



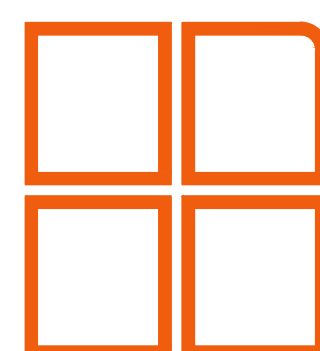
CLIMATE PROOFED ARID AND SEMI ARID RURAL ROADS, FINAL DESIGN OF MARIMA MAKUTANO ROAD BATCH 2

MARCH 2025

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

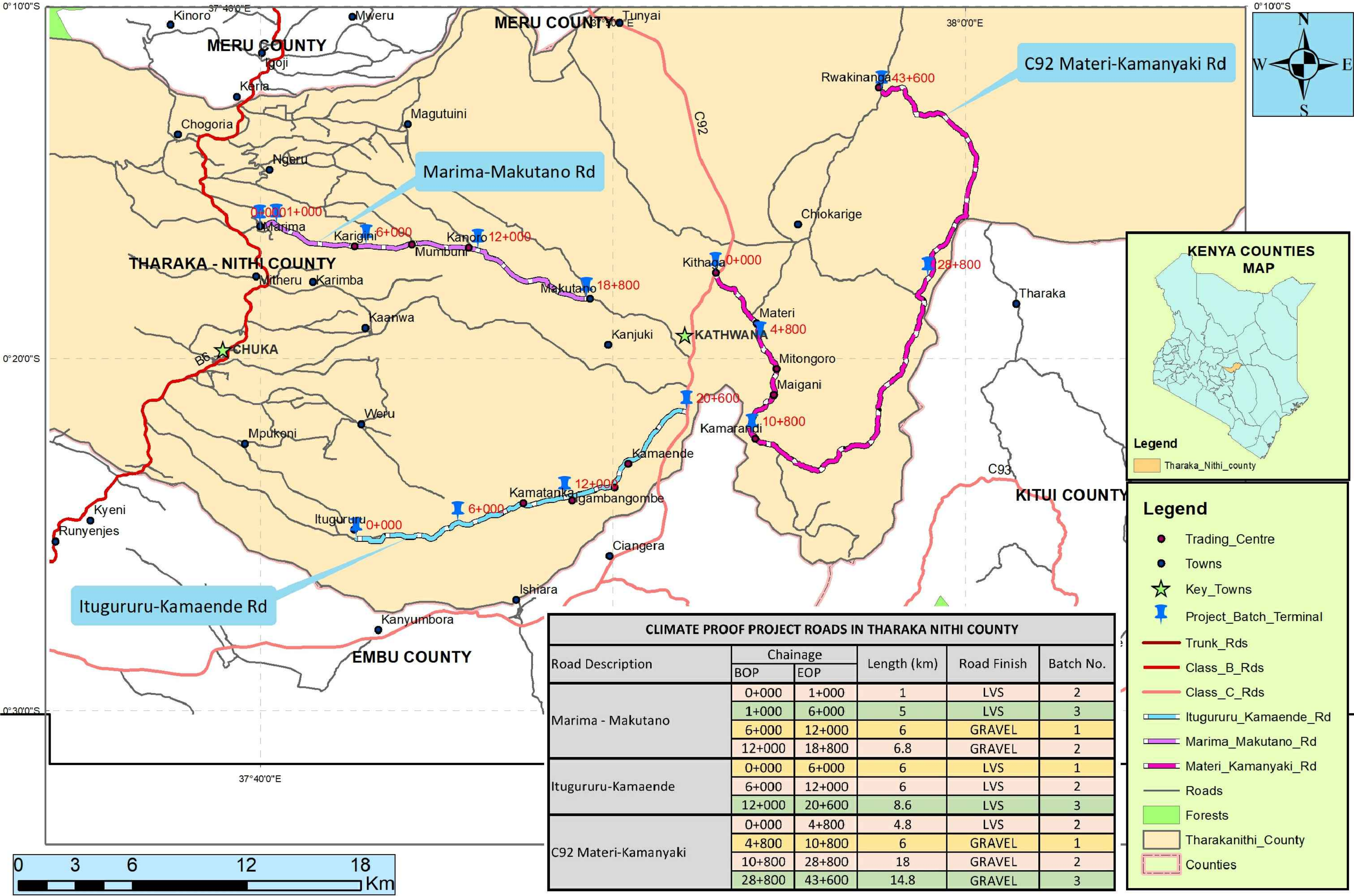
ENGINEER

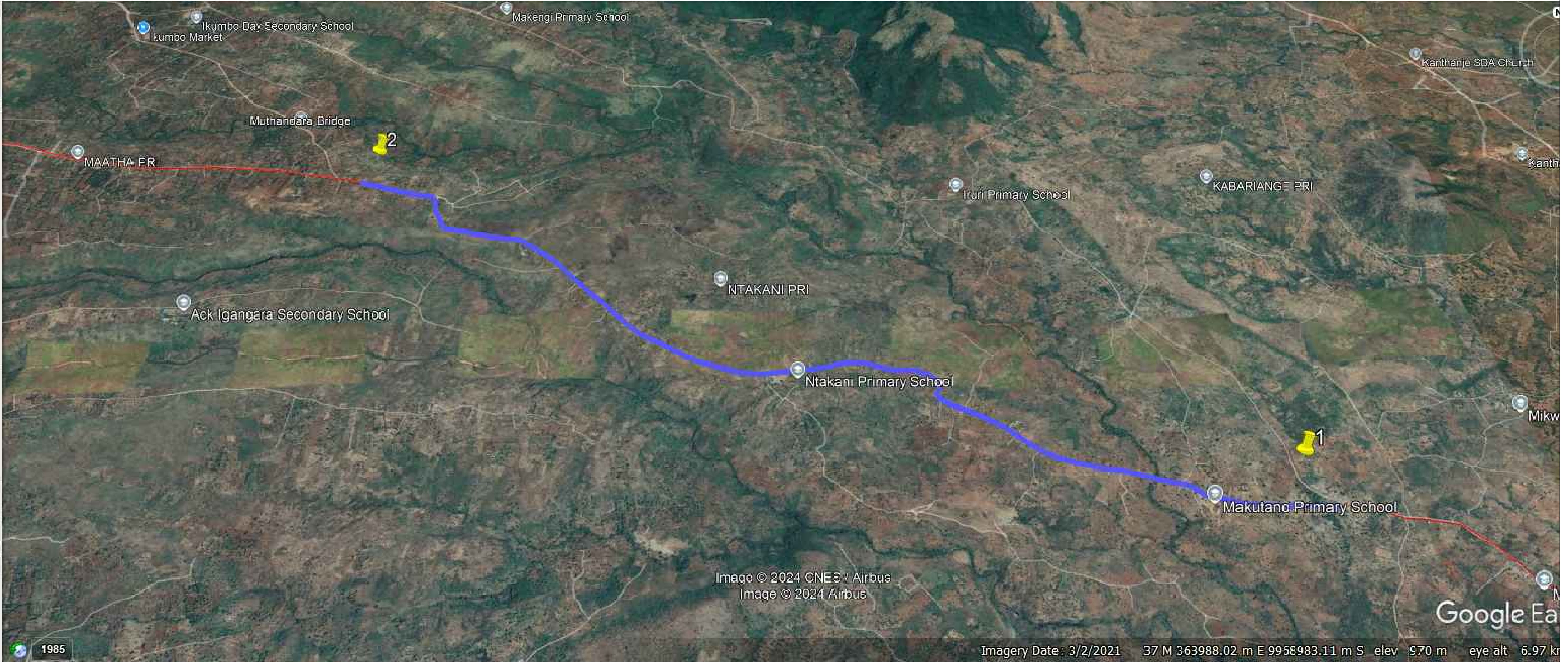
**DIRECTOR
PLANNING, DESIGN & ENVIRONMENT
P.O BOX 48151-00100,
NAIROBI, Kenya**

	MARIMA MAKUTANO ROAD BATCH 2 DRAWINGS
	COVER PAGE
	DRAWING LIST
	GENERAL DRAWINGS
CE1045/GD/MM/01	LOCATION MAP
CE1045/GD/MM/01	MARIMA MAKUTANO SKETCH MAP
CE1045/GD/MM/01	GENERAL LAYOUT (SHEET 1 OF 2) CHAINAGE 11+372 - 16+600
CE1045/GD/MM/02	GENERAL LAYOUT (SHEET 2 OF 2) CHAINAGE 16+600 - 18+797
	TYPICAL CROSS-SECTION
CE1045/TD/MM/01	TYPICAL CROSS-SECTION
	TYPICAL CULVERT DRAWINGS
CE1045/CDS/MM/O1	HEADWALL TYPE 1 (HEADWALL AND WINGWALLS)
CE1045/CDS/MM/O2	HEADWALL TYPE 2 (DROP INLETS)
CE1045/CDS/MM/O3	HEADWALL TYPE 4 (FOR ACCESS CULVERT)
CE1045/CDS/MM/O4	BEDDING AND HAUNCH PROFILES TYPE III& IV
CE1045/CDS/MM/O5	CULVERT ROAD SIGNS
	STANDARD DRAWINGS
CE1045/SD/MM/01	STANDARD DRAWING - STANDARD - ROAD SIGNS
CE1045/SD/MM/02	STANDARD DRAWING - STANDARD - ROAD SIGNS INSTALLATION
CE1045/SD/MM/03	STANDARD DRAWING - STANDARD - TRAFFIC MANAGEMENT
CE1045/SD/MM/04	STANDARD DRAWING - PUBLICITY SIGN BOARD

GENERAL DRAWINGS

CLIMATE PROOFED PROJECT ROADS IN THARAKA NITHI COUNTY





REVISIONS	No.	DATE	DESCRIPTION



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

DIRECTOR GENERAL	
DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)	



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 MARIMA MAKUTANO BATCH 2

DRAWING TITLE
MARIMA MAKUTANO SKETCH MAP

DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N
Scale: 1:5000

Drg No. CE1045/GD/MM/01
Date :DECEMBER 2024



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:
DRAFT DETAILED ENGINEERING DESIGN OF
MARIMA MAKUTANO BATCH 2

DRAWING TITLE:
GENERAL LAYOUT
SHEET 1 OF 2
CHAINAGE 11+972 - 16+600

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



REVISIONS	No.	DATE	DESCRIPTION



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

DIRECTOR GENERAL	
DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)	



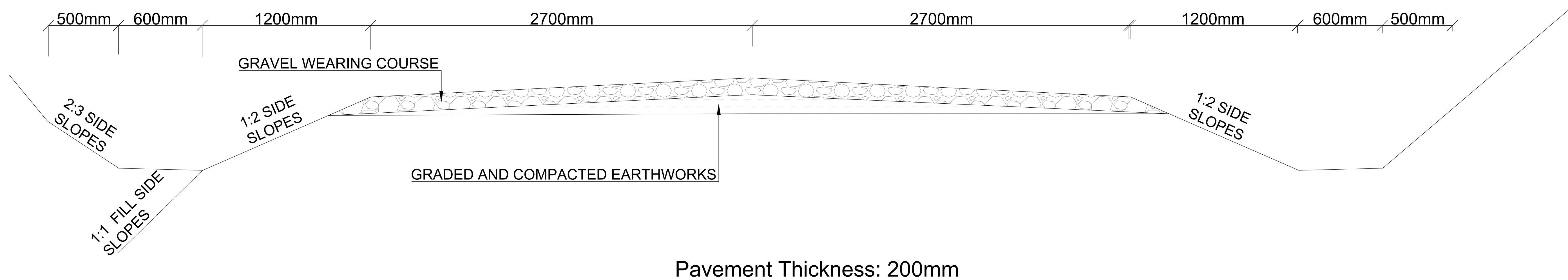
Runji Consulting Group Ltd
Engineering & Project Management.
3, Kindaruma Road (Off Ngong Road)
P. O. Box 68053-00200 Nairobi
Tel. (020) 2717213/4

PROJECT TITLE:	DRAFT DETAILED ENGINEERING DESIGN OF MARIMA MAKUTANO BATCH 2
----------------	---

DRAWING TITLE:	GENERAL LAYOUT SHEET 1 OF 2 CHAINAGE 16+600 - 18+797
----------------	--

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

TYPICAL CROSS-SECTION



Slope benching details

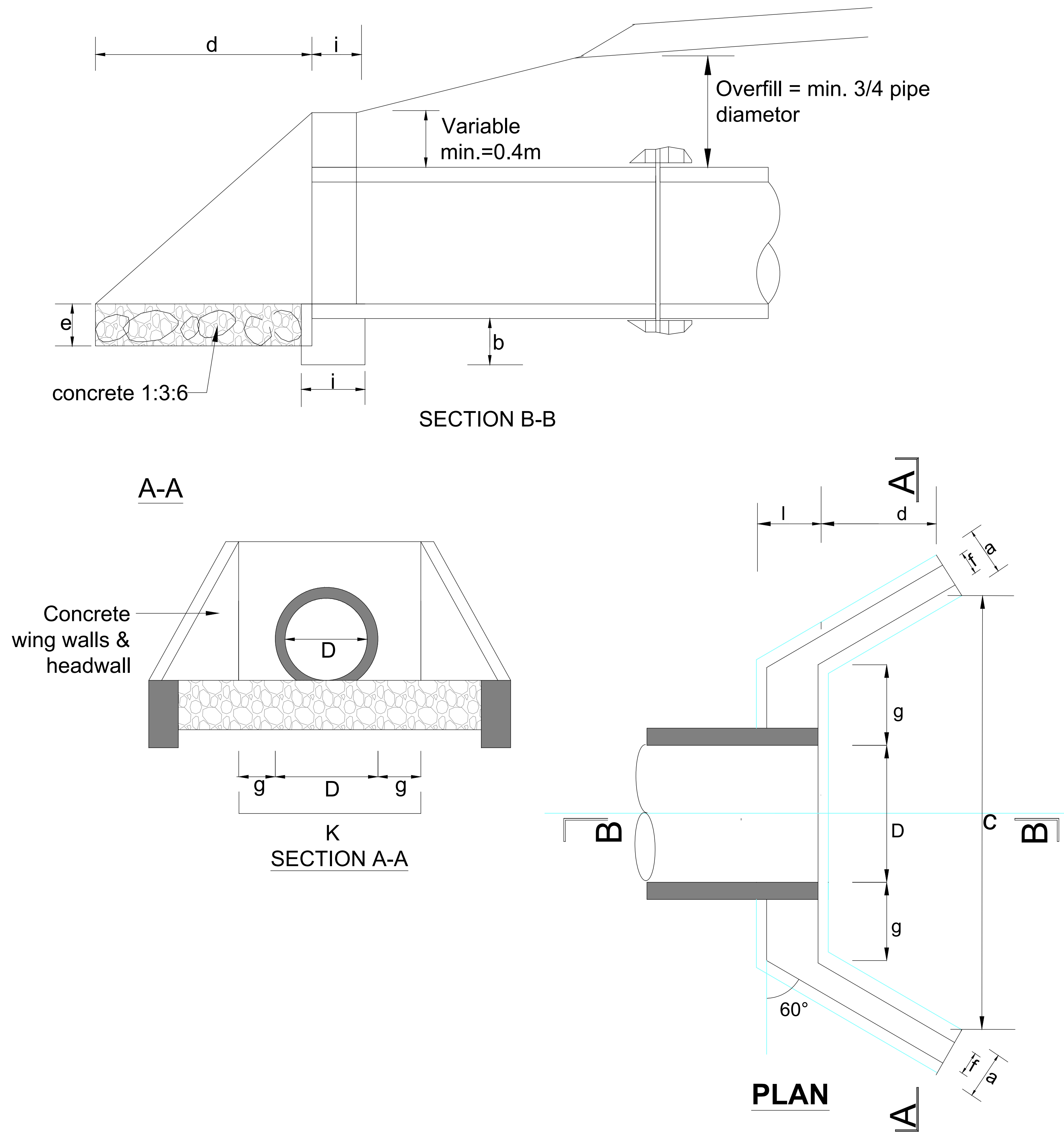
GENERAL NOTES:

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 instructed by the Engineer.

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:	DRAWING TITLE: TYPICAL CROSS-SECTION	DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/CDS/MM/O5
					DIRECTOR / (PLANNING , DESIGN &ENVIRONMENT)		DRAFT DETAILED ENGINEERING DESIGN OF MARIMA MAKUTANO ROAD BATCH 2		Scale: NTS	Date : DECEMBER 2024

TYPICAL CULVERT DRAWINGS

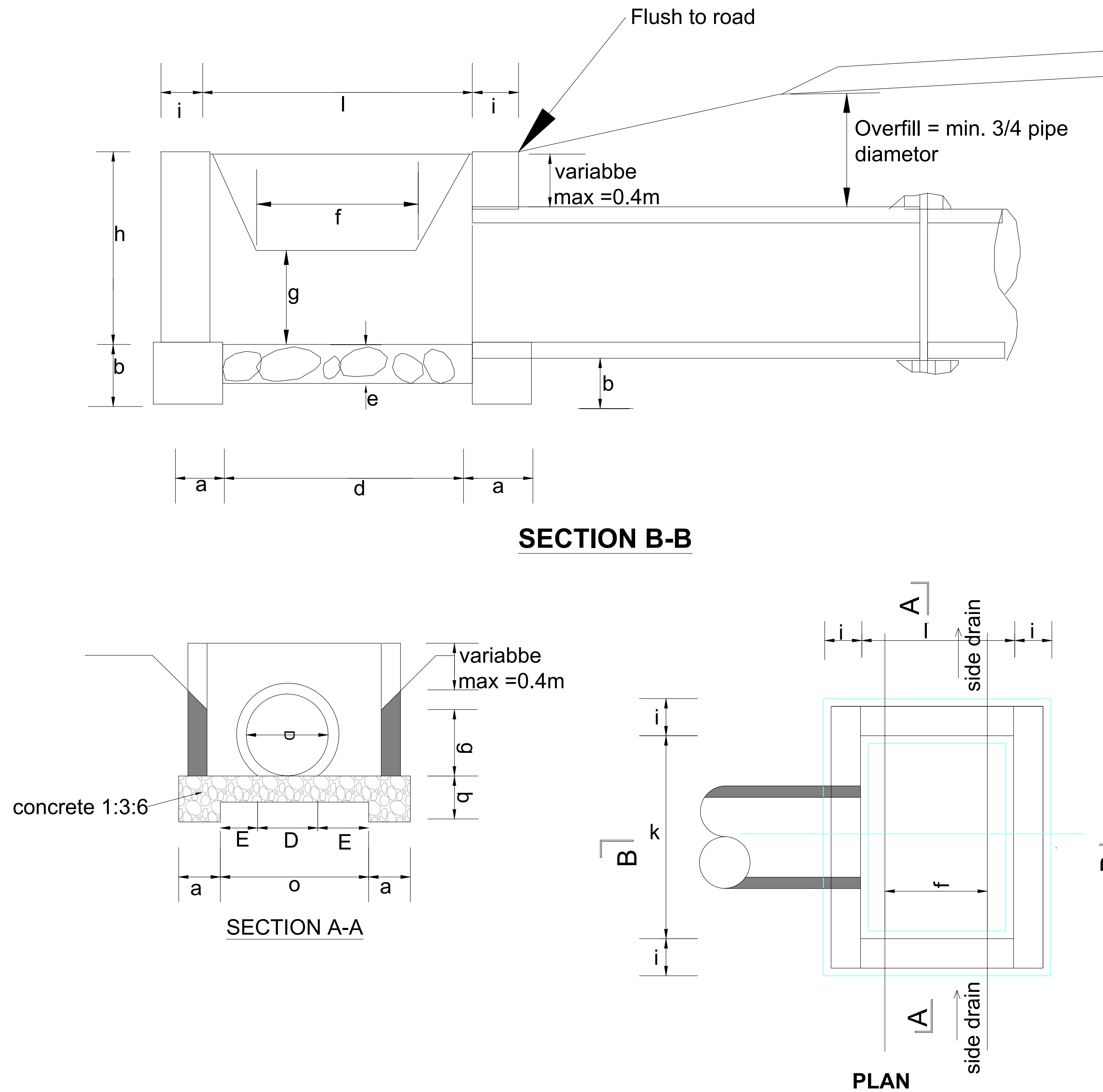
FIGURE H.8 - HEADWALL TYPE 1 (HEAD AND WINGWALLS)



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)		
			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



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:

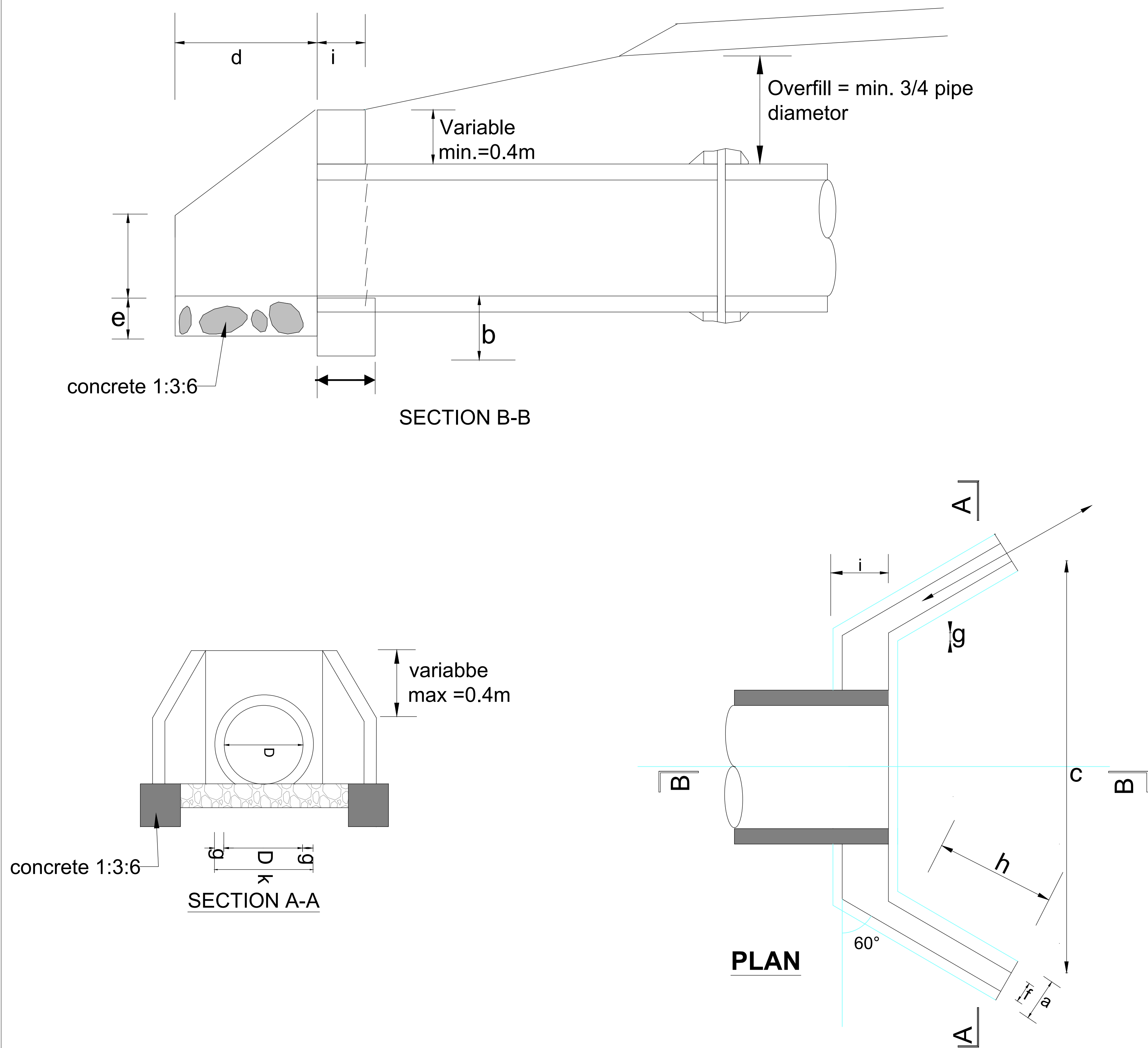
 DRAFT DETAILEDENGINEERING DESIGN OF
 MARIMA MAKUTANO ROAD BATCH 2

DRAWING TITLE:

HEADWALL TYPE 2 (DROP INLETS)

DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N Scale: NTS	Drg No. CE1045/CDS/MM/O2 Date : DECEMBER 2024
--	--

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



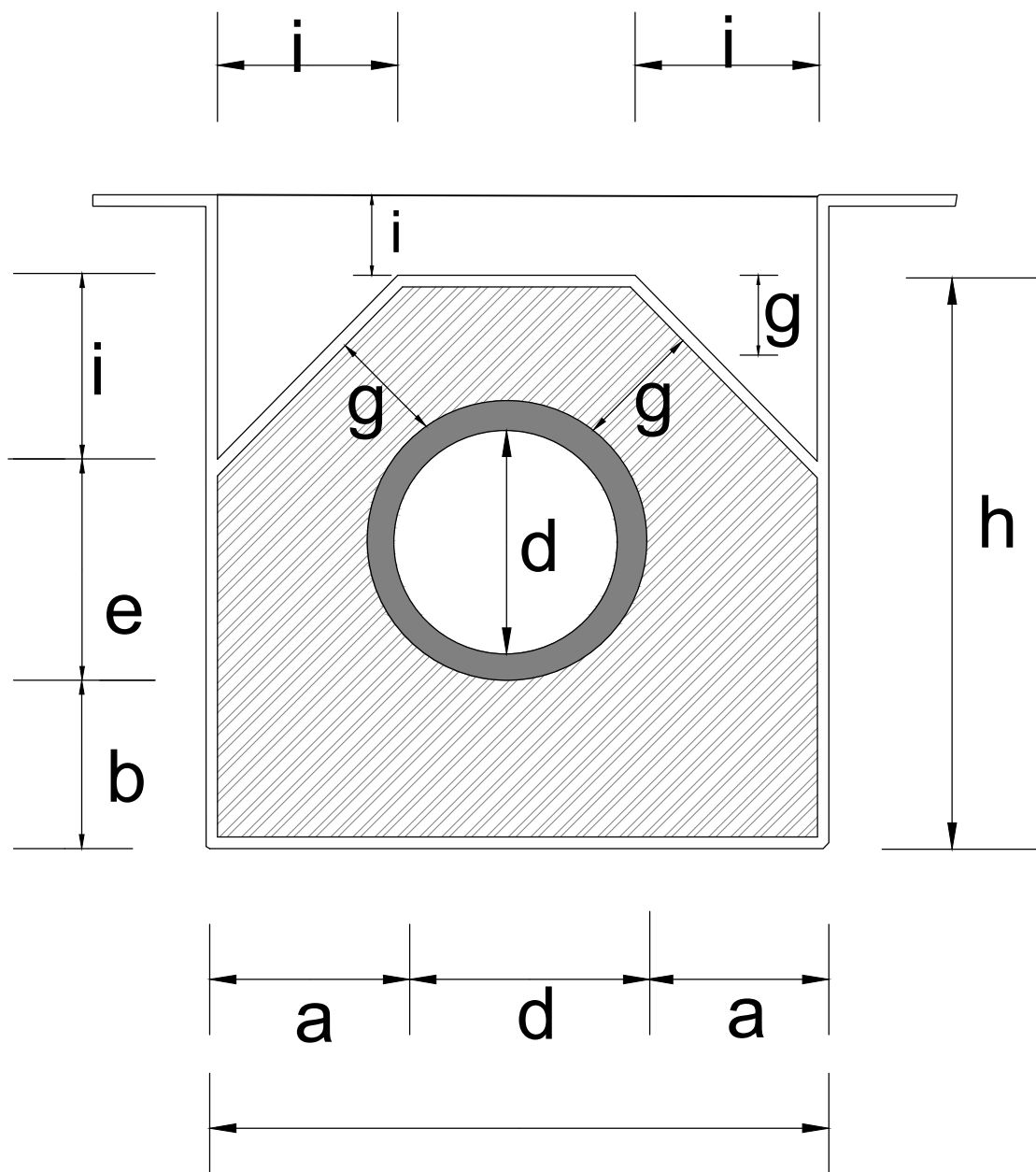
DIMENSIONS AND MATERIAL REQUIREMENTS

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	

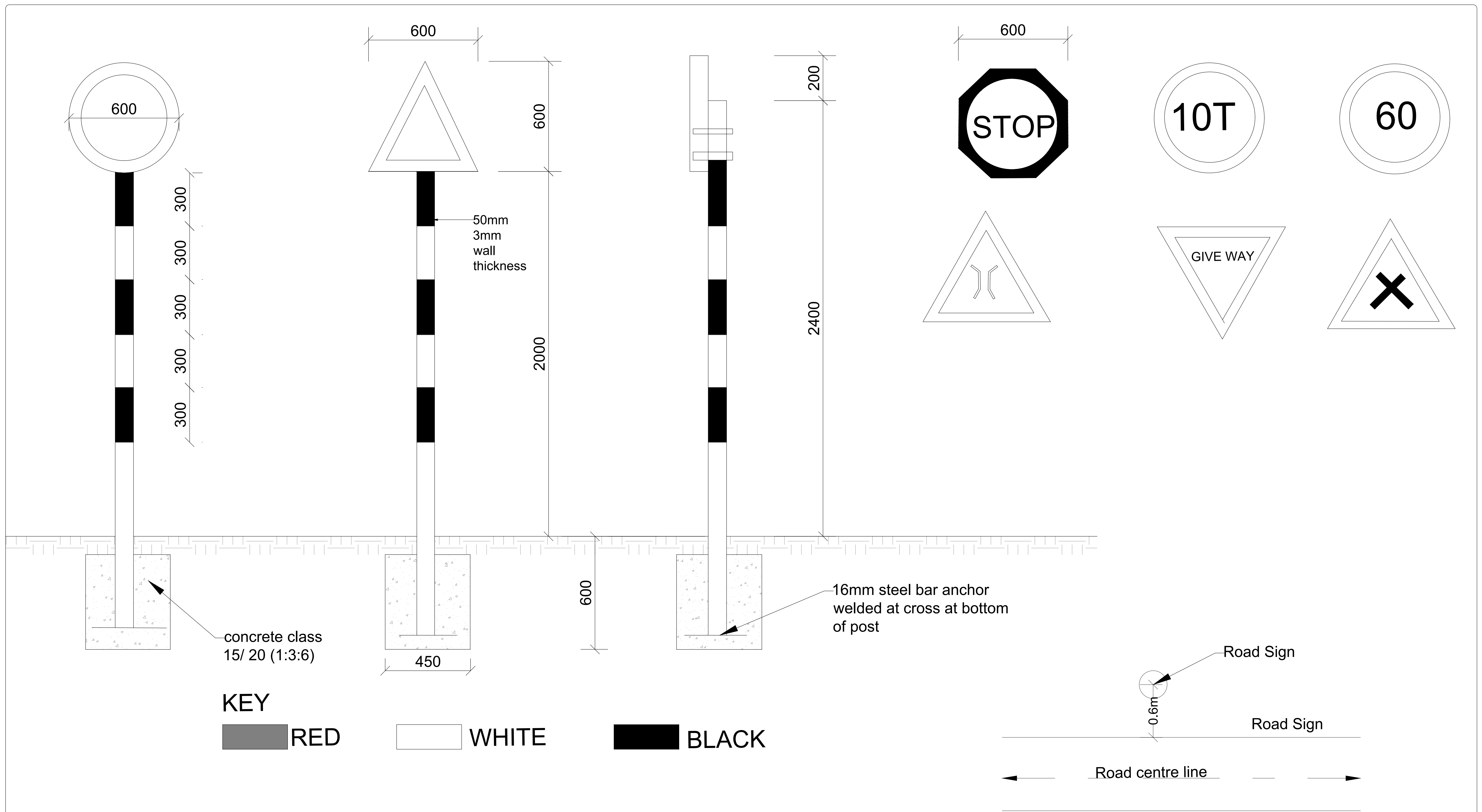
FIGURE H.14-BEDDING AND HAUNCH PROFILES TYPE III& IV

PROFILE IV

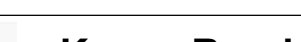
(CONCRETE)



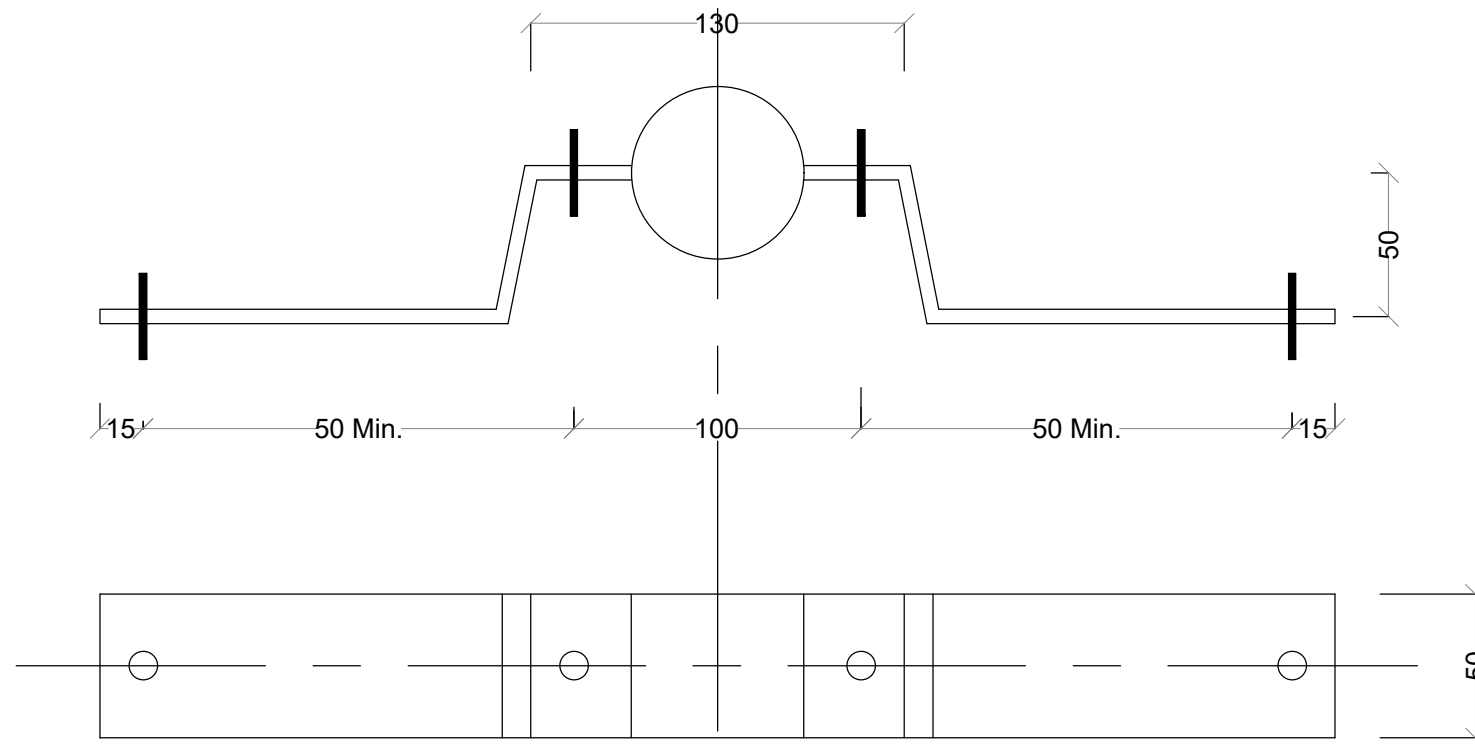
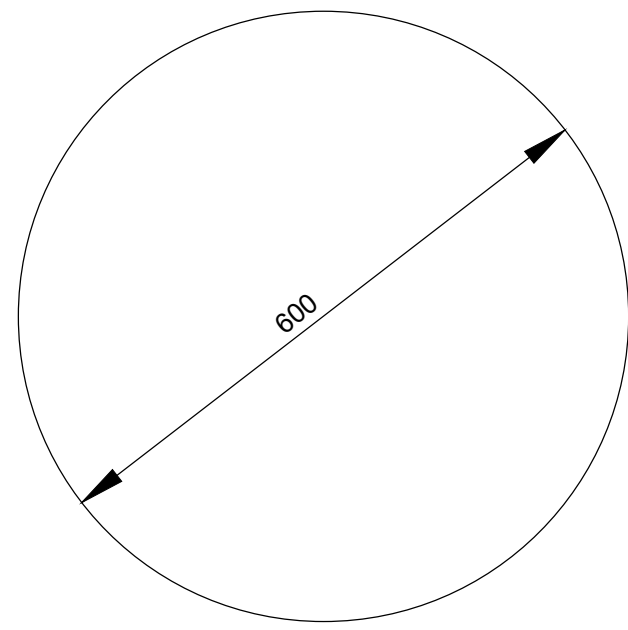
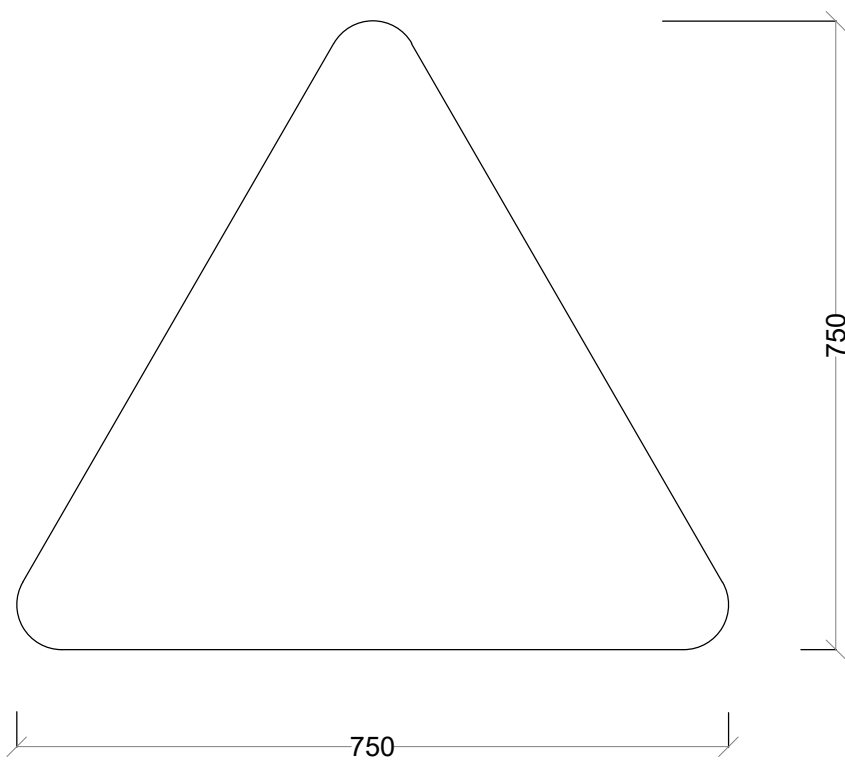
450 (mm)	600 (mm)	900 (mm)
Dimensions in (m)		
0.15	0.2	0.2
0.15	0.15	0.15
0.86	0.15	1.48
0.56	0.72	1.08
0.46	0.15	0.78
0.15	0.15	0.15
0.15	0.15	0.15
0.81	1.02	1.38
0.28	0.35	0.45
volume in (m3/m)		
0.37	0.61	0.92
-fair to poor subgrade condition -overfill > ³ / ₄ Dia; -Seasonal waterflow only. -Use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



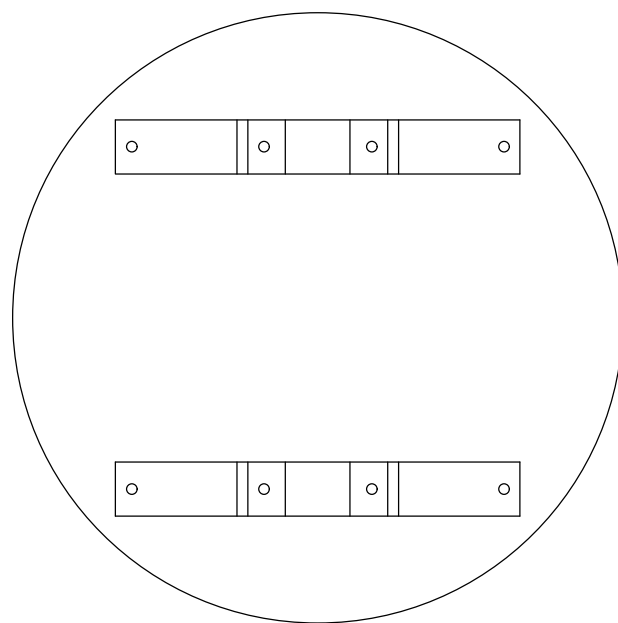
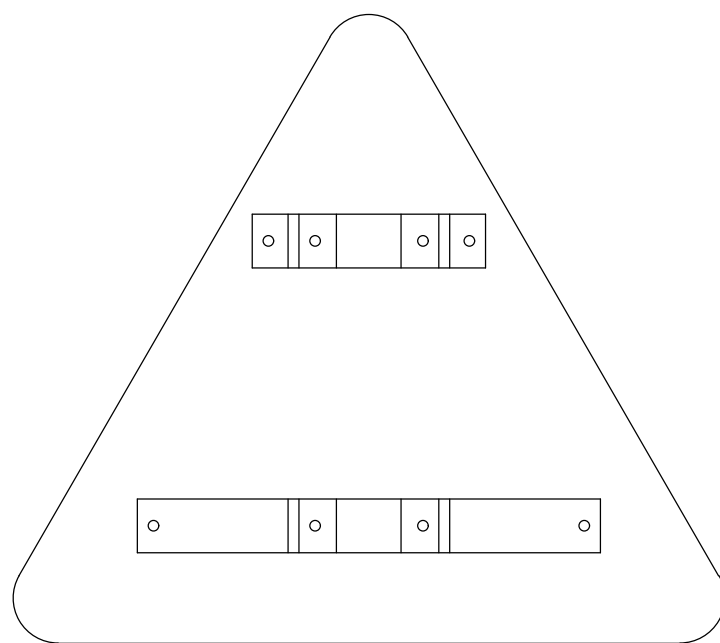
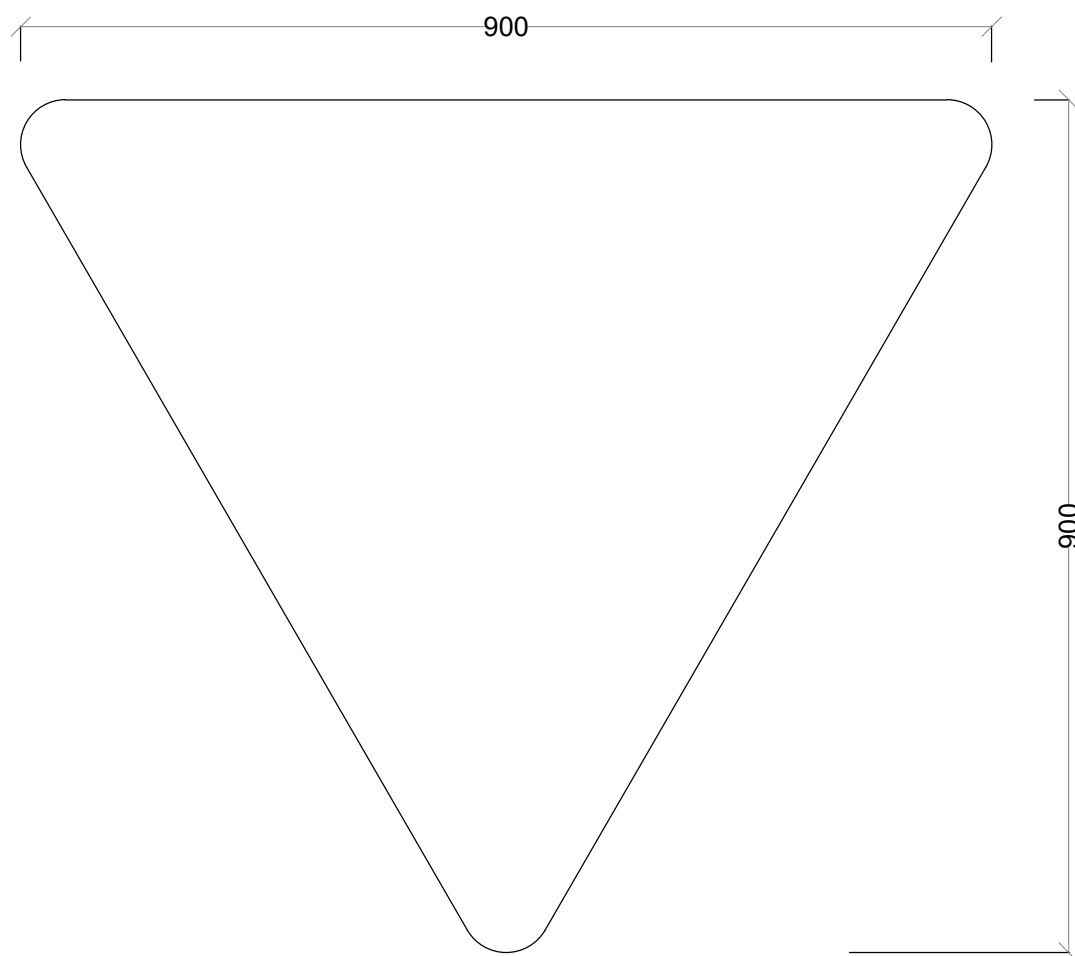
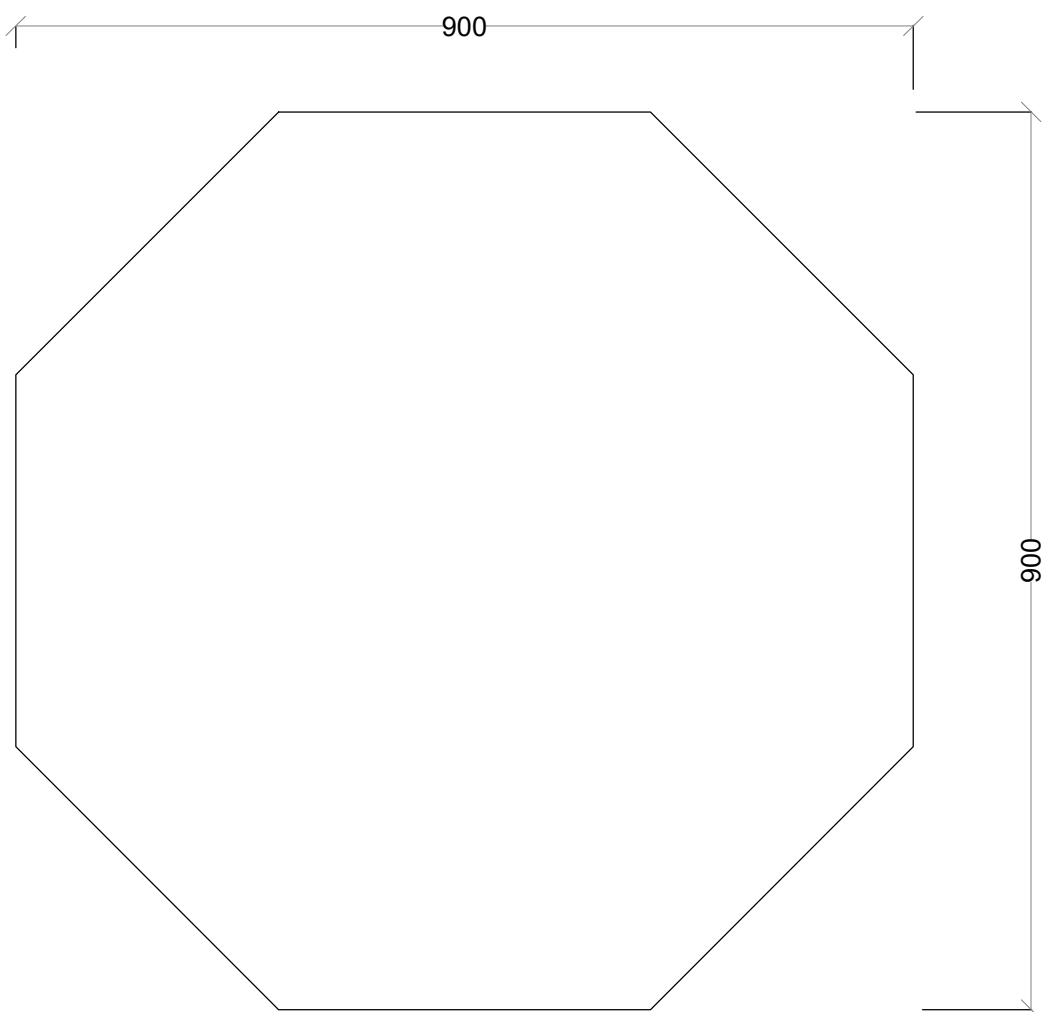
- 1.The type of sign required and their location shall de shown as road plan or as directed by engineer
2.signs plate to be 2mm thick mild steel plate
3.sign post to be 50mm fixing clamp/brackets
4.Sign plate to be fixed to steel tube by \$Nos M10 bolts and 50mm fixing clamp/brackets
5,Sign paints shall 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 DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)	 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 DETAILEDENGINEERING DESIGN OF MARIMA MAKUTANO ROAD BATCH 2	DRAWING TITLE CULVERT ROAD SIGNS	DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/CDS/MM/O5
									Scale: NTS	Date : DECEMBER 2024

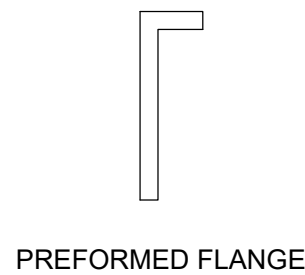
STANDARD DRAWINGS



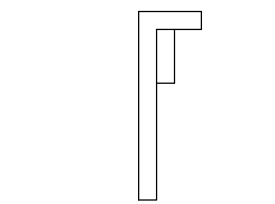
FIXING BRACKET DETAIL
SCALE 1:2.5



TYPICAL FIXING DETAILS
SCALE 1:25



PREFORMED FLANGE

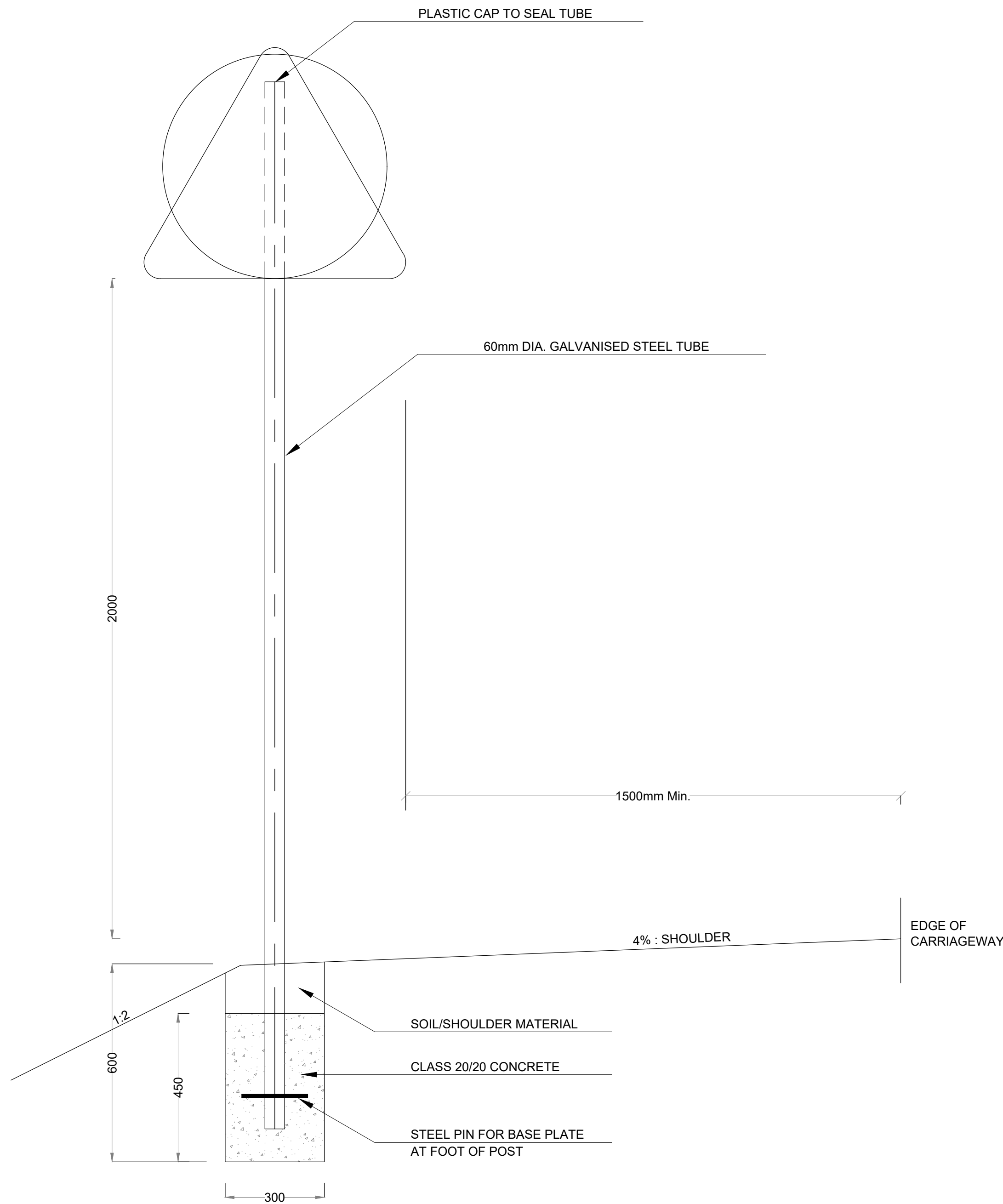


ANGLE STIFFENING

STIFFENING TO SIGNS
SCALE 1:20

GENERAL NOTES:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- ALL ROAD SIGNS ARE 3mm ALUMINIUM PLATES WITH REFLECTIVE MATERIALS.
- PLASTIC WASHERS TO BE PLACED BETWEEN ALUMINIUM SIGNS AND STEEL BRACKETS.
- ALL SIGN SUPPORTS AND FITTINGS TO BE GALVANISED MILD STEEL.
- THE ENDS OF BOLTS TO BE HAMMERED OR SPOT WELDED.
- ALL WHITE, RED, BLUE AND YELLOW PARTS ON SIGNS TO BE MADE OF RETRO-REFLECTIVE MATERIAL.
- 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.



SIGN PLACEMENT
SCALE 1:25

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:

DRAFT DETAILED ENGINEERING DESIGN OF
MARIMA MAKUTANO (ROAD) BATCH 2

DRAWING TITLE:

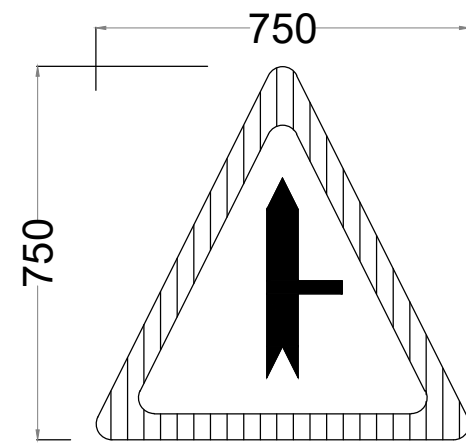
STANDARD DRAWING -
STANDARD - ROAD SIGNS

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

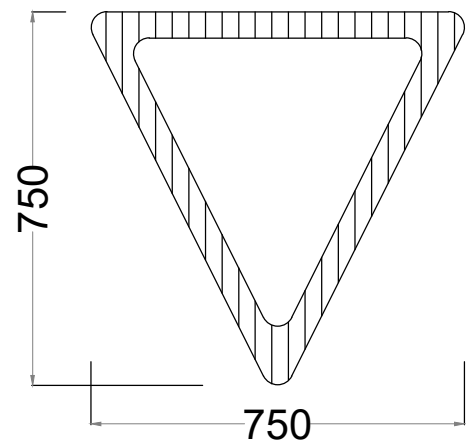
Scale: AS SHOWN

Drg No.
CE1045/SD/MM/01

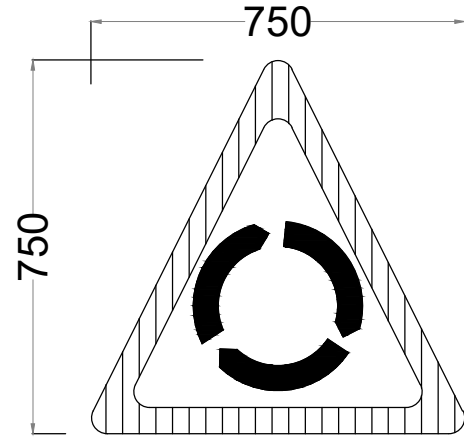
Date :DECEMBER 2024



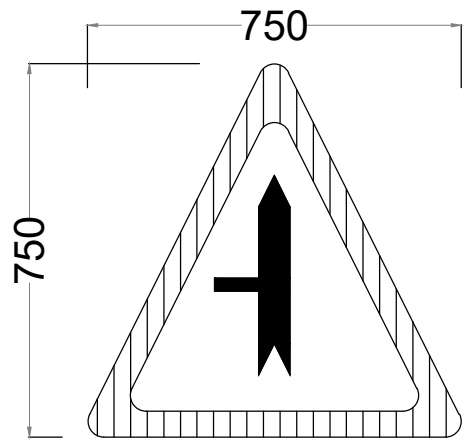
SIGN TYPE W 28C



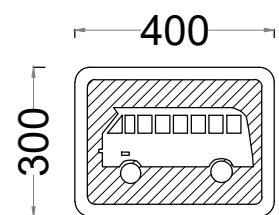
SIGN TYPE R2



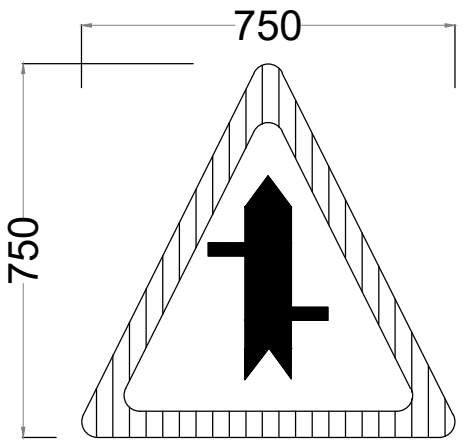
SIGN TYPE W 30



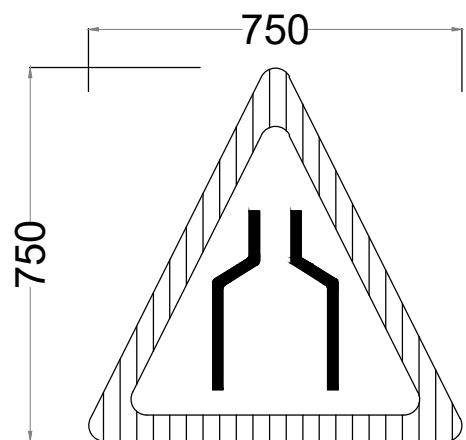
SIGN TYPE W 28B



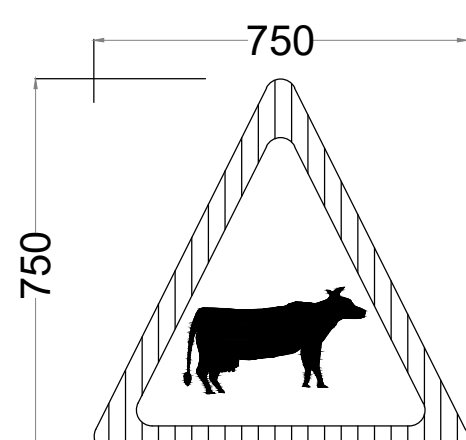
SIGN TYPE I 41



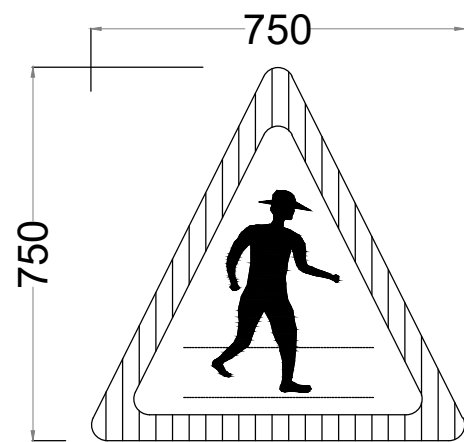
SIGN TYPE W 28



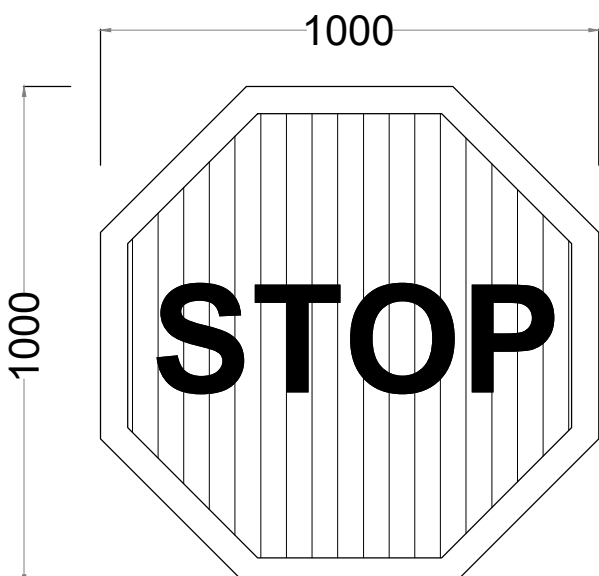
SIGN TYPE W 7



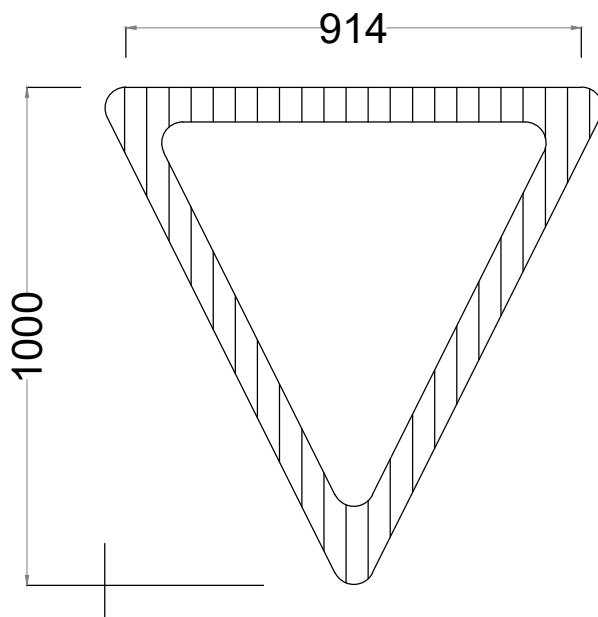
SIGN TYPE W 20



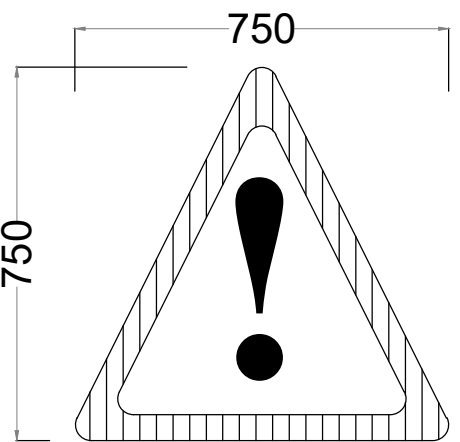
SIGN TYPE W 17



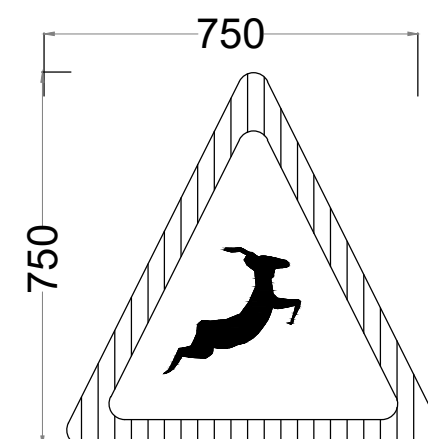
SIGN TYPE R 1



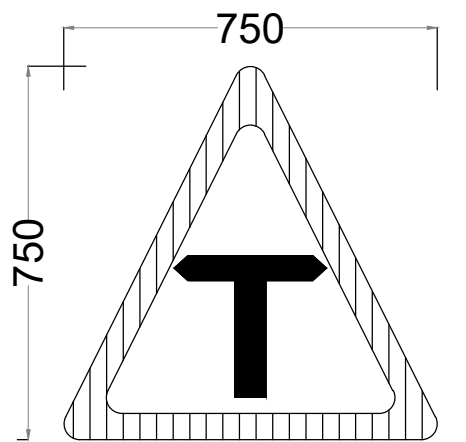
SIGN TYPE R2



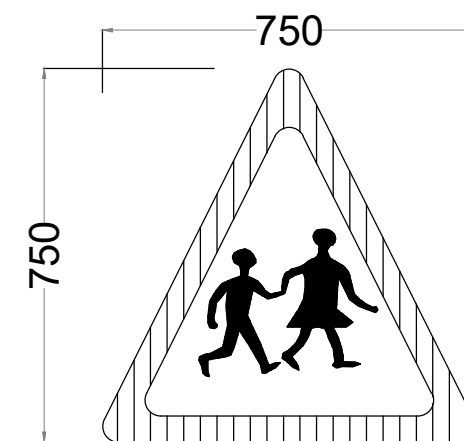
SIGN TYPE W26



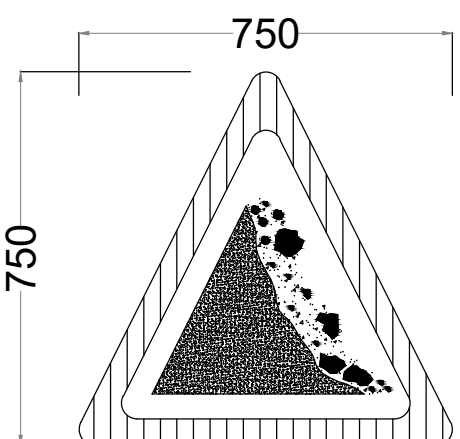
SIGN TYPE W 21



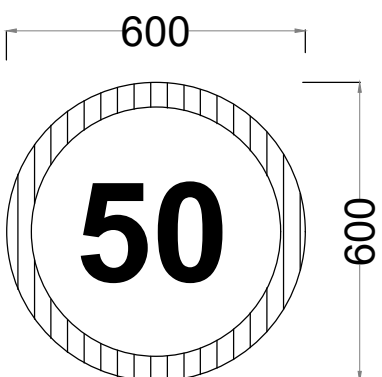
SIGN TYPE W 27



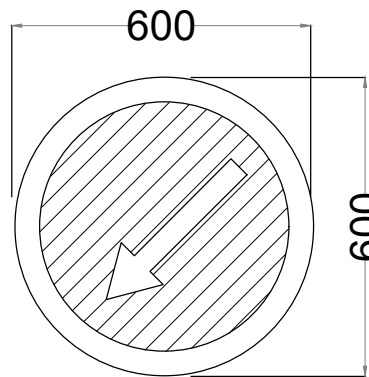
SIGN TYPE W 18



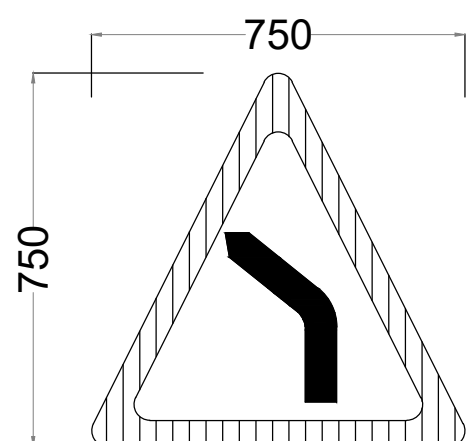
SIGN TYPE W16



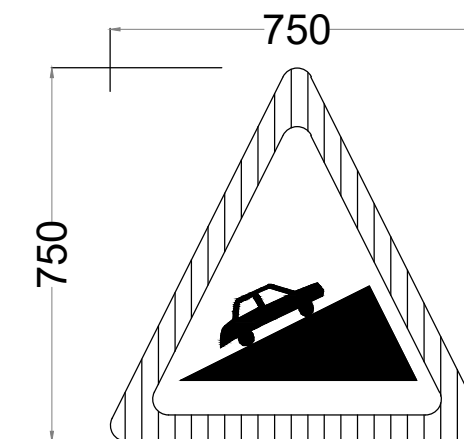
SIGN TYPE P25



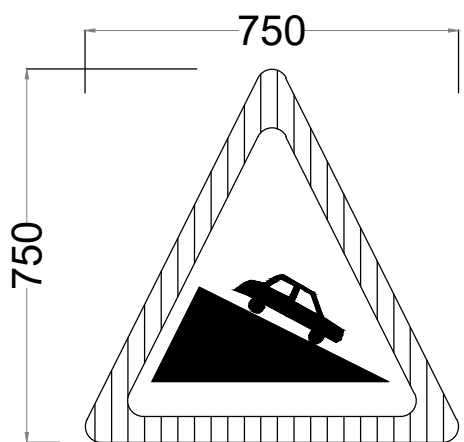
SIGN TYPE M5



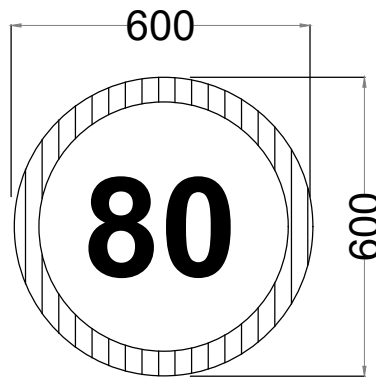
SIGN TYPE W 1



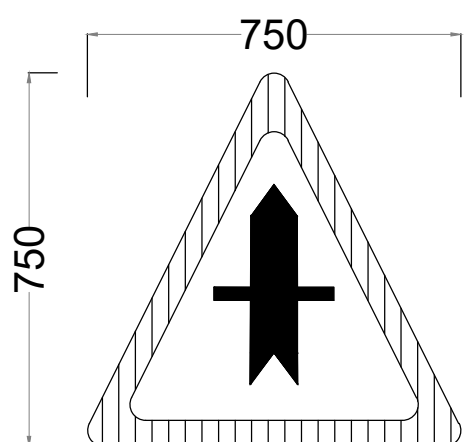
SIGN TYPE W 6



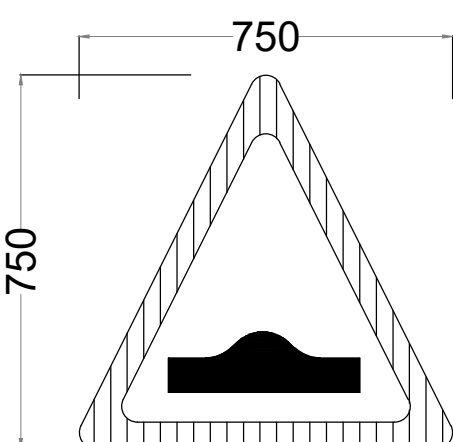
SIGN TYPE W 5



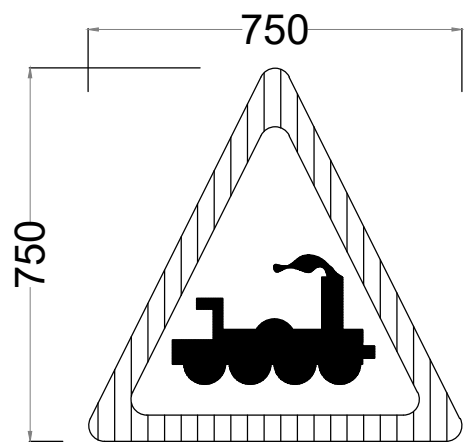
SIGN TYPE P25



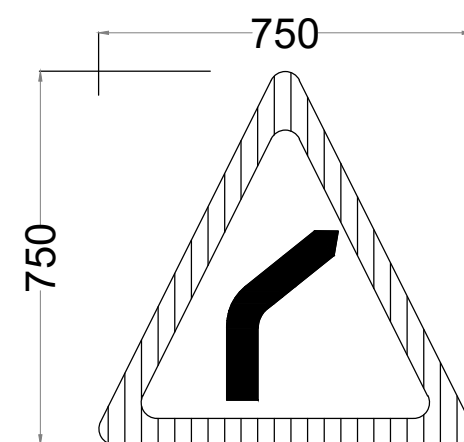
SIGN TYPE W 28A



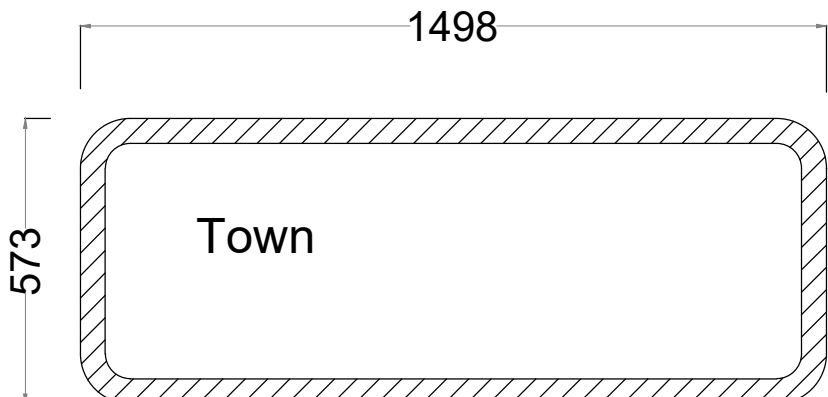
SIGN TYPE W 12



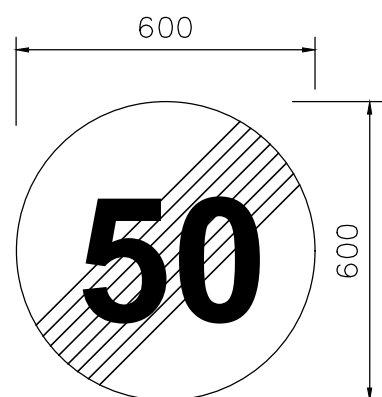
SIGN TYPE W 32



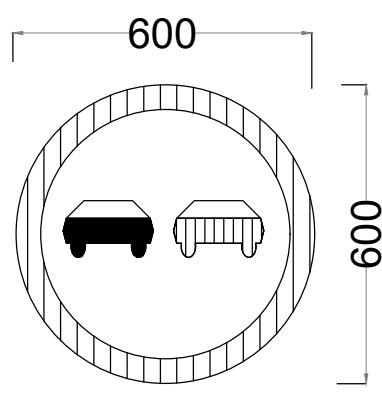
SIGN TYPE W 2



SIGN TYPE - I 27

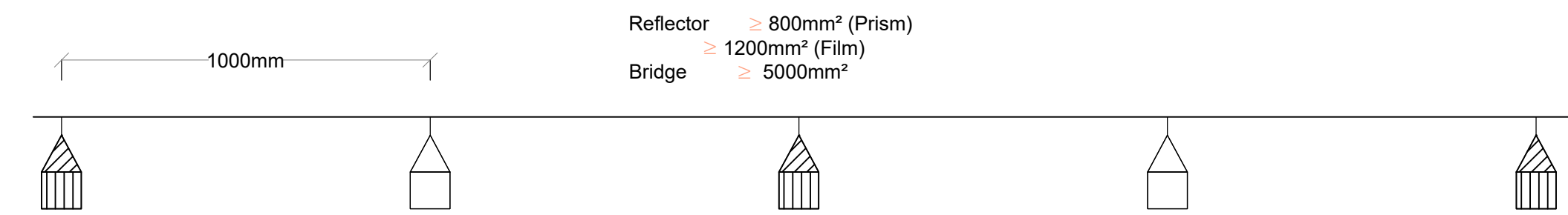
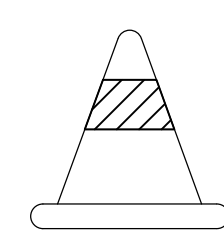
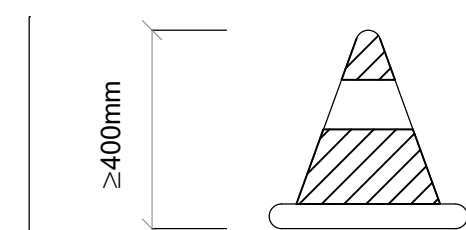
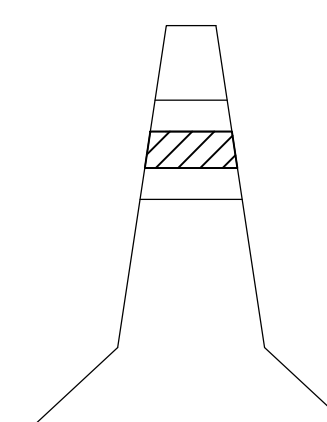
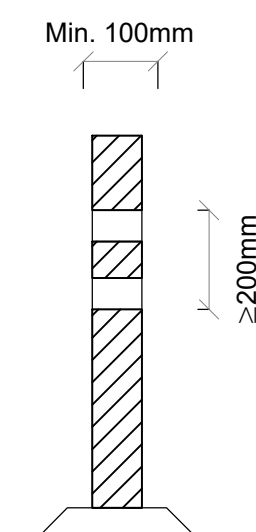
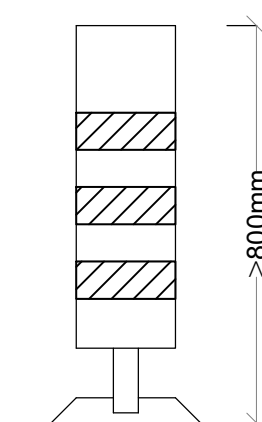
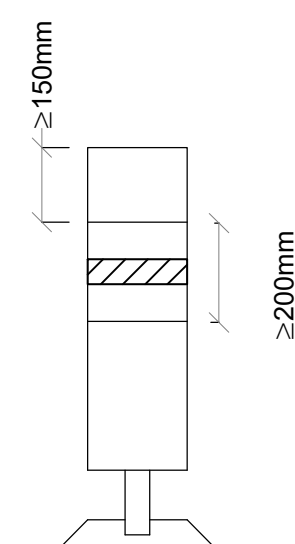
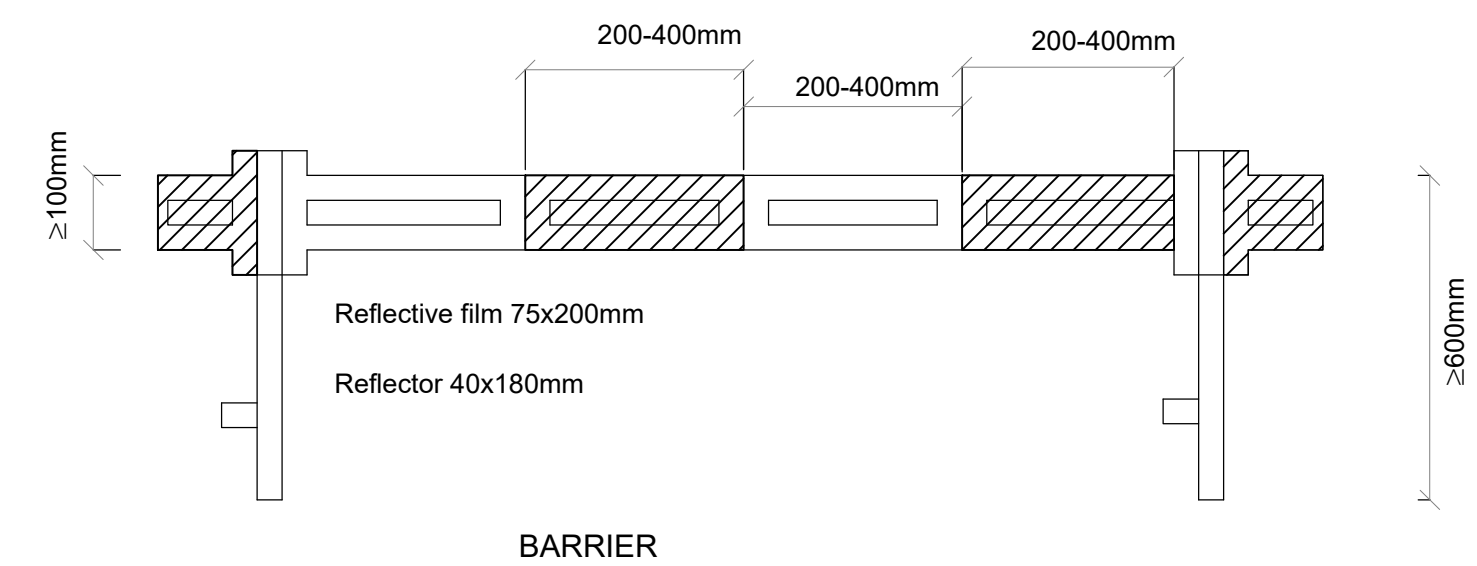


SIGN TYPE P30

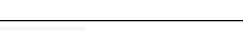
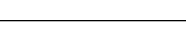


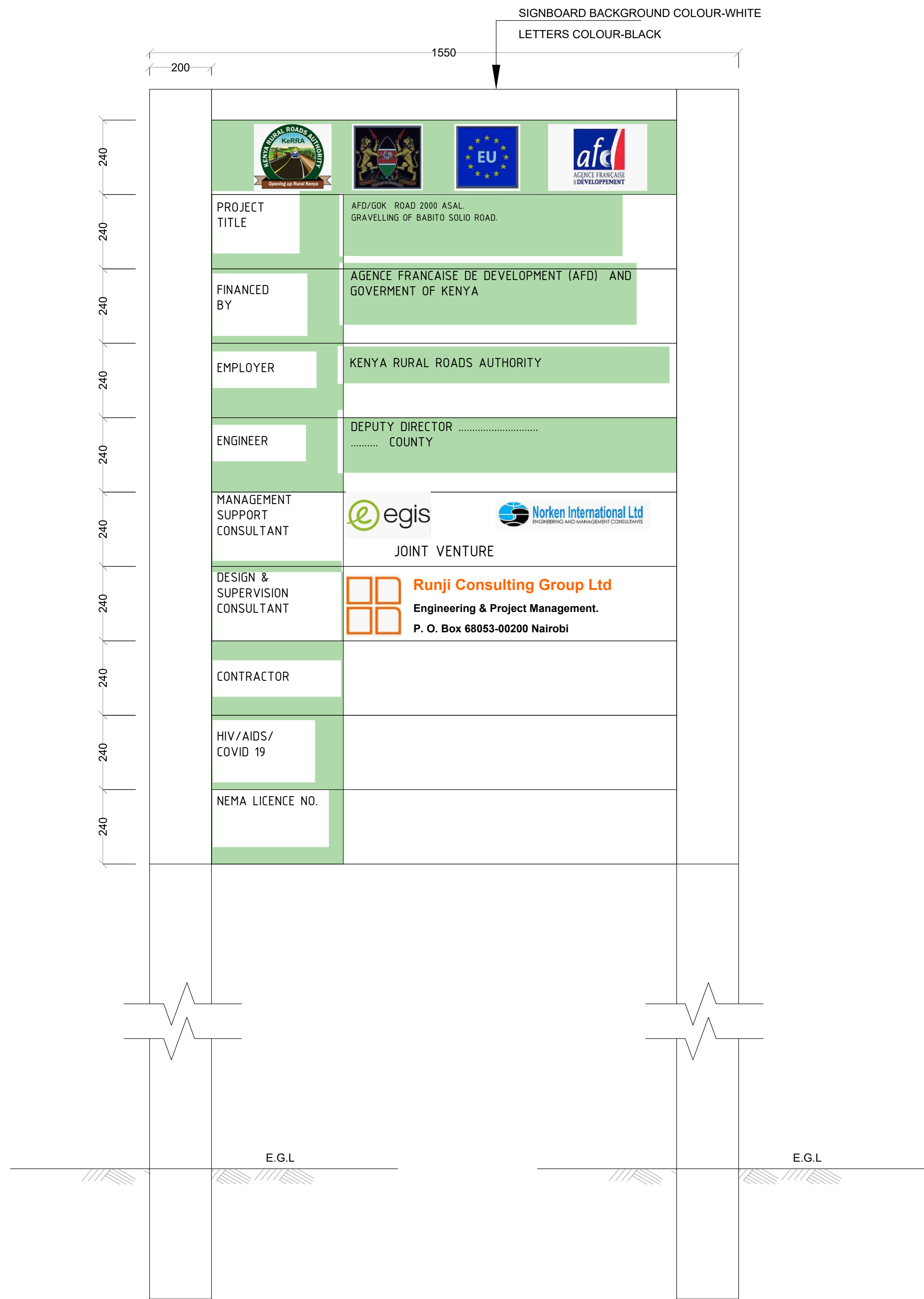
SIGN TYPE P23

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: DRAFT DETAILED ENGINEERING DESIGN OF MARIMA MAKUTANO (ROAD) BATCH 2	DRAWING TITLE: STANDARD DRAWING - STANDARD - ROAD SIGNS INSTALLATION	DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/SD/MM/02	
									Scale: AS SHOWN	Date :DECEMBER 2024		

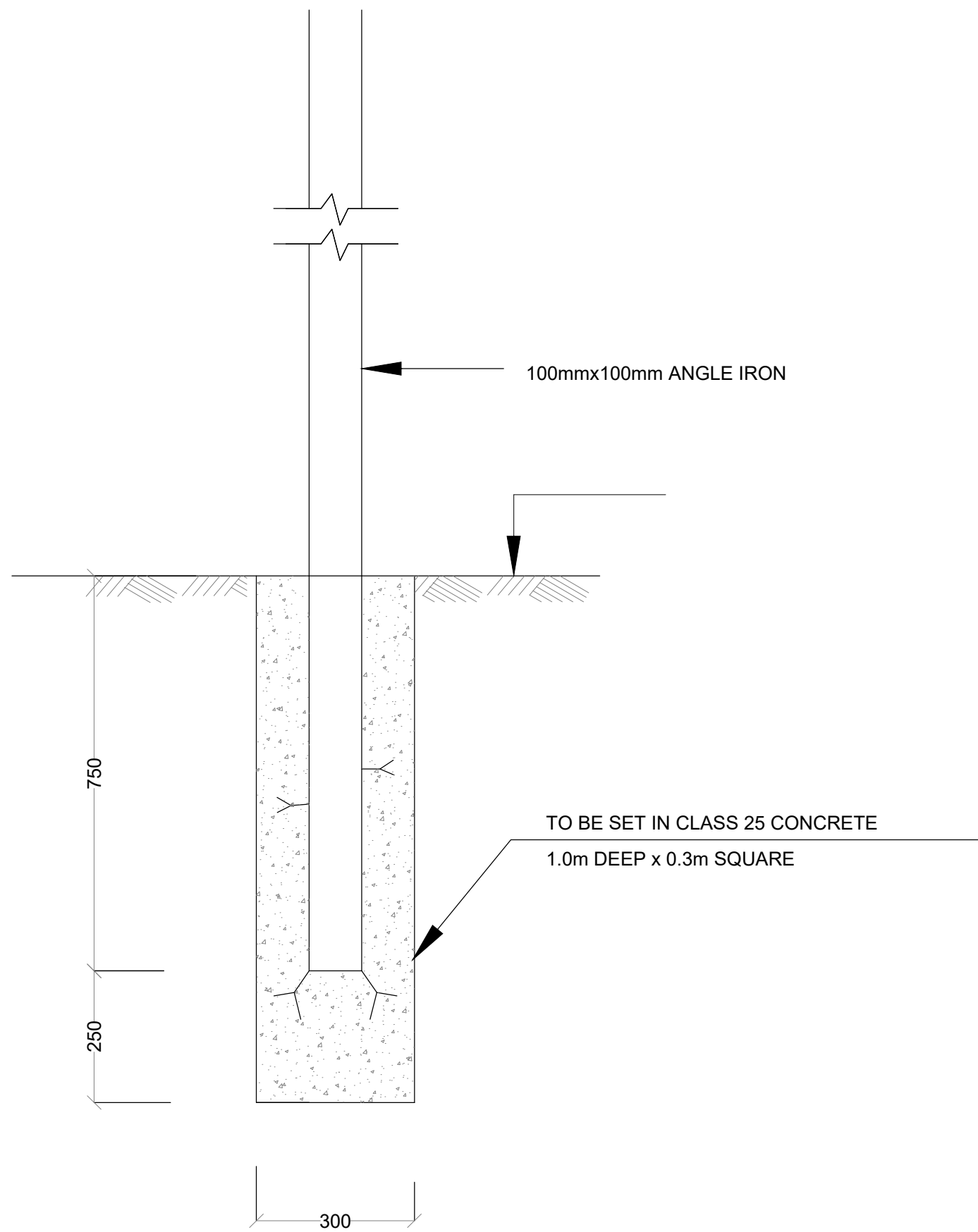


- NOTES:**
1. All temporary signs must be retro-reflective
 2. Numbers, lettering and colours to be in accordance with the Manual of Traffic Signs in Kenya Part II (JUNE 1975)
 3. Marker posts to be unbreakable plastic or glass fibre vergemaster or similar
 4. All signs must be kept clean and visible at all times.
 5. Sketches shown on this drawing are the minimum requirements, signs may be varied or adjusted as directed by the Resident Engineer to suit each particular site
 6. Fences and barriers shall be provided as directed by the Resident Engineer to separate pedestrians and traffic where they will need to use road or deviation for access
 7. All works and temporary signs are to comply with the requirements of Section 9 of the Standard Specification

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:	DRAWING TITLE: STANDARD DRAWING - TRAFFIC MANAGEMENT	DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/SD/MM/03
					DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)		DRAFT DETAILED ENGINEERING DESIGN OF MARIMA MAKUTANO (ROAD) BATCH 2		Scale: AS SHOWN	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	 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: DRAFT DETAILED ENGINEERING DESIGN OF MARIMA MAKUTANO (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/MM/04 Date :DECEMBER 2024