



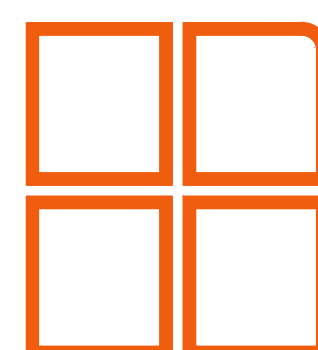
CLIMATE PROOFED ARID AND SEMI ARID RURAL ROADS, FINAL DESIGN OF KACHULU GOTU ROAD BATCH 2

MARCH 2025

EMPLOYER

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

CONSULTANT



Runji Consulting Group Ltd

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ENGINEER

**DIRECTOR
PLANNING, DESIGN & ENVIRONMENT
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NAIROBI, Kenya**

	KACHULU GOTU ROAD BATCH 2 DRAWINGS
	COVER PAGE
	DRAWING LIST
	GENERAL DRAWINGS
CE1045/GD/KG/01	LOCATION MAP
CE1045/GD/KG/01	KACHULU GOTU SKETCH MAP
CE1045/GD/KG/01	GENERAL LAYOUT (SHEET 1 OF 3) CHAINAGE 6+000 - 10+000
CE1045/GD/KG/02	GENERAL LAYOUT (SHEET 2 OF 3) CHAINAGE 10+000 - 14+100
CE1045/GD/KG/03	GENERAL LAYOUT (SHEET 3 OF 3) CHAINAGE 14+100 - 18+384
	TYPICAL CROSS-SECTION
CE1045/TD/KG/01	TYPICAL CROSS-SECTION
	TYPICAL CULVERT DRAWINGS
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CE1045/CDS/KG/O2	HEADWALL TYPE 2 (DROP INLETS)
CE1045/CDS/KG/O3	HEADWALL TYPE 4 (FOR ACCESS CULVERT)
CE1045/CDS/KG/O4	BEDDING AND HAUNCH PROFILES TYPE III& IV
CE1045/CDS/KG/O5	CULVERT ROAD SIGNS
	STANDARD DRAWINGS
CE1045/SD/KG/01	STANDARD DRAWING - STANDARD - ROAD SIGNS
CE1045/SD/KG/02	STANDARD DRAWING - STANDARD - ROAD SIGNS INSTALLATION
CE1045/SD/KG/03	STANDARD DRAWING - STANDARD - TRAFFIC MANAGEMENT
CE1045/SD/KG/04	STANDARD DRAWING - PUBLICITY SIGN BOARD

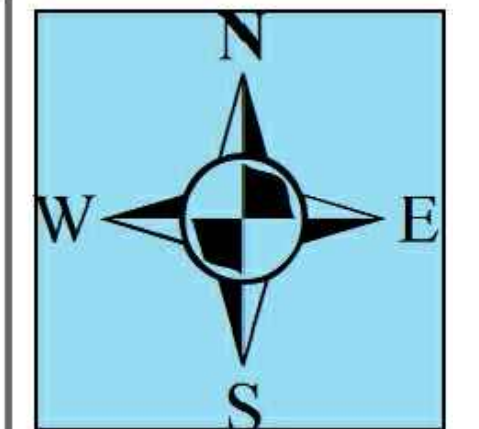
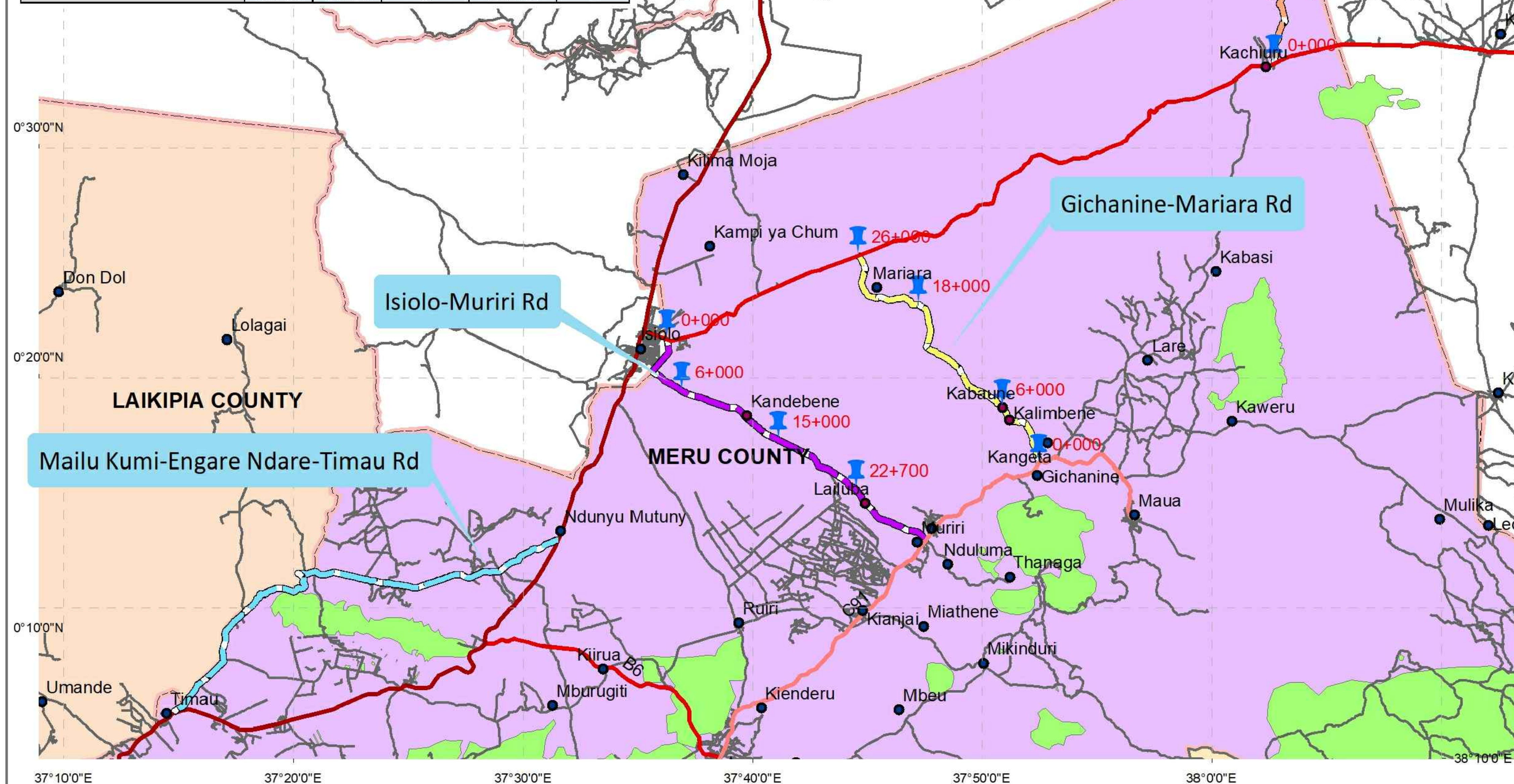
GENERAL DRAWINGS

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

No.	DATE	DESCRIPTION



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

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DIRECTOR (PLANNING & DESIGN & ENVIRONMENT)

Consultant:

Runji Consulting Group Ltd
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PROJECT TITLE:

PRELIMINARY AND DETAILED
ENGINEERING DESIGN OF
KACHYULU - GOTU ROAD

DRAWING TITLE:

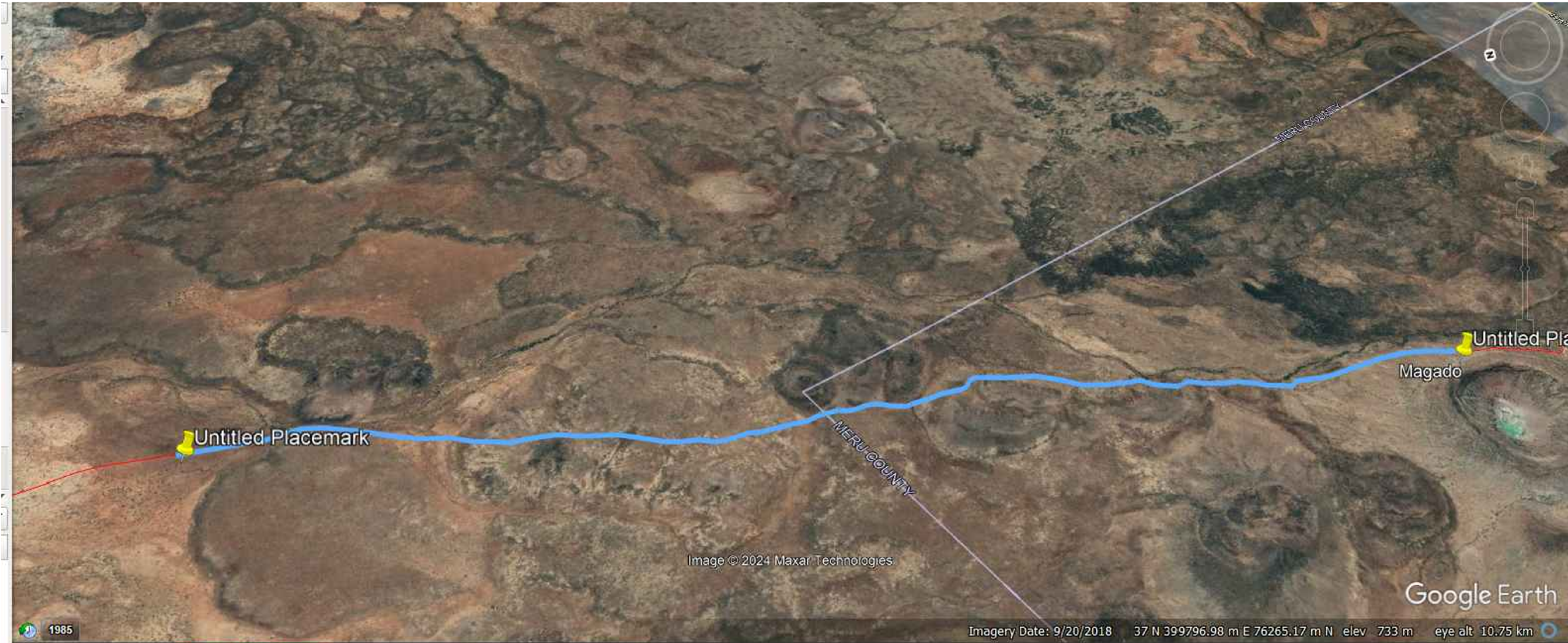
LOCATION MAP

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

Scale: 1:2000 HORIZONTAL
1:200 VERTICAL

Drg No.
CE1045/GD/KG/O1

Date : JUNE 2023



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
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Tel. (020) 2717213/4

PROJECT TITLE:
DRAFT DETAILEDENGINEERING DESIGN OF
KACHULU GOTU BATCH 2

DRAWING TITLE:
KACHULU GOTU

DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/GD/KG/01
Scale: 1:5000	Date : DECEMBER 2024



REVISIONS	No.	DATE	DESCRIPTION



Kenya Rural Roads Authority
Bara Bara Plaza,
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DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)	

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PROJECT TITLE:
DRAFT DETAILEDENGINEERING DESIGN OF

KACHULU GOTU BATCH 2

DRAWING TITLE:
GENERAL LAYOUT
SHEET 1 OF 3
CHAINAGE 6+000 - 10+000

DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/GD/KG/01
Scale: 1:5000	Date : DECEMBER 2024



REVISIONS	No.	DATE	DESCRIPTION



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Tel. (020) 2717213/4

PROJECT TITLE:
DRAFT DETAILEDENGINEERING DESIGN OF

KACHULU GOTU BATCH 2

DRAWING TITLE:
GENERAL LAYOUT
SHEET 2 OF 3
CHAINAGE 10+000 - 14+100

DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/GD/KG/02
Scale: 1:5000	Date : DECEMBER 2024



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PROJECT TITLE:

DRAFT DETAILEDENGINEERING DESIGN OF

KACHULU GOTU BATCH 2

DRAWING TITLE:

GENERAL LAYOUT
SHEET 3 OF 3
CHAINAGE 14+100 - 18+384

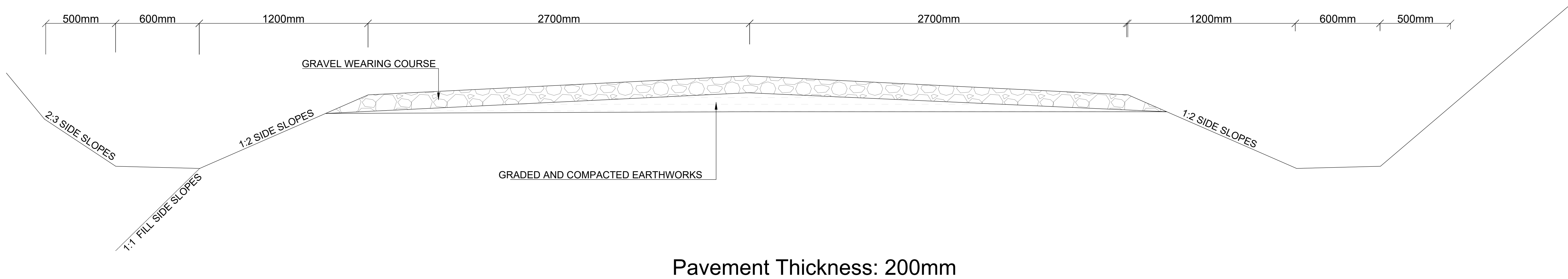
DRAWN BY: M.M
DESIGNED BY: C.N.M
CHECKED BY: M.J.N

Scale: 1:5000

Drg No.
CE1045/GD/KG/03

Date : DECEMBER 2024

TYPICAL CROSS-SECTION

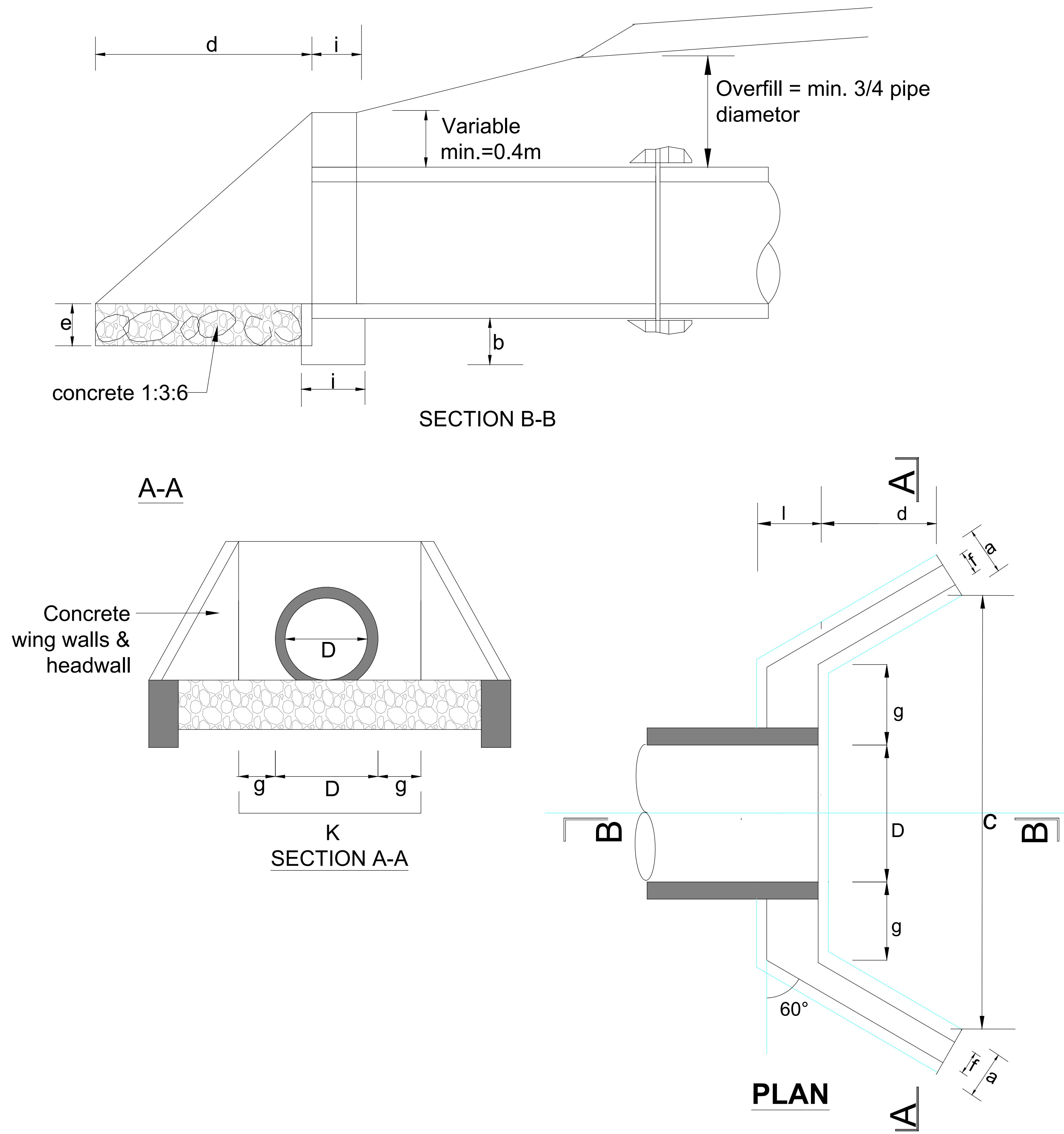


Slope benching details

- 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.

TYPICAL CULVERT DRAWINGS

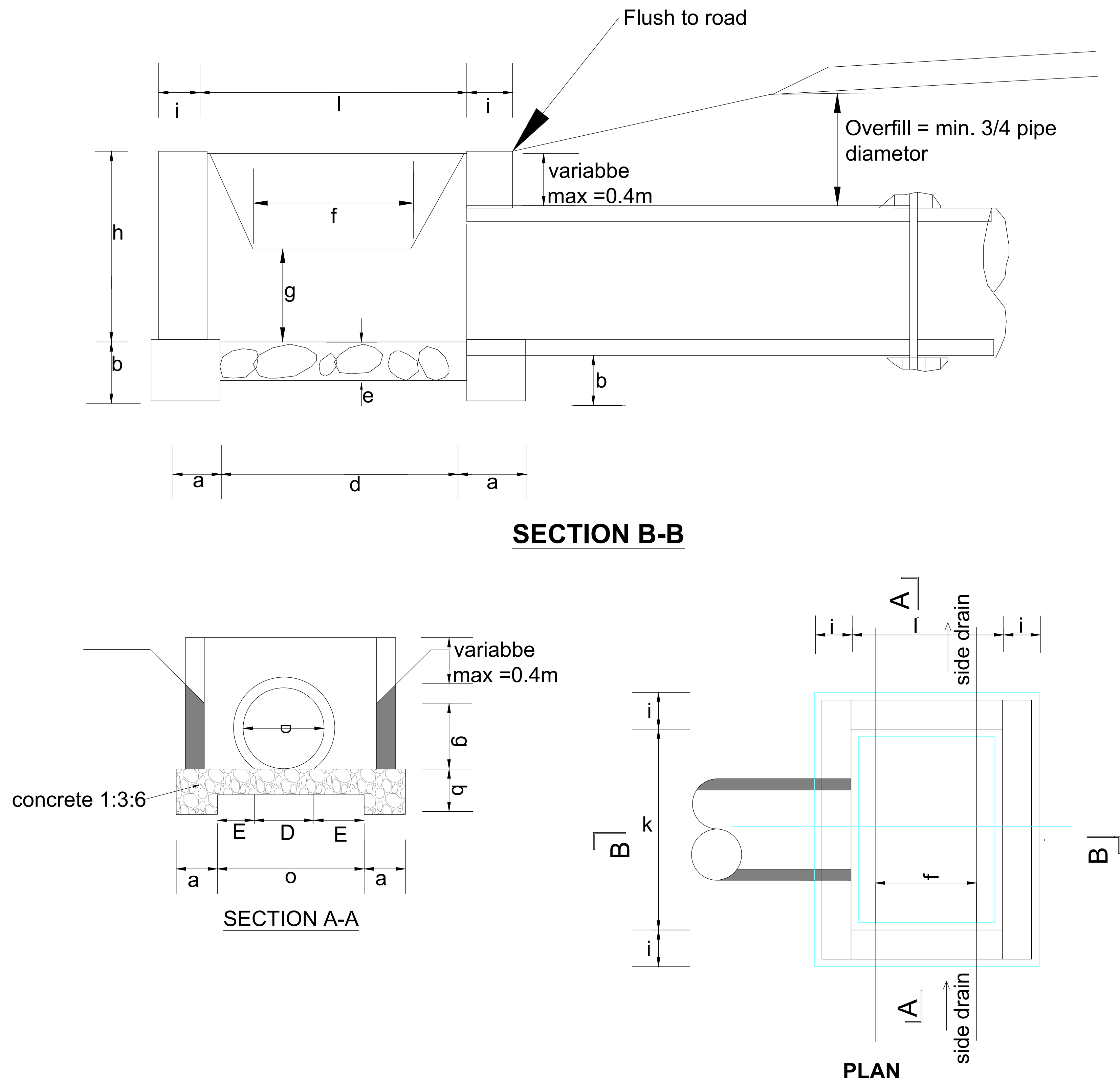
FIGURE H.8 - HEADWALL TYPE 1 (HEAD AND WINGWALLS)



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

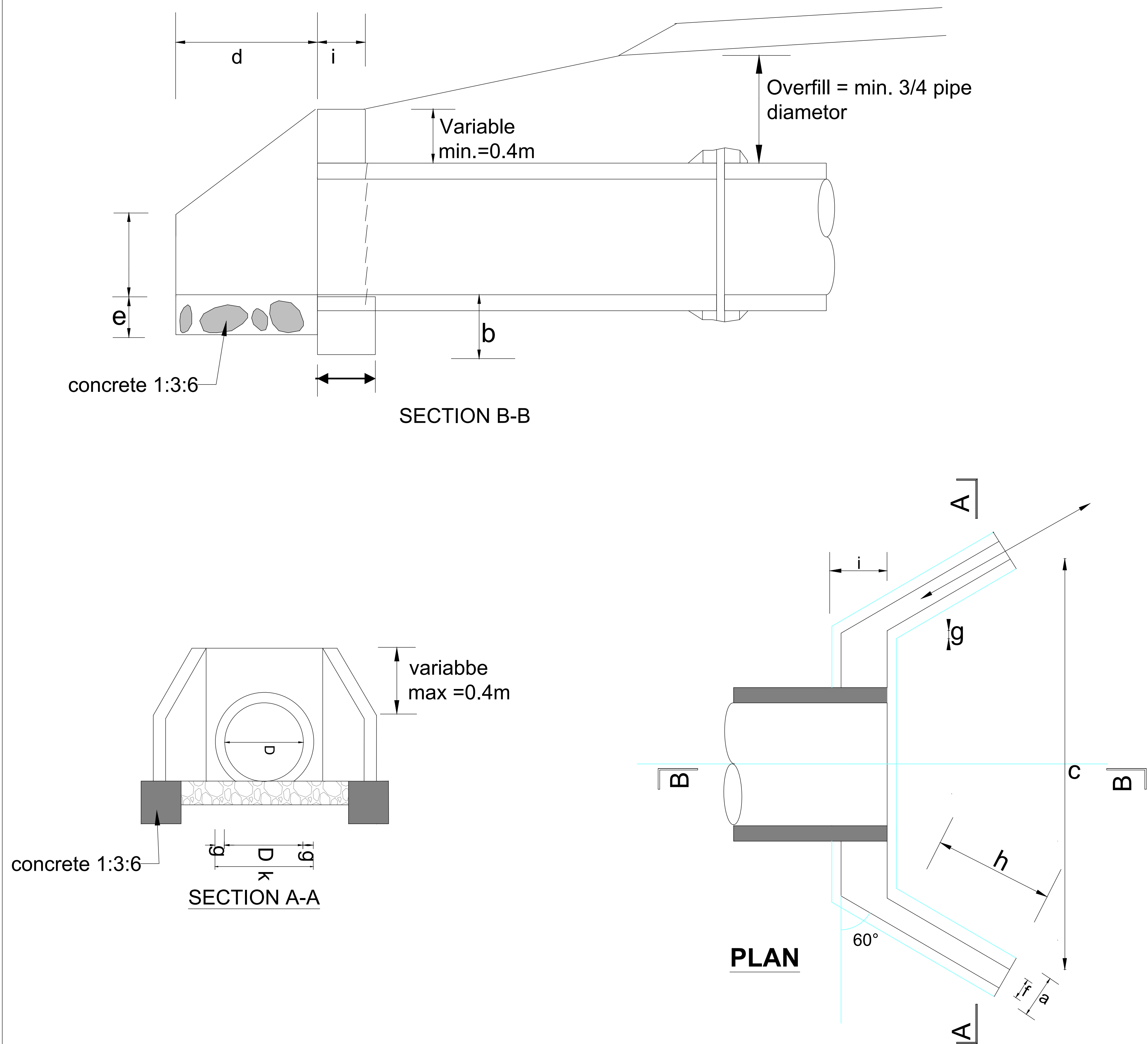
FIGURE H.9 - HEADWALL TYPE 2 (DROP INLETS)



DIMENSIONS AND MATERIAL REQUIREMENTS

PIPE DIAMETER IN (M)			TYPE A			TYPE B		
			(CONCRETE BLOCKS)			(STONE MASONRY)		
DIMENSION	UNIT		450	600	900	450	600	900
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

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



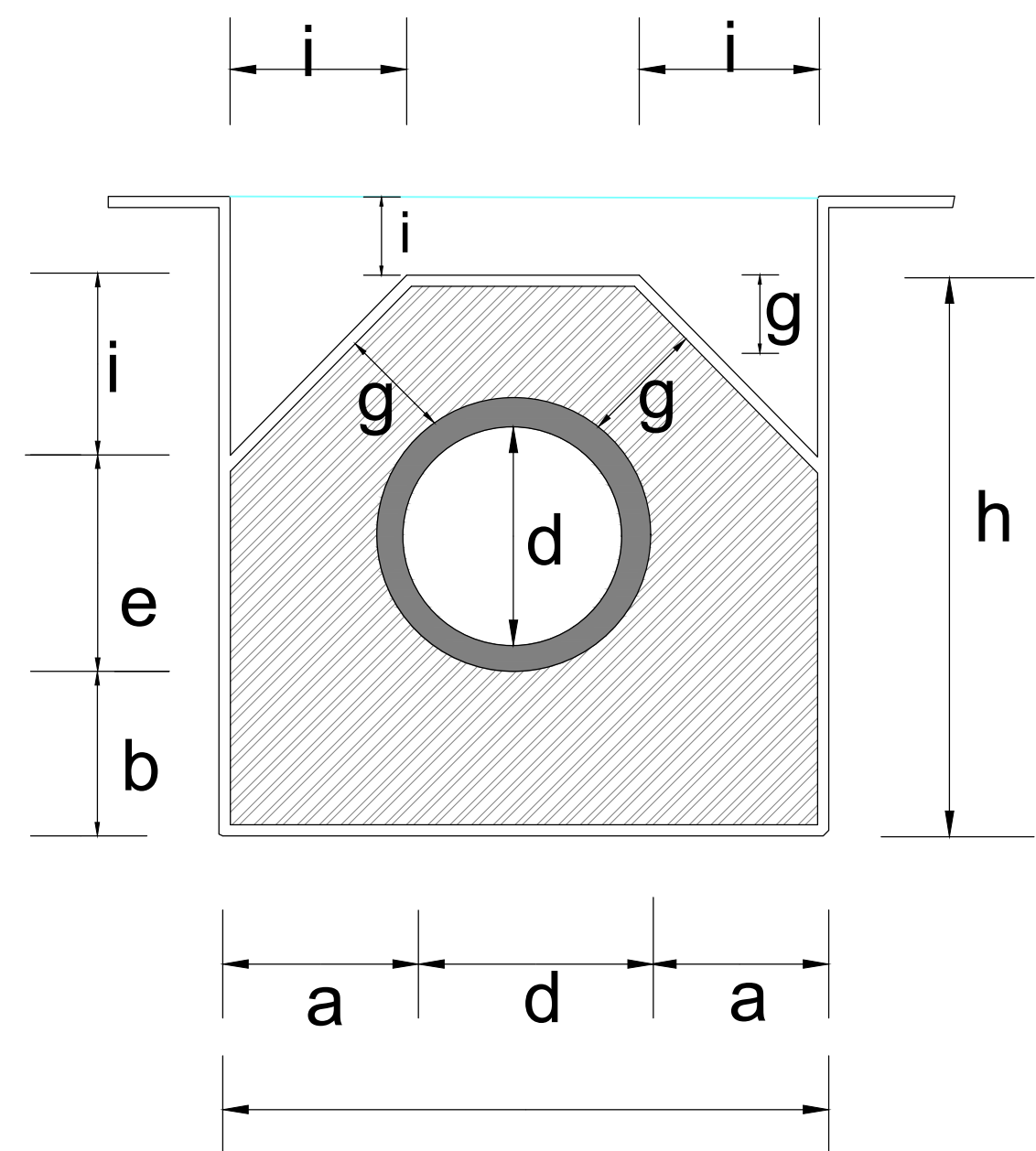
DIMENSIONS AND MATERIAL REQUIREMENTS

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	0.40	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	
l	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	

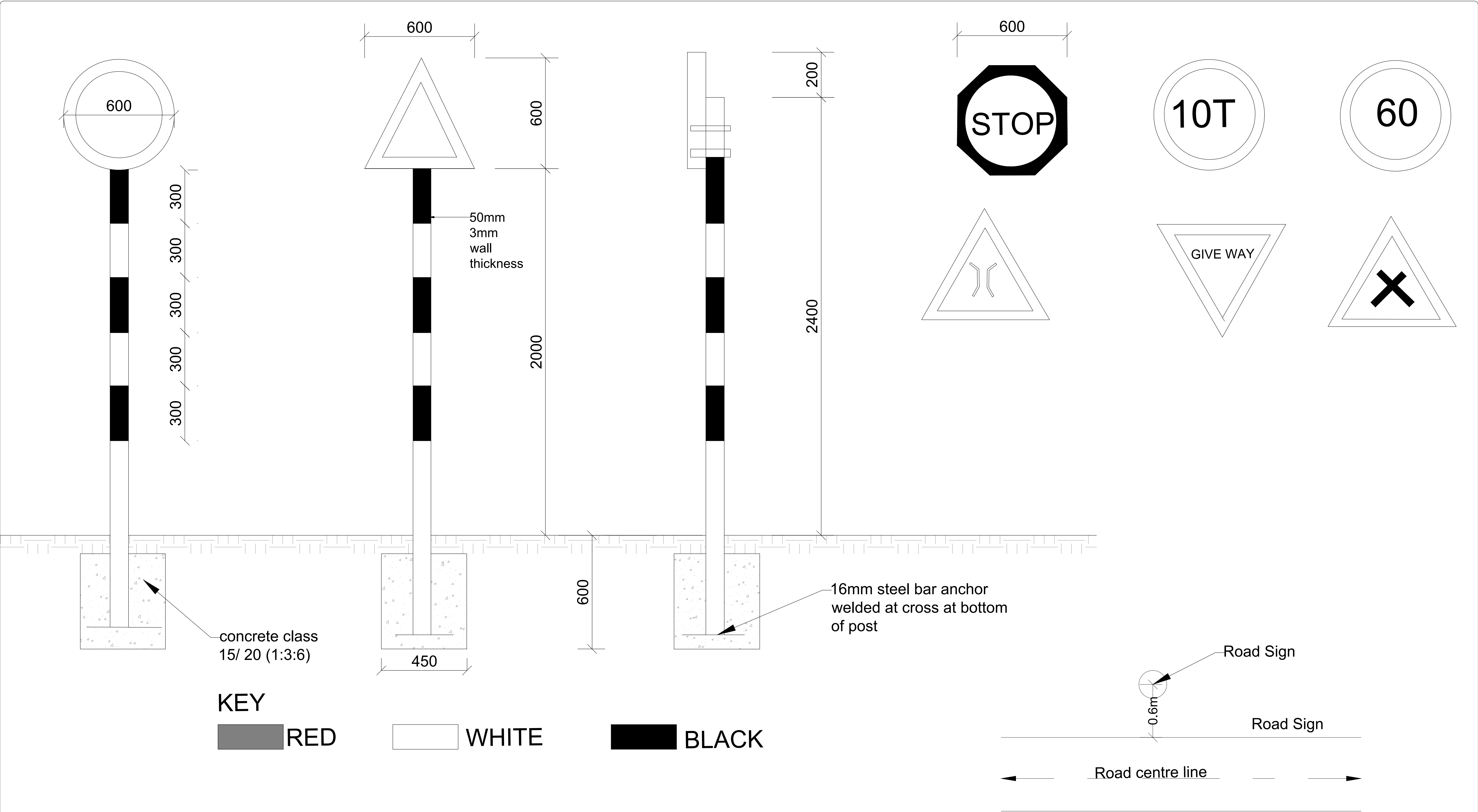
FIGURE H.14-BEDDING AND HAUNCH PROFILES TYPE III& IV

PROFILE IV

(CONCRETE)



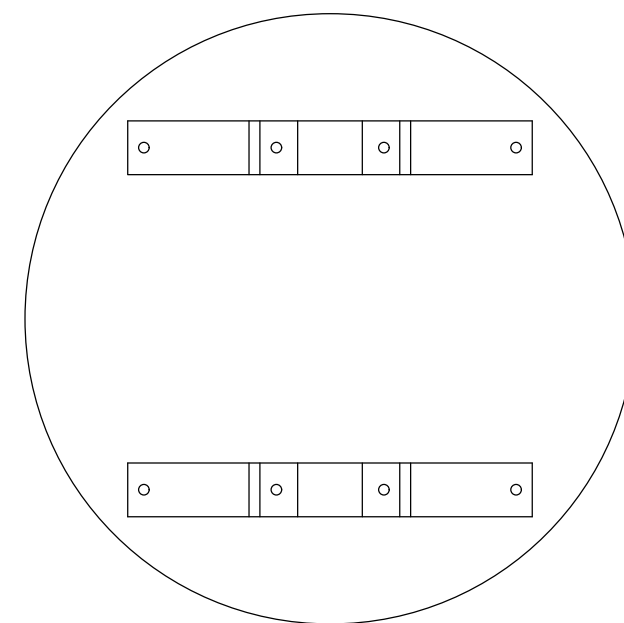
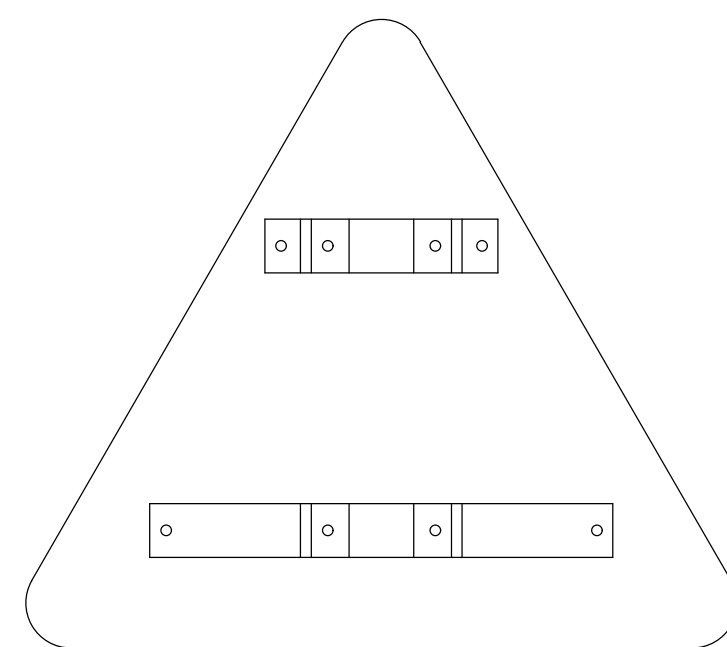
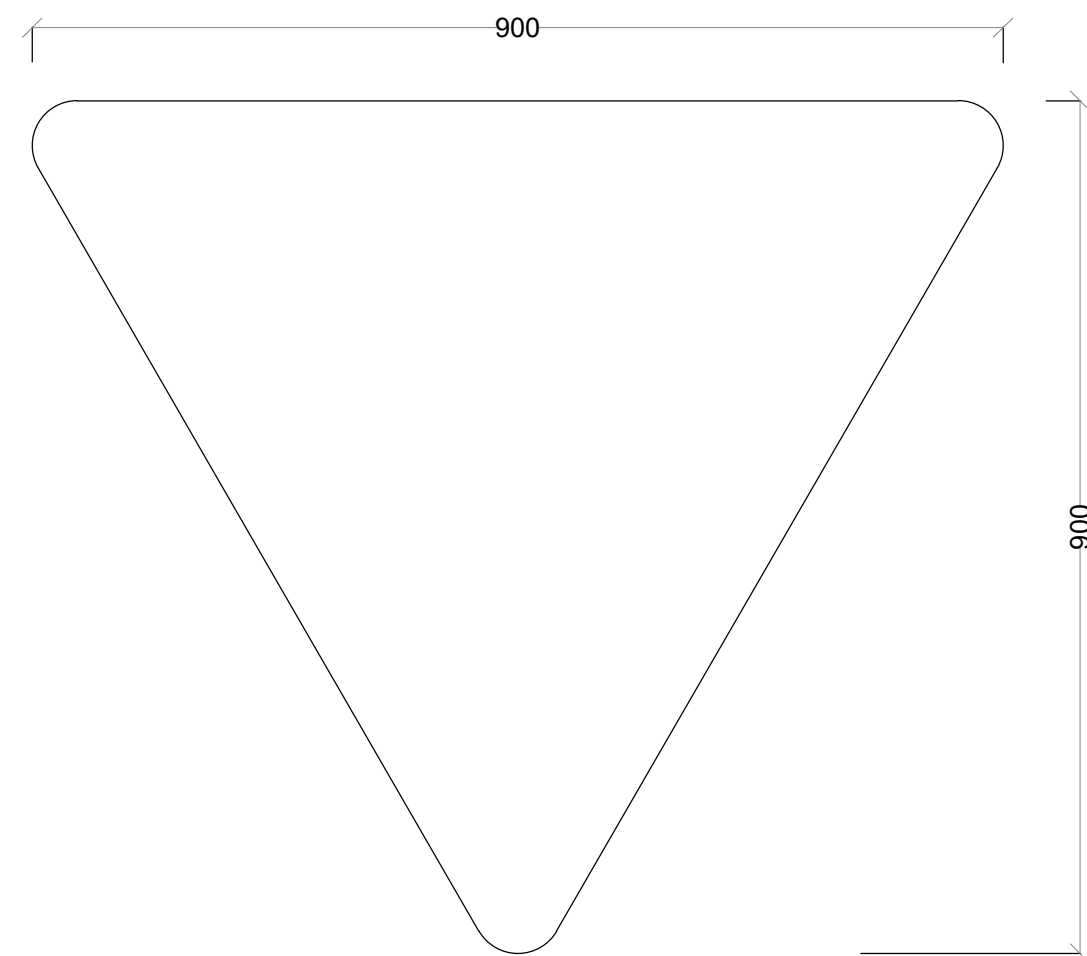
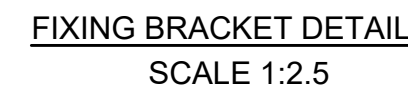
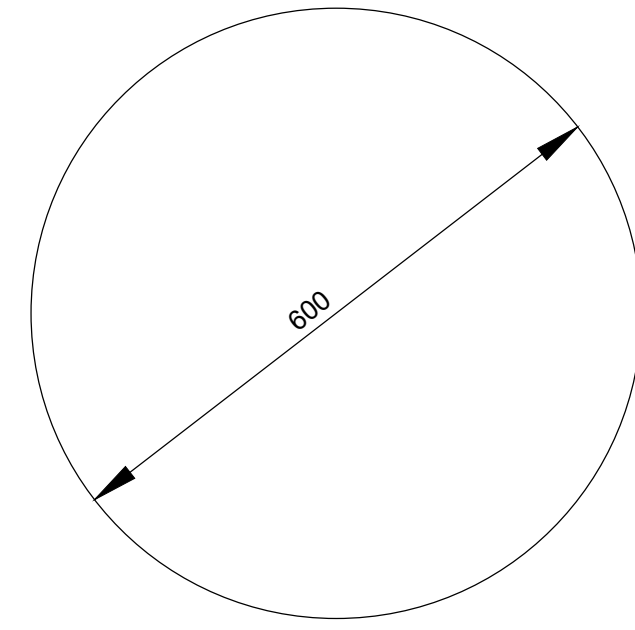
450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)		
0.15	0.2	0.2
0.15	0.15	0.15
0.86	0.15	1.48
0.56	0.72	1.08
0.46	0.15	0.78
0.15	0.15	0.15
0.15	0.15	0.15
0.81	1.02	1.38
0.28	0.35	0.45
volume in (m3/m)		
0.37	0.61	0.92
-fair to poor subgrade condition -overfill >$\frac{3}{4}$ Dia; -Seasonal waterflow only. -Use gravel material for. -backfill/overfill.		



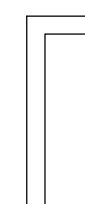
- 1.The type of sign required and their location shall de shown as road plan or as directed by engineer
- 2.signs plate to be 2mm thick mild steel plate
- 3.sign post to be 50mm fixing clamp/brackets
- 4.Sign plate to be fixed to steel tube by \$Nos M10 bolts and 50mm fixing clamp/brackets
- 5,Sign paints 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.

REVISIONS	No.	DATE	DESCRIPTION	 Kenya Rural Roads Authority Bara Bara Plaza, P.O. Box 48151- 00100, Nairobi. Kenya	DIRECTOR GENERAL	 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: DRAFT DETAILED ENGINEERING DESIGN OF KACHULU GOTU ROAD BATCH 2	DRAWING TITLE: CULVERT ROAD SIGNS	DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N Scale: NTS	Drg No. CE1045/CDS/KG/O5 Date : DECEMBER 2024	

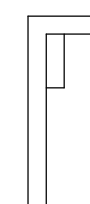
STANDARD DRAWINGS



TYPICAL FIXING DETAILS
SCALE 1:25



PREFORMED FLANGE

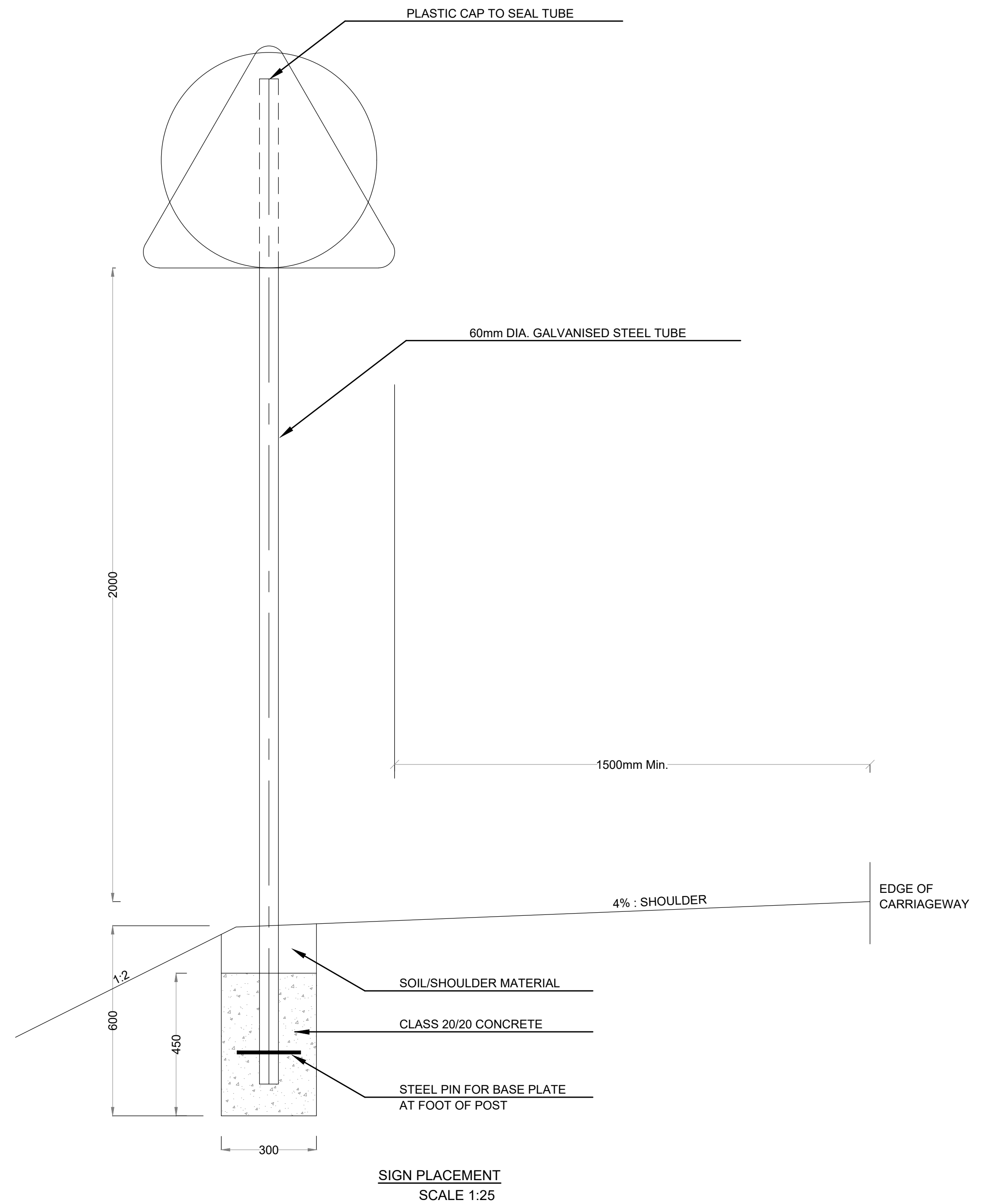


ANGLE STIFFENING

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.



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Tel. (020) 2717213/4

PROJECT TITLE:

DRAFT DETAILED
ENGINEERING DESIGN OF
KACHULU - GOTU (ROAD) BATCH 2

DRAWING TITLE:

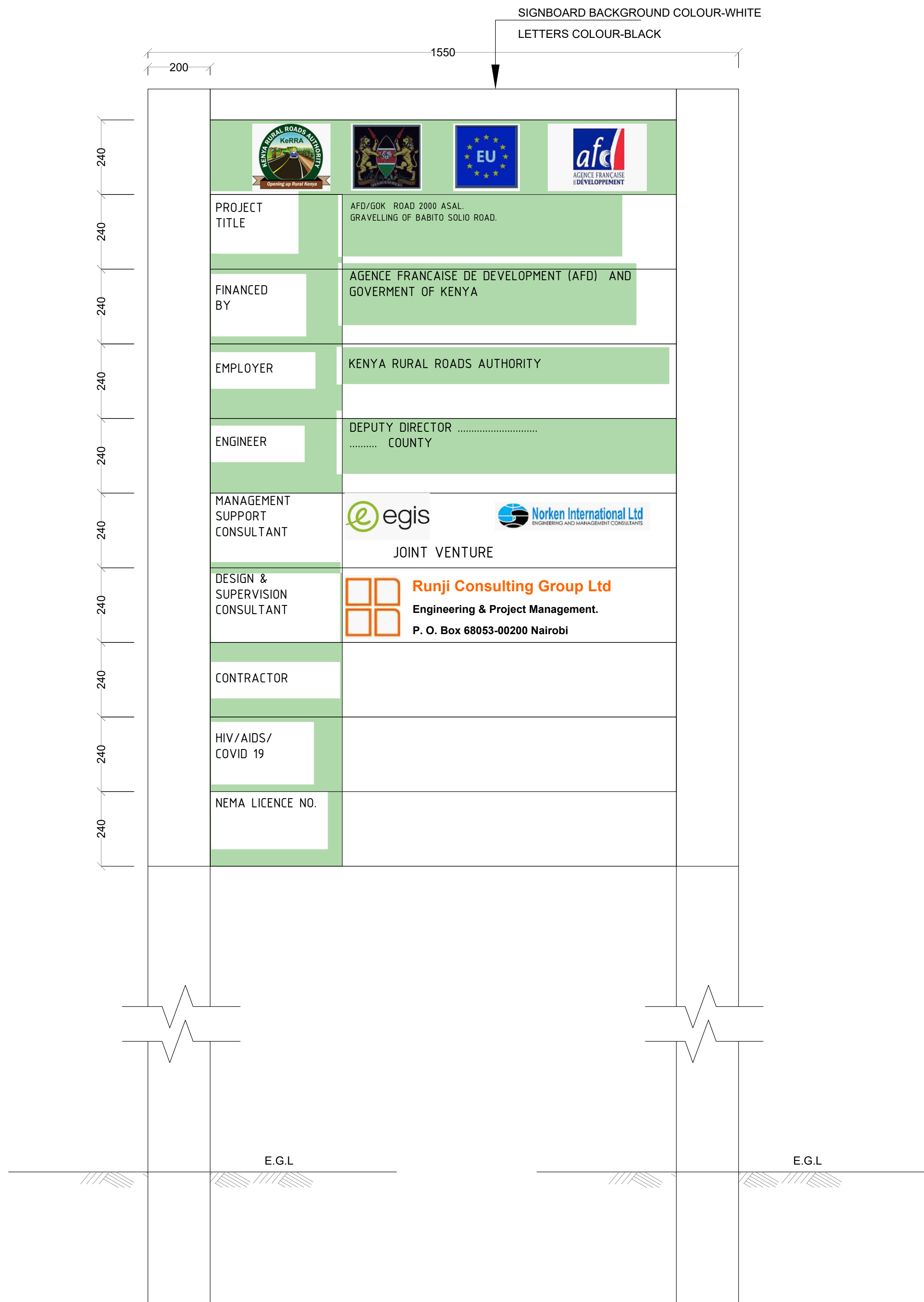
STANDARD DRAWING -
STANDARD - ROAD SIGNS

DRAWN BY: M.M
DESIGNED BY: C.N.M
CHECKED BY: M.J.N

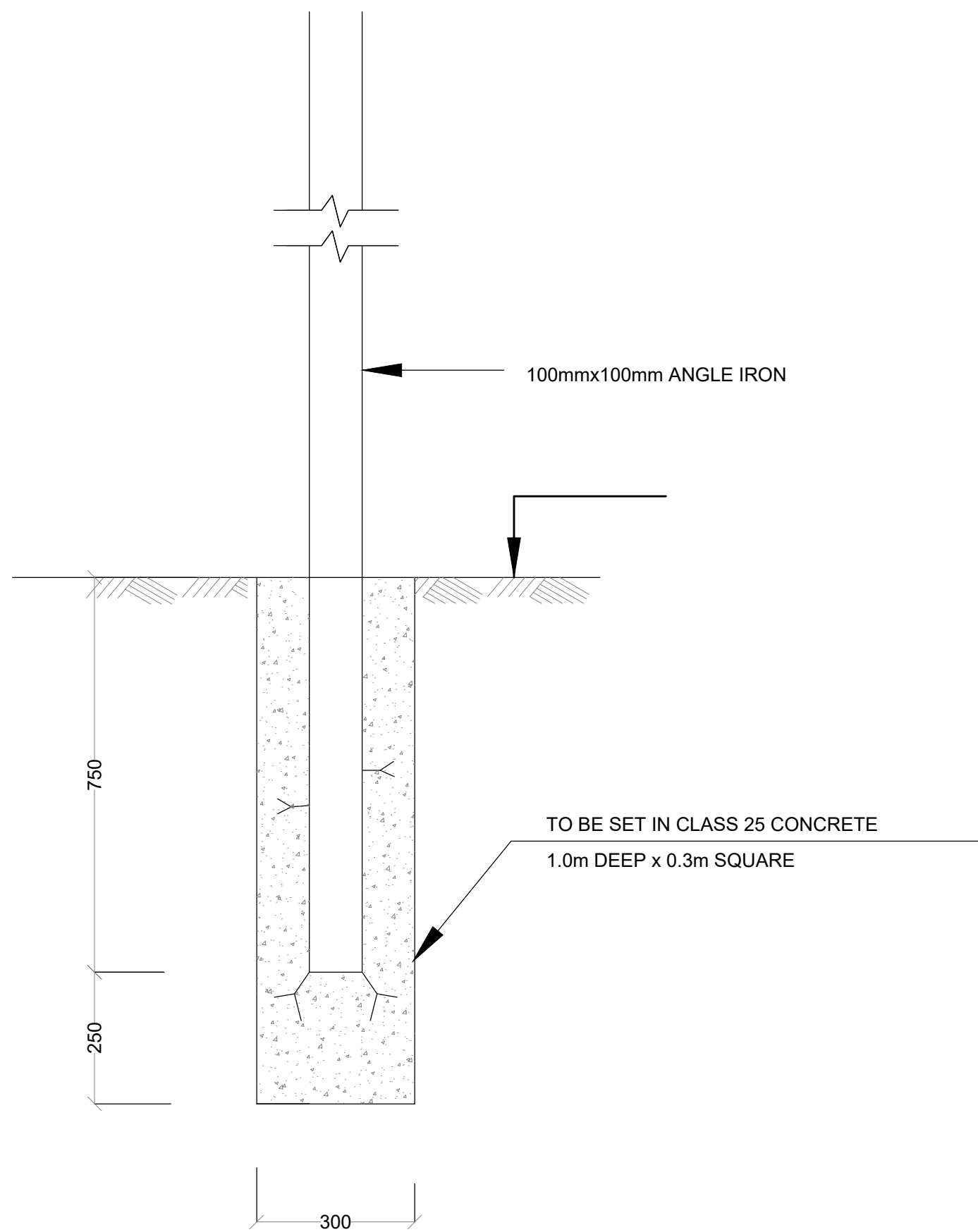
Scale: AS SHOWN

Drg No.
CE1045/SD/KG/01

Date : DECEMBER 2024



- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
 2. SPACING BETWEEN LINES TO BE 50mm.
 3. SPACING BETWEEN EDGE AND LINE TO BE 50mm.
 4. ALL STEEL POSTS TO BE TO BS 3049 CLASS 'A' (HOT ROLLED).
 5. THE FINISH TO BE HOT DIP GALVANIZED TO BS 729.
 6. ALL BOLTS SHALL BE BUTTON-HEADED AND GALVANISED.



SIGNBOARD FIXING DETAIL
SCALE: 1:100

REVISIONS	No.	DATE	DESCRIPTION



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Tel. (020) 2717213/4

PROJECT TITLE:
DRAFT DETAILED
ENGINEERING DESIGN OF
KACHULU - GOTU (ROAD) BATCH 2

DRAWING TITLE:

STANDARD DRAWING -
PUBLICITY SIGN BOARD

DRAWN BY: M.M
DESIGNED BY: C.N.M
CHECKED BY: M.J.N

Scale: AS SHOWN

Drg No.
CE1045/SD/KG/04

Date : DECEMBER 2024