

Road
 Code L44042P Section Name
Package: Lot 6: Periodic Maintenance of Mandera Border 1 road
 Contractor 0

Bill of Quantities					Page: 7
Bill No.15	BITUMINOUS SURFACE TREATMENT AND SURFACE DRESSING				Project:
Item No.	Description	Units	Quantity	Unit Bid Rate(Ksh)	Amount KSh
15-50-002	Prime coat	L	3500		-
15-50-003	Tack coat	L	2000		-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
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					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
Total Carried Forward to Summary:					-

130

Issued by Kenya Urban Roads Authority: October 2018

Road

Code L44042P

Section Name

Package: Lot 6: Periodic Maintenance of Mandera Border 1 road

Contractor

0

Bill of Quantities					Page: 9
Bill No.20	ROAD FURNITURE REPAIR AND MAINTENANCE				Project:
Item No.	Description	Units	Quantity	Unit Bid Rate(Ksh)	Amount KSh
20-50-012	Kerbs	MT	1000		-
20-50-031	Provide, lay and joint kerbs, 125mm x 100mm Channels	m	1000		-
20-70-010	Paint 0.1m wide themoplastic yellow centreline on the road as specified	M ²	25		-
20-70-011	Paint 0.1m wide themoplastic white lines on road	M ²	100		-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
					-
Total Carried Forward to Summary:					-

132

Issued by Kenya Urban Roads Authority: October 2018

SECTION VI: STANDARD FORMS

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)

NAME OF CONTRACT:

PERIODIC MAINTENANCE OF LOT 6 ROAD :MANDERA COUNTY

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

Sir,

1. Having examined the Conditions of Contract, Specifications, Bill 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 Bill 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.

2. 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 Bid.
3. 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 5% of the above named sum for the due performance of the contract under the terms of a Bond to be approved by you.
4. We agree to abide by this bid for the period of 90 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.

5. We understand that you are not bound to accept the lowest or any bid you may receive.
6. On the basis of our previous experience we are fully experienced and competent in the type of work included in this tender 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 tendered.

Dated this Day of 20

Signature.....in the capacity of

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

.....

(Address of Tenderer)

(Name of Witness)

(Signature of Witness)

(Address of Witness)

(Occupation of Witness)

APPENDIX TO FORM OF BID

APPENDIX TO FORM OF BID
(This appendix forms part of the bid)

CONDITIONS OF CONTRACT	CLAUSE	AMOUNT
Bid Security (Bank Guarantee Only)		Kshs 400,000.00 (Unconditional bank guarantee only)
Amount of Performance Security (Unconditional Bank Guarantee)	10.1	5 per cent of Tender Sum in the form of Unconditional Bank Guarantee
Program to be submitted	14.1	Not later than 21 (twenty one) days after issuance of Order to Commence
Cash flow estimate to be submitted	14.3	Not later than 21 (twenty one) days after issuance of Order to Commence
Minimum amount of Third Party Insurance	23.2	1% of the Contract Price or Kshs.
Period for commencement, from Engineer's order to commence	41.1	28 days
Time for completion	43.1	6 months
Amount of liquidated damages	47.1	0.05% of Contract Value per day
Limit of liquidated damages	47.1	5% of Contract Value
Defects Liability period	49.1	3 months
Percentage of Retention	60.3	5% of Interim Payment Certificate
Limit of Retention Money	60.3	5% of Contract Price
Minimum amount of interim certificates	60.2	Kshs. 1,500,000
Time within which payment to be made after Interim Payment Certificate signed by Engineer	60.10	28 days
Time within which payment to be made after Final Payment Certificate signed by Engineer	60.10	28 days
Appointer of Adjudicator	67.3	The Chartered Institute of Arbitrators (Kenya)
Notice to Employer and Engineer	68.2	The Employers address is: The Director General, Kenya Urban Roads Authority (KURA), P.O. Box 41727 - 00100 <u>NAIROBI</u> The Engineer's address is: General Manager (Maintenance), Kenya Urban Roads Authority (KURA), P.O. Box 41727 - 00100 <u>NAIROBI</u>

Signature of Tenderer..... Date

FORM OF BID SECURITY

FORM OF BID SECURITY**TENDER BANK GUARANTEE**

Note: The bidder shall complete 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

PERIODIC MAINTENANCE OF LOT 6 ROAD :MANDERA COUNTY

, 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.

SEALED with the common Seal of the said Bank this day of 20.....

THE CONDITIONS of this obligation are:

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

If the Bidder refuses to accept the correction of errors in his bid; or

If the Bidder having been notified of the acceptance of his bid by the Employer during the period of Bid Validity

- (i) fails or refuses to execute the Form of Agreement in accordance with the Instructions to Tenderers when required or
- (ii) 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 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.

SIGNATURE AND SEAL OF THE BANK

.....

NAME OF SIGNATORYDATE.....

NAME OF THE WITNESS

SIGNATURE OF THE WITNESS DATE

ADDRESS OF THE WITNESS

SECTION VII: SCHEDULES OF SUPPLEMENTARY INFORMATION

SCHEDULES OF SUPPLEMENTARY INFORMATION

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SCHEDULE 1: CONFIDENTIAL BUSINESS QUESTIONNAIRE

This Confidential Business Questionnaire of the Government of Kenya shall be completed by the Bidder.

REPUBLIC OF KENYA

CONFIDENTIAL BUSINESS QUESTIONNAIRE

You are requested to give the particulars indicated in Part 1 and either Part 2 (a). 2(b) or 2(c) 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

.....

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 one time:

Kshs.....

Name of your bankers

Branch.....

Are you an agent of the Kenya National Trading Corporation? YES/NO

Part 2(a) - Sole Proprietor:

Your name in full

.....

Age.....

NationalityCountry of origin

*Citizenship details

Part 2(b) - Partnership:

Give details of partners as follows:

Name	Nationality	Citizenship Details*	Shares
1.....			
2.....			
3.....			

Part 2(c) - Registered Company:

Private or public

State the nominal and issued capital of the company-

Nominal Kshs.

Issued Kshs.

Give details of all directors as follows:

Name	Nationality*	Citizenship Details**	Shares***
1.....			
2.....			
3.....			
4.....			
5.....			

.....

Date Signature of Bidder

Attach proof of citizenship (Certified Copy of National ID or Passport) (Compulsory)** Indicate by birth, registration or naturalization (Compulsory)***** Attach certified copy of Recent Form CR12 (Compulsory)*

Part 3- Interest in the Firm:

Is there any person / persons in the Kenya Urban Roads Authority (KURA) who has interest in this firm?

Yes****	
---------	--

No****	
--------	--

.....

Date

Signature of Bidder

**** Tick (✓) to agree as necessary (**Compulsory**)

SCHEDULE 2: 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 sign the document and 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:

To be filled by all Bidders.

*Both representative and alternate **must** attach copy of National Identification card or Passport.*

SCHEDULE 3: CERTIFICATE OF BIDDER’S VISIT TO SITE

This is to certify that

[*Name/s*].....

.....

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

.....

.....

participated in the organised inspection visit of the site of the works for the

PERIODIC MAINTENANCE OF LOT 6 ROAD :MANDERA COUNTY

held on.....day of.....20.....

Signed.....

(Employer’s Representative)

.....

.....
(Name of Employer’s Representative)

.....
(Designation)

NOTE: *This form is to be completed at the time of the organized site visit.*

SCHEDULE 4: KEY PERSONNEL

DESIGNATION	NAME	NATIONALITY	SUMMARY OF QUALIFICATIONS AND EXPERIENCE		
			Qualifications	General Experience (Yrs)	Specific Experience (Yrs)
Headquarters Partner/Director or other key staff (give designation)					
Site Office Site Agent					
Site Surveyor					
Foreman					

Note: The Bidder shall list in this schedule the key personnel he will employ from the Contractor's headquarters and from the Contractor's site office to direct and execute the work together with their qualifications, experience, position held and nationality in accordance with 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 certified copies of academic certificates, and CVs of all key staff.

I certify that the above information is correct.

.....
(Signature of Bidder)

.....
(Date)

SCHEDULE 5: SCHEDULE OF ROADWORKS CARRIED OUT BY THE BIDDER IN THE LAST THREE YEARS

SCHEDULE 5A: COMPLETED WORKS

DESCRIPTION OF WORKS	NAME OF CLIENT	VALUE OF WORKS (KSHS) *	YEAR COMPLETED/ REMARKS

Note: Bidders shall attach certified copies of letters of award (for each listed project), certified copies of completion certificates.

I certify that the above works were successfully carried out by this Bidder.

.....
(Signature of Bidder)

.....
(Date)

* Value in KShs using Central Bank of Kenya mean exchange rate at a reference date 7 days before date of BID opening

SCHEDULE 5B: NON-COMPLETED WORKS BEYOND COMPLETION DATE

DESCRIPTION OF WORKS	NAME OF CLIENT	VALUE OF WORKS (KSHS) *	YEAR COMPLETED/ REMARKS

Note: Bidders shall attach certified copies of letters of award (for each listed project), certified evidence for executed works for non-completed projects e.g copy of recent payment certificate.

I certify that the above works were successfully carried out by this Bidder.

.....
(Signature of Bidder)

.....
(Date)

* Value in KShs using Central Bank of Kenya mean exchange rate at a reference date 7 days before date of BID opening

SCHEDULE 6: SCHEDULE OF ONGOING PROJECTS

DESCRIPTION OF WORKS	NAME OF CLIENT	DATE OF COMMENCEMENT	DATE OF COMPLETION	VALUE OF WORKS (KSHS)	VALUE COMPLETED UP TO DATE %	PHYSICALLY COMPLETED UP TO DATE %

Note: 1. Bidders shall attach certified copies of letters of award (for each listed project) and any certified evidence for executed works e.g copy of recent payment certificate.

2. Bidders must indicate all their on-going works as at the time of bidding. Any non-disclosure shall constitute non-responsiveness)

I certify that the above works are being carried out by me and that the above information is correct.

.....
(Signature of Bidder)

.....
(Date)

SCHEDULE 7: FINANCIAL STANDING

- 1 Submit copies of audited profit and loss statements, balance sheet and Cash flow statements for the last two calendar years and estimated projection for the next two years with certified English translation where appropriate. These must be signed by Certified Public Accountant recognised by ICPAK and atleast one Director.
- 2 Give turnover figures for each of the last two (2) financial years. Quote in millions and decimal thereof.

	Year 1(.....)	Year 2(.....)
	Ksh. '000,000	Ksh. '000,000
Roadworks		
Other civil Engineering works		
Other (specify)		
Total		

SUMMARY OF ASSETS AND LIABILITIES OF THE AUDITED FINANCIAL STATEMENTS OF THE LAST TWO (2) FINANCIAL YEARS.

	Year 1(.....)	Year 2(.....)
	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+3-5)		

- (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 months.

Attach a certified copy of Undertaking of the Bank to providing the credit.

SCHEDULE 8: OTHER SUPPLEMENTARY INFORMATION

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

.....

.....

.....

.....

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. Must submit Bank statements for the last six months, signed and stamped by the issuing bank.

.....

.....

.....

.....

Name, address, telephone, telex, fax numbers of the Bidders Bankers who may provide reference if contacted by the Contracting Authority.

.....

.....

.....

I certify that the above information is correct.

.....
Date

.....
Signature of Bidder

SCHEDULE 9: LITIGATION HISTORY

Information on litigation history in which the Bidder was involved.

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

I certify that the above information is correct.

.....
Date

.....
Signature of Bidder

SCHEDULE 10: WORK METHODOLOGY

Give a brief description of how you intend to carry out the work including traffic management and quality assurance of works, in not less than three (3) pages and not more than five (5) pages (typed, font 12 and single spaced).

SCHEDULE 11: DECLARATION FORM (DEBARMENT)**DECLARATION FORM**

Date _____

To

The Director General,
Kenya Urban Roads Authority (KURA),
P.O. Box 41727 - 00100

NAIROBI

We (name and address) _____

_____ declare the following:

That we;

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

Name of Bidder

Signature

Date

(To be signed by authorized representative and officially stamped)

SCHEDULE 12: ANTICORRUPTION DECLARATION /COMMITMENT / PLEDGE FORM

I/We.....of

PostOffice Box.....

DeclarethatI/We recognizethat Public Procurementisbasedonafree,fair
andcompetitivetenderingprocesswhich shouldnotbeopentoabuse.

I/We.....

DeclarethatI/We will notoffer orfacilitate, directlyor indirectly,
anyinducementor rewardtoanypublic officer,their relationsor business
associates,in connection with tender No.

.....foror in the subsequent
performance ofthe contractifI/Weam/aresuccessful.

Signedby.....C.E.O. or

AuthorizedRepresentative.

Name.....

Designation.....

.

Signature.....

....

Date.....

.

In caseof sub-contracting

Signedby.....CEOofthefirmtobesubcontracted

Name.....

.....

Designation.....

Signature.....

Date.....

SECTION VIII: FORM OF AGREEMENT

SECTION 10: FORM OF AGREEMENT

THIS AGREEMENT is made on the day of 20 between the Kenya Urban Roads Authority (KURA) of P. O. Box 41727 - 00100, Nairobi, Kenya hereinafter called "the Employer" of the one part and hereinafter called "the Contractor" of the other part.

WHEREAS the Employer is desirous that certain works should be executed, viz.

PERIODIC MAINTENANCE OF LOT 6 ROAD :MANDERA COUNTY

and has accepted a Bid by the Contractor for the execution completion and maintenance of such works NOW THIS AGREEMENT WITNESSETH as follows:

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.

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

- The said BID dated
- The Conditions of Contract
- The Standard and Special Specification
- The Priced Bill of Quantities
- The Letter of Acceptance
- Schedules of Supplementary Information
- The Drawings
- Other documents as may be agreed and listed

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

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.

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 SEALED/STAMPED 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)

SECTION IX: FORM OF PERFORMANCE BANK GUARANTEE (UNCONDITIONAL)

SECTION IX: FORM OF PERFORMANCE BANK GUARANTEE (UNCONDITIONAL)

To

The Director General,
Kenya Urban Roads Authority (KURA)
P.O. Box 41727 - 00100

NAIROBI

WHEREAS (hereinafter
called “the Contractor”)
has undertaken in pursuance of Contract No.Dated
.....to execute the

PERIODIC MAINTENANCE OF LOT 6 ROAD :MANDERA COUNTY

, (hereinafter called the “Contract”)

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified in the Appendix to Form of Bid 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 in figures)

Kshs.

.....

.....
(amount in words)

and we undertake to payment to you, upon your first written demand and without cavil or argument, any sum or sums within and up to the limits as aforesaid without your needing to prove or show grounds or reasons for the sum specified therein.

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

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 thereunder 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 such change, addition or modification

This Guarantee shall be valid until 28 days after issuing of the Defects Liability Certificate.

AUTHORIZED SIGNATURE OF THE BANK

.....

Name of Signatory.....

Name of bank.....

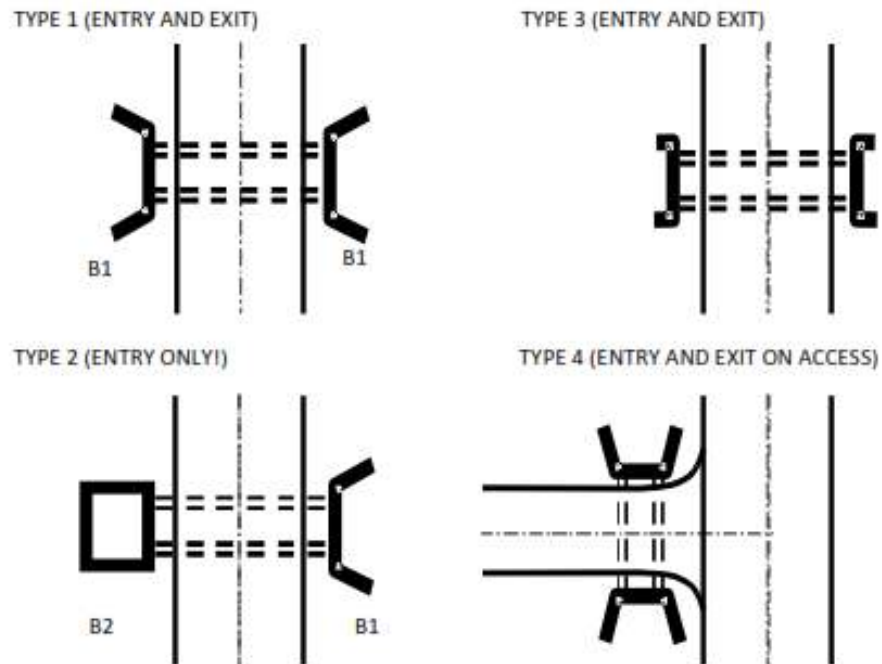
Address..... Date

SECTION X: SUPERVISION AND CONTRACT EVALUATION MANUAL 2012

The Manual refers to the Ministry of Roads ‘Supervision and Contract evaluation Manual for road Maintenance Works 2012

SECTION XI: DRAWINGS
(SEE VOLUME II)

FIGURE C.1 - CULVERT ENTRY / EXIT STRUCTURE TYPES

**NOTE:**

Coding system has been used in describing the standardised designs of the various culvert entry and exit structures. The code names consist of a number

to specify shape and function as elaborated in above while the used construction materials are identified through an alphabetic symbol as follows:

- A = Concrete block
- B = Stone masonry
- C = Dressed stones

An example code of “B2” would therefore stand for a drop inlet type structure to be built in stone masonry.

FIGURE C.2 -
HEADWALL TYPE 1
(HEAD AND
WINGWALLS)

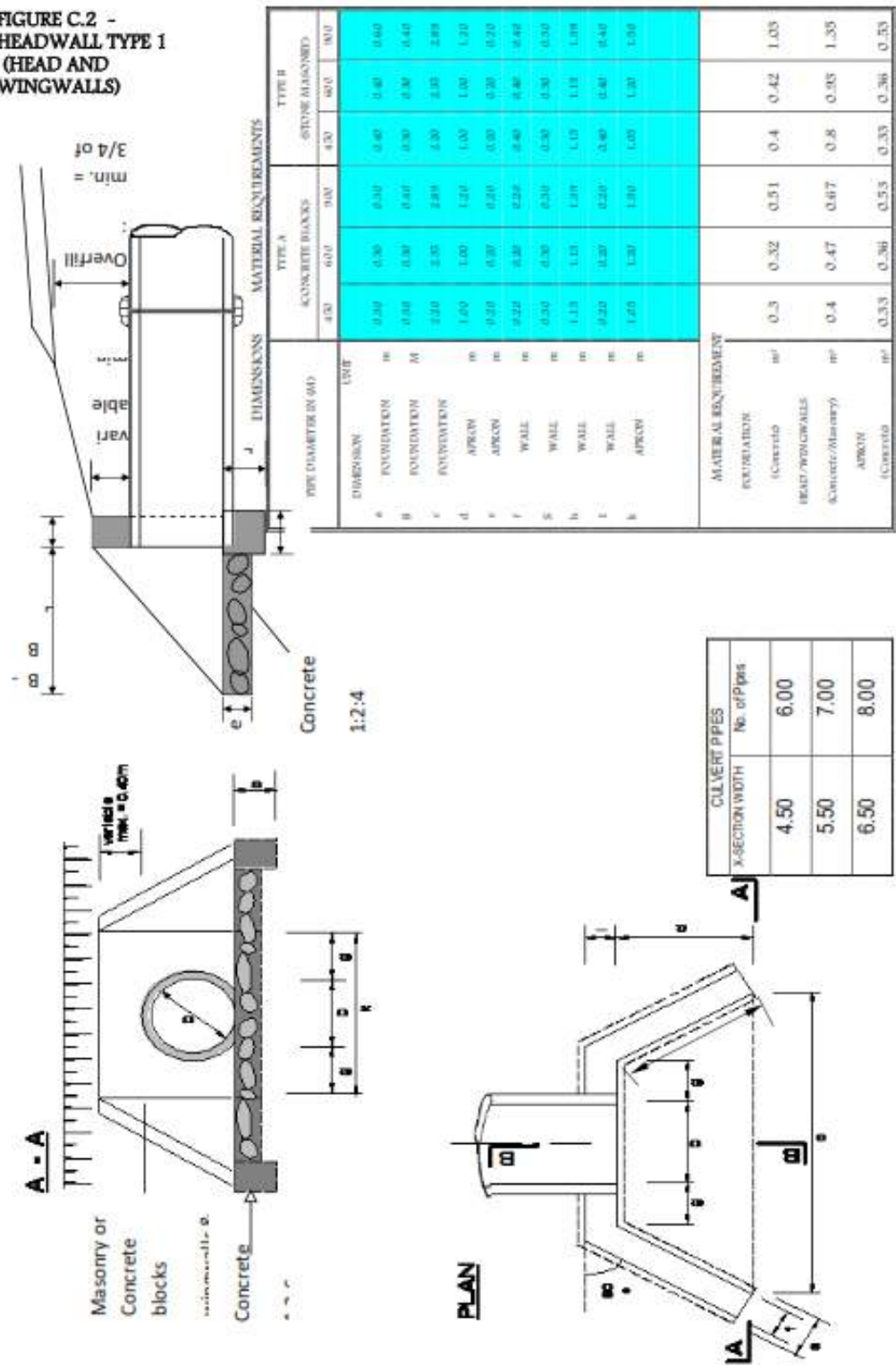


FIGURE C.3 - HEADWALL TYPE 2 (DROP INLET)

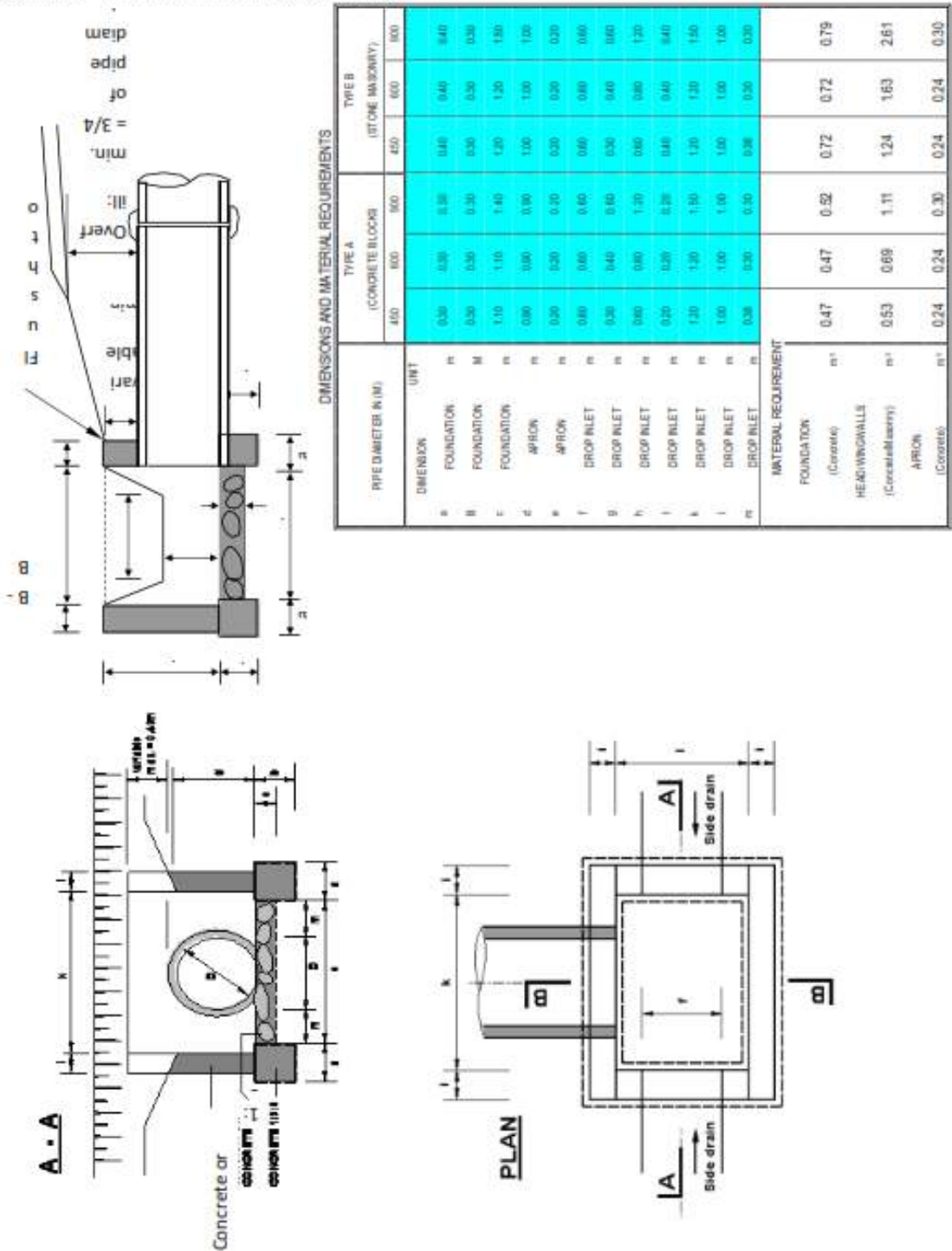


FIGURE C.4 - HEADWALL TYPE 3A (CONCRETE BLOCK HEADWALLS)

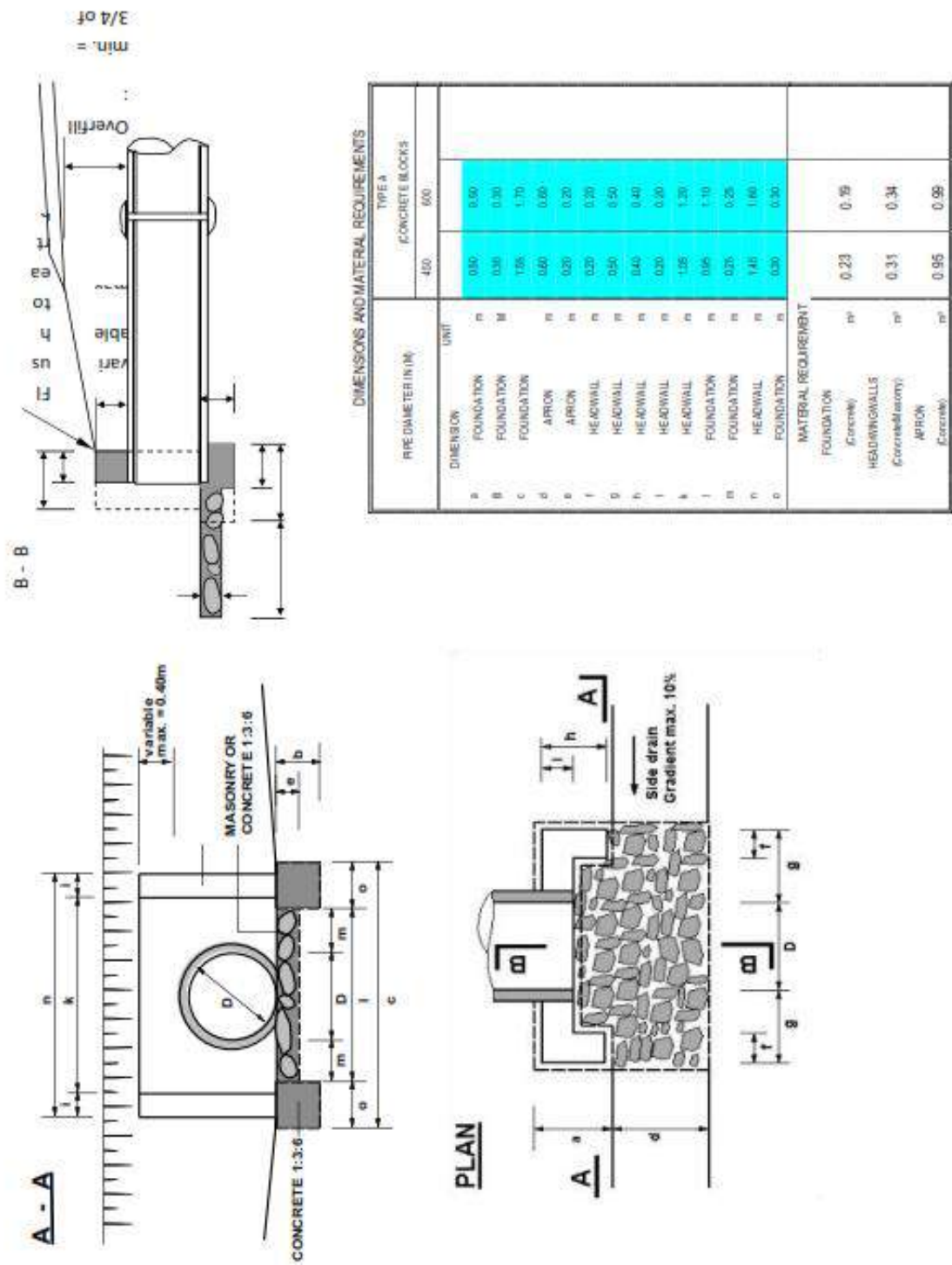


FIGURE C.5 - HEADWALL TYPE 3B (STONE MASONRY HEADWALLS)

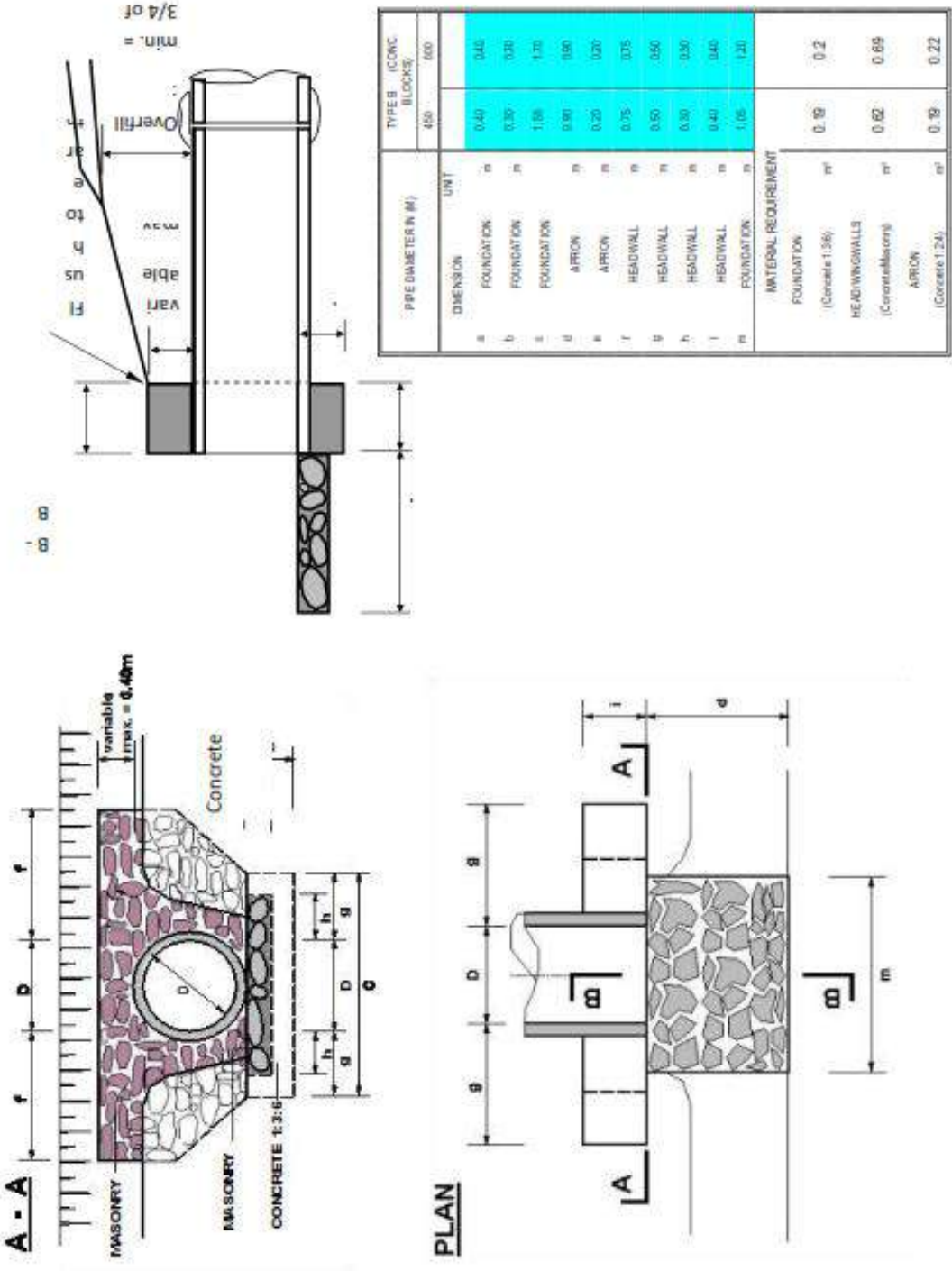


FIGURE C.6 - HEADWALL TYPE 4 (FOR ACCESS CULVERTS)

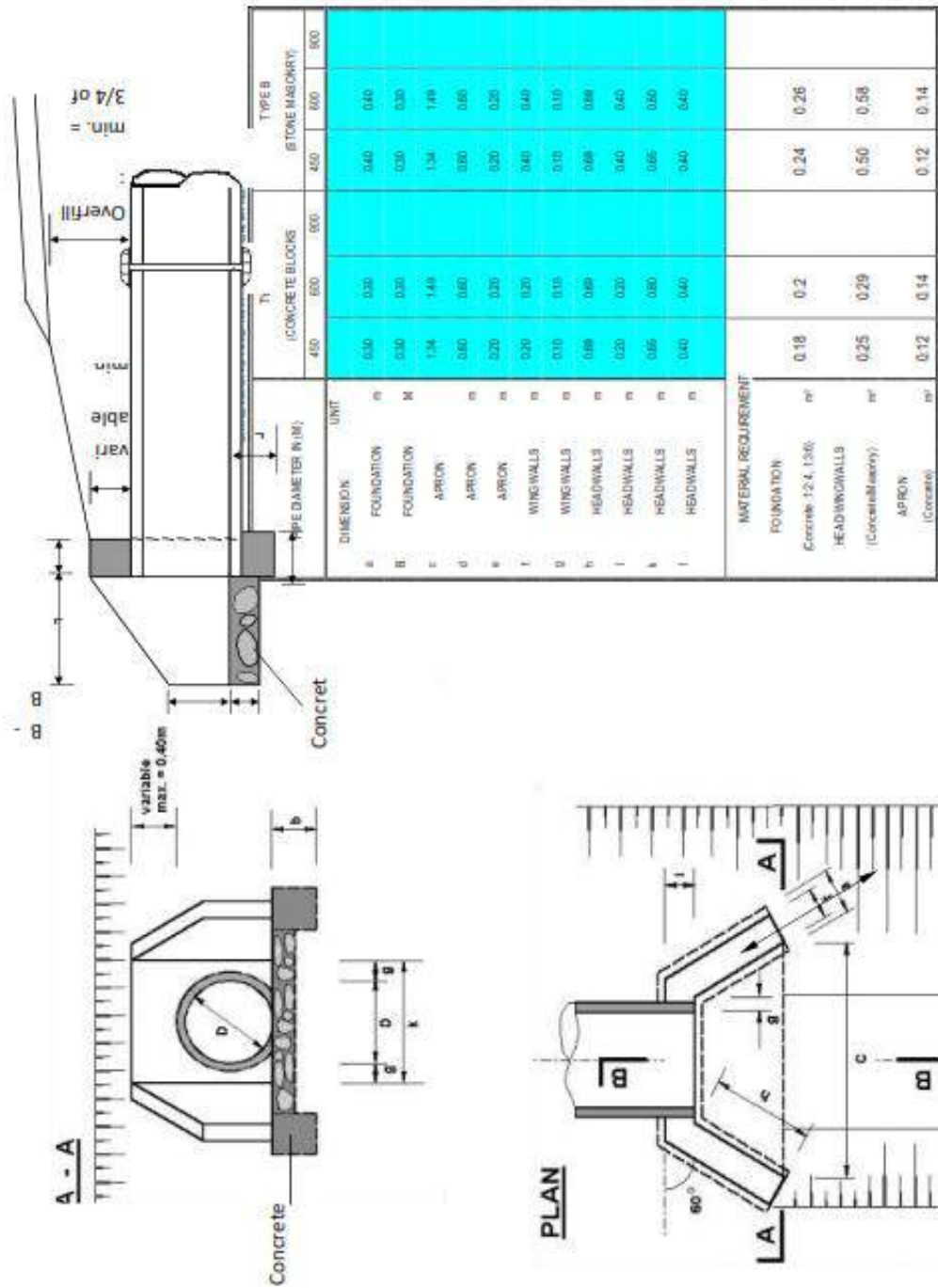
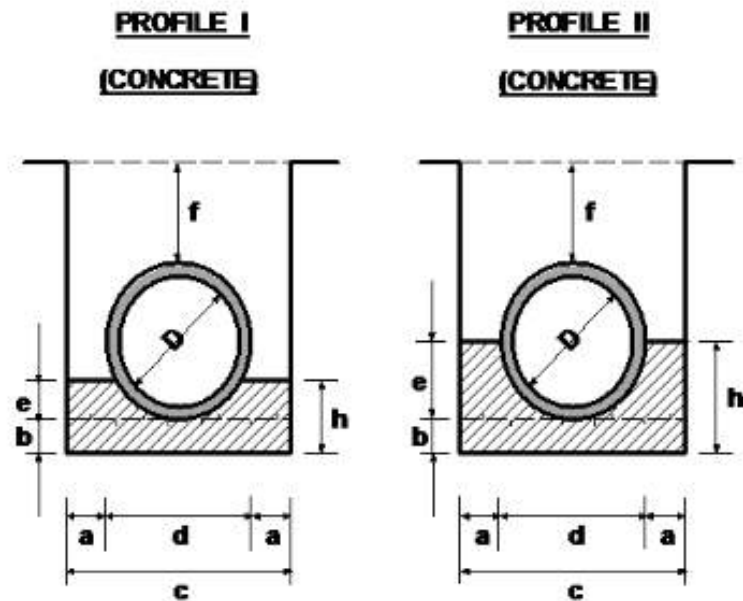


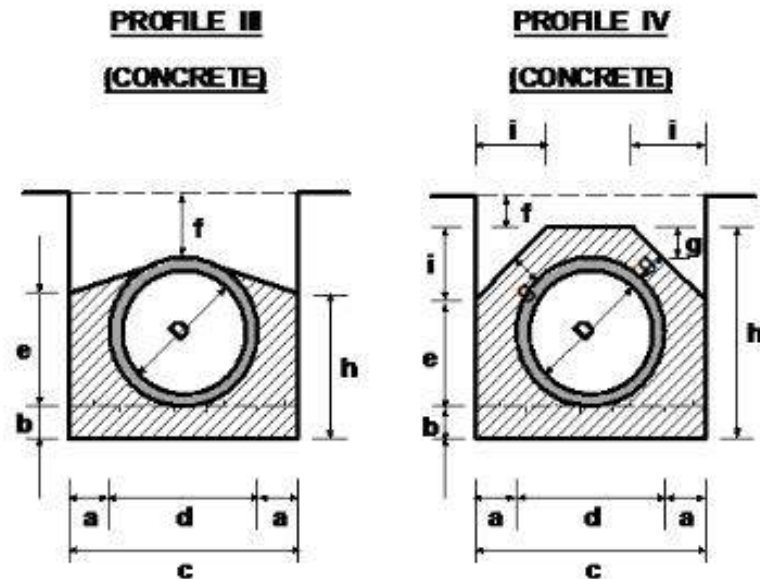
FIGURE C.7- BEDDING AND HAUNCH PROFILES TYPES I & II



Diameter (D)	450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)			
a	0.15	0.2	0.2
b	0.1	0.15	0.15
c	0.86	1.12	1.48
d	0.56	0.72	1.08
e	0.14	0.18	0.27
f (min.)	0.34	0.45	0.68
g	-	-	-
h	0.24	0.33	0.42
i	-	-	-
Concrete	Volume in (m ³ /m)		
	0.16	0.3	0.48
Application	- Fair subgrade condition; - Overfill > ¼ Diameter; - Seasonal waterflow only.		
Remarks	- Use gravel material for back/ overfill.		

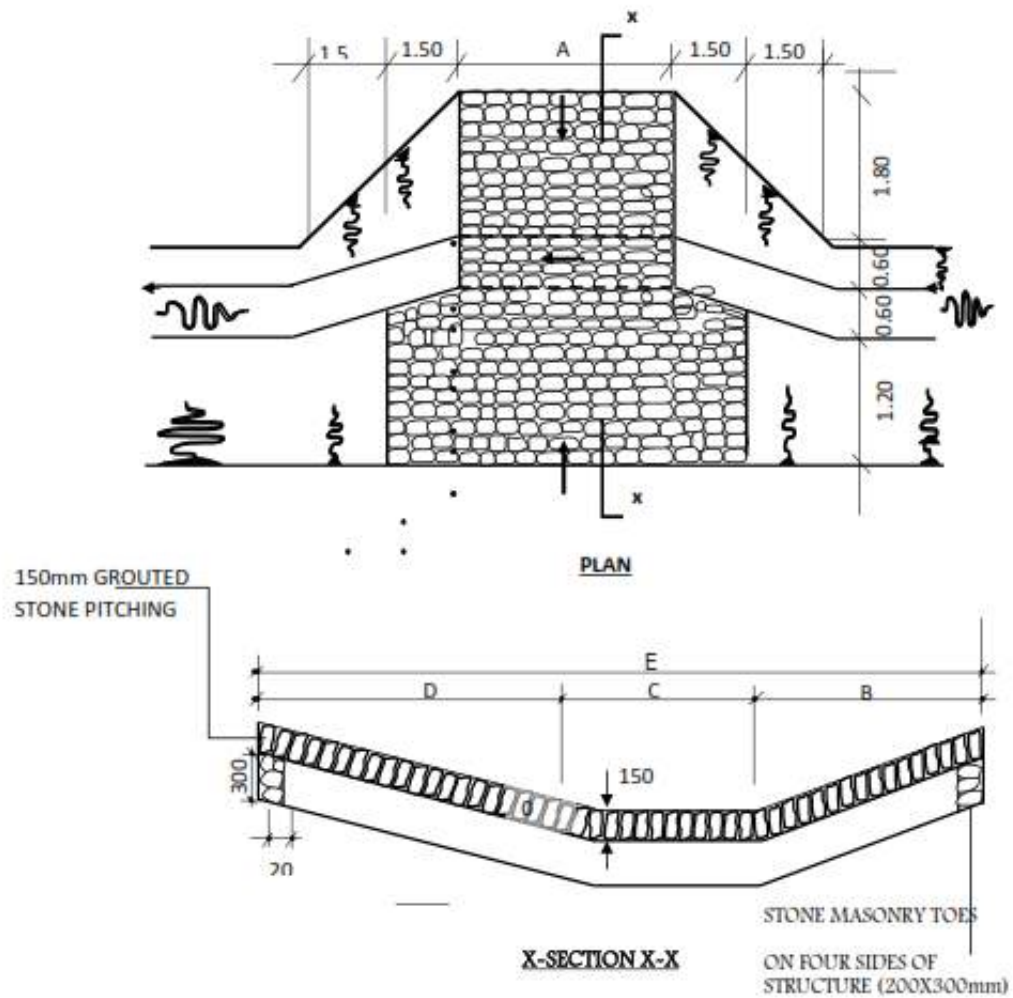
450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)		
0.15	0.2	0.2
0.1	0.15	0.15
0.86	1.12	1.48
0.56	0.72	1.08
0.28	0.36	0.54
0.34	0.45	0.68
-	-	-
0.38	0.51	0.69
-	-	-
Volume in (m ³ /m)		
0.2	0.37	0.56
- Fair to poor subgrade Condition; - Overfill > ¼ Diameter; - Seasonal waterflow only.		
- Use gravel material for back/ overfill.		

FIGURE C.8 - BEDDING AND HAUNCH PROFILES TYPES III & IV



Diameter (D)	450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)			
a	0.15	0.2	0.2
b	0.1	0.15	0.15
c	0.86	1.12	1.48
d	0.56	0.72	1.08
e	0.42	0.54	0.81
f (min.)	0.23	0.3	0.45
g	-	-	-
h	0.52	0.69	0.96
i	-	-	-
Concrete	Volume in (m ³ /m)		
	0.26	0.47	0.71
Application	- Fair subgrade condition; - Overfill > ¼ Diameter; - Seasonal waterflow only.		
Remarks	- Use gravel material for back/ overfill.		

	450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)			
	0.15	0.2	0.2
	0.1	0.15	0.15
	0.86	1.12	1.48
	0.56	0.72	1.08
	0.46	0.52	0.78
	0.15	0.15	0.15
	0.15	0.15	0.15
	0.81	1.02	1.38
	0.28	0.35	0.45
	Volume in (m ³ /m)		
	0.37	0.61	0.92
	- Fair to poor subgrade Condition; - Overfill > ¼ Diameter; - Seasonal waterflow only.		
	- Use gravel material for back/ overfill.		



QUANTITIES TABLE							
Cross section	DIMENSIONS					Excavation (m ³)	Stone masonry (m ³)
	A	B	C	D	E		150mm Grouted stone pitching (m ³)
A	4000	1800	600	1800	4200	7.50	1.30
	6000	1800	600	1800	4200	10.00	30.15
B	4000	1400	400	1800	3600	7.00	1.20
	6000	1400	400	1800	3600	9.00	25.50

