



CLIMATE PROOFED ARID AND SEMI ARID RURAL ROADS,

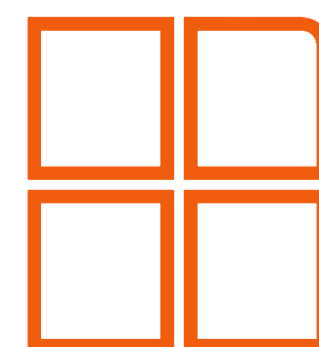
PRELIMINARY AND DETAILED DESIGN OF KACHYULU - GOTU ROAD

JANUARY 2023

EMPLOYER

**DIRECTOR GENERAL
KERRA
P.O BOX 48151-00100,
NAIROBI, Kenya**

CONSULTANT



Runji Consulting Group Ltd

3, Kindaruma Road, (Off Ngong Road)
P.O.Box 68053 - 00200 Nairobi, Kenya
Tel: (020) 271 72 13/4/271 30 66
Cell: +254 722 751 889/ +254 735 677627
Email: info@runji.co.ke Web: www.runji.co.ke

ENGINEER

**DIRECTOR
PLANNING, DESIGN & ENVIRONMENT
P.O BOX 48151-00100,
NAIROBI, Kenya**

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GENERAL DRAWINGS



REVISIONS	No.	DATE	DESCRIPTION



Kenya Rural Roads Authority
Bara Bara Plaza,
P.O. Box 48151- 00100, Nairobi. Kenya

DIRECTOR GENERAL	
DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)	

Consultant:

Runji Consulting Group Ltd
Engineering & Project Management.
3, Kindaruma Road (Off Ngong Road)
P. O. Box 68053-00200 Nairobi
Tel. (020) 2717213/4

PROJECT TITLE:

**PRELIMINARY AND DETAILED
ENGINEERING DESIGN
OF
KACHYULU GOTU ROAD BATCH 1**

DRAWING TITLE:

SKETCH MAP

DRAWN BY: S.W.D
DESIGNED BY: C.M.N
CHECKED BY: M.J.N

Scale: NTS

Drg No. CE1045/GD/KG/D2

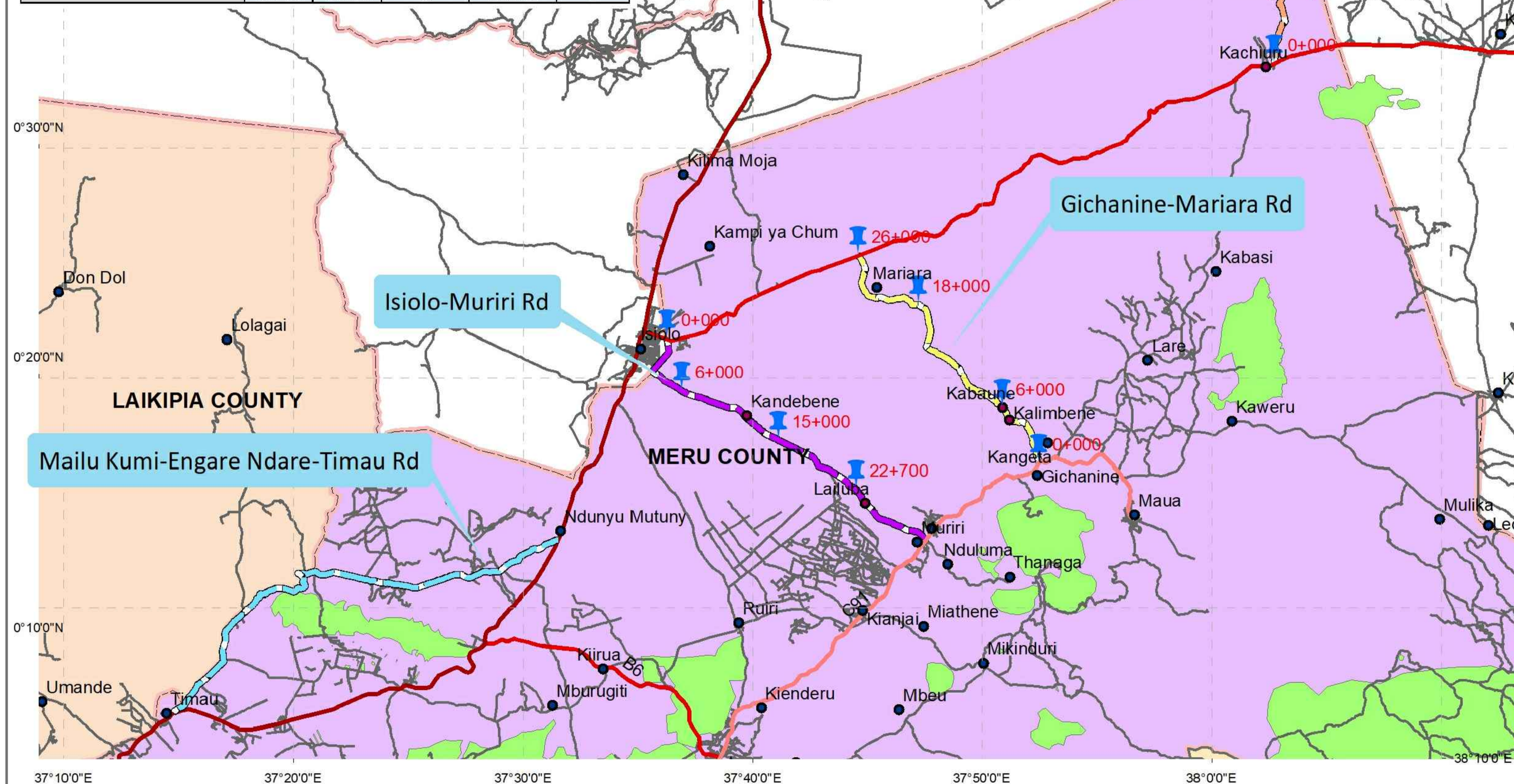
Date : JUNE 2023

0°50'0"N

CLIMATE PROOFED PROJECT ROADS IN MERU COUNTY

0°50'0"N

CLIMATE PROOF PROJECT ROADS IN MERU COUNTY					
Road Description	Chainage		Length (km)	Road Finish	Batch No.
	BOP	EOP			
C346 Kachiuru-Gotu	0+000	6+000	6	GRAVEL	1
	6+000	18+000	12	GRAVEL	2
	18+000	21+300	3.3	GRAVEL	3
Gichanine-Mariara	0+000	6+000	6	GRAVEL	1
	6+000	18+000	12	GRAVEL	2
	18+000	26+000	8	GRAVEL	3
Isiolo-Muriri	0+000	6+000	6	LVS	1
	6+000	15+000	9	LVS	2
	15+000	22+700	7.7	LVS	3
Mailu Kumi-Engare Ndare-Timau	0+000	6+000	6	LVS	2
	6+000	10+800	4.8	LVS	3
	10+800	23+800	13	GRAVEL	2



KENYA COUNTIES MAP

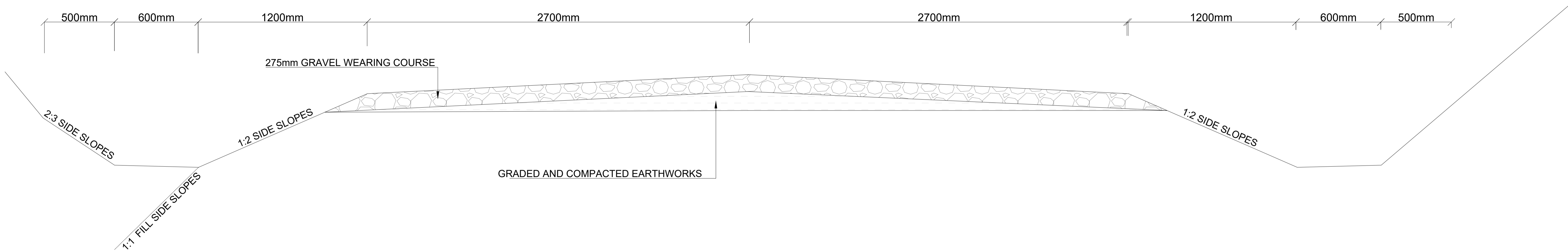
Legend

- Meru_County_Extent

Legend

- Trading_Centre
- Towns
- Project_Batch_Terminal
- Key_Towns
- Trunk_Rds
- Class_B_Rds
- Class_C_Rds
- Roads
- Isiolo_Muririri_Rd
- Gichanine_Mariara_Rd
- Kachiuru_Gotu_Rd
- Mailu_kumi_Timau_Rd
- Forests
- Meru_County
- Counties

TYPICAL CROSS-SECTION





Slope benching details

Pavement Thickness: 275mm

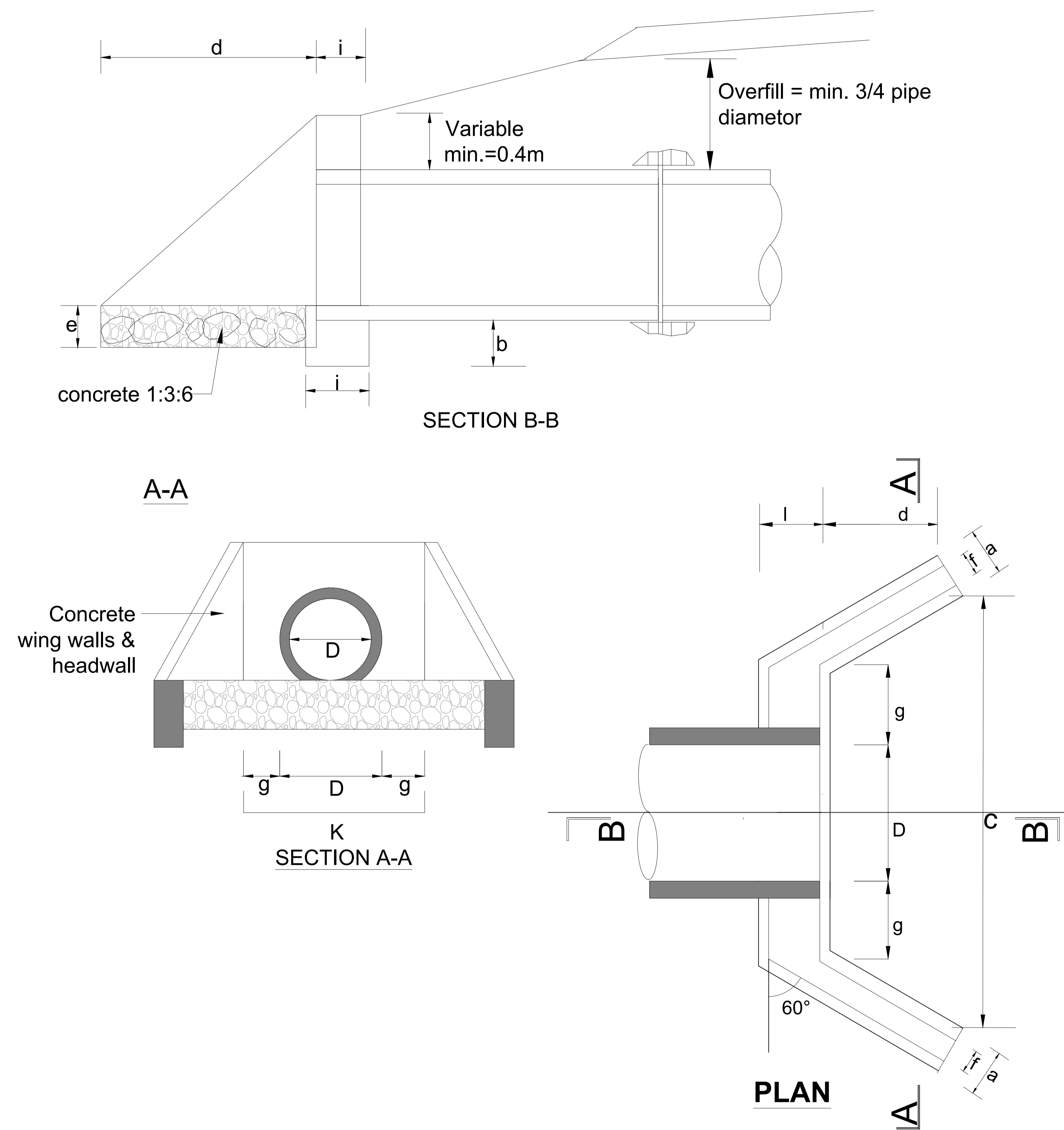
GENERAL NOTES:

- 1. Final fill slopes 1:1
- 2. Cutting backslopes may be steepened as instructed at culvert locations to minimise pipe extensions.
- 3. Cutting Backslopes 2:3
- 4. Width of side ditches 600Mm or wider as instruted by the Engineer.

REVISIONS	No.	DATE	DESCRIPTION	 <div>Kenya Rural Roads Authority Bara Bara Plaza, P.O. Box 48151- 00100, Nairobi. Kenya</div>	DIRECTOR GENERAL		<div>Consultant:</div> <div>Runji Consulting Group Ltd Engineering & Project Management. 3, Kindaruma Road (Off Ngong Road) P. O. Box 68053-00200 Nairobi Tel. (020) 2717213/4</div>	PROJECT TITLE: PRELIMINARY AND DETAILED ENGINEERING DESIGN OF KACHYULU-GOTU ROAD	DRAWING TITLE: TYPICAL CROSS-SECTION	DRAWN BY: S.W.O DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/CDS/BS/O5

TYPICAL CULVERT DRAWINGS

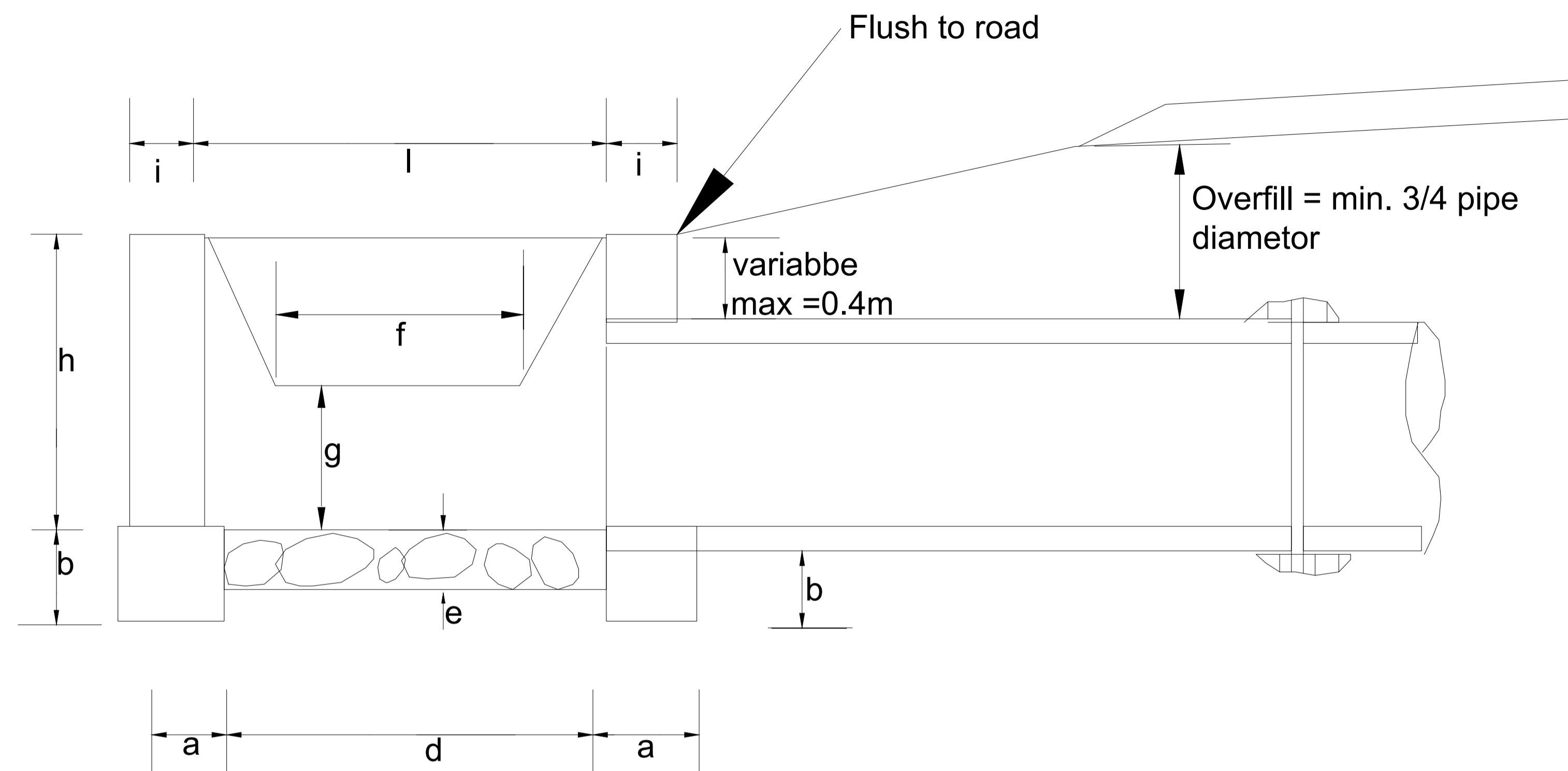
FIGURE H.8 - HEADWALL TYPE 1 (HEAD AND WINGWALLS)



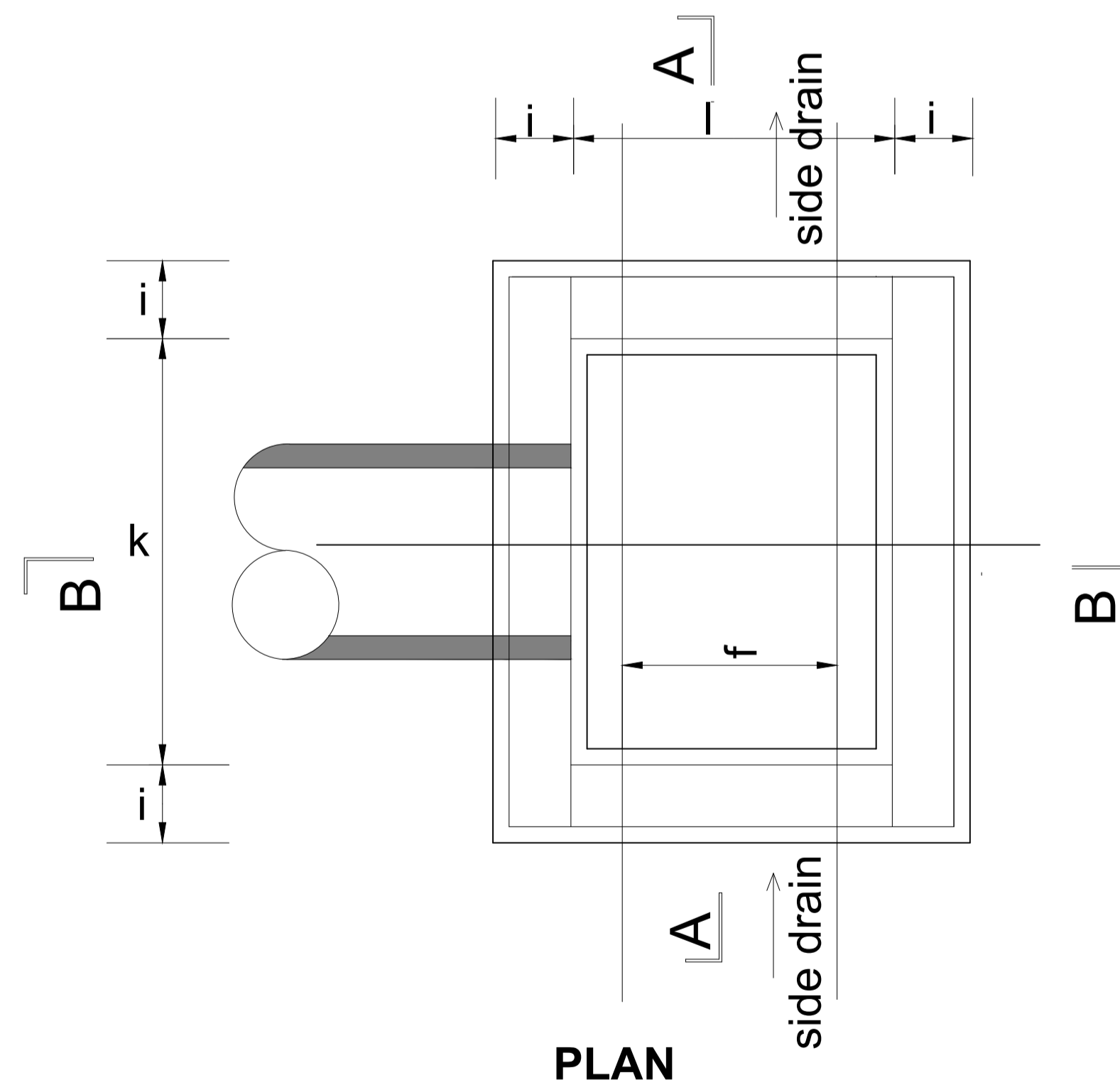
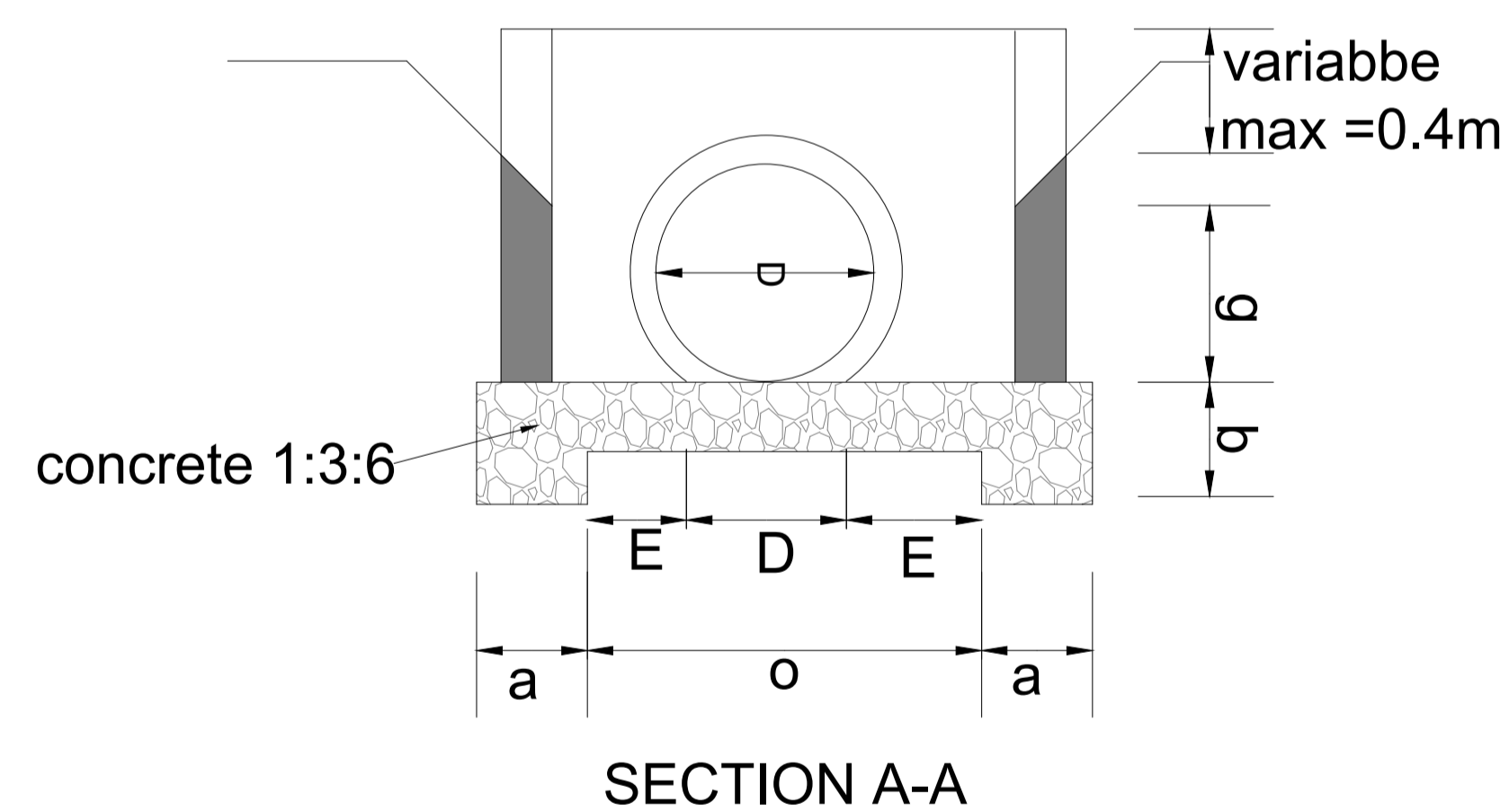
DIMENSIONS AND MATERIAL REQUIREMENTS

PIPE DIAMETER IN (M)			TYPE A			TYPE B		
			(CONCRETE BLOCKS)			(STONE MASONRY)		
			450	600	900	450	600	900
DIMENSION		UNIT						
a	FOUNDATION	m	0.30	0.30	0.30	0.40	0.40	0.60
b	FOUNDATION	m	0.30	0.30	0.40	0.30	0.30	0.40
c	FOUNDATION		2.20	2.35	2.89	2.20	2.35	2.89
d	APRON	m	1.00	1.00	1.20	1.00	1.00	1.20
e	APRON	m	0.20	0.20	0.20	0.20	0.20	0.20
f	WALL	m	0.20	0.20	0.20	0.40	0.40	0.40
g	WALL	m	0.30	0.30	0.30	0.30	0.30	0.30
h	WALL	m	1.15	1.15	1.39	1.15	1.15	1.39
i	WALL	m	0.20	0.20	0.20	0.40	0.40	0.40
k	APRON	m	1.05	1.20	1.50	1.05	1.20	1.50
MATERIAL REQUIREMENT								
FOUNDATION								
	(Concrete)	m3	0.3	0.32	0.51	0.4	0.42	1.03
HEAD/WINGWALLS								
	(Concrete/)	m3	0.4	0.47	0.67	0.8	0.93	1.35
APRON								
	(Concrete)	m3	0.33	0.36	0.53	0.33	0.36	0.53

FIGURE H.9 - HEADWALL TYPE 2 (DROP INLETS)



SECTION B-B



DIMENSIONS AND MATERIAL REQUIREMENTS

PIPE DIAMETER IN (M)			TYPE A			TYPE B		
			(CONCRETE BLOCKS			(STONE MASONRY)		
			450	600	900	450	600	900
DIMENSION		UNIT						
a	FOUNDATION	m	0.30	0.30	0.30	0.40	0.40	0.40
b	FOUNDATION	m	0.30	0.30	0.30	0.30	0.30	0.30
c	FOUNDATION	m	1.10	1.10	1.40	1.20	1.20	1.50
d	APRON	m	0.90	0.90	0.90	1.00	1.00	1.00
e	APRON	m	0.20	0.20	0.20	0.20	0.20	0.20
f	DROP INLET	m	0.60	0.60	0.60	0.60	0.60	0.60
g	DROP INLET	m	0.30	0.40	0.60	0.30	0.40	0.60
h	DROP INLET	m	0.60	0.80	1.20	0.60	0.80	1.20
l	DROP INLET	m	0.20	0.20	0.20	0.40	0.40	0.40
k	DROP INLET	m	1.20	1.20	1.50	1.20	1.20	1.50
l	DROP INLET	m	1.00	1.00	1.00	1.00	1.00	1.00
m	DROP INLET	m	0.38	0.30	0.30	0.38	0.30	0.30
MATERIAL REQUIREMENT								
FOUNDATION								
	(Concrete)	m3	0.47	0.47	0.52	0.72	0.72	0.79
HEAD/WINGWALLS								
	(Concrete/Masonry)	m3	0.53	0.69	1.11	1.24	1.63	2.61
APRON								
	(Concrete)	m3	0.24	0.24	0.30	0.24	0.24	0.30



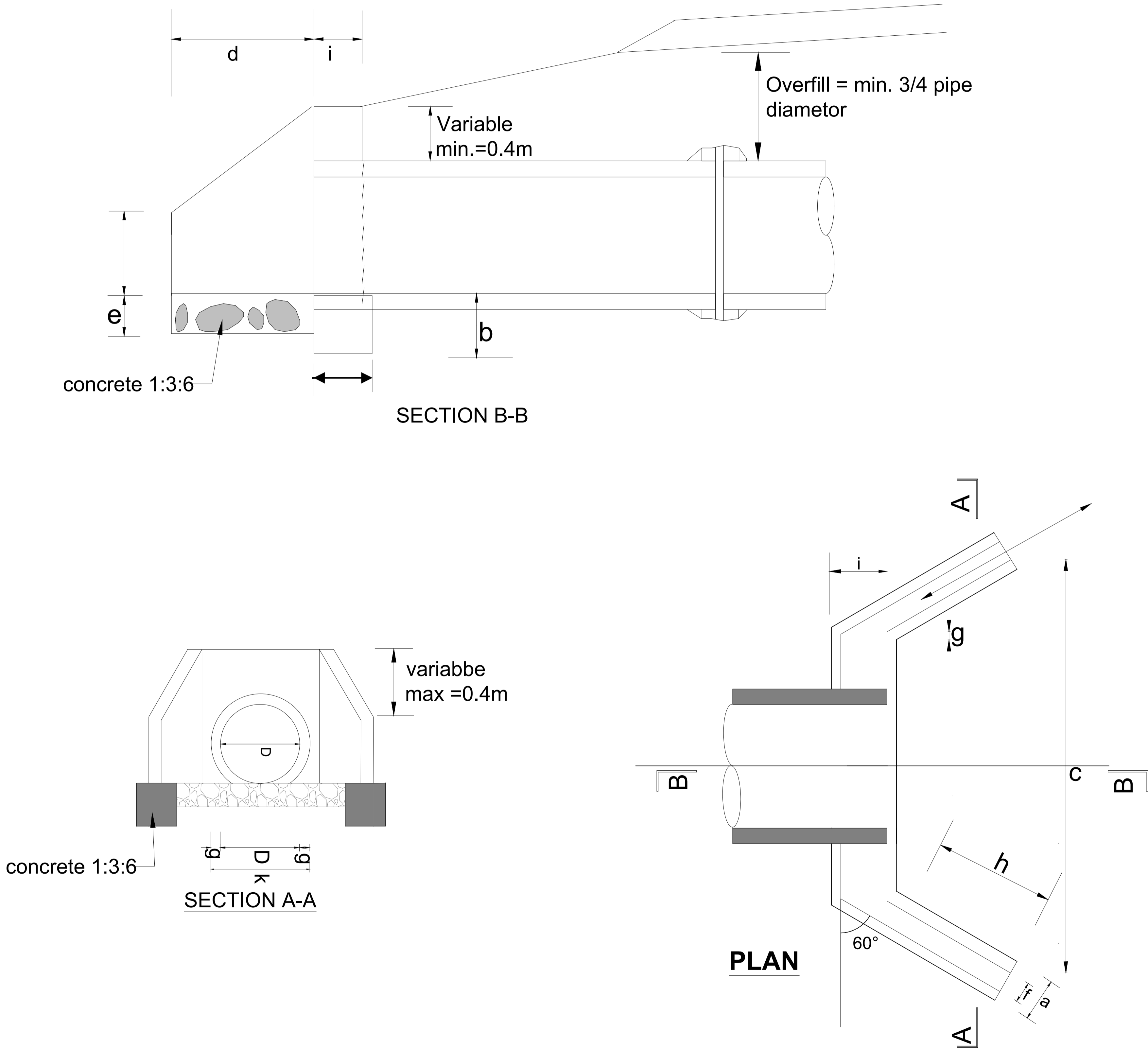
REVISIONS	No.	DATE	DESCRIPTION	 <p>Kenya Rural Roads Authority Bara Bara Plaza, P.O. Box 48151- 00100, Nairobi. Kenya</p>	DIRECTOR GENERAL	<p>Consultant:</p>  <p>Runji Consulting Group Ltd Engineering & Project Management. 3, Kindaruma Road (Off Ngong Road) P. O. Box 68053-00200 Nairobi Tel. (020) 2717213/4</p>	<p>PROJECT TITLE:</p> <p>PRELIMINARY AND DETAILED ENGINEERING DESIGN OF KACHYULU- GOTU ROAD</p>	<p>DRAWING TITLE:</p> <p>HEADWALL TYPE 2 (DROP INLETS)</p>	<p>DRAWN BY: S.W.O DESIGNED BY: C.N.M CHECKED BY: M.J.N</p> <p>Scale: NTS</p>	<p>Drg No. CE1045/CDS/KG/O2</p> <p>Date: JANUARY 2024</p>
					DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)					

FIGURE H.12 - HEADWALL TYPE 4 (FOR ACCESS CULVERT)

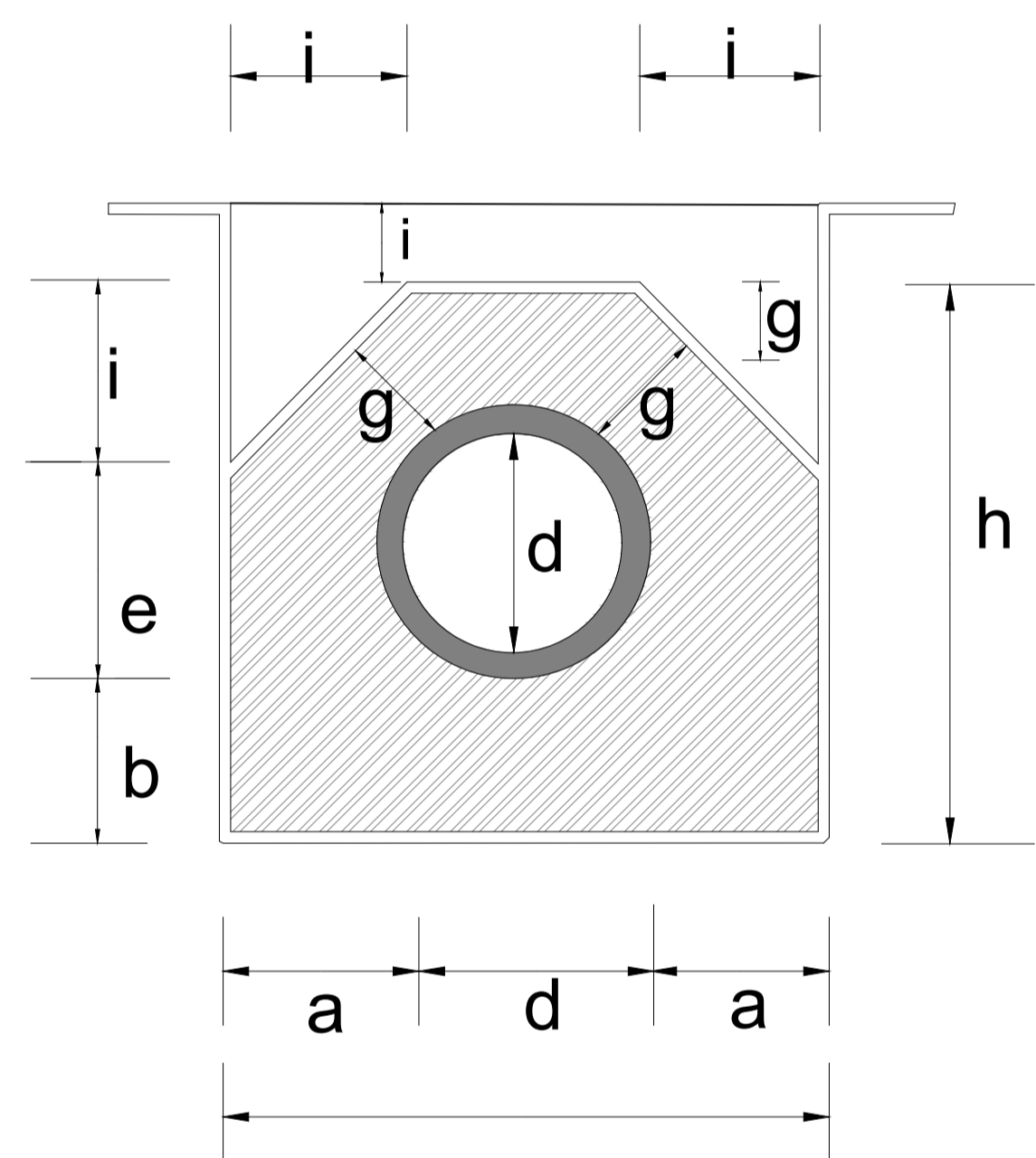


DIMENSIONS AND MATERIAL REQUIREMENTS							
PIPE DIAMETER IN (M)		TYPE A (CONCRETE BLOCKS)			TYPE B (STONE MASONRY)		
		450	600	900	450	600	900
DIMENSION		UNIT					
a	FOUNDATION	m	0.30	0.30		0.40	0.40
b	FOUNDATION	m	0.30	0.30		0.30	0.30
c	APRON		1.34	1.49		1.34	1.49
d	APRON	m	0.60	0.60		0.60	0.60
e	APRON	m		0.20		0.20	0.20
f	WINGWALLS	m	0.20	0.20		0.40	0.40
g	WINGWALLS	m	0.10	0.10		0.10	0.10
h	HEADWALLS	m	0.69	0.69		0.69	0.69
i	HEADWALLS	m	0.20	0.20		0.40	0.40
k	HEADWALLS	m	0.65	0.80		0.65	0.80
l	HEADWALLS	m	0.40	0.40		0.40	0.40
MATERIAL REQUIREMENT							
FOUNDATION							
(Concrete 1:2:4, 1:3:6)		m3	0.18	0.2		0.24	0.26
HEAD/WINGWALLS							
(Concrete/Masonry)		m3	0.25	0.29		0.50	0.58
APRON		m3	0.12	0.14		0.12	0.14

FIGURE H.14-BEDDING AND HAUNCH PROFILES TYPE III& IV


PROFILE IV

(CONCRETE)



	450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)			
	0.15	0.2	0.2
	0.15	0.15	0.15
	0.86	0.15	1.48
	0.56	0.72	1.08
	0.46	0.15	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 (m3/m)			
	0.37	0.61	0.92
<div>-fair to poor subgrade condition</div> <div>-overfill >$\frac{3}{4}$ Dia;</div> <div>-Seasonal waterflow only.</div> <div>-Use gravel material for.</div> <div>-backfill/overfill.</div>			

REVISIONS	No.	DATE	DESCRIPTION



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P.O. Box 48151- 00100, Nairobi. Kenya

DIRECTOR GENERAL	
DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)	

Consultant:

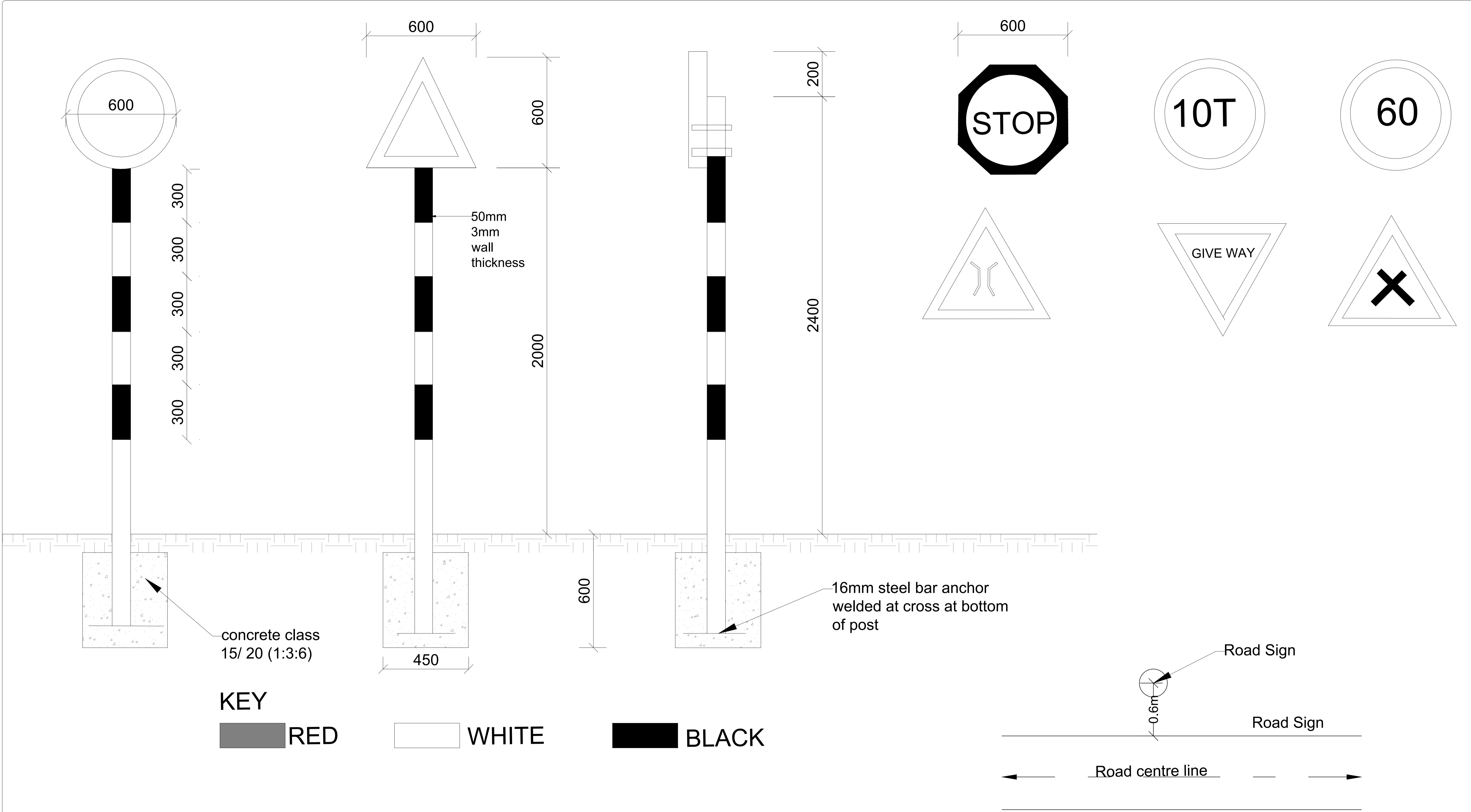


Runji Consulting Group Ltd
Engineering & Project Management.
3, Kindaruma Road (Off Ngong Road)
P. O. Box 68053-00200 Nairobi
Tel. (020) 2717213/4

PROJECT TITLE:	PRELIMINARY AND DETAILED ENGINEERING DESIGN OF KACHYULU- GOTU ROAD
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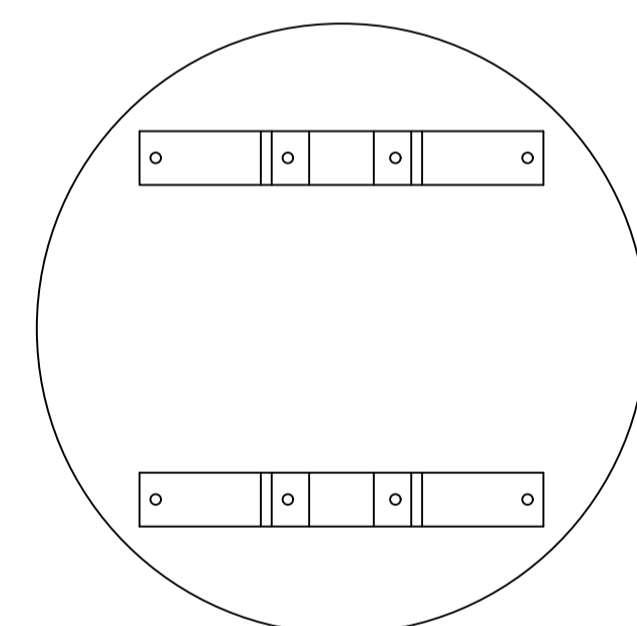
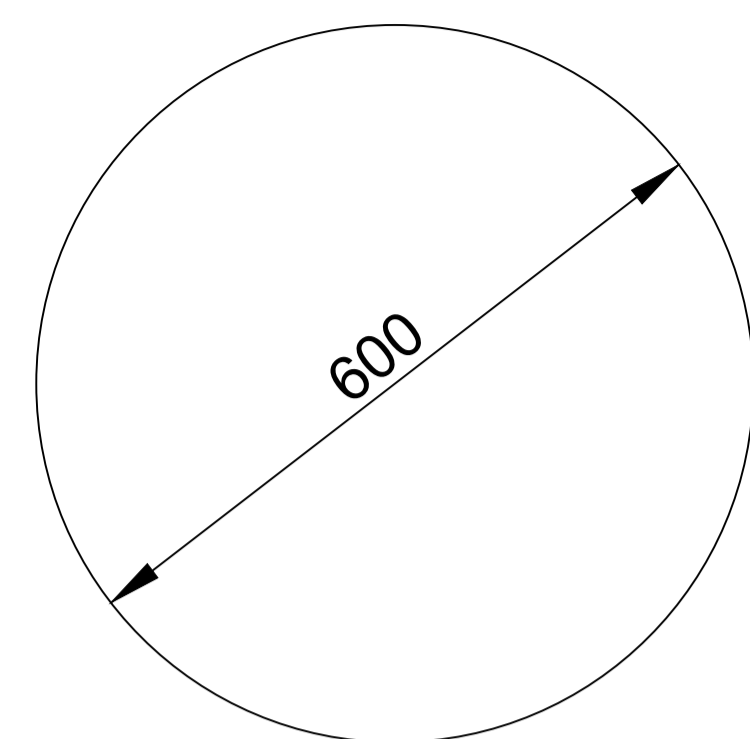
DRAWING TITLE:	BEDDING AND HAUNCH PROFILES TYPE III& IV
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DRAWN BY: S.W.O DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/CDS/KG/O4
Scale: NTS	Date : JANUARY 2024



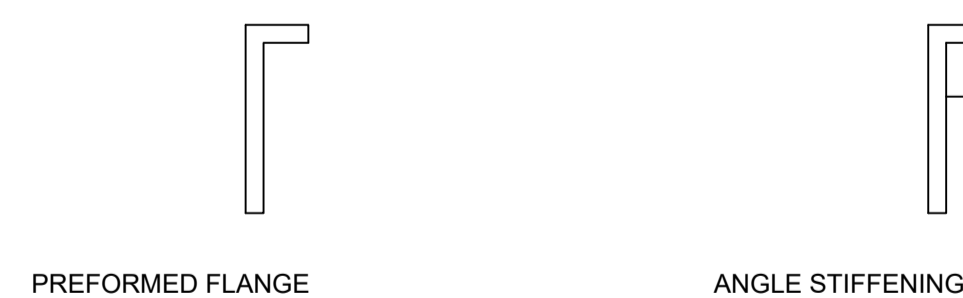
- 1.The type of sign required and their location shall de shown as road plan or as directed by engineer
- 2.signs plate to be 2mm thick mild steel plate
- 3.sign post to be 50mm fixing clamp/brackets
- 4.Sign plate to be fixed to steel tube by \$Nos M10 bolts and 50mm fixing clamp/brackets
- 5,Sign paints shall be reflective
- 6.The sign plate and post shall be treated by applying two coats of lead red oxide paint before applying a priming and two finish coats of approved paints. Paints used shall have a hard,durable and glossy finish.

STANDARD DRAWINGS



TYPICAL FIXING DETAILS

SCALE 1:25

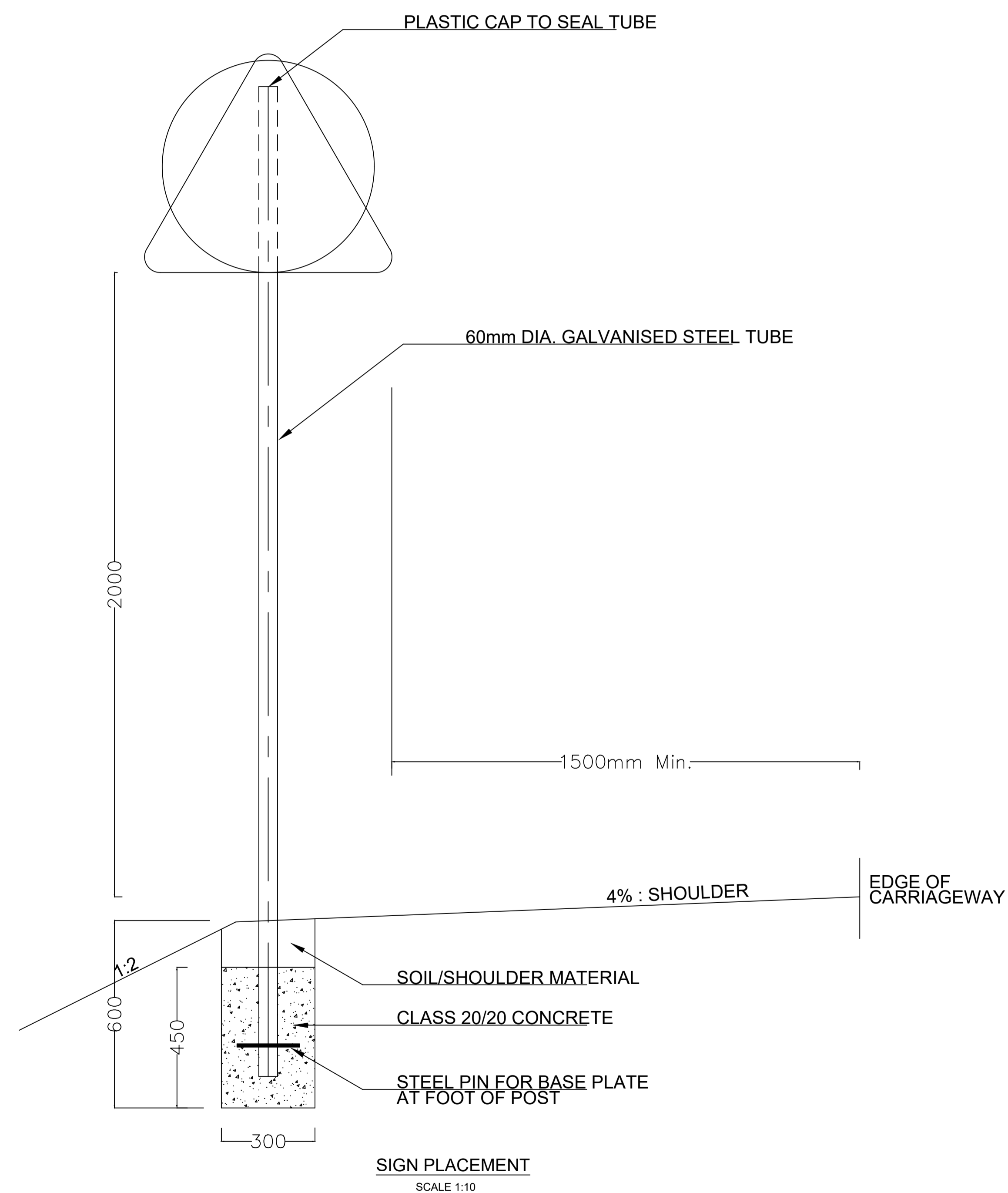


STIFFENING TO SIGNS

SCALE 1:20

GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. ALL ROAD SIGNS ARE 3mm ALUMINIUM PLATES WITH REFLECTIVE MATERIALS.
3. PLASTIC WASHERS TO BE PLACED BETWEEN ALUMINIUM SIGNS AND STEEL BRACKETS.
4. ALL SIGN SUPPORTS AND FITTINGS TO BE GALVANISED MILD STEEL.
5. THE ENDS OF BOLTS TO BE HAMMERED OR SPOT WELDED.
6. ALL WHITE, RED, BLUE AND YELLOW PARTS ON SIGNS TO BE MADE OF RETRO-REFLECTIVE MATERIAL.
7. THE WIDTHS OF SIGN MARKINGS TO BE AS FOLLOWS;
 - RED BORDERS TO STANDARD SIGNS - 75mm
 - RED STRIPES ON COUNT DOWN SIGNS - 75mm
 - RED BORDER TO PRIORITY TRIANGLE SIGNS - 100mm
 - RED BORDER TO PROHIBITORY SIGNS - 50mm
 - RED BORDERS TO CRUCIFORM LEVEL "X" - 60mm
 - WHITE BORDER TO PRIORITY (OCTAGON) - 50mm
 - YELLOW STRIPES ON HAZARD SIGNS - 100mm.
 - BLACK STRIPES ON HAZARD SIGNS - 200mm.

[illegible]

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PROJECT TITLE:

PRELIMINARY AND DETAILED
ENGINEERING DESIGN OF
KACHYULU- GOTU (ROAD)

DRAWING TITLE:

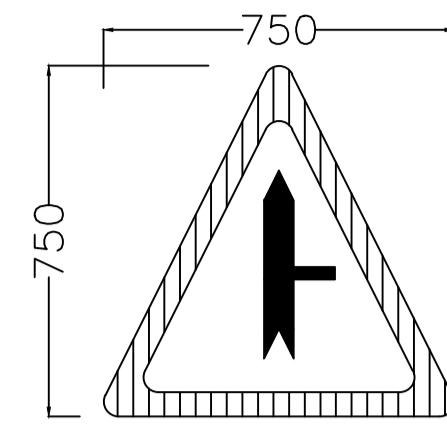
STANDARD DRAWING -
STANDARD - ROAD SIGNS

DRAWN BY: S.W.O
DESIGNED BY: C.N.M
CHECKED BY: M.J.N

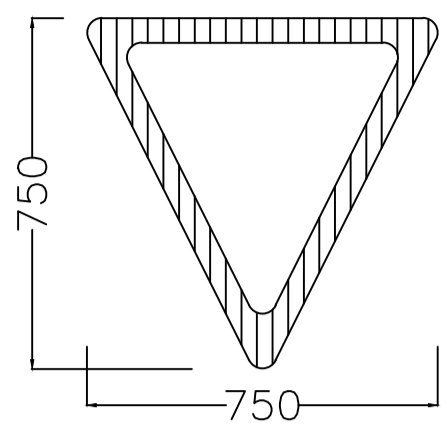
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Drg No.	CE1045/SD/KG/01
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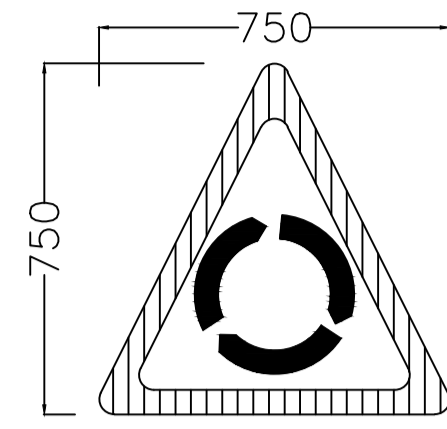
Date :JANUARY 2024



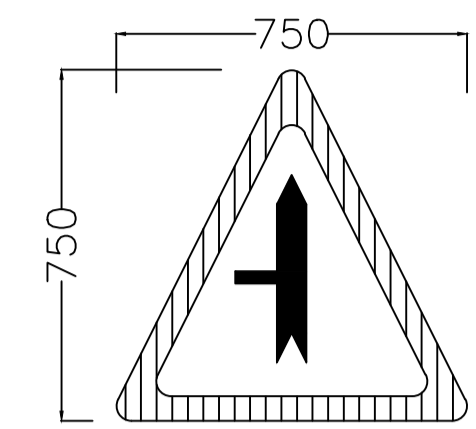
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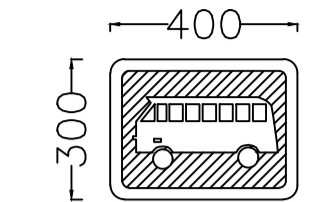
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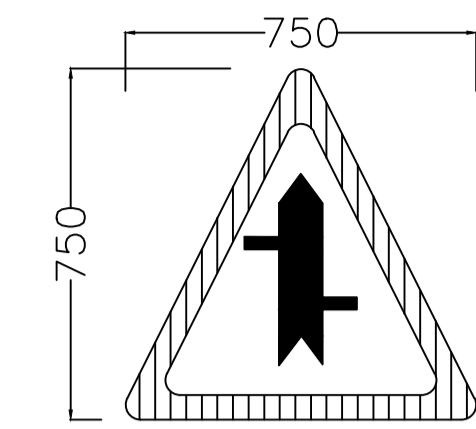
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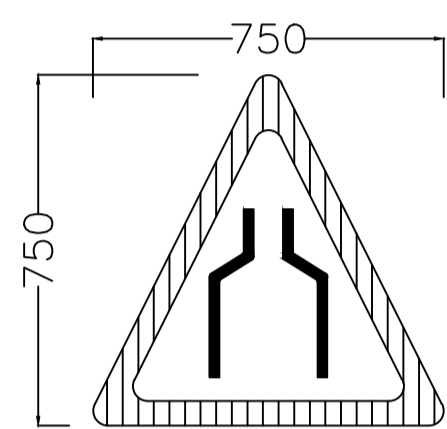
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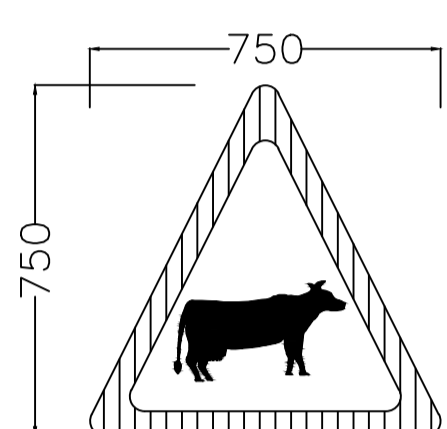
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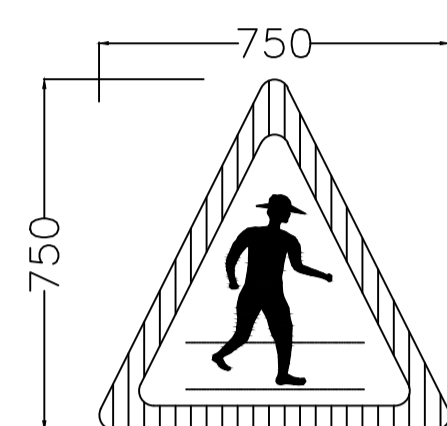
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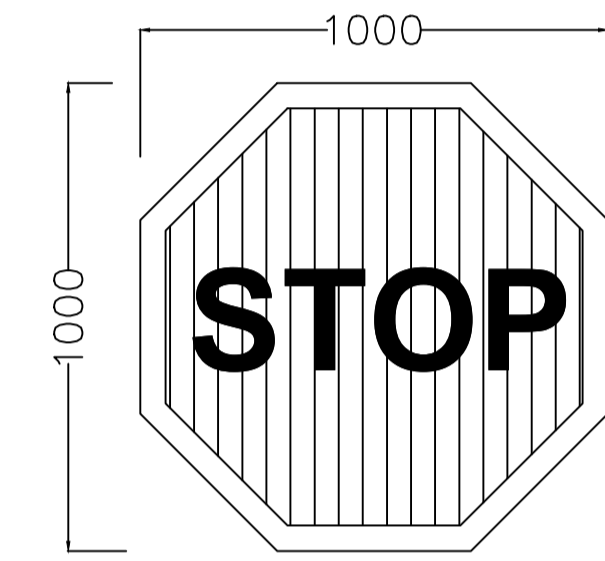
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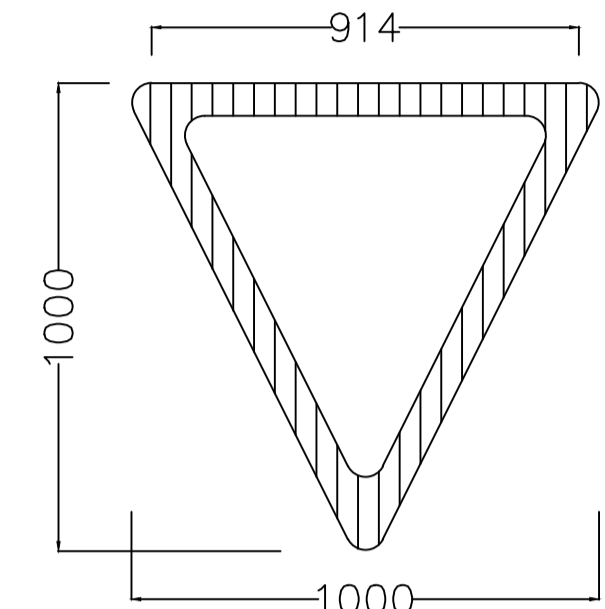
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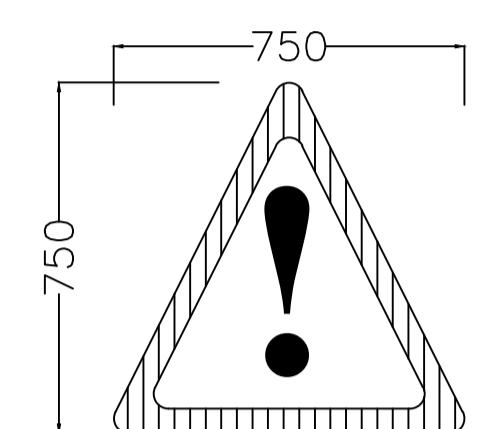
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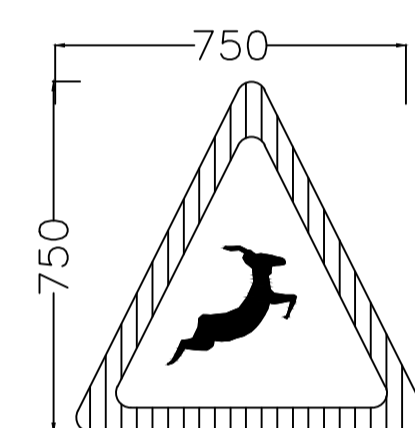
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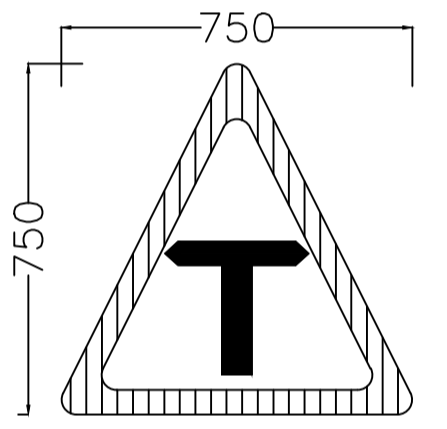
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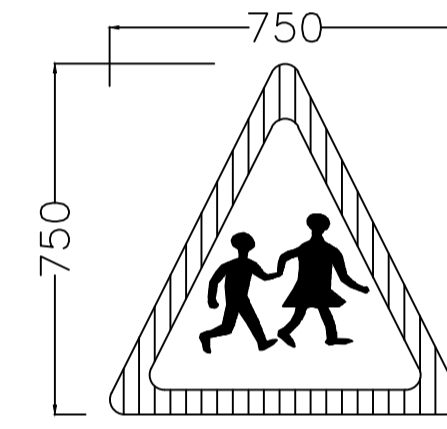
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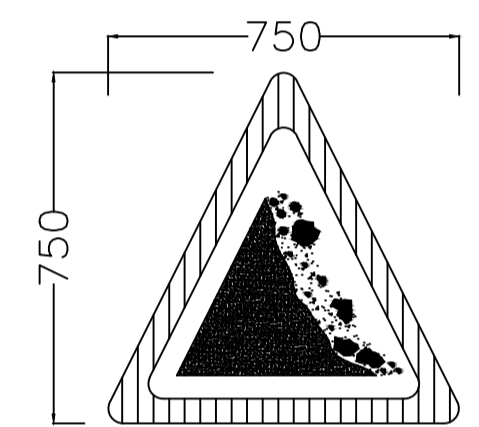
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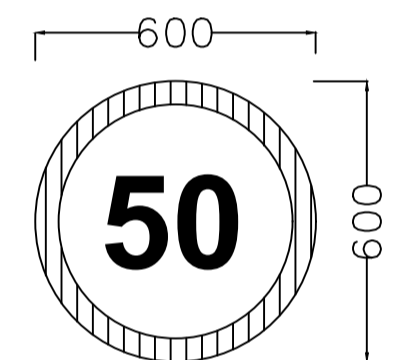
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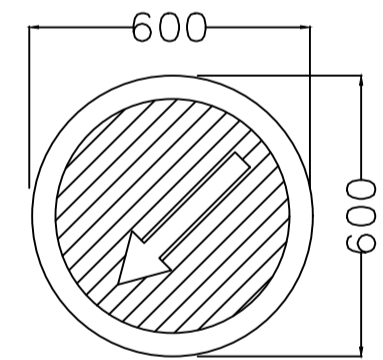
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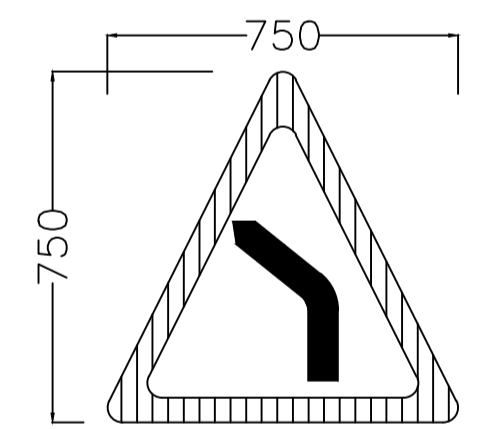
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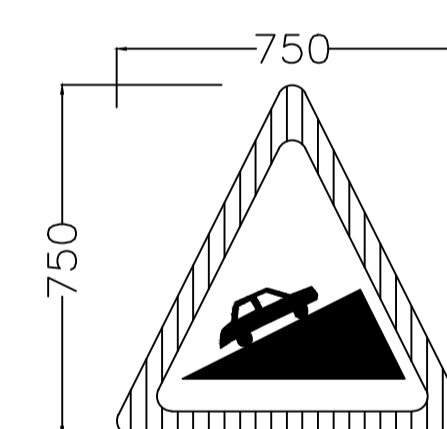
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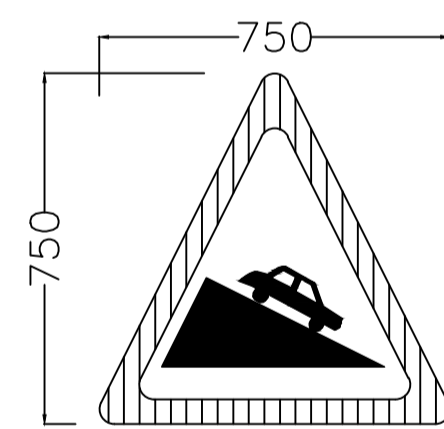
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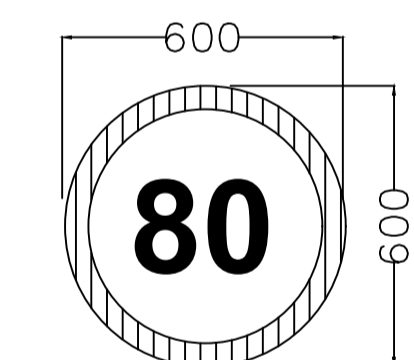
SIGN TYPE W 1



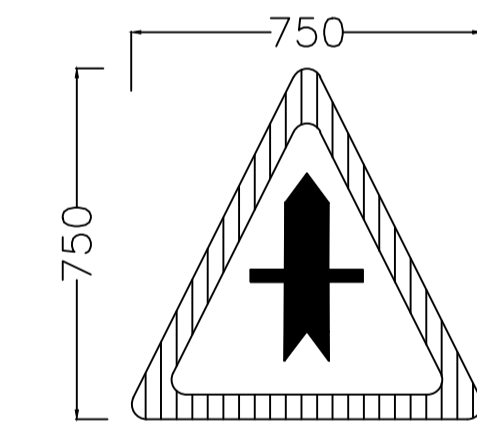
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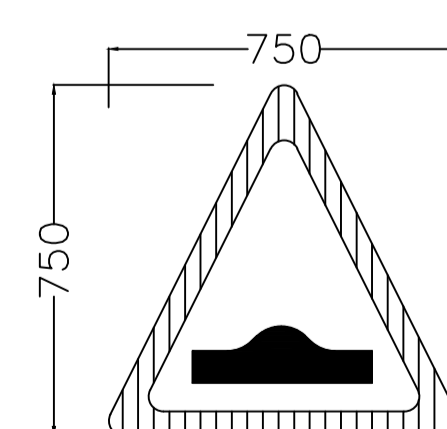
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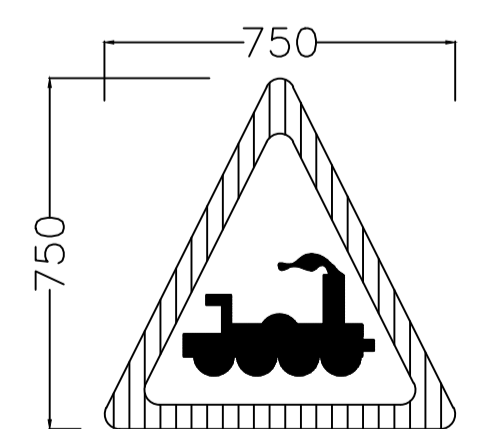
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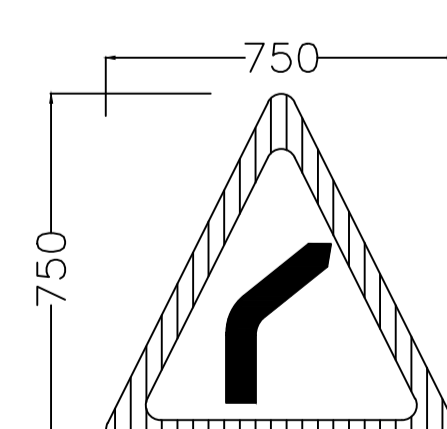
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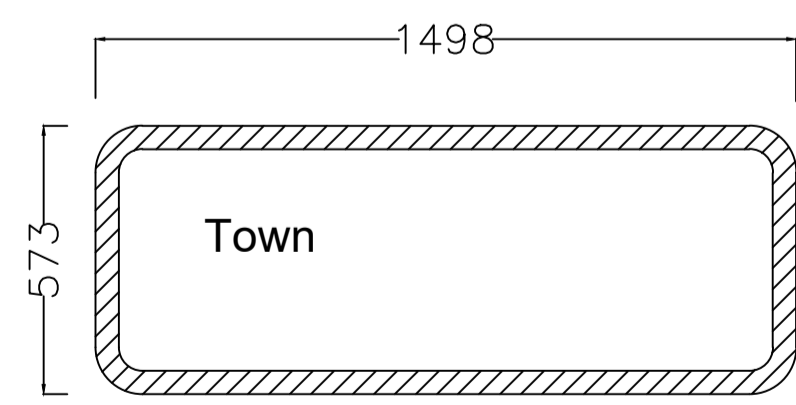
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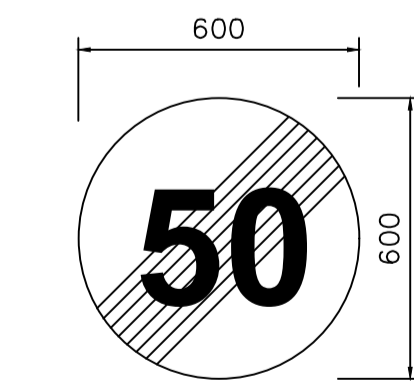
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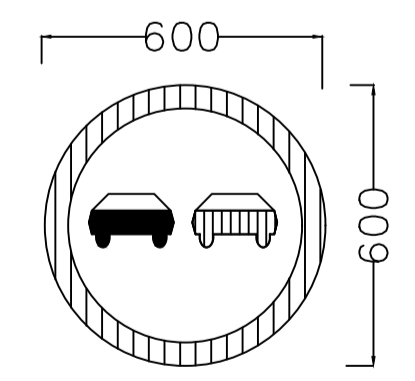
SIGN TYPE W 2





SIGN TYPE - I 27



SIGN TYPE P30



SIGN TYPE P23

REVISIONS	No.	DATE	DESCRIPTION	 Kenya Rural Roads Authority Bara Bara Plaza, P.O. Box 48151- 00100, Nairobi. Kenya	DIRECTOR GENERAL		Consultant:  Runji Consulting Group Ltd Engineering & Project Management. 3, Kindaruma Road (Off Ngong Road) P.O. Box 68053-00200 Nairobi Tel. (020) 2717213/4	PROJECT TITLE: PRELIMINARY AND DETAILED ENGINEERING DESIGN OF KACHYULU- GOTU (ROAD)	DRAWING TITLE: STANDARD DRAWING - STANDARD - ROAD SIGNS INSTALLATION	DRAWN BY: S.W.O DESIGNED BY: C.N.M CHECKED BY: M.J.N Scale: AS SHOWN	Drg No. CE1045/SD/KG/02
					DIRECTOR (PLANNING ,DESIGN &ENVIRONMENT)						

