NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	*
TENDER PURPOSES	
FOR CONSTRUCTION	
AS BUILT	

5		
4		
3		
2		
1		

DATE REVISIONS

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

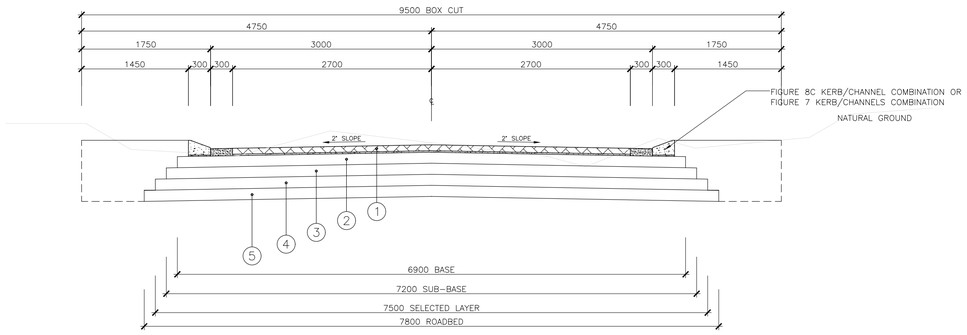
DRAWING TITLE :
ROAD LAYOUT AND SETTING OUT

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	1:1250
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

PROFESSIONAL SERVICE :
CIVIL ENGINEERING

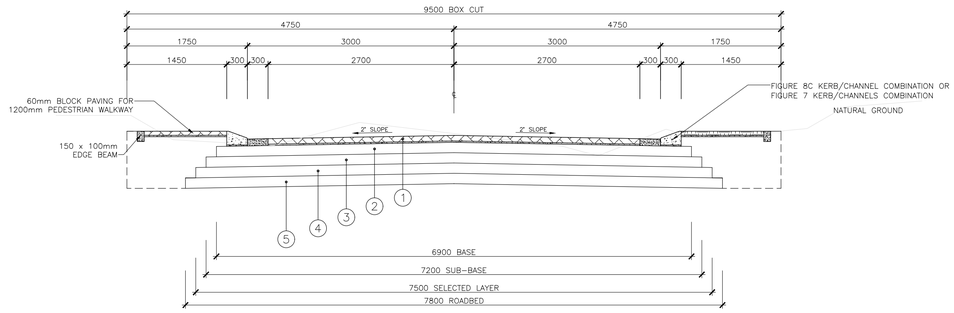
DRAWING No :
041/SHI/R001 REV 0

APPOLLO ENGINEERING
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za

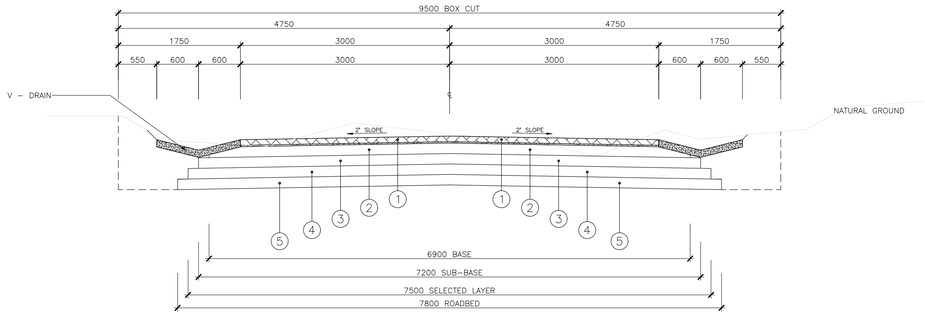


TYPICAL ROAD SECTION 1

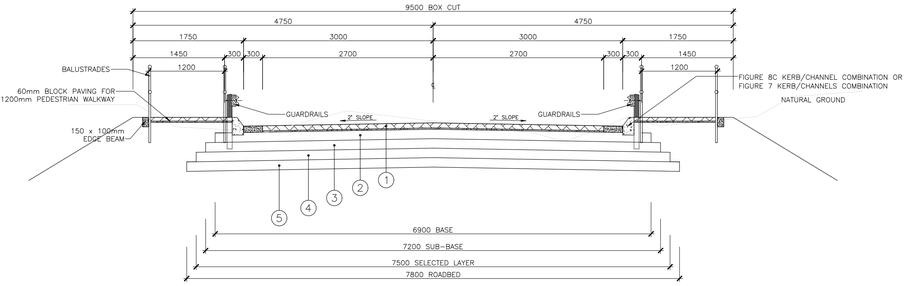
6M ROAD - CAMBER



TYPICAL ROAD SECTION 2 (WITH WALKWAY)



TYPICAL ROAD SECTION 3 (V-DRAINS)



TYPICAL ROAD SECTION 4 (AT BRIDGES)

ITEM	LAYER	THICKNESS (mm)	TRH 4 CODE	DESCRIPTION	FIELD REQUIRED COMPACTION
1	PAVING (BASE/SURFACE)	100		80mm THICK 35MPa INTERLOCKING PAVING BLOCKS ON A 20mm THICK BED OF RIVERSAND	–
2	SUB-BASE (IMPORTED FROM BORROW PIT AND/OR COMMERCIAL SOURCE)	150	C3	UCS:1,5 TO 3,0 Mpa @ 100% MOD. AASHTO; MINIMUM ITS = 250 Kpa @ 95-97% MOD. ASSHTO COMPACTION; MAXIMUM AGGREGATE 63mm; 5% MAXIMUM PI = 6 AFTER STABILIZATION; MAX. FINES LOSS = 20%; FIELD COMPACTION 98% MOD. AASHTO MIN.	98% MOD AASHTO MIN
3	SELECTED (IMPORTED FROM BORROW PIT AND/OR COMMERCIAL SOURCE)	150	G6	MINIMUM CBR = 15% @ 93% MOD. AASHTO; MAXIMUM SIZE ⅔ OF LAYER THICKNESS; DENSITY = 95% MOD. AASHTO; PI < 12 OR3GM + 10; MAXIMUM SWELL 1.5% @100% MOD. AASHTO; FIELD COMPACTION 95% MOD. AASHTO MIN.	95% MOD AASHTO MIN
4	ROADBED	150	IN-SITU	IN-SITU	93% MOD AASHTO MIN
5	SUBGRADE INSITU	150 LAYERS	IN-SITU	IN-SITU	90% MOD AASHTO MIN
*FILL (CUT & FILL) INSITU MATERIAL CUT TO STOCKPILE/FILL		150 LAYERS	IN-SITU	MINIMUM CBR = 3% @ 90% MOD. AASHTO; MAXIMUM SIZE ⅔ OF LAYER THICKNESS;	90% MOD AASHTO MIN
*PIONEER LAYER		300	–	ROCKFILL (MAXIIMUM ½ OF LAYER) THICKNESS MIXED WITH G9-G10	–
*REPLACEMENT LAYER		1000	–	DUMPROCK MIXED WITH G9-G10	–

NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		
DATE	REVISIONS	

CITY OF MBOMBELA
THE JEWEL'S DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :

CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :

PAVEMENT LAYERWORKS AND TYPICAL SECTION DETAILS 1 OF 2

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

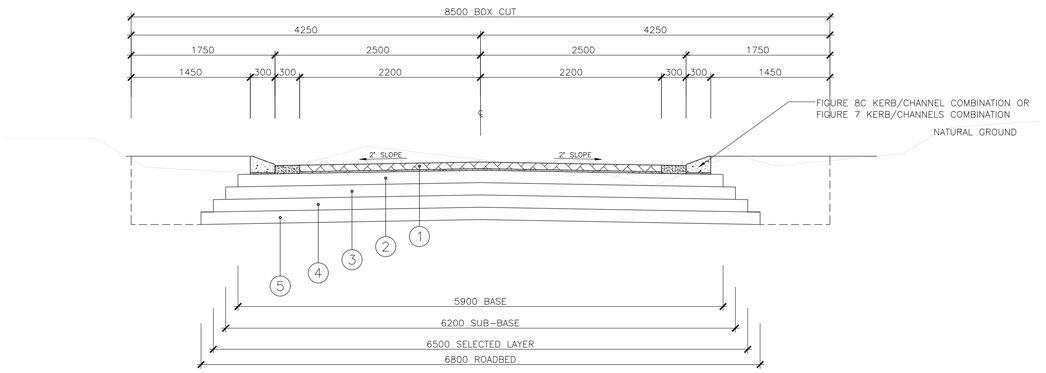
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R051 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

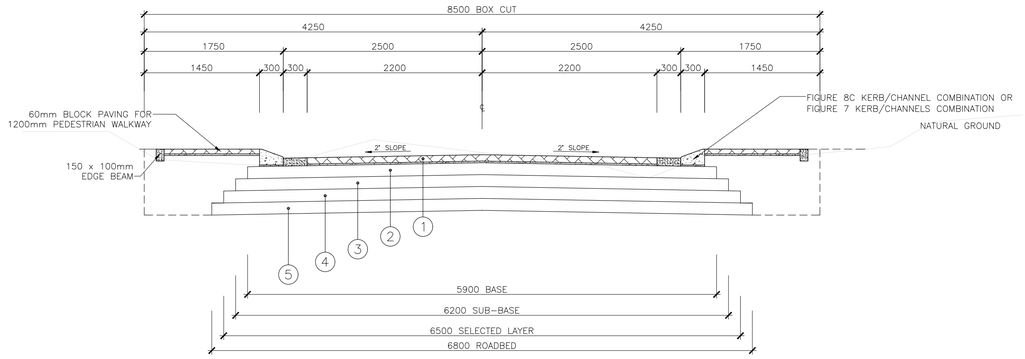
APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za

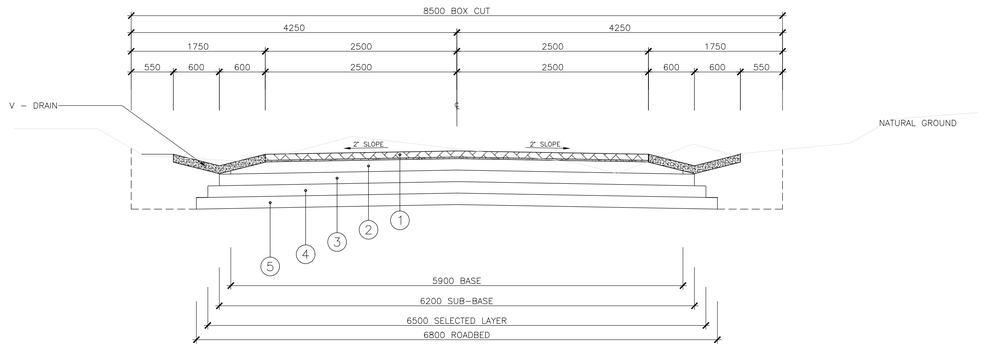


TYPICAL ROAD SECTION 1

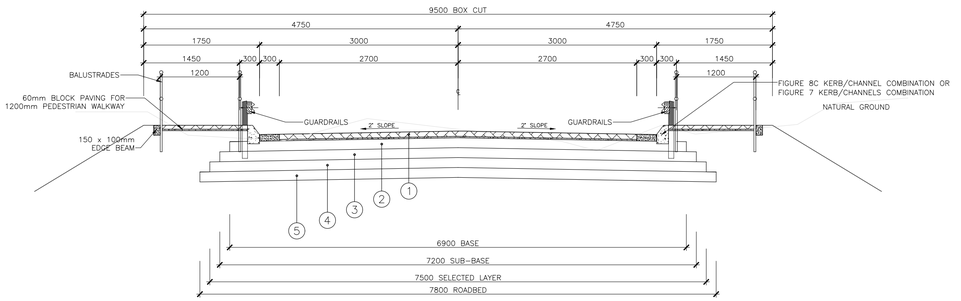
5M ROAD - CAMBER



TYPICAL ROAD SECTION 2 (WITH WALKWAY)



TYPICAL ROAD SECTION 3 (V-DRAINS)



TYPICAL ROAD SECTION 4 (AT BRIDGES)

ITEM	LAYER	THICKNESS (mm)	TRH 4 CODE	DESCRIPTION	FIELD REQUIRED COMPACTION
1	PAVING (BASE/SURFACE)	100		80mm THICK 35MPa INTERLOCKING PAVING BLOCKS ON A 20mm THICK BED OF RIVERSAND	–
2	SUB-BASE (IMPORTED FROM BORROW PIT AND/OR COMMERCIAL SOURCE)	150	C3	UCS:1,5 TO 3,0 Mpa @ 100% MOD. AASHTO; MINIMUM ITS = 250 Kpa @ 95-97% MOD. ASSHTO COMPACTION; MAXIMUM AGGREGATE 63mm; 5% MAXIMUM PI = 6 AFTER STABILIZATION; MAX. FINES LOSS = 20%; FIELD COMPACTION 98% MOD. AASHTO MIN.	98% MOD AASHTO MIN
3	SELECTED (IMPORTED FROM BORROW PIT AND/OR COMMERCIAL SOURCE)	150	G6	MINIMUM CBR = 15% @ 93% MOD. AASHTO; MAXIMUM SIZE ⅔ OF LAYER THICKNESS; DENSITY = 95% MOD. AASHTO; PI < 12 OR3GM + 10; MAXIMUM SWELL 1.5% @100% MOD. AASHTO; FIELD COMPACTION 95% MOD. AASHTO MIN.	95% MOD AASHTO MIN
4	ROADBED	150	IN-SITU	IN-SITU	93% MOD AASHTO MIN
5	SUBGRADE INSITU	150 LAYERS	IN-SITU	IN-SITU	90% MOD AASHTO MIN
*FILL (CUT & FILL) INSITU MATERIAL CUT TO STOCKPILE/FILL		150 LAYERS	IN-SITU	MINIMUM CBR = 3% @ 90% MOD. AASHTO; MAXIMUM SIZE ⅔ OF LAYER THICKNESS;	90% MOD AASHTO MIN
*PIONEER LAYER		300	–	ROCKFILL (MAXIIMUM ½ OF LAYER) THICKNESS MIXED WITH G9-G10	–
*REPLACEMENT LAYER		1000	–	DUMPROCK MIXED WITH G9-G10	–

NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		
DATE	REVISIONS	

CITY OF MBOMBELA
THE ULTIMATE DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :

CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :

PAVEMENT LAYERWORKS AND TYPICAL SECTION DETAILS 2 OF 2

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

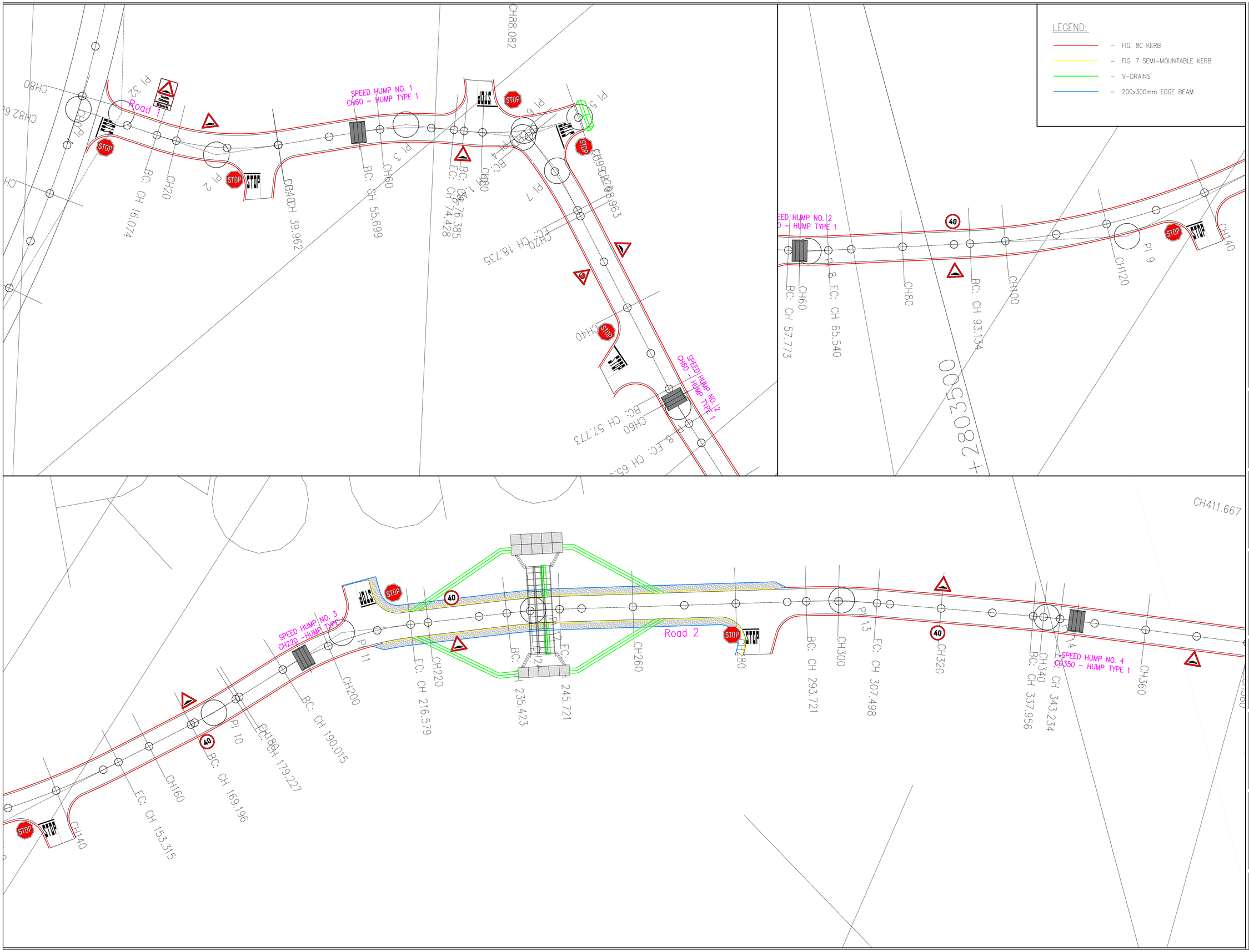
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R052 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		
DATE	REVISIONS	

CITY OF MBOMBELA
THE JEWEL'S DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :

CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :

ROAD DETAILS 1 OF 4
ROAD 1, & ROAD 2

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

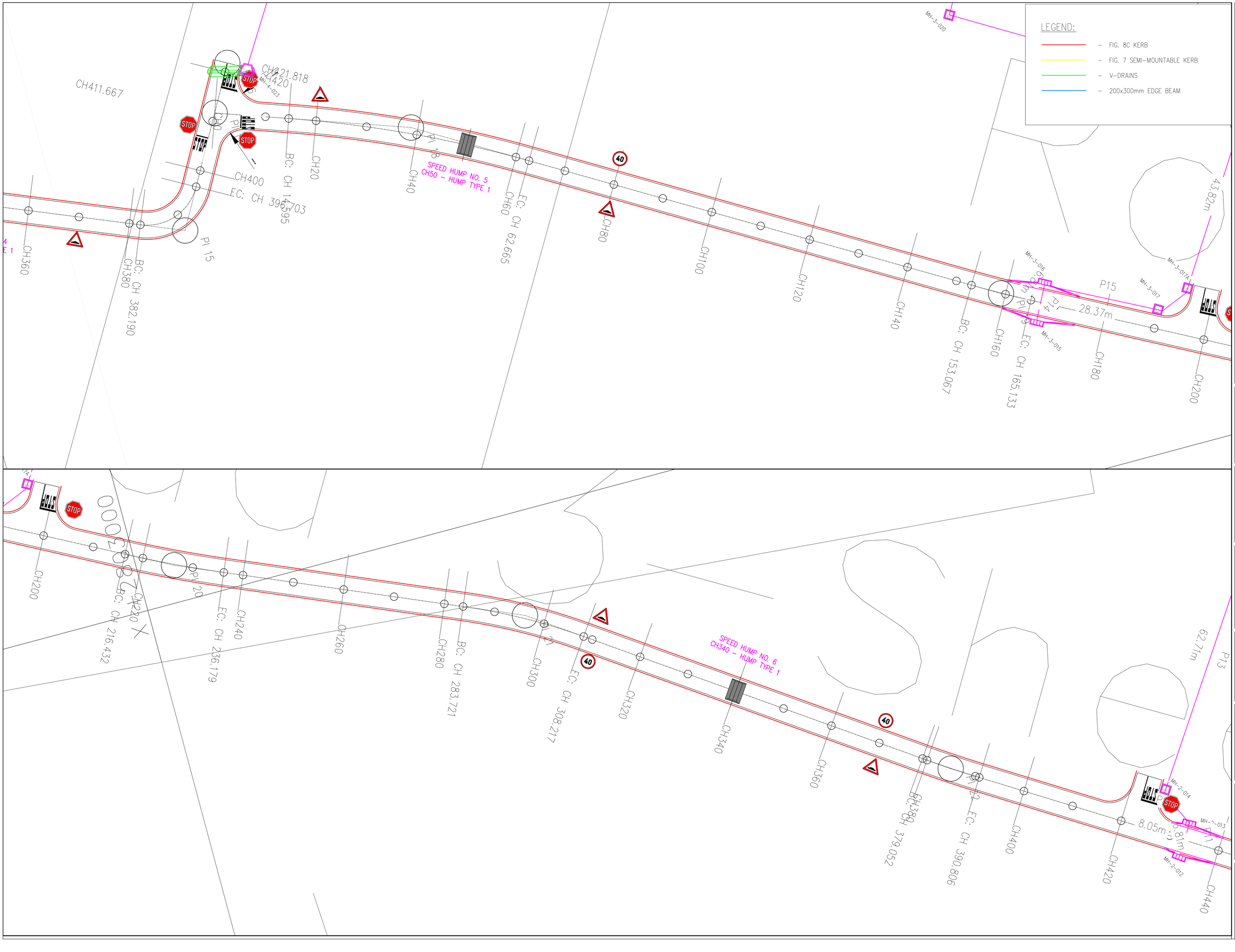
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R301 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		
DATE	REVISIONS	

CITY OF MBOMBELA
THE LOWPH'S DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :

CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :

ROAD DETAILS 2 OF 4

ROAD 1, & ROAD 2

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

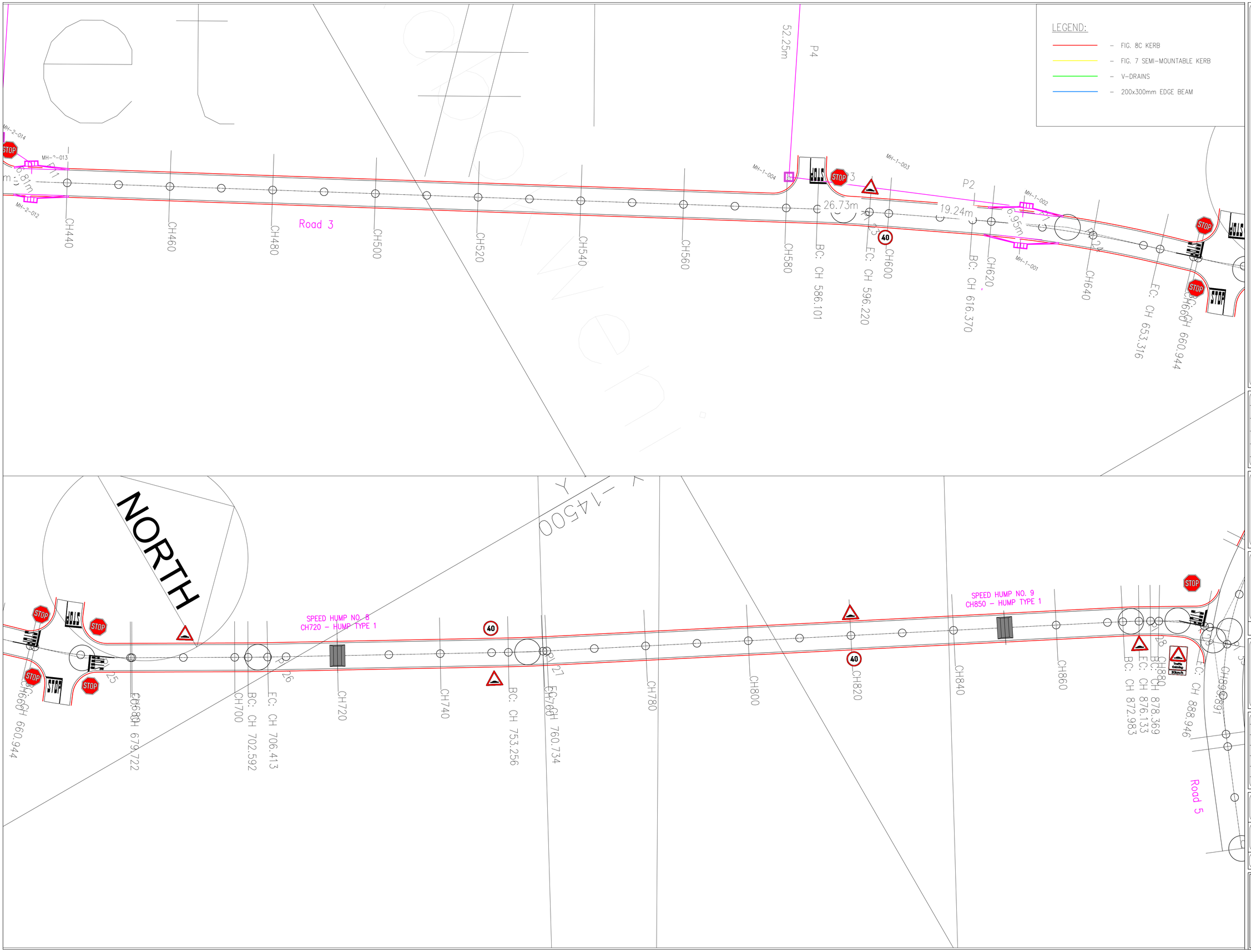
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R302 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		
DATE	REVISIONS	

City of Mbombela

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :

CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :

ROAD DETAILS 3 OF 4
ROAD 1, & ROAD 2

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

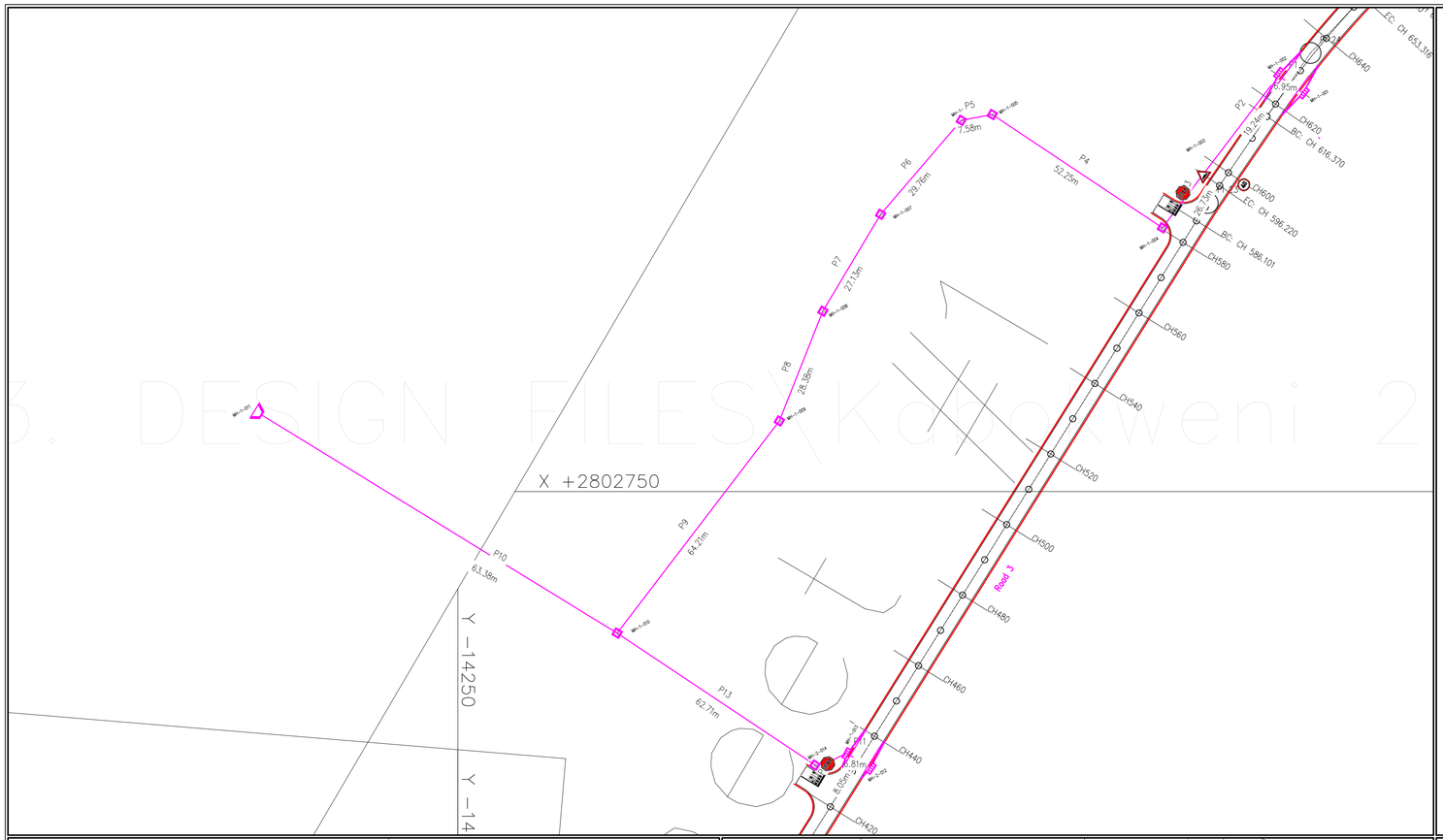
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

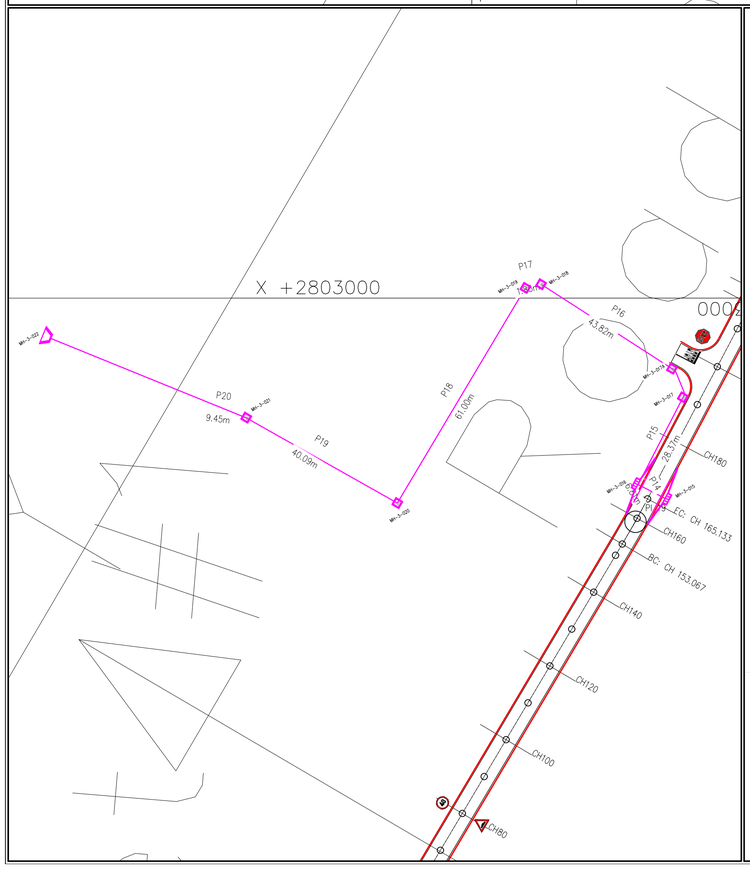
DRAWING No :
041/SHI/R303 REV 0

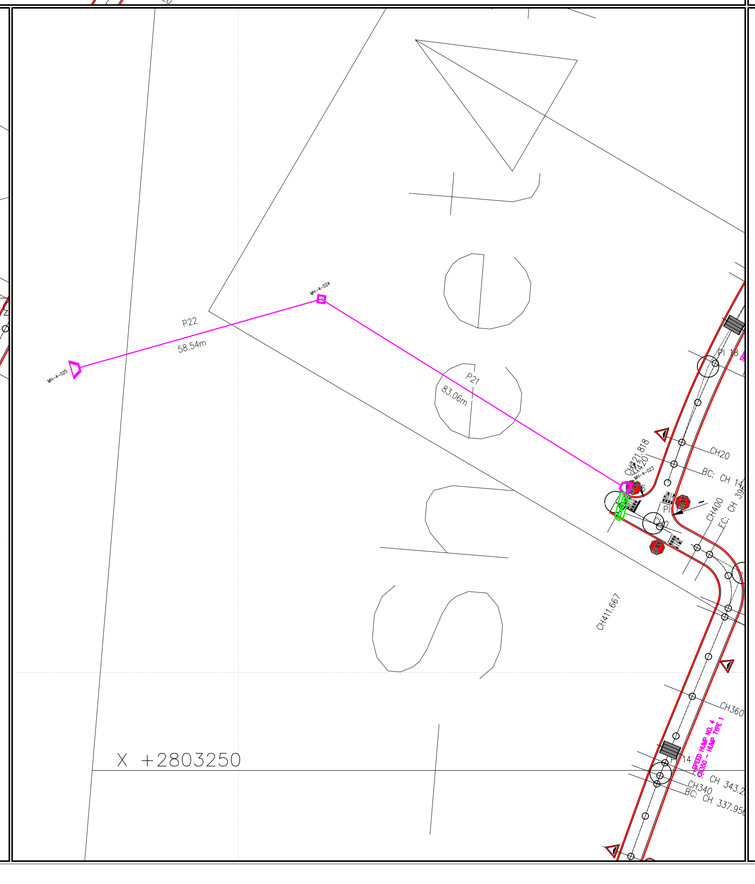
Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za







COORDINATE LIST

Lo

PIPE 1		
MH No.	YLo	XLo
Constant:		
MH-1-001	-14454.572	2802650.930
MH-1-002	-14447.655	2802650.291
MH-1-003	-14435.503	2802665.210
MH-1-004	-14421.966	2802688.260
MH-1-005	-14378.444	2802659.355
MH-1-006	-14370.993	2802660.754
MH-1-007	-14351.617	2802683.339
MH-1-008	-14337.725	2802706.637
MH-1-009	-14327.271	2802733.024
MH-1-010	-14288.277	2802784.037
MH-1-011	-14232.325	2802754.261
MH-2-012	-14350.709	2802813.429
MH-2-013	-14343.900	2802813.191
MH-2-014	-14339.635	2802820.017

PIPE DATA LIST

MH – MH	Distance	Diam.
PIPE 1	(m)	(mm)
MH-1-001 – MH-1-002	6.946	
MH-1-002 – MH-1-003	19.243	
MH-1-003 – MH-1-004	26.730	
MH-1-004 – MH-1-005	52.246	
MH-1-005 – MH-1-006	7.582	
MH-1-006 – MH-1-007	29.757	
MH-1-007 – MH-1-008	27.126	
MH-1-008 – MH-1-009	28.382	
MH-1-009 – MH-1-010	64.209	
MH-1-010 – MH-1-011	63.383	
MH-2-012 – MH-2-013	6.813	
MH-2-013 – MH-2-014	8.048	
MH-2-014 – MH-1-010	62.707	

COORDINATE LIST

Lo

PIPE 2		
MH No.	YLo	XLo
Constant:		
MH-3-015	-14216.093	2803049.558
MH-3-016	-14212.468	2803043.796
MH-3-017	-14225.709	2803018.708
MH-3-018	-14188.875	2802994.973
MH-3-019	-14187.073	2802995.399
MH-3-020	-14155.311	2803047.476
MH-3-021	-14121.003	2803026.733
MH-3-022	-14111.624	2803025.561

PIPE DATA LIST

MH – MH	Distance	Diam.
PIPE 2	(m)	(mm)
MH-3-015 – MH-3-016	6.807	
MH-3-016 – MH-3-017	28.367	
MH-3-017 – MH-3-018	43.819	
MH-3-018 – MH-3-019	1.851	
MH-3-019 – MH-3-020	60.999	
MH-3-020 – MH-3-021	40.092	
MH-3-021 – MH-3-022	9.452	

COORDINATE LIST

Lo

PIPE 3		
MH No.	YLo	XLo
Constant:		
MH-4-023	-14129.749	2803184.627
MH-4-024	-14059.626	2803140.102
MH-4-025	-14003.297	2803156.039

PIPE DATA LIST

MH – MH	Distance	Diam.
PIPE 3	(m)	(mm)
MH-4-023 – MH-4-024	83.064	
MH-4-024 – MH-4-025	58.540	

STORM WATER NODES DETAILED DESCRIPTIONS

UPSTREAM TRANSITION/ CHUTE LENGTH	MH – ID	DESCRITION	DOWNSTREAM TRANSITION/ CHUTE LENGTH
6m	MH-1-1	KERB INLET	6m
6m	MH-1-2	KERB INLET	6m
NA	MH-1-3	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-4	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-5	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-6	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-7	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-8	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-9	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-10	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-1-11	WING WALL OUTLET	NA
6m	MH-2-12	KERB INLET	6m
6m	MH-2-13	KERB INLET	6m
NA	MH-2-14	EXPOSED SHALLOW JUNCTION BOX	NA
6m	MH-3-15	KERB INLET	6m
6m	MH-3-16	KERB INLET	6m
NA	MH-3-17	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-3-18	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-3-19	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-3-20	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-3-21	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-3-22	WING WALL OUTLET	NA
NA	MH-4-23	DROP INLET	NA
NA	MH-4-24	EXPOSED SHALLOW JUNCTION BOX	NA
NA	MH-4-25	WING WALL OUTLET	NA

NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		

DATE REVISIONS

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :

CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :

ROAD LAYOUT DETAILS

STORMWATER

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

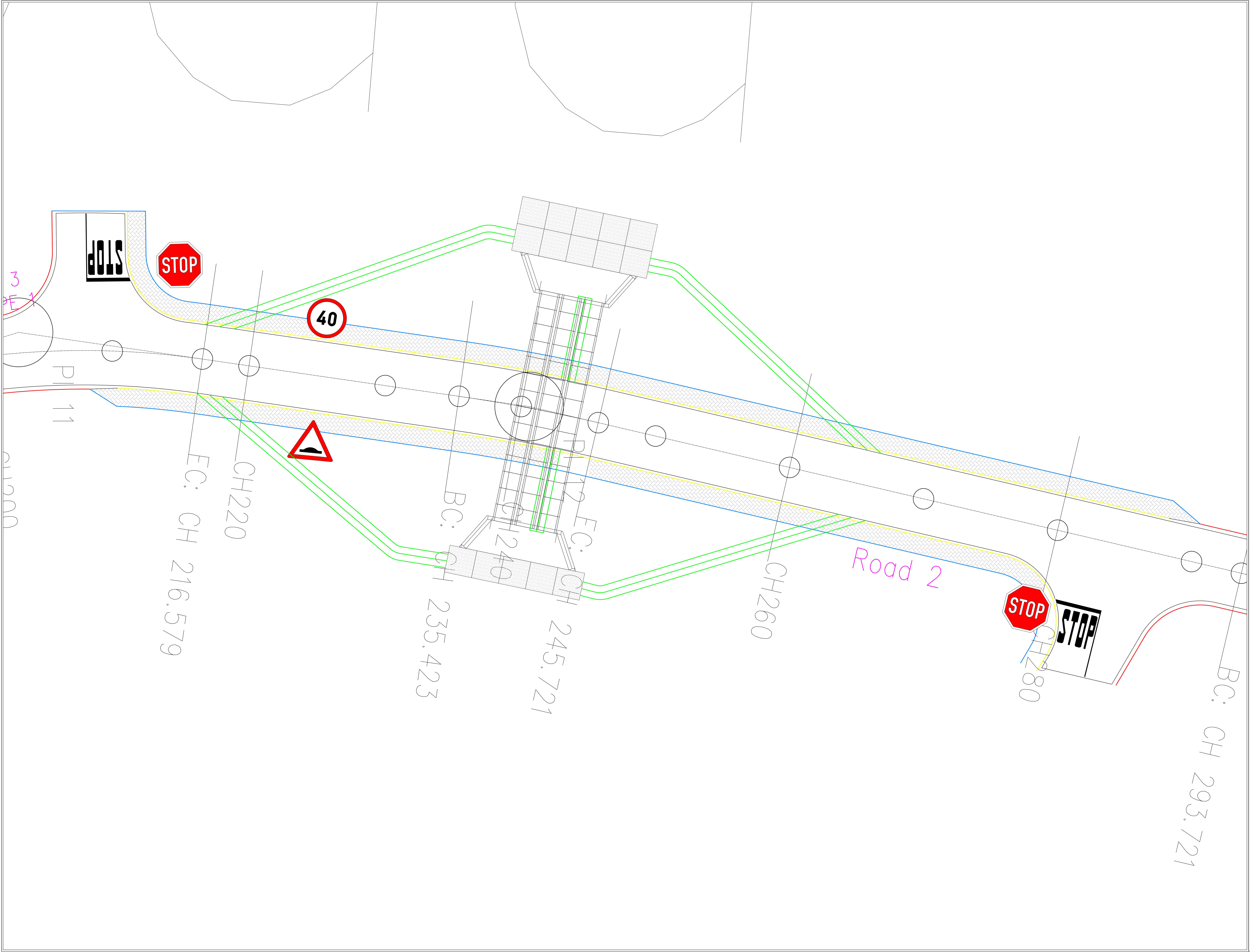
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
066/SHI/R304 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		
	DATE	REVISIONS

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
FINISHING DETAIL
CULVERT BRIDGE

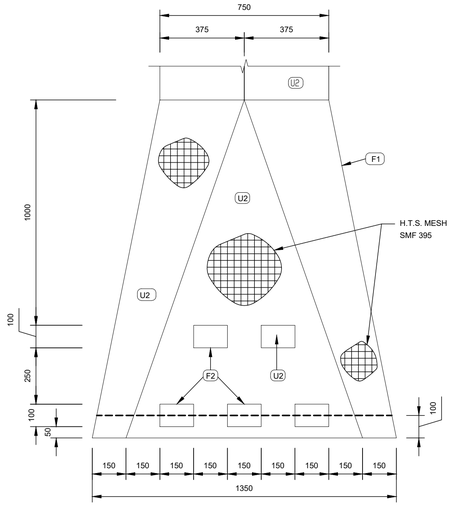
DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

PROFESSIONAL SERVICE :
CIVIL ENGINEERING

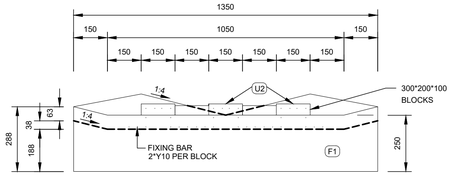
DRAWING No :
066/SHI/R501 REV 0

APPOLLO ENGINEERING

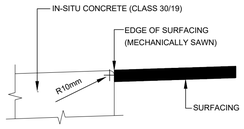
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



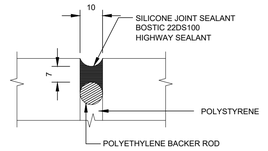
PLAN OF ENERGY BREAKER
SCALE 1:20



FRONT ELEVATION OF ENERGY BREAKER
SCALE 1:20

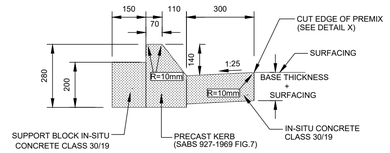


DETAIL X
SCALE 1:5

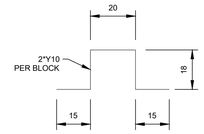


EXPANSION JOINT
SCALE : SCHEMATIC

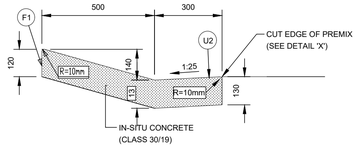
NOTE: EXPANSION JOINT EVERY 5th PANEL (10m)



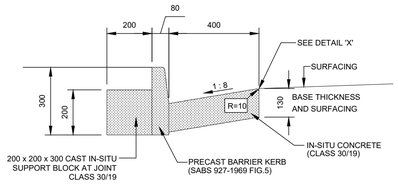
CROSS SECTION OF TYPE B SEMI MOUNTABLE KERB AT INTERSECTIONS
SCALE 1:10



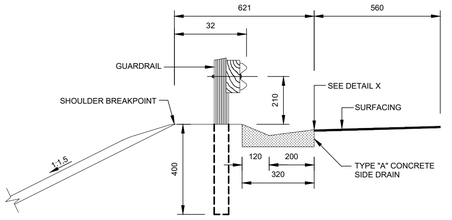
FIXING BAR
SCALE 1:10



CROSS SECTION OF TYPE C MOUNTABLE KERB AT RURAL INTERSECTIONS
SCALE 1:10

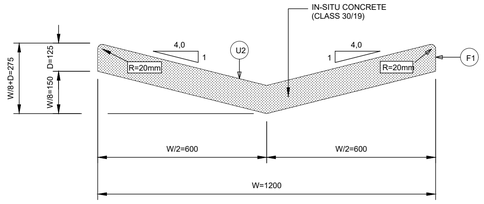


TYPE B1 KERB
SECTION THROUGH BARRIER KERB (FIG 5)
SCALE 1:10

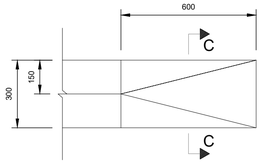


POSITION OF TYPE "A" CONCRETE SIDE DRAIN
SCALE 1:25

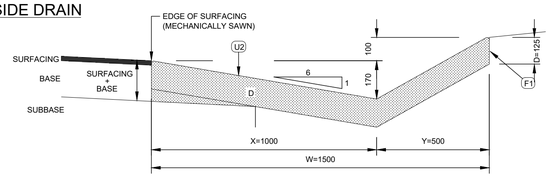
DETAIL OF ENERGY BREAKER SYSTEM AT DISCHARGE POINT OF TYPE 'F' CONCRETE SIDE DRAIN



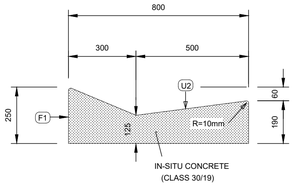
CROSS SECTION OF TYPE E CONCRETE CHANNEL IN OPEN DRAINS
SCALE : SCHEMATIC



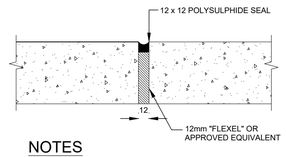
BEGINNING OF TYPE 'E' CONCRETE DRAIN
SCALE : SCHEMATIC



CROSS SECTION OF TYPE 'F' CONCRETE SIDE DRAIN IN CUTTINGS
SCALE : SCHEMATIC



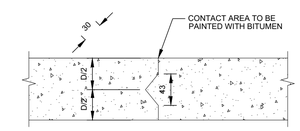
CROSS SECTION OF TYPE "A"
CONCRETE SIDE DRAIN
SCALE 1:10



NOTES

EXPANSION JOINT SHALL BE SPACED AT 30m INTERVALS

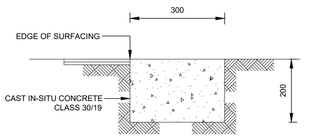
DETAIL OF EXPANSION JOINT
N.T.S



NOTES

CONTRACTION JOINTS SHALL BE SPACED AT 2m INTERVALS. ALTERNATIVELY, SHRINKAGE JOINTS MAY BE CUT TO A DEPTH OF 50mm AND FINISHED WITH A GROOVING TOOL

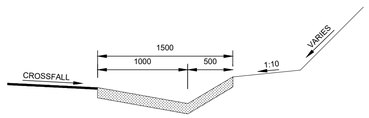
DETAIL OF CONTRACTION JOINT
N.T.S



DETAIL OF EDGE BEAM (TYPE A)
N.T.S

JOINTS IN CONRETE EDGE BEAMS

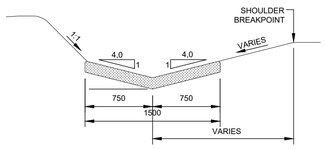
SECTION C-C
SCALE 1:50



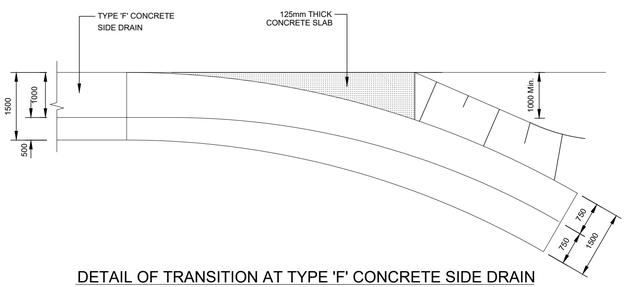
POSITION OF TYPE 'F' CONCRETE SIDE DRAIN
SCALE : SCHEMATIC

NOTES

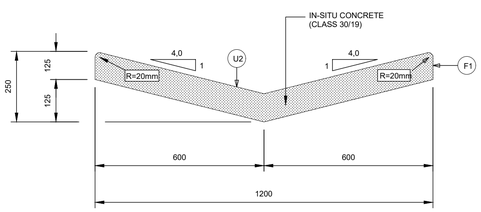
1. ALL CONCRETE CHANNELS AND OTHER DRAINAGE STRUCTURES ON THIS PLAN TO BE CAST USING CLASS 30/19 CONCRETE
2. TYPES 'E' AND 'F' CONCRETE MUST BE CAST IN ALTERNATIVE LENGTHS OF 2.0 m MAXIMUM WITH EXPANSION JOINTS EVERY 5th PANEL (10 m)
3. ALL EXPOSED CORNERS MUST BE ROUNDED OFF TO A RADIUS OF 10 mm
4. THE CLASS OF SURFACE FINISH IS INDICATED AS 'F1' OR 'U2'
5. V MIN. = 150mm (PREFERRED = 300mm)



POSITION OF TYPE 'E' CONCRETE DRAIN
IN SHALLOW CUT
SCALE : SCHEMATIC



DETAIL OF TRANSITION AT TYPE 'F' CONCRETE SIDE DRAIN
SCALE : SCHEMATIC



CROSS SECTION OF TYPE E CONCRETE CHANNEL IN OPEN DRAINS
SCALE : SCHEMATIC

CASE(n)	W	W/2	W/8	D	W/8+D	VOLUME m^3/m
1	1000	500	125	125	250	0,1250
2	1500	750	188	125	313	0.1875
3	2000	1000	250	150	400	0.3000
4	2500	1250	313	150	463	0.3750

DIMENSIONS OF TYPE E CONCRETE CHANNELS

CASE(n)	W	X	Y	Z	D	VOLUME m^3/m
1	1000	670	330	110	125	0,1250
2	1500	1000	500	170	125	0.1875
3	2000	1330	670	220	150	0.3000
4	2500	1670	830	280	150	0.3750

DIMENSIONS OF TYPE F CONCRETE CHANNELS

City of Mbombela
1 Nel Street
Mbombela
1201
TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za
City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS

CONCRETE CHANNEL AND KERB DETAILS

REVISIONS			
6			
5			
4			
3			
2			
1	-- / -- / --	---	

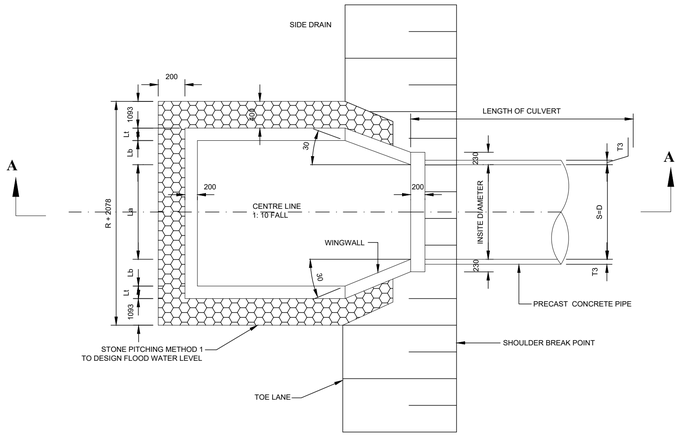
PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

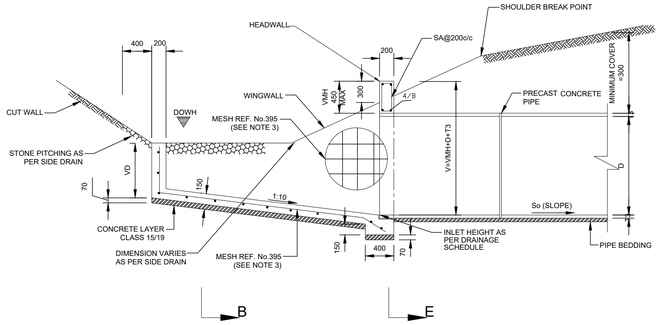
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R1201 REV 0

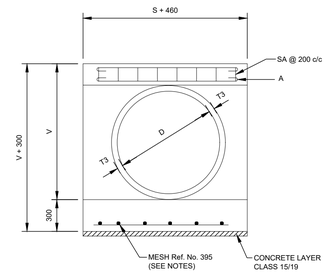
Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS
APPOLLO ENGINEERING
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



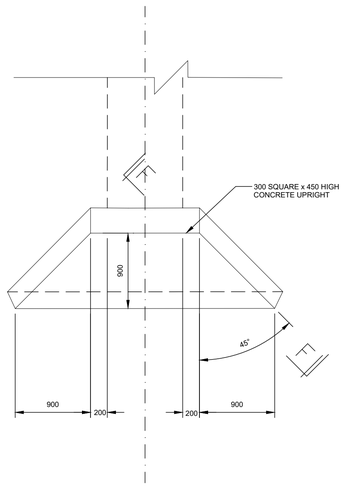
PLAN (DROP INLET)
SCALE 1: 25



SECTION A-A

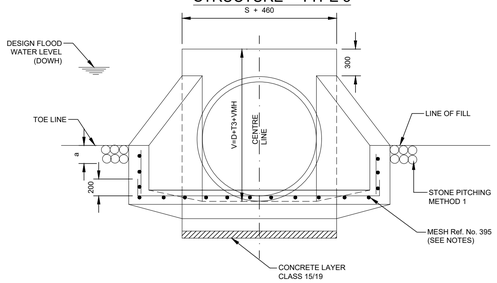


SECTION E - E

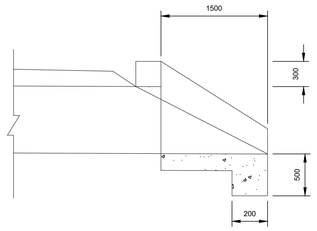


PLAN OF OUTLET AND OUTLET (NORMAL CULVETS)
SCALE 1 : 50

SINGLE PIPE CULVERT INLET STRUCTURE - TYPE 3



SECTION B - B



SECTION F-F
SCALE 1 : 50

BENDING SCHEDULE FOR HEADWALL BEAM TYPE 1 AND 2 PIPE CULVERTS

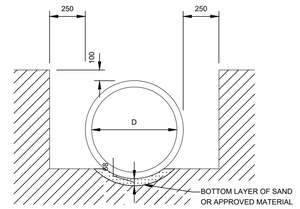
STAFF MARK	DIAMETER	LENGTH	BEND
A	Y12	S + 600	A OR B: 100 + S + 400 + 100
B	Y16	S + 600	
SA	R10	400 + 2X @ 200c/c	X=VMH - 50 (X AND 150 ARE OUTER DIMENSIONS) Y=HIGH TENSILE STEEL 410MPa R=MILD STEEL

NOTES : 1. SEE TYPE 1 & 2 DETAIL DRAWINGS FOR NOTE.(INFORMATION)
2. THIS TYPE OF HEADWALL IS ONLY APPLICABLE TO CULVERT INLET

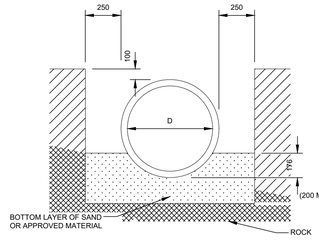
NOTES

ALL SHARP CORNERS ON HEADWALLS, WINGWALLS AND APRON SLAB TO BE FINISHED OFF WITH A 25x25 BEVEL

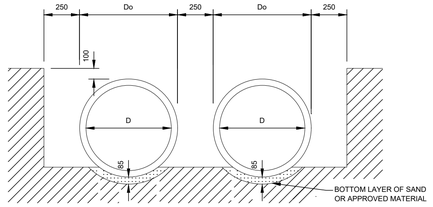
ALL DIMENSIONS AND LEVELS OF CULVERT TO BE FINALISED BEFORE CONSTRUCTION MAY COMMENCE



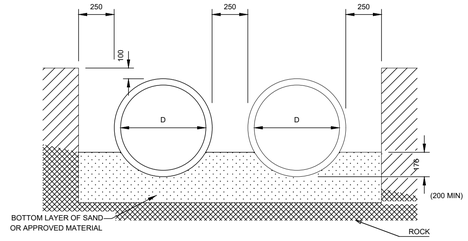
CLASS B BEDDING ON SOFT MATERIAL (SINGLE PIPE)
SCALE : SCHEMATIC



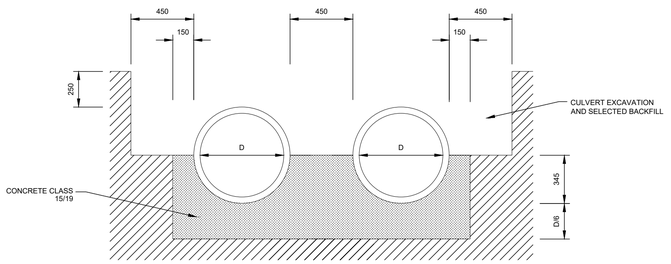
CLASS B BEDDING ON ROCK (SINGLE PIPE)
SCALE : SCHEMATIC



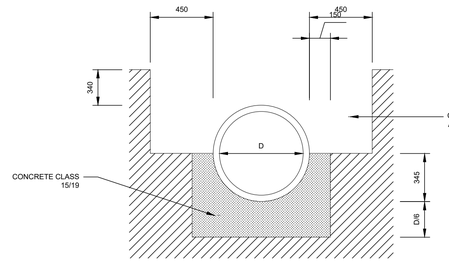
CLASS B BEDDING ON SOFT MATERIAL
SCALE : SCHEMATIC



CLASS B BEDDING ON ROCK
SCALE : SCHEMATIC



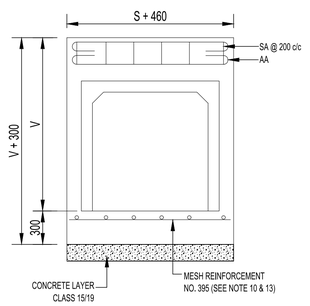
CLASS A BEDDING
SCALE 1:25



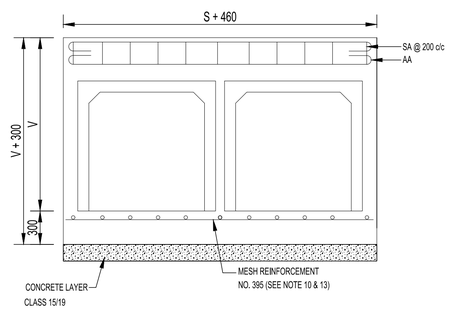
CLASS A BEDDING
SCALE 1:25

NOTES

1 .01 ALL CONCRETE PIPE CULVERTS SHALL COMPLY WITH THE REQUIREMENTS OF S.A.B.S 677.
1 .02 THE PIPE CLASS MUST BE DETERMINED FROM THE WEIGHT OF THE PRISM OF FILL ABOVE THE CULVERT PLUS THE SNABC LOADINGS IN ACCOARDANCE WITH TMH 7 (PARTS 1&2) "CODE OF PRACTICE FOR THE DESIGN OF HIGHWAY BRIDGES AND CULVERTS IN SOUTH AFRICA" AND STATED IN THE DRAINAGE SCHEDULE.
1 .03 THE MAXIMUM WHEEL LOAD ALLOWED ON THE PIPE IS 90KN WITH A MINUMUM FILL OF 150mm ON TOP OF THE PIPE FOR BOTH BEDDING CONDITIONS AND ALL PIPE DIAMETERS AS SHOWN.
1 .04 ALL INFORMATION REGARDING A SPECIFIC PIPE CULVERT APPEARS ON THE DRAINAGE SCHEDULE OF THE ROAD.
1 .05 CONCRETE BACKFILL CLASS 15/19.



SECTION E - E
SCALE 1:25



SECTION F - F
SCALE 1:25

CITY OF MBOMBELA
1 Nel Street
Mbombela
1201
TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za
City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS

CULVERT DETAILS

REVISIONS			
6			
5			
4			
3			
2			
1	-/-/-	---	

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

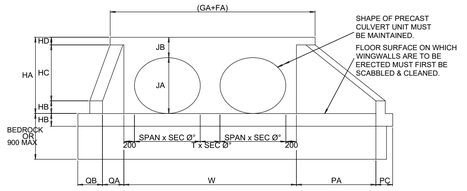
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R1202 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS
APPOLLO ENGINEERING
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za

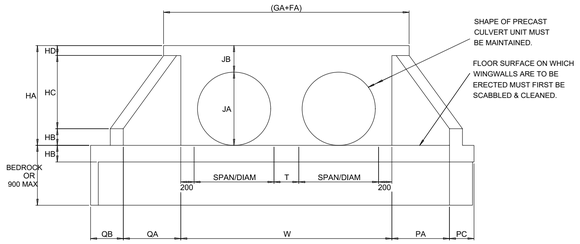
CULVERT DESCRIPTION	WINGWALL REFERENCE NUMBER					
		TYPE				
		BARRELS				
		SPAN/DIA				
		HEIGHT				
		PIPE&BED CLASS				
		SKEW ANGLE				
INLET/OUTLET WINGWALLS CONCRETE DIMENSIONS		FA				
		FB				
		GA				
		GB				
		HA				
		HB				
		HC				
		HD				
		JA				
		JB				
		JC				
		JD				
		KA				
		KB				
		L				
		MA				
		NA				
		PA				
		PB				
		PC				
		QA				
		QB				
		R				
		T				
		t				
		W				
INLET/OUTLET WINGWALLS REINFORCEMENT	ab aa	A1				
		BAR DIA				
		QUANTITY				
		aa				
	aa ab	A2				
		BAR DIA				
		QUANTITY				
		aa				
		ab				
		CUT LENGTH				
	aa ab	A3				
		BAR DIA				
		QUANTITY				
		aa				
		ab				
		CUT LENGTH				
	aa	A4				
		BAR DIA				
		QUANTITY				
		aa				
		CUT LENGTH				
	aa	A5				
		BAR DIA				
		QUANTITY				
		aa				
		CUT LENGTH				
	aa ab	A6				
		BAR DIA				
		QUANTITY				
		aa				
		ab				
		CUT LENGTH				
	aa ab	A7				
		BAR DIA				
		QUANTITY				
		aa				
		ab				
		CUT LENGTH				
INLET/OUTLET WINGWALLS MESH REINFORCEMENT	SMF 617 mc md ma BEND WALL FLOOR mb me	MESH AM				
		TYPE				
		ma				
		mb				
		mc				
		md				
		me				
		MASS (kg)				
	SMF 617 nd nc na BEND WALL FLOOR ne nb	MESH AN				
		TYPE				
		na				
		nb				
		nc				
		nd				
		ne				
		MASS (kg)				
	SMF 311 wb wc wd wa FLOOR	MESH AW				
		TYPE				
		wa				
		wb				
		wc				
		wd				
		MASS (kg)				
TOE BEAM	aa	ZB				
		BAR DIA				
		QTY				
		aa				
		CUT LENGTH				
	aa ab	ZC				
		BAR DIA				
		QTY				
		aa				
		ab				
		CUT LENGTH				
GABION ANCHORS	ab ac aa	ZA				
		BAR DIA				
		QTY				
		aa				
		ab				
		ac				
		CUT LENGTH				

REFER TO DRAWING R1203B



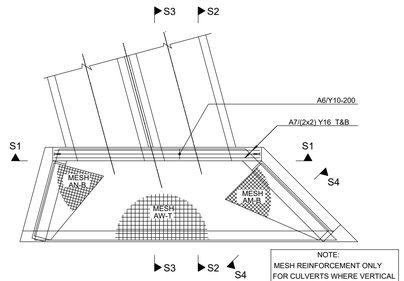
TYPICAL ELEVATION OF INLET/OUTLET WINGWALLS - MAX Ø= 30°

SCALE: SCHEMATIC



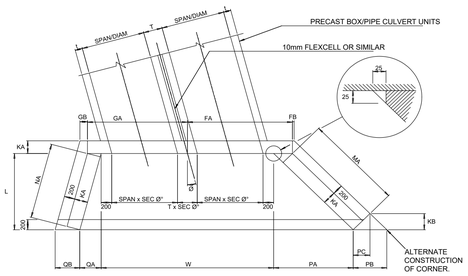
TYPICAL ELEVATION OF INLET/OUTLET WINGWALLS - Ø= 0° (SQUARE)

SCALE: SCHEMATIC



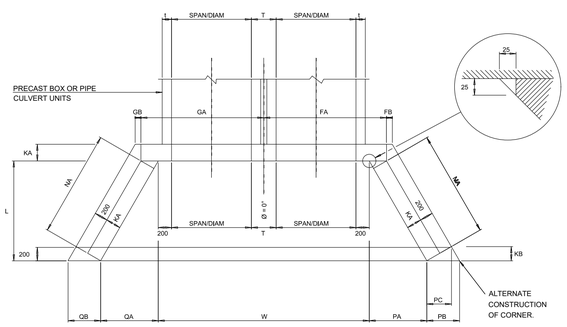
TYPICAL REINFORCEMENT PLAN OF INLET/OUTLET WINGWALLS - MAX = 30

SCALE: SCHEMATIC



TYPICAL PLAN OF INLET/OUTLET WINGWALLS - MAX Ø= 30°

SCALE: SCHEMATIC



TYPICAL PLAN OF INLET/OUTLET WINGWALLS - Ø= 0° (SQUARE)

SCALE: SCHEMATIC

DATA SHEET AND FORMULAE

VERTICAL HEIGHT OF CULVERT	HB	HD	KA	JB
JA < 900	150	200	225	400
JA > 900	250	250	250	500

INSITU FLOOR SLAB (JC) AND PRECAST UNIT WALL THICKNESS (t)

	JC	t
900mm SPAN	150mm MIN.	110mm/Rocla cat.
1200mm SPAN	160mm MIN.	125mm/Rocla cat.
1500mm SPAN	175mm MIN.	145mm/Rocla cat.
1800mm SPAN	190mm MIN.	150mm/Rocla cat.
2100mm SPAN	220mm MIN.	255mm/Rocla cat.

All dimensions in mm

FORMULAE

L = HC x S (min.1500mm) S = BATTER SLOPE

QA = L x TAN(Ø-30) Ø = CULVERT SKEW ANGLE

PA = L x TAN(Ø+30) t = PRECAST WALL THICKNESS

NA = L x SEC(Ø-30) - KA x TAN(Ø-30)

MA = L x SEC(Ø+30) - KA x TAN(Ø+30)

T = t x 2 + 80

QB = (KA + 200) x SEC(Ø - 30)

PB = (KA + 200) x SEC(Ø + 30)

KB = (KA + 200) x SIN(Ø + 30)

PC = (KA + 200) x COS(Ø + 30)

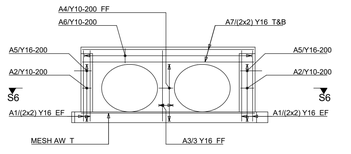
GA = W/2 + KA x SEC(Ø -30)

GB = [200 x COSEC(Ø - 30)] - KA x TAN(Ø - 30)

FA = W/2 + KA x SEC(Ø +30)

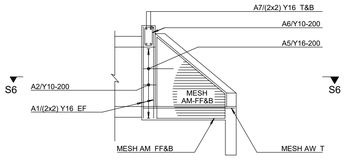
FB = [200 x COSEC(Ø + 30)] - KA x TAN(Ø + 30)

R = t + 100



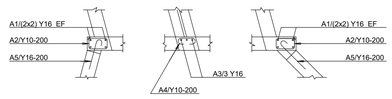
SECTION S1-S1 - INLET/OUTLET WINGWALLS HEADWALL & COLUMNS - REINFORCEMENT

SCALE: SCHEMATIC



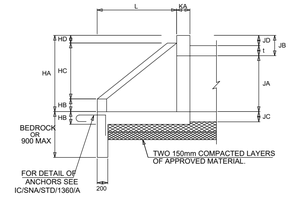
SECTION S2-S2 - INLET/OUTLET WINGWALLS HEADWALL & WINGWALLS - REINFORCEMENT

SCALE: SCHEMATIC



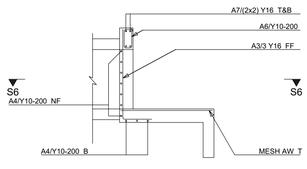
SECTION S6-S6 - INLET/OUTLET WINGWALLS HEADWALL COLUMNS - REINFORCEMENT

SCALE: SCHEMATIC



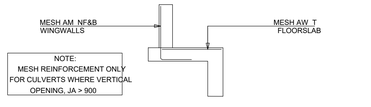
TYPICAL END-ELEVATION OF INLET/OUTLET WINGWALLS - MAX = 30

SCALE: SCHEMATIC



SECTION S3-S3 - INLET/OUTLET WINGWALLS HEADWALL & COLUMNS - REINFORCEMENT

SCALE: SCHEMATIC



SECTION S4-S4 - INLET/OUTLET WINGWALLS WINGWALLS & FLOORSLAB - REINFORCEMENT

SCALE: SCHEMATIC

NOTES FOR INLET/OUTLET WINGWALLS

1 DESIGN CRITERIA

1.01 THE WINGWALLS ARE DESIGNED AS CANTILEVERS FIXED TO THE BASE AND SUPPORTED BY THE HEADWALL.

1.02 THE WINGWALLS ARE DESIGNED FOR A SURCHARGE OF 750 mm AND A MAXIMUM SLOPE OF 1:1,5 FOR ANY FILL HEIGHT.

1.03 THE DENSITY OF SOIL = 20 kN/m.

1.04 SOIL PRESSURES DETERMINED USING RANKINE'S THEORY.

1.05 CONCRETE:

	WINGWALLS	INSITU BARREL
CHARACTERISTIC STRENGTH (MPa)	30	30
CLASS CONCRETE	30/19	30/19

1.06 REINFORCEMENT ACCORDING TO SABS 920 - LATEST REVISION.
CHARACTERISTIC STRENGTH OF HIGH TENSILE STEEL = 450 MPa
CHARACTERISTIC STRENGTH OF HIGH TENSILE STEEL MESH = 450 MPa

1.07 A LINEAR SOIL PRESSURE DISTRIBUTION IS ASSUMED.

2 GENERAL

2.01 THE REQUIRED CLASS OF SURFACE FINISH IS F2 FOR ALL VISIBLE SURFACES.

2.02 ALL VISIBLE CORNERS MUST HAVE A 25 x 25 mm CHAMFER.

2.03 TWO 150 mm LAYERS OF APPROVED MATERIAL, COMPACTED TO 93% MODIFIED A.A.S.H.T.O. DENSITY, ARE REQUIRED UNDER THE INLETS AND OUTLETS.

2.04 MINIMUM CONCRETE COVER TO REINFORCEMENT IS 40 mm.

2.05 FURTHER INFORMATION REGARDING SPECIFIC CULVERTS APPEAR ON THE DRAINAGE SCHEDULES OF THE ROAD.

2.06 THE INLET AND OUTLET UNITS ARE DESIGNED TO ACT AS INDEPENDENT UNITS WHEN USED TOGETHER WITH PIPES.

2.07 THE HEADWALLS MUST BE ALIGNED PARALLEL TO THE ROAD SHOULDER.

1m 0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m 11m 12m 13m 14m

ORIGINAL SCALE: 1 : 100

CITY OF MBOMBELA
THE UMPIMA'S DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS

INLET AND OUTLET WING WALLS

REVISIONS			
6			
5			
4			
3			
2			
1	-- / -- / --	---	

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

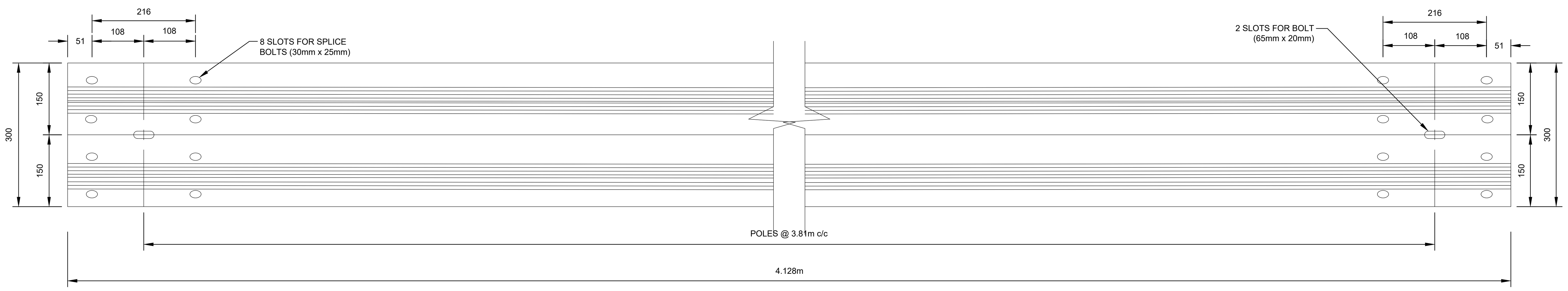
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R1203A REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

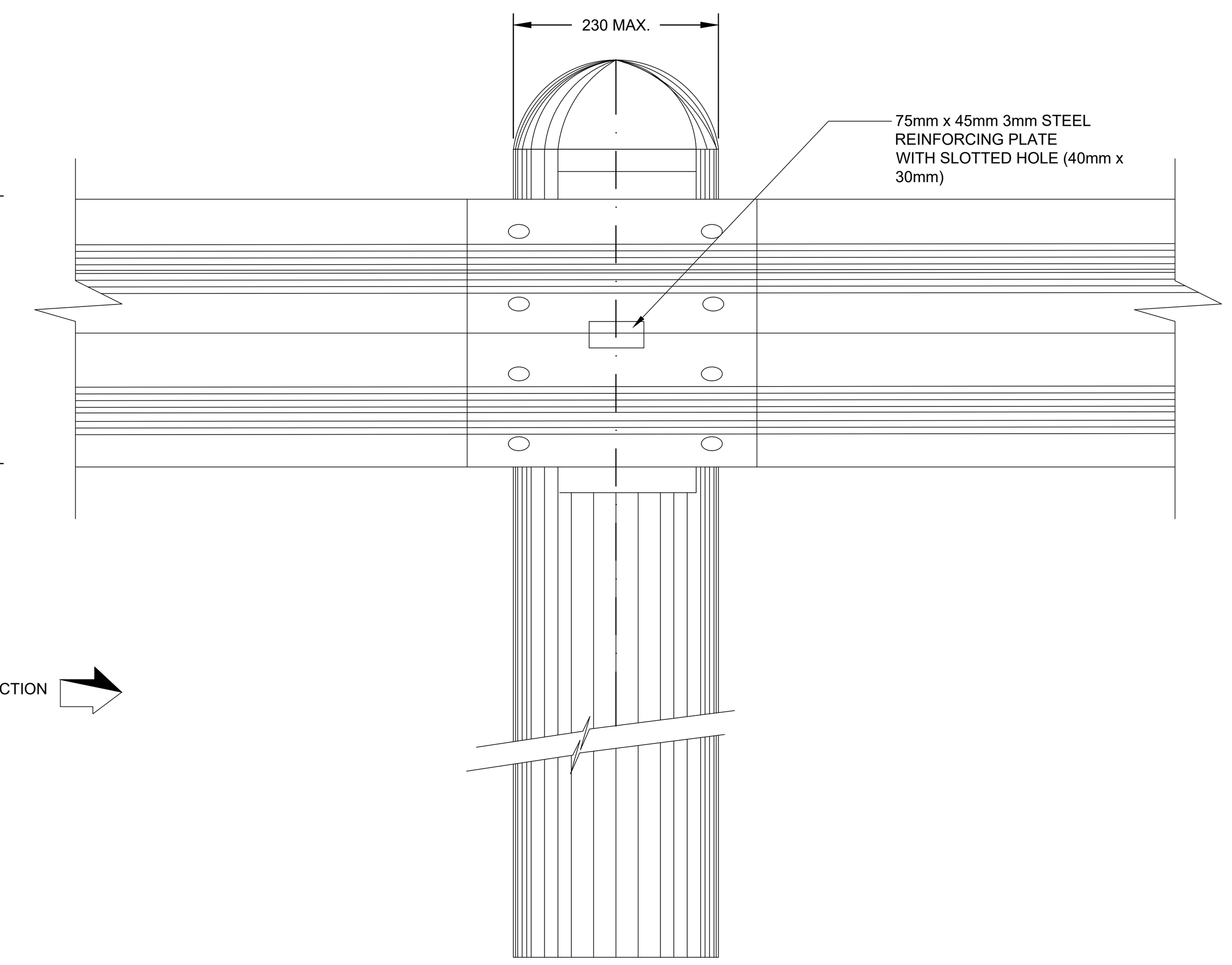
APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



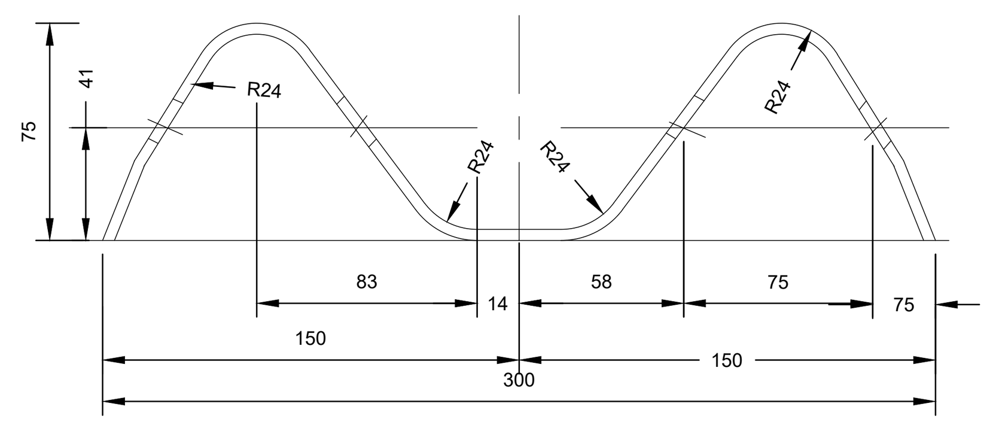
TYPICAL GUARDRAIL SECTION

1:5



DETAIL A: FRONT ELEVATION NORMAL SPACING OF POSTS

1:5

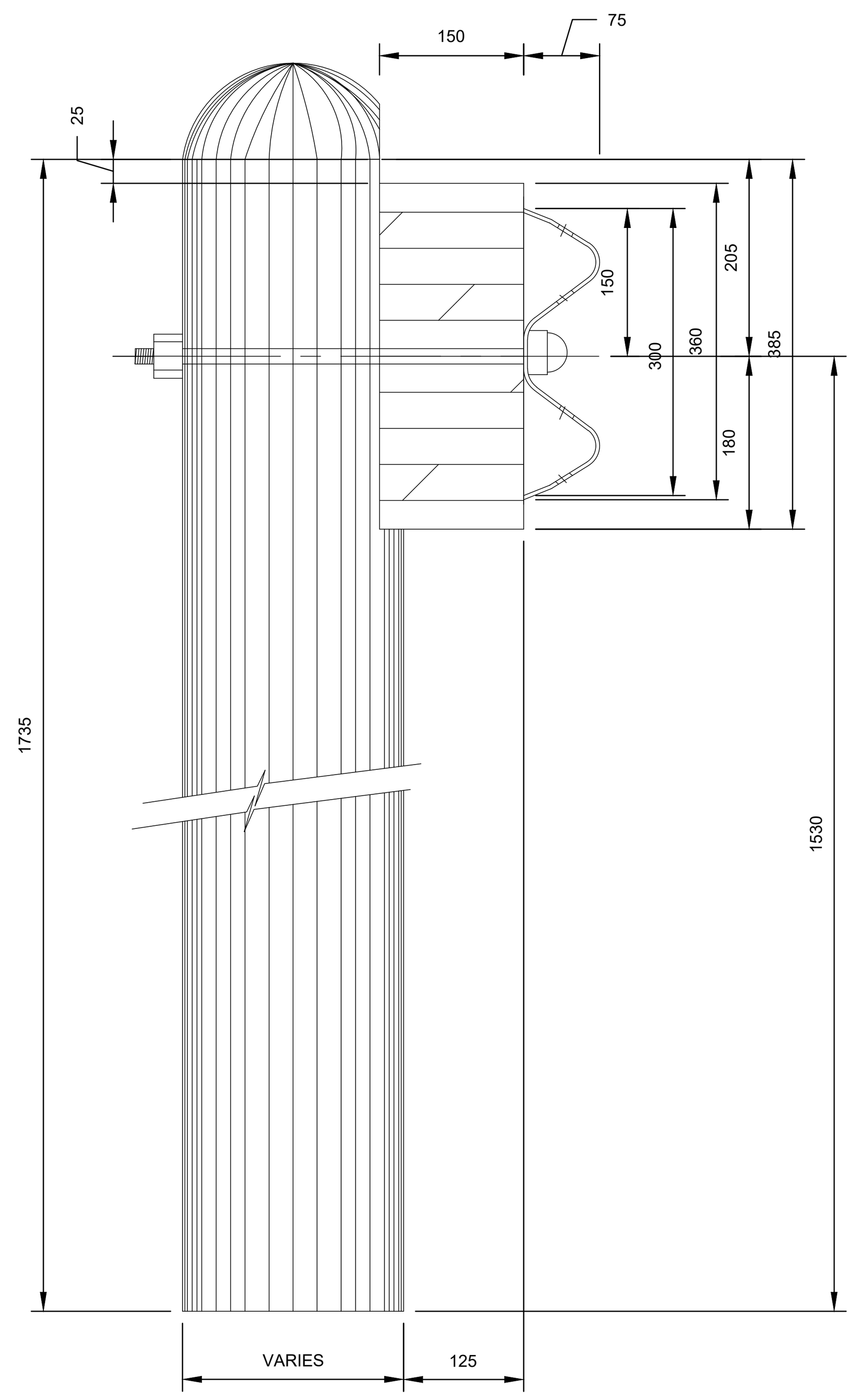


SECTION THROUGH GUARDRAIL

1:2

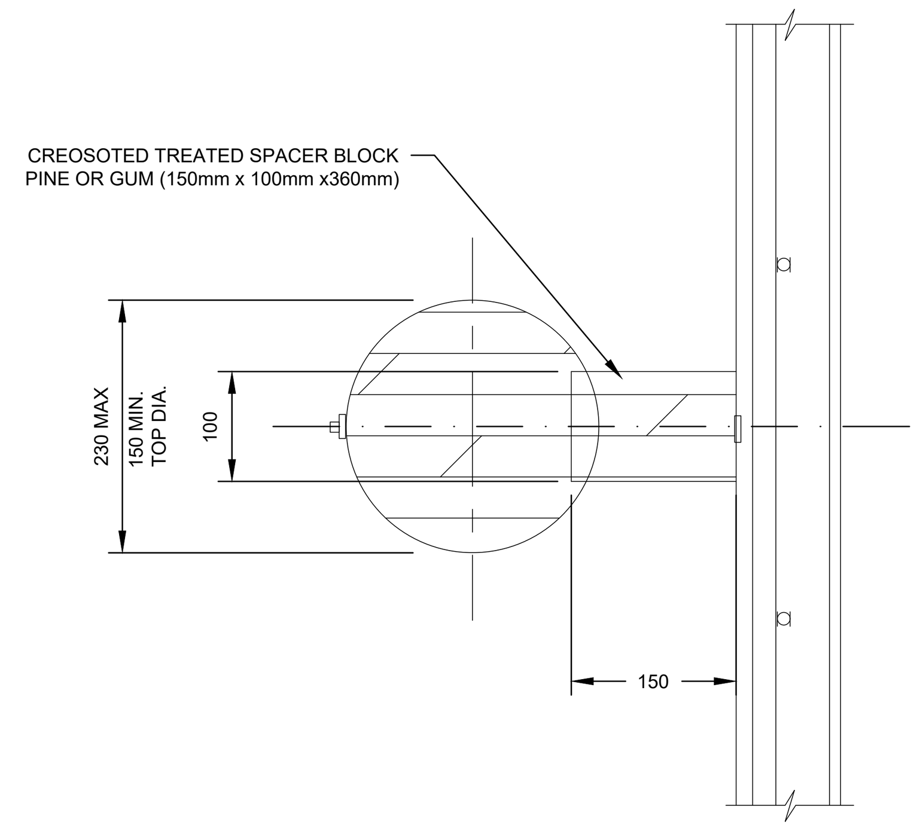
NOTE:

1. GUARDRAILS WILL BE PLACED WHERE REQUIRE BY THE ENGINEER
2. ALL GUARDRAILS MUST BE GULVANISED (NOT PAINTED)



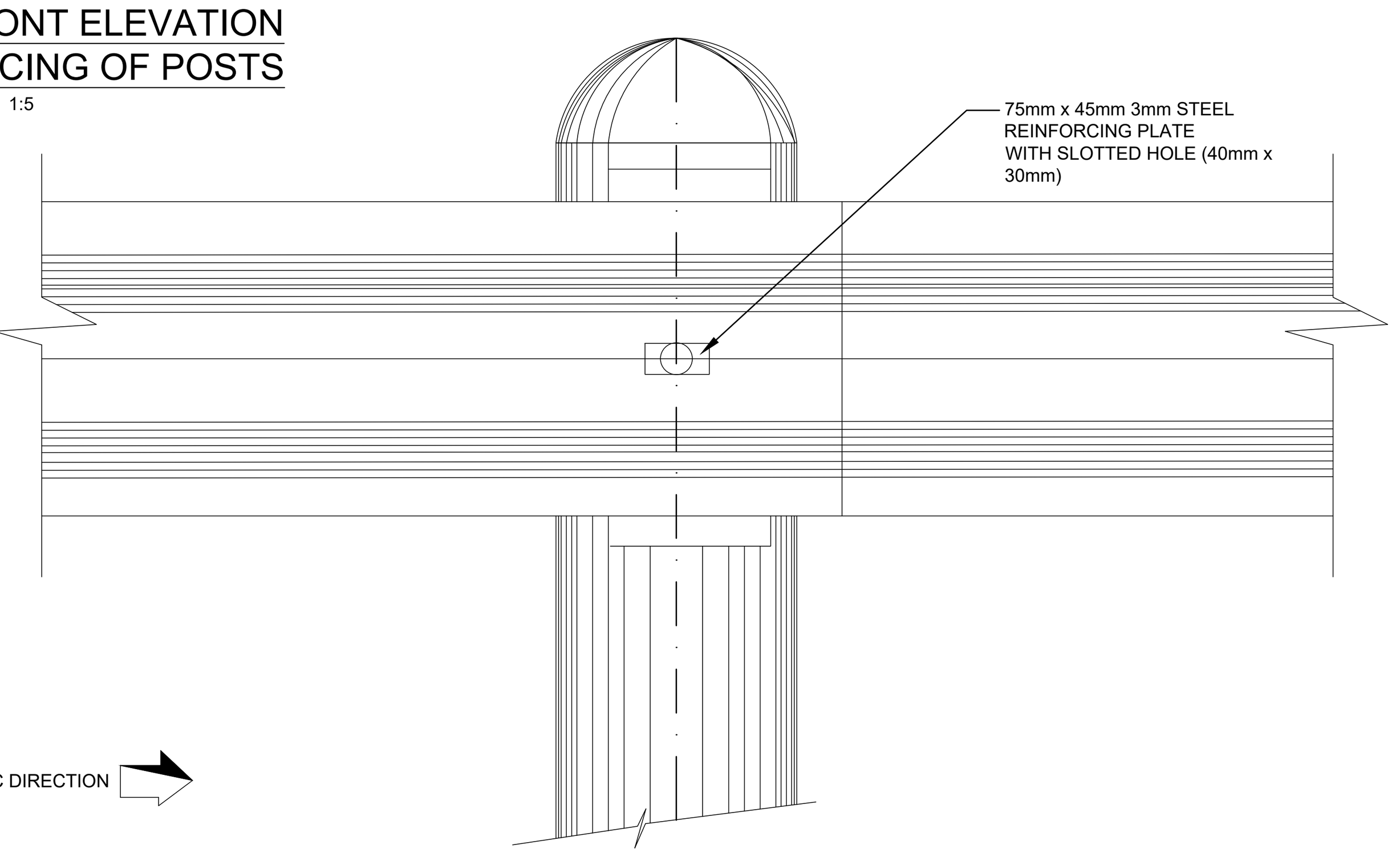
ELEVATION OF GUARDRAIL

1:5



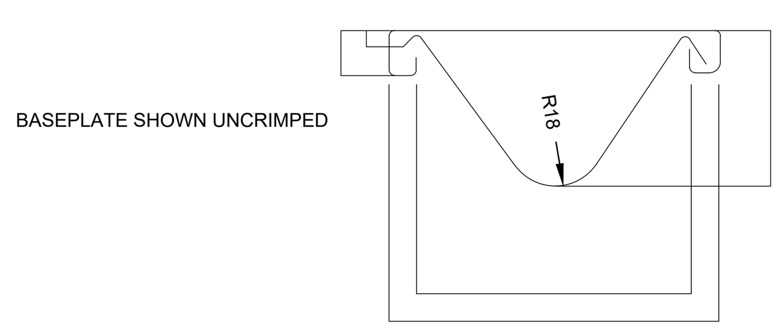
PLAN

1:5

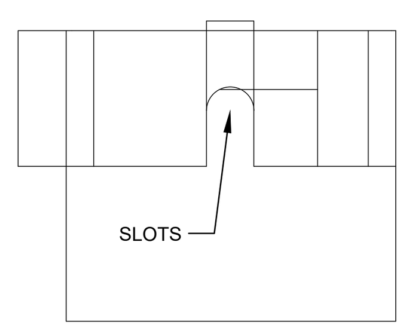


DETAIL B: FRONT ELEVATION HALF SPACING OF POSTS

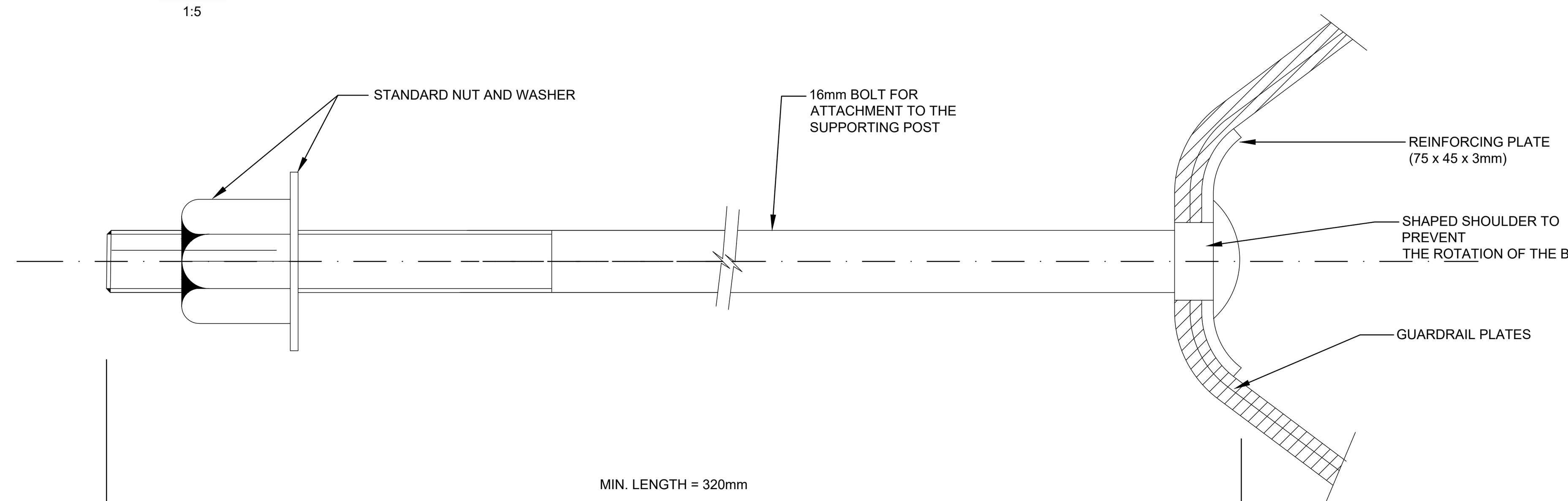
1:5



SECTION PLAN



DETAIL OF BASE PLATE

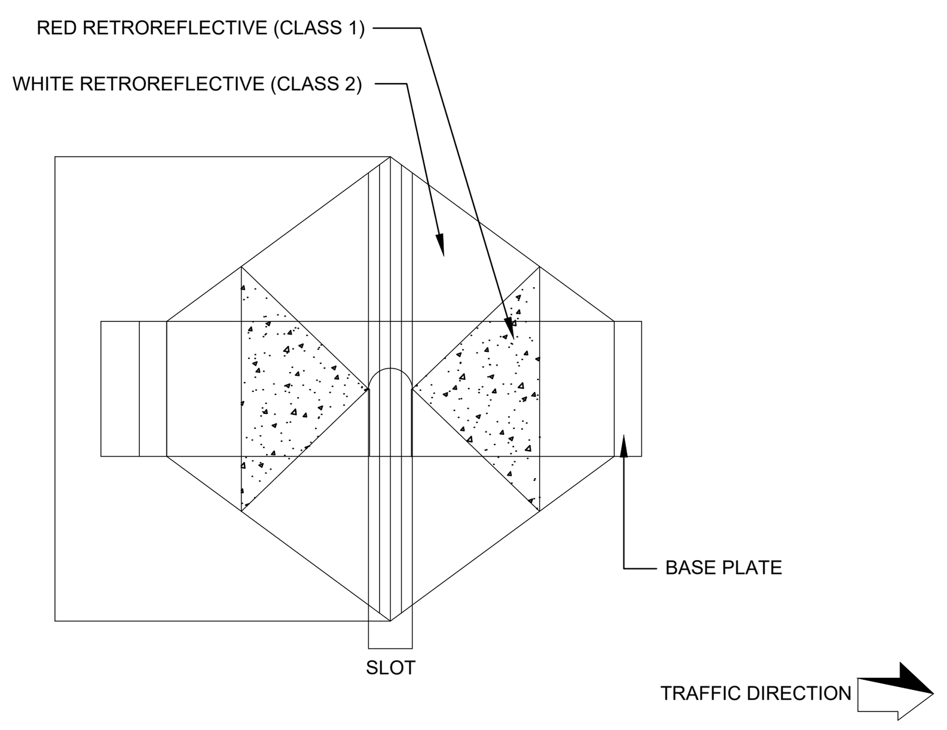


TYPICAL BOLTS

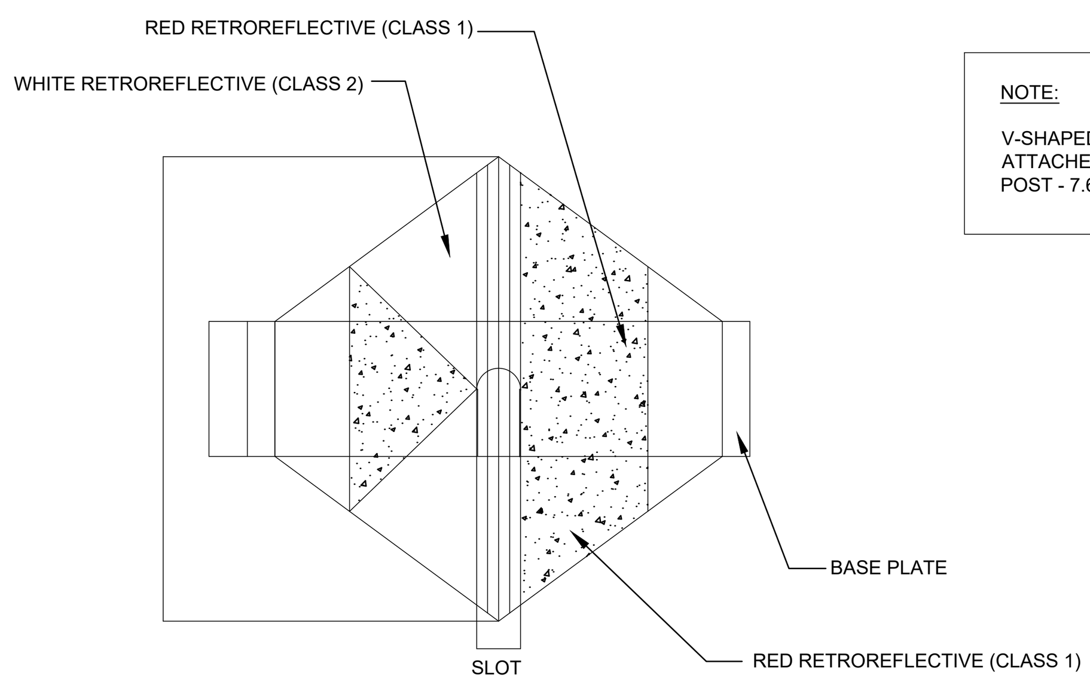
1:1

NOTE:

V-SHAPED REFLECTIVE PLATES ATTACHED TO EACH ALTERNATIVE POST - 7.62m c/c



FRONT ELEVATION : TYPE D1 (A)

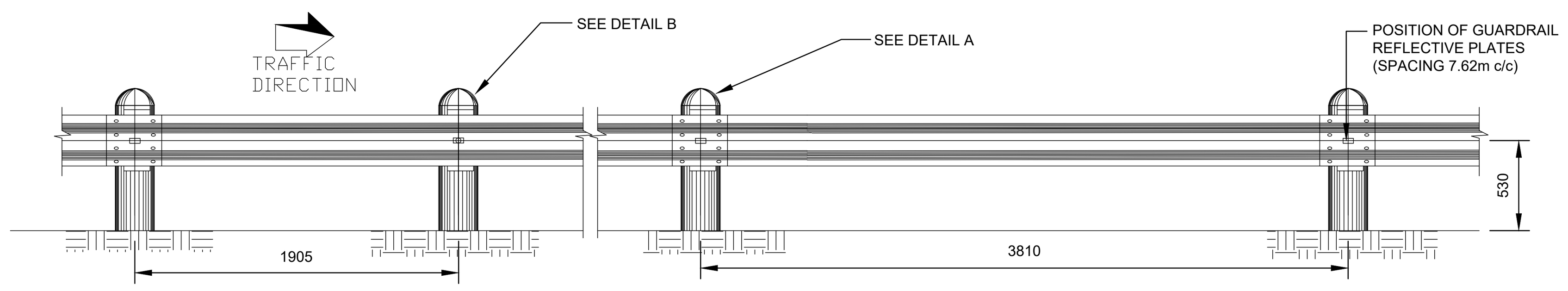


FRONT ELEVATION : TYPE D1 (B)

DETAIL OF GUARDRAIL REFLECTIVE PLATES

SPECIFICATIONS

1. BOLTS: HIGH TENSILE STEEL 16mm
2. WASHERS: 3mm THICK
3. SPACER BLOCK: PINE OR GUM, PRESSURE IMPREGNATED WHICH COMPLIES WITH SABS 536 OR 539.
4. POSTS: 150mm MIN - 230mm MAX, PINE OR GUM, PRESSURE IMPREGNATED WITH CREOSOTE WHICH COMPLIES WITH SABS 538 OR 539.
5. GALVANAZING: GUARDRAILS - SABS 763: TYPE A1 ARTICLE. BOLTS AND WASHERS: SABS 763: TYPE C1 ARTICLE
6. TIMBER POST: POSTS SHALL COMPLY WITH THE REQUIREMENTS OF SABS AND SHALL CARRY THE SABS MARK.
7. CREOSOTE TREATMENT: TIMBER POSTS AND SPACER BLOCKS SHALL BE TREATED IN ACCORDANCE WITH SABS 05 WITH CREOSOTE WHICH COMPLIES WITH SABS 538 OR 539F.
8. REFLECTIVE PLATES: OUTER SURFACE SHALL BE COATED WITH ENGINEERING GRADE RETRO-REFLECTIVE MATERIAL WHICH COMPLIES WITH THE PROVISION OF CKS 191 IN THE COLOURS SHOWN IN THE DRAWING.



SPACING OF POSTS AND POSITION OF REFLECTIVE PLATES

1:25

CITY OF MBOMBELA

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS

GUARDRAIL DETAILS

REVISIONS			
6			
5			
4			
3			
2			
1	–/–/–	—	

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R1204A REV 0

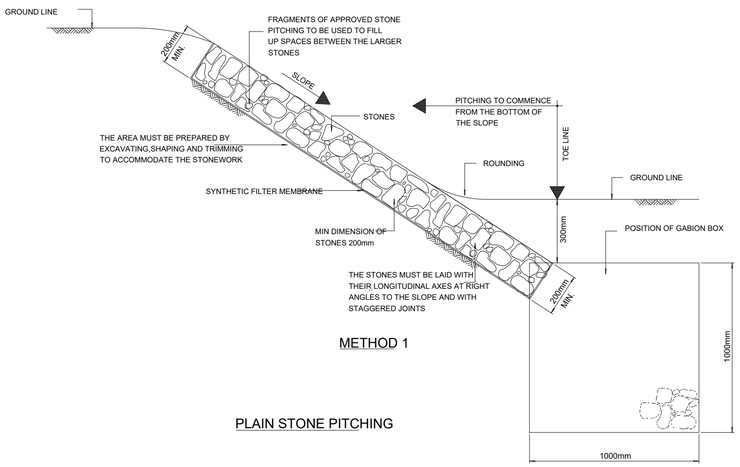
Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za

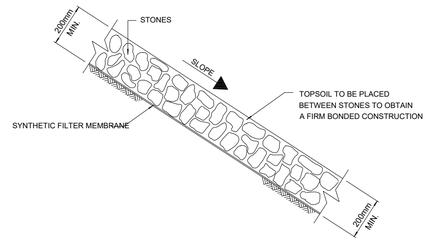
PITCHING AND GABIONS

STONE PITCHING



METHOD 1

PLAIN STONE PITCHING

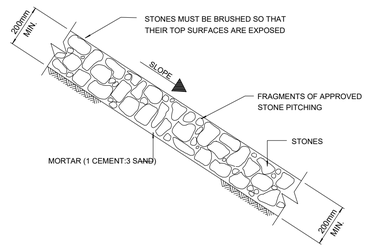


METHOD 2

NOTES:

THE TECHNIQUE AND REQUIREMENTS LAID DOWN IN METHOD 1 SHALL APPLY WITH THE FOLLWING EXCEPTIONS:

1. NO SMALL STONES SHALL BE USED TO FILL THE SPACES BETWEEN THE LARGER STONES.
2. TOPSOIL SHALL BE INTRODUCED BETWEEN INDIVIDUAL STONES SIMULTANEOUSLY WITH PLACING OF STONES.
3. ROOTED GRASS OR GRASS TUFTS SHALL THEN BE PLACED IN THE TOPSOIL.

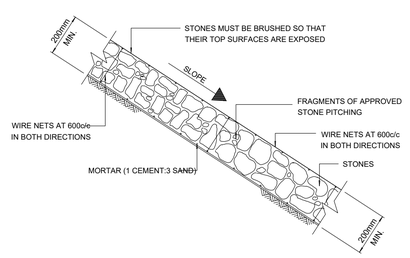


GROUTED STONE PITCHING

NOTES:

THE TECHNIQUE AND REQUIRMENTS LAID DOWN IN METHOD 1 SHALL APPLY WITH THE FOLLOWING EXCEPTION:

1. THE SPACES BETWEEN THE STONES SHALL BE FILLED WITH MORTAR.



WIRE AND GROUTED STONE PITCHING

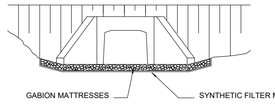
NOTES:

THE TECHNIQUE AND REQUIRMENTS LAID DOWN IN METHOD 1 SHALL APPLY WITH THE FOLLOWING EXCEPTIONS.

1. PITCHING IN ACCORDANCE WITH GROUTED STONE PITCHING.
2. CONSTUCTION SHALL BE AS FOLLOWS:
   a) PLACING OF BOTTOM WIRE NET.
   b) ATTACHING OF WIRE TIES TO BOTTOM MESH.
   c) PITCHING.
   d) PLACING THE TOP WIRE NET AND FASTENING WIRE TIES.
   e) GROUTING.

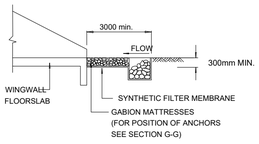
GABIONS

PLAN OF DOWN CHUTE AND ENERGY BREAKER
1:40

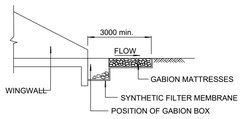


ELEVATION OF INLET/OUTLET

PLAN OF INLET/OUTLET



SECTION A-A (INLET)



SECTION A-A (OUTLET)

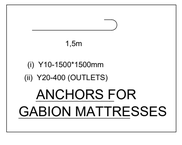
DETAIL OF GABION MATTRESSES AND BOXES AT INLETS AND OUTLETS

BOXES

STANDARD SIZES OF BOXES	
LENGTH	1000mm, 2000mm, 3000mm, 4000mm
WIDTH	1000mm
DEPTH	500mm, 1000mm
DIAPHRAGM SPACING	1000mm

ROCK USED FOR THE FILLING OF CAGES		
DEPTH OF CAGES	ROCK SIZE (DIMENSIONS)	
	MIN. (mm)	MAX. (mm)
230	100	125
300	100	200
500	100	250
1000	100	300

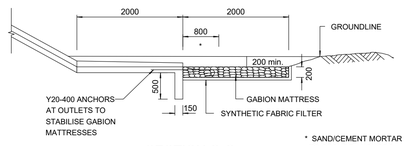
MESH SIZE AND WIRE DIAMETER FOR CAGES		
DEPTH OF GABION	MESH SIZE (mm)	WIRE DIA. (mm)
500mm AND OVER	80 x 100	2,7
200mm TO 300mm	80 x 100	2,5



ANCHORS FOR GABION MATTRESSES

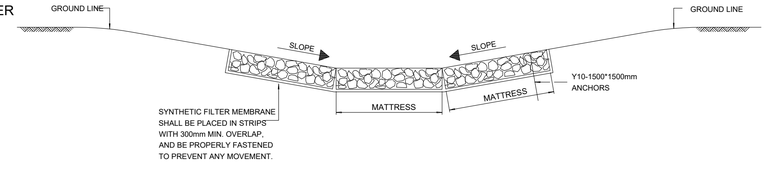
MATTRESSES

STANDARD SIZES	
LENGTH	6000mm
WIDTH	2000mm
DEPTH	170mm, 230mm, 300mm



SECTION G-G
1:40

* SAND/CEMENT MORTAR TO SECURE ANCHORS



SECTION OF MATTRESS IN CANAL

CITY OF MBOMBELA
THE LEOPPA'S DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS

GABION DETAILS

REVISIONS			
6			
5			
4			
3			
2			
1	--/--/--	---	

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

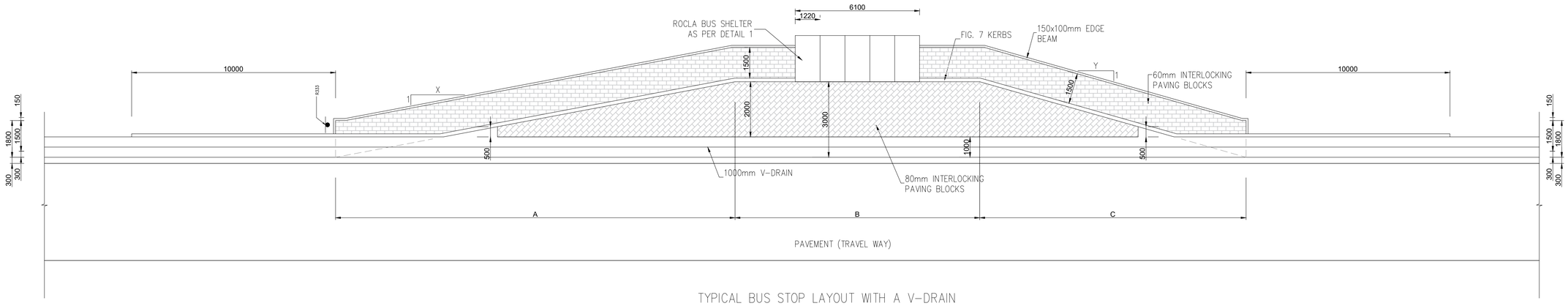
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R1205 REV 0

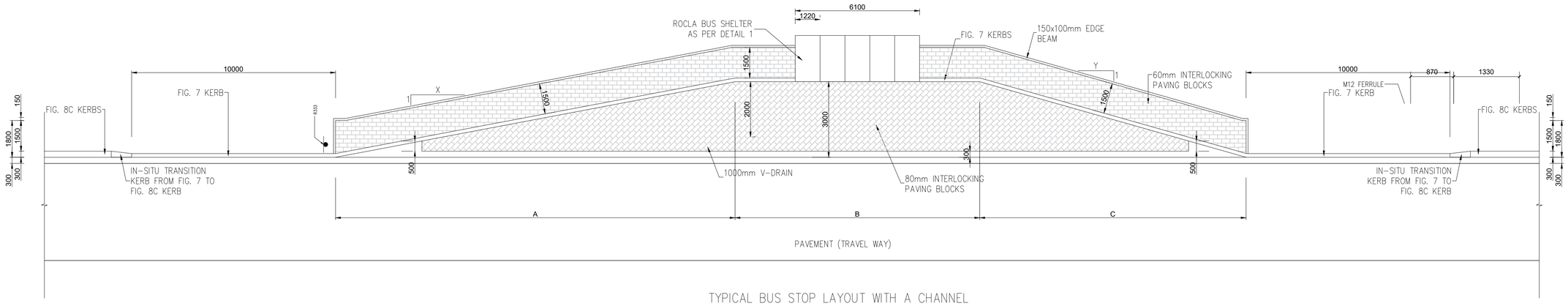
Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

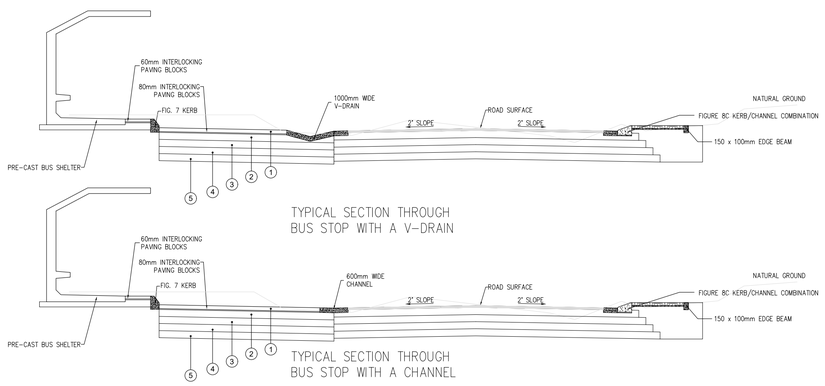
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



TYPICAL BUS STOP LAYOUT WITH A V-DRAIN

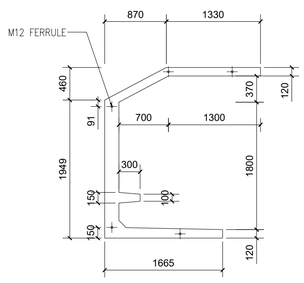


TYPICAL BUS STOP LAYOUT WITH A CHANNEL



TYPICAL SECTION THROUGH
BUS STOP WITH A V-DRAIN

TYPICAL SECTION THROUGH
BUS STOP WITH A CHANNEL



DETAIL 1
PRE-CAST ROCLA BUS SHELTER

TABLE A: DIMENSIONS OF BUS AND TAXI BAYS		
DIMENSIONS	BUS BAY	TAXI BAY
A	18,0m	10,0m
B	23,0m – TRIPLE (15,0m) – DOUBLE (12,0m) – SINGLE + 12,0m PER ADDITIONAL BUS	8,0m (6,0m) + 8,0m (*5,5m) PER ADDITIONAL TAXI
C	12,0m	6,0m
D	3,0m – 3,5m	2,5m
1: X	1: 6 *(1: 5)	1: 4 *(1: 3,2)
1: Y	1: 4	1: 2,4

NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

5		
4		
3		
2		
1		
DATE	REVISIONS	

CITY OF MBOMBELA
THE LOPPIES DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
BUS STOP AND BUS SHELTER DETAILS

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
066/SHI/R1206 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appologroup.co.za

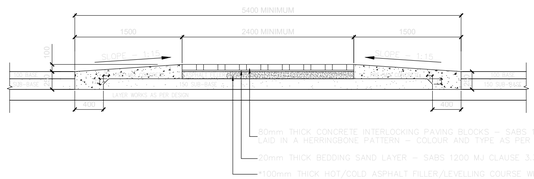
SPEED HUMPS IN PAVING ROADS

PLATFORM SPEED HUMP FOR NORMAL ROAD FLAT = 2400 SLOPED = 1500 TOTAL = 5400 TYPE 1

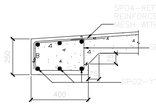
PEDESTRIAN PLATFORM SPEED HUMP FOR NORMAL ROAD FLAT = 2400 MIN. SLOPED = 1500 TOTAL = 5400 MIN. TYPE 2

PLATFORM SPEED HUMP FOR NORMAL ROAD FLAT = 2400 SLOPED = 3000 TOTAL = 8400 TYPE 3

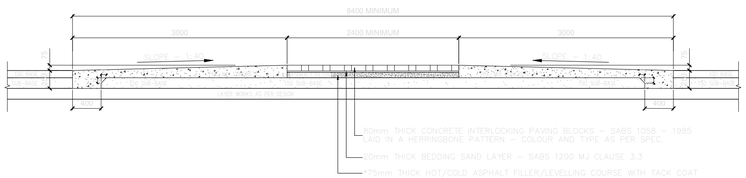
PEDESTRIAN PLATFORM SPEED HUMP FOR NORMAL ROAD FLAT = 2400 MIN. SLOPED = 3000 TOTAL = 8400 MIN. TYPE 4



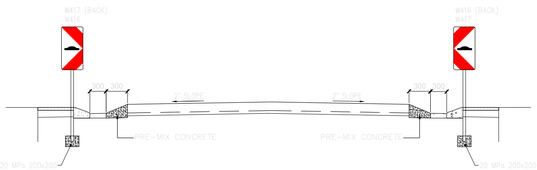
SECTION KK – SPEED HUMPS
SCALE: N.T.S



REINFORCING & CONCRETE DETAIL

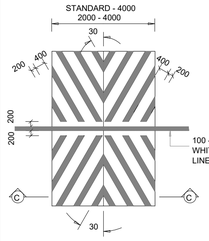


SECTION KK – SPEED HUMPS
SCALE: N.T.S

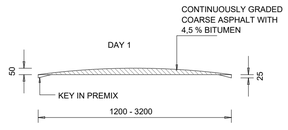


SECTION JJ SPEED HUMPS
SCALE: N.T.S

DETAIL OF PAVING PLATFORM SPEED HUMP
*AFTER SUB-BASE, LAY & COMPACT ASPHALT FILLER FIRST THEN CUT OFF EDGES AFTER COMPACTION IS COMPLETE



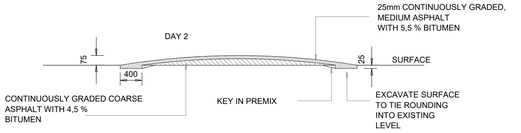
DETAIL OF SPEED HUMP



CONSTRUCTION DETAIL OF SPEED HUMP

NOTES FOR ASPHALT HUMPS:

1. SHOULD THE ASPHALT COOL-OFF BEFORE SECOND LAYER IS PLACED, A SECOND LAYER OF TACK COAT SHOULD BE APPLIED.
2. PRIME COAT - 60/70 PEN BITUMEN
3. TACK COAT - 30 % CAT. EMULSION @ 0,55 l/m
4. ALL SIGNAGE TO BE IN ACCORDANCE WITH THE ROAD TRAFFIC SIGNS MANUAL AND NATIONAL GUIDELINES FOR TRAFFIC CALMING



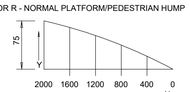
SECTION C-C

SPEED HUMP FOR NORMAL ROAD TYPE 5

DETAIL OF ASPHALT SEMI-CIRCULAR SPEED HUMP

TABLE & DETAILS FOR R - NORMAL PLATFORM/PEDESTRIAN HUMP

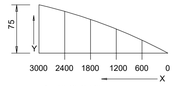
X(mm)	Y(mm)
0	0
400	27
800	46
1200	63
1600	72
2000	75



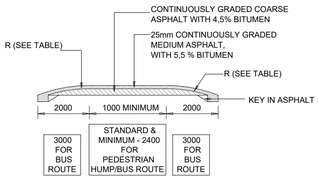
DETAIL OF CURVE

TABLE & DETAILS FOR R - BUS ROUTE PLATFORM/PEDESTRIAN HUMP

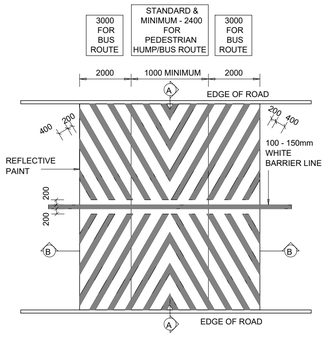
X(mm)	Y(mm)
0	0
600	27
1200	46
1800	63
2400	72
3000	75



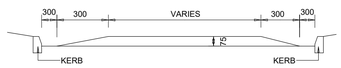
DETAIL OF CURVE



SECTION B-B



PLAN OF PLATFORM HUMP
PAINTING IS DIFFERENT FOR PEDESTRIAN HUMP



SECTION A-A

DETAIL OF ASPHALT PLATFORM HUMP

NORMAL PLATFORM SPEED HUMP FLAT = 1000mm CURVED = 2000mm TOTAL = 5000mm TYPE 6

NORMAL PEDESTRIAN PLATFORM SPEED HUMP FLAT = 2400mm MIN. CURVED = 2000mm TOTAL = 6400mm MIN. TYPE 7

BUS ROUTE PLATFORM SPEED HUMP FLAT = 2400mm CURVED = 3000mm TOTAL = 8400mm TYPE 8

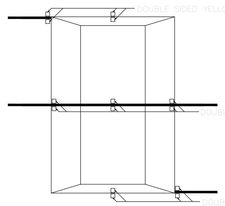
BUS ROUTE PEDESTRIAN PLATFORM SPEED HUMP FLAT = 2400mm MIN. CURVED = 3000mm TOTAL = 8400mm MIN. TYPE 9

STANDARD HEIGHT OF HUMP – NORMAL ROAD		
DESIGN MAXIMUM SPEED OVER HUMP (km/h)	HEIGHT OF HUMP (mm)	HEIGHT OF ASPHALT FILLER (mm)
30	120	120
40	100	100
50	80	80

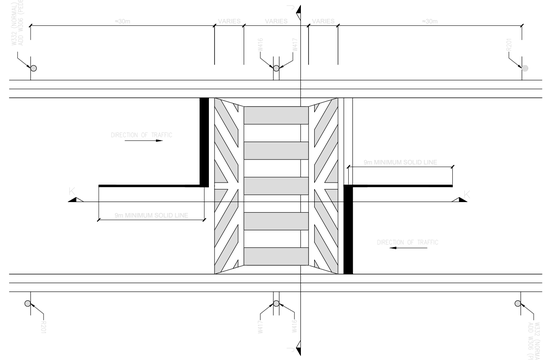
STANDARD HEIGHT OF HUMP – BUS ROUTE		
DESIGN MAXIMUM SPEED OVER HUMP (km/h)	HEIGHT OF HUMP (mm)	HEIGHT OF ASPHALT FILLER (mm)
ALL	75	75

BENDING SCHEDULE FOR SPEED HUMP											
BAR MARK	TYPE OF BAR	NO. OF MEMBERS	NO. OF BARS IN EACH	TOTAL NO.	LENGTH (mm)	SHAPE CODE	A (mm)	B (mm)	C (mm)	D (mm)
SP01	Y10	2	*CALC.	*CALC.	1430	55A	550	190	340	200
SP02	Y12	2	12	24	4490	37	150			

*CALC – CALCULATION TO BE CARRIED OUT BY CONTRACTOR AS IT DEPENDS ON ROAD WIDTH
*CALC – ENGINEER TO CHECK CALCULATION BEFORE ORDERING OF REINFORCEMENT



ROAD STUD DETAIL
SCALE: N.T.S



SPEED HUMPS PLAN VIEW
SCALE: N.T.S

TYPICAL SPEED HUMP PLAN VIEW INCLUDING SIGNAGE & MARKINGS
PAINTING IS DIFFERENT BETWEEN NORMAL & PEDESTRIAN HUMP

CITY OF MBOMBELA
THE ULTIMATE DESTINATION
1 Nel Street
Mbombela
1201
TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za
City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS

SPEED HUMP DETAILS

REVISIONS			
6			
5			
4			
3			
2			
1	--/--/--	---	

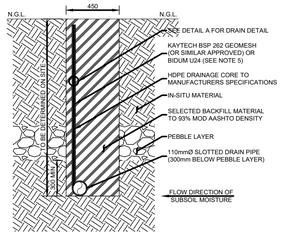
PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

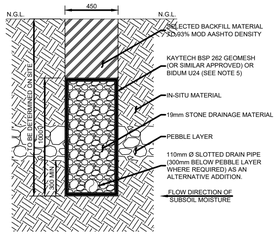
DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

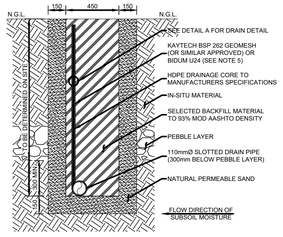
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

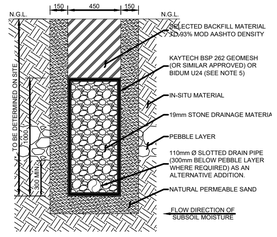
DRAWING No :
041/SHI/R1207 REV 0

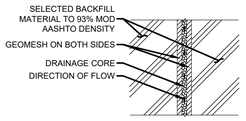
Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS
APPOLLO ENGINEERING
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za

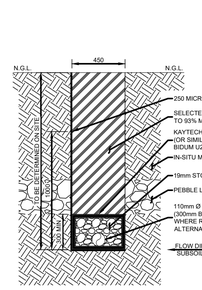


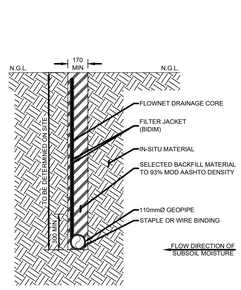


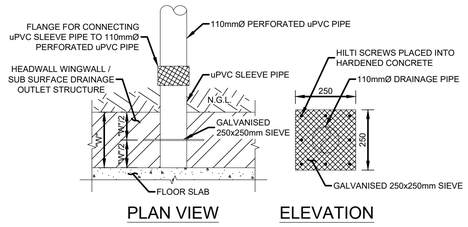


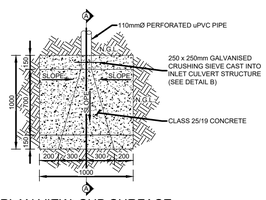


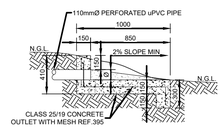


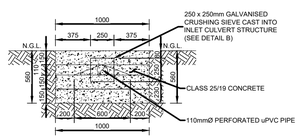


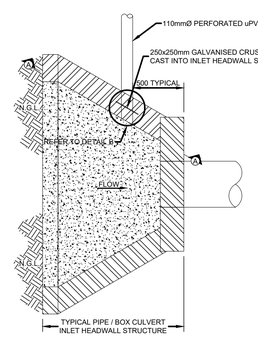


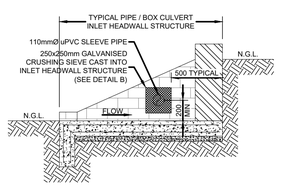












TYPE 1: TYPICAL FIN-DRAIN DETAIL

SCALE 1:15

TYPE 2: TYPICAL SUBSOIL-DRAIN DETAIL

SCALE 1:15

TYPICAL DRAIN DETAIL FOR SANDY MATERIAL

TYPE 3: TYPICAL FIN-DRAIN DETAIL

SCALE 1:15

TYPE 4: TYPICAL SUBSOIL-DRAIN DETAIL

SCALE 1:15

TYPICAL DRAIN DETAIL FOR CLAYEY MATERIAL

DETAIL A: DRAIN DETAIL

SCALE 1:5

LEGEND:

- ▨ SELECTED BACKFILL MATERIAL
- ▦ 19mm STONE DRAINAGE MATERIAL
- ▩ NATURAL PERMEABLE SAND
- ▧ IN-SITU MATERIAL
- ▤ PEBBLE LAYER

NOTES:

1. UNLESS OTHERWISE SPECIFIED, TYPICAL SUBSOIL DRAINAGE MUST BE APPLIED THROUGHOUT.
2. WHERE A SUBSURFACE DRAINAGE CONDUIT IS PLACED IN A STORMWATER BEARING SIDE DRAIN, IT MUST BE PROTECTED BY LINING THE SIDE DRAIN WITH A CONCRETE LINING / STONE / PAVING / CORBELS OR SLURRY PAVING.
3. FLOWNET AND PVC PIPE ONLY TO BE INSTALLED AT THE ENGINEER'S REQUEST.
4. THE MINIMUM DEPTH OF SUBSOILS SHOULD BE AS DIRECTED BY THE ENGINEER ON SITE.
5. USE BIDUM U24 IF SUBSOIL DRAIN IS TO BE SUBMERGED BY GROUNDWATER, OTHERWISE USE KAYTECH BSP 262 GEOMESH OR SIMILAR APPROVED.

DETAIL B: GALVANISED CRUSHING SIEVE

SCALE 1:10

TYPE 5: CUT-OFF DRAIN

SCALE 1:15

TYPE 6: FLO-DRAIN

SCALE 1:15

GRADING REQUIREMENTS OF CRUSHED STONE

1. CRUSHED STONE SHALL BE GRADED
2. CRUSHED STONE, WHICH CONFORMS TO THE FOLLOWING REQUIREMENTS:

   PERCENTAGE PASSING THROUGH:
   26.6mm SIEVE.........................100
   13.2mm SIEVE.....................60-85

3. FINE GRADE STONE:
   - 3.1. A MINIMUM OF 15% PASSING THROUGH A 3.35mm SIEVE.
   - 3.2. A MAXIMUM OF 15% PASSING THROUGH A 1.18mm SIEVE.
4. COURSE GRADE STONE:
   - 4.1. A MINIMUM OF 15% PASSING THROUGH A 6.70mm SIEVE.
   - 4.2. A MAXIMUM PF 15% PASSING THROUGH A 2.38mm SIEVE.
5. IN THE CASE OF CRUSHED STONE NOT MORE THAN 5% OF THE MATERIAL SHALL PASS THROUGH THE 0.075mm SIEVE.

PLAN VIEW: SUB SURFACE DRAINAGE OUTLET STRUCTURE

SCALE 1:20

SECTION A-A: SUB SURFACE DRAINAGE OUTLET STRUCTURE

SCALE 1:20

ELEVATION: SUB SURFACE DRAINAGE OUTLET STRUCTURE

SCALE 1:20

PLAN VIEW: SUB SURFACE DRAINAGE IN HEADWALL STRUCTURE

SCALE 1:20

SECTION A-A: SUB SURFACE DRAINAGE IN HEADWALL STRUCTURE

SCALE 1:20

CITY OF MBOMBELA
THE ULTIMATE DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS

SUBSURFACE DRAINS, & DETAILS

REVISIONS		
6		
5		
4		
3		
2		
1	--/--/--	--

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

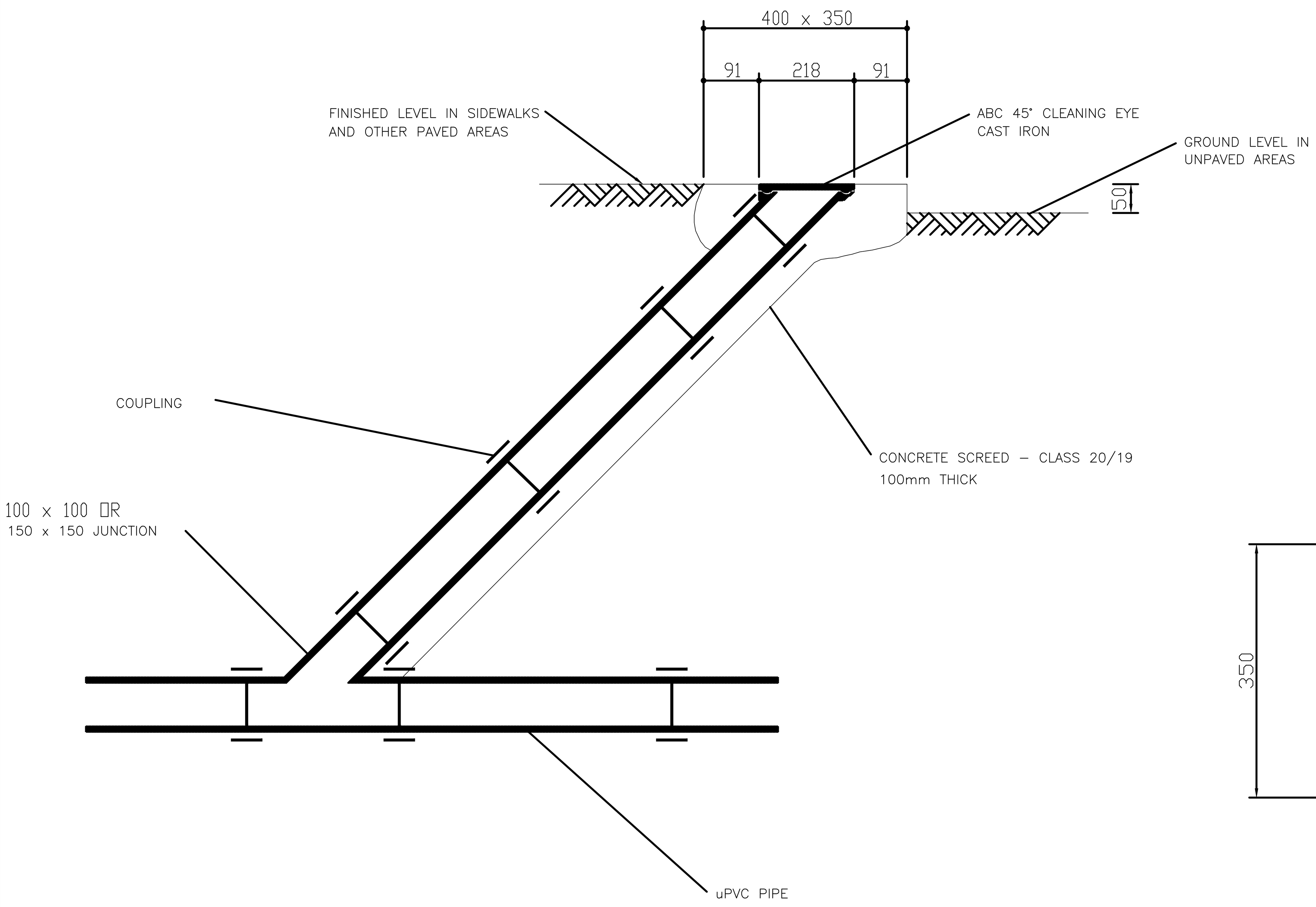
DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

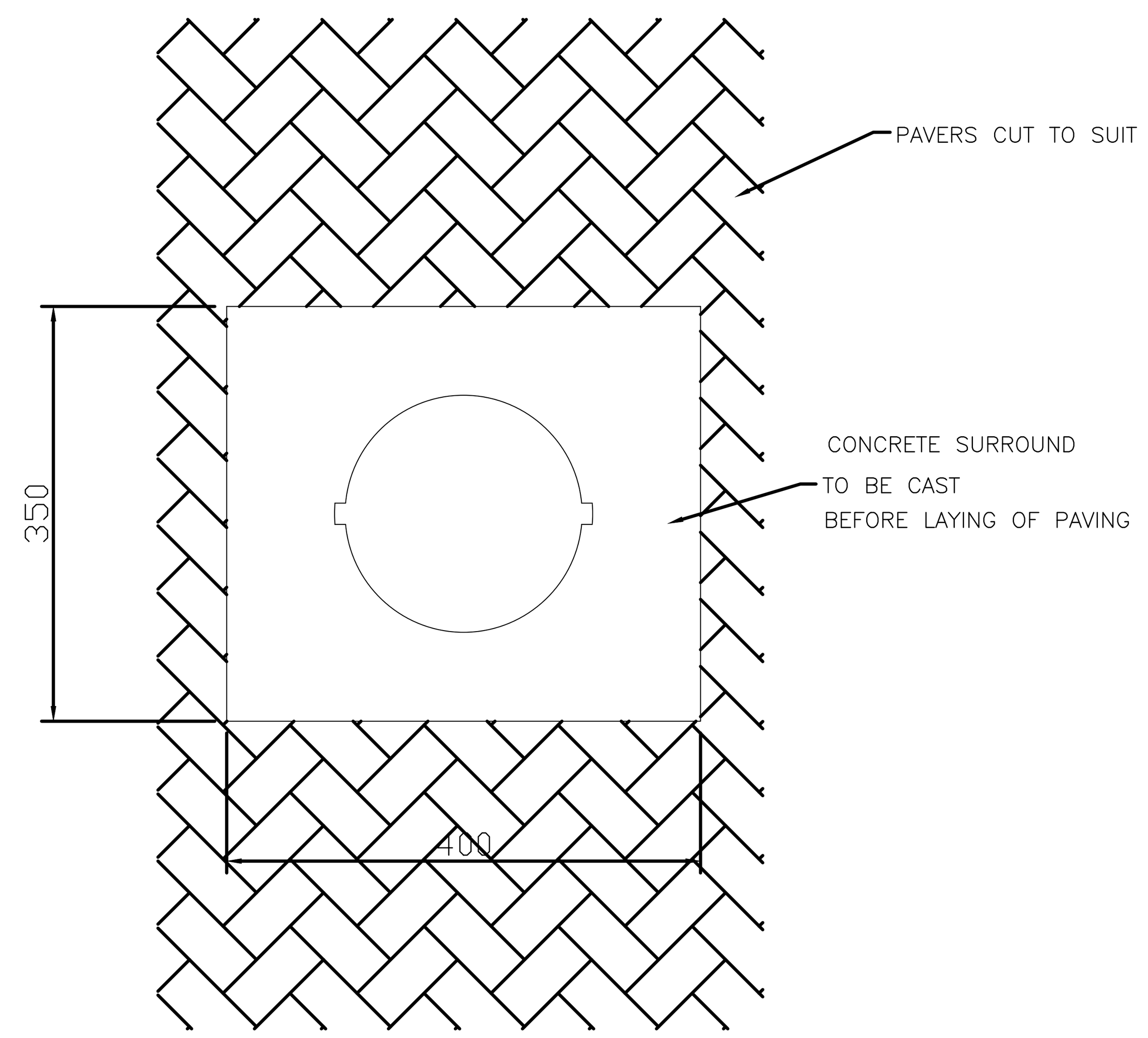
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R1211 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za





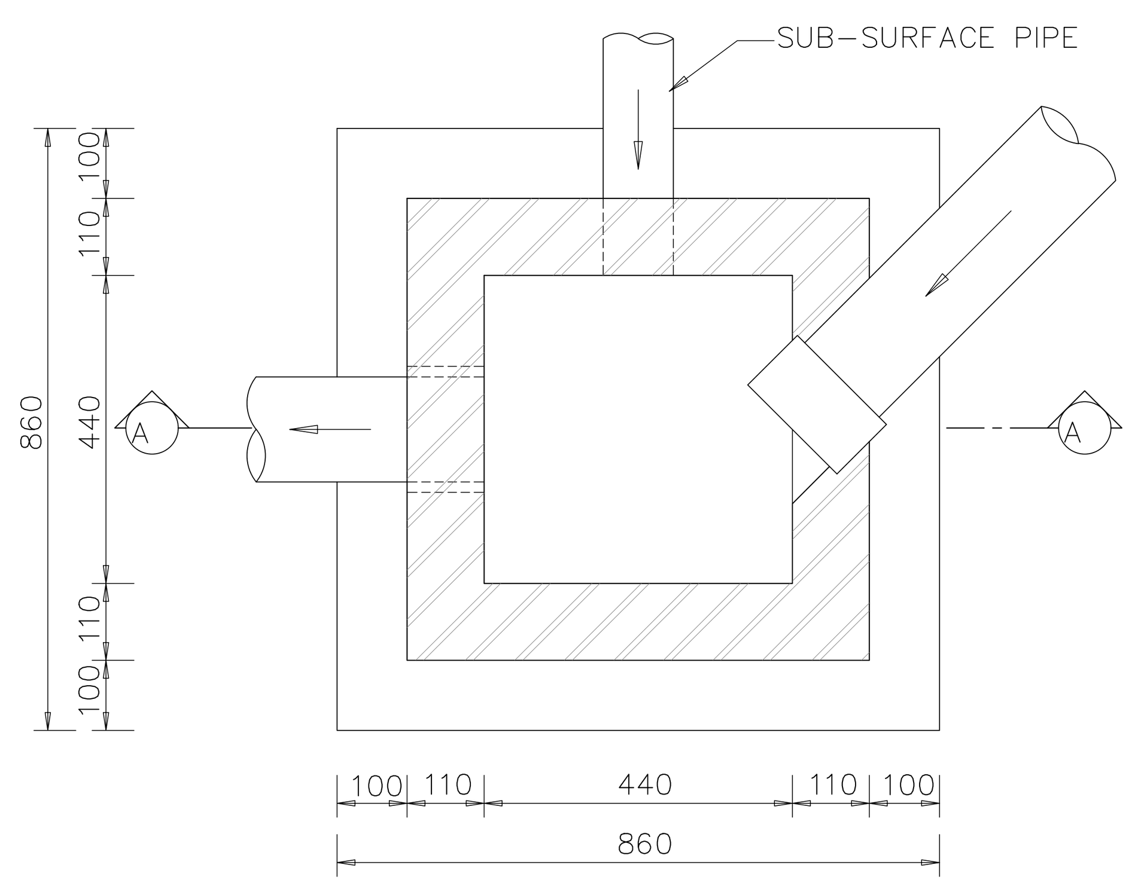
PLACE AT THE BEGINNING OF EVERY SUBSOIL DRAIN AND AT SELECTED POSITIONS AS IDENTIFIED BY THE ENGINEER

SUBSURFACE DRAIN RODDING EYE DETAILS

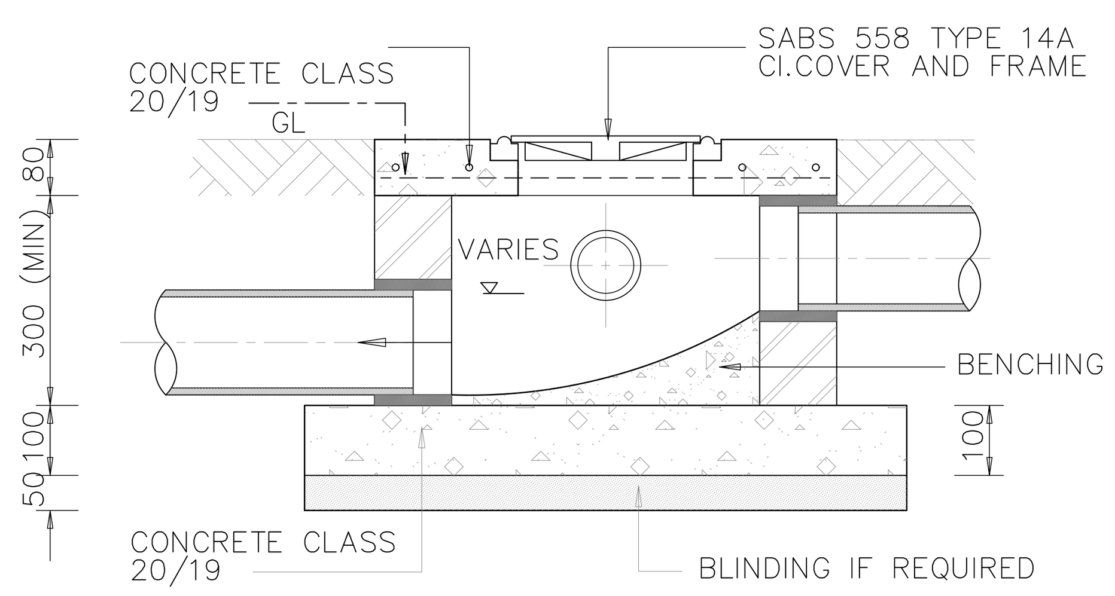
PLAN

NOTES

1. MAXIMUM DEPTH. OF MANHOLE IS 750mm.
2. ALL BRICKWORK TO BE IN ENGLISH BOND.
3. ALL BRICKS TO BE FBSE 30 TO SABS 227–1986 WITH WATER ABSORTION < 14% AND EFFLORESCENCE <10.

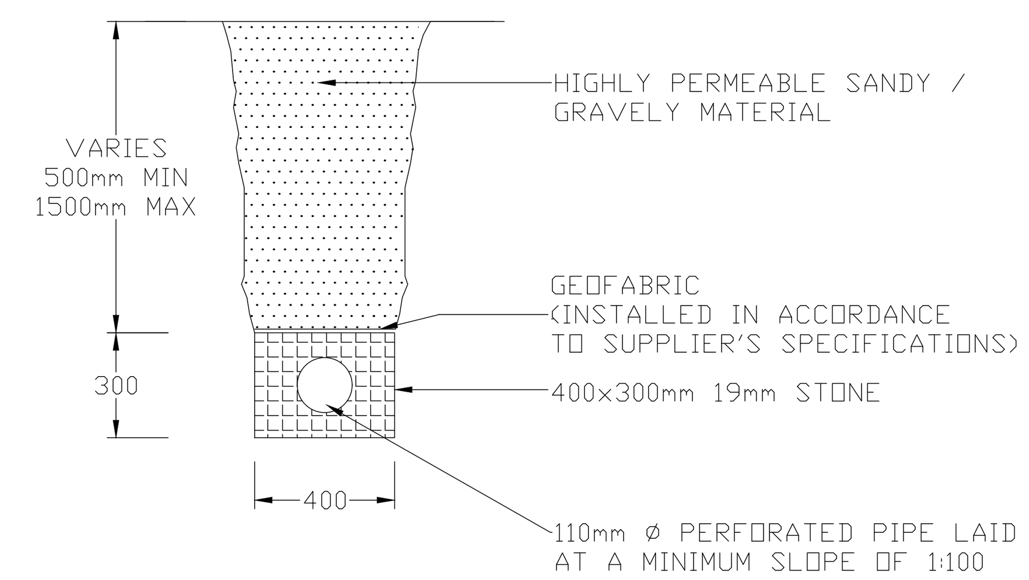


PLAN (COVER NOT SHOWN)



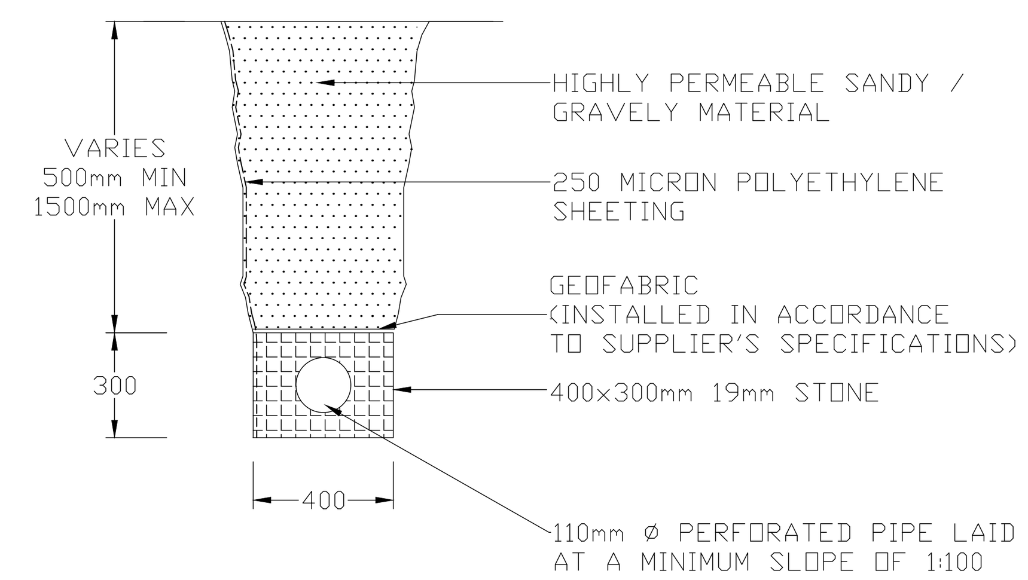
SECTION A–A

SUBSURFACE DRAIN MANHOLE DETAILS



SUBSOIL DRAIN

SCALE 1:20



SUBSOIL DRAIN

SCALE 1:20

CITY OF MBOMBELA
1 Nel Street
Mbombela
1201
TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za
City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
STANDARD DETAILS
SUBSURFACE DRAINAGE DETAILS

REVISIONS		
6		
5		
4		
3		
2		
1	–/–/–	–

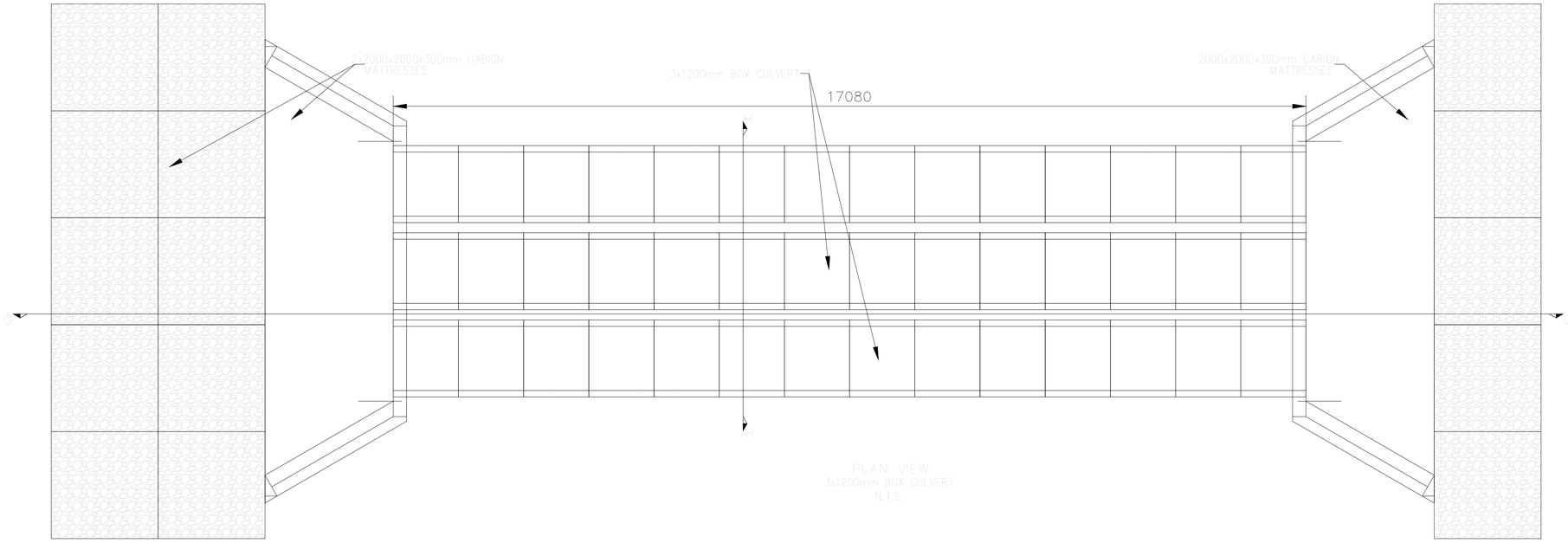
PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

DESIGNED :	J.T.
DRAWN :	J.T.
SCALE :	N. T. S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M.
SIGNATURE :	

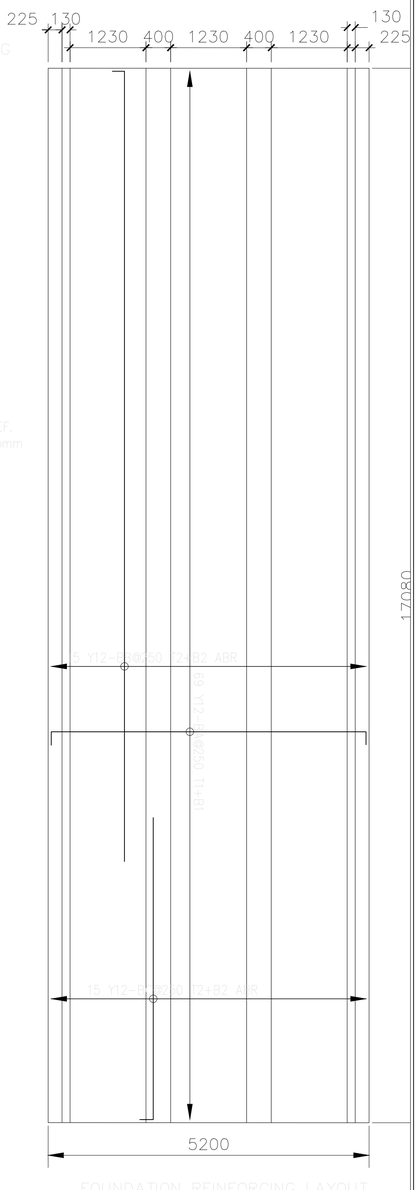
PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/R1212 REV 0

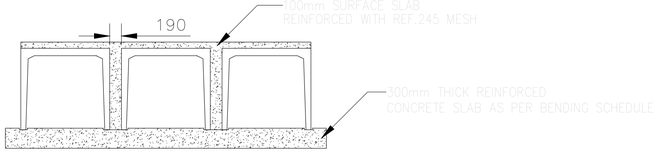
Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS
APPOLLO ENGINEERING
5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za



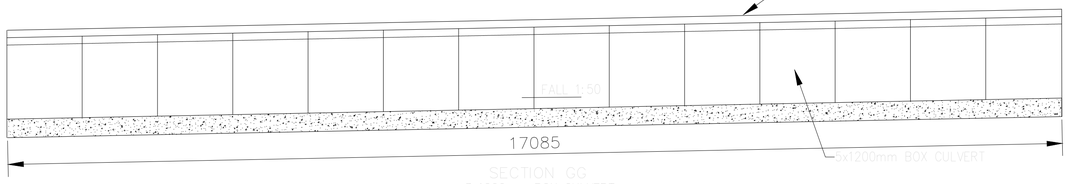
PLAN VIEW
3x1200mm BOX CULVERT
N.T.S.



FOUNDATION REINFORCING LAYOUT
3x1200mm BOX CULVERT
N.T.S.



SECTION HH
3x1200mm BOX CULVERT
N.T.S.



SECTION GG
3x1200mm BOX CULVERT
N.T.S.

STORM WATER CULVERT DETAILS FOR ROAD 1 CH 265

NOTES

1. 50mm WORKING SCREED TO BE CAST BEFORE CASTING APRON SLAB
2. ALL PIPE CULVERTS TO BE CONSTRUCTED ACCORDING TO SABS 1200 LE
3. ALL CONCRETE ACCORDING TO SABS 1200 GA
4. BRICKS USED TO BE APPROVED BY ENGINEER
5. CONCRETE PIPES ACCORDING TO SABS 677
6. PIPES LAYED ON CLASS B BEDDING
6. ALL EXPOSED CONCRETE AT STORMWATER CATCHPITS TO BE CLASS 25/19 CONCRETE, STEEL FLOATED AND BUILT TO DEGREE OF ACCURACY I IN TERMS OF SABS 1200 GA.

NOTES :

REFER TO NOTES DRAWINGS, DRAWING NUMBERS; SG001, SG002, AND SG003

PRELIMINARY	
TENDER PURPOSES	
FOR CONSTRUCTION	*
AS BUILT	

5		
4		
3		
2		
1		
DATE	REVISIONS	

CITY OF MBOMBELA
THE JEWEL'S DESTINATION

1 Nel Street
Mbombela
1201

TEL: (013) 759 9111
FAX: (013) 759 2070
WEB: www.mbombela.gov.za

City of Mbombela

PROJECT :
CONSTRUCTION OF SHIKISHA ROAD WITH VEHICULAR BRIDGE WARD 33

PROJECT NO: 213/2020 VIIIC

DRAWING TITLE :
CULVERT DETAILED DRAWING

ROAD 2 CH - 242

DESIGNED :	J.T.
DRAWN :	A.F.
SCALE :	N.T.S.
DATE :	23 DECEMBER 2022
CHECKED :	J.T.
APPROVED :	J.T.M
SIGNATURE :	

PROFESSIONAL SERVICE :
CIVIL ENGINEERING

DRAWING No :
041/SHI/SC001 REV 0

Appollo Engineering
CONSULTING ENGINEERS & PROJECT MANAGERS

APPOLLO ENGINEERING

5 RUSSEL STREET, NELSPRUIT, 1201
TEL: (013) 752 6187, EMAIL: info@appollogroup.co.za