ROAD SETTING OUT DATA — Lo 31

PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 1	0.000	89073.113	2806848.289	Road 1			
BC 2	69.680	89020.414	2806893.875				
PI 2		89011.378	2806901.691	50	26°52'40"	11.948	23.455
EC 2	93.135	88999.785	2806904.578				
BC 3	115.469	88978.113	2806909.974				
PI 3		88965.468	2806913.123	50	29°12'53"	13.031	25.495
EC 3	140.963	88955.969	2806922.043				
BC 4	178.962	88928.267	2806948.053				
PI 4		88920.241	2806955.590	100	12°33'58"	11.010	21.932
EC 4	200.894	88910.767	2806961.199				
BC 5	271.764	88849.786	2806997.309				
PI 5		88846.102	2806999.490	100	4°54'11"	4.281	8.557
EC 5	280.322	88842.245	2807001.349				
BC 6	308.884	88816.514	2807013.748				
PI 6		88810.682	2807016.558	100	7°24'28"	6.474	12.929
EC 6	321.813	88805.261	2807020.097				
BC 7	350.856	88780.942	2807035.973				
PI 7		88775.579	2807039.473	30	24°05'55"	6.404	12.618
EC 7	363.475	88769.255	2807040.479				
BC 8	365.092	88767.657	2807040.733				
PI 8		88763.319	2807041.423	30	16°39'46"	4.393	8.725
EC 8	373.817	88759.360	2807043.329				
BC 9	384.339	88749.879	2807047.892				
PI 9		88746.322	2807049.603	30	14°59'23"	3.947	7.849
EC 9	392.188	88742.444	2807050.337				
BC 10	402.539	88732.273	2807052.260				
PI 10		88731.176	2807052.468	30	4°15'45"	1.116	2.232
EC 10	404.770	88730.067	2807052.593				
BC 11	419.158	88715.771	2807054.209				
PI 11		88711.247	2807054.720	30	17°15'24"	4.552	9.036
EC 11	428.194	88706.776	2807053.867				
BC 12	471.319	88664.415	2807045.779				
PI 12		88663.549	2807045.614	50	2°01'17"	0.882	1.764
EC 12	473.083	88662.677	2807045.479				
BC 13	505.657	88630.486	2807040.503				
PI 13		88629.775	2807040.393	50	1°38'52"	0.719	1.438
EC 13	507.094	88629.062	2807040.304				
BC 14	526.382	88609.924	2807037.907				
PI 14		88606.892	2807037.527	50	6°59'37"	3.055	6.103
EC 14	532.485	88603.929	2807036.781				
BC 15	567.132	88570.331	2807028.321				
PI 15		88568.549	2807027.872	50	4°12'37"	1.838	3.674
EC 15	570.807	88566.804	2807027.294				
BC 16	595.911	88542.975	2807019.393				
PI 16		88537.285	2807017.506	100	6°51'42"	5.995	11.976
EC 16	607.887	88531.410	2807016.313				
BC 17	633.622	88506.189	2807011.190				
PI 17		88493.769	2807008.667	100	14°26'47"	12.674	25.214
EC 17	658.836	88481.112	2807009.322				
BC 18	688.508	88451.479	2807010.857				
PI 18		88449.058	2807010.982	100	2°46'39"	2.424	4.847
EC 18	693.356	88446.634	2807010.990				
BC 19	741.785	88398.205	2807011.148				
PI 19		88387.329	2807011.184	50	24°32'35"	10.876	21.418
EC 19	763.203	88377.422	2807006.699				
BC 20	778.588	88363.406	2807000.354				
PI 20		88357.791	2806997.812	50	14°03'19"	6.164	12.265
EC 20	790.853	88352.961	2806993.982				
BC 21	813.385	88335.306	2806979.983				
PI 21		88333.417	2806978.485	50	5°31'15"	2.411	4.818
EC 21	818.203	88331.392	2806977.176				
BC 22	873.402	88285.045	2806947.194				
PI 22		88278.395	2806942.892	50	18°00'15"	7.921	15.712
EC 22	889.114	88270.740	2806940.856				
BC 23	894.723	88265.320	2806939.414				
PI 23		88258.214	2806937.524	50	16°43'50"	7.352	14.600
EC 23	909.323	88251.954	2806933.669				
BC 24	912.577	88249.183	2806931.962				
PI 24		88242.098	2806927.599	50	18°53'45"	8.320	16.490
EC 24	929.067	88233.982	2806925.766				
BC 25	930.286	88232.793	2806925.497				
PI 25		88219.928	2806922.591	50	29°33'13"	13.189	25.791
EC 25	956.076	88207.304	2806926.408				
BC 26	982.410	88182.097	2806934.030				
PI 26		88178.169	2806935.218	10	44°37'08"	4.103	7.787
EC 26	990.197	88174.540	2806933.305				
PI 27	997.899	88167.727	2806929.713				

ROAD SETTING OUT DATA — Lo 31

PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 28	0.000	88287.841	2807330.721	Road 2			
BC 29	6.702	88283.139	2807325.947				
PI 29		88280.625	2807323.395	10	39°24'49"	3.582	6.879
EC 29	13.581	88280.304	2807319.827				
BC 30	14.234	88280.245	2807319.176				
PI 30		88279.996	2807316.411	20	15°48'20"	2.776	5.517
EC 30	19.751	88280.509	2807313.683				
BC 31	32.277	88282.825	2807301.373				
PI 31		88283.066	2807300.091	30	4°58'50"	1.305	2.608
EC 31	34.885	88283.195	2807298.793				
BC 32	45.102	88284.205	2807288.625				
PI 32		88284.442	2807286.242	30	9°07'44"	2.395	4.780
EC 32	49.882	88284.298	2807283.852				
BC 33	54.399	88284.026	2807279.343				
PI 33		88283.883	2807276.988	30	8°59'38"	2.359	4.709
EC 33	59.108	88283.375	2807274.684				
BC 34	62.425	88282.660	2807271.444				
PI 34		88281.893	2807267.971	30	13°31'24"	3.557	7.081
EC 34	69.506	88280.335	2807264.773				
BC 35	80.053	88275.717	2807255.292				
PI 35		88273.877	2807251.515	50	9°36'25"	4.202	8.384
EC 35	88.436	88272.693	2807247.483				
BC 36	99.778	88269.497	2807236.601				
PI 36		88268.693	2807233.863	50	6°31'58"	2.854	5.701
EC 36	105.479	88268.206	2807231.051				
BC 37	125.952	88264.710	2807210.879				
PI 37		88264.623	2807210.374	50	1°10'21"	0.512	1.023
EC 37	126.976	88264.525	2807209.872				
BC 38	153.027	88259.552	2807184.300				
PI 38		88258.514	2807178.961	50	12°25'02"	5.439	10.836
EC 38	163.863	88258.648	2807173.523				
BC 39	173.683	88258.890	2807163.706				
PI 39		88258.985	2807159.863	50	8°47'31"	3.844	7.672
EC 39	181.356	88258.491	2807156.051				
BC 40	200.927	88255.977	2807136.642				
PI 40		88255.650	2807134.117	50	5°49'53"	2.547	5.089
EC 40	206.015	88255.581	2807131.571				
BC 41	214.896	88255.341	2807122.694				
PI 41		88255.272	2807120.143	50	5°50'36"	2.552	5.099
EC 41	219.995	88254.944	2807117.612				
BC 42	236.684	88252.797	2807101.062				
PI 42		88252.449	2807098.379	50	6°11'45"	2.706	5.407
EC 42	242.091	88251.813	2807095.748				
BC 43	257.114	88248.284	2807081.145				
PI 43		88247.708	2807078.762	50	5°36'52"	2.452	4.899
EC 43	262.014	88247.368	2807076.334				
BC 44	274.075	88245.695	2807064.390				
PI 44		88245.296	2807061.543	50	6°34'50"	2.874	5.743
EC 44	279.817	88244.574	2807058.761				
BC 45	290.056	88242.001	2807048.851				
PI 45		88241.395	2807046.516	50	5°31'27"	2.412	4.821
EC 45	294.877	88240.567	2807044.250				
BC 46	313.879	88234.043	2807026.403				
PI 46		88231.076	2807018.286	50	19°36'49"	8.643	17.116
EC 46	330.995	88231.006	2807009.643				
BC 47	337.011	88230.958	2807003.628				
PI 47		88230.906	2806997.198	10	65°29'03"	6.430	11.429
EC 47	348.440	88236.734	2806994.482				
BC 48	393.651	88277.716	2806975.390				
PI 48		88283.809	2806972.551	10	67°48'39"	6.721	11.835
EC 48	405.486	88283.481	2806965.838				
BC 49	414.763	88283.030	2806956.572				
PI 49		88282.873	2806953.356	10	35°42'13"	3.221	6.231
EC 49	420.995	88284.623	2806950.652				
PI 50	424.127	88286.325	2806948.022				

ROAD SETTING OUT DATA — Lo 31

PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 51	0.000	88303.017	2806806.038	Road 3			
BC 52	12.487	88294.838	2806796.602				
PI 52		88291.064	2806792.248	50	13°08'53"	5.762	11.474
EC 52	23.961	88286.398	2806788.866				
BC 53	36.415	88276.315	2806781.558				
PI 53		88272.122	2806778.519	50	11°49'35"	5.179	10.321
EC 53	46.736	88268.640	2806774.685				
PI 54	57.005	88261.737	2806767.081				

ROAD SETTING OUT DATA — Lo 31

PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 55	0.000	88268.104	2806774.094	Road 4			
BC 56	7.348	88262.664	2806779.033				
PI 56		88260.614	2806780.894	50	6°20'21"	2.769	5.532
EC 56	12.880	88258.783	2806782.971				
BC 57	48.383	88235.294	2806809.593				
PI 57		88233.034	2806812.154	50	7°48'55"	3.415	6.820
EC 57	55.203	88231.144	2806814.999				
BC 58	71.131	88222.328	2806828.265				
PI 58		88219.164	2806833.025	50	13°02'38"	5.716	11.383
EC 58	82.514	88217.157	2806838.377				
BC 59	95.672	88212.535	2806850.697				
PI 59		88210.579	2806855.912	50	12°42'45"	5.570	11.094
EC 59	106.765	88207.523	2806860.568				
BC 60	135.392	88191.817	2806884.502				
PI 60		88190.504	2806886.502	50	5°28'47"	2.393	4.782
EC 60	140.174	88189.388	2806888.619				
BC 61	198.556	88162.165	2806940.265				
PI 61		88152.811	2806958.009	20	90°10'05"	20.059	31.475
EC 61	230.030	88135.094	2806948.604				
BC 62	263.797	88105.270	2806932.770				
PI 62		88099.029	2806929.457	10	70°29'22"	7.066	12.303
EC 62	276.099	88093.822	2806934.233				
BC 63	306.333	88071.541	2806954.669				
PI 63		88058.088	2806967.008	50	40°06'44"	18.254	35.005
EC 63	341.338	88039.850	2806967.777				
BC 64	353.327	88027.871	2806968.282				
PI 64		88027.515	2806968.297	50	0°49'01"	0.357	0.713
EC 64	354.040	88027.159	2806968.307				
BC 65	376.207	88005.000	2806968.924				
PI 65		87997.072	2806969.145	50	18°01'37"	7.931	15.731
EC 65	391.939	87989.601	2806971.809				
BC 66	423.551	87959.825	2806982.426				
PI 66		87955.249	2806984.058	50	11°05'53"	4.858	9.685
EC 66	433.236	87950.445	2806984.778				
BC 67	444.138	87939.665	2806986.394				
PI 67		87930.928	2806987.704	50	20°02'24"	8.834	17.488
EC 67	461.626	87923.169	2806991.928				
BC 68	485.011	87902.631	2807003.110				
PI 68		87898.732	2807005.233	10	47°52'21"	4.439	8.355
EC 68	493.366	87894.543	2807003.765				
BC 69	497.423	87890.714	2807002.424				
PI 69		87884.604	2807000.283	20	35°52'24"	6.474	12.522
EC 69	509.945	87880.907	2806994.969				
PI 70	518.890	87875.800	2806987.625				

ROAD SETTING OUT DATA — Lo 31

PI No.	CH	YLo	XLo	Radius	DA	TL	AL
Const:				(m)	D M S	(m)	(m)
PI 71	0.000	87886.808	2806978.374	Road 5			
BC 72	8.710	87880.268	2806984.126				
PI 72		87877.012	2806986.989	50	9°54'42"	4.336	8.650
EC 72	17.359	87873.312	2806989.249				
BC 73	44.980	87849.740	2807003.645				
PI 73		87847.221	2807005.184	50	6°45'25"	2.952	5.896
EC 73	50.876	87844.901	2807007.008				
BC 74	92.365	87812.284	2807032.649				
PI 74		87798.711	2807043.319	200	9°52'04"	17.265	34.445
EC 74	126.809	87787.168	2807056.158				
BC 75	143.719	87775.861	2807068.732				
PI 75		87761.450	2807084.760	60	39°31'09"	21.554	41.384
EC 75	185.104	87740.135	2807087.953				
BC 76	225.594	87700.091	2807093.953				
PI 76		87686.632	2807095.969	200	7°47'09"	13.610	27.178
EC 76	252.772	87673.569	2807099.790				
PI 77	286.541	87641.158	2807109.272				



FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING; USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
- T = TOP LAYER
- B = BOTTOM LAYER

2. MINIMUM LAPS
- REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
- REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm

3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004

4. STANDARD SPECIFICATION:
- SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE

5. BENDING SPECIFICATION
- SANS 282: SHAPE CODES AND DIMENSIONS
- ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

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

AUTHORITY / APPROVALS

25 SCHEEPERS STREET EMAKHAZENI 1100 | P.O. BOX 17 EMAKHAZENI (BELFAST) 1100 | TEL: (013)253 7600 FAX: (013)253 2440/1889

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: ---

DRAWING TITLE :
GENERAL SITE LAYOUT

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT
APPROVED :
SIGNATURE : DATE :

CLIENT APPROVAL
APPROVED :
SIGNATURE : DATE :
DRAWING ID NO. :

DESIGNED : J.T.M
DRAWN : A.P.F
SCALE : AS SHOWN
DATE : 12 MARCH 2025
CHECKED : P.H
APPROVED : J.T.M.
SIGNATURE :

CLIENT:
agriculture, land reform & rural development
Department: Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

DRAWING No :
071/PAL/R002 REV 0

YBS CONSULTING
Sustainable Engineered Solutions



FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING; USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
   - T = TOP LAYER
   - B = BOTTOM LAYER
2. MINIMUM LAPS
   - REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
   - REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm
3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004
4. STANDARD SPECIFICATION:
   - SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE
5. BENDING SPECIFICATION
   - SANS 282: SHAPE CODES AND DIMENSIONS
   - ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

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

AUTHORITY / APPROVALS

25 SCHEEPERS STREET EMAKHAZENI 1100
P.O. BOX 17 EMAKHAZENI (BELFAST) 1100
TEL: (013)253 7600 FAX: (013)253 2440/ 1889

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: ---

DRAWING TITLE :
GENERAL SITE LAYOUT

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :

CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	12 MARCH 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

CLIENT:
agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

DRAWING No :
071/PAL/R002 REV 0

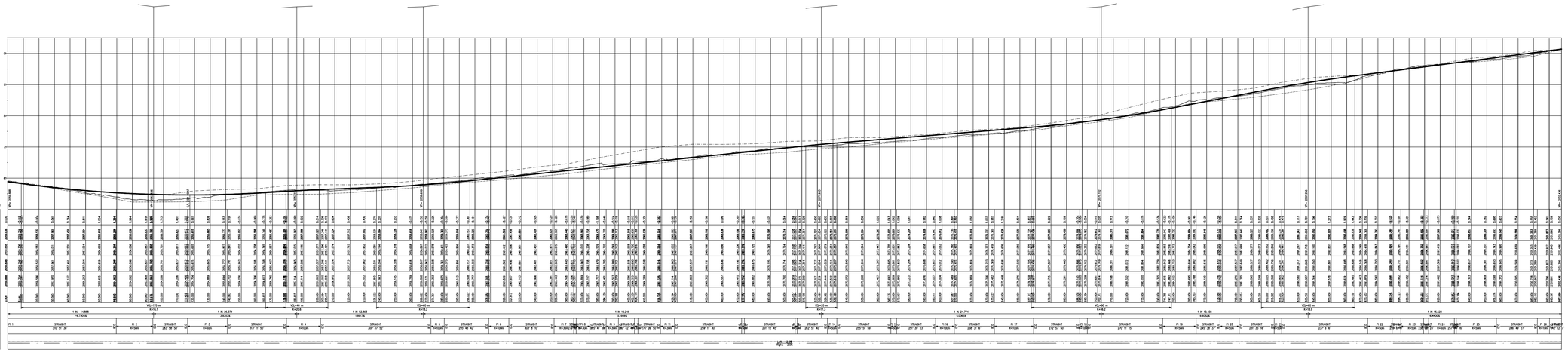
THIS DRAWING IS THE PROPERTY OF YBS CONSULTING, & REPRODUCTION, DISTRIBUTION, ALTERATION OR ISSUING THEREOF WITHOUT PERMISSION IS PROHIBITED UNDER THE COPYRIGHT ACT.

YBS CONSULTING
Sustainable Engineered Solutions

ROAD-LEFT
ROAD-CENTRELINE
ROAD-RIGHT
WAL-LEFT
WAL-CENTRELINE
WAL-RIGHT

SCALES:
Horizontal 1:500
Vertical 1:250
Datum : 2051 m

CUT / FILL		
ROAD	LEFT	
	CENTRELINE	
	RIGHT	
C/L GROUND LEVEL		
DISTANCE (m)		
VERTICAL PROFILE		
HORIZONTAL		
SECTION PROFILE		

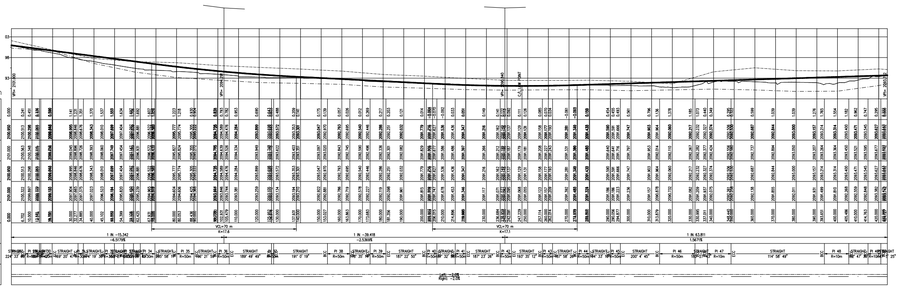


Road 1
DESIGN SPEED: 60

ROAD-LEFT
ROAD-CENTRELINE
ROAD-RIGHT
WAL-LEFT
WAL-CENTRELINE
WAL-RIGHT

SCALES:
Horizontal 1:500
Vertical 1:250
Datum : 2088 m

CUT / FILL		
ROAD	LEFT	
	CENTRELINE	
	RIGHT	
C/L GROUND LEVEL		
DISTANCE (m)		
VERTICAL PROFILE		
HORIZONTAL		
SECTION PROFILE		

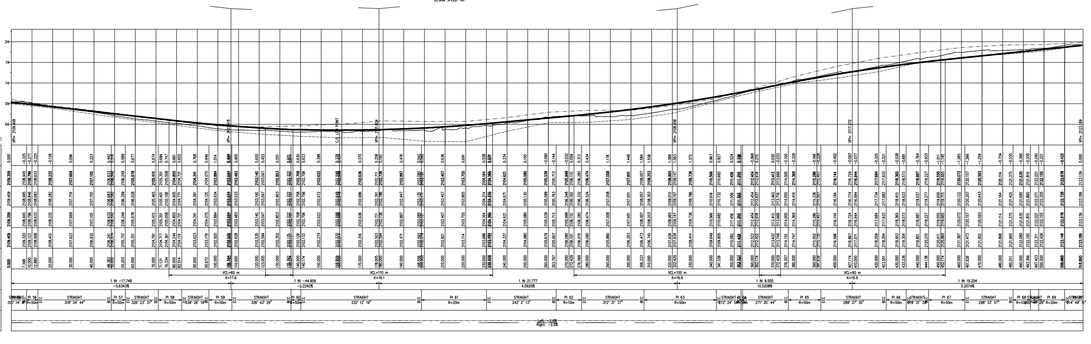


Road 2
DESIGN SPEED: 60

ROAD-LEFT
ROAD-CENTRELINE
ROAD-RIGHT
WAL-LEFT
WAL-CENTRELINE
WAL-RIGHT

SCALES:
Horizontal 1:500
Vertical 1:250
Datum : 2099 m

CUT / FILL		
ROAD	LEFT	
	CENTRELINE	
	RIGHT	
C/L GROUND LEVEL		
DISTANCE (m)		
VERTICAL PROFILE		
HORIZONTAL		
SECTION PROFILE		

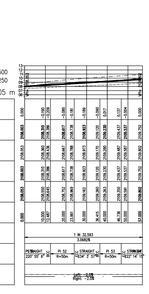


Road 4
DESIGN SPEED: 60

ROAD-LEFT
ROAD-CENTRELINE
ROAD-RIGHT
WAL-LEFT
WAL-CENTRELINE
WAL-RIGHT

SCALES:
Horizontal 1:500
Vertical 1:250
Datum : 2105 m

CUT / FILL		
ROAD	LEFT	
	CENTRELINE	
	RIGHT	
C/L GROUND LEVEL		
DISTANCE (m)		
VERTICAL PROFILE		
HORIZONTAL		
SECTION PROFILE		

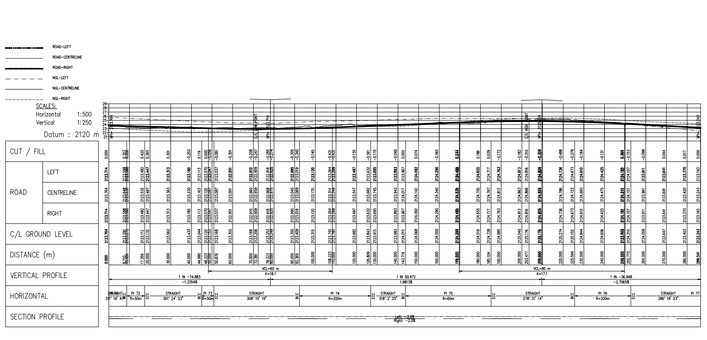


Road 3
DESIGN SPEED: 60

ROAD-LEFT
ROAD-CENTRELINE
ROAD-RIGHT
WAL-LEFT
WAL-CENTRELINE
WAL-RIGHT

SCALES:
Horizontal 1:500
Vertical 1:250
Datum : 2120 m

CUT / FILL		
ROAD	LEFT	
	CENTRELINE	
	RIGHT	
C/L GROUND LEVEL		
DISTANCE (m)		
VERTICAL PROFILE		
HORIZONTAL		
SECTION PROFILE		



Road 5
DESIGN SPEED: 60

FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING; USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
   - T = TOP LAYER
   - B = BOTTOM LAYER
2. MINIMUM LAPS
   - REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
   - REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm
3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004
4. STANDARD SPECIFICATION:
   - SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE
5. BENDING SPECIFICATION
   - SANS 282: SHAPE CODES AND DIMENSIONS.
   - ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

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

AUTHORITY / APPROVALS

25 SCHEEPERS STREET
EMAKHAZENI
1100

P.O. BOX 17
EMAKHAZENI (BELFAST)
1100

TEL: (013)253 7600
FAX: (013)253 2440/
1889

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: ---

DRAWING TITLE :
ROAD LONG SECTIONS

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :

CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	12 MARCH 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

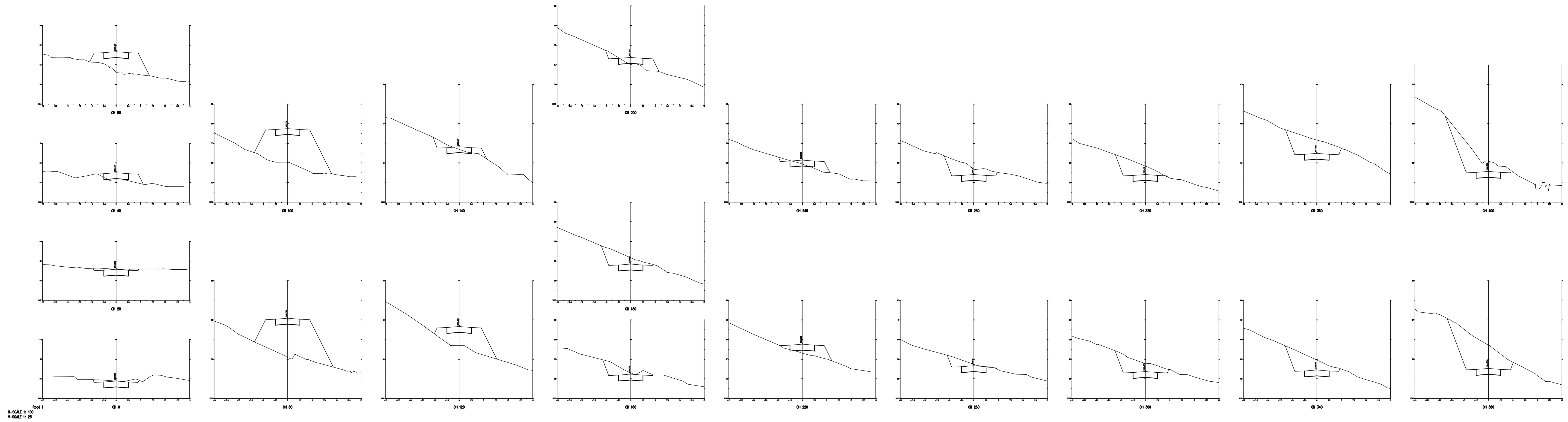
CLIENT:

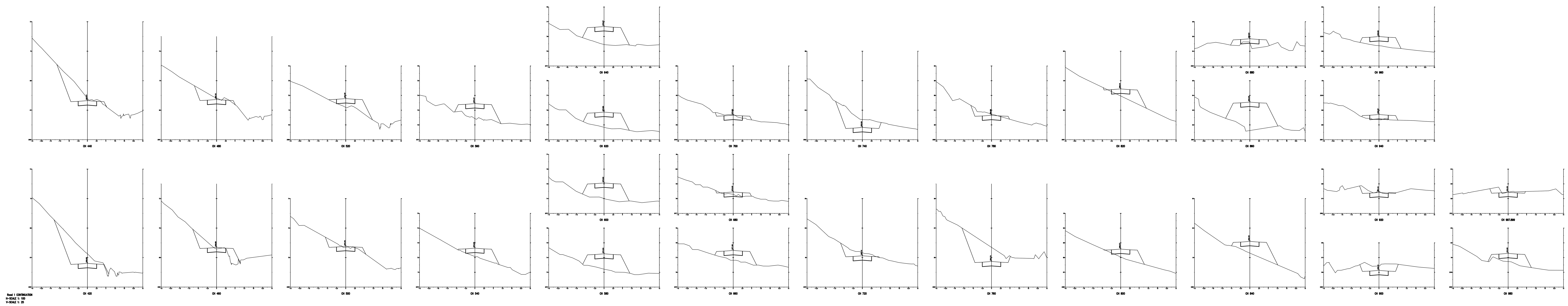
agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

DRAWING No :
071/PAL/R101 REV 0

YBS CONSULTING
Sustainable Engineered Solutions





FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING; USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
- T = TOP LAYER
- B = BOTTOM LAYER

2. MINIMUM LAPS
- REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
- REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm

3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004

4. STANDARD SPECIFICATION:
- SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE

5. BENDING SPECIFICATION
- SANS 282: SHAPE CODES AND DIMENSIONS
- ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

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

AUTHORITY / APPROVALS

25 SCHEEPERS STREET EMAKHAZENI 1100
P.O. BOX 17 EMAKHAZENI (BELFAST) 1100
TEL: (013)253 7600 FAX: (013)253 2440/1889

PROJECT : PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: ---

DRAWING TITLE : ROAD 1 CROSS-SECTIONS

1 OF 3

LOCATION/VILLAGE : PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT
APPROVED :
SIGNATURE : DATE :

CLIENT APPROVAL
APPROVED :
SIGNATURE : DATE :
DRAWING ID NO. :

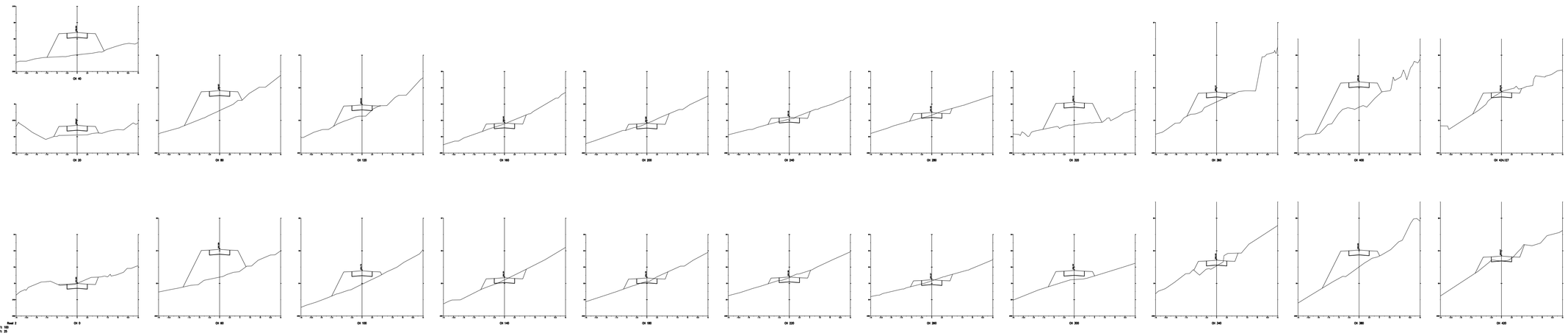
DESIGNED :	J.T.M
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	12 MARCH 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

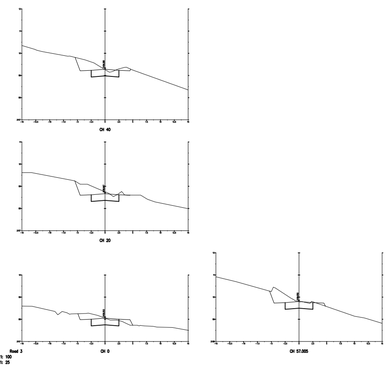
CLIENT:
agriculture, land reform & rural development
Department: Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

DRAWING No :
071/PAL/R201 REV 0

YBS CONSULTING
Sustainable Engineered Solutions





FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING; USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
- T = TOP LAYER
- B = BOTTOM LAYER

2. MINIMUM LAPS
- REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
- REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm

3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004

4. STANDARD SPECIFICATION:
- SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE

5. BENDING SPECIFICATION
- SANS 282: SHAPE CODES AND DIMENSIONS
- ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

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

AUTHORITY / APPROVALS

25 SCHEEPERS STREET
EMAKHAZENI
1100

P.O. BOX 17
EMAKHAZENI (BELFAST)
1100

TEL: (013)253 7600
FAX: (013)253 2440/
1889

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: ---

DRAWING TITLE :
ROAD 2 & 3 CROSS-SECTIONS

2 OF 3

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :

CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	12 MARCH 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

CLIENT:

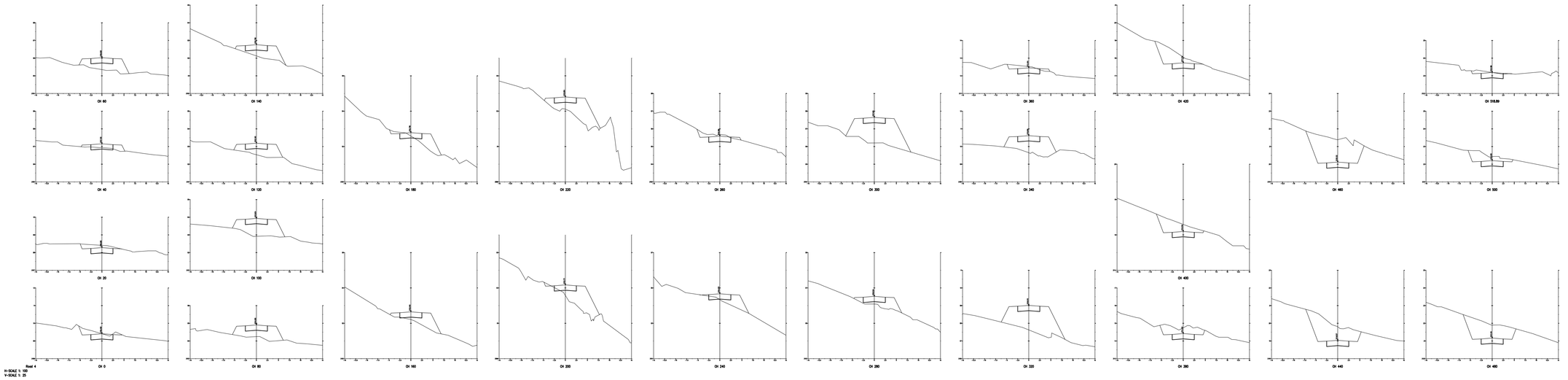
agriculture, land reform & rural development

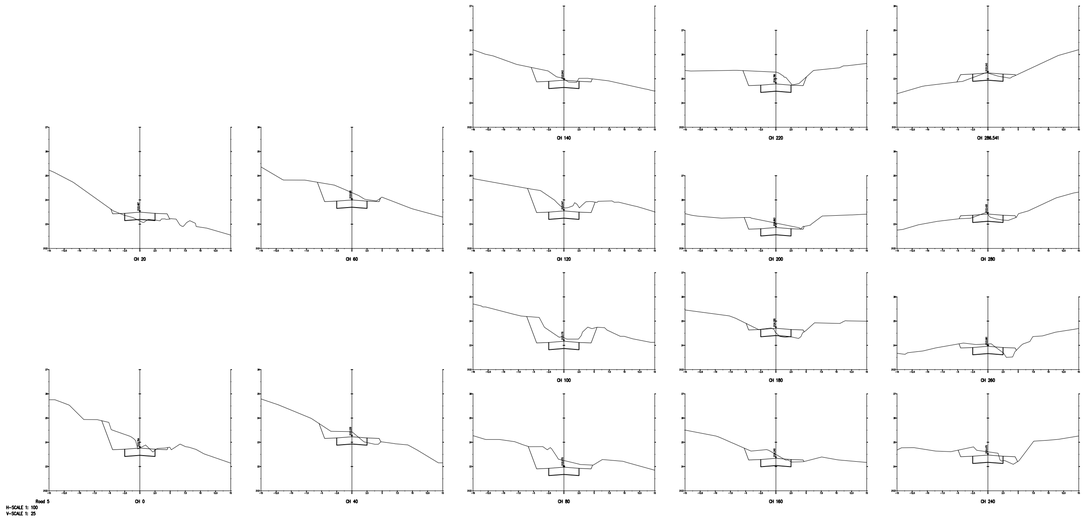
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

DRAWING No :
071/PAL/R202 REV 0

YBS CONSULTING
Sustainable Engineered Solutions





FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING; USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
- T = TOP LAYER
- B = BOTTOM LAYER

2. MINIMUM LAPS
- REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
- REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm

3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004

4. STANDARD SPECIFICATION:
- SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE

5. BENDING SPECIFICATION
- SANS 282: SHAPE CODES AND DIMENSIONS
- ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

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

AUTHORITY / APPROVALS

25 SCHEEPERS STREET
EMAKHAZENI
1100

P.O. BOX 17
EMAKHAZENI (BELFAST)
1100

TEL: (013)253 7600
FAX: (013)253 2440/
1889

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: ---

DRAWING TITLE :
ROAD 4 & 5 CROSS-SECTIONS

3 OF 3

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :

CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	12 MARCH 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

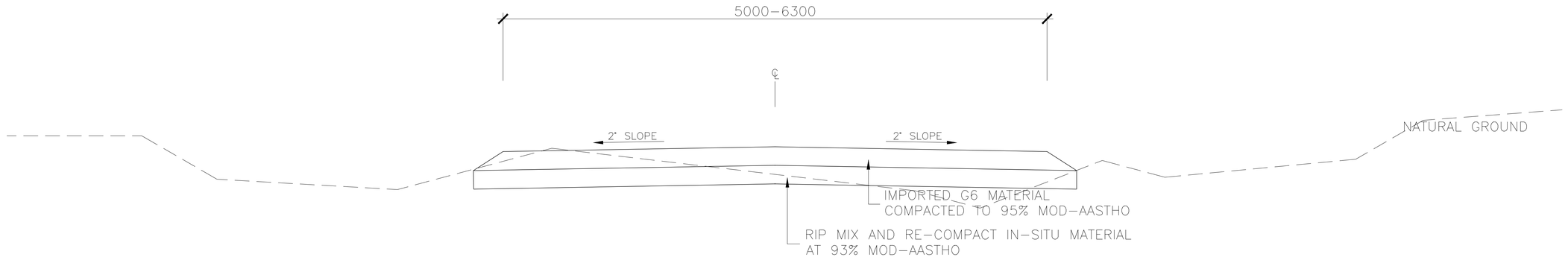
CLIENT:

agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

DRAWING No :
071/PAL/R203 REV 0

YBS CONSULTING
Sustainable Engineered Solutions



TYPICAL ROAD SECTION 1

ITEM	LAYER	THICKNESS (mm)	TRH 4 CODE	DESCRIPTION	FIELD REQUIRED COMPACTION
1	WEARING COURSE (IMPORTED FROM BORROW PIT AND/OR COMMERCIAL SOURCE)	150	G6	MINIMUM CBR = 25% @ 95% MOD. AASHTO; MAXIMUM SIZE ⅔ OF LAYER THICKNESS; DENSITY = 95% MOD. AASHTO; PI < 12 OR3GM + 10; MAXIMUM SWELL 1.0% @100% MOD. AASHTO; FIELD COMPACTION 95% MOD. AASHTO MIN.	95% MOD AASHTO MIN
2	ROADBED	150	IN–SITU	IN–SITU	93% MOD AASHTO MIN
3	SUBGRADE INSITU	150 LAYERS	IN–SITU	IN–SITU	90% MOD AASHTO MIN
OPTION FOR 3. *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
OPTION FOR 3. *PIONEER LAYER		300	–	ROCKFILL (MAXIIMUM ½ OF LAYER) THICKNESS MIXED WITH G9–G10	–
OPTION FOR 3. *REPLACEMENT LAYER		1000	–	DUMPROCK MIXED WITH G9–G10	–

FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING.
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING; USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
- T = TOP LAYER
- B = BOTTOM LAYER

2. MINIMUM LAPS
- REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
- REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm

3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004

4. STANDARD SPECIFICATION:
- SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE

5. BENDING SPECIFICATION
- SANS 282: SHAPE CODES AND DIMENSIONS
- ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

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

AUTHORITY / APPROVALS

25 SCHEEPERS STREET, EMAKHAZENI, 1100
P.O. BOX 17, EMAKHAZENI (BELFAST), 1100
TEL: (013)253 7600, FAX: (013)253 2440/1889

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: —

DRAWING TITLE :
TYPICAL ROAD SECTION

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :

CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	12 MARCH 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

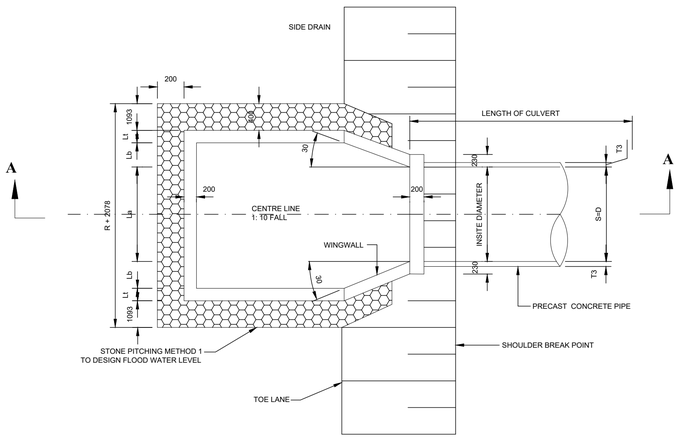
CLIENT:
agriculture, land reform & rural development
Department: Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

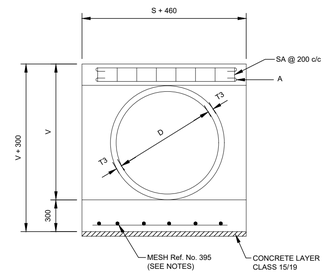
DRAWING No :
071/PAL/R051 REV 0

THIS DRAWING IS THE PROPERTY OF YBS CONSULTING, & REPRODUCTION, DISTRIBUTION, ALTERATION OR ISSUING THEREOF WITHOUT PERMISSION IS PROHIBITED UNDER THE COPYRIGHT ACT.

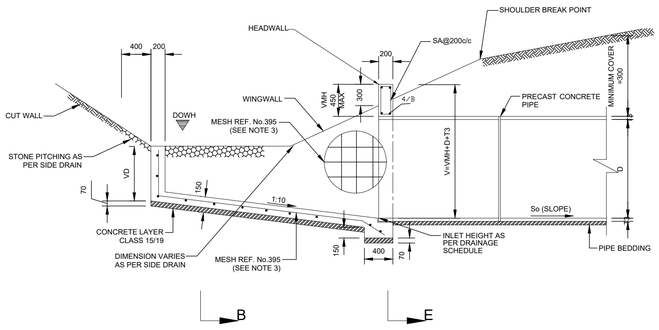
YBS CONSULTING
Sustainable Engineered Solutions



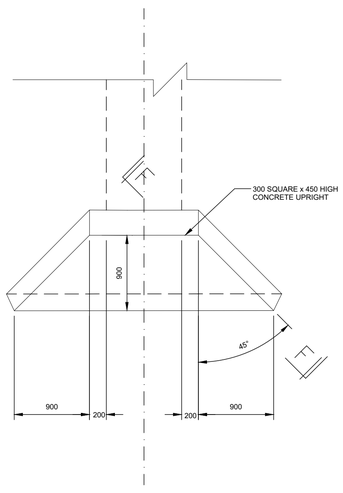
PLAN (DROP INLET)
SCALE 1: 25



SECTION E - E

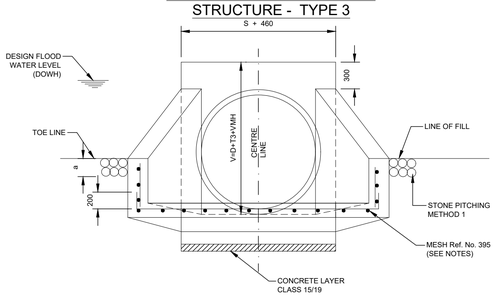


SECTION A-A

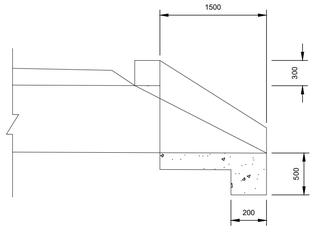


PLAN OF OUTLET AND OUTLET (NORMAL CULVETS)
SCALE 1 : 50

SINGLE PIPE CULVERT INLET STRUCTURE - TYPE 3



SECTION B - B



SECTION F-F
SCALE 1 : 50

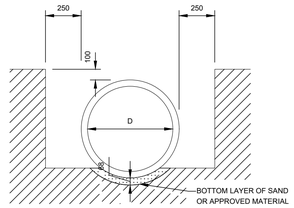
BENDING SCHEDULE FOR HEADWALL BEAM TYPE 1 AND 2 PIPE CULVERTS			
STAFF MARK	DIAMETER	LENGTH	BEND
A	Y12	S + 600	A OR B: 100 / S + 400 / 100
B	Y16	S + 600	
SA	R10	400 + 2X @ 200c/c	X=VMH - 50 (X AND 150 ARE OUTER DIMENSIONS) Y=HIGH TENSILE STEEL 410MPa R=MILD STEEL

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

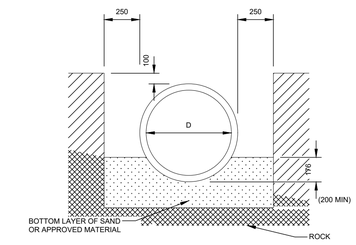
NOTES

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

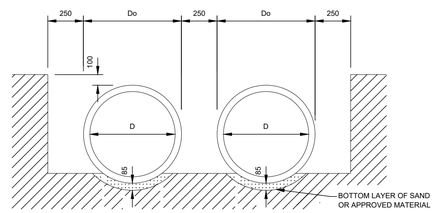
ALL DIMENSIONS AND LEVELS OF CULVERT TO BE FINALISED BEFORE CONSTRUCTION MAY COMMENCE



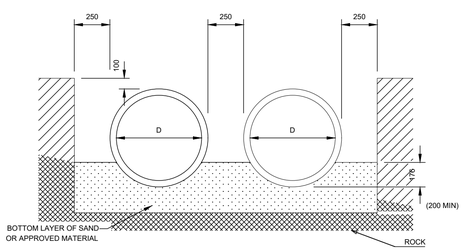
CLASS B BEDDING ON SOFT MATERIAL (SINGLE PIPE)
SCALE : SCHEMATIC



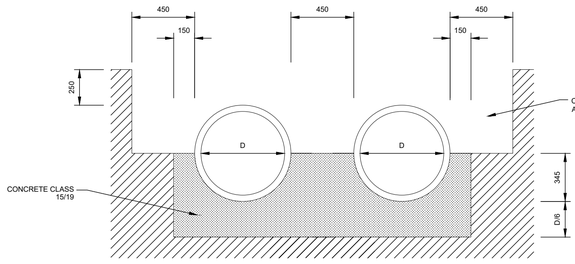
CLASS B BEDDING ON ROCK (SINGLE PIPE)
SCALE : SCHEMATIC



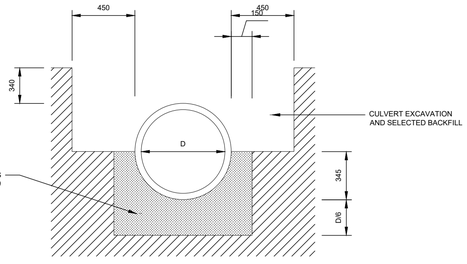
CLASS B BEDDING ON SOFT MATERIAL
SCALE : SCHEMATIC



CLASS B BEDDING ON ROCK
SCALE : SCHEMATIC



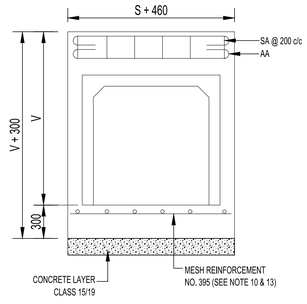
CLASS A BEDDING
SCALE 1:25



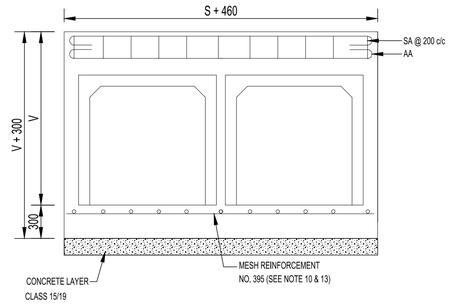
CLASS A BEDDING
SCALE 1:25

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

FOR CONSTRUCTION

CLIENT:
agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO.: —

DRAWING TITLE :
STANDARD PIPE DETAILS

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

AUTHORITY / APPROVALS

25 SCHEEPERS STREET
EMAKHAZENI
1100

P.O. BOX 17
EMAKHAZENI (BELFAST)
1100

TEL: (013)253 7600
FAX: (013)253 2440/
1889

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :
CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M.
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	13 FEB 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

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

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

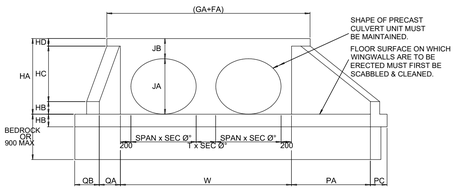
DRAWING No :
071/PAL/R1202 REV 0

THIS DRAWING IS THE PROPERTY OF YBS CONSULTING, & REPRODUCTION, DISTRIBUTION, ALTERATION OR ISSUING THEREOF WITHOUT PERMISSION IS PROHIBITED UNDER THE COPYRIGHT ACT,

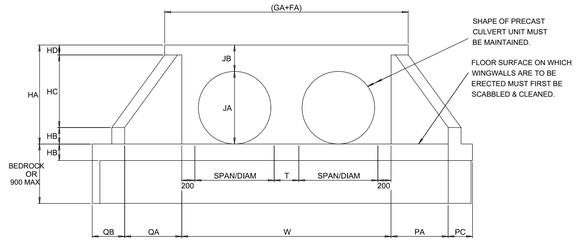
YBS CONSULTING
Sustainable Engineered Solutions

CULVERT DESCRIPTION	WINGWALL REFERENCE NUMBER				
		TYPE			
		BARRELS			
		SPAN/DIA			
		HEIGHT			
		PIPEBBED 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, ab	A4			
		BAR DIA			
		QUANTITY			
		aa			
		CUT LENGTH			
	aa, ab	A5			
		BAR DIA			
		QUANTITY			
		aa			
		ab			
		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, mb, BEND, FLOOR, WALL, 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, ab	ZC			
		BAR DIA			
		QTY			
		aa			
		ab			
		CUT LENGTH			
GABION ANCHORS	ab, ac, aa	ZA			
		BAR DIA			
		QTY			
		aa			
		ab			
		ac			
		CUT LENGTH			

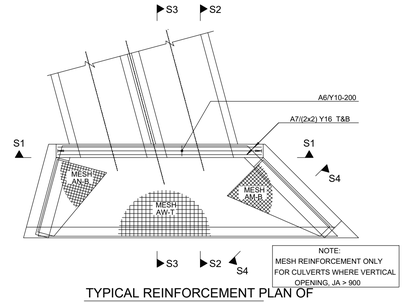
REFER TO DRAWING R1203B



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

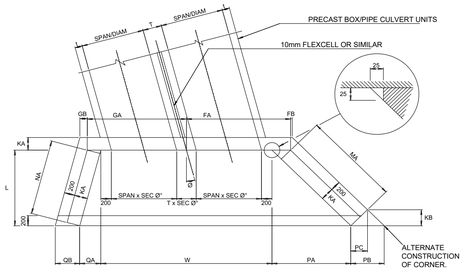


TYPICAL ELEVATION OF INLET/OUTLET WINGWALLS - Ø= 0° (SQUARE)
SCALE: SCHEMATIC

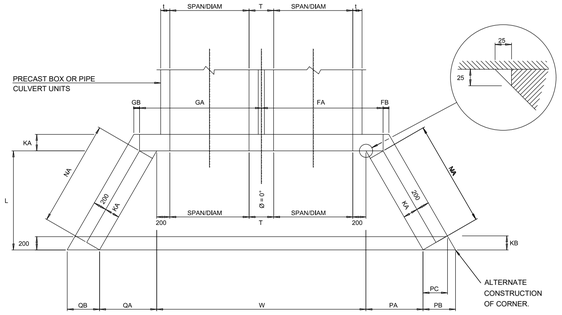


NOTE:
MESH REINFORCEMENT ONLY FOR CULVERTS WHERE VERTICAL OPENING, JA > 900

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)

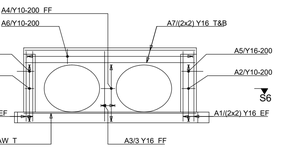
GA = W/2 + KA x SEC(Ø -30)

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

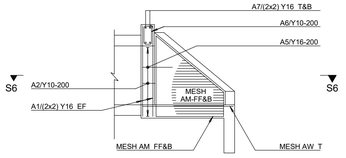
FA = W/2 + KA x SEC(Ø +30)

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

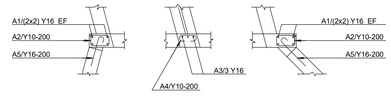
R = t + 100



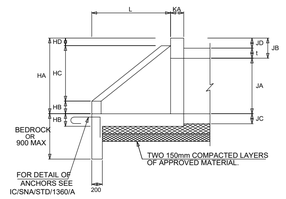
SECTION S1-S1 - INLET/OUTLET WINGWALLS HEADWALL & COLUMNS - REINFORCEMENT
SCALE: SCHEMATIC



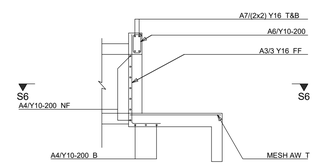
SECTION S2-S2 - INLET/OUTLET WINGWALLS HEADWALL & WINGWALLS - REINFORCEMENT
SCALE: SCHEMATIC



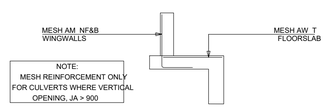
SECTION S6-S6 - INLET/OUTLET WINGWALLS HEADWALL COLUMNS - REINFORCEMENT
SCALE: SCHEMATIC



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

FOR CONSTRUCTION

CLIENT:
agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO.: —

DRAWING TITLE :
STANDARD DETAILS
INLET & OUTLET STRUCTURES DETAILS

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

AUTHORITY / APPROVALS

25 SCHEEPERS STREET
EMAKHAZENI
1100

P.O. BOX 17
EMAKHAZENI (BELFAST)
1100

TEL: (013)253 7600
FAX: (013)253 2440/
1889

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :
CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M.
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	13 FEB 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

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

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

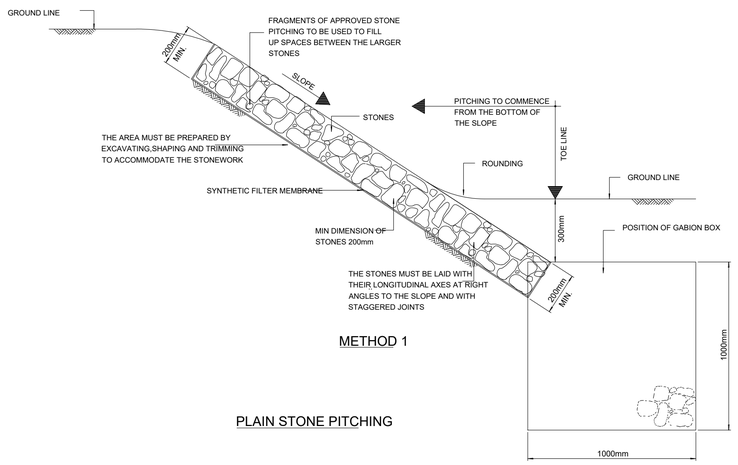
DRAWING No :
071/PAL/R1203 REV 0

THIS DRAWING IS THE PROPERTY OF YBS CONSULTING, & REPRODUCTION, DISTRIBUTION, ALTERATION OR ISSUING THEREOF WITHOUT PERMISSION IS PROHIBITED UNDER THE COPYRIGHT ACT.

YBS CONSULTING
Sustainable Engineered Solutions

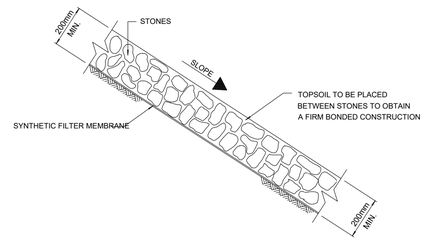
PITCHING AND GABIONS

PLAIN STONE PITCHING



METHOD 1

STONE PITCHING

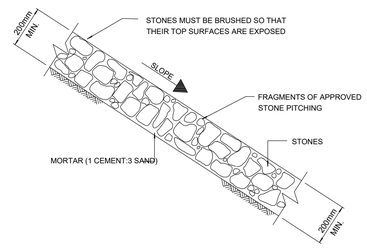


METHOD 2

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.

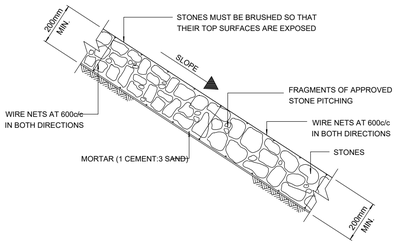


GROUTED STONE PITCHING

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.



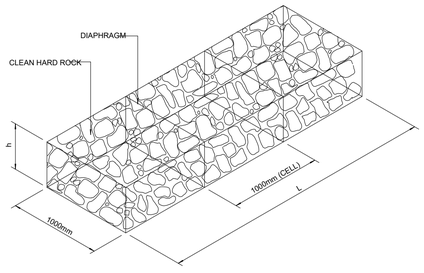
WIRE AND GROUTED STONE PITCHING

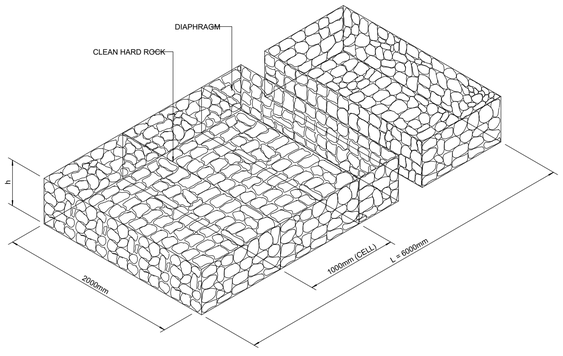
NOTES:

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



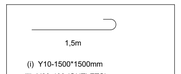


BOXES

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

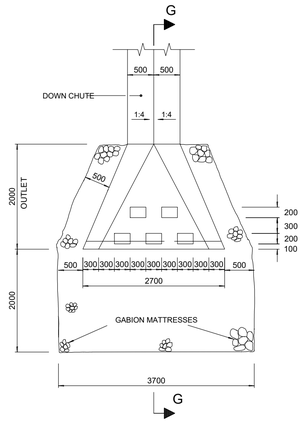
MESH SIZE AND WIRE DIAMETER FOR CAGES		
DEPTH OF GABION	MESH SIZE (mm)	WIRE DIA. (mm)
500mm AND OVER	80 x 100	2,7
200mm TO 300mm	80 x 100	2,5



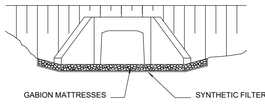
ANCHORS FOR GABION MATTRESSES

MATTRESSES

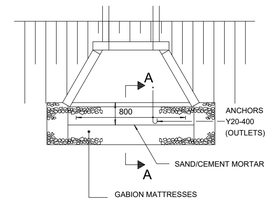
STANDARD SIZES	
LENGTH	6000mm
WIDTH	2000mm
DEPTH	170mm, 230mm, 300mm



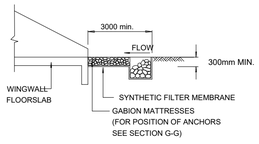
PLAN OF DOWN CHUTE AND ENERGY BREAKER
1:40



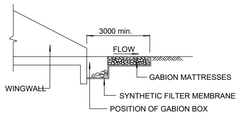
ELEVATION OF INLET/OUTLET



PLAN OF INLET/OUTLET

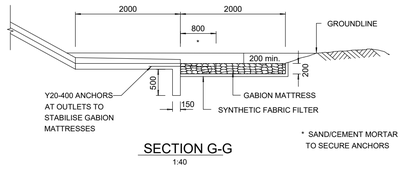


SECTION A-A (INLET)

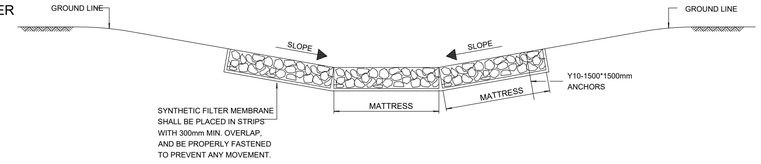


SECTION A-A (OUTLET)

DETAIL OF GABION MATTRESSES AND BOXES AT INLETS AND OUTLETS



SECTION G-G
1:40



SECTION OF MATTRESS IN CANAL

FOR CONSTRUCTION

CLIENT:
agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO.: ---

DRAWING TITLE :
STANDARD DETAILS
GABIONS DETAILS

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

AUTHORITY / APPROVALS

25 SCHEEPERS STREET
EMAKHAZENI
1100

P.O. BOX 17
EMAKHAZENI (BELFAST)
1100

TEL: (013)253 7600
FAX: (013)253 2440/
1889

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :
CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M.
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	13 FEB 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

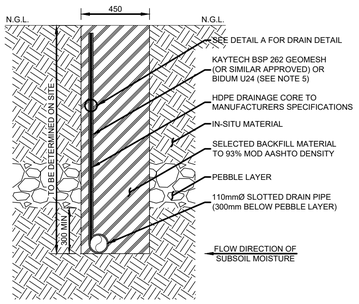
5		
4		
3		
2		
1	--/--/--	---
DATE	REVISIONS	

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

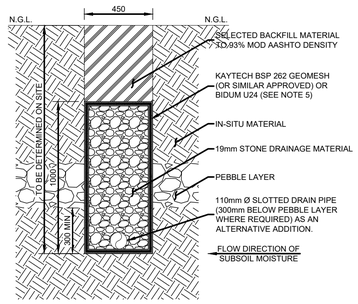
DRAWING No :
071/PAL/R1205 REV 0

THIS DRAWING IS THE PROPERTY OF YBS CONSULTING, & REPRODUCTION, DISTRIBUTION, ALTERATION OR ISSUING THEREOF WITHOUT PERMISSION IS PROHIBITED UNDER THE COPYRIGHT ACT.

YBS CONSULTING
Sustainable Engineered Solutions

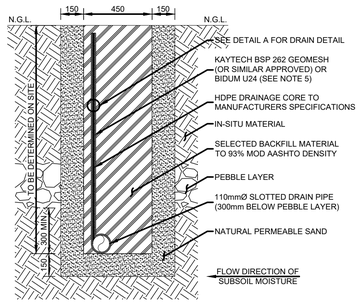


TYPE 1: TYPICAL FIN-DRAIN DETAIL
SCALE 1:15

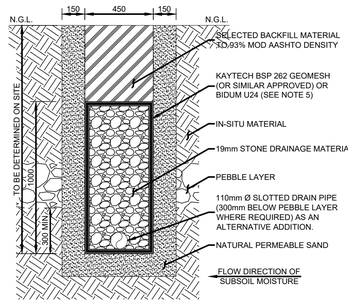


TYPE 2: TYPICAL SUBSOIL-DRAIN DETAIL
SCALE 1:15

TYPICAL DRAIN DETAIL FOR SANDY MATERIAL

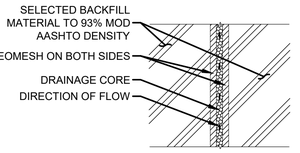


TYPE 3: TYPICAL FIN-DRAIN DETAIL
SCALE 1:15



TYPE 4: TYPICAL SUBSOIL-DRAIN DETAIL
SCALE 1:15

TYPICAL DRAIN DETAIL FOR CLAYEY MATERIAL



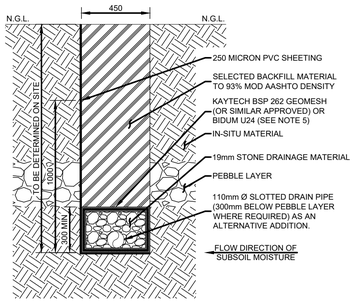
DETAIL A: DRAIN DETAIL
SCALE 1:5

LEGEND:

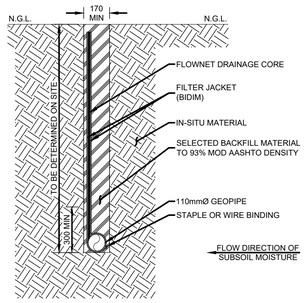
- SELECTED BACKFILL MATERIAL
- 19mm STONE DRAINAGE MATERIAL
- NATURAL PERMEABLE SAND
- IN-SITU MATERIAL
- PEBBLE LAYER

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.



TYPE 5: CUT-OFF DRAIN
SCALE 1:15

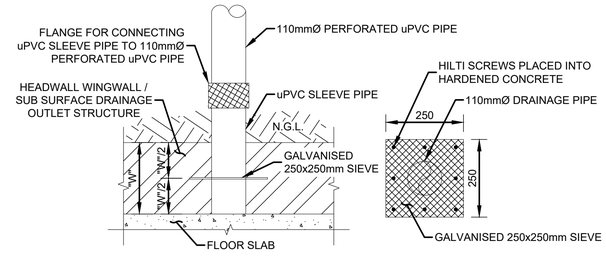


TYPE 6: FLO-DRAIN
SCALE 1:15

GRADING REQUIREMENTS OF CRUSHED STONE

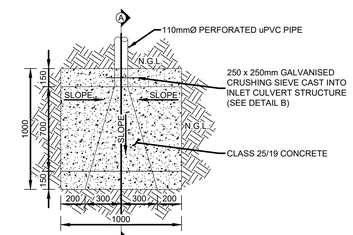
1. CRUSHED STONE SHALL BE GRADED
2. CRUSHED STONE, WHICH CONFORMS TO THE FOLLOWING REQUIREMENTS:

   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.

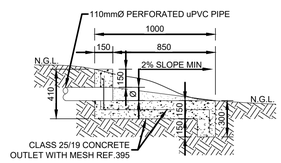


PLAN VIEW ELEVATION

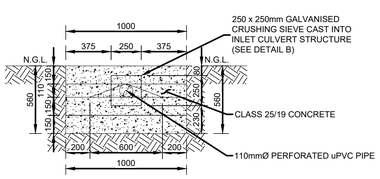
DETAIL B: GALVANISED CRUSHING SIEVE
SCALE 1:10



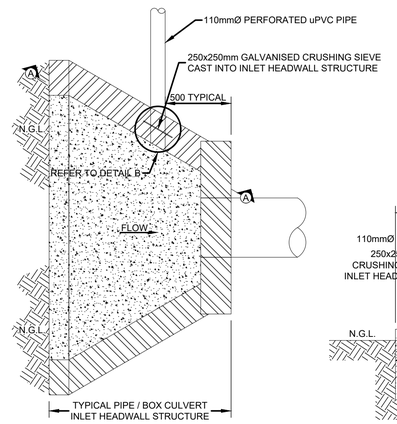
PLAN VIEW: SUB SURFACE DRAINAGE OUTLET STRUCTURE
SCALE 1:20



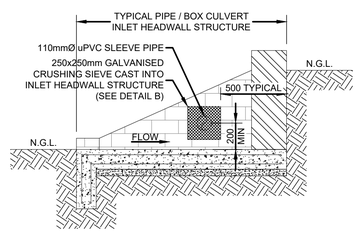
SECTION A-A: SUB SURFACE DRAINAGE OUTLET STRUCTURE
SCALE 1:20



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

FOR CONSTRUCTION

CLIENT:
agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROJECT : PALMEITFONTEIN GRAVEL ROADS

PROJECT NO.: ---

DRAWING TITLE : STANDARD DETAILS SUBSURFACE DRAIN TYPES

LOCATION/VILLAGE : PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

AUTHORITY / APPROVALS

25 SCHEEPERS STREET
EMAKHAZENI
1100
P.O. BOX 17
EMAKHAZENI (BELFAST)
1100
TEL: (013)253 7600
FAX: (013)253 2440/ 1889

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :
CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M.
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	13 FEB 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

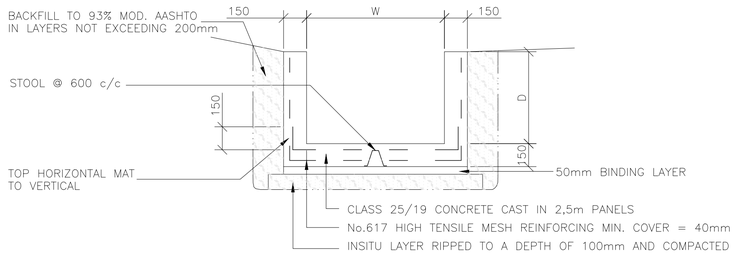
5		
4		
3		
2		
1	--/--/--	---
DATE	REVISIONS	

PROFESSIONAL SERVICE : CIVIL & STRUCTURAL ENGINEERING

DRAWING No : 071/PAL/R1212 REV 0

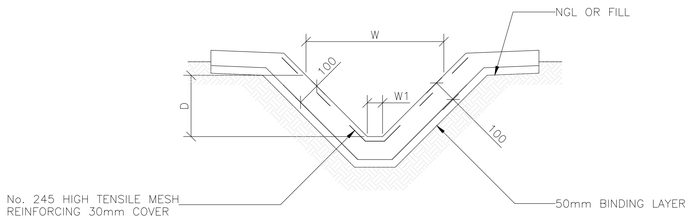
THIS DRAWING IS THE PROPERTY OF YBS CONSULTING, & REPRODUCTION, DISTRIBUTION, ALTERATION OR ISSUING THEREOF WITHOUT PERMISSION IS PROHIBITED UNDER THE COPYRIGHT ACT.

YBS CONSULTING
Sustainable Engineered Solutions



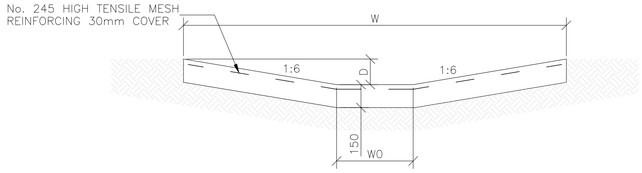
TYPE RECTANGULAR 12 CHANNEL

SCALE 1 : 20



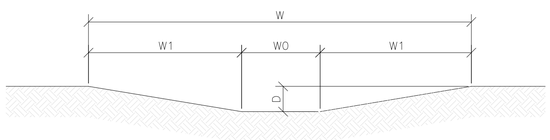
TYPE B CHANNEL

N.T.S



TYPE C CHANNEL

SCALE 1 : 20

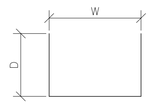


TYPICAL DETAIL : EARTH CHANNELS

N.T.S

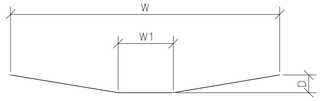
1. WIDTH OF SLAB MUST EXTENT 500mm EITHER SIDE OF THE CHANNEL
2. STRUCTURAL CONCRETE CLASS 25/19
3. 50mm BLINDING LAYER CLASS 10/19
4. CONSTRUCTION JOINT TO BE PLACED AT 2,5m AND REPLACED EACH 15m WITH AN EXPANSION JOINT
5. DESIGNED FOR LIGHT VEHICLES. NO HEAVY VEHICLES PERMITTED

TYPE RECTANGULAR 12 CONCRETE CHANNEL DIMENSIONS



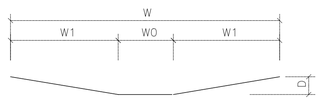
TYPE	W (mm)	D (mm)		
RECT. 12	1150	1150		

TYPE B CONCRETE CHANNEL DIMENSIONS



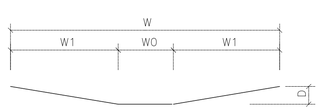
TYPE	W (mm)	W1 (mm)	D (mm)	PHASE 3 TYPE
B1	750	200	275	B1 A
B2	900	200	350	B1
B3	1050	200	425	B2 A
B4	1200	200	500	B2
B5	850	300	275	
B6	1000	300	350	
B7	1150	300	425	
B8	1300	300	500	B3
B9	1500	500	500	
B10	1750	750	500	
B11	2250	750	750	

TYPE C CONCRETE CHANNEL DIMENSIONS

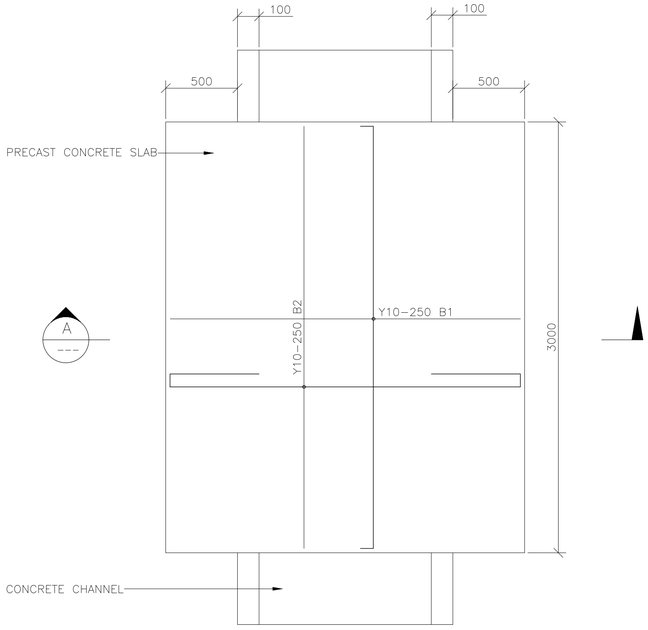


TYPE	D (mm)	W1	W0	W
C3	125	750	500	2000

TYPE G EARTH CHANNELS DIMENSIONS

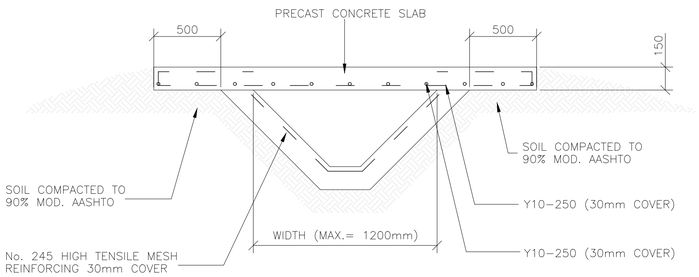


TYPE	D (mm)	W1	W0	W
G1	100	600	500	1700
G2	125	750	500	2000



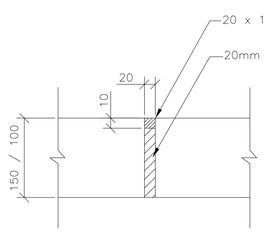
VEHICLE CROSSING (PLAN)

N.T.S



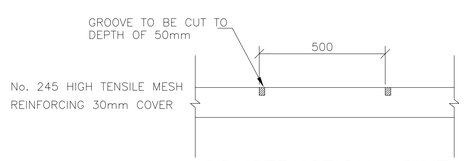
SECTION A

1 : 20



EXPANSION JOINT

N.T.S



CONSTRUCTION JOINT

N.T.S

FOR INFORMATION

NOTES :

GENERAL NOTES
1. CARE SHOULD BE TAKEN TO ENSURE THAT STORMWATER IS DIRECTED AWAY FROM THE BUILDING
2. ALL CONCRETE TO BE 25MPa OR OTHERWISE STATED.
3. COVER TO REINFORCEMENT TO BE 50mm BELOW GROUND LEVEL.
4. COVER TO REINFORCEMENT TO BE 25mm ABOVE GROUND LEVEL.
5. DO NOT SCALE FROM THIS DRAWING: USE STATED DIMENSIONS ONLY. ANY QUERIES TO BE DIRECTED TO THE ENGINEER.
6. ALL REINFORCEMENT TO BE INSPECTED BY THE ENGINEER PRIOR TO PLACING OF CONCRETE.

REINFORCEMENT NOTES
1. ABBREVIATIONS
   - T = TOP LAYER
   - B = BOTTOM LAYER
2. MINIMUM LAPS
   - REBAR MINIMUM SPLICE LENGTH = 45 x BAR DIAMETER
   - REINFORCEMENT MESH MINIMUM SPLICE LENGTH = 300mm
3. REINFORCEMENT BARS TO BE BENT ACCORDING TO SANS 282-2004
4. STANDARD SPECIFICATION:
   - SANS 10144: DETAILING OF STEEL REINFORCEMENT FOR CONCRETE
5. BENDING SPECIFICATION
   - SANS 282: SHAPE CODES AND DIMENSIONS
   - ALL REINFORCEMENT DIMENSIONS ARE MEASURED EXTERNALLY

STORMWATER APRON SLAB
1. ALL CONCRETE USED ON APRON SLAB TO BE 15MPa OR OTHERWISE STATED
2. PANEL LENGTH SHALL NOT EXCEED 1.5m
3. STOEP FINISHED FLOOR LEVEL TO BE MINIMUM 50mm LOWER THAN FINISHED FLOOR LEVEL INSIDE THE HOUSE

5		
4		
3		
2		
1	-/-/-	---

DATE REVISIONS

AUTHORITY / APPROVALS

25 SCHEEPERS STREET EMAKHAZENI 1100
P.O. BOX 17 EMAKHAZENI (BELFAST) 1100
TEL: (013)253 7600 FAX: (013)253 2440/ 1889

PROJECT :
PALMEITFONTEIN GRAVEL ROADS

PROJECT NO: ---

DRAWING TITLE :
STANDARD DETAILS

CHANNELS AND VEHICLE CROSSINGS DETAILS

LOCATION/VILLAGE :
PALMEITFONTEIN, EMAKHAZENI LOCAL MUNICIPALITY

CERTIFIED AS BUILT FOR CONTRACT	
APPROVED :	
SIGNATURE :	DATE :

CLIENT APPROVAL	
APPROVED :	
SIGNATURE :	DATE :
DRAWING ID NO. :	

DESIGNED :	J.T.M
DRAWN :	A.P.F
SCALE :	AS SHOWN
DATE :	12 MARCH 2025
CHECKED :	P.H
APPROVED :	J.T.M.
SIGNATURE :	

CLIENT:

agriculture, land reform & rural development
Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

PROFESSIONAL SERVICE :
CIVIL & STRUCTURAL ENGINEERING

DRAWING No :
071/PAL/R1217 REV 0

THIS DRAWING IS THE PROPERTY OF YBS CONSULTING, & REPRODUCTION, DISTRIBUTION, ALTERATION OR ISSUING THEREOF WITHOUT PERMISSION IS PROHIBITED UNDER THE COPYRIGHT ACT.

YBS CONSULTING
Sustainable Engineered Solutions