shall be that which the Engineer considers necessary to ensure that the bentonite slurry is in accordance with the Contractor’s proposals.
- Should the physical properties of any bentonite slurry deviate outside the agreed limits, such slurry shall be replaced, irrespective of the number of times it has been used, with new bentonite slurry of correct physical properties to the approval of the Engineer.
- Adequate time shall be allowed for proper hydration to take place, consistent with the method of mixing, before using slurry in the works.
- The Contractor shall control the bentonite slurry so that it does not cause a nuisance either on the site of adjacent waterways or any other areas. After use it shall be disposed of in a manner to the approval of the Engineer.
- The level of the slurry in the bentonite shall be maintained, so that the internal fluid pressure always exceeds the external water pressure.
- If chiselling is used when boring through hard strata or to overcome obstructions, the stability of the excavation shall be maintained by methods acceptable to the Engineer.
- Where pile bores contain water or drilling fluid, a cleaning process shall be employed before concrete is placed. Large debris and/or accumulated sediment shall be removed using appropriate approved methods, which shall be designed to clean while at the same time minimising ground disturbance below the pile bases. Water or drilling fluid shall be maintained at such levels throughout and following the cleaning operation that stability of the bore is preserved.
- Before placing concrete, measures shall be taken to the satisfaction of the Engineer to ensure that there is no accumulation of silt or other material at the base of the boring, and the Contractor shall ensure that heavily contaminated bentonite suspension, which could impair the free flow of concrete from the tremie pipe, has not accumulated in the bottom of the hole.
- Concrete to be placed under water or drilling fluid shall be placed by tremie and shall not be discharged freely into the water or drilling fluid. Pumping of concrete may be approved by the Engineer, where appropriate.

- A sample of the bentonite suspension shall be taken from the base of the boring using an approved sampling device. If the specific gravity of the suspension exceeds 1.20 the placing of concrete shall not proceed. In this event the Contractor shall modify or replace the bentonite as approved to meet the Specification.

(iv) Excavation from Boreholes

- The soil and debris from inside the pile boreholes shall be removed by bucket, auger or circulating bentonite slurry provided that no jetting at the foot of the borehole shall be permitted. Methods of excavation, which in the opinion of the Engineer may damage the permanent lining of the pile, shall not be employed.
- Should the excavation reveal any soil stratum below the bottom of a pile which is, in the opinion of the Engineer, unsuitable for supporting the loads that will be imposed on it, the Contractor shall remove all such subsoil stratum to the satisfaction of the Engineer and shall lengthen the pile as necessary and the cost of any such lengthening shall be paid in accordance with the Contract rates.
- Excavation shall be carried out as rapidly as possible in order to reduce to a minimum the time in which any strata are exposed to the atmosphere, bentonite slurry or water. In any case, a pile shall not remain unfilled with concrete for any period exceeding eighteen (18) hours after completion of the borehole.
- Excavations shall not be exposed to the atmosphere longer than is necessary and shall be covered at all times when work is not in progress. The Contractor shall take all precautions necessary to prevent the ingress of surface water or foreign matter. Temporary casing or drilling fluid shall be provided where necessary to ensure stability of the pile boring during boring, placing of reinforcement and concreting operations.
- The materials from pile excavation shall be disposed of as agreed with the Engineer so that the same does not interfere with any part of the permanent works of this Contract leaving the site in a neat and workmanlike manner.

(v) Samples and Tests

- The Contractor shall take soil samples as given below or as directed by the Engineer to the designed tip elevation of the pile and shall carry out in-situ Standard Penetration tests within, and ahead of borehole on the line of vertical axis of the pile at these locations after each one and half (1.5) meter interval.
- The costs of tests and collection of samples shall be deemed to be included in the unit rates submitted by the Contractor.
- Each disturbed sample shall, as far as possible, be truly representative of the grading of in-situ soil at the point from which

it is taken, without contamination by other material. It shall approximately be five (5) kg in weight and shall be placed in a strong airtight container immediately after its removal from the sampler. The container shall be sealed as soon as the sample has been placed in and shall be taken to the site laboratory for grading, moisture content and Atterberg Limits.

- The apparatus and procedure for the Standard Penetration Test shall be in accordance with the provisions of ASTM D 1586 Penetration Test and split-barrel sampling of soils and/or ASTM D 1587 thin-walled sampling of soils, or as otherwise agreed with the Engineer.

(vi) Limitations of Boring Sequence

- Piles shall be constructed in such a manner and sequence as to ensure that no damage is sustained by piles already constructed in adjacent positions.
- The Contractor shall submit to the Engineer for his approval a programme showing sequence of construction of various piles.

(vii) Tolerances

- The heads of piles at the designated cut off level shall be within seventy five (75) mm of their position in plan as shown on the shop drawings and no pile shall deviate from the vertical alignment by more than one half (0.5) degree.
- Forcible methods of correction of any casing or piles shall not be used.

(viii) Inspection

- After the borehole has reached its final stipulated positions, and all the samples have been taken out, as required by the Engineer, and the borehole has been completely cleaned of all loose matter and otherwise made ready to receive the reinforcement and thereafter the concrete, the Contractor shall so inform the Engineer, and request inspection and approval.
- The Engineer shall inspect the soil samples and test results therefrom, check the elevation of the bottom of the borehole and the amount and direction, if any, by which the top of the casing is out of position, or out-of-plumb and having satisfied himself on these and on any other points which he may consider relevant, shall provide written approval for the Contractor to proceed with the placing of the reinforcement.
- The Contractor shall under no circumstances proceed with the placing of reinforcement or with the subsequent concreting without having first obtained the approval signed separately for each and every pile bore from the Engineer.

(ix) Pile Reinforcement

- The reinforcement for each pile shall be assembled and securely tied by means of binding wire and by welded reinforcement rings shown on the approved shop drawings, in such a manner as to form a rigid cage.
- The required concrete cover to the reinforcement shall be maintained by suitable spacers securely attached to the reinforcement and of sufficient strength to resist damage during handling of the reinforcement cage into the pile. The distance between the spacers shall be such that the required cover is maintained throughout and that there is no displacement of the reinforcement cage in the course of the concreting operation.
- Should the Contractor prefer to lower the reinforcement cage assembly into the borehole in sections he may do so provided the same lapping requirements as for assembly on the ground are followed, namely, the longitudinal reinforcement shall be suitably lapped and the spiral reinforcement shall be doubled over the lap zones. Spacers maintaining concrete cover shall be located immediately below and above the laps at 4 points spaced around the cage.

(d) Concreting of Piles

The following particular requirements shall be observed.

(i) Materials

- Concrete for cast-in-place piles shall be a rich coherent mix of high workability and cement content meeting all requirements for the specified class as provided below.

PORTLAND CEMENT CONCRETE REQUIREMENTS

Minimum Cement Content	Max. Size of Coarse Aggregate	28 days Compressive Strength (Min.)	Consistency (Range in slump)		Maximum Permissible Water/Cement Ratio
kg/m ³	(mm)	(MPa)	(mm)	(mm)	
365	20	30	150	180	0.60

- The concrete shall be of Class 30/20, unless otherwise specified.
- All concrete for cast-in-place piles shall be compacted to produce a dense homogeneous mass by a method agreed by the Engineer.
- Suitable retarder, plasticiser may be added by the Contractor subject to approval by the Engineer.
- Workability and slump requirements are given in the table below:

PILING MIX WORKABILITY	SLUMP		TYPICAL CONDITIONS OF USE
	Minimum (mm)	Range (mm)	
a	75	75 – 150	Placed into water-free unlined or permanently lined bore of 600 mm diameter or over, or where casting level lies below temporary casing; reinforcement widely spaced, leaving ample room for free movement of concrete between bars.

PILING MIX WORKABILITY	SLUMP		TYPICAL CONDITIONS OF USE
	Minimum (mm)	Range (mm)	
b.	100	100 – 200	Where reinforcement is not spaced widely; where cut-off level of concrete is within temporary casing; where pile bore is water-free and the diameter is less than 600 mm.
c.	150	150 or more	Where concrete is to be placed by tremie under water or drilling mud or by pumping.

- The Contractor shall submit the details of the proposed additive for Engineer's approval with appropriate supporting data on laboratory trial mix results. The dosing of retarders shall ensure initial setting time of not less than five (5) hours corresponding to the ambient temperature at which the concreting is proposed to be carried out.

(ii) Commencement of Concreting

Prior to placing any concrete:

- Any heavy contaminated bentonite slurry, which could impair the free flow of concrete from the tremie pipe, shall be removed.
- Any loose or soft material/water soil shall be removed from the bottom of the bore by methods acceptable to the Engineer.

The Contractor shall not proceed with the concreting of the pile until the Engineer gives specific approval to do so after satisfying himself of the following:

- Adequacy of the Contractor's equipment and arrangement.
- Proficiency of his personnel.
- Cleanliness of the borehole, and
- Contractor shall have suitable lighting arrangements at all times for the Engineer to inspect the entire length of the shells, pipe or hole before placing the reinforcing steel or concrete.

Prior to the concreting a pile a sample of slurry shall be taken from the base of the borehole using an approved sampling device and its

specific gravity shall be determined and submitted for the Engineer's approval.

(iii) Placing of Concrete

- The tremie shall be of not less than two hundred and fifty (250) mm diameter made of watertight construction.
- The means of supporting the tremie shall be such as to permit the free movement of the discharge end of the concrete.
- The tremie pipe shall be fitted with a travelling plug, which shall be placed at the top of the pipe before charging the tremie pipe with concrete, as a barrier between the concrete and water or bentonite slurry, so as to prevent water or bentonite slurry entering the tube and mixing with the concrete.
- The tremie shall be carefully lowered into the borehole, so that the end of the tube shall rest at about one hundred and fifty (150) mm above the bottom of the borehole, with reinforcement in the borehole, and the hopper end of the tremie tube shall be filled with concrete as aforesaid. It shall be slightly raised, so that when the concrete reaches the bottom it flows out of the lower end of the tube and fills the bottom of the borehole.
- Thereafter, the rate of withdrawal of the tremie shall be gradual so as to ensure the end of the tremie pipe is always one and a half (1.5) metres below the top of the concrete in the borehole. An allowance shall be made for the top five hundred (500) mm of concrete in the borehole during concreting being unsatisfactory.
- When the next batch is placed in the hopper, the tremie shall be slightly raised but not out of the concrete at the bottom, until the batch discharges to the bottom of the hopper. This operation shall be controlled by calculating the volume of concrete required to fill one linear meter of pile and then by measuring the rate of withdrawal of the tube corresponding to the volume of the batch in the hopper. The flow shall then be retarded by lowering the tube.
- The depth of the concrete in borehole shall be measured at intervals to keep a constant check that the tremie pipe bottom is immersed in concrete.
- Concreting in each pile shall be carried out in a continuous operation without stoppages until the pile has been completed.
- If the bottom of the tremie pipe ceases to be immersed in the body of the concrete in the pile and the seal is broken, concreting shall cease immediately and such remedial measures as the Engineer may accept or direct shall be carried out.
- The Contractor shall take precautions to ensure that the concrete is free of voids and shall prevent the entry of water and/or collapse of soil into concrete. If any soil or other deleterious or extraneous

materials fall into any pile excavation prior to or during concreting, it shall be removed immediately.

- Concreting shall continue until the concrete has reached an elevation of five hundred (500) mm higher than the designated pile cut off level shown on the shop drawings or as otherwise directed by the Engineer.
- The concrete shall be placed in one continuous operation from tip to cut-off elevation and shall be carried out in such a manner as to avoid segregation. The method of placing the concrete and the consistency (slump) shall be to the satisfaction of the Engineer.
- No shell or pipe shall be filled with concrete until all adjacent shells, pipes or piles within a radius of three (3) m or five (5) times the pile diameter, whichever is greater, have been driven to the required resistance.
- After a shell or pipe has been filled with concrete, no pile shall be driven within seven (7) metres thereof until at least seven (7) days have elapsed.

(e) Withdrawal of Temporary Casing

If the method of construction involves withdrawal of temporary casing as concreting proceeds, a sufficient head of concrete shall be maintained above the bottom of the temporary casing to ensure that no voids are formed within the pile and to prevent the entry of ground water and to prevent the collapse of soil into the concrete.

If such entry or collapse should occur, the temporary casing shall be re-driven before the concrete has set and all defective concrete shall be removed or the construction of the pile shall be abandoned, in which case the provision of the clause herein which refers to “Defective Piles” shall apply.

The withdrawal of the temporary casing shall be carried out before the adjacent concrete has taken its initial set.

The method and timing of withdrawal must be such as to ensure that the space between the pile and the surrounding ground shall be filled with concrete.

(f) Cutting of Piles

Tops of piles shall be embedded in the concrete footing as shown on the shop drawings.

Concrete piles shall, when approved by the Engineer, be cut off at such a level that at least 50 mm of undamaged pile can be embedded in the structure above, but not more than 150 mm, unless otherwise specified or directed by the Engineer. If a pile is damaged below this level, the Contractor shall repair the pile to the satisfaction of the Engineer. The longitudinal reinforcement of the piles shall be embedded in the structure above to a length equal to at least (40) times the diameter of the main reinforcing bars.

When the cut-off elevation for a cast-in-place concrete pile is below the elevation of the bottom of the pile cap, the pile may be built up from the butt of the pile to the elevation of the bottom of the cap by means of a reinforced concrete construction method, to be submitted to the Engineer for approval.

(g) Defective Piles

Any pile completed with defects such as damage during casting in-situ, placed out of its proper location, incapable or partially capable of permanently carrying the load which it is intended to carry, driven below the elevation fixed by the Engineer, due to the immature setting of the concrete in the pile or due to cavity/collapse of the borehole fully or partially, or due to any cause of which Engineer shall be sole judge to determine shall be corrected at the Contractor's expense by one of the following methods approved by the Engineer:

- A second pile shall be driven or cast adjacent to the defective pile

- The Contractor shall undertake such additional tests/works as the Engineer may specify to provide additional foundations to supplement the defective piles and so modify the structure to be supported as to ensure that load will be transferred safely to the additional foundations of existing pile. The Contractor shall be responsible for the cost of such additional functions and tests and/or of the extra work carried out in such modifications to the structure.

A concrete pile shall be considered defective if it has a visible crack or cracks, extending around the four sides of the pile, or any defect, which, in the opinion of the Engineer, affects the strength or service life of the pile.

When a new pile is driven or cast to replace a rejected one, the Contractor at his expense, shall enlarge the footing as deemed necessary by the Engineer.

(h) File Records

The Contractor shall keep records of the piles driven or installed. A copy of the record shall be given to the Engineer within two (2) days after each pile is driven. The record form to be used shall be approved by the Engineer. The pile records shall give full information on the following:

Data	Driven cast in-place Concrete Piles	Bored cast in-place Concrete Piles	Continuous Flight Auger Concrete or Grout Piles
Contract	*	*	*
Pile reference number (location)	*	*	*
Pile Type	*	*	*
Nominal cross-sectional dimensions or diameter	*	*	*
Nominal diameter of underream/base	~~	*	~~
Length of performed pile	~~	~~	~~
Standing groundwater level from direct observation or given site investigation data	*	*	*
Date and time of driving, re-driving or boring	*	*	*
Date of concreting	*	*	*
Ground level at pile position at commencement of installation of pile (commencing surface)	*	*	*
Working level on which piling base machine stands	*	*	*
Depth from ground level at pile position to pile toe	*	*	*
Toe level	*	*	*
Pile head level as constructed	*	*	*
Pile cut-off level	*	*	*
Length of temporary casing	*	*	~~
Length of permanent casing	*	*	~~
Type, weight, drop and mechanical condition of hammer and equivalent information for	*	~~	~~

Data	Driven cast in-place Concrete Piles	Bored cast in-place Concrete Piles	Continuous Flight Auger Concrete or Grout Piles
other equipment			
Number and type of packings used and type and condition of dolly used during driving of the pile	*	~~	~~
Set of pile or pile tube in millimetres per 10 blows or number of blows per 25 mm of penetration	*	~~	~~
If required, the sets taken at intervals during the last 3 m of driving	*	~~	~~

Data	Driven cast in-place Concrete Piles	Bored cast in-place Concrete Piles	Continuous Flight Auger Concrete or Grout Piles
If required, temporary compression of ground and pile from time of a marked increase in driving resistance until pile reached its final level	*	~~	~~
If required, driving resistance taken at regular intervals over the last 3 m of driving	*	~~	~~
Soil samples taken and in-situ tests carried out during pile formation or adjacent to pile position	*	*	*
Length and details of reinforcement	*	*	*
Concrete Mix	*	*	*
Volume of concrete supplied to pile	*	*	*
All information regarding obstructions delays and other interruptions to the sequence of work	*	*	*

On completion of the piling for each structure, the Contractor shall deliver to the Engineer a drawing recording the exact location and the final depth (tip elevation) of all piles.

2110.21 Site Supervision

Full details of the Personnel in charge of the piling operation, including their qualification and experience, shall be submitted by the Contractor to the Engineer for his approval. He shall also retain an approved and competent English-speaking foreman on the Works, while piling is in progress, and shall keep at the Site of the Works copies of all the drawings, Specifications, instructions and a complete log and records of all piles formed or driven with details of the set obtained, if any, and the actual length of each completed pile. These shall be available to the Engineer for inspection at all times. The Contractor shall give every assistance to the Engineer to enable him to keep a similar record.

2110.22 Piles – Type and Design

The piles for the bridge shall have a nominal working load of 85 tonnes. The nominal pile length is also indicated on the drawings. All the piles will be designed on the basis of end bearing in dense sand. The number of piles and/or the length can be changed from that shown on the drawings, depending on the results obtained from test pile. At least 2 months before it is proposed to start the piling operation on a particular bridge, an independent test pile shall be constructed close to one of the proposed piled foundations at a location determined by the Engineer. The test pile shall be of the same size as the working piles and its length shall be as instructed by the Engineer and it shall be constructed in the same manner and to the same standards as proposed, and as directed by the Engineer, for the working piles. The test shall be carried out to the approval of the Engineer.

Two copies of the test results shall be supplied to the Engineer within twenty-four (24) hours, and within thirty (30) days of the test records having been handed over to the Engineer, the Contractor shall be instructed as to the founding levels for the working piles.

2110.23 Proof Loading of Piles

(a) General

- (i) Piles selected by the Engineer shall be tested by proof loading and the Contractor shall give the Engineer at least 24 hours' notice of the commencement of the test.
- (ii) The test load shall be applied by a method agreed by the Engineer

(b) Main Piles

- (i) Test piles shall be main piles selected by the Engineer for test loading by one of the methods described herein and shall be tested after the pile has attained its characteristic strength.
- (ii) Main piles shall not be used as reaction piles.

(c) Measuring Devices

- (i) Load measuring devices shall be calibrated before and after each series of tests, whenever adjustments or replacements are made to the devices and at the intervals recommended by the manufacturer of the equipment. Pressure gauges and hydraulic jacks shall be calibrated together. Certificates of calibration from a testing laboratory approved by the Engineer for such calibration shall be supplied to the Engineer.
- (ii) The Contractor's proposed method of measuring the movement of pile heads shall be submitted to the Engineer for his agreement.

2110.24 Test Loading of Working Piles

(a) General

Each increment of load shall be measured within an accuracy of 2%. Movements shall be measured within an accuracy of 0.25 mm. An independent reference frame or wire shall be set up to permit measurement of pile movement. Dial gauges shall be accurate to within 0.1 mm. Overall movements shall be checked by optical or any other levelling method agreed with the Engineer by reference to an external datum.

Where required by the Engineer, working piles shall be subjected to test loads of up to 1.5 times its nominal working load. The test load shall not be applied by jacking against the adjacent working piles, but by jacking against additional piles installed for that purpose, or by jacking against kentledge, heavier than the required test load, placed on a platform supported well clear of the test pile.

The Contractor shall prepare and submit to the Engineer for agreement, his proposals for carrying out the test loading, including the method of extending the pile to ground level, if necessary, and full details of the methods of applying the load and measuring loads and deflections. A copy of the current certificates of calibration of the approved load measuring apparatus shall be submitted to the Engineer, prior to any test loading being applied to a pile. The deflections of the head of the test pile shall be accurately measured in relation to an undisturbed datum.

Piles shall not be loaded until the Contractor has received the Engineer's approval of his proposals.

(b) Procedure

The Contractor shall give the Engineer not less than 12 hours' notice of his intention to commence the application of the test load.

The test load equal to the nominal working load shall be applied in four equal increments. The intermediate load shall be maintained until the rate of change of deflection of the test pile is less than 0.1 mm in 30 minutes. The working load of the pile shall be maintained for a period of not less than 12 hours and the total movement recorded before unloading. Load is taken off in four equal intervals with holding time of 10 minutes for each interval.

After 1 hour, the test load equal to 150 percent of the nominal working load shall be reapplied in increments of 25 percent of the nominal working load. The intermediate loads corresponding to 25, 50, 75, 100, 125 and 150 percent of the nominal working load shall be maintained until the rate of change of deflection of the test pile is less than 0.2 mm in 30 minutes. The load corresponding to 150 percent of the nominal working load shall be maintained for 24 hours and the total movement recorded.

The load shall then be reduced to zero in decrements of 25 percent of the nominal working load. Each load shall be maintained until the rate of change of deflection of the test pile is less than 0.35 mm in 30 minutes.

(c) Records

The progressive deflection of the pile head shall be measured accurately throughout the whole period of the test.

Readings for the unloading and intermediate test loads should be taken at about 1,2,4,8,15 and 30 minutes after each change in loading and thereafter at least every 30 minutes.

Two copies of the test records shall be supplied to the Engineer within 24 hours of the completion of a pile test. The records shall give the dates and times of load application and removal, the load-pile deflection and time-pile deflection relationships, both in tabular and graphical form, reference number of the load measuring apparatus and details of any special circumstances relating to the pile test.

(d) Limits of Settlement

The maximum settlement of the pile head permitted shall be 4 mm under the nominal working load and 6 mm for 1.5 times the working load. The piling scheme put forward by the Contractor must meet these requirements, and the Contractor must guarantee that the piles will carry the required loads without exceeding the specified deflection.

(e) Defective Piles

If, in the opinion of the Engineer, any pile is incapable or only partially capable of permanently carrying the load which it is intended to carry, as determined by the pile test or by reason of ground water or soil having entered during construction, or the strength of concrete (as shown by the results of the cube tests) being below that specified, or the pile having been constructed outside the permitted tolerances or having been damaged by the construction of any other pile nearby or otherwise, or failure to conform in any other respect to the requirements of the Contract, then the Engineer will require the Contractor to submit for approval his proposals for making good any defective work or inadequate pile all at his own expense.

2111 STEEL PILING FOR STRUCTURES

A. Scope

The work covered by this Clause of these Specification comprises furnishing all materials, plant, equipment, labour and in performing all operations in connection with the execution of piling works. This includes tests on piles on completion of installation, subject to the Conditions of Contract and in accordance with this Section of these Specification and the applicable Drawings.

Provisions under this Clause, stipulating the use of steel piling for structures, are subject to the Engineer's review depending on the outcome of the geotechnical investigations stated in Clause 2109 of this Special Specification.

B. General

1. Compliance:

Piling shall comply in all respects with the principles contained in BS 8004 (1986) for Foundations.

2. Difference in Ground Conditions:

In addition to submission of the records required under Clause 2111 D 1 of this Special Specification, the Contractor shall immediately report to the Engineer any ground conditions circumstances, he encounters, which may affect progress of the piling works and the bearing capacity of the piles.

3. File Positioning Correction:

Where piles have not been positioned within the limits described in the Contract, no method of forcible correction will be permitted.

4. Order List:

The Contractor shall supply all piles which are intended to remain in place for the structure on completion. The number and lengths of piles required will be based on information secured from the driving of test piles or other data available. The lengths shown on the drawings, prepared after the design described under Clause 2109 of this Special Specification, shall be the lengths required below cut-off and the Contractor shall, at his own expense, increase the lengths and the necessary amount to provide for fresh heading and to reach from the cut-off level up to the position of his driving equipment.

5. Piling Ordered and Not Driven:

The supply of additional piles or piles of greater lengths than those required shall be at the Contractor's expense.

6. Piles Destroyed in Handling or Driving:

Any pile, which is damaged or destroyed before or at the time it is being driven, shall be replaced by the Contractor at his own expense.

7. Preparation for Foundation:

Foundation pits, including the construction of cofferdams or cribs where required, shall be excavated as directed by the Engineer. Upheaval of the pit bottom, due to driving the piles, shall be removed before the foundation concrete is placed. Backfill with gravel will normally be permitted to achieve the pit bottom correct level.

8. Elevation of cut-off:

The tops of all piles shall be sawn to a true plane as shown on the Drawings, prepared after the design described under Clause 2109 of this Special Specification, and at the level determined by the Engineer. Broken, split, or misplaced, piles shall be withdrawn and properly replaced entirely at the Contractor's expense.

9. Piles Driven Below Cut-off:

Piles driven below the cut-off level without the Engineer's approval shall be withdrawn and replaced with new ones and, if necessary, longer piles or shall be extended, as directed by the Engineer, at the expense of the Contractor.

10. Equipment for Driving:

- (i) Steel piles, shall be driven with the approved diesel, steam or air hammers developing not less than 1100 gfm of energy per blow or with a drop hammer of weight and type approved by the Engineer.

The Contractor shall furnish the Engineer with the manufacturer's specifications and catalogues for all diesel, steam or air hammers used, showing all the data necessary for computing the bearing value of piles driven.

Gravity or drop hammers shall be weighed in the presence of the Engineer. Hammers so weighed shall have the exact weight stamped on them.

- (ii) Leads:

Fixed lead pile drivers shall be used when driving all bearing piles. The use of hanging or swinging leads will not be allowed unless they are so constructed that they can be

held in a fixed position during the driving operations. Leads shall be of sufficient length so that the use of a follower or dolly will not be necessary. Leads adapted to the driving of batter or raking piles shall be employed for trestle construction or for foundation work involving inclined piles.

(iii) Water Jets:

Water jets shall not be used.

11. Test Piles:

When specified on the Drawings, prepared after the detailed design stated under Clause 2109 of this Special Specification, or ordered by the Engineer, the Contractor shall drive test piles to determine the lengths of piling required to obtain the necessary load carrying capacity or penetration. These piles shall be driven at the locations designated by the Engineer and shall be of sufficient length to provide for any variation in soil conditions. Test piles shall be of the same material as the permanent piles that are to be driven. Steel test piles shall have the same cross-section and other characteristics as the permanent piles. Driving equipment used to drive test piles shall be the same as that to be used for driving the permanent piles.

12. Loading Tests:

When specified or required by the Engineer, the size and number of piles shall be determined by the actual loading tests. These tests shall consist of the application of test loads, together with suitable apparatus for accurately determining the superimposed weight and the settlement of the pile under each increment of load. The minimum test load shall be at least twice the design load or as shown on the Drawings and shall be applied and removed in increments as determined by the Engineer. Final settlement after each increment shall be recorded. The minimum time between load increments and settlements readings shall not be less than three minutes or at the discretion of the Engineer. Pile tests shall be carried out in accordance with British BS 8004 (1986) for Foundations.

In the absence of loading tests the safe bearing value of the piles shall be determined by a substantiated adequate pile driving formula specified by the Engineer.

C. Steel Piles:

1. Protection, Storage and Handling:

The protection, storage, handling and lengthening of steel piles shall be in compliance with the following:

- (i) Piles shall be supported, handled and pitched as described in the Contract and in such way as to avoid damage and, where pile have to be stored, they shall be placed on sufficient supports on firm ground to avoid damage by excessive bending.
- (ii) Bent or kinked piles which, in the opinion of the Engineer, cannot be straightened without damage to the metal will be rejected.
- (iii) Each pile shall be marked indelibly to show its identification number, grade of steel and length.
- (iv) Before dispatch from the Manufacturer's Works, the piles shall be protected, as directed by the Engineer.

2. Materials:

Steel piles shall be of the section shown on the Drawings and shall be structural steel complying with the requirements of ASTM A36-77a or BS 4360 (1972). The Contractor will be required to furnish the Engineer with two certified copies of the records of idle analysis and physical test, as reported by the Manufacturer, complying with the requirements of ASTM A6-77B OR BS 4360 (1972).

3. Steel for H piles:

Steel for H piles and fabricated sections shall comply with that for structural steel or comply with the requirements of BS 153 Part 1 (1972) and BS4360 (1972). In addition, structural steel hot-rolled sections and structural steel hot-rolled hollow sections shall comply with the requirements of BS 4 Part 1 (1972) or Part 2 (1969).

4. Driving:

The Engineer shall be notified 24 hours before the commencement of driving. Piles shall be driven to the set or depth and in sequence of driving approved by the Engineer. The set shall be taken in the presence of the Engineer or his representative unless permission to the contrary has been obtained in writing.

5. Cut-Ends:

Steel piles shall have square-cut ends and the heads shall be protected during driving by a metal cap made to fit the head of the pile.

6. Splicing:

Splicing of steel piles will, in general, be permitted subject to the approval of the Engineer as to the necessity for splicing and the manner in which the splice is to be made.

7. Lengthening of Piles:

Full penetration butt welds shall be used for all pile lengthening. Sections to be joined shall be maintained in true alignment and position. After welding, the affected area shall be thoroughly cleaned and protected in the same way as adjacent surfaces.

8. Capping:

When specified on the Drawings, steel piles shall be capped with a steel plate, after being cut off at the required level. In such case, the pile top shall be cut square and smooth as practicable. The pile cap shall consist of steel plate of the size and shape shown on the Drawings. The method of attachment of the pile cap shall be by electric welding in the amount and in the manner shown on the Drawings.

9. Determination of Bearing Values:

The bearing values of steel piles shall be determined by means of the loading tests specified in Clause 2110 B 12 of this Special Specification when directed by the Engineer.

10. Surplus Length of Piles:

Any length of piles surplus to that required for incorporation in the substructure shall be cut off and removed.

11. Risen Piles:

Piles that have risen as a result of driving adjacent piles shall be re-driven to the Engineer's approval.

D. Pile Records

The Contractor shall keep a record of all piles driven or installed and a copy of the record of the work done each day shall be given to the Engineer within 24 hours. The piling records shall be in the format shown in record form 07A given at the end of this Specification.

On completion of the piling, the Contractor shall submit to the Engineer a drawing showing the final depths of all piles relative to the National Trigonometric Survey Datum or the agreed site datum.

E. Pile Load Testing:

Loading tests on piles will be carried out where specified in accordance with Section 7.5 (Bearing Capacity and Test Loading) of BS 8004 (1986) for Foundations.

2112 MEASUREMENT AND PAYMENT

Measurement and payment will be effected as detailed in Bill No 21 of the Bill of Quantities.

2200 DAY WORKS

2201 Scope

This specification covers instructions that may be issued by the Engineer as additional or substituted work to be executed on a day work basis by the Contractor or by his sub-contractors.

2202 Standards

All codes and standards mean the latest. Where not specified otherwise the installation shall generally follow the Kenyan Standard Specification for Road and Bridge Construction

2203 Measurement and Payments

Measurement and payment for all day works items shall be in accordance with the items listed in the Bill of Quantities, the preamble to Bill of quantities and the specifications above and cover the payment of plant, labour and materials for work executed in accordance with the Engineer's instructions.

2300 Environmental Management Plan

The Contractor shall implement the Environmental Management Plan (EMP) measures (Matrix Tables given below both for construction and maintenance and use phases), enhancement measures as directed by the Engineer. He shall submit the report on compliance with the Environmental Mitigation measures periodically to the Engineer. The Engineer will review the compliance submitted by the Contractor.

Environment and Social Management Plan Matrix

Construction Phase: see table below

Environment and Social Management Plan Matrix

Construction Phase

Table 1: Actions Matrix

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Targets to Achieve	Monitoring Parameters
1	Degradation of Water Sources				
	- Over-abstraction of water; - Water quality degradation; - Effects on downstream dependants; and - Stream bed siltation. Sources: - Silt from earth moving; - Oil and grease; - Raw asphalt concrete; - Workshops and machinery maintenance areas; - Construction Camp sites; and - Material preparation sites.	- Observe regulations on water abstraction permits, slope excavations, etc.; - Monitor standards of sanitation at the construction camps; - Establish a mechanism for solid waste collection, storage, transfer and disposal; - Liaise with water authorities for installation of RGS at all crossings.	- The Contractor; - The Resident Engineer; and - County Director of Environment (CDE) and KURA Engineers. Throughout the Construction Period	- Minimal silt discharging into water bodies; - No effects on physical status on water quality; and - Centralized effective collection of solid wastes.	- Status of streams and wetlands and water quality along reserve; - General social concerns; and - Specific attention at all crossings and other water bodies.
2	Air Quality				
	- Dust and particulate matter; - Visual disruption; - Surface depositions; - Bronchial and eye problems. Sources: - Construction activities (Earth moving and machinery operations).	- Ensure earth surface roads, deviations and dry materials are kept damp at all times; - Establish information flow process to the communities on dusty conditions; and - Keep inevitable dusty conditions and/or emissions as short as possible.	- The Contractor; - The Resident Engineer; - Surveillance by National Environment Management Authority (NEMA) Officials, County Director of Environment (CDE) and Public Health Officials. Throughout the Construction Period	- Low visible particulate matter in the air; and - Requirements of Clause 19 of the General Conditions of the Contract.	- Dust level within the project, exhaust fumes from construction machineries; and - Project wide situation.
3	Vegetation Cover Degradation				
	- Removal of vegetation from road reserve and deviation routes; - Loss of vegetation from material sites and access	- Collaboration with the local authorities in their beautification Programmes; - Implement top-soiling and	- The Contractor; - The Resident Engineer; - KURA Engineers; and - County Director of Environment (CDE) to keep	- Vegetation trend that is also safe to the road users; and - Requirements to Clause 19 of the Standard Bid	- Greenery along the route of the road. - Special attention at sloppy sections and river crossings will be

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Targets to Achieve	Monitoring Parameters
	routes. Sources: Construction of deviations, material borrow pits and quarries.	grassing programme for the road reserve and material sites; - Introduce soft shrubs in the median of the dual carriage; - Introduce trees on canopies on reserves near built-up areas; and - Ensure vegetation does not compromise road safety.	surveillance.	Document	necessary.
4	Environmental Pollution				
	- Siltation of water bodies; - Pollution of water (turbidity and hydrocarbons residuals); and - Visual pollution (from dust and emissions). Source: - Oil/grease storage; - Solid waste disposal (Filters, greases, asphalt waste, etc.); - Construction machinery and vehicles; - Excavated earth; and - Water abstraction points.	- Develop Standard Operating Procedures (SOPs), schedules and supervision guidelines for the project works; - Focus on sensitive features (e.g. stream crossings and slopes) for necessary precautions; - Establish dust control programme and machinery performance and waste disposal controls.	- The Contractor; - The Resident Engineer; and - NEMA Officers and KURA Engineers to keep surveillance. - Throughout the Construction Period	Minimal disruption to physical and biological environmental quality through the route.	- Water quality; - Environmental features; - Risk to health and safety; - Waste characteristics; and - Pollution from camps sites, service yards and material preparation yards.
5	Land Degradation				
	- Soil loss; - Soil quality degradation; - Land use changes; and - Material sites. Source: - Surface runoff channels from camps and working areas; - Temporary road diversion routes; and - Material extraction and transportation.	- Monitor land use trends along the route in liaison with planning department; - Initiate a planned vegetation programme on road reserve; and - Rehabilitation plans of material sites with landowners (lease agreements to reflect this aspect).	- The Contractor; - The Resident Engineer; and - County Director of Environment (CDE) and KURA Engineers to do surveillance - Throughout the Construction Period	Conservation of soils on each side of the road.	- Land use trends; - A project wide concern, specific locations of camp sites, sloppy zones and crossings; and - The Contractor to carry out ESIA study for all material sites

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Targets to Achieve	Monitoring Parameters
6	Health and Safety				
	- Personal injuries (construction employees); - Communicable diseases including HIV/AIDS); - Potential accidents at material quarries; and - Environmental Diseases (Bronchial and eye problems). Source: - Construction dust emissions; - Interaction of construction workers with communities; - Pollution of water from construction activities; - Material sites; - Traffic Deviations; and - Construction camp sites.	- Provide safety programmes for material sites and working areas; - Provide safety provisions (signage and lighting) for deviations; - Awareness, prevention and training on HIV/AIDS and other social diseases; - Provide service roads and bus at settlement areas to reduce road accidents; and - Provide medical, insurance cover and PPEs for all the construction workers.	- The Contractor; - The Resident Engineer; - PPRO; and - Surveillance by the DWO, DPHO and the CDE in Nairobi. Throughout the Construction Period	- Information flow and dissemination on health and safety; - Specific response to HIV/AIDS issues - Requirements of Clause 19 of the Standard Bid Docs; and - Requirements of Clause 34 and 35 of the General Condition of Contract.	- Complaints on health safety aspects related to the road construction activities; - Trends in HIV/AIDS cases along the corridor; and - Special focus on material sites and road diversions routes.
7	Social and Economic				
	- Temporary disruption of business activities; - Insensitivity to public concerns during construction; - Access into and out of highway by special social groups; - Benefits to riparian communities; - Safety issues (deviations and material sites, etc.); and - Noise to residents living along the route. Source: - Material sites; - Deviation routes; - Construction machineries; - Crossings; and	- Enhance consultations with communities on activities affecting them and collaborate on the impacts reduction; - Establish modalities of recruiting manual labour from within the project areas; - Provide service roads and slips accesses; - Nairobi County may consider physical planning along the highway for maximum benefits; - Integrate construction works with other projects ongoing in the project route; and - The Contractor to establish	- The Resident Engineer; - The Contractor; and - Nairobi County. Throughout the Construction Period	An acceptable, sustainable and economically viable road with long term benefits to the people without adverse implications on the physical and social environment.	- Trends in Socio-economic dynamics along the project road and its catchments; and - Special attention on realigned and expanded sections of the road. Encroached sections will also require attention.

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Targets to Achieve	Monitoring Parameters
	Construction Camps.	and manage environmental and social committee to oversee mitigation measures.			
8	Provision of Road Reserve				
		- Kenya Urban Roads Authority to undertake availability of the road reserve; and - Serve adequate quit notices to the encroaching developments.	- Kenya Urban Roads Authority (KURA) - Upon commencement of the Project	Clear project route and get back the road reserve.	- The design of the road is confined within the 60m; and - Completed survey will provide actual encroachments and necessary acquisitions.
9	Material Sites (Hard stone, gravel and water)				
	- Land degradation; - Loss of land vegetation cover; - Surface hydrology changes; - Access roads damages; - Water sources degradation; and - Water quality.	- ESIA Studies should be undertaken on all material sites upon final identification; - Rehabilitate the material sites after construction. Lease responsibilities with landowners necessary; and - Obtain appropriate permits for construction water abstraction.	- Contractor; - The Resident Engineer; and - CDE and KURA Engineers to Supervise - Throughout the Construction Phase.	Sustainable abstraction of materials.	- It is likely that all material sites will be on private land; and - Sources of construction water have other uses by the communities.
10	Decommissioning				
	- Removal of construction camps; - Material sites and preparation yards; and - Equipment removals.	- Carry out decommissioning audits for the camp sites; - Rehabilitate all material sites and preparation yards; and - Remove all construction equipment and excess materials from the site.	The Contractor under the supervision of the Resident Engineer, PPRO and the CDE.	Rehabilitated material sites and cleared material preparation yards.	Usability of the affected camps and material sites.

Road Maintenance and Use

Table 2: Action Plan Matrix (Maintenance and Use)

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Targets to Achieve	Monitoring Parameters
1	Environmental Pollution				
	- Water quality degradation; - Air Pollution; - Solid Waste dumping (Road Litter); - Material Spills (Pollutants); - Vehicular scraps; and - Residuals from material sites and preparation yards. Sources: - Surface runoff drains from the road; - Oil spills on the road surface; - Road litter (from road users and roadside clearing); - Poorly maintained vehicles – higher related emissions; - Spills from accident sites; - Emerging Social and Economic Centers; and - Road repairs; and maintenance activities.	- Establish a Policy and implementation guidelines in close collaboration with experts and NEMA; - Develop monitoring compliance with vehicular emission standards along the road; - Introduce clean-up responsibilities for the road users (e.g. spills from accident vehicle owners); - Provide public waste receptacles at strategic locations along the route (bus stops and crossing areas); - Drainage channels be kept clear at all times to prevent overloading with polluting materials; - Collaboration with the Traffic Police on enforcement of road regulations.	- KURA; - Consultation with the CDE and Water Officers for Surveillance; and - Administration, Traffic Police Department and the Nairobi County. Throughout Maintenance Period	A road that is compatible with the social conditions and features	- Complaints on the utilization of the roads; - Environmental quality trends (status of water sources, water quality and aquatic vegetation); and - Compliance with road transport regulations.
2	Health, Safety and Security				
	- Contamination of water and water sources; - Noise and vibration; - Increased road accidents; - Security aspects; and - Spread of infectious diseases (HIV/AIDS and other social diseases).	- Draw strategies for road safety measures and sensitize residents within risk areas; - Integrate safety measures in the overall maintenance of the road; - Develop liaison with health provision arms for emerging response on the	- KURA; - Traffic Police Department; - Administration Leadership; - Health Department and Rescue Groups. Throughout the Project Maintenance Cycle	Enhanced safety throughout the road and construction of the road to enforce security.	- Complaints from the riparian residents; - Recorded cases and categories of road accidents; and - HIV/AIDS trends with the project area.

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Targets to Achieve	Monitoring Parameters
	Sources: - Contaminated runoff from the road surface; - Roadside litter and solid wastes; - Increased traffic and driving style variances along the route; - Social interactions; - Inadequate road safety signage and facilities	- road; - Liaise with appropriate department to ensure compliance with road regulations and traffic rules along the stretch; and - Ensure maintenance of the signage and other facilities at all times.			
3	Social and Economic Aspects				
	- Land use changes due to efficient transport; - Increased settlements and population; - Higher traffic volumes; - Mixed economic activities (General Trading, Industrial, Institutional, etc.); - Road Safety Issues; and - Road ownership by all.	- Collaboration with physical planning Department to enhance roadside planning; - Collaborations for sustainable social and economic development; and - Include environmental aspects in scheduled road audits.	- KURA - Throughout the Project Maintenance Cycle	Compatibility of the road with social and economic interests of the local residents and road users.	- Land use trends in time and along the Project; - Population trends; and - Complaints received from the local communities and the road users in general.
4	Maintenance				
	- Drainage clearance for free storm water flow; - Vegetation clearing for enhanced visibility; - Roadside litter collection; - Road safety facilities and signage maintenance; - Re-encroachment into the road reserve; and - Roadside land development practices.	- Establish modalities for the involvement of the riparian landowners in the maintenance of the road; - Install and maintain appropriate road signs; - Liaise with other authorities in the control of roadside advertisement billboards that masks the safety signs; - Maintain trash bins at strategic locations along the route (bus stops and	- KURA; - Contractor; - CDE; - NWSC - Nairobi County - Throughout the Project Maintenance Cycle	Maintained high level quality of road surface, installations and components.	~

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

Item No.	Anticipated Impacts and Sources	Proposed Actions	Responsibility and Timeframe	Targets to Achieve	Monitoring Parameters
		major crossing points); and ▪ Prepare a maintenance procedure in line with existing guidelines.			
5	Decommissioning Phase				
		Undertake a decommissioning audit of part, sections or entire road reconstruction and establish appropriate measures to prevention environmental pollution and public safety.	▪ KURA		

2400 TRAFFIC MANAGEMENT AND DIVERSION

2401 General

The Contractor shall prepare and submit to Engineer within one month of the date of commencement of the works a detail traffic diversion plan as per the requirement of traffic authorities. The Contractor shall have to carry out the modifications in the traffic diversion plan at various stages of work as required. The Contractor shall maintain liaison with the traffic/highway police/authorities so as to ensure smooth flow of traffic at all stages of the work without causing inconveniences to the traffic.

2402 Traffic Rotary

The Contractor shall provide traffic rotary showing traffic direction made up of four blinders mounted on M.S. Frame of 5-x50 mm x 6 mm size 250 Hz frequency electrically operated at both ends of the cordoned area for help and guidance of road users. Necessary arrangements for supply of electricity shall be made by the Contractor.

2403 Road Delineates

Road delineates as per the relevant codes and as per the relevant drawings and as directed by Engineer shall be fixed at suitable intervals to have a suitable guidance to the road users at the night time for smooth flow of traffic. Delineators shall be fixed firmly in the ground. Also, red flags and cat eye reflectors shall be fixed on the barricades. Alternative arrangements shall also be kept ready in case of failure of electricity.

2404 Signs, Lights, Barriers and other Traffic Control Devices

Signs, lights, barriers and other traffic control devices shall be provided and maintained in a satisfactory condition till such time that they are not required as directed by the Engineer, so as to ensure smooth and safe traffic on the road throughout the length of the project road.

2405 Barricades

The barricades erected on either side of the carriageway/portion of the carriageway closed to traffic, shall be of strong design to resist violation, and painted with alternate black and white stripes. Red lanterns or warning lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

At the points where traffic is to deviate from its normal path, whether on temporary diversion or part width of the carriageway, the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or similar devices to the directions of the Engineer. At night, the passage shall be delineated with lanterns of another suitable light source.

2406 Passage through Works

2406.1 One-Way Traffic Operation

One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic. This shall be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic, the flagmen shall be equipped with red and green flags and lanterns/lights.

2406.2 Two Way Traffic Operation

On both sides, suitable regulatory/warning signs as approved by the Engineer shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m away. The signs shall be of approved design and of refractory type, if so, directed by the Engineer.

2406.3 Traffic Control Devices

Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversions shall be maintained in a satisfactory condition till such time that they are not required as directed by the

Engineer. The temporary travelled way shall be kept free of dust by frequent applications of water as necessary.

The details of work which is to be carried out by the Contractor as part of the traffic management during the construction period are given under Bill № 9 of the Bill of Quantities.

2500 SPECIFICATIONS OF MATERIALS AND WORKMANSHIP FOR STREETLIGHTING

2500.1 Scope of Works

This section of the specification covers the supply, installation, connection, testing and commissioning of the street lighting installation in accordance with specifications and bills of quantities.

The Contractor shall include for all apparatus and appliances not particularly called for in this Specification but which are necessary for the completion and satisfactory functioning of the Works. The Engineer may instruct for the installation of a street lighting system comprising of either in part or in totality. The rates in the bills of quantities should be those for installing a solar system in totality.

It is deemed that if, in the opinion of the Contractor at the time of quoting, there existed a discrepancy between the Specification and the actual work, that the Contractor clarified this difference with the Engineer before quoting.

2500.2 Specification

The work shall be executed and completed, unless expressly directed otherwise, in accordance with the following: -

The specification

The current edition of the Institution of Electrical Engineers (I.E.E) regulations

The Electric Power Act of Kenya

The Kenya Power Bylaws

The British or Kenya Standard specification and relevant and applicable British code of practice.

2500.3 Ordering

The Contractor shall order materials from the quantities taken from his own approved working drawings and not from the quantities shown on in the Specification.

2500.4 Submission of materials and defective work

All materials to be installed must be new and the best of their respective kinds.

The Contractor must examine carefully any materials and /or apparatus submitted to him for installation and/or connection. Any defects detected must be communicated to the Engineer.

2500.5 Samples and defective work

All materials to be used in the installation work must be made available for Inspection and approval and samples must be submitted upon request to the Engineer.

If the Contractor wishes to install or use other types of materials different from those specified in the Contract document, then the manufacturers technical and any other relevant pamphlets must be submitted to the Engineer for consideration and approval.

The right is expressly reserved to order at the Contractors expense the removal from site of all materials not conforming to the specifications and the dismantling and re-execution of all works which by reason of inclusion of improper, specified or defective materials and /or poor class or defective workmanship are a contravention of any clause in the specification.

2500.6 Ratings

Unless specified otherwise stated or where it does not apply all the materials shall be capable of being used on 240 volts 50 Hz. AC single phase and neutral supply.

2500.7 Street Lighting Columns

These shall be manufactured from Class B galvanized steel pipes as per City Council of Nairobi drawing number F45B F45C and shall be complete with doors and brackets. The columns shall be of 10m mounting height from ground level and shall be installed at 1200mm depth on a thick concrete foundation. Space for mounting cutouts and hole for cable entry shall be provided as indicated on the drawing.

A 20 metre polygonal galvanized high mast pole complete with a lowering mechanism and complete with all the accessories and as per the drawings

2500.8 Lanterns

Lanterns shall be of completely enclosed type designed for side entry mounting on brackets with a nipple of plane tube. They shall be capable of accommodating one single 250 watts HPS-T tubular lamp with a screw type lamp holder connected with heat resisting cables or 120 Watts light emitting diode (LED) lanterns. The lanterns will be with control gear complete with the specified lamp and reflector.

2500.9 System of Wiring

Wiring to poles shall be in PVC/SWA/PVC cables installed in 450mm deep cable trench as per cable size and routes. A layer of soft sand underneath and above the cable laid in trench shall be provided by the Contractor. Fused cut-outs shall be used to loop the cables in pole at lower level and wiring from cut-out to lantern shall be in 1.5mm² twin core PVC insulated sheathed cable with earth. Copper earth clips shall be used on galvanized armouring while looping in poles and earthwire to lantern shall be connected from there by using copper connectors.

"DANGER/HATARI" cable tiles shall be supplied and installed throughout the length of the trench to protect the cables except for the road crossing and plot entrances where cables shall be passed through PVC ducts.

2500.10 Earthing

All poles, lanterns and other metal parts shall be properly earthed. Electrical and Mechanical continuity shall be preserved throughout the whole system from the Consumer unit to the remotest pole and the earth resistance must not exceed 0.5ohms. Every 4th pole shall be efficiently earthed through earth electrode by means of substantial copper clamps secured by non-rusting bolts. The lead must be visible and adequately protected. No earthing lead shall be less than 6mm² in size except for the one used for earthing lanterns where 1.5mm² twin with earth wire shall be used.

Cable glands shall be used at every underground cable termination to bond the Cable armour onto the steel parts of the column and control pillar. The 1.5mm² copper wire of the twin and earth cable shall be used to provide the earth terminal continuity from the lantern to the columns earth terminal.

2500.11 Control Pillar

This shall be a metal pillar manufactured from mild steel to BS 15 as per City Council of Nairobi drawing number F41B. The control pillar shall be installed on 300mm. Thick concrete plinth. The control pillar shall be with all switchgear, interconnections, labels and earthing as approved by the Engineer. The control of the street lighting shall be through a photocell mounted on a 4.6m pole close to the pillar.

2500.12 Testing of the Installation

The Contractor shall carry out tests of the completed installation, copies of the test results shall be provided to the Engineer.

Insulation Resistance

The insulation resistance between line (phase) and neutral, the line (phase) and earth and the neutral and earth shall not be less than one mega ohms when tested.

Earth Continuity

The resistance measured from every earth electrode to the farthest point of the installation shall not exceed 0.5 ohms with 500 volts direct circuit (D.C.) supply.

Earth Electrode Resistance

Test for earth electrode resistance shall not exceed 3 ohms using a null balance tester

Polarity Check

Checks shall be carried out to verify that the neutral is correctly connected and that all fuses and switching (control) devices are connected to the phase ("LIVE") conductors only.

The Contractor shall be expected to test and inspect the installation particularly those parts that are to be concealed, during the erection, as he shall be held responsible for and shall rectify at his own expense all faults, defects, omissions, faulty workmanship, incorrectly positioned or installed parts of the installation revealed by such inspection and tests.

The Contractor shall provide accurate instruments and/or apparatus and the labour to carry out the above tests independently of any tests made by the Engineer or Kenya Power & Lighting Co. The instruments and apparatus shall be made available to the Engineer for him to carry out the tests as he may require.

The Contractor shall give a seven days notice of his intention to carry out the test so as to enable the Engineer to witness the tests if he so wishes.

2500.13 Guarantee of the Installation

The Contractor shall guarantee the whole installation for a period of 12 months from the date of final completion. During this period all defects arising out of faulty materials or workmanship shall be made good free of cost – fair wear and tear expected.

Any contravention of the clauses and conditions of the specifications discovered during the guaranteed period must be corrected free of charge. The submission of the completed Test Form cannot be offered by the Contractor as a final discharge of his responsibilities in respect of the soundness of the installation neither must it be inferred that the readings will necessarily be made accepted.

The acceptance of the Form shall in no manner vitiate claims that may subsequently be made under the terms of the guarantee.

2500.14 Clearing of Site and damages

The Contractor must include for the clearing away from site immediately, after completion, all the unused materials and any rubbish or litter as may have been caused by his works.

2500.15 Measurement and Payments

Measurement and payment for all street-lighting works shall be in accordance with the items listed in the Bill of Quantities, the preamble to Bill of quantities and the specifications above.

2600 HIV/AIDS, GENDER, SOCIAL ISSUES AND LOCAL PARTICIPATION

2601 Scope

This specification sets out the Contractor's obligations with regard to on-site HIV/AIDS awareness campaign and preventive measures which are to be instituted.

2602 Interpretation and Documentation

The following documents shall inter-alia be read in conjunction with this specification.

The instruction to bidders

The Conditions of Contract

The drawings

2603 HIV/AIDS Awareness Campaign

The Contractor shall institute an HIV/AIDS awareness campaign amongst his workers for the duration of the Contract. As part of the Campaign the Contractor will be required to display AIDS awareness posters in all buildings frequented by workers employed on the Contract where such buildings fall under the control of the Contractor. In addition, at least ten (10) of the Contractor's vehicles, regularly used on site shall display HIV/AIDS awareness posters. The posters shall be printed on gloss paper and shall be at least A1 size on building and A3 size or other approved size on vehicles. The message on the posters shall be supplied by the Employer through the Engineer before the posters are printed.

AIDS awareness shall also be included in the orientation process of all workers employed on the Contract.

In the awareness campaign, the Contractor shall employ and designate a safety officer who will undertake and coordinate all aspects of the HIV/AIDS awareness campaign.

2604 AIDS Prevention Campaign

The Contractor shall institute an HIV/AIDS prevention campaign amongst his workers for the duration of the Contract. As part of the campaign the Contractor will be required to make condoms available to workers. The condoms shall be from an approved manufacturer and comply with the current ISO Standards or WHO/UNAIDS Specifications and Guidelines for condoms, 1998, or any more recent equivalent publication. The Contractor shall make available at least 4,000 condoms every month, through dispensing machines or other approved method of distribution. The Contractor shall at all times keep the site adequately supplied with condoms.

As part of the campaign the Contractor shall operate at least one STD and HIV/AIDS clinic on site or make alternative arrangements with an existing suitably qualified and equipped Local clinic. The clinic shall have a minimum of two rooms each at least 10 m² with ablution and washroom. The clinic shall be suitably staffed and equipped for screening, diagnosis and counselling of STD and HIV/AIDS of the project staff and labour. The Contractor shall cover the costs of the clinic to provide free treatment for general STD cases, whereas workers with HIV/AIDS shall be referred to the national HIV/AIDS programme coordinated by the Ministry of Health.

2605 HIV/AIDS Training

2605.1 Objective

The objective of the AIDS/HIV training programme is to reduce the risk of exposure to and spread of the HIV virus in the Area influenced by the construction project. The target group will be local labourers and their superintendents employed by the works Contractor. The wider community will benefit indirectly through their normal day-to-day interaction with the target group.

2605.2 Scope of activities

Activities for HIV/AIDS awareness and prevention will be broad-based, targeting both individuals and groups. They may consist of:

- ❖ Information posters in public places, both on and offsite (eating houses, bars and guest houses) and on the Contractor's vehicles
- ❖ Availability of socially marketed condoms
- ❖ Peer educators (reference people) drawn from the local labour and educated in HIV/AIDS issues for discussion with colleagues (estimate 1 per 100 employees).
- ❖ Small focus group discussions to disseminate information covering key issues
- ❖ Theatre groups and video presentations
- ❖ Promotional events (such as football matches) to encourage openness and discussion of HIV/AIDS issues.
- ❖ Promotional bill boards to raise awareness of the integration of construction and HIV/AIDS activities
- ❖ Inclusion of HIV/AIDS activities at site meetings with the Local Aids Committees and other approved representatives.
- ❖ Availability of promotional materials including T-shirts, caps, bumper stickers and key rings.

The scope of activities may be tailored as required to meet the perceived needs and priorities of the labourers and should involve participatory approaches to ensure that they are appropriate and have a public health impact. The scale and frequency of activities may also be adjusted to suit the requirements of the target group. The education will cover:

Preventive behaviour including partner reduction, condom use, awareness and appreciation of the importance of treatment of sexually transmitted incidences (STIs)

Skills including negotiating safer sex, correct condom use, purchase of condoms without embarrassment, and Referral to local health centres and available services.

Tasks to be undertaken to support the above activities services shall include:

- ❖ Establishing the status and focus of all current and planned HIV/AIDS activities in the area to ensure complementarities and determining potential involvement in project activities
- ❖ Carrying out a brief review of regional activities combining road construction with HIV/AIDS campaigns to determine options, best practice key issues and constraints
- ❖ Reviewing of Information, Education and Communication (IEC) materials available and their relevance to road construction, making recommendations for future development of IEC materials
- ❖ Providing education and training for the site personnel, superintendents and peer educators for the scope of activities as above.
- ❖ Providing supervision for peer educators to ensure sustained quality of education and provision of incentives for the scope of activities as above.
- ❖ Providing Mechanism for the social marketing of condoms and distribution of materials
- ❖ Monitoring activities regularly to assess effectiveness and impact. This should include an initial, interim and final assessment of basis knowledge, attitude and practices (KAP) taking account of the existing data sources and recognizing the limitations due to the short time frame to show behaviour change. The KAP shall be supported by qualitative information from focus group discussion.

2605.3 Collaboration

HIV/AIDS activities are coordinated nationally by the National Aids Control Council (NACC). The Kenya Urban Roads Authority in consultation with NACC and the Ministry of Health (MOH) shall coordinate with the local representatives. Representatives of Local Health Authorities shall be invited to attend training and communication activities.

Activities on the construction site shall be linked as far as possible with the on-going HIV/AIDS awareness and prevention in the area. This will ensure complementarity of approaches, reinforcing education and minimizing duplication, in addition, these links will ensure that the target group will have access to continued information after the end of the construction period.

2605.4 Contractor's Responsibilities

The Contractor will employ and designate a qualified HIV/AIDS expert, to be approved by the Engineer, who will work closely with the Employer, Ministry of Health and other implementing agencies to support the HIV/AIDS awareness and prevention activities. This will ensure maximum effectiveness and integration with construction activities. Specific but not exclusive, issues to be addressed by the Contractor shall include:

- ❖ Scheduling appropriate timing and durations of the implementation of HIV/AIDS activities as part of work plan for labourers and superintendents.
- ❖ Designated rest times such as lunch breaks and paydays shall be excluded.
- ❖ Identification of suitable individuals from recruitment records for education with the implementing organization
- ❖ Provision of suitable sites for communication activities and for condom distribution
- ❖ Monitoring of the implementation of peer educator activities, and
- ❖ Provision of support as necessary to the implementing organization.

2605.5 Inputs

An organization experienced in the provision of HIV/AIDS awareness and prevention activities shall be selected as a subcontractor to provide the above scope of activities on behalf of the main Contractor.

2605.6 Reporting

The implementing organization shall produce the following reports to be submitted to the Contractor, Consultants, Ministry of Roads, Kenya Urban Roads Authority and NACC:

- ❖ Monthly progress briefs for inclusion in site meetings discussions
- ❖ Quarterly reports detailing activities carried out, issues and follow ups

A review report of activities in the road construction sector

A review report of the existing IEC materials with recommendations for development of materials specifically for the road sector

A final report detailing the methodology and activities carried out under this project including lessons learnt, impact, liaison with the Contractor and other parties.

In addition, a report with the recommended approach for integration of HIV/AIDS awareness and prevention activities in the road construction sector shall be produced. This shall be a synthesis of project activities including contractual approaches, communication activities, availability of materials and liaison with the existing organizations. It shall be developed with all parties involved in the construction activities to ensure that the wide range of views and experiences are gained.

The final report and recommended approach will be presented to the Ministry of Roads, Kenya Urban Roads Authority, NACC and other interested organizations including private sector, funding agencies and Non-Governmental Organisations.

2606 Timing

Activities shall commence at the start of the construction period and continue throughout the Contract period to ensure that a sustained impact reporting and dissemination activities shall continue for three months after the project is completed to ensure integration into the current practice.

2607 Measurement and Payment

The payment items in this Clause shall include full compensation for all work associated with the provision of HIV/AIDS related services as specified.

Item: Instituting an HIV/AIDS awareness campaign

Unit: Months

The unit of measurement shall be the calendar month or part thereof, measured over the duration of the campaign. The rate shall include for providing a Safety Officer to deal with HIV/AIDS together with his/her transport requirements. The payment shall be made monthly, pro-rata for parts of a month, from the date of appointment of the officer until the completion of the works or substantial demobilization of the local workforce whichever comes first.

Item: Instituting an HIV/AIDS prevention campaign

Unit: Months

The unit of measurements shall be the month. The rate shall include the cost of providing a clinic or make alternative suitable arrangements, running the clinic, providing condoms as per the specifications and meeting all the costs of time related costs.

The payment shall be made monthly, pro-rata for parts of a month, from the date of establishing the clinic until the completion of the works or substantial demobilization of the local workforce whichever comes first.

Payment shall only be made for periods during which the Contractor has effectively provided the services.

Item: HIV/AIDS training

Unit: Provisional Sum

Payment shall be made for the actual expenditure incurred by the Contractor for which receipted vouchers shall be produced. The rate shall include full compensation for equipment, labour and material required for the provision of the services.

In addition, the Contractor will be paid for handling, overheads and profit at a percentage (%) rate of the receipted expenses incurred.

SECTION 9: BILLS OF QUANTITIES

PREAMBLE TO BILL OF QUANTITIES

The Bill of Quantities shall form part of the Contract documents and is to be read in conjunction with Instructions to Bid, Conditions of Contract, Specifications and Drawings.

The brief description of the items in the Bill of Quantities is purely for the purpose of identification, and in no way modifies or supersedes the detailed description given in the Conditions of Contract and specification for the full direction and description of work and materials.

The Quantities set forth in the Bill of Quantities are estimated and provisional representing substantially the work to be carried out and given to provide a common basic for bidding and comparing the bids. There is no guarantee to the Contractor that he will be required to carry out all the quantities of work indicated under any one particular item or group of items in the Bill of Quantities. The basic of payment shall be the

Contractor's rates and the quantities of work actually done in fulfilment of his obligation under the Contract.

The prices and rates inserted in the Bill of Quantities will be used for valuation of the work executed and the Engineer will measure the whole of the works executed in accordance with this Contract.

A price or rate shall be entered in link against every item in the Bill of Quantities with the exception of items which already have provisional sums affixed thereto. The bidders are reminded that no "nil" or "included" rates or "lump-sum" discounts will be accepted. The rates for various items should include discount if any. Bidders who fail to comply with this will be disqualified.

Provisional Sums (including Dayworks) in the Bill of Quantities shall be expended in whole or part at the discretion of the Engineer in accordance with Subclause 52.4 and Clause 58 of the Conditions of Contract.

The price and rates entered in the Bill of Quantities shall, except insofar as it is otherwise provided in the Contract, include all constructional plants to be used, labour, insurance, supervision, compliance, testing, materials, erection, maintenance of works overhead and profit, taxes and duties together with the general risks, liabilities and obligations set out or implied in the Contract, transport, electricity and telephone, water, use and replenishment of all consumables, including those required under the Contract by the Engineer and his staff.

Errors will be corrected by the Employer for any arithmetic error in computation or summation as stipulated under Clause 28 of the Instructions to Bidders.

The Bill of Quantities, unless otherwise expressly stated therein, shall be deemed to have been prepared in accordance with the principle of the latest edition of the Civil Engineering Standard Method of Measurement (CESMM)

"Authorised" "Directed" or "Approved" shall mean the authority, direction or approval of the Engineer.

Unless otherwise stated, all measurement shall be net on the finished work carried out in accordance with the details shown on the drawings or instructed, with no allowance for extra cuts or fills, waste or additional thickness necessary to obtain the minimum finished thickness or dimensions required in this Contract. Any work performed in excess of the requirements of the plans and specifications will not be paid for, unless ordered in writing by the Engineer.

Hard/rock materials in this Contract, shall be defined as the material which, in the opinion of the Engineer, require blasting, or the use of metal wedges and sledge hammers, or the use of compressed air drilling for their removal, and which cannot be extracted by ripping with a dozer tractor of at least 150 brake horse power (112 kilowatt) with a single rear-mounted hydraulic ripper. Boulders of more than 0.2 m³ occurring in soft materials shall be classified as hard material

Soft materials shall be all material other than hard material as defined under Item (I) above.

The units of measurement and abbreviations tabulated below are used herein

Unit
Abbreviation

Number	N _o
Millimetre	mm
Square millimetre	mm ² / sq mm
Metre	m
Square metre	m ² / sq m
Cubic metre	m ³ / cu m
Hectare	ha
Kilogramme	kg
Lump sum	LS
Prime Cost	PC
Tonne	Tonne
Metric ton (100 kg)	t / tonne
Degrees centigrade	°C
Hour	h / hr
Week	wk
Month	nth
Horsepower	HP
Kilowatt	KW

BILLS OF QUANTITIES

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 1: Preliminary and General Items					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
1.01	Provide or rent approved Engineer's staff accommodation equivalent to:				
	(i) Type I house	№	1		
	(ii) Type II house	№	2		
	(iii) Type III house	№	4		
	(iv) Type IV house	№	8		
1.02	Provide and maintain Engineer's main office as shown on the drawings or as instructed by the Engineer for use during the duration of the Contract.	№	1		
1.03	Provide and maintain furniture and equipment for the Engineer's office as well as survey equipment as specified for the Contract period and as detailed in Appendix to Bill Item № 1.03.	Lump Sum			
1.04	Construct and maintain Engineer's main Laboratory	№	1		
1.05	Provide Laboratory equipment and reagents for use by the Engineer's Representative's and his staff for entire duration of the contract as detailed in Appendix to Bill Item № 1.06.	Item			
1.06	Allow a provisional sum of KShs. 1,500,000 for Material Testing as directed by the Engineer	PC Sum	1	1,500,000.00	1,500,000.00
1.07	Extra Over on Item 1.06 for the Contractor's Overheads and Profit.	%			
1.08	Provide with driver and maintain two (2), minimum 3.0 litre turbocharged 4-wheel drive, 5 door utility vehicle or similar, approved by the Engineer, fitted with air bags, mobile telephone hands free headset and a two way radio for the exclusive use of the Engineer inclusive of the first 4,000 km per vehicle month.	V. Month	72		
1.09	Extra Over on Item 1.08 inclusive of fuels, maintenance, lubricants and servicing for kilometrage over 4,000 km per vehicle month.	km	120,000		
1.10	Provide with driver and maintain Two (2), minimum 2.8 litre turbocharged 4-wheel drive, twin- cab pick up vehicle or similar approved by the Engineer, fitted with air bags, mobile telephone hand free headset and a two way radio for the exclusive use of the Engineer inclusive of the first 4,000 km per vehicle month.	V. month	72		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

1.11	Extra Over on Item 1.10 inclusive of fuels, maintenance, lubricants and servicing for kilometrage over 4,000 km per vehicle month.	km	108,000		
1.12	Provide with driver and maintain one (1), minimum 2.8 litre 4-wheel drive, single-cab pick up vehicle (with canvas back seat) or similar approved by the Engineer, fitted with air bags, mobile telephone hand free headset and a two way radio for the exclusive use of the Engineer inclusive of the first 4,000 km per vehicle month.	V. month	36		
1.13	Extra Over on Item 1.12 inclusive of fuels, maintenance, lubricants and servicing for kilometrage over 4,000 km per vehicle month.	km	36,000		
1.14	Provide with driver and maintain one (1), minimum 1.8 litre small utility vehicle or similar approved by the Engineer, fitted with air bags, mobile telephone hand free headset and a two way radio for the exclusive use of the Engineer inclusive of the first 4,000 km per vehicle month.	V. month	36		
1.15	Extra Over on Item 1.14 inclusive of fuels, maintenance, lubricants and servicing for kilometrage over 4,000 km per vehicle month.	km	1,500		
1.16	Allow a sum of KShs 4,000,000 for the Engineer's miscellaneous account to be spent in whole or part as instructed by the Engineer and to be reimbursed against receipts.	PC Sum			4,000,000.00
1.17	Extra Over on Item 1.16 for the Contractors Overheads and Profit.	%			
1.18	Provide, erect and maintain publicity signs as instructed by the Engineer.	No	4		
1.19	Allow for attendance upon the Engineer by the following staff in accordance with Clause 137 of Special Specification.				
	(a) Assistant Engineers	M. month	72		
	(a) Inspector of Works	M. month	108		
	(b) Laboratory technician	M. month	72		
	(c) Assistant Laboratory technician	M. month	108		
	(d) Assistant Quantity Surveyor	M. month	48		
	(e) Draftsman/ CAD Assistant	M. month	48		
	(f) General Clerk	M. month	36		
	(g) Survey assistant	M. month	108		
	(h) Secretary	M. month	72		
	(i) Office Assistant	M. month	72		
	(j) Chainmen	M. month	144		
	(k) General Attendants	M. month	144		
1.20	Allow a provisional sum of KShs.10,000,000 for attendance to the Employer's representatives	PC. Sum			10,000,000.00

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

1.21	Include a percentage on Item 1.20 for the Contractor's Overheads and Profit	%			
1.22	Provide a provisional sum of KShs 2,000,000 for reimbursement to the Contractor for payment of the Engineer's support staff and or Junior Engineer's over time and allowances in accordance with Clause 140 of the Special Specifications.	PC. Sum			2,000,000.00
1.23	Include a percentage on Item 1.22 for the Contractor's Overheads and Profit.	%			
1.24	Provide and maintain the Engineer's staff mobile phones.	Nº	8		
1.25	Allow a provisional Sum of KShs 600,000 for the Engineer's staff mobile phone airtime charges	PC. Sum			600,000.00
1.26	Include a percentage on Item 1.25 for the Contractor's Overheads and Profit	%			
1.27	Allow a provisional sum of KShs 720,000 for the telephone charges including internet services installed in the Engineer's office.	PC . Sum			720,000.00
1.28	Include a percentage on Item 1.27 for the Contractor's Overheads and Profit.	%			

BILL 1 TOTAL CARRIED TO SUMMARY PAGE

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY

BILL Nº 4: Site Clearance and Topsoil Stripping

Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
4.01	Clear site on road reserve including removal of trees,hedges, bushes, and other vegetation or deleterious organic material , grub up roots and backfilling of holes left by removal of holes left by removal of stumps and roots in accordance with the specifications, as shown in the drawings and as directed by the Engineer	Ha	6.50		
4.02	Remove upto 0.2m unsuitable material/top soil including removal of all grass, transport to spoil and spread or stockpile for re-use but excluding replacement by suitable soil which shall be paid separately	m³	26,000		
4.03	Cutting of trees of all girth above 300mm including cutting of trunks, branches, uprooting and removal of all materials stacking within the ROW and filling depressions/pits by earth etc. complete including liaison with concerned authorities for obtaining permissions				
	(i) girth 300mm and above	Nº	1,604		
	(ii) girth above 600mm to 900mm	Nº	752		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

	(iii) girth above 900mm to 1800mm	Nº	371		
	(iv) girth above 1800mm	Nº	41		
4.04	Dismantling of structures on roadway including sorting out the dismantled material, disposal of unserviceable material and utilizing the serviceable material free of cost in permanent works as directed by the engineer with all leads and lifts etc. complete				
	(i) Brick masonry	m³	620.91		
	(ii) RC	m³	51.05		
	(iii) Barbed wire fencing	m	720		
	(iv) Bituminous pavement	m³	3,920		
4.05	Allow a prime cost sum of Kshs 100,000,000 for removal and reinstatement of services along and around the works	PC Sum	1.00		100,000,000.00
4.06	Include a percentage on Item 4.05 for the Contractor's Overheads and Profit	%			

BILL 4 TOTAL CARRIED TO SUMMARY PAGE

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY

BILL Nº 5: Earthworks

Item	Description	Unit	Quantity	Rate (Kshs.)	Amount
	<i>Note: No separate payments shall be made for the overhaul of the material and the cost of such haulage shall be included in the rates and or prices.</i>				
5.01	Cut to fill in soft material, including benching of shoulders and embankments to 95% MDD (AASHTO) as directed by the Engineer.	m³	22,200		
5.02	As Item 5.01 but in hard material	m³	5,000		
5.03	Scarify, water, process and compact 150 mm existing ground below embankments or subgrade to 95% MDD (AASHTO T99)	m³	22,705		
5.04	Compaction of the 300mm for sub-grade below formation level in cutting to 100% MDD (AASHTO T99)	m³	40,000		
5.05	Provide, spread, water, process and compact 300mm imported granular material of base quality as subgrade to 100% MDD (AASHTO T99) in two layers of 150mm thickness	m³	4,200		
5.06	Cut to spoil in soft material	m³	66,100		
5.07	Cut to spoil in hard material	m³	8,000		
5.08	Fill in soft material from borrow pits	m³	85,700		
5.09	Excavate and cut to spoil in swamps	m³	5,000		
5.10	Provide rockfill (boulders) material and fill to swampy areas	m³	10,000		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

5.11	Filter fabric under, over or around rock fill	m ²	2,360		
BILL 5 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 7: Excavation and Filling for Structures					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
7.01	Excavate in soft material for structures such as box culverts, abutments, wing walls, gabions and pier foundations to a maximum depth of 3m	m ³	3,000		
7.02	As Item 7.01 but a depth of more than 3m	m ³	2,000		
7.03	Excavate in hard material for structures such as box culverts, abutments, wing walls, gabions and pier foundations to a maximum depth of 3m	m ³	8,000		
7.04	As Item 7.03 but a depth of more than 3m	m ³	5,000		
7.05	Providing, placing selected granular backfill material behind abutment, wingwalls and retaining walls to any depth and compaction complete as per the drgs and technical specifications and as instructed by the Engineer	m ³	10,000		
7.06	Provide and lay stone pitching as shown on the drawings to technical specifications and as instructed by the Engineer.	m ²	6,000		
7.07	Providing and constructing gabion structures for erosion control, river training works and protection works including wire crates, cross netting and galvanizing coating woven into mesh with double twist, mesh filled with boulders with least dimension of 20mm, all loose ends to be securely tied with 4mm galvanized steel wire complying with required clauses 711 of standard specifications	m ²	2,200		
7.08	Provide rockfill to gabions	m ³	500		
BILL 7 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 8: Culvert and Drainage Works					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
	<i>No separate payment shall be made for the haulage of surplus or unsuitable excavated material and the cost of such haulage shall be included in the rates and/or prices</i>				
8.01	Excavate in soft material to the range of depths stated below for pipe culverts, subsoil drains, headwalls, wing walls, aprons, toe walls, drop inlets, mitre drains, catch water drains and median drains including support of trench sides, backfilling and compacting as specified or as instructed by the Engineer.	m ³	1,200		
8.02	As item 8.01 but in hard material	m ³	300		
8.03	Provide, lay, joint and backfill with suitable material 1200 mm I.D. Reinforced Cement Concrete pipes using class 25/20 concrete	m	200		
8.04	As item 8.03 above but 900mm I.D	m	300		
8.05	As item 8.03 above but 600mm I.D	m	900		
8.06	As item 8.03 above but 300mm I.D.	m	1,000		
8.07	As item 8.03 above but 450mm I.D.	m	400		
8.07	Provide, lay and joint 600x355 mm I.D. Cement Concrete pipes for drain inlets and ducts as instructed by the Engineer	m	7,500		
8.08	Provide and place PCC/RCC Class 25/20 concrete for side walls, top slabs, trenches, drains, retaining walls, toe walls, head walls, wing walls, pipe culvert surrounds haunches and aprons, 20% natural and rest crushed sand including formwork and excluding provision and placing of reinforcement as shown on the drawings.	m ³	4,500		
8.09	Supply, fit, cut and place steel deformed bar reinforcement in structure complete as per drawing and complying with the requirement of standard specifications	Tonne	10		
8.10	Construct Class 15/20 concrete lining to side drains and out fall channels, bed concrete for side drains and pipe culverts as instructed by the Engineer	m ³	1,200		
8.11	Provide and place PCC/RCC Class 20/20 concrete for in-situ gravity structures, drains, service ducts at locations to be instructed by the Engineer	m ³	4,500		
8.12	Excavate in any material provide and joint 600x355mm invert block drains (IBD) precast concrete channels with precast side slabs of 600x225x50mm as lining for storm water drain including bedding and backfilling with selected material as directed by the Engineer	m	7,500		
8.13	Provide place and compact rock fill below culverts	m ³	200		
8.14	Provide and place filter fabric to rockfill and subsoil drains	m ²	300		
BILL 8 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 9: Passage of Traffic					
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs.)	AMOUNT (Kshs.)
9.01	Provide and maintain the signs and barriers for safe passage of traffic (signages, drum and steel type portable barriers, flashing panels, safety tape etc) through the contract period.	LS	1		
9.02	Maintain and allow for the passage of traffic through the works	LS	1		
9.03	Construct Deviations using 125mm gravel and 35mm asphaltic concrete type 1 as instructed by the Engineer	m ³	850.00		
BILL 9 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 12: Natural Gravel for Sub-base and Base					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
	<i>Note: Measurements and Payment by method A as defined in the standard specifications. No separate payments shall be made for the overhaul of material and the cost of such haulage shall be included in the rates and or prices</i>				
12.01	Provide, place and compact Natural Gravel Material in new road, junction's accesses and bus bays as directed by the Engineer	m ³	33,000		
BILL 12 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 13: Graded Crushed Stone Sub-base and Base					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
13.01	Provide, mixing, spreading and compacting Graded Crushed Stone (GCS) for Subbase/base in the main carriageway, service roads, slip roads, junctions, accesses, bus bays and shoulders with all leads and lifts complete shown in the Book of Drawings complete with approved specifications or as instructed by the Engineer.	m ³	30,675		
BILL 13 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY

BILL № 14: Cement and Lime Treated Material

Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
14.01	Provide, store and transport to site of works cement improvement agent for natural material base and sub-base for new roads, junctions, busbays and matatu parks as per specifications and as directed by the Engineer.	Tonne	1,656		
14.02	Allow for mixing and processing with improvement agent in plant for Graded Crushed stones.	m ³	30,675		
14.04	Allow for curing and protection of cement improved /treated sub-base as specified or as instructed by the Engineer.	m ²	119,014		

BILL 14 TOTAL CARRIED TO SUMMARY PAGE

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY

BILL № 15: Bituminous surface treatment and surface dressing

Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
15.01	Clean and prepare surface of maincarriageway, slip roads, shoulders, busbays, accesses and junctions , provide, heat and sparay on the prepared surfaces MC 70 cutback bitumen prime coat at a rate of spray in the range of 1.0L/M2 to 1.2L/M2 or as instructed by the Engineer	Litres	252,000.		
15.02	Clean and prepare surface of maincarriageway, slip roads, shoulders, busbays, accesses and junctions , provide, heat and sparay on the prepared surfaces K1-60 cutback bitumen prime coat at a rate of spray in the range of 0.5L/M2 to 0.8L/M2 or as instructed by the Engineer	Litres	650,000.00		

BILL 15 TOTAL CARRIED TO SUMMARY PAGE

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAISELEASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 16: Bituminous Mix Bases, Binder Courses and Wearing Courses.					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
	<i>Note: No haulage will be paid for bituminous mix bases and Asphalt Concrete (AC) binder course and the rate shall be all inclusive.</i>				
16.01	Prepare surfaces, provide, mix, lay and compact AC type 1 (0/20 Gradation) as wearing course	m ³	10,000		
16.02	Provide, lay and compact Dense Bituminous Concrete DBM as base layer with modified bitumen and 0/30mm aggregates on prepared surface of granular base layer.	m ³	20,000		
BILL 16 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 17: Concrete Works					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
17.01	Provide, place and compact blinding concrete class (15/20) 100mm thk to foundation of piers, abutments and retaining walls	m ³	1,150		
17.02	Provide, place and compact concrete class 30(20) to foundation of piers, abutments, retaining walls and piles	m ³	8,500		
17.03	Provide, place and compact concrete class 35(20) to piers, pier caps, walls of abutments, retaining walls and to deck slab	m ³	12,000		
17.04	Provide, place on the pier caps, precast concrete girders of class 35(20)	m ³	11,500		
	Formwork				
17.05	Provide, erect and dismantle formwork to provide class F1 finish to main footings of piers, abutments walls and retaining walls	m ²	2,652		
17.06	As item 17.05 but to provide fromwork class F2 finish to vertical sides of piers, abutment walls	m ²	3,663		
17.07	As item 17.06 but to provide formwork class F3 finish to soffit of deck	m ²	12,600		
	Reinforcement				
	Provide, cut, bend and fix as per specifications or as directed by the Engineer the following items of reinforcement				
17.08	High tensile bar reinforcement to BS 4461 or any diameter less than 16mm	Tonne	2,640		
17.09	High tensile bar reinforcement to BS 4461 of diameter 16mm to 40mm	Tonne	650		
BILL 17 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 17B: REINFORCED EARTH WALLS					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
17B.01	Supply and delivery to site of panel inserts				
	(a) Inserts only, for concrete panels with steel strips,				
	including tie points, dowels, tubes, lifting pins,				
	nuts & bolts, seating pads and filter fabric,				
	all measured by area of panel	m ²	2,000		
17B.02	Provide supply and install Reinforcing strips				
	(a) 50mm x 4mm HA galvanized steel strips	m	15,000.00		
17B.03	Excavation for concrete footings for walls				
	(a) In soft material	m ³	35		
	(b) Extra Over sub-item 7.08(a) for excavation in				
	hard material	m ³	100		
17B.04	Concrete footings for walls, Class 15 concrete	m ³	35		
17B.05	Erection of concrete cladding panels	m ²	1,866		
17B.06	Infill concrete and finishing on top of the wall				
	30MPa concrete, including formwork and reinforcement	m ³	8.00		
17B.07	Extra over items for supplying and compaction of approved suitable fill material meeting the requirements of BS8006 for the Reinforced Earth embankment	m ³	7,640		
17B.08	Allow for On site precasting concrete panels, 140mm thick				
	(a) Hiring of moulds for panels and corner units	m ²	1,866		
	(b) Casting panels with Class 30MPa concrete and F2 finish				
	(i) Casting Type O, unreinforced panels	m ²	1,866		
	(iii) Casting Corner units	m ²	2		
BILL 17B TOTAL CARRIED TO SUMMARY PAGE					

**CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND
UPPERHILL HAILESELASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY**

BILL № 19: Structural Steel

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs.)	AMOUNT (Kshs.)
19.01	Supply, fabricate and erect in structural steel for foot bridges at locations to be given by the Engineer inclusive of shear connectors and surface treatment.	Tonnes	300.00		
BILL 19 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 20: Road Furniture					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
	Road Marking and Road Signs				
	Road Marking				
	Provide and lay hot applied thermoplastic road marking compound in approved colour and shade (ASTM 9) for road marking on bituminous surface on centerline, 100 mm, edge line 150 mm wide 3.0 mm thick, using fully automatic extrusion machine and using pre-melter for melting thermoplastic material including cleaning the surface of all dirt, dust, and other foreign matter, complete with demarcation at site/pre-marking, finishing and managing the traffic movements. Marking to be done as per the specifications, detailed drawings and as instructed by the Engineer.				
20.01	(i) For lane markings (broken lines) with white paint, 100 mm wide	m ²	261		
20.02	(ii) For lane markings (continuous line) with yellow paint, 100 mm wide	m ²	522		
20.03	(iii) For edge lines (continuous line) with white paint, 150 mm wide	m ²	1565		
20.04	Providing and applying two coats of synthetic enamel paint including primer to kerbs as per the Technical Specifications and as instructed by the Engineer.	m	10435		
	Permanent Road Signs				
20.05	Supply and fix regulatory/mandatory road sign boards made up with high intensity grade retro-reflective type sheeting (ASTM 9) complete as per the drawings and Technical specifications.	№	5		
20.06	Supply and fix cautionary/warning road sign boards made up with high intensity grade retro-reflective type sheeting (ASTM 9) complete as per the drawings and Technical Specifications	№	25		
	Supply and fix informatory road sign boards made up with high intensity grade retro-reflective type sheeting complete as per drawing and Technical specifications.				
20.07	(i) Area less than 1.0 m ²	№	20		
20.08	(ii) Area more than 1.0 m ² but less than 2 m ²	№	9		
20.09	(iii) Area more than 2.0 m ² but less than 5 m ²	№	2		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

	Supply and fix in position road overhead retro-reflective informatory sign boards including fixing on overhead gantry/any other overhead structure excluding the cost of gantry and other supports but including cost of back frame complete as per the drawings and specifications.				
20.10	(i) For 12.5 m span	Nº	4		
20.11	(ii) For 25m span	Nº	4		
	Other Road Furniture				
	Provide and lay cement concrete kerb/divider for central reserve, footpaths and traffic islands in concrete Class 25/20 as per the drawings and as instructed by the Engineer complete with all leads and lifts. Pre-cast/cast-in-situ kerb / divider				
20.12	(i) Barrier type	m	15655		
20.13	(ii) Mountable type	m	5220		
20.14	Erect standard bumps and rumble strips using Type 1 AC as per drg where instructed by the Engineer.	m ³	7		
20.15	Provide and place gauge 16 steel pipe bollards of diameter 168mm and 1.0m above the ground, embedded to a depth of 0.5m at place painted and fitted and reflectorized as shown on the drawing and as directed by the Engineer. Rate to include foundation base and filling pipe with concrete minimum class 15/20	Nº	2380		
20.16	Provide and erect single sided single head flexi-beam gaurdrails complete with steel posts, spacers, nuts, bolts, end pieces and fittings as directed by the Engineer	m	2680		
20.17	Provide and fix on the footpaths interlocking concrete paved unishaped blocks (monolithic single layer precast concrete blocks) of any specified colour/size & shape, with approved pattern of 60/80 mm thick having average crushing strength of 50 N/mm ² on average thickness of 20 mm uniformly graded river sand cushioning properly compacted with a mechanical compactor to required level, grade and camber as per the drawings	m ²	8650		
20.18	Provide and fix aluminium casted reflective studs (Cat's eyes) of size 100 mm x 100 mm at the base with zinc coated nails of size 12 mm dia. of 120 mm long having both side (dual direction) high impact ABC 3 Nº of eyes of 16 mm dia on both side containing 7 beads each, a total of 42 beads in retro reflective.	Nº	2170		
20.19	Provide moveable concrete barriers using class 25/20 (Cost including reinforcement and formwork) of 600mm and 300mm base and 300mm thk stem with effective height of 1.6m	m ³	510		
	Service Ducts				

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

20.20	Provide and lay service ducts for utilities as instructed by the Engineer	PC Sum			1,200,000.00
20.21	Extra Over on Item 20D.01 for the Contractor's Overheads and Profit.	%			
BILL 20 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY

BILL № 21: Miscellaneous Bridge Works

Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
21.01	Strip seal type of expansion joint with structural steel and anchorage assembly complete as per drawing & specification including acceptance testing as specified, to be installed under supervision of a specialist manufacturer	m	600		
21.02	Reinforced cement concrete crash barrier including cost of reinforcement, steel planets and pipes complete as per drawing specifications	m	2000		
21.03	Providing and fixing in position 20mm thick compressible fibre board filler in expansion joint complete as per drawing and technical specifications	m	600		
21.04	Providing and filling joint sealing compound as per drawings and technical specifications. Coarse sand with bitumen (6% by wt)	m	600		
21.05	Drainage spouts complete as per drawings and technical specifications	№	200		
21.06	Providing weep holes in plain concrete/RC abutment, wing wall/return wall complete as per drawing specifications	№	300		
21.07	Pipe handrails to bridges as per standard	m	2000		
21.08	Allow a prime cost sum of Kshs 4,500,000 for Geotechnical investigations	PC Sum			4,500,000.00
21.09	Include a percentage on Item 23.15 for the Contractor's Overheads and Profit.	%			
21.10	Supply and fix of Elastomeric bearings complete as per drawings and as per BS 5400 part 9.2 and as directed by the Engineer				
	(i) Capacity 490T	№	850		
21.11	Mobilize for piling works as per specifications	LS	1		
21.12	Form in position as shown on drawings cast insitu vertical piles nominal shaft diameter of between 600mm to 1200mm in any strata. Pile length as shown on drawings or as determined on site. Piles to be cast 1000mm above the pile cap soffit level and trimmed back as instructed by the Engineer.	m	800		
21.13	Move piling rig and other equipment	LS	1		

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

	from one pile location to another pile location, set up as required for piling				
21.14	Allow for boring through obstructions such as hard boulders, old foundations etc	Hours	160		
21.15	Allow for trimming piles and cutting /bending projecting reinforcement to required shape and level.	No.	240		
21.16	Allow for load testing of working concrete piles to one and a half times the working load as instructed by the Engineer including all equipment and labour necessary. Rate to include for three copies of certified test results and report.	No.	20		
21.17	Provide equipment and carry out pile integrity testing as per the specifications to the satisfaction of the Engineer. The rate to include three copies of certified test results and report	No.	20.00		
BILL 21 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 22: Day Works					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
Note:	<i>Any plant employed upon Day works which have power rating lower than that specified, shall be paid for at rates lower than those in the Schedule of Day works. The reduction in the payable rate shall be in proportion to the power rating below that specified.</i>				
	PLANT				
22.01	Crawler Dozer with Hydraulic Ripper				
	(a) 100-135 Kw rated flywheel power	hr	20		
	(b) 136-185 Kw rated flywheel power	hr	20		
	(c) 186-250 Kw rated flywheel power	hr	20		
22.02	Motorized rubber tyred single engine scrapers				
	(a) Up to 16m ³ heaped capacity	hr	7		
	(b) 17-26 m ³ heaped capacity	hr	7		
22.03	Motorized rubber tyred twin engine scrapers		0		
	(a) Up to 16 m ³ heaped capacity	hr	20		
	(b) 17-26 m ³ heaped capacity	hr	20		
22.04	Motor Graders with Hydraulic Ripper or Scarifier				
	(a) 80-110 Kw rated flywheel power	hr	10		
	(b) 111-120 Kw rated flywheel power	hr	10		
	(c) 121-160 Kw rated flywheel power	hr	10		
22.05	Tracked Excavator Cranes				
	(a) 20-28t max working load	hr	10		
	(b) 28.1-36.1t max working load	hr	10		
	(c) 36.1-56t max working load	hr	10		
22.06	Excavators hydraulic wheeled dual purpose				
	(a) 0.6-0.8m ³ rated bucket capacity	hr	10		
	(b) 0.81-1.0m ³ rated bucket capacity	hr	10		
22.07	Wheeled loaders 4X4 articulated				
	(a) 1.5-2.0 m ³ SAE rated capacity	hr	10		
	(b) 2.01-3m ³ SAE rated capacity	hr	10		
	(c) 3-5 m ³ SAE rated capacity	hr	10		
22.08	Crawler Loaders with Hydraulic Ripper				
	(a) 0.8-1.3m ³ SAE rated capacity	hr	10		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

	(b) 1.31-1.99 m ³ SAE rated capacity	hr	10		
	(c) 2-2.5 m ³ SAE rated capacity	hr	10		
22.09	Rollers Towed vibratory including tractor				
	(a) 6.5-8.8t un-ballasted weight	hr	10		
	(b) 8.6-11.7t un-ballasted weight	hr	10		
22.10	Road Roller deadweight (Steel Three Wheel)				
	(a) 6.5 -8.8t un-ballasted weight	hr	10		
	(b) 8.6-11.7t un-ballasted weight	hr	10		
22.11	Roller rubber tyred self propelled				
	(a) up to 1 t per wheel	hr	10		
	(b) 1.1 t -2.0 t per wheel	hr	10		
22.12	Roller Vibratory single roll Rubber tyred, 8.3-10.5 t un-ballasted weight	hr	10		
22.13	Vibrating plate compactor 114-200 kg operating weight	hr	6		
22.14	Compressor rated by normal delivery of free air per minute complete with all tools				
	(a) 6.0-7.4 m ³ /min	hr	10		
	(b) 7.5-9.7m ³ /min	hr	10		
	(c) 9.8-25.5m ³ /min	hr	10		
22.15	Mobile rubber tyred rough terrain crane 23-40 t max working load	hr	10		
22.16	Small dumpers 751kg-1.2t max rated payload	hr	10		
22.17	Pumps (Inclusive of all hoses)				
	(a) 50-76mm delivery	hr	10		
	(b) 77-101mm delivery	hr	10		
22.18	Rubber tyred tractors including trailer. 50-70kw rated flywheel power	hr	10		
22.19	Concrete mixers (wet capacity)				
	(a) up to 100 litres	hr	6		
	(b) 101-200 litres	hr	6		
	(c) 201-300 litres	hr	10		
22.20	Transit Mixer 4.5 m ³ /hour	hr	10		
22.21	Concrete pump of 45 and 30 m ³ capacity	hr	10		
22.22	Concrete poker vibrator	hr	6		
22.23	Lorries - Flatbed				
	(a) up to 7.5t gross vehicle weight	hr	6		
	(b) 7.6-12.0t gross vehicle weight	hr	10		
22.24	Lorries - Tippers				
	(a) up to 11t gross vehicle weight	hr	10		
	(b) 11-17t gross vehicle weight	hr	10		
	(c) 17.1- 25t gross vehicle weight	hr	10		
22.25	Van, Pickup or similar utility vehicle				

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

	(a) up to 1 t carrying capacity	hr	10		
	(b) 1.1-2.6 t carrying capacity	hr	10		
22.26	Self propelled water or fuel tanker				
	(a) 3500-4550 litre capacity	hr	6		
	(b) 4551-7000 litre capacity	hr	6		
	(c) 7001-12000 litre capacity	hr	10		
22.27	Bitumen pressure distributor				
	(a) 3500-4550 litre capacity	hr	10		
	(b) 4551-9000 litre capacity	hr	10		
22.28	Hot mix plant - 60 tonnes per hour	hr	4		
22.29	Mechanical broom	hr	10		
22.3	Batching and mixing plant 15-20 m ³ capacity	hr	10		
22.31	Paver finisher with 40 HP motor with sensor control	hr	4		
22.32	Chip spreader	hr	10		
22.33	Kerb making machine	hr	10		
22.34	Road marking machine	hr	10		
22.35	Electric generator				
	(a) 100 KVA	hr	10		
	(b) 125 KVA	hr	10		
22.36	Crusher Plant	hr	10		
22.37	Pulvimixer	hr	10		
	LABOUR				
22.38	Unskilled Labour	hr	40		
22.39	Skilled Labour	hr	20		
22.40	Artisan	hr	20		
22.41	Plant Operator	hr	20		
22.42	Driver	hr	20		
22.43	Foreman/Headman	hr	20		
22.44	Office attendants and chainmen	hr	20		
22.45	Blaster (Certified)	hr	20		
22.46	Blacksmith	hr	20		
22.47	Driller	hr	20		
22.48	Mason	hr	20		
	MATERIALS				
	<i>All items of materials must be priced to comply with the Specifications.</i>				
22.43	Ordinary Portland Cement	tonne	20		
22.44	Hydrated Lime	tonne	20		
22.46	High Yield Steel				
	(a) Up to and including 16mm diameter	tonne	20		
	(b) Over 16mm diameter	tonne	20		
22.47	Aggregates for Concrete				
	(a) Fine	m ³	20		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

	(b) coarse	m ³	20		
22.48	Shuttering Timber				
	(a) F1 finish	m ²	30		
	(b) F2 finish	m ²	30		
	(c) F3 finish	m ²	30		
22.49	Chippings				
	(a) Class 3 any size	m ³	20		
	(b) fine aggregate	m ³	20		
22.50	Cutback Bitumen and emulsion				
	(a) 80/100 penetration grade bitumen	litre	80		
	(b) MC 3000 cut-back bitumen	litre	80		
	(c) MC 70 cut-back bitumen	litre	80		
	(d) K-160 bitumen emulsion	litre	80		
22.51	Gabion mesh, size 1.0 m x 1.0 m x1.0 m	m ²	70		
22.52	Stone for gabions	m ³	80		
22.53	Dynamite stick explosives	kg	10		
22.54	Explosive fuse	m	10		
22.55	Detonators	Nº	10		
BILL 22 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAISELELASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL Nº 23: Landscaping and Environmental Mitigation Measures & Road Safety					
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs.)	AMOUNT (Kshs.)
23.01	Supply, stack and spread approved earth and manure at site including royalty and carriage up to 15 m as instructed by the Engineer.	m ³	2,250		
23.02	Supply, stack, plant and water flowering/avenue trees of at least 1m height above the ground level in excavated pits of size 1.2m x 1.2m x 1.2m and after planting, removal and stacking of excavated earth to approved location, filling the pit with soil for large and small trees as instructed by the Engineer.	Nº	2,792		
23.03	Provide, plant and develop the plants, shrubs and flower bed on embankment slopes, inside the embankment and as shown on the drawing in excavated pits of size 0.6 x 0.6 x 0.6 and after planting removal and staking of excavated pits / bed with appropriate material				
	(a) Medium shrubs	Nº	563		
	(b) Small shrubs	Nº	241		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

23.04	Transplantation of the existing trees of girth above 600 mm girth as instructed by Engineer, including uprooting, shifting of the tree and placing in excavated pits of suitable size and after transplanting, removal and stacking of excavated earth to approved locations as instructed by the Engineer. Rate to include maintenance of transplanted trees including watering , including labour, all tools and equipment and maintaining up to defect liability period. as instructed by Engineer up to the end of the defect liability period.	Nº	25		
23.05	Grassing as instructed by the Engineer. Rate to include care and watering of the grass until it is firmly established to the satisfaction of the Engineer.	m ²	6,031		
23.07	Landscaping of embankment slopes, cut faces, side drains of outfall channels, shoulders, spoil and borrow areas. Rate to include light compaction of the landscaped areas to the satisfaction of the Engineer.	m ²	1,883		
23.08	Compensatory road side plantation of approved species of indigenous trees including MS tree guard, watering, manure, maintenance during the construction and defect liability periods or as instructed by the Engineer.	Nº	1,787		
23.09	Provide and lay crazy stones as per the direction of the Engineer	m ²	1,447		
23.10	Monitor Air quality for SPM, PM10, SO ₂ , NO _x , CO & HC in each season i.e. summer, winter & post monsoon with a frequency of 24 hr/day for two consecutive working days per week for two weeks during construction period at three locations as instructed by the Engineer.	Nº of samples	10		
23.11	Monitor Noise levels once in every season for two non consecutive days per week for 2 weeks with an interval of 10 minutes for 24 hr at three locations as instructed by the Engineer.	Nº of samples	4		
23.12	Test water quality at two locations along the project for pH, BOD, TSS, TDS, DO, turbidity and O&G once in each season or as instructed by the Engineer.	Nº of samples	2		
23.13	Test soil quality for heavy metals and oil & grease at the start and end of construction activity at the relevant sections as instructed by the Engineer.	Nº of samples	2		
23.14	Excavate, desilt and clean rivers/channels on either side of the road as instructed by the Engineer	m	20		
23.15	Allow for a provisional sum of KShs 1,311,000 for Environmental measures as instructed by the Engineer.	Prov. Sum			1,311,000.00
23.16	Include a percentage on Item 23.15 for the Contractor's Overheads and Profit.	%			

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

23.17	Allow for a sum of KShs. 5,500,000 for training of engineers as directed by the Engineer	PC Sum			5,500,000.00
23.18	Include a percentage on Item 1.29 for the Contractor's Overheads and Profit.	%			
23.19	Allow for a provisional sum of KShs20,000,000 for Road Safety Training & Education as instructed by the Engineer.	Prov. Sum			20,000,000.00
23.20	Include a percentage on Item 23.17 for the Contractor's Overheads and Profit.	%			
BILL 23 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 24: Street Lighting					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
	Supply, Install, Test, Commission and Set to Work the following:-				
24.01	Street lighting concrete poles with suitable decorative double arm brackets to achieve 10 M above the finished road level surface. The brackets should be able to hold in place 80 Watts All-In-One solar street light fitting as per the specifications.	No	170		
24.02	80 Watts All-In-One Solar street lights fittings as per the specifications or as approved by the engineer	No	340		
24.03	Hole digging, erect the street lights concrete poles and installation of brackets and light fittings	No	170		
24.04	120W LED street lighting fitting (flood light) luminaire for lighting up under bridge with slim surfaces and performance longevity through optimized heat dissipation or approved by the Engineer	No	100		
24.05	Under bridge light bracket to mount the LED street light fitting	No	100		
24.06	Free standing sheet steel weather proof control pillar on concrete plinth complete with three coats of paint and necessary internal wiring board with lockable accessories	No.	4		
24.07	Surface mounted 4 Way 100A SP&N MCB Consumer Unit complete with 100A DP integral main switch and hinged protective cover but excluding MCBs as Schneider or approved equivalent	No	4		
24.08	10 Amp S.P MCB	No	12		
24.09	Blanking plates for consumer unit.	No	4		
24.10	40A DP contactor with metal clad enclosure as Crabtree Cat. No. 302/C25DP or approved equivalent	No	4		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

24.11	40A DP residual current operated circuit breaker with rated residual operating current of 300mA and metal clad enclosure as Crabtree Cat. No. 224/300 or approved equivalent	No	4		
24.12	Electronic Timer Switch, 1.5 maximum differential and 5A switching capacity or approved equivalent to be mounted on a steel column and wired to control street lights. Include a manual overriding switch	No	4		
24.13	Cable glands for item 24.20 above	No	20		
24.14	10.0 mm ² 2core PVC/SWA/PVC copper cable from the control pillar to the under bridge LED Light fittings	M	4000		
24.15	Cable glands for item 24.23 above.	No	40		
24.16	25mm diameter H.G. PVC with mounting accessories, installed along the underpass road lighting fittings to protect the 10.0 mm ² 2core PVC/SWA/PVC copper cable.	M	4000		
24.17	Excavate trench for the cables in soft ground, average depth 600mm, lay cable, cover with "HATARI" tiles, back-fill and compact	M	200		
24.18	100mm diameter H.G. PVC duct with concrete surround installed at road crossing	M	250		
24.19	Earthing comprising of 6mm ² SC earthing conductor, 1500mm long by 12mm diameter earth rod and concrete inspection pit for the control pillars and under bridge lighting sections. Use parallel earth rods where necessary	No	10		
24.20	Allow for numbering of columns to NCCG/KURA standard	Lump Sum			
24.21	Allow for engraving of components to NCCG/KURA standard as may be directed by the Engineer	Lump Sum			
24.22	Allow a Provisional Sum of KShs.1,000,00.00 for Kenya Power Service Line Charges and power supply connection	PC Sum			1,000,000.00
24.23	Include a percentage on Item 24.22 for the Contractor's Overheads and Profit.	%			
BILL 24 TOTAL CARRIED TO SUMMARY PAGE					

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAILESELLASIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY					
BILL № 26: HIV/AIDS Awareness					
Item	Description	Unit	Quantity	Rate (Kshs.)	Amount (Kshs.)
26.01	Implement HIV/AIDS awareness campaign amongst the workers for the duration of the Contract	month	36		
26.02	Allow for social amenities to be provided on the road: wellness clinic consisting of two containers of forty feet long as per attached drgs. To include water supply, sewer and power connections, security and utility bills for maintenance for 36 months	Lump sum			
26.03	Allow for the availability of condoms to workers and staff for the duration of Contract	month	36		
26.04	Allow a provisional sum of Ksh. 2,000,000 for personnel, purchase of kits and equipment for testing in awareness centres	PC sum			2,000,000.00
26.05	E.O item 26.04 for contractor's profit and overheads	%			
26.06	Allow for the participation of representative of County health worker, and National AIDS council representative to train and communicate with workers. Allowance to include transport, meals, accommodation and any other reasonable allowances associated expenses and equipment expenses	month	36		
26.07	Allow for the engagement of specialist HIV sub-contractor to deal with prevention and awareness activities as per programme to be approved by the Engineer	month	36		
26.08	Allow for the preparation and submission of monthly report for HIV/AIDS awareness and prevention activities report to be tabled at site meetings	month	36		
BILL 26 TOTAL CARRIED TO SUMMARY PAGE					

APPENDIX TO BILL ITEM № 1.03: ENGINEER'S OFFICE FURNITURE & SURVEY EQUIPMENT					
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (Kshs)
103	1.0 FURNITURE AND EQUIPMENT FOR THE ENGINEER'S OFFICE				
103/1	AO size drawing board on adjustable metal stand with parallel sliding cursor	№	1		
103/2	Tee square to suit AO size drawing board	№	1		
103/3	250mm set square 45°	№	2		
103/4	250mm set square 60°	№	2		
103/5	Protractor for tache plotting with interchangeable scales	№	1		
103/6	Set of full divided scales (metric 1/1000, 1/2500, 1/500, 1/1200, 1/2000, 1/250, 1/1500)	№	1		
103/7	Set of drawing instruments (Kern or similar approved)	№	1		
103/8	Set of drawing pens (Rotring Micron or similar approved)	№	1		
103/9	Complete set of stencils 0.2mm to 2.0mm	№	1		
103/10	Digital planimeter OTT 30010 or similar	№	1		
103/11	Protractor 360°	№	1		
103/12	Provide and maintain five (5) approved branded laptop computers with the following: Intel Core i7 processor, 16" LED display, 1TB SATA HDD storage, 8 GB DDR RAM, DVD ±RW multi-layer drive, NIC card, 540M graphics card complete with all accessories and pre-loaded with licensed Windows 10 Ultimate 64-bit OS, latest MS Office and MS Project. The PC should have full multimedia capabilities.	№	5		
103/13	As for 104/13 but similar approved branded Desktop Computer with 20" TFT screen.	№	1		
103/14	Provide and maintain Konica Minolta bizhub 220 or similar multifunctional colour/print system	№	1		
103/15	Provide and maintain Konica Minolta pagepro 1490 MF or similar approved desktop laser printer	№	4		
103/16	UPS 600VA	№	4		
103/17	Electronic Scientific Calculator 12 figures (Casio fx-95 ES PLUS)	№	6		
103/18	Document binding machine	№	1		
103/19	Assorted diameter 21 Ring A4 Plastic Binding Combs	№	5		
103/20	Reams of A4 photocopying paper	№	500		
103/21	Reams of A3 photocopying paper	№	50		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

103/22	Provide and maintain HP DesignJet T830 36in Multifunction Printer or similar approved Large format printer	No	1		
103/23	Stapling machine Ofrex size 66 or similar with 5000 staples	No	3		
103/25	Stapling machine Ofrex size 50 or similar with 5000 staples	No	6		
103/26	Pencil sharpener (desk mounted type)	No	2		
103/27	Heavy duty paper punch	No	1		
103/28	Ordinary paper punch	No	6		
103/29	Filling tray	No	12		
103/30	First aid kit	No	3		
103/31	Fire extinguisher	No	4		
103/32	Waste paper basket	No	12		
103/33	Refrigerator min. capacity 0.285m ³	No	1		
103/34	Vacuum cleaner of approved make, minimum 1000W power	No	1		
103/35	900 watt 25 litre microwave oven with grill	No	1		
103/36	Air conditioner unit, medium size	No	2		
103/37	2.0 OFFICE FURNITURE				
103/38	Cupboard 0.15 m ³ , lockable	No	6		
103/39	Cooker 2 plate electric	No	1		
103/40	Desk 2.2 x 0.9m with fock up drawers	No	6		
103/41	Swivel chair with arms	No	6		
103/42	Chairs (standard)	No	12		
103/43	Drawing table stools	No	1		
103/44	Typist's desk	No	1		
103/45	Typist's chair	No	2		
103/46	Stationery cupboard, 1.2m ³ lockable	No	2		
103/47	Steel filing cabinet 4 drawers, lockable	No	1		
103/48	Bookshelf, 3 shelves 1.5m long hold box files	No	2		
103/49	Office table (2 m x 1.2 m) each with 2 chairs	No	6		
103/50	Portable table top electric fan	No	2		
103/51	Standard electric fan	No	2		
103/52	Conference table for 12 persons	No	1		
103/53	Chairs for conference table	No	12		
103/54	3m long bench with cushioned seat and back rest	No	1		
103/55	3.0 SURVEY EQUIPMENT & DESIGN SOFTWARE				
103/56	Engineer's digital Level machine with all its suporting accessories, that meets the requirements as indicated in the special specification	No	1		
	Digital Levelling staff 5m with levelling bubble (Leica or similar approved)	No	6		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

103/57	Set of tripods (wild or similar)	Nº	1		
103/58	Survey umbrella	Nº	1		
103/59	2.5m ranging rod (metallic)	Nº	2		
103/60	Levelling staff 5m with levelling bubble (wild iNLE 3 or similar)	Nº	2		
103/61	1m stainless steel straight edge	Nº	1		
103/62	3m aluminium straight edge	Nº	2		
103/63	30m steel white face tape	Nº	2		
103/64	100m steel band tape	Nº	2		
103/65	3m tape measure	Nº	2		
103/66	Steel tape repair outfit	Nº	1		
103/67	2kg hammer	Nº	2		
103/68	Pangas 16" straight	Nº	5		
103/69	Roll of tracing paper 750 mm x 20 m	Nº	5		
103/70	Drawing office stools	Nº	2		
103/71	Robotic Total Station - Leica Viva TS12 + series [Or equivalent] with Automatic target recognition, EGL guide light, remote control, motorised, PowerSearch (PS) and GUS74 laser guide or equivalent complete with 32GB memory card facility plus downloading software Leica geo office system, three measuring poles with double prisms each per total station.	Nº	1		
103/72	Provide 3 No. single user licensed Latest AutoDesk Architecture, Engineering and Construction collection software including a three year subscription and training.	Nº	3		
Total of Appendix to Bill Item 1.03 (Carried Forward to Bill Nº 1)					

APPENDIX TO BILL ITEM Nº 1.06: ENGINEER'S LABORATORY FURNITURE & EQUIPMENT

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE (Kshs)	AMOUNT (Kshs)
106	A. FURNITURE AND EQUIPMENT FOR THE ENGINEER'S LABORATORY				
106/1	Provide and maintain two (2) approved branded desktop computer with the following: Intel Core i7 processor, 20" TFT screen display, 750 GB SATA HDD storage, 8 GB DDR RAM, DVD ±RW multi-layer drive, NIC card, 540M graphics card complete with all accessories and pre-loaded with licensed Windows 10 Pro 64-bit OS, latest MS Office and MS Project. The PC should have full multimedia capabilities.	Nº	2		
106/2	Provide and maintain Konica Minolta pagepro 1490 MF or similar approved desktop laser printer	Nº	1		
106/3	UPS 600VA	Nº	1		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/4	Electronic Scientific Calculator 12 figures (Casio fx-995)	Nq	4		
106/5	Reams of A4 photocopying paper	Nq	50		
106/6	Stapling machine Ofrex size 66 or similar with 5000 staples	Nq	1		
106/7	Stapling machine Ofrex size 50 or similar with 5000 staples	Nq	4		
106/8	Pencil sharpener (desk mounted type)	Nq	2		
106/9	Heavy duty paper punch	Nq	1		
106/10	Ordinary paper punch	Nq	4		
106/11	Filling tray	Nq	10		
106/12	Refrigerator, 75 litre capacity	Nq	1		
106/13	Vacuum cleaner of approved make, minimum 1000W power	Nq	1		
106/14	900 watt 25 litre microwave oven with grill	Nq	1		
106/15	Air conditioner unit, medium size	Nq	2		
106/16	Writing desk, 2.2 m x 0.9 m with lockable drawers	Nq	1		
106/17	Swivel chair, adjustable height, with arms	Nq	1		
106/18	4-drawer lockable steel filing cabinets	Nq	2		
106/19	3 m ² wooden book shelves	Nq	2		
106/20	Drawing tables. 1.8 m x 0.9 m with drawer	Nq	2		
106/21	Chairs for drawing tables	Nq	2		
106/22	Typist table complete with a chair	Nq	1		
106/23	Lockable cupboards	Nq	2		
106/24	Soft board for wall notices, 2.0 m x 1.0 m	Nq	2		
106/25	Bench for people waiting	Nq	1		
106/26	Waste paper basket	Nq	6		
106/27	Fire extinguishers, CO ₂ type 5 litre capacity	Nq	3		
106/28	First aid kit for general purposes	Nq	2		
106/29	First aid kit for snake bites	Nq	1		
106/30	Set of laboratory cleaning and washing up equipment	Nq	1		
106/31	Set of curtains for all windows	Nq	4		
	B. LABORATORY EQUIPMENT				
	1.0 COMPACTION TEST (AASHTO T99 & T180)				
106/32	Compaction moulds complete with base plate and extension collar 101.1.6 internal diameter x 116.43mm high	Nq	10		
106/33	2.49kg compaction hammer, drop regulated to 304.8mm	Nq	2		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/34	4.536kg compaction hammer, drop regulated to 457.2mm	Nº	2		
106/35	Electric vibrating Kango hammer fitted with steel tamper (BS1377) with support frame	Nº	1		
106/36	Straight edge 300mm long with handles	Nº	4		
106/37	Steel tamping rod (BS1377)	Nº	4		
106/38	Compaction mould 152.4mm dia x 116.43 high complete with base plate and extension collar	Nº	2		
106/39	Galvanized metal tray 1m x 0.5m x 75mm deep	Nº	4		
106/40	75mm brush	Nº	2		
106/41	Semi-automatic balance. 25kg capacity accurate to 10g, including weights	Nº	4		
106/42	20mm BS Sieve, 300mm diameter	Nº	1		
106/43	Stop clock	Nº	4		
106/44	Electric oven, thermostatically controlled between 10 and 150 deg. Celsius, 0.2225 m³ min. capacity	Nº	2		
106/45	As item 106/30 but gas	Nº	1		
106/46	Moisture content tins, 75mm dia calcium or aluminium plated	Nº	2		
106/47	Cone penetrometer with gauge and automatically controlled test cup	Nº	2		
	2.0 DENSITY (Sand Replacement Method BS 1377)				
106/48	Metal containers (450mm diameter)	Nº	2		
106/49	Stainless steel tray 305mm diameter	Nº	2		
106/50	Metal tray 300 x 300mm square, 40mm deep with 150mm diameter hole in the centre	Nº	2		
106/51	Metal tray 500 x 500mm square, 50 mm deep, with 200mm diameter hole in the centre	Nº	2		
106/52	Steel pegs for fixing tray in position	Nº	50		
106/53	Sand pouring cylinder, 150mm diameter	Nº	3		
106/54	Sand pouring cylinder, 200 mm diameter	Nº	3		
106/55	Cold steel chisel 20mm x 300mm long	Nº	3		
106/56	Cold steel chisel 10mm x 250mm long	Nº	3		
106/57	1.5kg, 3.5kg hammers and 1 kg rubber mallet	Set	1		
106/58	Scoop for removing excavated material from hole, 250m long handle	Nº	4		
106/59	100mm brush, soft	Nº	6		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/60	50mm brush, soft	Nº	10		
106/61	Primus gas stove	Nº	1		
106/62	Calibrating can 150mm diameter x 150mm deep	Nº	4		
106/63	As item 106/62 but 200 mm diameter x 250mm deep	Nº	2		
	3.0 DENSITY (Nuclear Method AASHTO T238J)				
106/64	Nuclear densometer (Troxler 3411B or similar approved) complete with hole forming device and guide)	Nº	1		
	4.0 CBR (AASHTO T193)		1		
106/65	CBR mould, 152.4 dia x 178mm high, complete with perforated base plate and extension collar 50.8mm high that can be fitted to either end of the mould	Nº	25		
106/66	Perforated swell plate 150mm diameter with an adjustable center post of rustproof metal provided with a lock-nut	Nº	25		
106/67	2.25kg split surcharge weight	Nº	25		
106/68	Set of annular surcharge weights	Nº	25		
106/69	Solid base plate for CBR mould	Nº	25		
106/70	Static Compaction displacer discs 1 Nº 61.4mm, 1 Nº 50.8mm and 2 Nº 38.8 thick	Nº	4		
106/71	Disk lifting handle	Nº	6		
106/72	Linear shrinkage mould	Nº	5		
106/73	Static Compaction press, 50 tonnes capacity with an adjustable distance between platens of 530 to 250mm (hydraulic or mechanical operation and hand operated)	Nº	1		
106/74	Set of guards for above press	Set	1		
106/75	CBR load frame (electric and hand operated) including proving rings for 10 kN, 28 kN and 50 kN, stabilizing bar, piston and bracket.	Nº	1		
106/76	Penetration gauge range 0-25mm	Nº	4		
106/77	Swell measurement tripod complete with gauge calibrated in 0.01 divisions	Nº	4		
106/78	Soaking tank for CBR moulds sufficient for at least 50 moulds.	Nº	1		
	5.0 RELATIVE DENSITY OF AGGREGATES (BS & 812)				
106/79	Wire mesh basket with apertures not greater than 6.5mm large enough to contain 2.5kg of aggregate	Set	2		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/80	A stout watertight container in which the basket can be freely suspended	Nº	2		
106/81	Soft absorbent cloth (tea towel)	Nº	10		
106/82	Shallow tray of area not less than 0.065m ²	Nº	2		
106/83	An air tight container of similar capacity to the basket	Nº	2		
106/84	Pycnometer of 1 litre capacity	Nº	4		
106/85	Semi-automatic 5kg balance accurate to 0.1g to be of size and type to permit the basket containing the sample to be suspended in water (to be supplied with weights)	Nº	1		
106/86	Hot air drier (electric)	Nº	1		
	6.0 FLAKINESS (BS 812)				
106/87	Flakiness gauge	Nº	1		
106/88	ACV apparatus of 150mm internal diameter with plunger and base plate	Nº	1		
106/89	Metal tamping rod 16mm diameter and 450mm to 600mm length with one end round	Set	2		
106/90	Cylindrical measure to BS 812	Nº	2		
	7.0 LAA TEST				
106/91	LAA Machine as el_42-530/01 or similar	Nº	1		
106/92	Spare set of abrasive charges	Nº	2		
	8.0 CONCRETE: Cube and Compression Testing				
106/93	Concrete compression machine, to BS 1610 irade A with 300mm gauge, rectangular platens, capacity 1560kN. complete with safety guard 50, 70, 100mm distance pieces and electro-mechanical load pacer	Nº	1		
	9.0 CONCRETE: Slump and Cube Manufacture (BS 1881)				
106/94	Slump cone, tamping rod and base	Nº	2		
106/95	Concrete cube mould (150 mm cube)	Nº	20		
106/96	Curing tank for cubes (Capacity 50 Nº)	Nº	1		
106/97	Cube Tamping rods	Nº	8		
	10.0 AGGREGATES AND CHIPPINGS				
106/98	Metal tamping rod 16mm diameter and 450mm to 600mm length with one end round	Set	1		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/99	Beaker 250ml	Nº	2		
106/100	Thermometer 0° C to +50° C	Nº	2		
106/101	Thermometer 0° C to +250° C	Nº	2		
106/102	Reagent grade silica gel, 500g container	Nº	20		
	11.0 BITUMEN SPRAY TEST (BS 1707)				
106/103	Steel tray 20 mm deep x 0.1 m ² (for measuring bitumen spray quantity) including purpose made detachable handle 1.5 m long to enable trays to be picked up.	No	6		
	12.0 CONSUMABLES AND SUNDRIES				
106/104	Paraffin wax	kg	50		
106/105	Gas	kg	600		
106/106	Gunny sack	Nº	500		
106/107	Plastic bag 900 x 450mm x 1000 gauge	Nº	500		
106/108	Plastic bag 900 x 450mm x 500 gauge	Nº	500		
106/109	Plastic bag 450 x 300mm x 1000 gauge	Nº	250		
106/110	Plastic bag 450 x 300mm x 500 gauge	Nº	600		
106/111	Filter paper 150 mm diameter Watman Nº 5 (Boxes of 100)	Nº	25		
106/112	Filter paper 450 mm diameter Watman Nº 5 (Boxes of 100)	Nº	25		
106/113	Filter paper 100 mm diameter Watman Nº 5 (Boxes of 100)	Nº	25		
106/114	Trichloroethylene 205 little drum	Nº	2		
106/115	Cotton waste (or drying cloths)	kg	25		
106/116	Filter paper 270 mm diameter 33 mm with diameter Hole in centre, Watman Nº 5 (Box of 100)	Nº	20		
106/117	Filter paper 400 mm diameter Watman Nº 54 (box of 100)	Nº	25		
106/118	Gas cylinder compatible with stove supplied under Item 106/61	Nº	6		
	13.0 MARSHALL TEST ASTM D1559				
106/119	Specimen mould assembly	Nº	3		
106/120	Specimen extractor	Nº	1		
106/121	Marshall Compactor, complete	Nº	1		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/122	Marshall testing machine complete including flow meter	Nº	1		
106/123	Electric mixer with isomantle	Nº	1		
106/124	Water bath	Nº	1		
106/125	200mm x 200mm x 50mm deep steel baking trays	Nº	6		
106/126	Pots suitable for heating bitumen	Nº	6		
106/127	Spatulas	Nº	3		
106/128	Dial thermometers 10° C to 210° C	Nº	3		
106/129	Pairs of gloves for handling hot material	Nº	10		
106/130	Pairs of rubber gloves to remove specimens from water bath	Nº	4		
106/131	Flat bottomed scoop	Nº	2		
106/132	Ladle for placing mixture in moulds	Nº	2		
106/133	Gyratory compactor (laboratory mix design) ELE SERVO PAC or equivalent with 100mm and 150mm diameter moulds	Nº	1		
106/134	Vibratory hammer complete with shanks, tampers, 6 moulds and 7 base plates	Nº	1		
	14.0 MAXIMUM S. G. OF BITUMINOUS PAVING MIXTURES (ASTM D2041)				
106/135	Balance of sufficient capacity and sensitivity to enable maximum specific gravity of samples of uncompacted paving mixtures to be calculated to at least four significant figures, it shall be equipped with a suitable suspension apparatus to permit weighing of the samples while suspended centre of the pan	Nº	1		
106/136	Vacuum pump	Nº	1		
106/137	Glass or metal container of at least 1,000ml capacity it shall be sufficiently strong to withstand a partial vacuum, it shall have a cover fitted with a rubber gasket and a hose connection. Fine wire mesh shall cover the hose opening to prevent loss of fines. The top surface of the container shall be smooth and substantially plane.	Nº	1		
	15.0 QUANTITATIVE EXTRACTION OF BITUMEN FROM BITUMINOUS MIXTURES ASTM D2172 AND ASTM D95				

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/138	Water bath for use with bowl suitable for immersing the bowl and apparatus for suspending the bowl from the centre of the scale pan	Nº	1		
106/139	Oven capable of maintaining temperature at 100° C to 104° C	Nº	1		
106/140	Flat pan 300mm x 200mm x 25mm deep	Nº	1		
106/141	Balance capacity 5000g accurate to 0.2g	Nº	1		
106/142	Balance capacity 15000g accurate to 1.0g	Nº	1		
106/144	Ignition dish 125mm capacity	Nº	4		
106/145	Dessicator	Nº	1		
106/146	Analytical balance	Nº	1		
106/147	Centrifuge to ASTM E2172	Nº	1		
106/148	Filter rings for centrifuge (packs of 100)	Nº	15		
106/149	Reflux condenser to ASTM E95	Nº	4		
106/151	Trichoeethylene reagent grade	kg	1,000		
106/152	Extractor fan	Nº	1		
	16.0 RECOVERY OF BITUMEN FROM SOLUTION				
106/153	Centrifuge to AASHTO T170	Nº	1		
106/154	Centrifuge tubes	Nº	10		
106/155	Distillation assembly to AASHTO T170	Nº	1		
106/156	Water jacketed condenser	Nº	1		
106/157	ASTM low distillation thermometer with range 2° C to 300°C	Nº	2		
106/158	Gas flow meter	Nº	1		
106/159	Corks drilled as AASHTO T170	Nº	10		
106/160	Separator funnel 125ml capacity	Nº	1		
	18.0 SIEVE ANALYSIS				
106/153	BS Sieve 300 mm diameter in sizes 75, 63, 50, 37.5, 28, 20, 14, 10, 6.3, 5 and 4mm, plus lid and receiver	set	1		
106/154	BS Steve 200 mm diameter in sizes 2, 1, 0.6, 0.5, 0.425, 0.30, 0.15 and 0.075 plus lid and receiver	Set	1		
106/155	Electric sieve shaker	Nº	1		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/156	BS Sieve 200 mm diameter 0.425 and 0.075mm	Set	2		
106/157	1m x 1m x 75mm deep galvanized metal tray	No	5		
106/158	Riffle box with 50mm slots (BS 1377)	Set	2		
	19.0 MISCELLANEOUS EQUIPMENT				
106/159	Wheel barrow	No	4		
106/160	Dustpan brush	No	4		
106/161	Shovel	No	4		
106/162	Pick axe with handle	No	4		
106/163	Metal scoop, large (150m wide)	No	4		
106/164	Metal scoop, medium (100m wide)	No	2		
106/165	Garden trowel	No	4		
106/166	Steel tray 0.3 x 0.3 x 0.01 deep	Set	8		
106/167	Palette knife 200mm long blade	No	4		
106/168	Palette knife 100mm long blade	Set	4		
106/169	BS Sieve 450 diameter 37.5 mm	No	1		
106/170	BS Sieve 450 diameter 20 mm	No	2		
106/171	BS Sieve 450 diameter 5 mm	No	2		
106/172	BS Sieve 450 diameter 0.6mm	No	4		
106/173	BS Sieve 450 diameter 0.425 mm	No	10		
106/174	BS Sieve 450 diameter 0.3 mm	No	4		
106/175	BS Sieve 450 diameter 0.075mm	No	4		
106/176	Lid and receiver for Item 165 to item 175	Set	1		
106/177	BS sieve brush	No	4		
106/178	Measuring cylinder set 25ml, 100ml, 500ml, 1000ml, 200ml	No	4		
106/179	Glass jar capacity 5 litres	No	2		
106/180	200mm x 200mm x 20mm cadmium plated or aluminium tin	No	2		
106/181	Electronic balance capacity 1000g accurate to 0.01gm	No	2		
106/182	Balance 2000g capacity accurate to 0.1g (manual) including weights	No	2		
106/183	Balance 50kg capacity accurate to 10g including weights	No	1		
106/184	Still for producing distilled water	No	1		

Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile Sellasie Overpass And Associated Road Networks In Nairobi County

106/185	Polythene or glass 20 litres storage vessels with tap at bottom	Nº	2		
106/186	Stiff broom	Nº	4		
106/187	Vernier calipers, 150mm	Nº	2		
106/188	Vernier calipers, 250mm	Nº	2		
106/189	Pestle and mortar	Nº	2		
106/190	Linear shrinkage mould (BS 1377)	Nº	2		
106/191	Average least dimension gauge	Nº	2		
106/192	Plastic or metal bucket including lid, 10 litres capacity	Nº	2		
106/193	Polythene wash bottle (500ml)	Nº	20		
106/194	A4 size clipboard	Nº	6		
106/195	Thermometer range 50°C to 150°C, glass (BS 593)	Nº	2		
106/196	Laboratory thermometer, range 0°C to 250°C (BS 593)	Nº	2		
106/197	Lockable tool box containing 1 pr "mole grips" 2*150mm screw driver, 2*300mm screw driver (1 standard and 1 Phillips head of each) adjustable spanners 200mm and 300mm 1 general purpose pliers, 1 plastic faced mallet (kg), 1 set imperial spanners 14: to 15/16" 1 set metric spanners 8mm to 20mm 2 tyre pressure gauge range 0-100 p.s.i	Nº	1		
106/198	Maximum and Minimum Thermometer (BS 692)	Nº	2		
106/199	Rain Gauge	Nº	1		
106/200	Pocket dial thermometer +50°C to 250°C accurate to +3% with 0.75m long	Nº	4		
106/201	5 litre capacity steel storage containers with leak and dustproof lids for storage of bitumen samples	Nº	6		
106/202	Hotplate 200mm diameter with thermostat heat control unit	Nº	2		
106/203	450mm diameter x 150mm deep basins	Nº	5		
	20.0 STANDARD SPECIFICATION				
	Copies of each of the following standard specifications (Latest edition). The Contractor shall supply the other standards quoted in the Contract but the cost of these shall be deemed to have been included in other rates elsewhere.				

*Construction Of Valley Road-Kenyatta Avenue/Ngong /Nyerere Road Interchange And Upper Hill Haile
Sellasie Overpass And Associated Road Networks In Nairobi County*

106/204	BS 812	Nº	1		
106/205	BS 882	Nº	1		
106/206	BS 1377	Nº	1		
106/207	BS 1881	Nº	1		
106/208	BS 1924	Nº	1		
106/209	ASTM 04.03	Nº	1		
106/210	AASHTO - GDPS - 3 V3	Nº	1		
106/211	AASHTO HM - 25 (PART I & PART II)	Set	1		
	Total of Appendix to Bill Item 1.06 (Carried Forward to Bill Nº 1)				

SUMMARY BILL OF QUANTITIES

CONSTRUCTION OF VALLEY ROAD-KENYATTA AVENUE/NGONG ROAD/NYERERE ROAD INTERCHANGE AND UPPERHILL HAISESELASSIE OVERPASS AND ASSOCIATED ROAD NETWORKS IN NAIROBI CITY COUNTY		
Bill 1	Preliminary & General Items	
Bill 4	Site clearance & Topsoil stripping	
Bill 5	Earthworks	
Bill 7	Excavation for Structures	
Bill 8	Culvert & Drainage Works	
Bill 9	Passage of Traffic	
Bill 12	Natural Gravel for Sub-base & Base	
Bill 13	Graded Crushed Stone Sub-base & Base	
Bill 14	Cement & Lime Treated Material	
Bill 15	Bituminous surface treatment and surface dressing	
Bill 16	Bituminous Mix Bases, Binder Courses and Wearing Courses.	
Bill 17	Concrete Works	
Bill 17B	Reinforced Earth Walls	
Bill 19	Structural Steel	
Bill 20	Road Furniture	
Bill 21	Miscellaneous Bridgeworks	
Bill 22	Dayworks	
Bill 23	Landscaping and Environmental Mitigation Measures,	
Bill 24	Street lighting	
Bill 26	HIV/AIDS Awareness	
Sub-total 1		
Add 5% of Sub-total 1 for Contingencies to be expended in whole or in part or deleted as directed by the Engineer.		
Add 5% of Sub-total 1 for Variation of Prices in accordance with Clause 70 of the Conditions of Contract.		
Sub-total 2		
Add 16% of Sub-total 2 for Value Added Tax (VAT)		
GRAND TOTAL		

SECTION 10: DRAWINGS

See Volume I – Book of Drawings

See Volume II – Book of Drawings

