



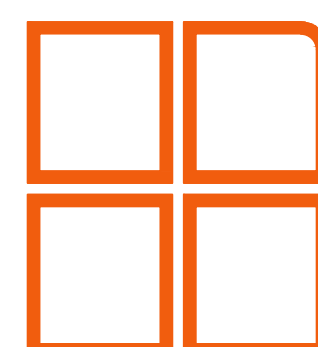
CLIMATE PROOFED ARID AND SEMI ARID RURAL ROADS, PRELIMINARY DETAILED DESIGN OF BABITO - SOLIO ROAD

JANUARY 2024

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

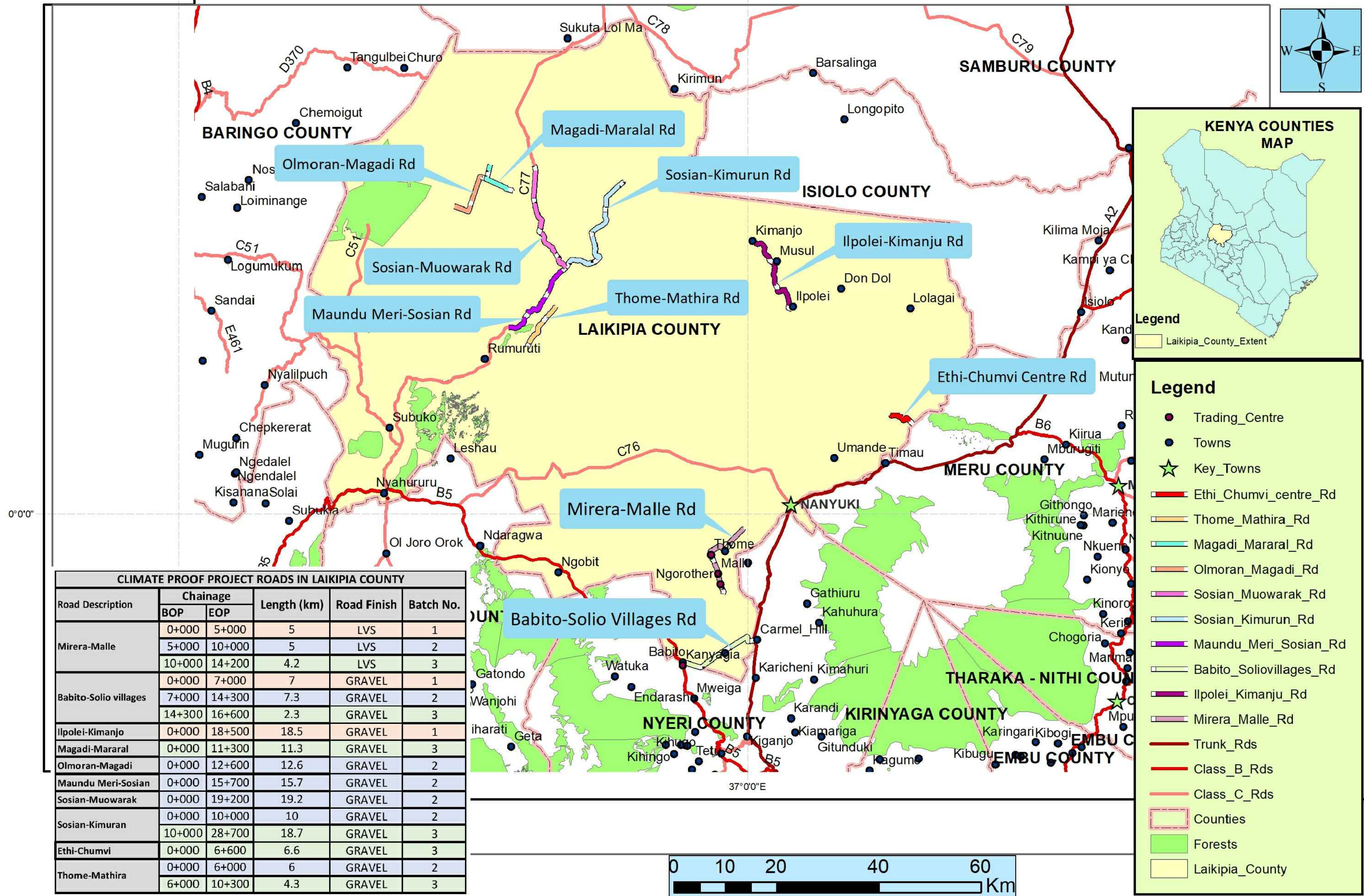
ENGINEER

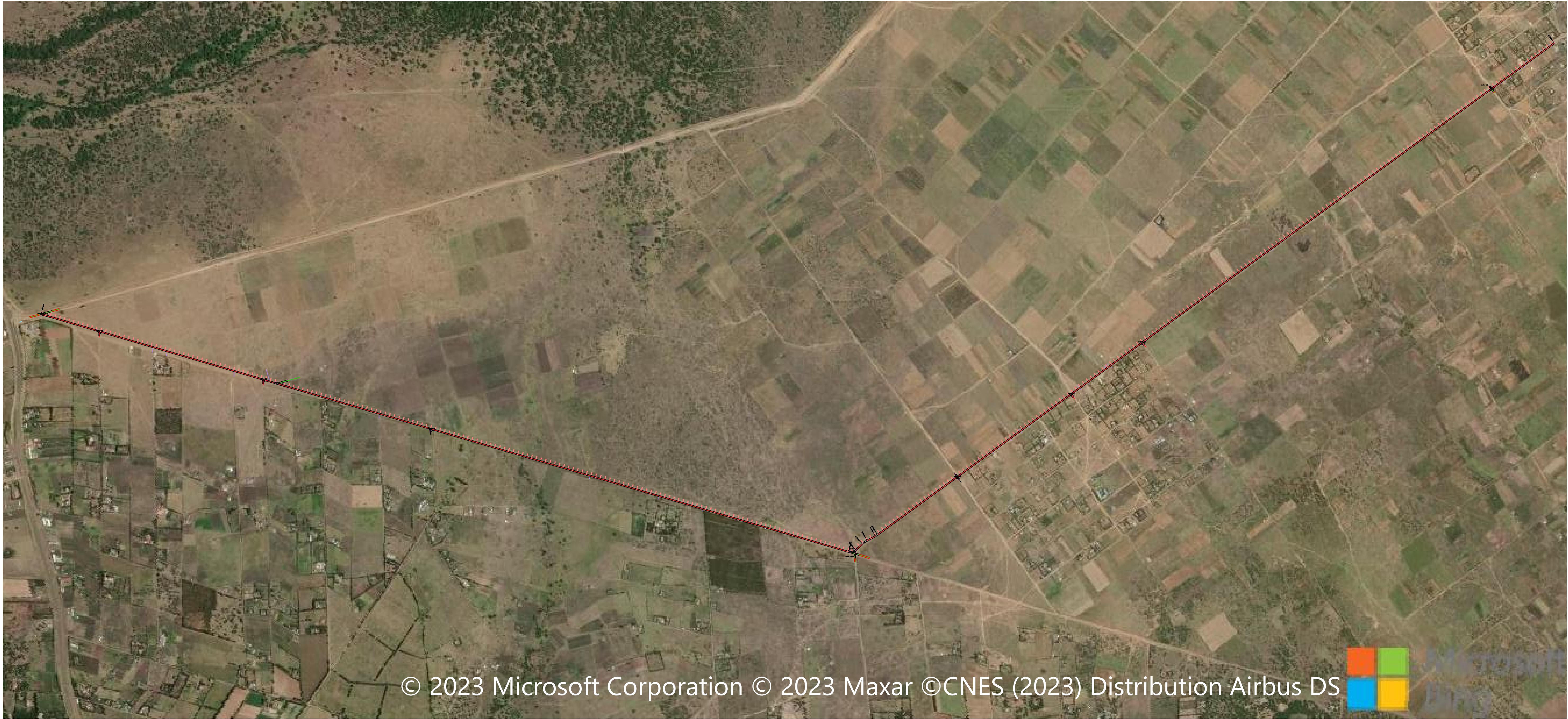
**DIRECTOR
PLANNING, DESIGN & ENVIRONMENT
P.O BOX 48151-00100,
NAIROBI, Kenya**

	BABITO - SOLIO ROAD DRAWINGS
	COVER PAGE
	DRAWING LIST
	GENERAL DRAWINGS
CE/1045/GD/BS/01	LOCATION MAP
CE/1045/GD/BS/02	SKETCH MAP
	TYPICAL CROSS SECTION DRAWINGS
CE1045/TS/BS/01	TYPICAL CROSS SECTION
	TYPICAL CULVERT DRAWINGS
CE1045/CDS/BS/01	HEADWALL TYPE 1 (HEADWALL AND WINGWALLS)
CE1045/CDS/BS/02	HEADWALL TYPE 2 (DROP INLETS)
CE1045/CDS/BS/03	HEADWALL TYPE 4 (FOR ACCESS CULVERT)
CE1045/CDS/BS/04	BEDDING AND HAUNCH PROFILES TYPE III& IV
CE1045/CDS/BS/05	CULVERT ROAD SIGNS
	STANDARD DRAWINGS
CE1045/SD/BS/01	STANDARD DRAWING - STANDARD - ROAD SIGNS
CE1045/SD/BS/02	STANDARD DRAWING - STANDARD - ROAD SIGNS INSTALLATION
CE1045/SD/BS/03	STANDARD DRAWING - TRAFFIC MANAGEMENT
CE1045/SD/BS/04	STANDARD DRAWING - PUBLICITY SIGN BOARD

GENERAL DRAWINGS

CLIMATE PROOFED PROJECT ROADS IN LAIKIPIA 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 88053-00200 Nairobi
Tel. (020) 2717213/4

PROJECT TITLE:

**PRELIMINARY AND DETAILED
ENGINEERING DESIGN OF
BABITO SOLIO VILLAGES**

DRAWING TITLE

SKETCH MAP

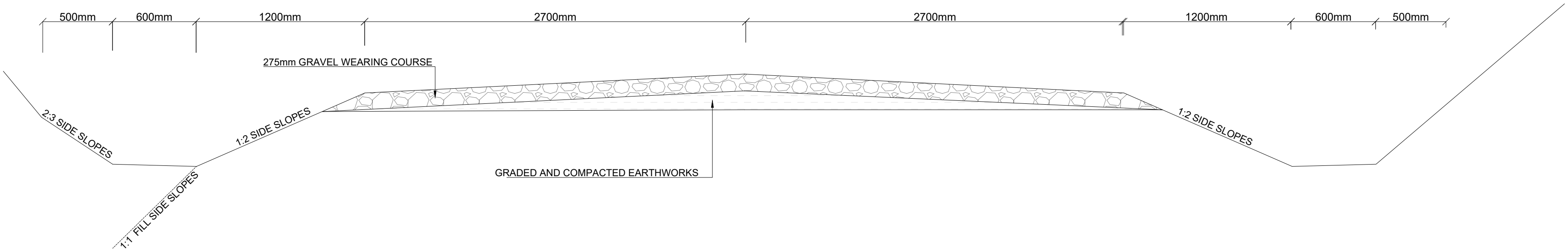
DRAWN BY: S.W.D
DESIGNED BY: C.M.N
CHECKED BY: M.J.N

Scale: NTS

Drg No.
CE1045/GD/BS/02

Date : JANUARY 2024

TYPICAL CROSS-SECTION



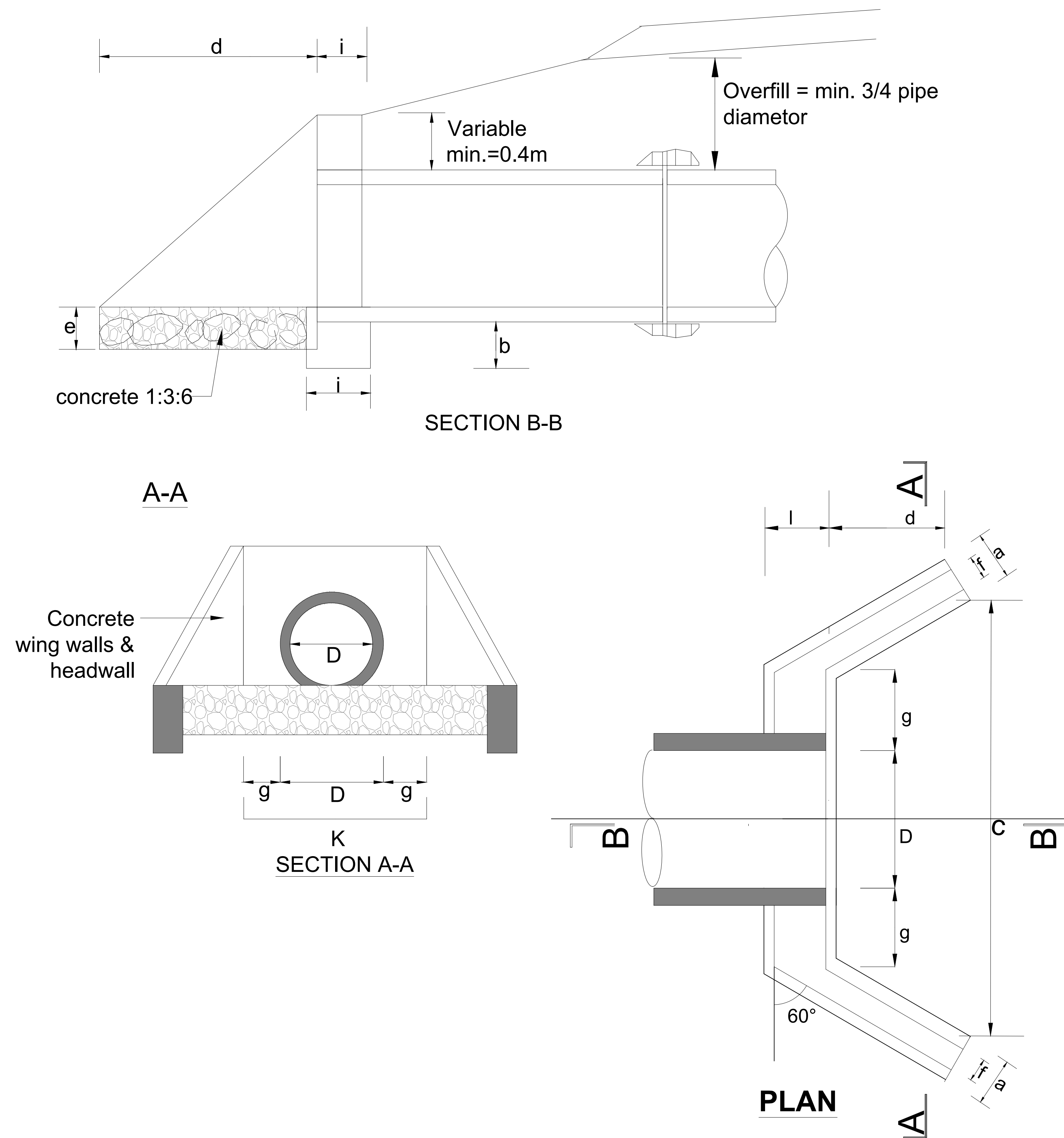
Slope benching details

- 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.

Pavement Thickness: 275mm

TYPICAL CULVERT DRAWINGS

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

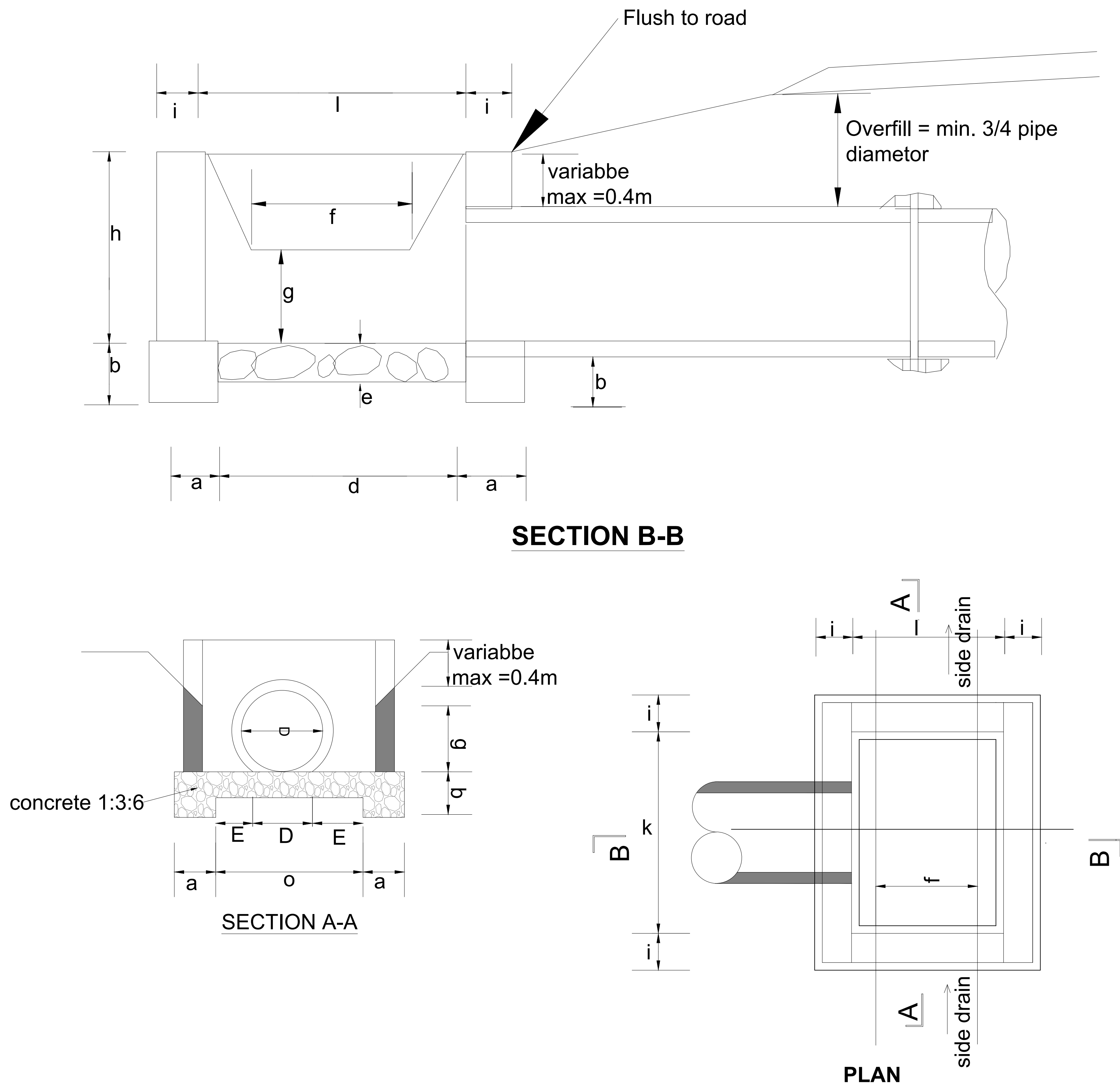


DIMENSIONS AND MATERIAL REQUIREMENTS

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	0.30	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
l	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

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 BABITO- SOLIO ROAD	DRAWING TITLE: HEADWALL TYPE 1 (HEADWALL AND WINGWALLS)	DRAWN BY: S.W.O DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/CDS/BS/O1			
											Scale: NTS	Date : JANUARY 2024	

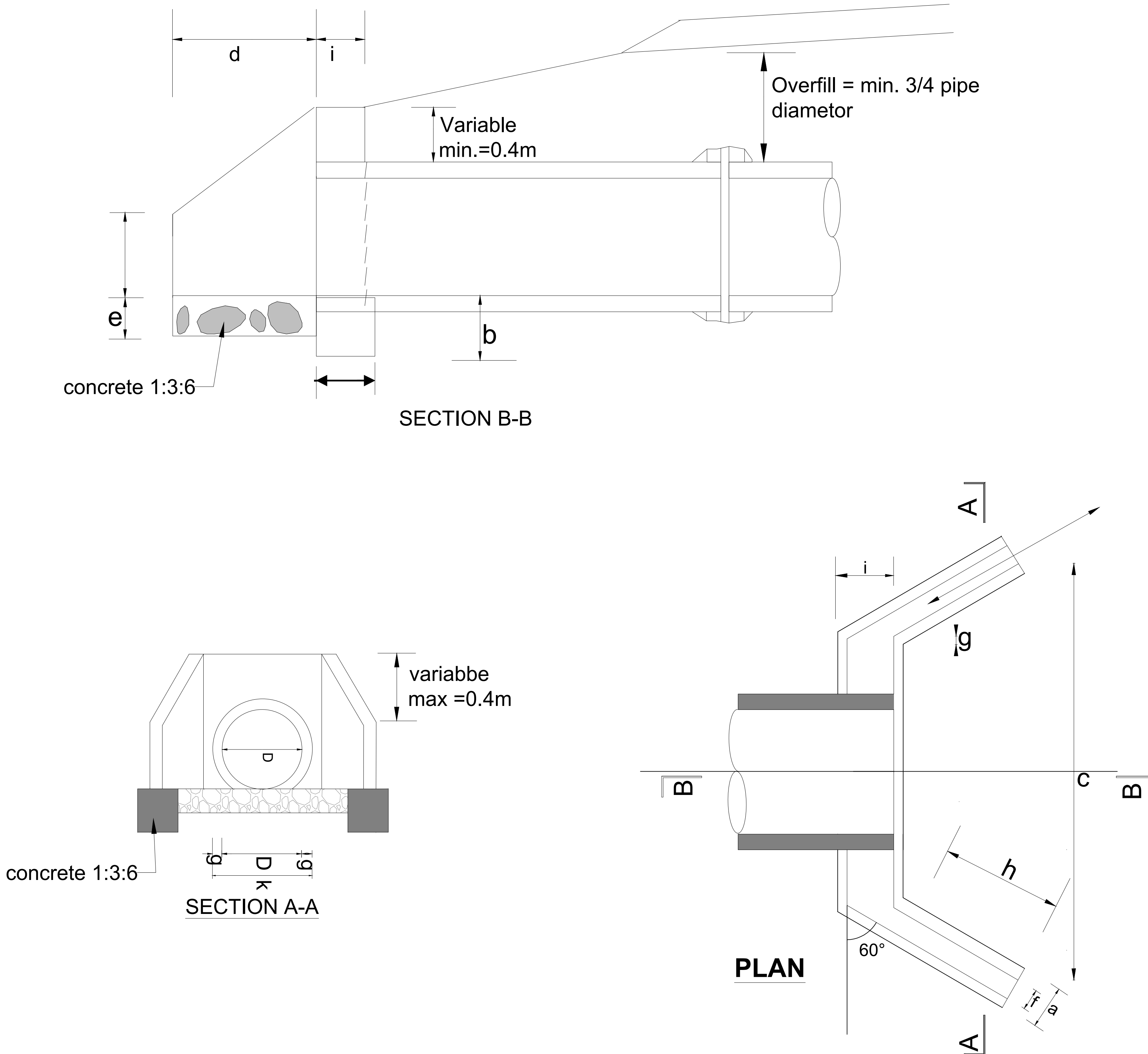
FIGURE H.9 - HEADWALL TYPE 2 (DROP INLETS)



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
i	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)



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	

[illegible]

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 BABITO- SOLIO ROAD

DRAWING TITLE:

HEADWALL TYPE 4 (FOR ACCESS
CULVERT)

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

Scale: NTS

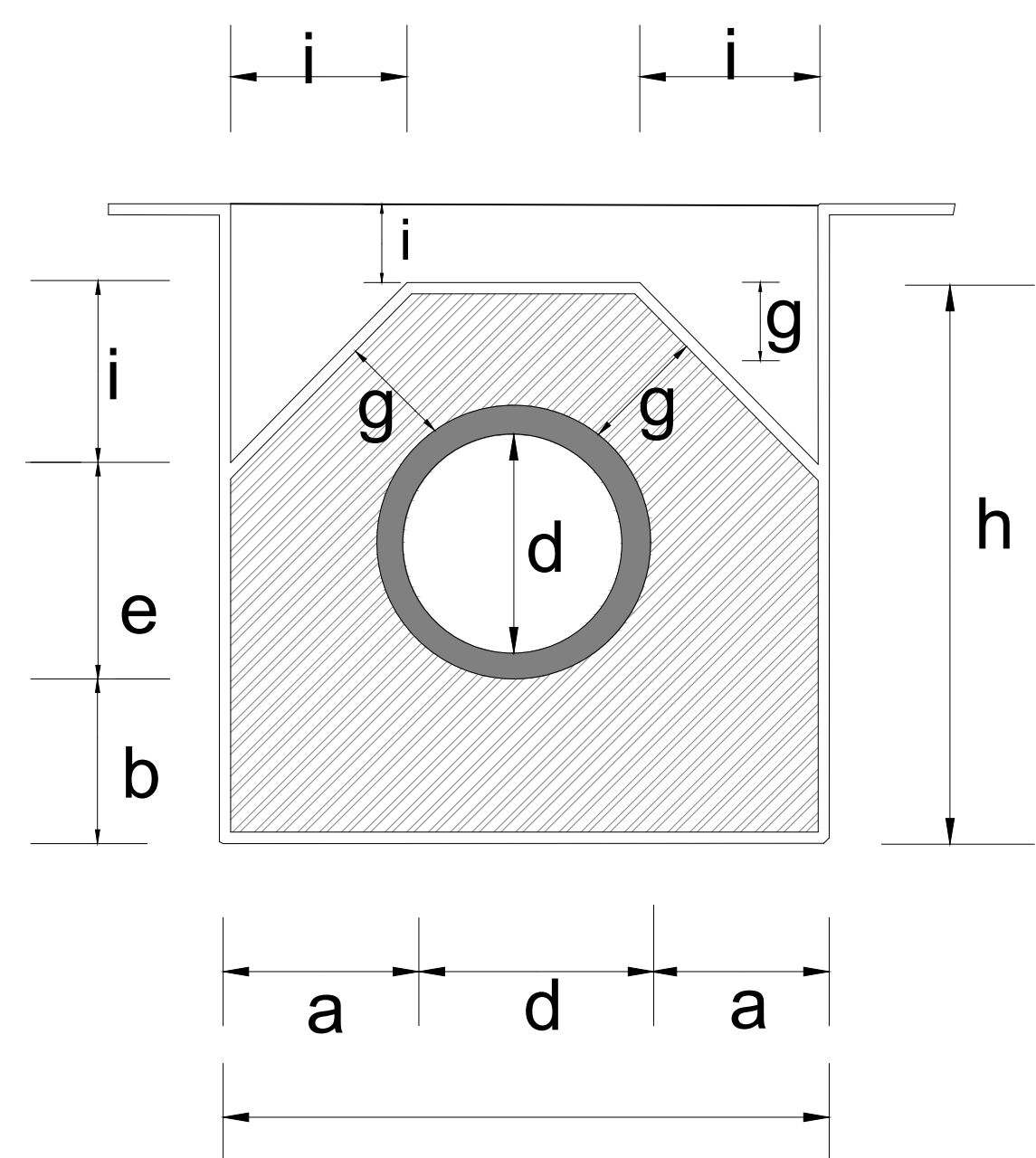
Org No.
CE1045/CDS/BS/O3

Date : JANUARY 2024

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.			

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:



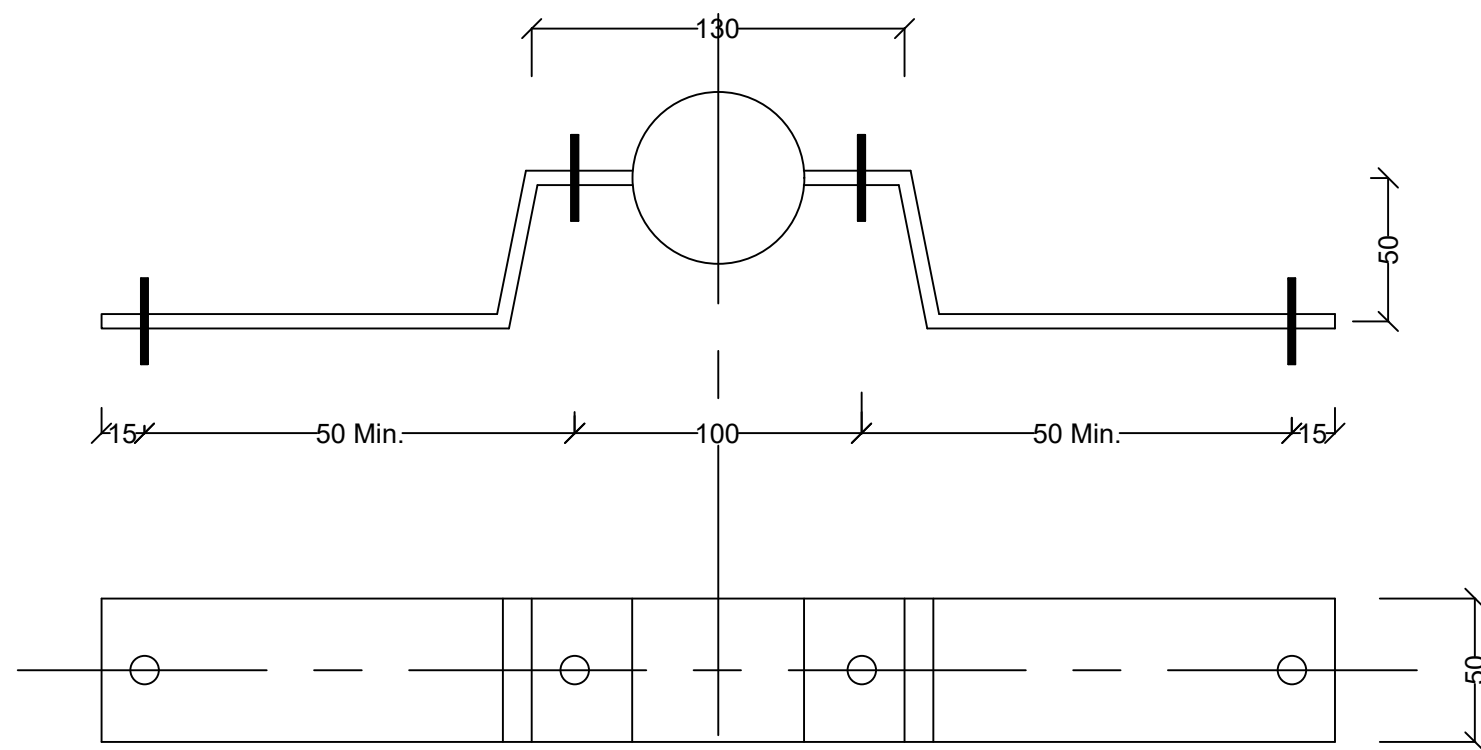
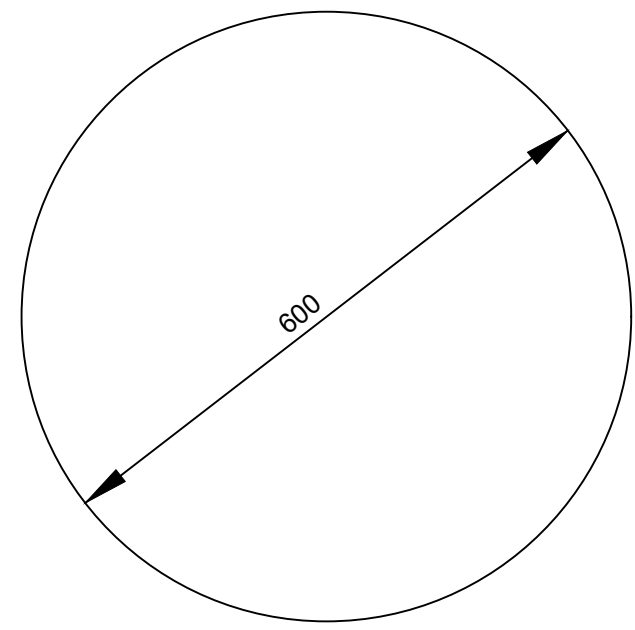
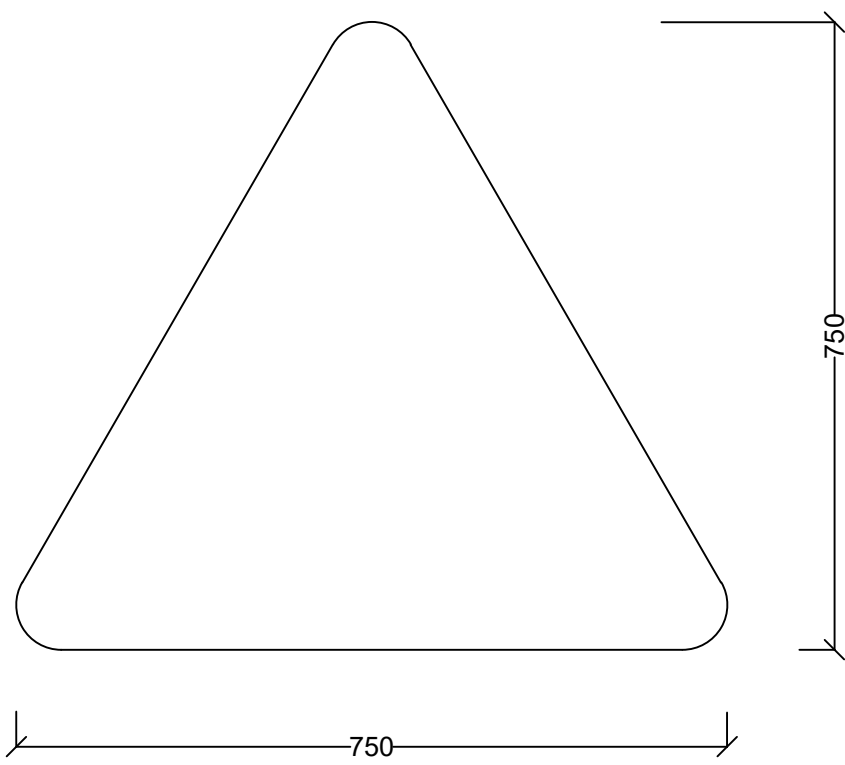
Runji Consulting Group Ltd
Engineering & Project Management.
3, Kindaruma Road (Off Ngong Road)
P. O. Box 68053-00200 Nairobi
Tel. (020) 2717213/4

PROJECT TITLE:	PRELIMINARY AND DETAILED ENGINEERING DESIGN OF BABITO- SOLIO ROAD
----------------	---

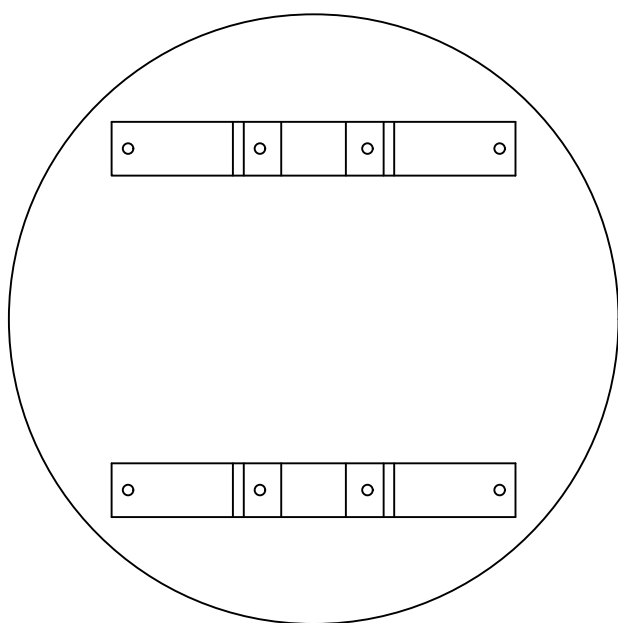
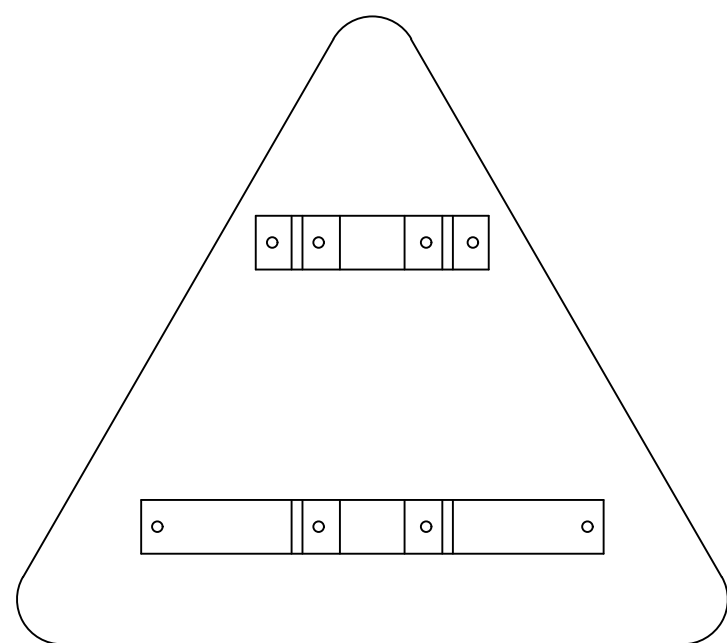
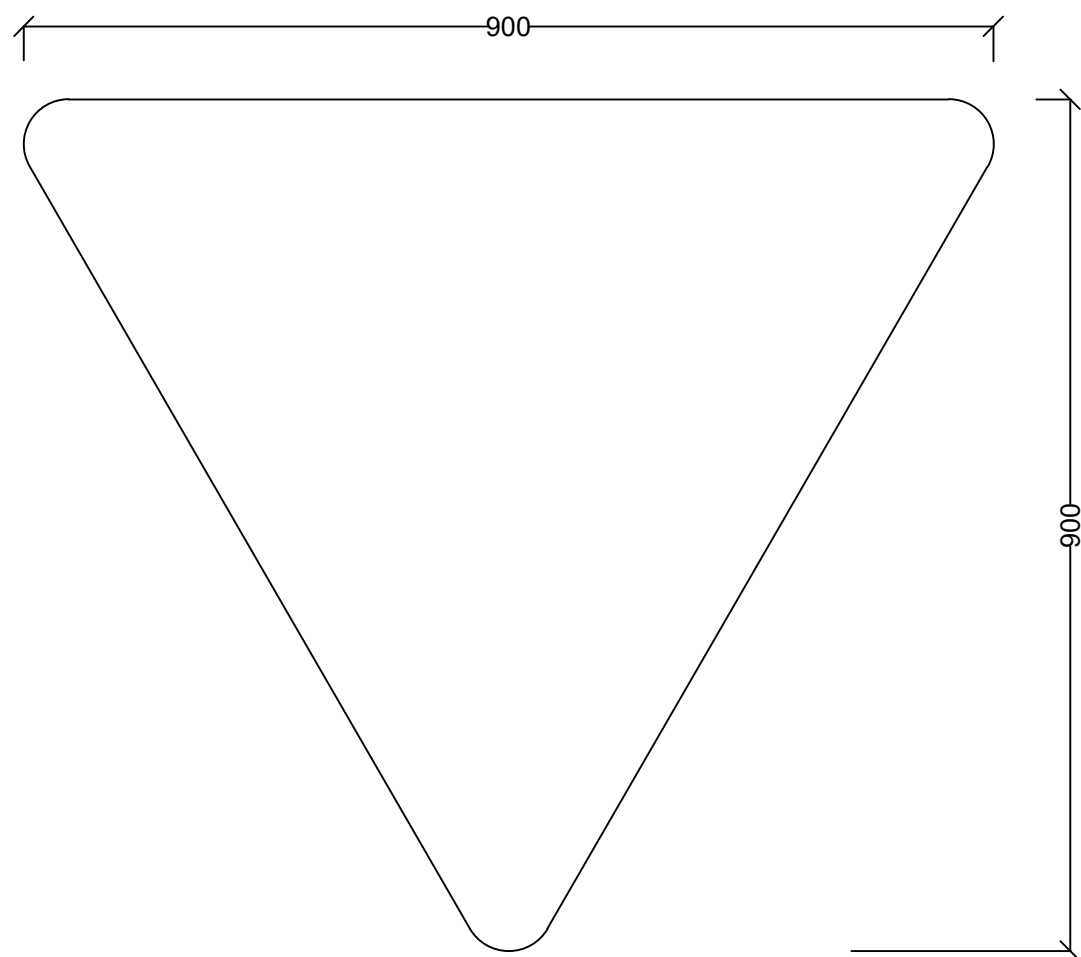
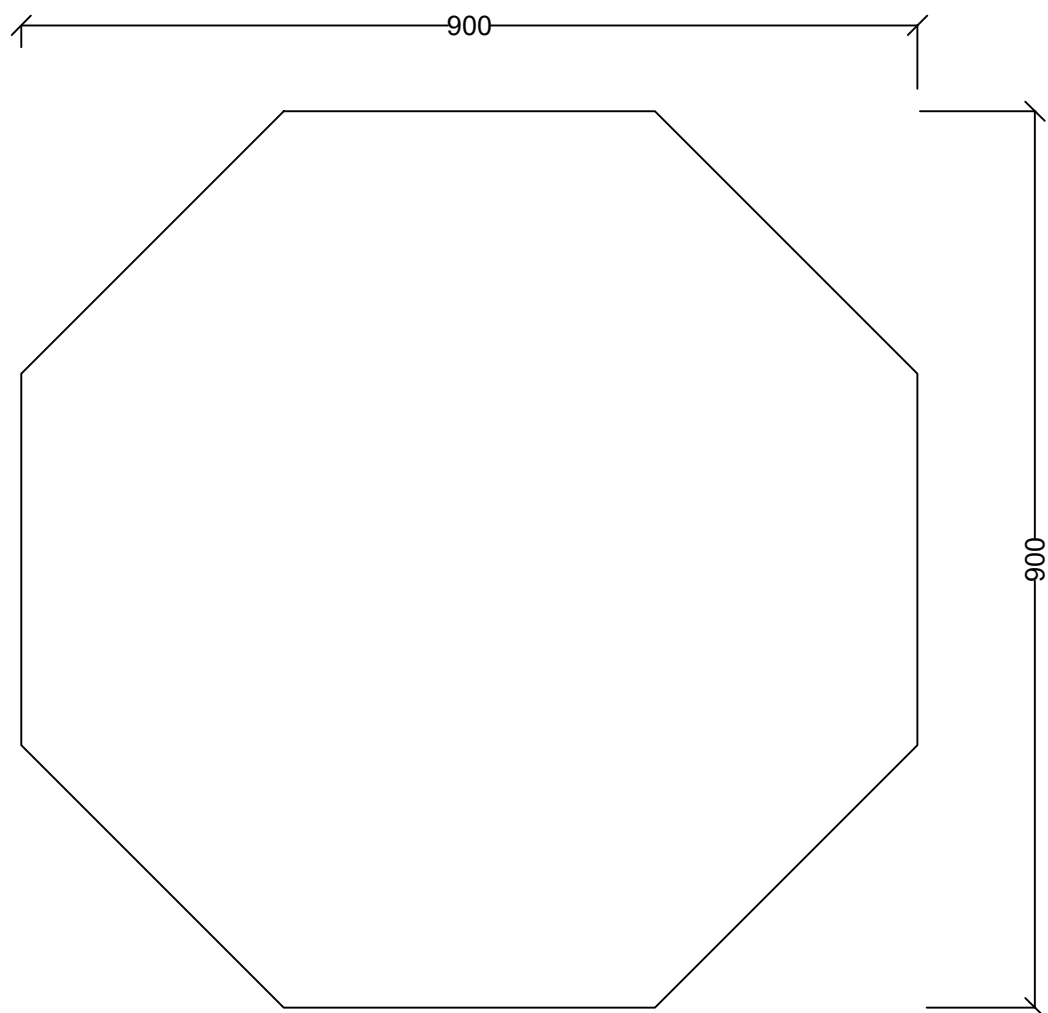
DRAWING TITLE:	BEDDING AND HAUNCH PROFILES TYPE III& IV
----------------	---

DRAWN BY: S.W.O DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/CDS/BS/O4
Scale: NTS	Date : JANUARY 2024

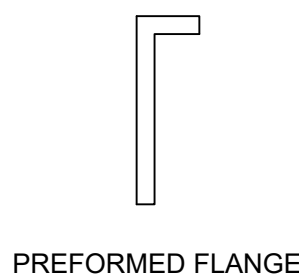
STANDARD DRAWINGS



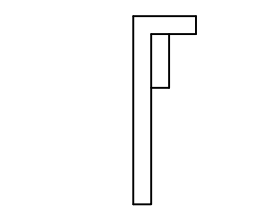
FIXING BRACKET DETAIL
SCALE 1:2.5



TYPICAL FIXING DETAILS
SCALE 1:25



PREFORMED FLANGE

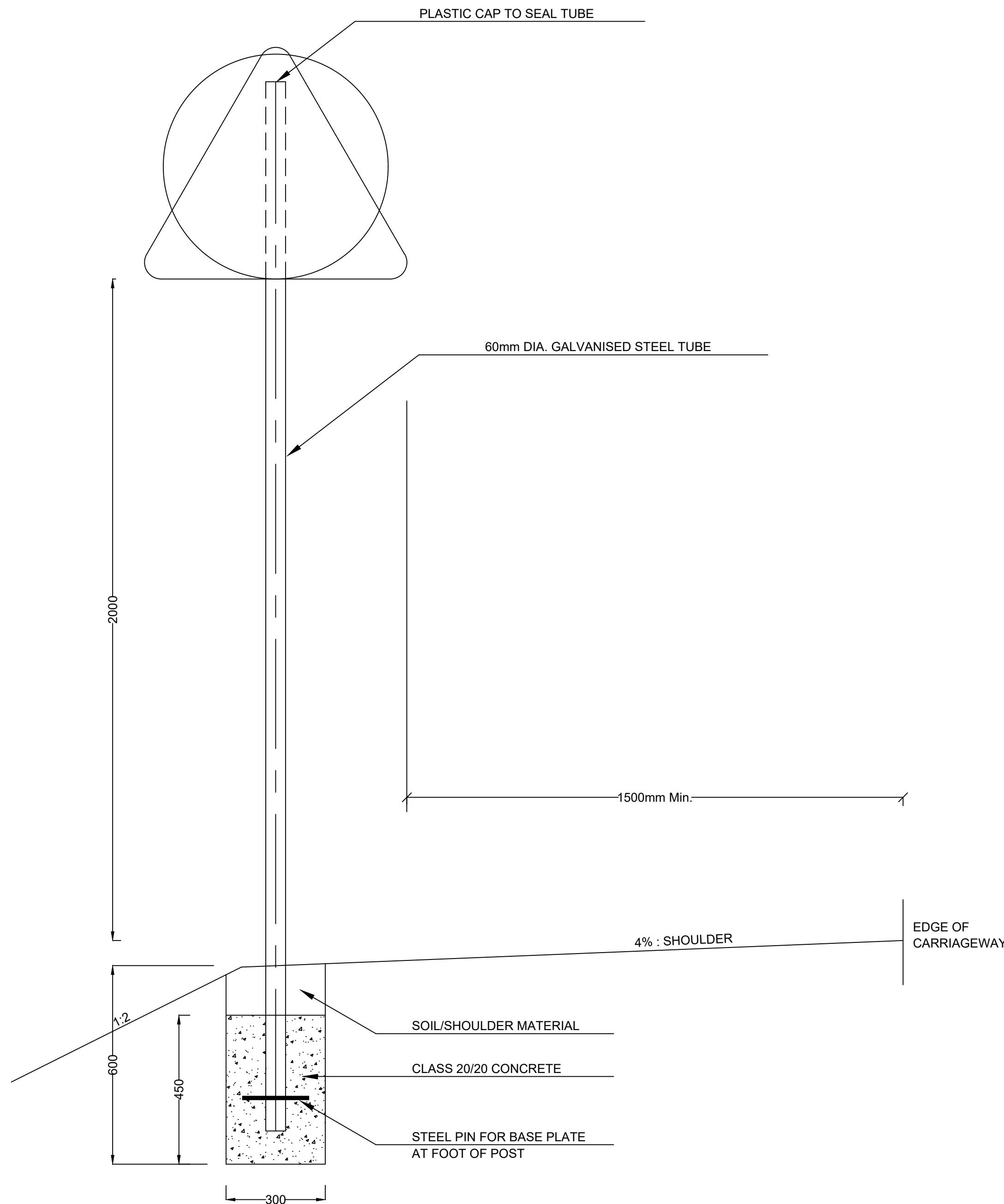


ANGLE STIFFENING

STIFFENING TO SIGNS
SCALE 1:20

GENERAL NOTES:

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.



SIGN PLACEMENT
SCALE 1:25

No.	DATE	DESCRIPTION



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

DIRECTOR GENERAL	
DIRECTOR (PLANNING , DESIGN &ENVIRONMENT)	

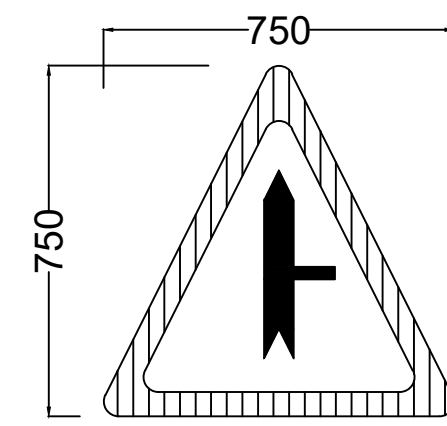
Consultant:
Runji Consulting Group Ltd
Engineering & Project Management.
3, Kindaruma Road (Off Ngong Road)
P. O. Box 68053-00200 Nairobi
Tel. (020) 2717213/4

PROJECT TITLE:
**PRELIMINARYAND DETAILED
ENGINEERING DESIGN OF
BABITO- SOLIO (ROAD)**

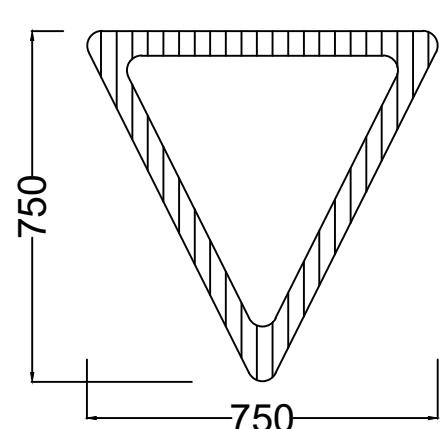
DRAWING TITLE:
**STANDARD DRAWING -
STANDARD - ROAD SIGNS**

DRAWN BY: M.M
DESIGNED BY: C.N.M
CHECKED BY: M.J.N
Scale: AS SHOWN

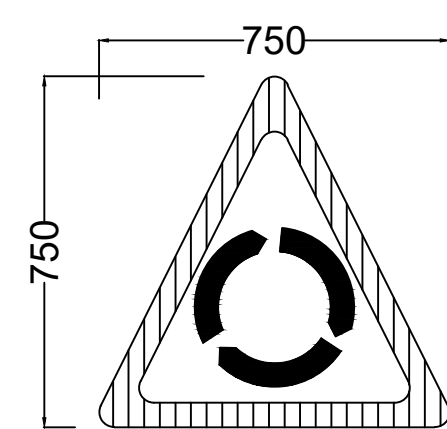
Drg No.
CE1045/SD/BS/01
Date :JANUARY 2024



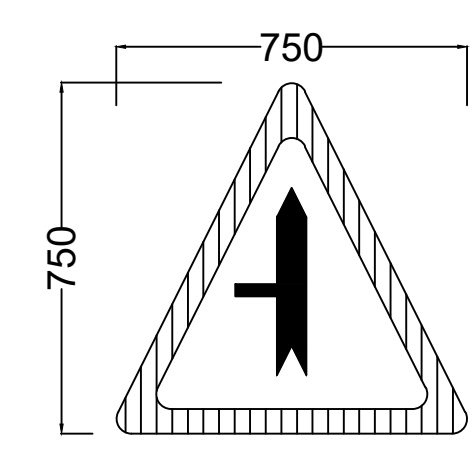
SIGN TYPE W 28C



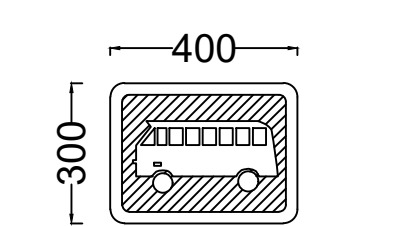
SIGN TYPE R2



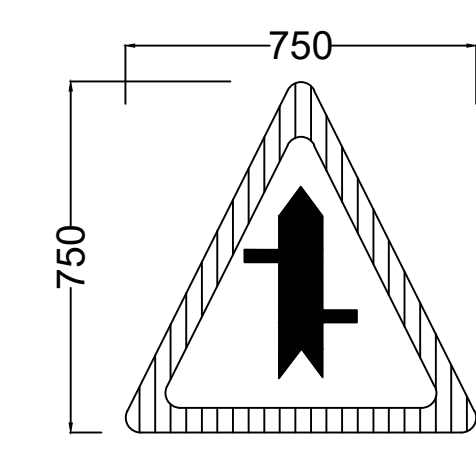
SIGN TYPE W 30



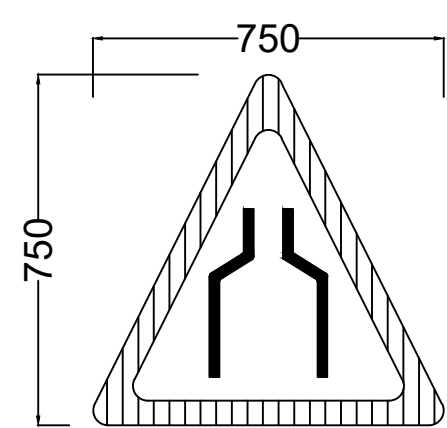
SIGN TYPE W 28B



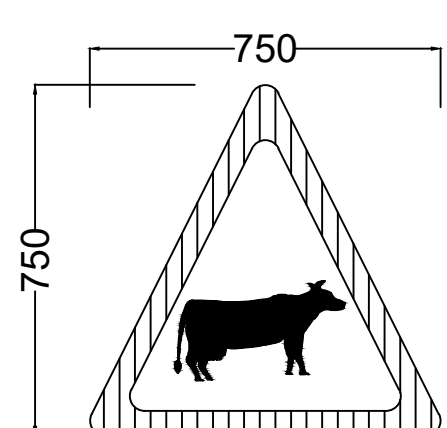
SIGN TYPE I 41



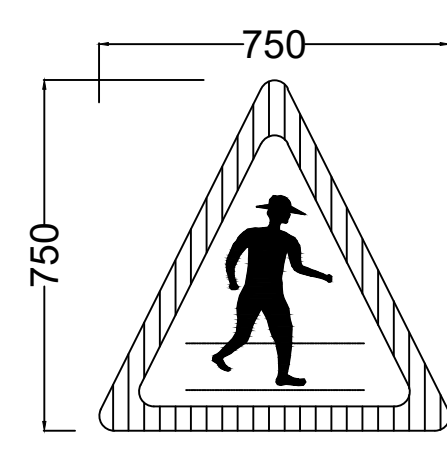
SIGN TYPE W 28



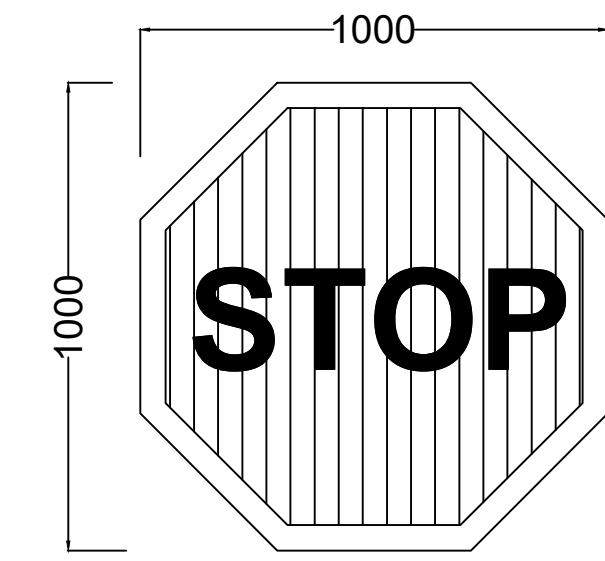
SIGN TYPE W 7



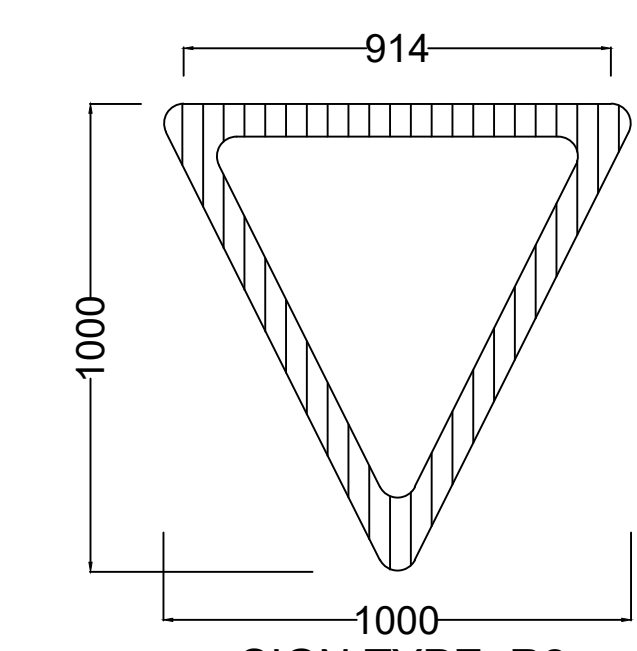
SIGN TYPE W 20



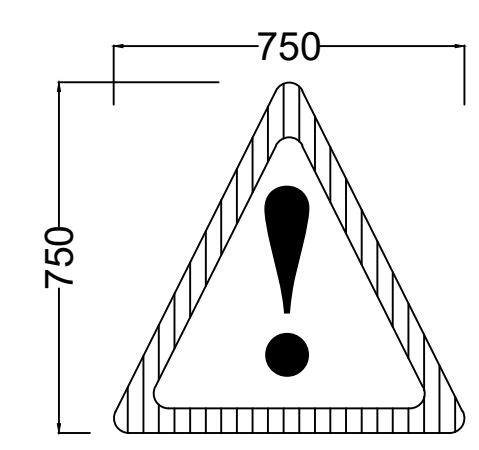
SIGN TYPE W 17



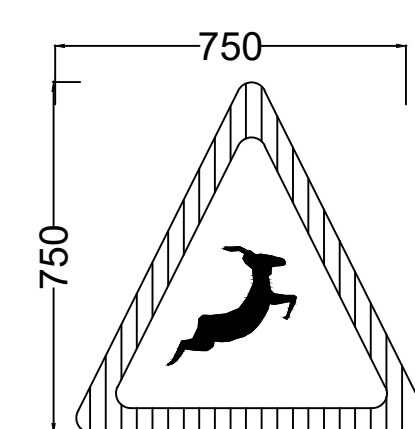
SIGN TYPE R 1



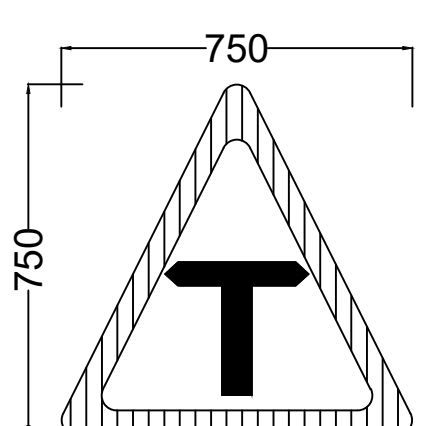
SIGN TYPE R2



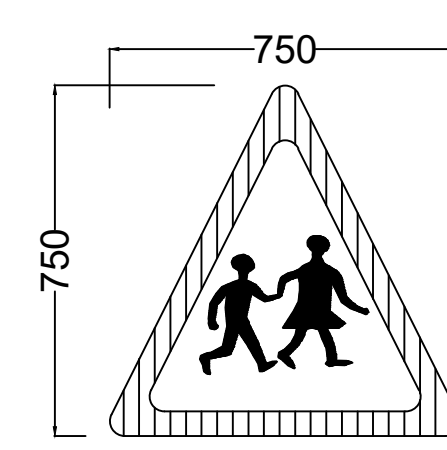
SIGN TYPE W26



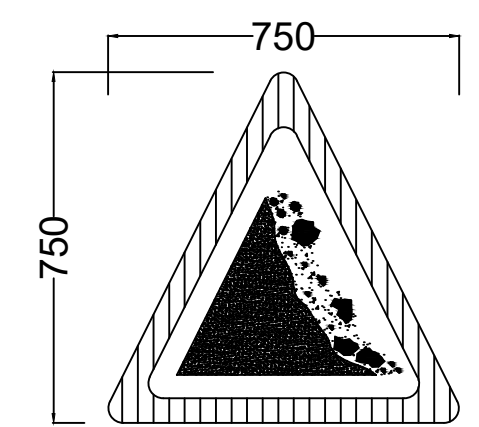
SIGN TYPE W 21



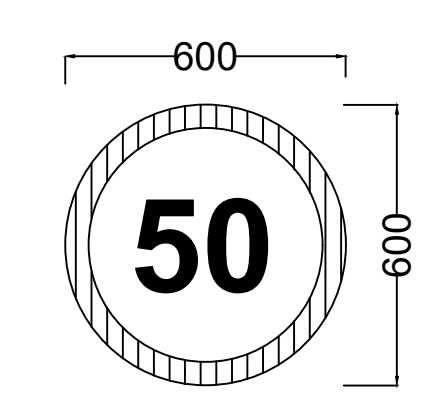
SIGN TYPE W 27



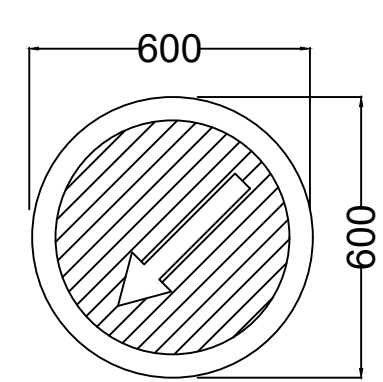
SIGN TYPE W 18



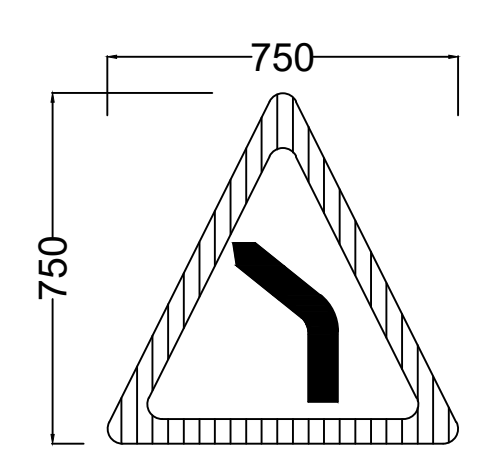
SIGN TYPE W16



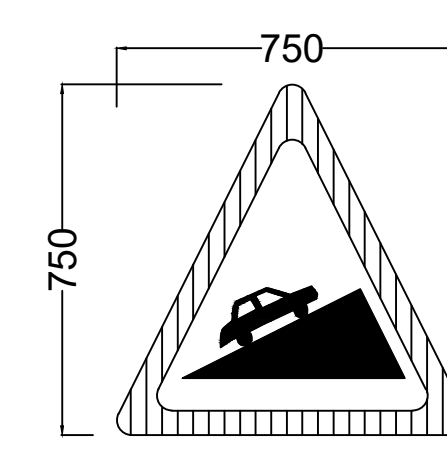
SIGN TYPE P25



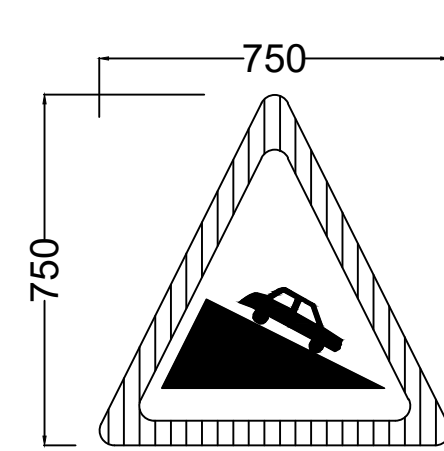
SIGN TYPE M5



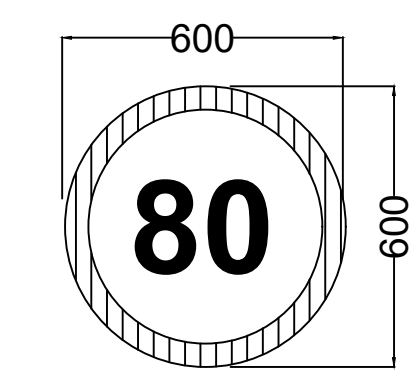
SIGN TYPE W 1



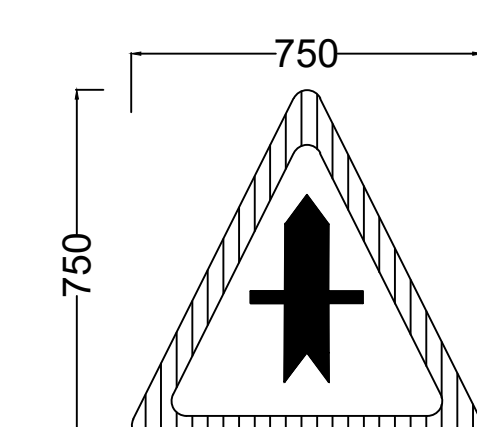
SIGN TYPE W 6



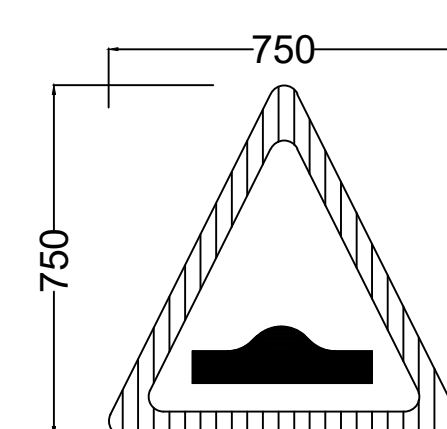
SIGN TYPE W 5



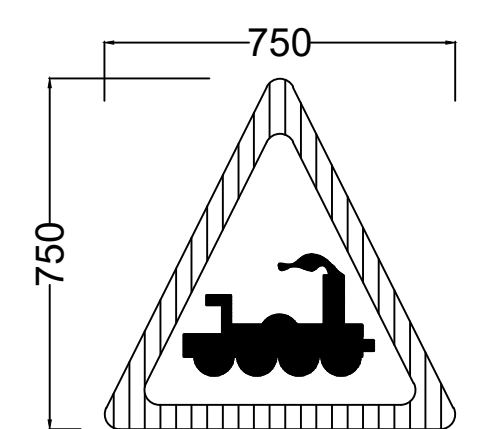
SIGN TYPE P25



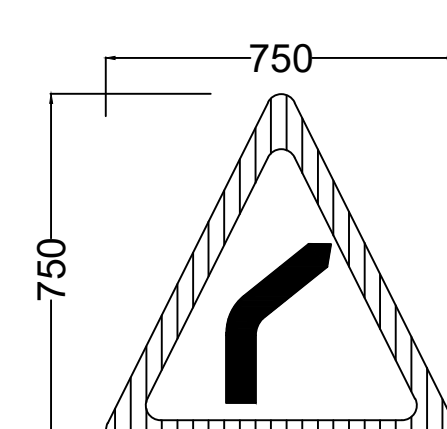
SIGN TYPE W 28A



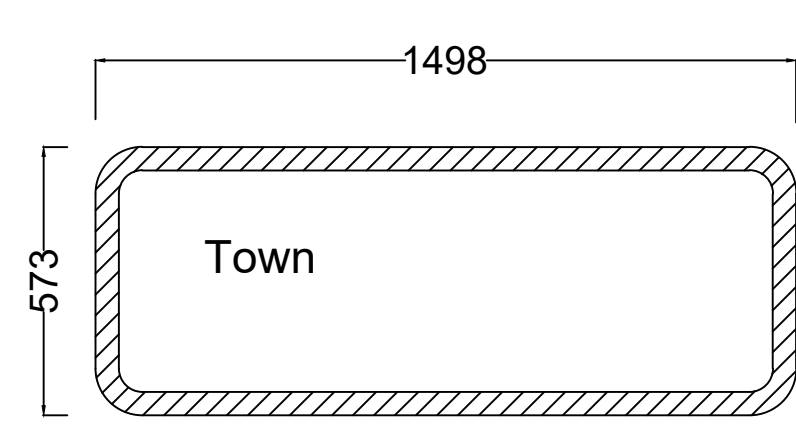
SIGN TYPE W 12



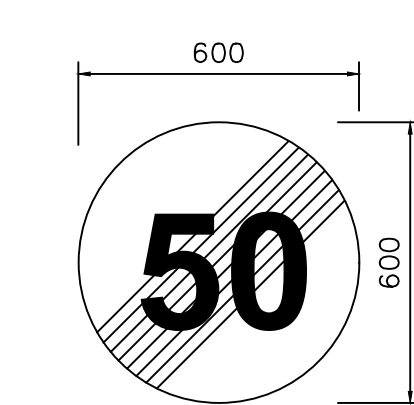
SIGN TYPE W 32



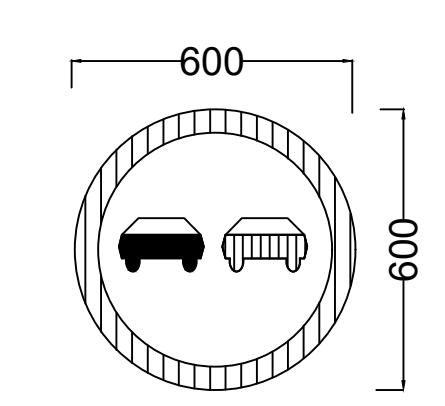
SIGN TYPE W 2



SIGN TYPE - I 27

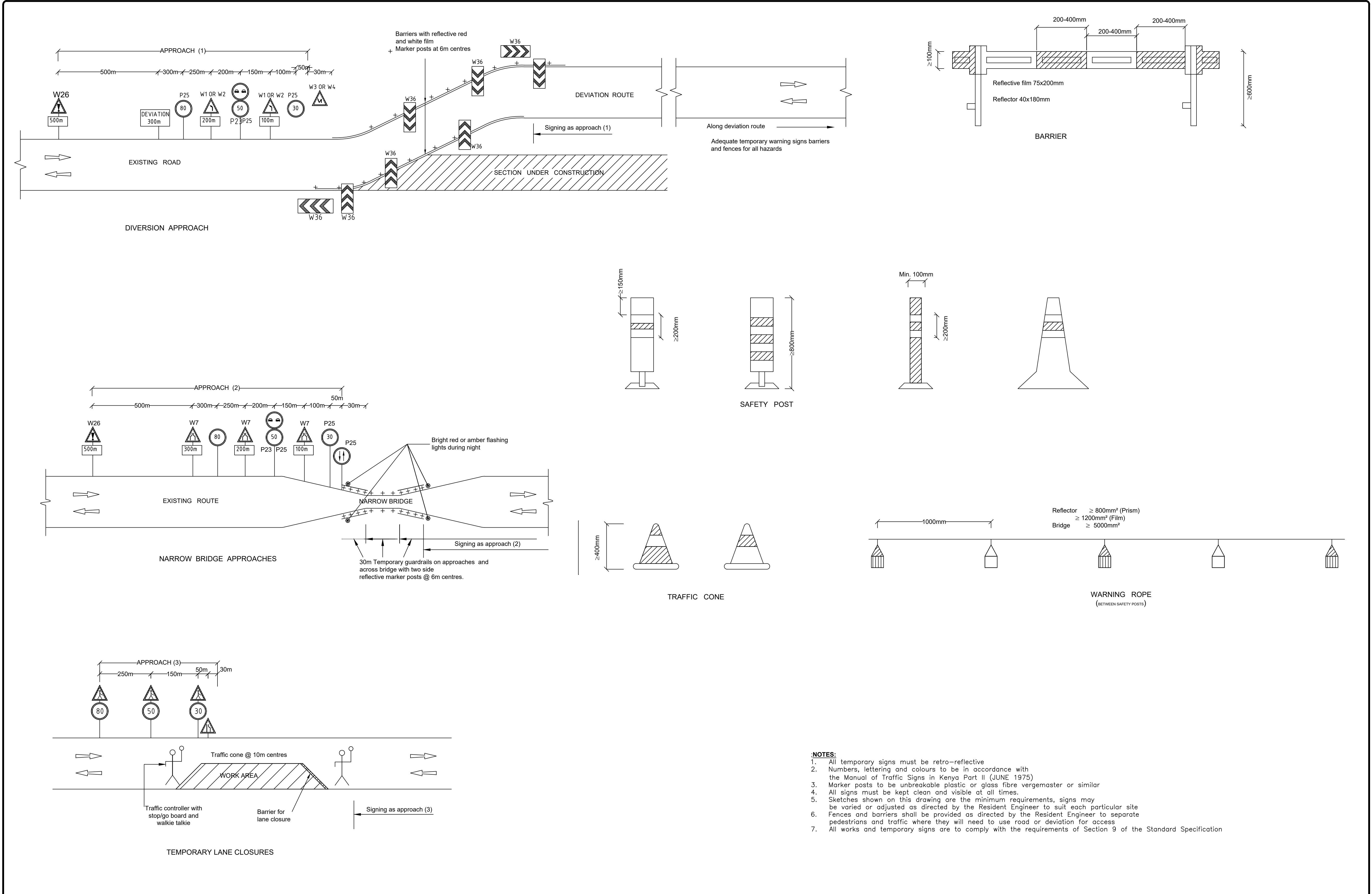


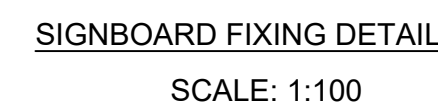
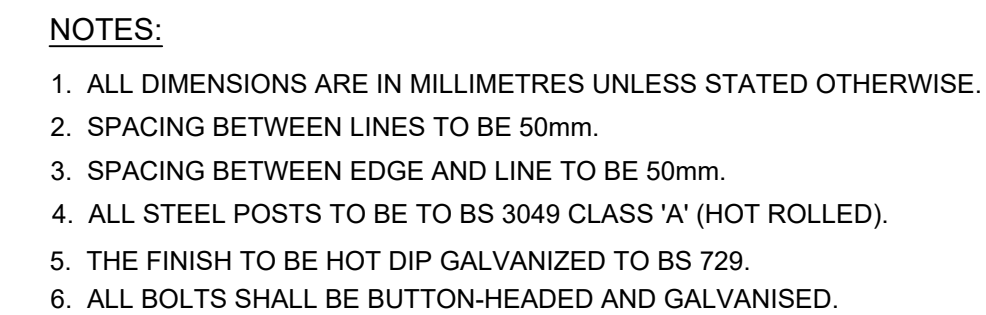
SIGN TYPE P30



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: PRELIMINARY AND DETAILED ENGINEERING DESIGN OF BABITO- SOLIO (ROAD)	DRAWING TITLE: STANDARD DRAWING - STANDARD - ROAD SIGNS INSTALLATION	DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N Scale: AS SHOWN	Drg No. CE1045/SD/BS/02
					DIRECTOR (PLANNING ,DESIGN &ENVIRONMENT)						





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: PRELIMINARYAND DETAILED ENGINEERING DESIGN OF BABITO- SOLIO (ROAD)	DRAWING TITLE: STANDARD DRAWING - PUBLICITY SIGN BOARD	DRAWN BY: M.M DESIGNED BY: C.N.M CHECKED BY: M.J.N	Drg No. CE1045/SD/BS/04		
											Scale: AS SHOWN	Date :JANUARY 2024