

THE ROADS AUTHORITY  
REPUBLIC OF MALAWI

## FINAL DETAILED ENGINEERING DRAWINGS

LEA ASSOCIATES SOUTH ASIA  
PVT. LTD., India  
in association with  
RUO CONSULTING ENGINEERS  
LTD, Malawi



PART - A : HIGHWAY DRAWINGS  
PART - B : STRUCTURAL DRAWINGS

Consultancy Services for Design Review and Supervision of  
Nsipe-Chingeni-Liwonde Road Rehabilitation, Malawi;

(PROJECT ID NO:P-MW-DB-022)

OCTOBER 2023



# PART - A: HIGHWAY DRAWINGS



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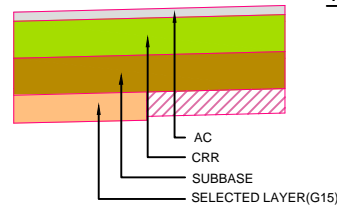
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				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI	DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:  TABLE OF CONTENT	SCALE:  N.T.S	DESIGNED BY VISHAL JHA / RAMANA	
									DRAWN BY VINAYACHANDRAN	
									APPROVED BY RAMANA	
									DATE MAY, 2023	SHEET SIZE A3
MKD.	DESCRIPTIONS	BY	DATE						DRAWING NO.	80087-A\LASA\HWY\NL\TOC - 01
REVISIONS										



# **TYPICAL CROSS SECTIONS**

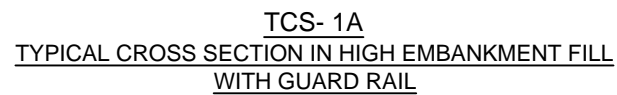




TCS- 1  
TYPICAL CROSS SECTION OF EXISTING ROAD  
WIDENING AT RURAL AREA

HEIGHT OF EMBANKMENT (m)	FILL SLOPE V:H	CUT SLOPE V:H
$\leq 1$	4	4
$>1 \leq 2$	3	3
$> 2$	2	2

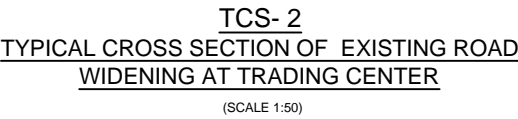
SR. NO.	SECTION	LAYER	THICKNESS (MM)
1	0+00 To 20+000	AC	50
		CRR	200
		SUBBASE	200
		SELECTED LAYER(G15)	150
2	20+00 To 54+440	AC	50
		CRR	150
		SUBBASE	200
		SELECTED LAYER(G15)	150



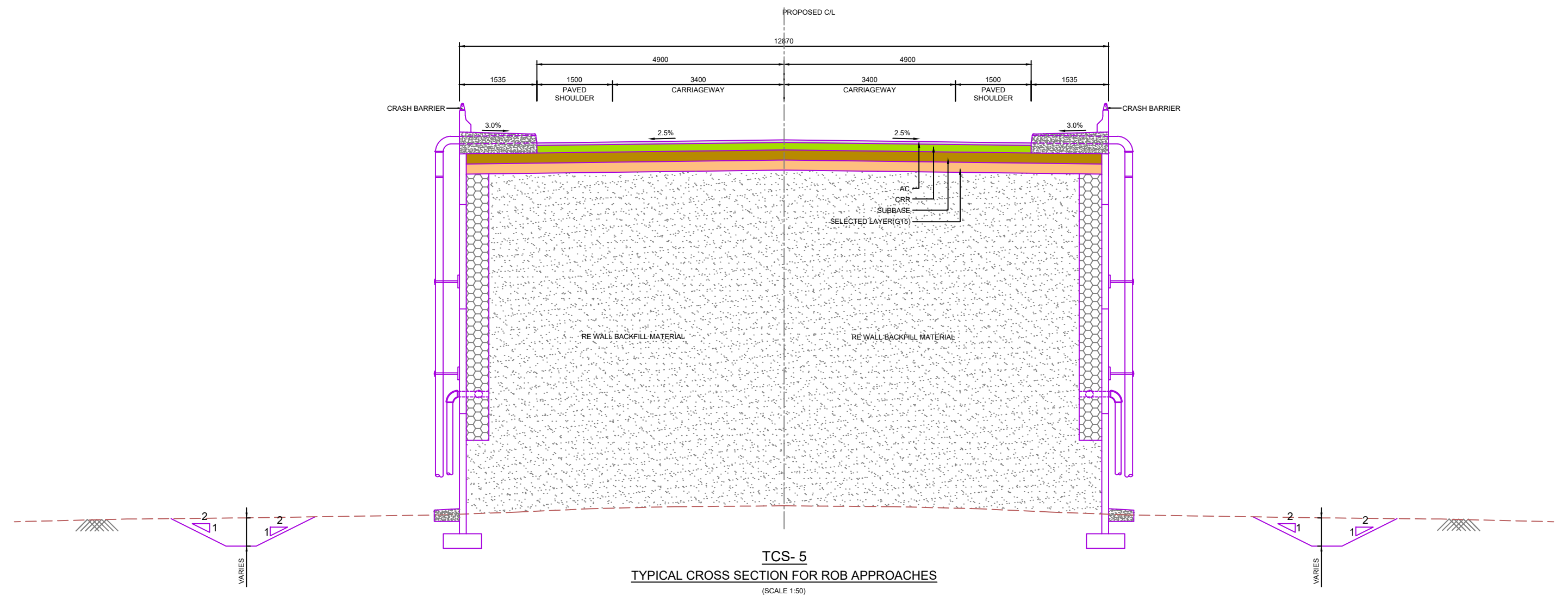
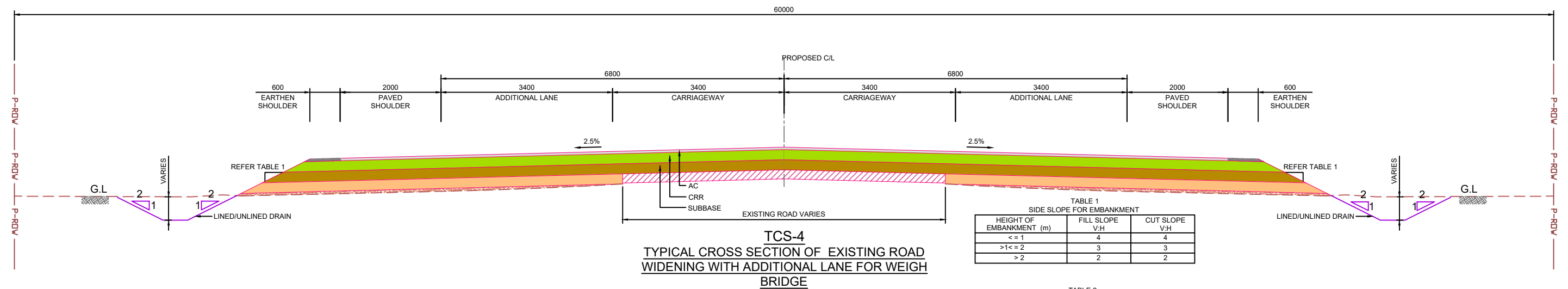
(SCALE 1:50)

			CIENT:	DESIGN CONSULTANT:	PROJECT:	DRAWING TITLE:	SCALE:	DESIGNED BY	VISHAL JHA / RAMANA	
			THE ROADS AUTHORITY	LEA Associates South Asia Pvt Ltd., India	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	TYPICAL CROSS SECTION	AS SHOWN	DRAWN BY	VINAYACHANDRAN	
			CHIEF EXECUTIVE OFFICER	in association with				APPROVED BY	V.V. RAMANA	
			PRIVATE BAG B346	Ruo Consulting Engineers Ltd, Malawi				DATE	MAY, 2023	SHEET SIZE A3
			LILONGWE					DRAWING NO.	80087-A/LASA/HWYNLTC5- 01	
MKD.	DESCRIPTIONS	BY	DATE	MALAWI						
REVISIONS										





SR. NO.	SECTION	LAYER	THICKNESS (MM)
1	0+000 To 20+000	AC	50
		CRR	200
		SUBBASE	200
		SELECTED LAYER(G15)	150
2	20+000 To 54+440	AC	50
		CRR	150
		SUBBASE	200
		SELECTED LAYER(G15)	150



				CLIENT:	THE ROADS AUTHORITY		DESIGN CONSULTANT:	<div>LEA Associates South Asia Pvt Ltd., India</div> <div>LEA</div> <div>in association with</div> <div>RUO Consulting Engineers Ltd, Malawi</div> <div>RUO Consultants</div> <div>Multi-disciplinary Consulting Civil Engineers</div>		PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE:	TYPICAL CROSS SECTION		SCALE:	AS SHOWN		DESIGNED BY	VISHAL JHA / RAMANA		
					CHIEF EXECUTIVE OFFICER												DRAWN BY		VINAYACHANDRAN			
					PRIVATE BAG B346												APPROVED BY		V.V. RAMANA			
					LILONGWE												DATE		MAY, 2023		SHEET SIZE A3	
					MALAWI												DRAWING NO.		80087-AILASAIHWYNLTCS- 03			
MKD.				DESCRIPTIONS		BY	DATE															
REVISIONS																						



# **HORIZONTAL ALIGNMENT DETAILS**



Sr. No.	HIP Details			Radius (m)	Deflection Angle			Ls in	Ls out	Lc	Start of		End of		Start of Transition		Start of Circular		End of Circular		End of Transition		Superelevation (%)	Hand of Curve	Speed (kmph)
	Chainage	Northing	Easting		D	M	S				Transition	Circular	Circular	Transition	Northing	Easting	Northing	Easting	Northing	Easting	Northing	Easting			
1	2942.420	8356510.888	691235.423	860	39	12	39.2	50	50	539	2611.055	2661.055	3199.604	3249.604	8356388.374	690927.536	8356406.408	690974.169	8356425.759	691503.607	8356411.176	691551.432	5.40%	RIGHT	100
2	5414.220	8355759.822	693615.719	900	38	44	0.1	50	50	558	5072.824	5122.824	5681.246	5731.246	8355862.550	693290.150	8355847.065	693337.689	8355517.290	693777.243	8355475.979	693805.408	5.25%	RIGHT	100
3	6241.070	8355052.102	694088.68	650	13	56	25.17	60	60	98	6131.573	6191.573	6289.721	6349.721	8355143.137	694027.842	8355093.775	694061.941	8355019.464	694125.914	8354978.405	694169.657	6.75%	LEFT	100
4	8280.340	8353678.943	695597.48	800	21	31	15.51	50	50	250	8103.277	8153.277	8403.766	8453.766	8353798.119	695466.532	8353764.083	695503.156	8353564.677	695653.060	8353520.038	695675.580	5.75%	RIGHT	100
5	9211.020	8352840.435	696009.599	760	17	47	22.13	55	55	181	9064.551	9119.551	9300.519	9355.519	8352971.883	695944.994	8352922.821	695969.846	8352775.054	696073.577	8352735.011	696111.275	6.00%	LEFT	100
6	11445.330	8351230.792	697562.015	750	20	17	21.43	55	55	211	11283.606	11338.606	11549.192	11604.192	8351347.201	697449.745	8351308.085	697488.404	8351185.031	697658.445	8351160.537	697707.685	6.00%	LEFT	100
7	15555.030	8349444.266	701266.273	900	29	53	20.73	50	50	419	15289.780	15339.780	15759.277	15809.277	8349559.493	701027.357	8349537.357	701072.188	8349266.317	701387.389	8349225.308	701415.991	5.25%	RIGHT	100
8	17419.190	8347896.362	702324.692	5800	5	26	48.49			551		17143.299	17694.674				8348124.107	702168.966	8347684.428	702501.333			-2.50%	LEFT	50
9	18904.800	8346754.848	703276.109	1000	20	23	22.84	50	50	306	18699.943	18749.943	19055.810	19105.810	8346912.210	703144.952	8346873.538	703176.643	8346608.663	703327.206	8346561.650	703344.223	4.75%	RIGHT	100
10	19869.040	8345841.84	703597.997	800	31	35	0.95	35	35	406	19625.273	19660.273	20066.264	20101.264	8346071.742	703516.943	8346038.819	703528.821	8345710.665	703760.414	8345688.443	703787.454	2.70%	LEFT	50
11	21056.770	8345087.174	704530.068	1500	11	18	30.91	50	50	246	20883.256	20933.256	21179.314	21229.314	8345196.363	704395.211	8345165.116	704434.245	8345030.027	704639.573	8345006.549	704683.718	3.40%	LEFT	100
12	22478.810	8344425.976	705790.142	850	24	39	33.75	50	50	316	22267.993	22317.993	22633.822	22683.822	8344523.932	705603.464	8344500.267	705647.507	8344298.350	705887.997	8344259.067	705918.927	5.40%	RIGHT	100
13	23908.230	8343289.68	706666.893	1200	46	11	48.44	50	50	918	23371.386	23421.386	24338.929	24388.929	8343714.708	706338.947	8343675.336	706369.765	8343237.870	707150.971	8343232.168	707200.644	4.10%	LEFT	100
14	24758.060	8343192.623	707567.652	1800	13	6	42.01			412		24551.200	24963.116				8343214.784	707361.981	8343124.383	707762.934			-2.50%	RIGHT	50
15	25803.320	8342847.215	708556.107	2100	13	0	44.35			477		25563.828	26040.755				8342926.219	708330.020	8342821.145	708794.177			-2.50%	LEFT	50
16	26740.450	8342744.981	709489.711	450	31	37	30.54	35	35	213	26595.471	26630.471	26843.854	26878.854	8342760.762	709345.597	8342756.502	709380.335	8342677.102	709576.246	8342655.976	709604.148	4.30%	RIGHT	50
17	27230.590	8342440.037	709881.79	650	28	9	55.06	35	35	285	27050.007	27085.007	27369.532	27404.532	8342550.900	709739.249	8342529.166	709766.681	8342306.873	709940.624	8342275.019	709955.124	3.20%	RIGHT	50
18	27928.170	8341796.509	710167.773	470	70	10	41.84	35	35	541	27580.401	27615.401	28156.077	28191.077	8342114.305	710026.545	8342082.502	710041.153	8341819.514	710479.695	8341821.607	710514.630	4.30%	LEFT	50
19	28985.930	8341878.971	711307.414	500	30	46	37.13	35	35	234	28830.791	28865.791	29099.371	29134.371	8341867.775	711152.676	8341869.893	711187.610	8341824.737	711414.624	8341809.412	711446.089	3.80%	RIGHT	50
20	30302.680	8341285.592	712490.384	23500	0	57	33.11			393		30105.964	30499.381				8341373.790	712314.551	8341194.463	712664.716			-2.50%	RIGHT	50
21	32324.360	8340349.024	714282.057	55000	0	12	15.63			196		32226.286	32422.441				8340394.459	714195.139	8340303.899	714369.137			-2.50%	LEFT	100
22	34241.530	8339466.946	715984.249	300000	0	3	19.62			290		34096.361	34386.694				8339533.736	715855.360	8339400.031	716113.073			-2.50%	RIGHT	100
23	35288.720	8338984.236	716913.557	6000	5	48	36.15			608		34984.251	35592.677				8339124.585	716643.359	8338871.961	717196.574			-2.50%	LEFT	100
24	36530.860	8338526.005	718068.639	600	32	4	24.21	35	35	301	36340.870	36375.870	36676.742	36711.742	8338596.063	717892.041	8338583.474	717924.697	8338554.411	718221.004	8338560.415	718255.484	3.40%	LEFT	50
25	37937.560	8338782.43	719461.034	1200	14	32	44.68	50	50	255	37759.408	37809.408	38064.053	38114.053	8338750.163	719285.824	8338758.877	719335.057	8338772.896	719588.838	8338769.658	719638.732	4.10%	RIGHT	100
26	38434.280	8338746.701	719958.14	650	19	57	37.47	60	60	166	38289.866	38349.866	38516.309	38576.309	8338757.054	719814.092	8338753.674	719873.991	8338770.648	720039.110	8338786.143	720097.069	6.75%	LEFT	100
27	39179.020	8338950.75	720676.868	750	20	5	15.6	55	55	208	39018.656	39073.656	39281.603	39336.603	8338906.953	720522.599	8338921.325	720575.685	8338942.292	720781.903	8338938.898	720836.795	6.00%	RIGHT	100
28	40032.990	8338887.432	721531.282	2150	7	25	3.55			278		39893.628	40171.972				8338897.732	721392.296	8338895.162	721670.434			-2.50%	LEFT	100
29	41440.320	8338965.507	722936.829	1000	14	36	4.07	50	50	205	41287.193	41337.193	41542.031	41592.031	8338957.014	722783.939	8338960.203	722833.836	8338997.396	723034.905	8339012.267	723082.640	4.75%	LEFT	100
30	42117.720	8339172.798	723583.22	600	29	51	25.96	35	35	278	41940.230	41975.230	42252.894	42287.894	8339118.597	723414.207	8339128.961	723447.637	8339142.653	723722.489	8339135.663	723756.783	3.40%	RIGHT	50
31	42566.620	8339077.349	724029.335	1250	9	48	27.06			214		42459.370	42673.337				8339099.787	723924.463	8339037.375	724128.852			-2.50%	RIGHT	50
32	43552.760	8338709.584	724944.908	5500	2	32	40.77			244		43430.610	43674.880				8338755.115	724831.556	8338669.130	725060.170			-2.50%	LEFT	100
33	43972.390	8338570.604	725340.896	350	39	40	34.08			242		43846.123	44088.491				8338612.420	725221.751	8338614.487	725459.296			5.30%	LEFT	80
34	44466.850	8338745.981	725814.073	320	45	2	55.49			252		44334.145	44585.744				8338699.860	725689.637	8338690.501	725934.627			5.50%	RIGHT	80
35	44820.590	8338592.321	726147.967	520	29	4	5.73			264		44685.780	44949.595				8338648.680	726025.501	8338602.561	726282.389			3.80%	LEFT	80
36	45641.980	8338655.151	726972.779	700	20	0	38.58			244		45518.488	45762.965				8338645.771	726849.639	8338621.827	727091.694			3.00%	RIGHT	80
37	46045.550	8338545.574	727363.8	600	27	32	59.74			289		45898.457	46186.959				8338585.266	727222.160	8338444.871	727471.020			3.40%	RIGHT	80
38	46489.700	8338237.616	727691.6901	1250	10	41	21.48			233		46372.755	46605.959				8338317.674	727606.450	8338143.135	727760.602			-2.50%	RIGHT	80
39	46814.830	8337974.384	727883.6851	1200	8	10	39.24			171		46729.048	46900.319				8338043.689	727833.136	8337912.974	727943.578			-2.50%	LEFT	80
40	47444.880	8337523.126	728323.799	500	51	59	10.33			454		47201.091	47654.756				8337697.654	728153.581	8337549.751	728566.133			3.80%	LEFT	80
41	48042.360	8337592.082	728951.416	330	56	19	58.49			324		47865.662	48190.116				8337572.785	728775.777	8337456.600	729064.845			5.50%	RIGHT	80
42	48441.260	8337264.035	729226.066	600	27	53	50.1			292		48292.235	48584.375				8337378.300	729130.400	8337207.810	729364.078			3.40%	LEFT	80
43	49244.460	8336958.768	729975.38	1800	8	32	39.53	50	50	218	49084.992	49134.992	49353.420	49403.420	8337018.9										



# **VERTICAL ALIGNMENT DETAILS**

Sl. No	PVC		PVI		PVT		Grade in (%)	Grade out (%)	Curve length (m)	K Value	Type	Speed (Kmph)
	Station (m)	Elevation (m)	Station (m)	Elevation (m)	Station (m)	Elevation (m)						
1	58.148	887.016	190.648	884.040	323.148	890.665	-2.25%	5.00%	265	36.571	Sag	100
2	544.766	901.746	634.766	906.246	724.766	908.868	5.00%	2.91%	180	86.257	Crest	100
3	992.395	916.664	1122.395	920.451	1252.395	917.431	2.91%	-2.32%	260	49.651	Crest	100
4	1516.315	911.299	1701.315	907.001	1886.315	915.614	-2.32%	-4.66%	370	53.016	Sag	100
5	2132.345	927.069	2369.845	938.126	2607.345	927.188	4.66%	-4.61%	475	51.288	Crest	100
6	2705.925	922.648	2885.925	914.357	3065.925	920.914	-4.61%	3.64%	360	43.645	Sag	100
7	3360.022	931.627	3627.522	941.371	3895.022	930.562	3.64%	-4.04%	535	69.628	Crest	100
8	4203.855	918.082	4293.855	914.445	4383.855	912.851	-4.04%	-1.77%	180	79.294	Sag	100
9	5155.831	899.179	5260.831	897.319	5365.831	896.600	-1.77%	-0.69%	210	193.367	Sag	100
10	5376.423	896.528	5518.923	895.551	5661.423	889.306	-0.69%	-4.38%	285	77.081	Crest	100
11	5790.212	883.662	5900.212	878.842	6010.212	876.831	-4.38%	-1.83%	220	86.107	Sag	100
12	6139.596	874.467	6229.596	872.822	6319.596	868.610	-1.83%	-4.68%	180	63.086	Crest	100
13	6394.048	865.125	6501.548	860.093	6609.048	858.093	-4.68%	-1.86%	215	76.230	Sag	100
14	7174.200	847.580	7276.700	845.673	7379.200	847.657	-1.86%	1.94%	205	54.011	Sag	100
15	7404.500	848.146	7549.500	850.952	7694.500	847.002	1.94%	-2.72%	290	62.242	Crest	100
16	7791.851	844.351	7861.851	842.444	7931.851	841.949	-2.72%	-0.71%	140	69.384	Sag	100
17	7972.292	841.664	8022.292	841.311	8072.292	840.464	-0.71%	-1.69%	100	101.226	Crest	100
18	8246.587	837.511	8336.587	835.986	8426.587	835.516	-1.69%	-0.52%	180	153.543	Sag	100
19	8834.904	833.386	8934.904	832.864	9034.904	830.830	-0.52%	-2.03%	200	132.314	Crest	100
20	9617.985	818.974	9717.985	816.941	9817.985	815.519	-2.03%	-1.42%	200	327.131	Sag	100
21	10066.547	811.984	10149.047	810.811	10231.547	807.997	-1.42%	-3.41%	165	82.984	Crest	100
22	10307.737	805.399	10362.737	803.523	10417.737	802.370	-3.41%	-2.10%	110	83.777	Sag	100
23	10532.248	799.968	10632.248	797.871	10732.248	799.137	-2.10%	1.27%	200	59.470	Sag	100
24	10784.052	799.792	10904.052	801.311	11024.052	798.156	1.27%	-2.63%	240	61.623	Crest	100
25	11490.679	785.889	11590.679	783.260	11690.679	782.685	-2.63%	-0.57%	200	97.353	Sag	100
26	11869.115	781.660	11959.115	781.143	12049.115	779.735	-0.57%	-1.56%	180	181.868	Crest	100
27	12267.485	776.319	12367.485	774.755	12467.485	772.324	-1.56%	-2.43%	200	230.917	Crest	100
28	12575.043	769.710	12700.043	766.672	12825.043	765.883	-2.43%	-0.63%	250	138.963	Sag	100
29	13329.092	762.701	13439.092	762.006	13549.092	759.130	-0.63%	-2.61%	220	110.908	Crest	100
30	13674.160	755.859	13799.160	752.590	13924.160	751.704	-2.61%	-0.71%	250	131.148	Sag	100
31	14062.953	750.721	14142.953	750.154	14222.953	748.800	-0.71%	-1.69%	160	162.706	Crest	100
32	14330.501	746.980	14440.501	745.119	14550.501	749.055	-1.69%	3.58%	220	41.745	Sag	100
33	14637.152	752.155	14772.152	756.985	14907.152	753.977	3.58%	-2.23%	270	46.502	Crest	100
34	14973.807	752.492	15123.807	749.149	15273.807	754.409	-2.23%	3.51%	300	52.311	Sag	100
35	15309.664	755.667	15559.664	764.433	15809.664	758.466	3.51%	-2.39%	500	84.840	Crest	100
36	16317.722	746.340	16427.722	743.715	16537.722	747.495	-2.39%	3.44%	220	37.779	Sag	100
37	16702.850	753.170	16800.350	756.520	16897.850	757.663	3.44%	1.17%	195	86.101	Crest	100
38	17184.205	761.018	17274.205	762.073	17364.205	760.941	1.17%	-1.26%	180	74.104	Crest	50
39	17374.121	760.817	17464.121	759.685	17554.121	758.999	-1.26%	-0.76%	180	363.493	Sag	50
40	17727.691	757.677	17837.691	756.839	17947.691	754.179	-0.76%	-2.42%	220	132.853	Crest	100
41	18207.397	747.899	18334.897	744.816	18462.397	745.237	-2.42%	0.33%	255	92.795	Sag	100
42	18526.036	745.447	18626.036	745.777	18726.036	744.413	0.33%	-1.36%	200	118.060	Crest	50
43	19040.629	740.122	19200.629	737.939	19360.629	740.340	-1.36%	1.50%	320	111.719	Sag	100
44	19611.950	744.110	19681.950	745.160	19751.950	744.953	1.50%	-0.30%	140	77.952	Crest	100
45	19855.803	744.646	19945.803	744.380	20035.803	743.480	-0.30%	-1.00%	180	255.672	Crest	50
46	20517.970	738.660	20642.970	737.410	20767.970	734.954	-1.00%	-1.97%	250	258.975	Crest	100
47	20971.617	730.952	21171.617	727.022	21371.617	725.228	-1.97%	-0.90%	400	374.512	Sag	100
48	21843.662	720.994	21973.662	719.828	22103.662	715.388	-0.90%	-3.41%	260	103.260	Crest	100
49	22228.106	711.139	22303.106	708.578	22378.106	706.792	-3.41%	-2.38%	150	145.094	Sag	100
50	22985.850	692.321	23085.850	689.940	23185.850	689.353	-2.38%	-0.59%	200	111.422	Sag	100
51	23353.097	688.373	23463.097	687.728	23573.097	684.856	-0.59%	-2.61%	220	108.655	Crest	100
52	23627.986	683.423	23707.986	681.335	23787.986	681.779	-2.61%	0.56%	160	50.523	Sag	100
53	24100.720	683.518	24325.720	684.769	24550.720	678.923	0.56%	-2.60%	450	142.661	Crest	100
54	24631.310	676.829	24771.310	673.191	24911.310	671.869	-2.60%	-0.94%	280	169.298	Sag	100
55	25103.619	670.053	25303.619	668.164	25503.619	665.001	-0.94%	-1.58%	400	628.044	Crest	100
56	25712.371	661.700	25807.371	660.198	25902.371	659.618	-1.58%	-0.61%	190	195.692	Sag	100
57	26383.775	656.679	26508.775	655.916	26633.775	654.023	-0.61%	-1.51%	250	276.389	Crest	50
58	27272.547	644.346	27347.547	643.209	27422.547	641.287	-1.51%	-2.56%	150	143.089	Crest	50

Sl. No	PVC		PVI		PVT		Grade in (% )	Grade out (% )	Curve length (m)	K Value	Type	Speed (Kmph)
	Station (m)	Elevation (m)	Station (m)	Elevation (m)	Station (m)	Elevation (m)						
59	27526.520	638.622	27801.520	631.573	28076.520	638.008	-2.56%	2.34%	550	112.168	Sag	50
60	28174.308	640.297	28216.808	641.291	28259.308	641.291	2.34%	0.00%	85	36.323	Crest	50
61	28282.439	641.291	28257.439	641.291	28432.439	638.291	0.00%	-4.00%	150	37.500	Crest	50
62	28516.439	634.931	28591.439	631.931	28666.439	631.128	-4.00%	-1.07%	150	51.217	Sag	50
63	29034.353	627.186	29124.353	626.222	29214.353	624.961	-1.07%	-1.40%	180	545.110	Crest	50
64	29849.729	616.056	30074.729	612.902	30299.729	611.095	-1.40%	-0.80%	450	752.236	Sag	100
65	31225.128	603.661	31515.128	601.332	31805.128	600.646	-0.80%	-0.24%	580	1023.102	Sag	100
66	32425.036	599.181	32875.036	598.117	33325.036	591.232	-0.24%	-1.53%	900	695.765	Crest	100
67	33418.144	589.808	33538.144	587.972	33658.144	588.411	-1.53%	0.37%	240	126.577	Sag	100
68	33790.509	588.896	33915.509	589.354	34040.509	588.281	0.37%	-0.86%	250	204.194	Crest	100
69	34206.850	586.853	34281.850	586.210	34356.850	586.665	-0.86%	0.61%	150	102.372	Sag	100
70	34371.948	586.757	34441.948	587.182	34511.948	586.927	0.61%	-0.36%	140	144.201	Crest	100
71	34581.820	586.673	34656.820	586.400	34731.820	586.975	-0.36%	0.77%	150	132.722	Sag	100
72	34835.315	587.768	34935.315	588.534	35035.315	587.883	0.77%	-0.65%	200	141.111	Crest	100
73	35498.130	584.871	35588.130	584.285	35678.130	582.726	-0.65%	-1.73%	180	166.456	Crest	100
74	35720.595	581.990	35810.595	580.431	35900.595	580.431	-1.73%	0.00%	180	103.908	Sag	100
75	36031.458	580.431	36131.458	580.431	36231.458	580.158	0.00%	-0.27%	200	731.961	Crest	100
76	36385.130	579.738	36510.130	579.397	36635.130	581.401	-0.27%	1.60%	250	133.232	Sag	100
77	37053.375	588.106	37228.375	590.911	37403.375	598.495	1.60%	4.33%	350	128.192	Sag	100
78	37586.197	606.417	37696.197	611.184	37806.197	612.160	4.33%	0.89%	220	63.835	Crest	100
79	38155.814	615.262	38335.814	616.858	38515.814	624.964	0.89%	4.50%	360	99.550	Sag	100
80	38710.824	633.746	38855.824	640.276	39000.824	639.962	4.50%	-0.22%	290	61.440	Crest	100
81	39201.819	639.527	39306.819	639.299	39411.819	636.503	-0.22%	-2.66%	210	85.834	Crest	100
82	39820.872	625.609	39950.872	622.146	40080.872	623.560	-2.66%	1.09%	260	69.322	Sag	100
83	40257.070	625.476	40347.070	626.455	40437.070	626.187	1.09%	-0.30%	180	129.943	Crest	100
84	40700.374	625.402	40820.374	625.045	40940.374	622.984	-0.30%	-1.72%				

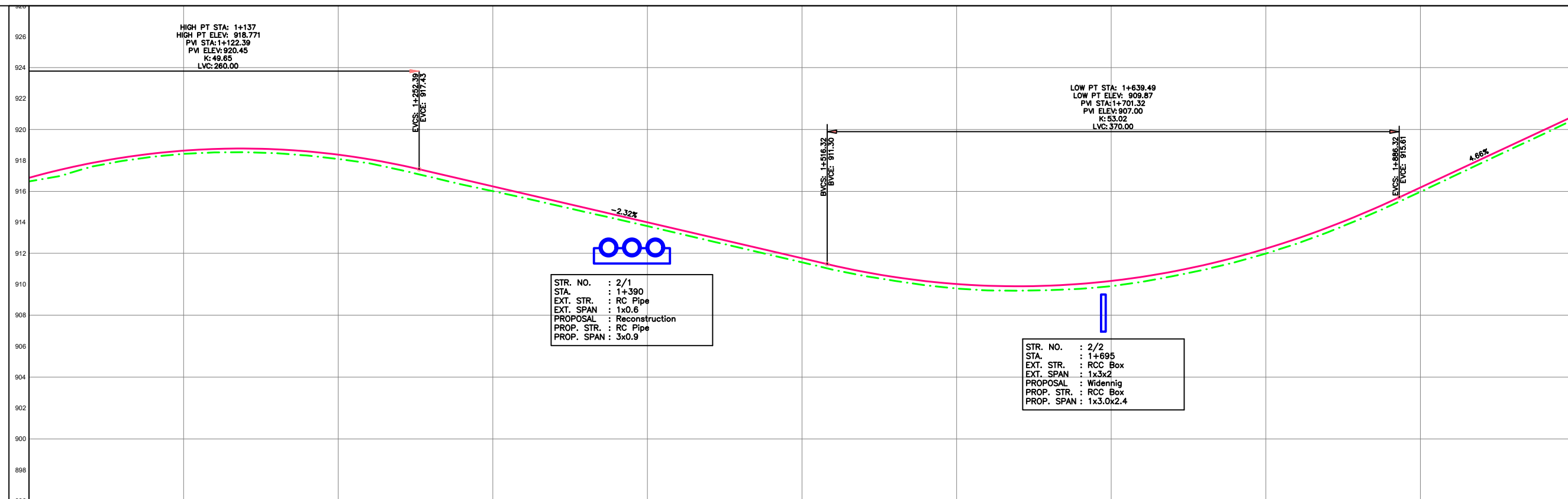
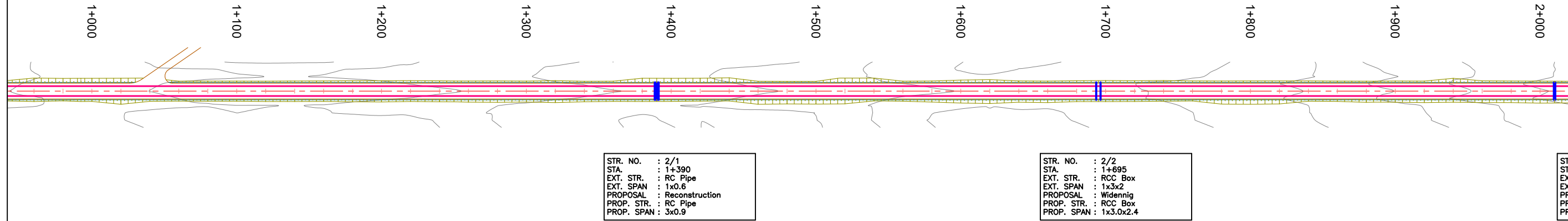
# **PLAN AND PROFILE**







← NSIPE

LIWONDE →



*DATUM LEVEL*  


CHAINAGE	1+000 1+020 1+040 1+060 1+080 1+100 1+120 1+140 1+160 1+180 1+200 1+220 1+240 1+260 1+280 1+300 1+320 1+340 1+360 1+380 1+400 1+420 1+440 1+460 1+480 1+500 1+520 1+540 1+560 1+580 1+600 1+620 1+640 1+660 1+680 1+700 1+720 1+740 1+760 1+780 1+800 1+820 1+840 1+860 1+880 1+900 1+920 1+940 1+960 1+980
C/L GROUND LEVEL 	916.643 916.991 917.392 917.592 917.693 917.840 918.040 918.240 918.428 918.518 918.533 918.467 918.318 918.095 917.817 917.390 916.917 916.446 916.015 915.582 915.122 914.685 914.216 913.754 913.283 912.817 912.353 911.880 911.418 910.941 910.539 910.219 909.930 909.722 909.598 909.580 909.620 909.702 909.871 910.156 910.524 910.937 911.419 911.981 912.621 913.351 914.170 915.052 915.971 916.913 917.859 918.795 919.724
DESIGN CENTRE LINE 	916.980 917.392 917.823 918.173 918.443 918.633 918.742 918.770 918.718 918.585 918.372 918.078 917.703 917.254 916.790 916.325 915.860 915.396 914.931 914.466 914.002 913.537 913.072 912.608 912.143 911.678 911.215 910.802 910.464 910.202 910.015 909.904 909.868 909.908 910.023 910.214 910.480 910.821 911.238 911.730 912.298 912.941 913.660 914.454 915.324 916.231 917.182 918.114 919.045 919.976
HORIZONTAL GEOMETRY	L = 2611.055
SUPERELEVATION	+emax% +2.5% G -2.5% -emax%
VERTICAL GEOMETRY	L: 260.00 K: 49.651 -2.323% L: 370.00 K: 53.016 4.656%
CROSS SECTION TYPE	TCS 1

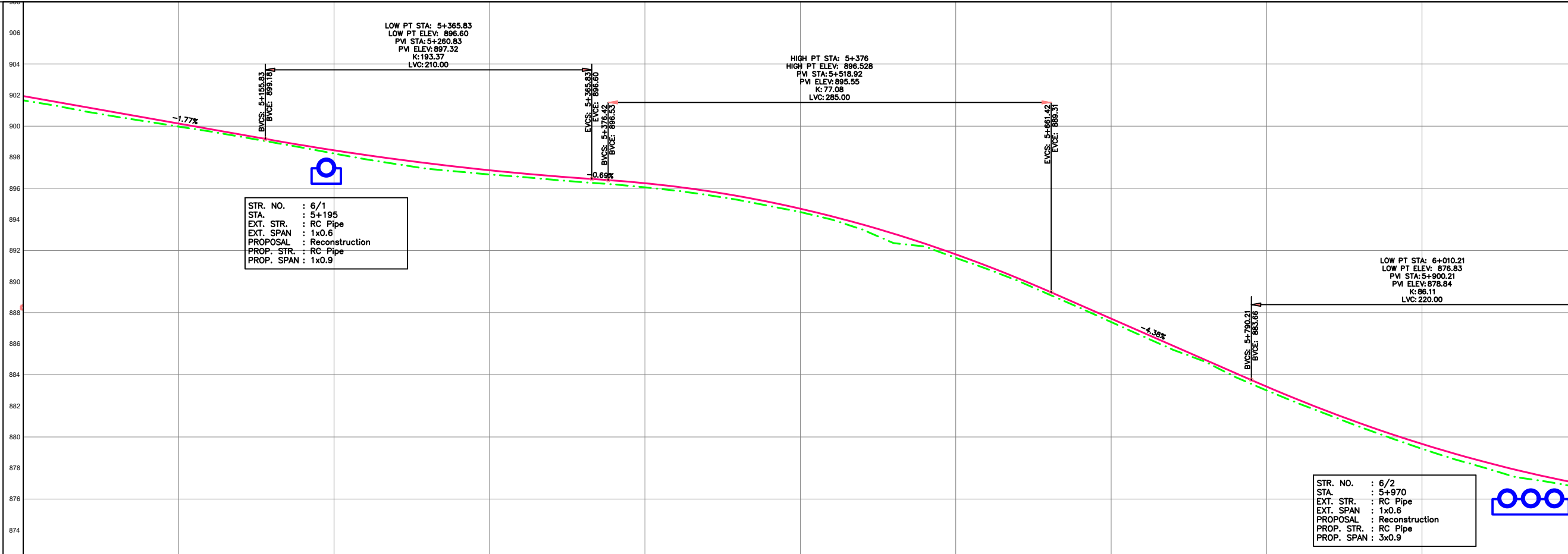
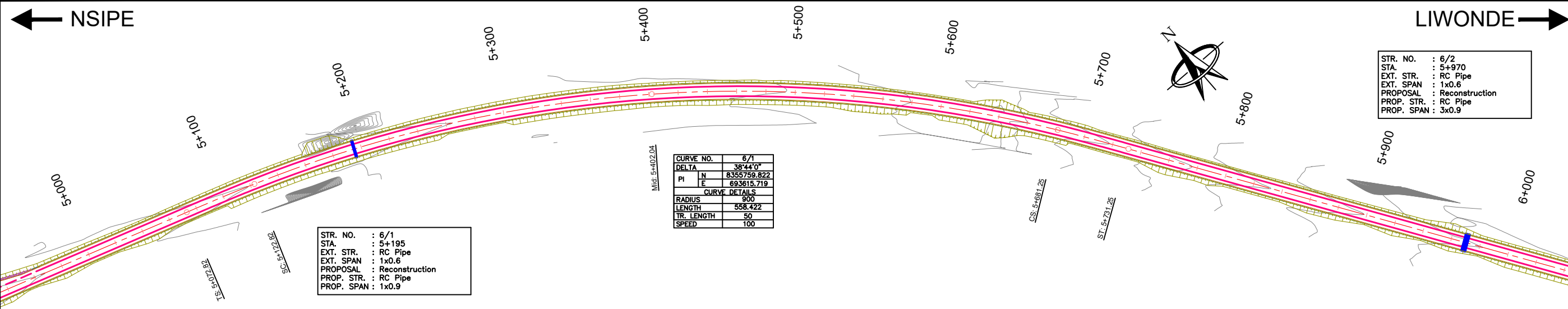
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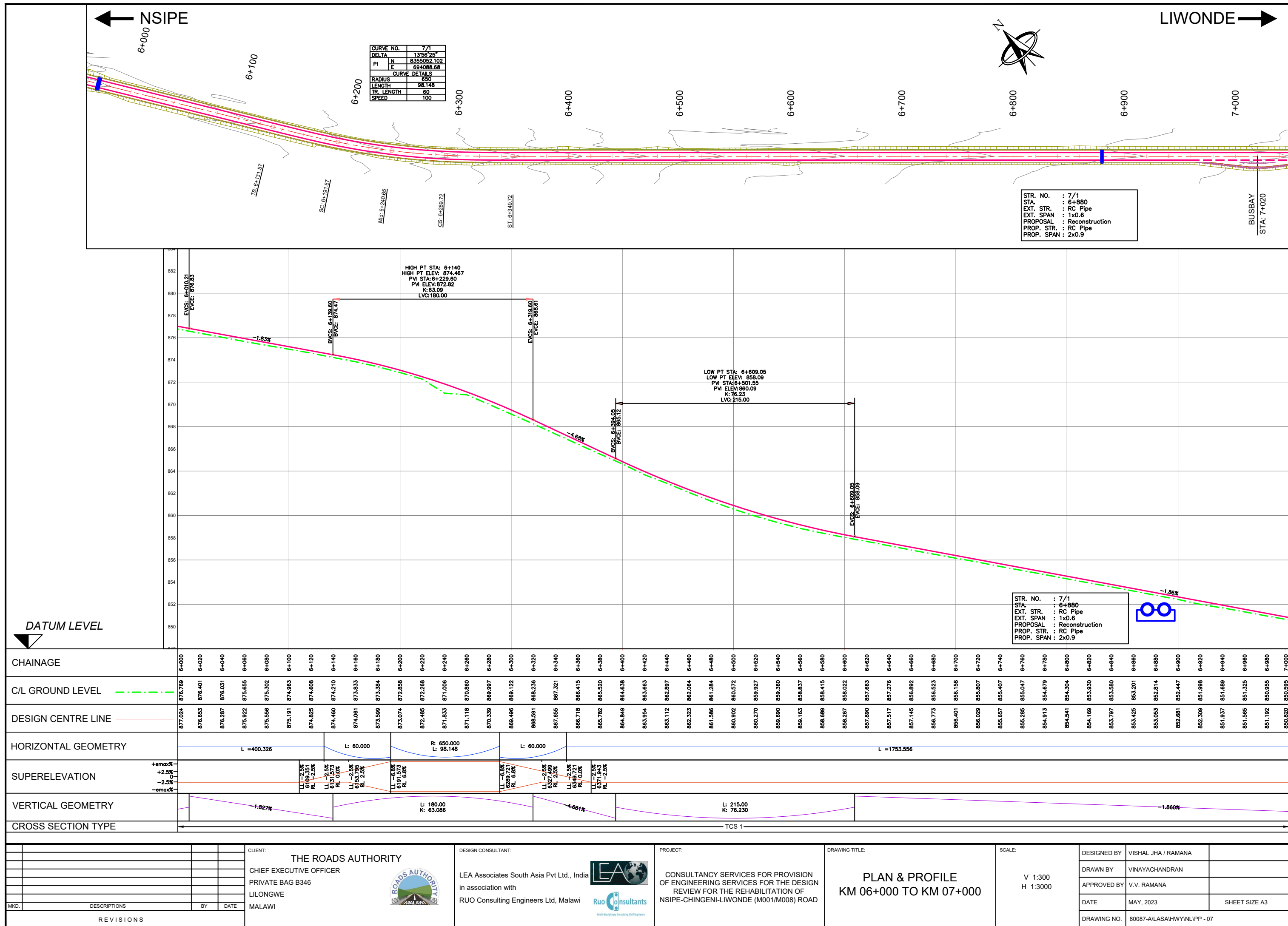


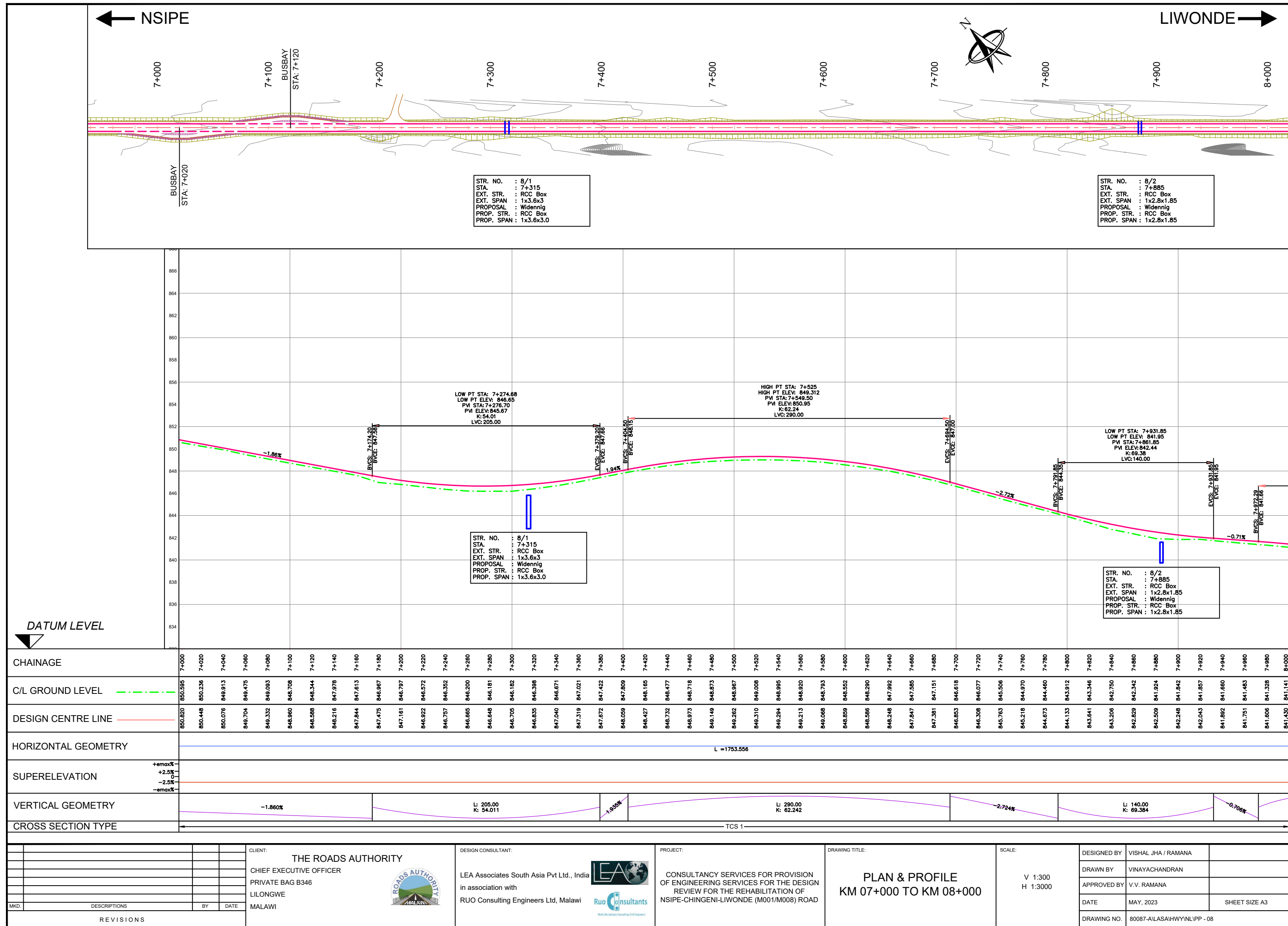


CHAINAGE																																																																																																																																																																																																																																																																																																																																																				
C/L GROUND LEVEL	901.662	901.335	900.945	900.606	900.292	899.971	899.664	899.318	898.966	898.614	898.239	897.875	897.560	897.254	896.976	896.690	896.390	896.083	895.852	895.576	895.255	894.968	894.674	894.341	893.996	893.631	893.247	892.822	892.356	891.850	891.304	890.729	890.124	889.490	888.826	888.133	887.411	886.661	885.885	885.084	884.258	883.407	882.531	881.630	880.704	879.753	878.777	877.776	876.751	875.702	874.629	873.533	872.415	871.276	870.117	868.938	867.739	866.511	865.255	863.972	862.662	861.326	859.964	858.576	857.162	855.723	854.259	852.771	851.259	849.724	848.166	846.585	844.982	843.357	841.710	840.042	838.354	836.646	834.918	833.171	831.405	829.619	827.814	825.990	824.148	822.288	820.409	818.512	816.598	814.667	812.719	810.754	808.774	806.779	804.769	802.744	800.695	798.622	796.526	794.407	792.265	790.100	787.912	785.701	783.468	781.213	778.936	776.647	774.346	772.033	769.708	767.371	765.022	762.661	760.288	757.903	755.507	753.100	750.682	748.253	745.813	743.362	740.900	738.428	735.945	733.452	730.949	728.436	725.913	723.380	720.837	718.284	715.721	713.148	710.565	707.972	705.369	702.756	700.133	697.500	694.857	692.204	689.541	686.868	684.185	681.492	678.790	676.078	673.356	670.624	667.882	665.130	662.368	659.596	656.814	654.022	651.220	648.408	645.586	642.754	639.912	637.060	634.198	631.326	628.444	625.552	622.650	619.738	616.816	613.884	610.942	607.990	605.028	602.056	599.074	596.082	593.080	590.068	587.046	584.014	580.972	577.920	574.858	571.786	568.704	565.612	562.510	559.398	556.276	553.144	550.002	546.850	543.688	540.516	537.334	534.142	530.940	527.728	524.506	521.274	518.032	514.780	511.518	508.246	504.964	501.672	498.370	495.058	491.736	488.404	485.062	481.710	478.348	474.976	471.594	468.202	464.800	461.388	457.966	454.534	451.092	447.640	444.178	440.706	437.224	433.732	430.230	426.718	423.196	419.664	416.122	412.570	409.008	405.436	401.854	398.262	394.660	391.048	387.426	383.794	380.152	376.500	372.838	369.166	365.484	361.792	358.090	354.378	350.656	346.924	343.182	339.430	335.668	331.896	328.114	324.322	320.520	316.708	312.886	309.054	305.212	301.360	297.498	293.626	289.744	285.852	281.950	278.038	274.116	270.184	266.242	262.290	258.328	254.356	250.374	246.382	242.380	238.368	234.346	230.314	226.272	222.220	218.158	214.086	210.004	205.912	201.810	197.698	193.576	189.444	185.302	181.150	176.988	172.816	168.634	164.442	160.240	156.028	151.806	147.574	143.332	139.080	134.818	130.546	126.264	121.972	117.670	113.358	109.036	104.704	100.362	96.010	91.648	87.276	82.894	78.502	74.100	69.688	65.266	60.834	56.392	51.940	47.478	43.006	38.524	34.032	29.530	25.018	20.506	15.984	11.452	6.910	2.368	-0.184	-5.732	-11.274	-16.816	-22.358	-27.900	-33.44

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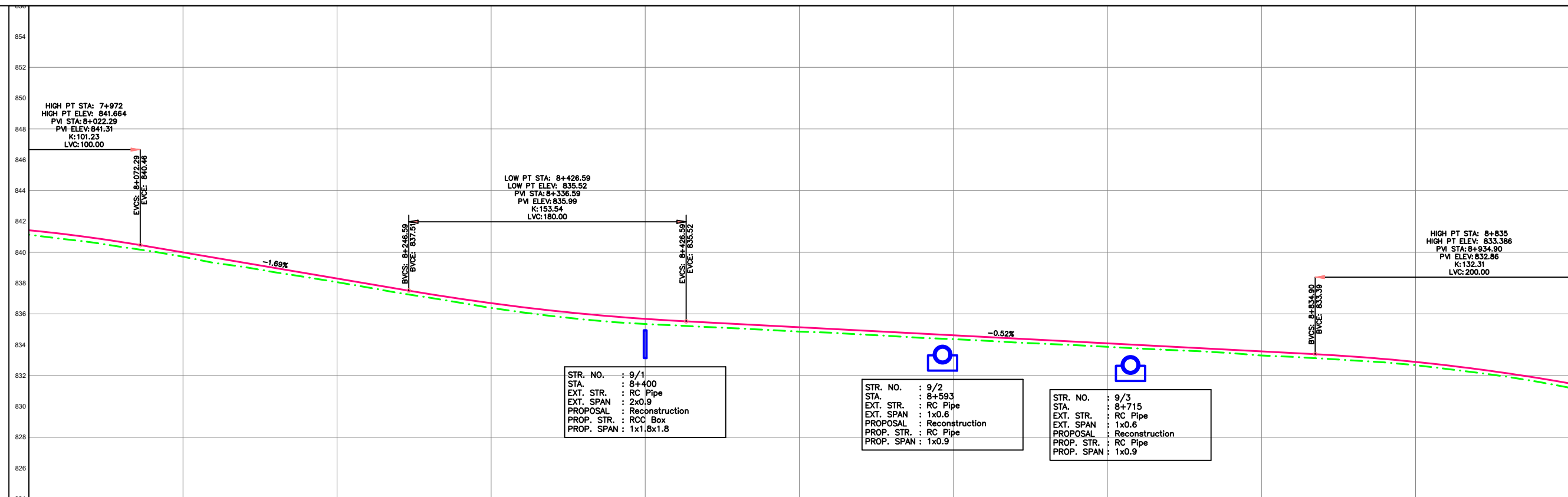
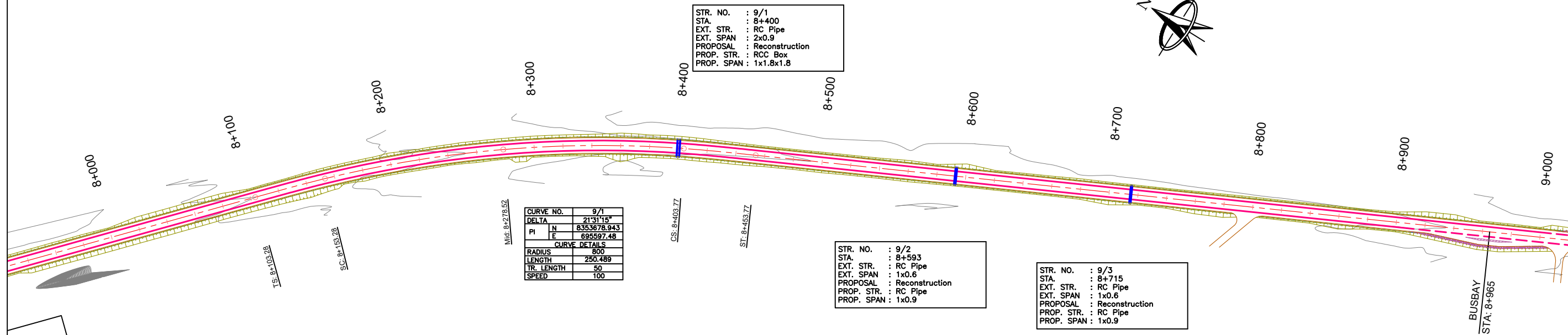










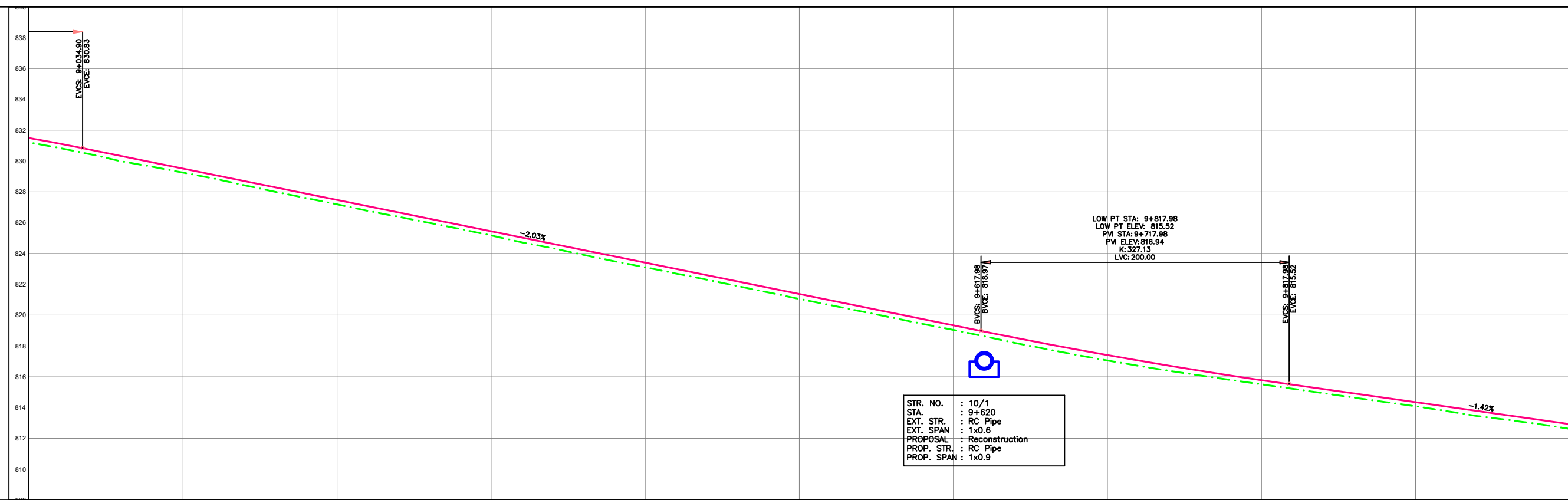
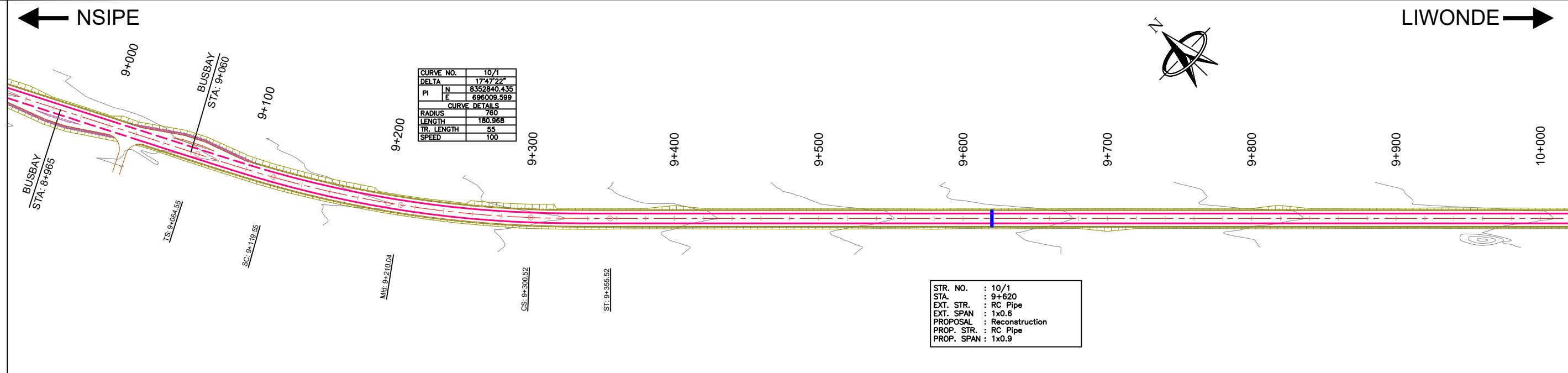
LIWONDE →



*DATUM LEVEL*

CHAINAGE	8+000	8+020	8+040	8+060	8+080	8+100	8+120	8+140	8+160	8+180	8+200	8+220	8+240	8+260	8+280	8+300	8+320	8+340	8+360	8+380	8+400	8+420	8+440	8+460	8+480	8+500	8+520	8+540	8+560	8+580	8+600	8+620	8+640	8+660	8+680	8+700	8+720	8+740	8+760	8+780	8+800	8+820	8+840	8+860	8+880	8+900	8+920	8+940	8+960	8+980	9+000																																																																																																																																																																					
C/L GROUND LEVEL	841.141	840.890	840.658	840.348	840.059	839.714	839.313	839.041	838.697	838.387	838.060	837.719	837.359	837.055	836.722	836.389	836.105	835.853	835.641	835.465	835.348	835.252	835.151	835.082	834.980	834.852	834.785	834.670	834.563	834.443	834.363	834.284	834.149	834.057	833.969	833.865	833.755	833.661	833.581	833.458	833.301	833.216	833.100	832.980	832.854	832.677	832.436	832.189	831.915	831.599	831.209	830.740																																																																																																																																																																				
DESIGN CENTRE LINE	841.430	841.214	840.999	840.664	840.333	839.994	839.655	839.317	838.978	838.639	838.300	837.961	837.622	837.289	836.981	836.699	836.443	836.212	836.008	835.830	835.678	835.552	835.446	835.342	835.238	835.133	835.029	834.925	834.820	834.716	834.611	834.507	834.403	834.298	834.194	834.090	833.985	833.881	833.777	833.672	833.568	833.463	833.358	833.251	833.142	833.033	829.924	829.815	829.706	829.597	829.488	829.379	829.270	829.161	829.052	828.943	828.834	828.725	828.616	828.507	828.398	828.289	828.180	828.071	827.962	827.853	827.744	827.635	827.526	827.417	827.308	827.199	827.090	826.981	826.872	826.763	826.654	826.545	826.436	826.327	826.218	826.109	825.999	825.890	825.781	825.672	825.563	825.454	825.345	825.236	825.127	825.018	824.909	824.800	824.691	824.582	824.473	824.364	824.255	824.146	824.037	823.928	823.819	823.710	823.601	823.492	823.383	823.274	823.165	823.056	822.947	822.838	822.729	822.620	822.511	822.402	822.293	822.184	822.075	821.966	821.857	821.748	821.639	821.530	821.421	821.312	821.203	821.094	820.985	820.876	820.767	820.658	820.549	820.440	820.331	820.222	820.113	820.004	819.895	819.786	819.677	819.568	819.459	819.350	819.241	819.132	819.023	818.914	818.805	818.696	818.587	818.478	818.369	818.260	818.151	818.042	817.933	817.824	817.715	817.606	817.497	817.388	817.279	817.170	817.061	816.952	816.843	816.734	816.625	816.516	816.407	816.298	816.189	816.080	815.971	815.862	815.753	815.644	815.535	815.426	815.317	815.208	815.099	814.990	814.881	814.772	814.663	814.554	814.445	814.336	814.227	814.118	814.009	813.900	813.791	813.682	813.573	813.464	813.355	813.246	813.137	813.028	812.919	812.810	812.701	812.592	812.483	812.374	812.265	812.156	812.047	811.938	811.829	811.720	811.611	

					CLIENT:	THE ROADS AUTHORITY		DESIGN CONSULTANT:		PROJECT:			DRAWING TITLE:			SCALE:			DESIGNED BY	VISHAL JHA / RAMANA									
						CHIEF EXECUTIVE OFFICER				LEA Associates South Asia Pvt Ltd., India  in association with  RUO Consulting Engineers Ltd, Malawi			CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		PLAN & PROFILE KM 08+000 TO KM 09+000		V 1:300 H 1:3000		DRAWN BY	VINAYACHANDRAN									
					LILONGWE	APPROVED BY	V.V. RAMANA																						
					MALAWI	DATE	MAY, 2023	SHEET SIZE A3																					
MKD.				DESCRIPTIONS	BY	DATE	DRAWING NO.												80087-A/LASAIHWYNLIPP - 09										
REVISIONS																													

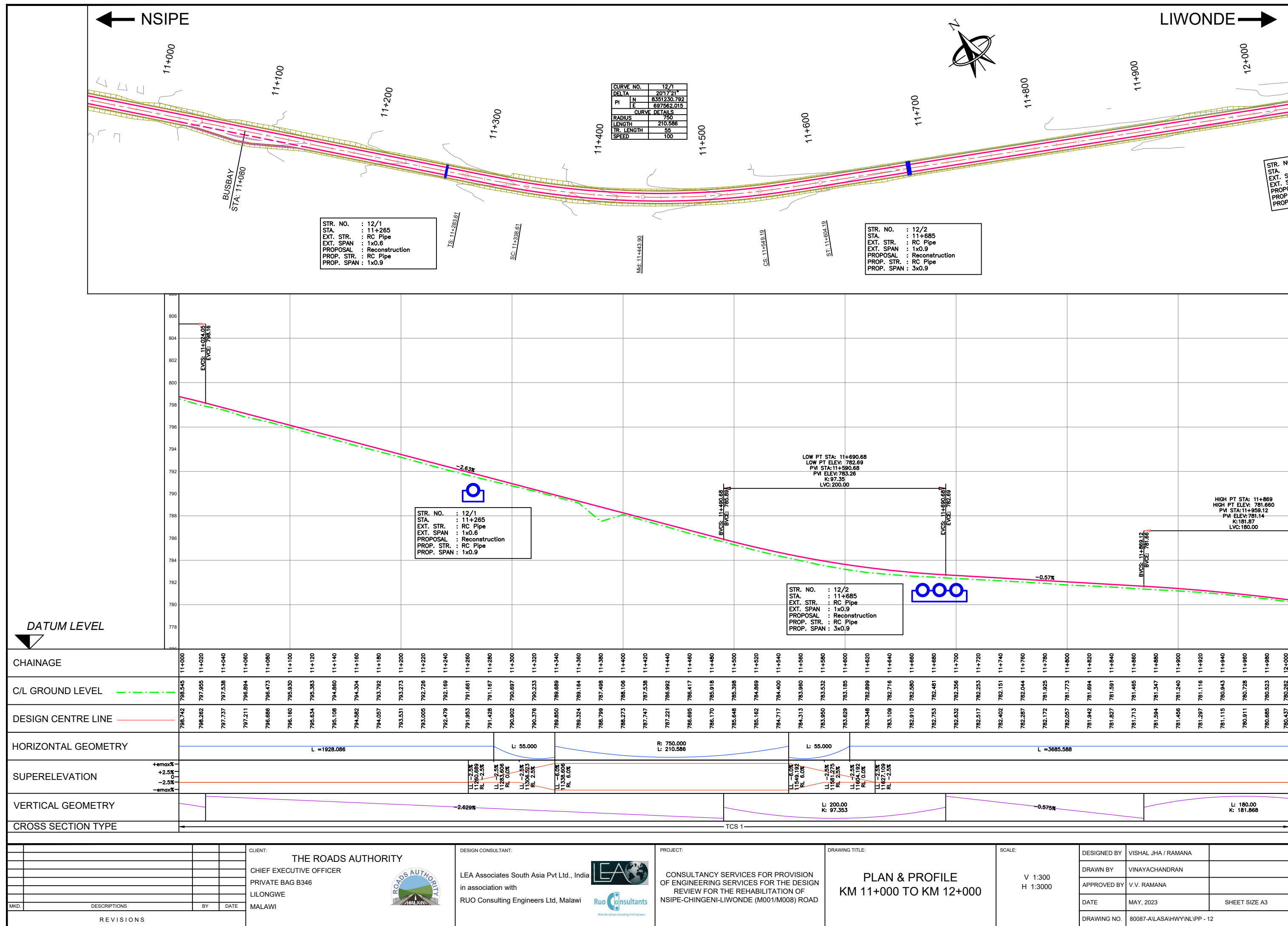


CHAINAGE										
C/L GROUND LEVEL										
DESIGN CENTRE LINE										
HORIZONTAL GEOMETRY										
SUPERELEVATION										
VERTICAL GEOMETRY										
CROSS SECTION TYPE										

					CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi <small>Ruo Consultants Multi-disciplinary Consulting Civil Engineers</small>	PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE: <b>PLAN &amp; PROFILE KM 09+000 TO KM 10+000</b>	SCALE: V 1:300 H 1:3000	DESIGNED BY VISHAL JHA / RAMANA	VISUAL JHA / RAMANA	
MKD.	DESCRIPTIONS	BY	DATE								APPROVED BY V.V. RAMANA	V.V. RAMANA	
REVISIONS											DATE MAY, 2023	MAY, 2023	SHEET SIZE A3
											DRAWING NO. 80087-A/LASAIHWYNLP - 10	80087-A/LASAIHWYNLP - 10	

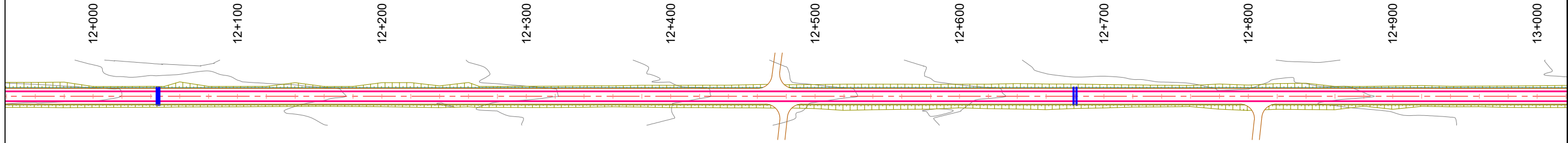






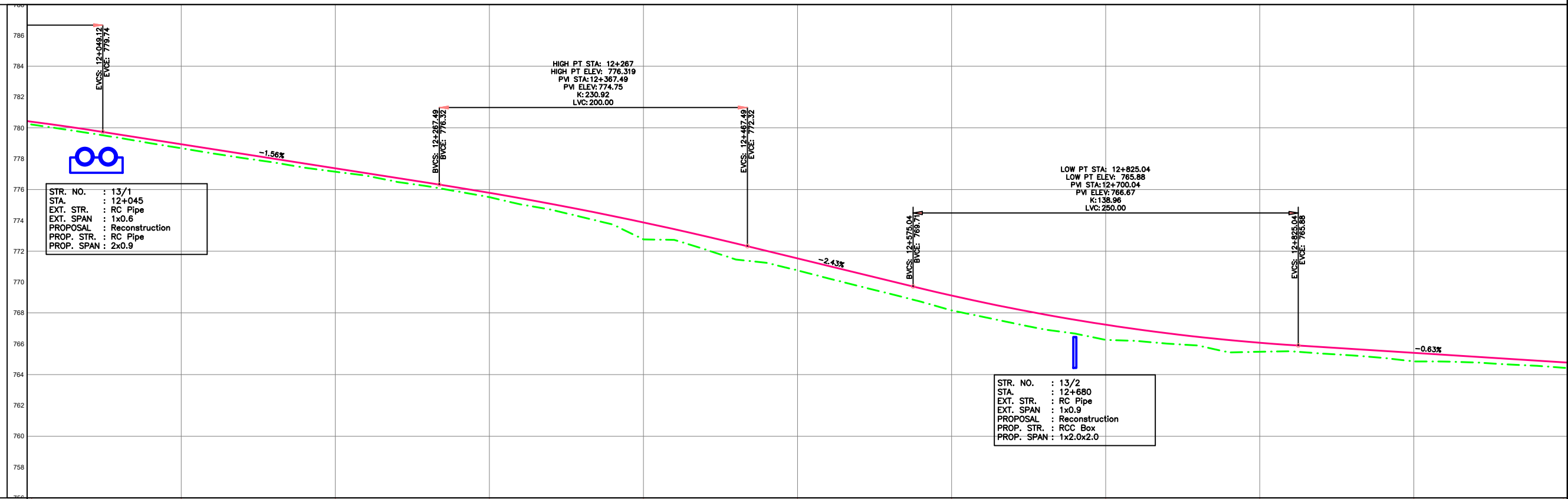
← NSIPE

LIWONDE →



STR. NO.	: 13/1
STA.	: 12+045
EXT. STR.	: RC Pipe
EXT. SPAN	: 1x0.6
PROPOSAL	: Reconstruction
PROP. STR.	: RC Pipe
PROP. SPAN	: 2x0.9

STR. NO. : 13/2  
STA. : 12+680  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.9  
PROPOSAL : Reconstruction  
PROP. STR. : RCC Box  
PROP. SPAN : 1x2.0x2.0



*DATUM LEVEL*

CHAINAGE	12+000	12+005	12+010	12+015	12+020	12+025	12+030	12+035	12+040	12+045	12+050	12+055	12+060	12+065	12+070	12+075	12+080	12+085	12+090	12+095	12+100	12+105	12+110	12+115	12+120	12+125	12+130	12+135	12+140	12+145	12+150	12+155	12+160	12+165	12+170	12+175	12+180	12+185	12+190	12+195	12+200	12+205	12+210	12+215	12+220	12+225	12+230	12+235	12+240	12+245	12+250	12+255	12+260	12+265	12+270	12+275	12+280	12+285	12+290	12+295	12+300	12+305	12+310	12+315	12+320	12+325	12+330	12+335	12+340	12+345	12+350	12+355	12+360	12+365	12+370	12+375	12+380	12+385	12+390	12+395	12+400	12+405	12+410	12+415	12+420	12+425	12+430	12+435	12+440	12+445	12+450	12+455	12+460	12+465	12+470	12+475	12+480	12+485	12+490	12+495	12+500	12+505	12+510	12+515	12+520	12+525	12+530	12+535	12+540	12+545	12+550	12+555	12+560	12+565	12+570	12+575	12+580	12+585	12+590	12+595	12+600	12+605	12+610	12+615	12+620	12+625	12+630	12+635	12+640	12+645	12+650	12+655	12+660	12+665	12+670	12+675	12+680	12+685	12+690	12+695	12+700	12+705	12+710	12+715	12+720	12+725	12+730	12+735	12+740	12+745	12+750	12+755	12+760	12+765	12+770	12+775	12+780	12+785	12+790	12+795	12+800	12+805	12+810	12+815	12+820	12+825	12+830	12+835	12+840	12+845	12+850	12+855	12+860	12+865	12+870	12+875	12+880	12+885	12+890	12+895	12+900	12+905	12+910	12+915	12+920	12+925	12+930	12+935	12+940	12+945	12+950	12+955	12+960	12+965	12+970	12+975	12+980	12+985	12+990	12+995	13+000
C/L GROUND LEVEL	780.382	780.387	779.867	779.862	779.857	779.852	779.847	779.842	779.837	779.832	779.827	779.822	779.817	779.812	779.807	779.802	779.797	779.792	779.787	779.782	779.777	779.772	779.767	779.762	779.757	779.752	779.747	779.742	779.737	779.732	779.727	779.722	779.717	779.712	779.707	779.702	779.697	779.692	779.687	779.682	779.677	779.672	779.667	779.662	779.657	779.652	779.647	779.642	779.637	779.632	779.627	779.622	779.617	779.612	779.607	779.602	779.597	779.592	779.587	779.582	779.577	779.572	779.567	779.562	779.557	779.552	779.547	779.542	779.537	779.532	779.527	779.522	779.517	779.512	779.507	779.502	779.497	779.492	779.487	779.482	779.477	779.472	779.467	779.462	779.457	779.452	779.447	779.442	779.437	779.432	779.427	779.422	779.417	779.412	779.407	779.402	779.397	779.392	779.387	779.382	779.377	779.372	779.367	779.362	779.357	779.352	779.347	779.342	779.337	779.332	779.327	779.322	779.317	779.312	779.307	779.302	779.297	779.292	779.287	779.282	779.277	779.272	779.267	779.262	779.257	779.252	779.247	779.242	779.237	779.232	779.227	779.222	779.217	779.212	779.207	779.202	779.197	779.192	779.187	779.182	779.177	779.172	779.167	779.162	779.157	779.152	779.147	779.142	779.137	779.132	779.127	779.122	779.117	779.112	779.																																														

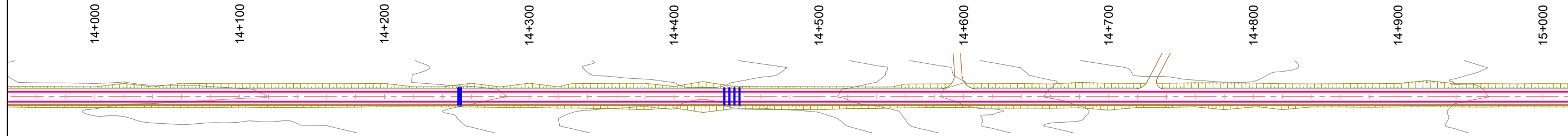
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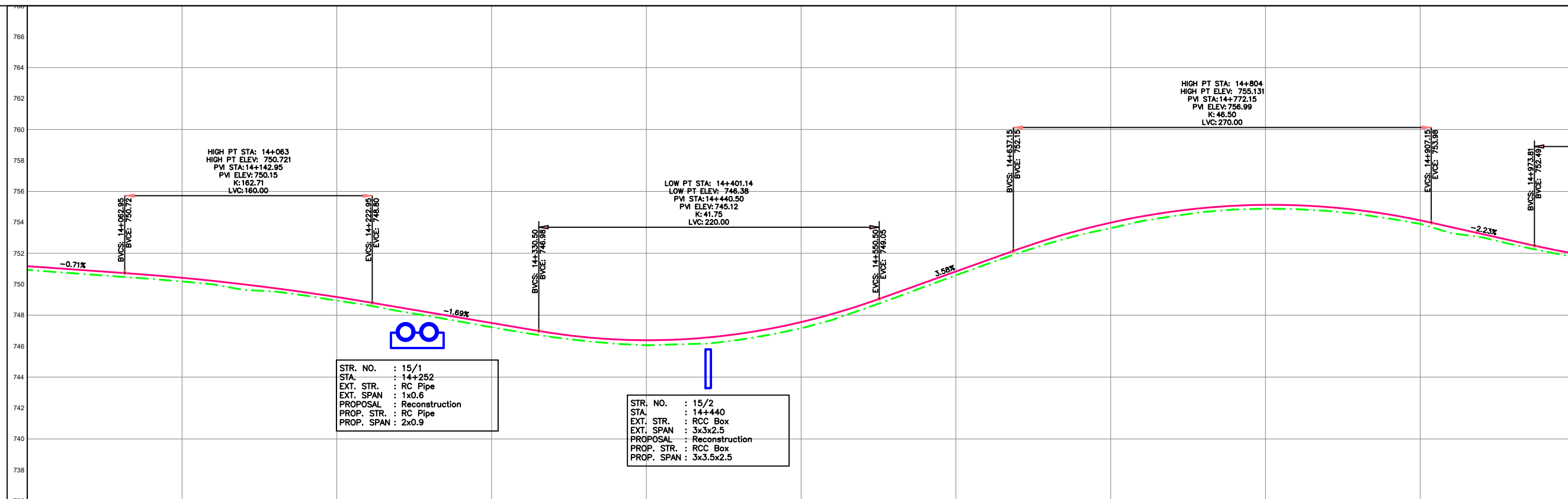
← NSIPE

LIWONDE →





STR. NO. : 15/1  
STA. : 14+252  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.6  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 2x0.9

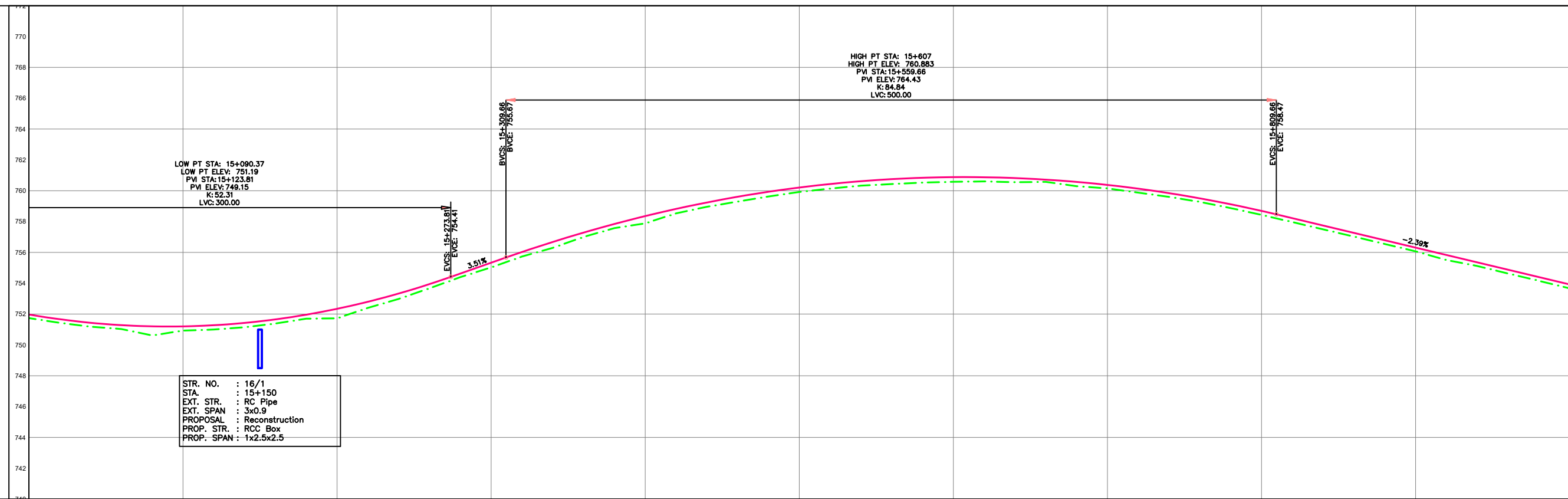
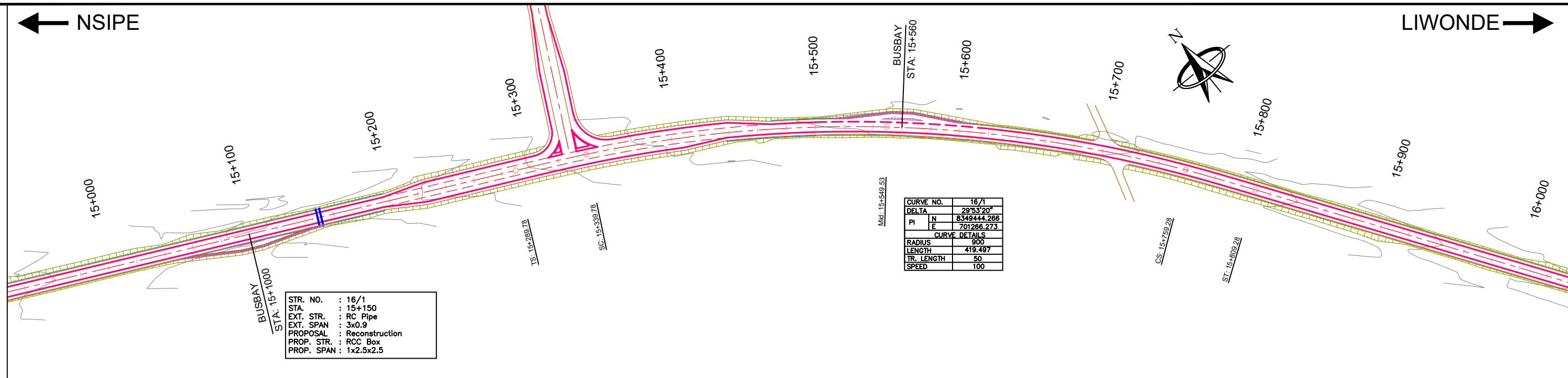
STR. NO. : 15/2  
STA. : 14+440  
EXT. STR. : RCC Box  
EXT. SPAN : 3x3x2.5  
PROPOSAL : Reconstruction  
PROP. STR. : RCC Box  
PROP. SPAN : 3x3.5x2.5



*DATUM LEVEL*

CHAINAGE		1+1000	1+1020	1+1040	1+1060	1+1080	1+1100	1+1120	1+1140	1+1160	1+1180	1+1200	1+1220	1+1240	1+1260	1+1280	1+1300	1+1320	1+1340	1+1360	1+1380	1+1400	1+1420	1+1440	1+1460	1+1480	1+1500	1+1520	1+1540	1+1560	1+1580	1+1600	1+1620	1+1640	1+1660	1+1680	1+1700	1+1720	1+1740	1+1760	1+1780	1+1800	1+1820	1+1840	1+1860	1+1880	1+1900	1+1920	1+1940	1+1960	1+1980
C/L GROUND LEVEL		750.927	750.777	750.634	750.489	750.344	750.182	749.989	749.631	749.533	749.285	748.940	748.646	748.263	747.931	747.582	747.221	746.874	746.576	746.335	746.153	746.053	746.116	746.163	746.405	746.737	747.151	747.690	748.392	749.101	749.847	750.579	751.298	752.008	752.640	753.199	753.623	754.080	754.398	754.689	754.829	754.882	754.854	754.735	754.538	754.244	753.903	753.300	753.027	752.555	752.127
DESIGN CENTRE LINE		751.167	751.025	750.883	750.742	750.591	750.416	750.216	749.992	749.743	749.470	749.172	748.850	748.512	748.173	747.835	747.496	747.158	746.820	746.585	746.438	746.383	746.425	746.563	746.798	747.127	747.553	748.075	748.692	749.394	750.110	750.826	751.541	752.256	752.916	753.491	753.979	754.381	754.697	754.928	755.072	755.130	755.102	754.988	754.789	754.503	754.131	753.691	753.245	752.799	752.357
HORIZONTAL GEOMETRY		L = 3685.588																																																	
SUPERELEVATION	<div><div>+emax%</div><div>+2.5%</div><div>G</div><div>-2.5%</div><div>-emax%</div></div>																																																		
VERTICAL GEOMETRY		<div><div><div>-0.709%</div><div>L: 160.00 K: 162.706</div><div>1.692%</div><div>L: 220.00 K: 41.745</div><div>3.578%</div><div>L: 270.00 K: 46.502</div><div>2.228%</div></div></div>																																																	
CROSS SECTION TYPE		TCS 1																																																	

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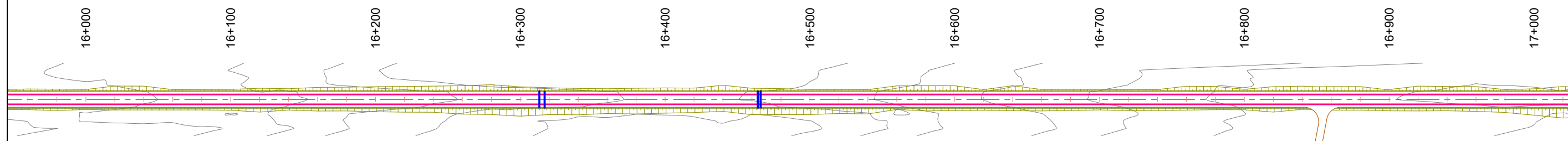


CHAINAGE	15+000	15+020	15+040	15+060	15+080	15+100	15+120	15+140	15+160	15+180	15+200	15+220	15+240	15+260	15+280	15+300	15+320	15+340	15+360	15+380	15+400	15+420	15+440	15+460	15+480	15+500	15+520	15+540	15+560	15+580	15+600	15+620	15+640	15+660	15+680	15+700	15+720	15+740	15+760	15+780	15+800	15+820	15+840	15+860	15+880	15+900	15+920	15+940	15+960	15+980	16+000																																																																																																																																																																																																																						
C/L GROUND LEVEL	751.741	751.430	751.182	751.031	750.613	750.928	750.997	751.143	751.386	751.701	751.724	752.401	752.982	753.670	754.363	755.027	755.728	756.296	757.003	757.573	757.884	758.531	758.957	759.296	759.930	759.625	759.919	760.138	760.328	760.433	760.525	760.578	760.603	760.553	760.572	760.294	760.149	759.876	759.600	759.275	758.874	758.431	757.967	757.494	757.023	756.545	756.068	755.503	755.120	754.631	754.156	753.924	753.666	753.392	753.194	752.924	752.666	752.401	752.136	751.871	751.606	751.341	751.076	750.811	750.546	750.281	750.016	749.751	749.486	749.221	748.956	748.691	748.426	748.161	747.896	747.631	747.366	747.101	746.836	746.571	746.306	746.041	745.776	745.511	745.246	744.981	744.716	744.451	744.186	743.921	743.656	743.391	743.126	742.861	742.596	742.331	742.066	741.801	741.536	741.271	741.006	740.741	740.476	740.211	740.946	740.681	740.416	740.151	740.886	740.621	740.356	740.091	739.826	739.561	739.296	739.031	738.766	738.501	738.236	737.971	737.706	737.441	737.176	736.911	736.646	736.381	736.116	735.851	735.586	735.321	735.056	734.791	734.526	734.261	734.000	733.735	733.470	733.205	732.940	732.675	732.410	732.145	731.880	731.615	731.350	731.085	730.820	730.555	730.290	730.025	729.760	729.495	729.230	728.965	728.700	728.435	728.170	727.905	727.640	727.375	727.110	726.845	726.580	726.315	726.050	725.785	725.520	725.255	724.990	724.725	724.460	724.195	723.930	723.665	723.400	723.135	722.870	722.605	722.340	722.075	721.810	721.545	721.280	721.015	720.750	720.485	720.220	720.955	720.690	720.425	720.160	719.895	719.630	719.365	719.100	718.835	718.570	718.305	718.040	717.775	717.510	717.245	716.980	716.715	716.450	716.185	715.920	715.655	715.390	715.125	714.860	714.595	714.330	714.065	713.800	713.535	713.270	713.005	712.740	712.475	712.210	711.945	711.680	711.415	711.150	710.885	710.620	710.355	710.090	709.825	709.560	709.295	709.030	708.765	708.500	708.235	707.970	707.705	707.440	707.175	706.910	706.645	706.380	706.115	705.850	705.585	705.320	705.055	704.790	704.525	704.260	704.000	703.735	703.470	703.205	702.940	702.675	702.410	702.145	701.880	701.615	701.350	701.085	700.820	700.55

				CLIENT:	<b>THE ROADS AUTHORITY</b>		DESIGN CONSULTANT:			PROJECT:			DRAWING TITLE:			SCALE:			DESIGNED BY	VISHAL JHA / RAMANA	
					CHIEF EXECUTIVE OFFICER											V 1:300			DRAWN BY	VINAYACHANDRAN	
					PRIVATE BAG B346											H 1:3000			APPROVED BY	V.V. RAMANA	
					LILONGWE														DATE	MAY, 2023	SHEET SIZE A3
					MALAWI														DRAWING NO.	80087-A/LASAIHWYNLIPP - 16	
MKD.				DESCRIPTIONS				BY		DATE		REVISIONS									

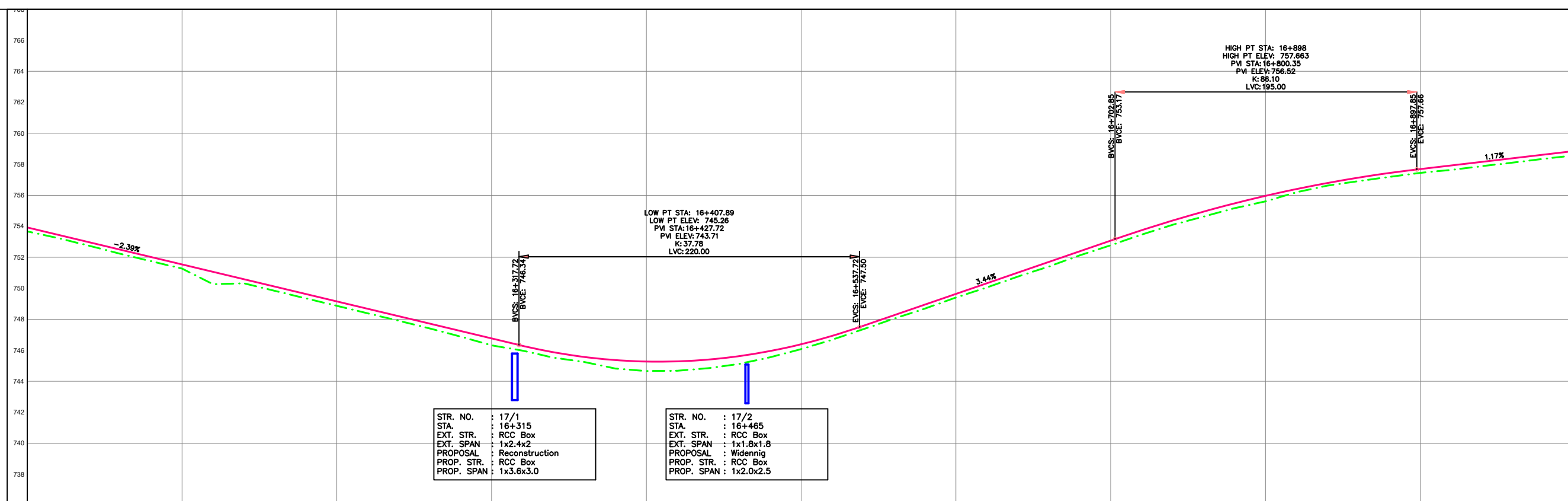
← NSIPE

LIWONDE →



STR. NO.	: 17/1
STA.	: 16+315
EXT. STR.	: RCC Box
EXT. SPAN	: 1x2.4x2
PROPOSAL	: Reconstruction
PROP. STR.	: RCC Box
PROP. SPAN	: 1x3.6x3.0

STR. NO.	: 17/2
STA.	: 16+465
EXT. STR.	: RCC Box
EXT. SPAN	: 1x1.8x1.8
PROPOSAL	: Widennig
PROP. STR.	: RCC Box
PROP. SPAN	: 1x2.0x2.5



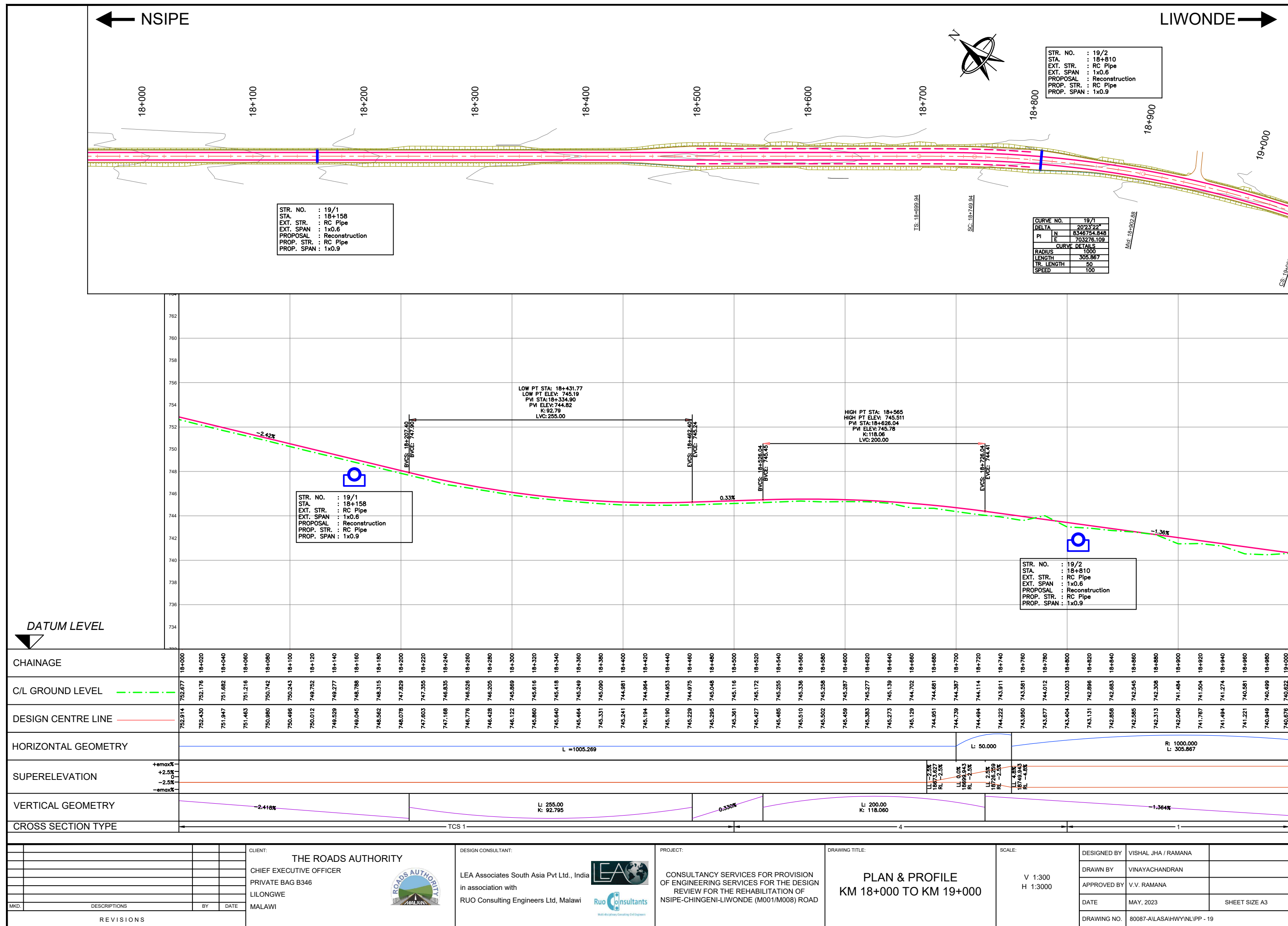
*DATUM LEVEL*

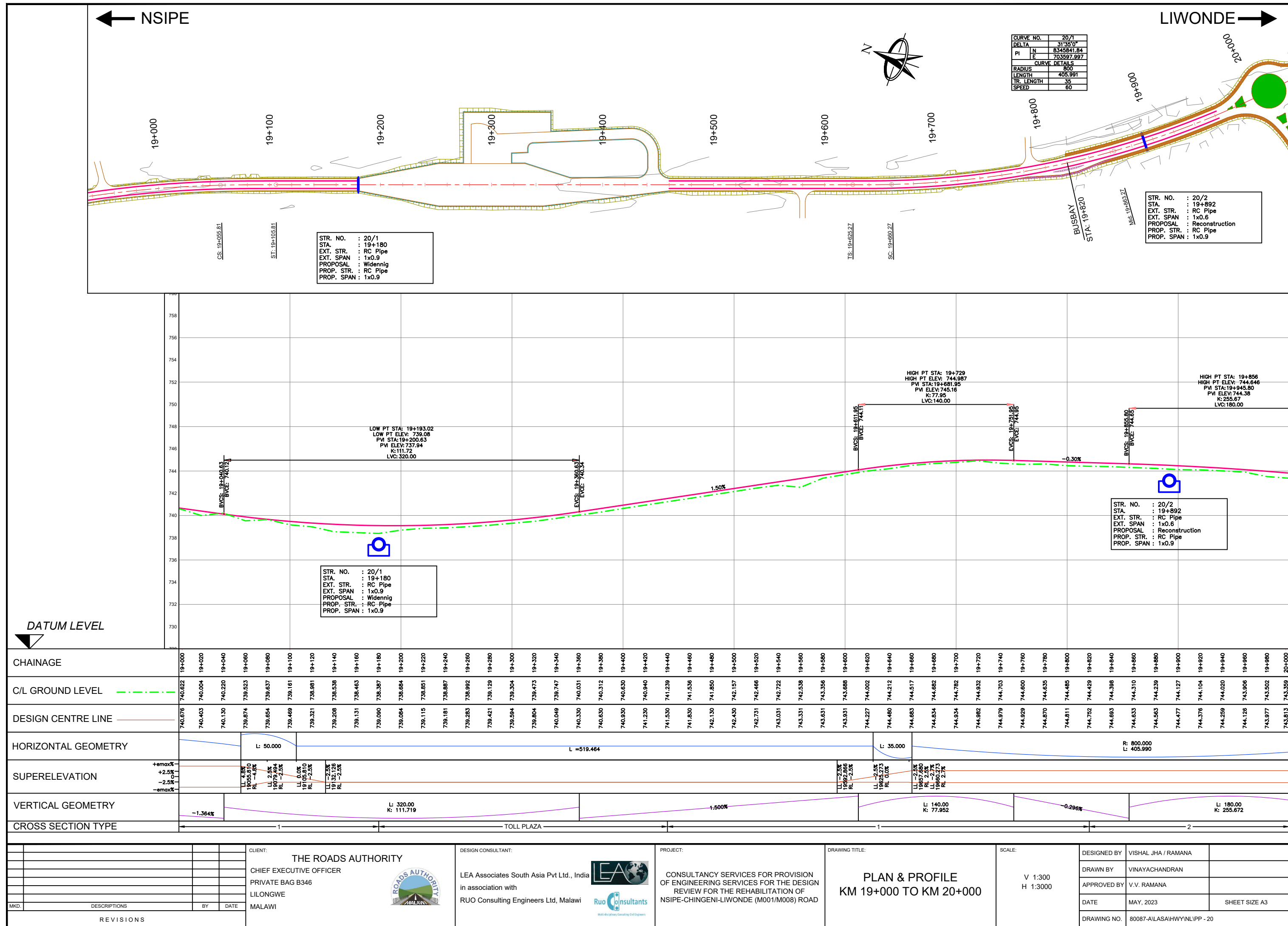
CHAINAGE	16+000	16+020	16+040	16+060	16+080	16+100	16+120	16+140	16+160	16+180	16+200	16+220	16+240	16+260	16+280	16+300	16+320	16+340	16+360	16+380	16+400	16+420	16+440	16+460	16+480	16+500	16+520	16+540	16+560	16+580	16+600	16+620	16+640	16+660	16+680	16+700	16+720	16+740	16+760	16+780	16+800	16+820	16+840	16+860	16+880	16+900	16+920	16+940	16+960	16+980
C/L GROUND LEVEL	753.666	753.235	752.743	752.228	751.745	751.269	750.263	750.317	749.833	749.347	748.868	748.392	747.902	747.410	746.882	746.316	745.978	745.523	745.242	744.820	744.660	744.679	744.841	745.119	745.548	746.075	746.678	747.352	748.040	748.688	749.404	750.051	750.753	751.401	752.120	752.771	753.462	754.095	754.624	755.186	755.604	756.195	756.620	756.909	757.186	757.445	757.637	757.879	758.107	758.356
DESIGN CENTRE LINE	753.924	753.448	752.969	752.491	752.014	751.537	751.059	750.582	750.105	749.627	749.150	748.673	748.195	747.718	747.241	746.763	746.287	745.874	745.568	745.367	745.272	745.284	745.401	745.624	745.952	746.387	746.928	747.573	748.261	748.948	749.635	750.323	751.010	751.697	752.385	753.072	753.742	754.366	754.944	755.475	755.960	756.399	756.791	757.136	757.435	757.688	757.922	758.157	758.391	758.626
HORIZONTAL GEOMETRY	L =1334.022																																																	
SUPERELEVATION	+emax%	+2.5%	0	-2.5%	-emax%																																													
VERTICAL GEOMETRY	-2.387%																L: 220.00 K: 37.779										3.437%										L: 195.00 K: 86.101										1.172%			
CROSS SECTION TYPE	TCS 1																																																	

[illegible]





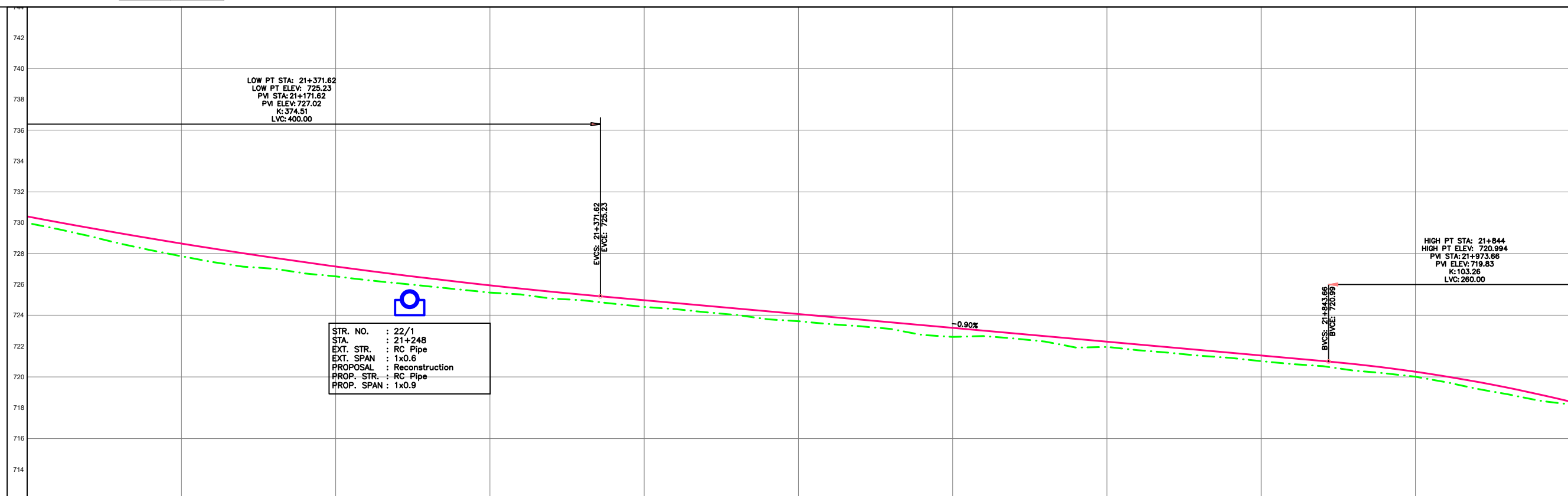
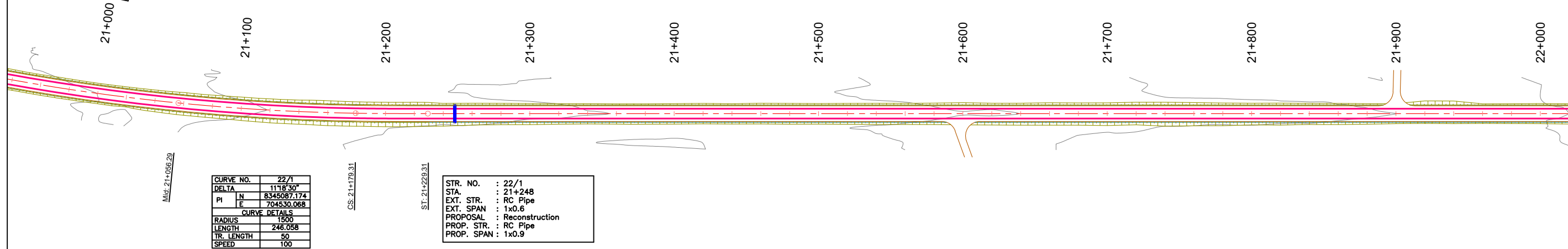








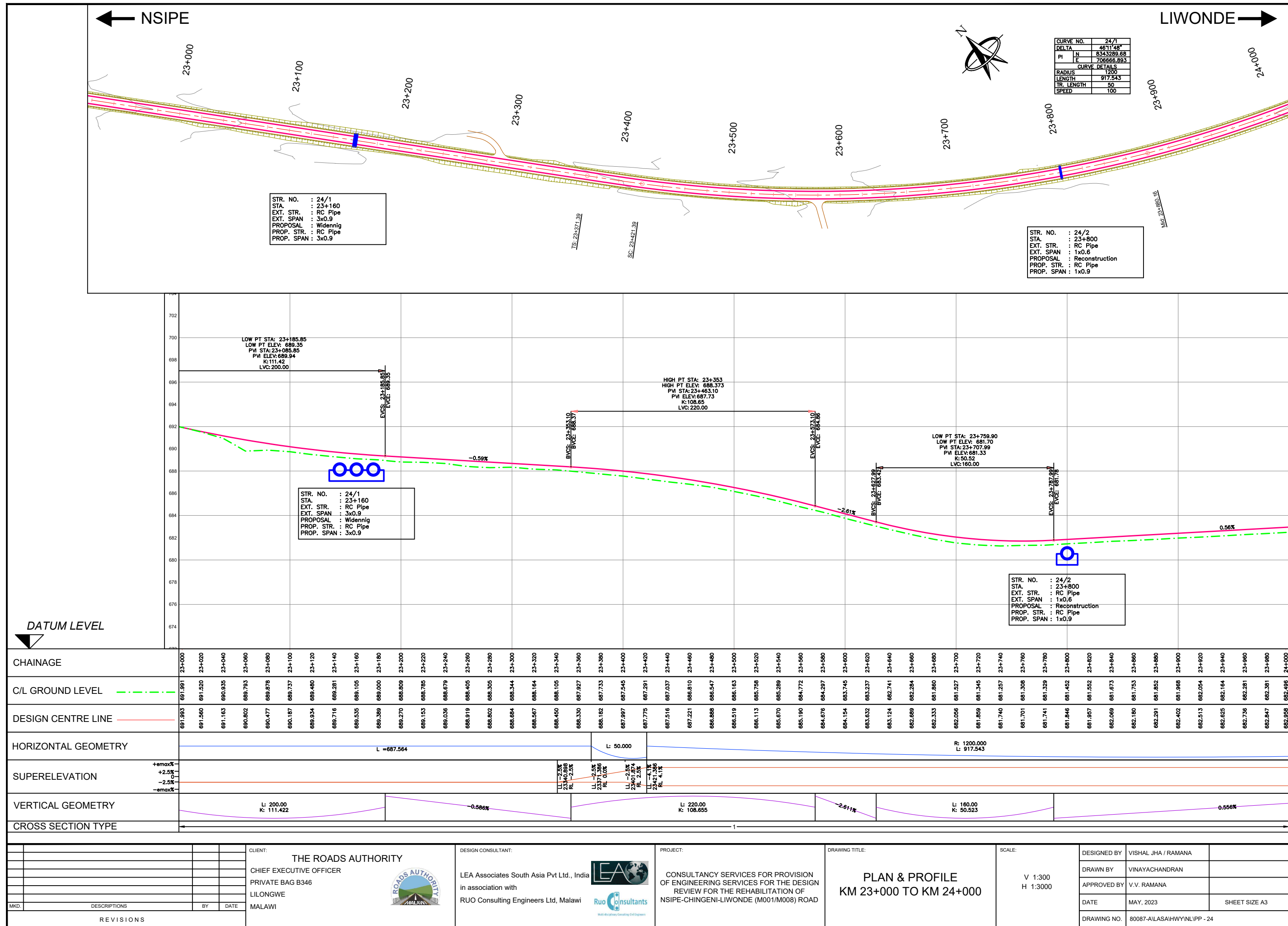
NO. : 21/1  
STR. : 20+910  
SPAN : RC Pipe  
OSAL : 1x0.6  
STR. : Reconstruction  
SPAN : RC Pipe  
SPAN : 1x0.9



	Station
CHAINAGE	21+000 21+020 21+040 21+060 21+080 21+100 21+120 21+140 21+160 21+180 21+200 21+220 21+240 21+260 21+280 21+300 21+320 21+340 21+360 21+380 21+400 21+420 21+440 21+460 21+480 21+500 21+520 21+540 21+560 21+580 21+600 21+620 21+640 21+660 21+680 21+700 21+720 21+740 21+760 21+780 21+800 21+820 21+840 21+860 21+880 21+900 21+920 21+940 21+960 21+980 22+000
C/L GROUND LEVEL	728.988 728.583 728.140 728.650 728.220 727.826 727.453 727.150 727.015 726.712 726.516 726.280 726.075 725.876 725.671 725.468 725.347 725.082 724.970 724.747 724.537 724.398 724.192 724.015 723.737 723.611 723.428 723.284 723.109 722.725 722.592 722.648 722.489 722.289 721.902 721.944 721.730 721.570 721.372 721.234 721.020 720.832 720.696 720.411 720.238 720.010 719.654 719.225 718.870 718.462 718.217 717.980
DESIGN CENTRE LINE	730.405 730.033 729.671 729.320 728.979 728.650 728.330 728.022 727.724 727.437 727.161 726.895 726.640 726.396 726.162 725.939 725.727 725.525 725.334 725.153 724.974 724.794 724.615 724.435 724.256 724.077 723.897 723.718 723.538 723.359 723.180 723.000 722.821 722.641 722.462 722.283 722.103 721.924 721.744 721.565 721.386 721.206 721.027 720.834 720.604 720.335 720.027 719.654 719.225 718.880 718.571 718.288 718.020
HORIZONTAL GEOMETRY	R: 1500.000 L: 246.058 L: 50.000 L = 1038.679
SUPERELEVATION	+emax +2.5% -2.5% -emax LL -3.4% RL 3.4% LL -2.5% RL 2.5% LL -2.5% RL 2.5% LL -2.5% RL 2.5%
VERTICAL GEOMETRY	L: 400.00 K: 374.512 -0.897% L: 260.00 K: 103.260
CROSS SECTION TYPE	

[illegible]

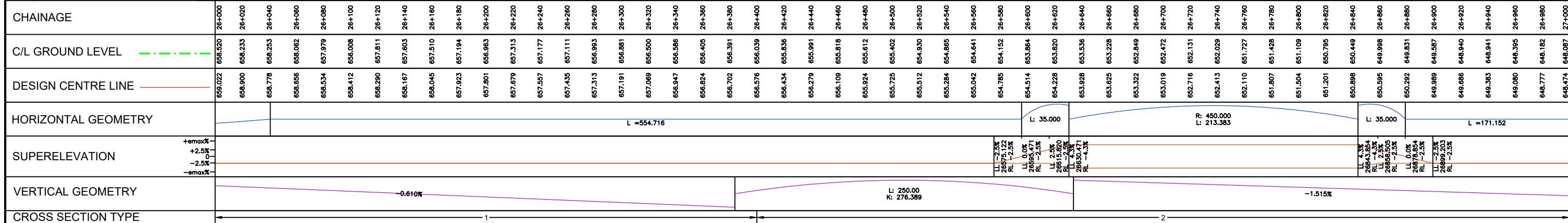
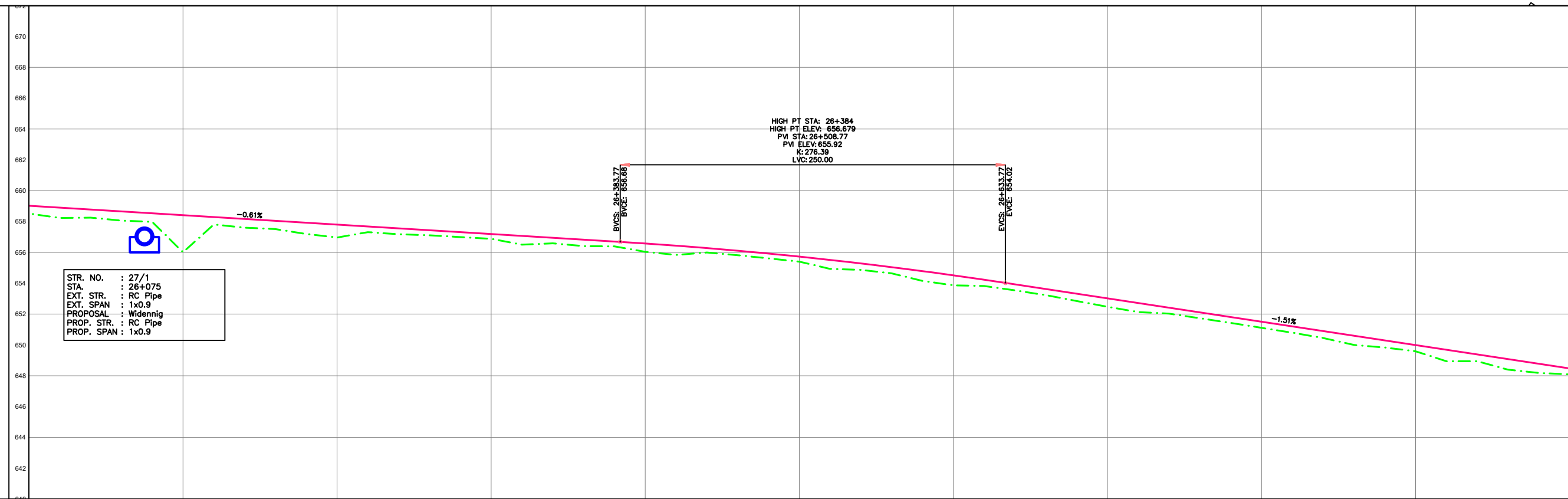
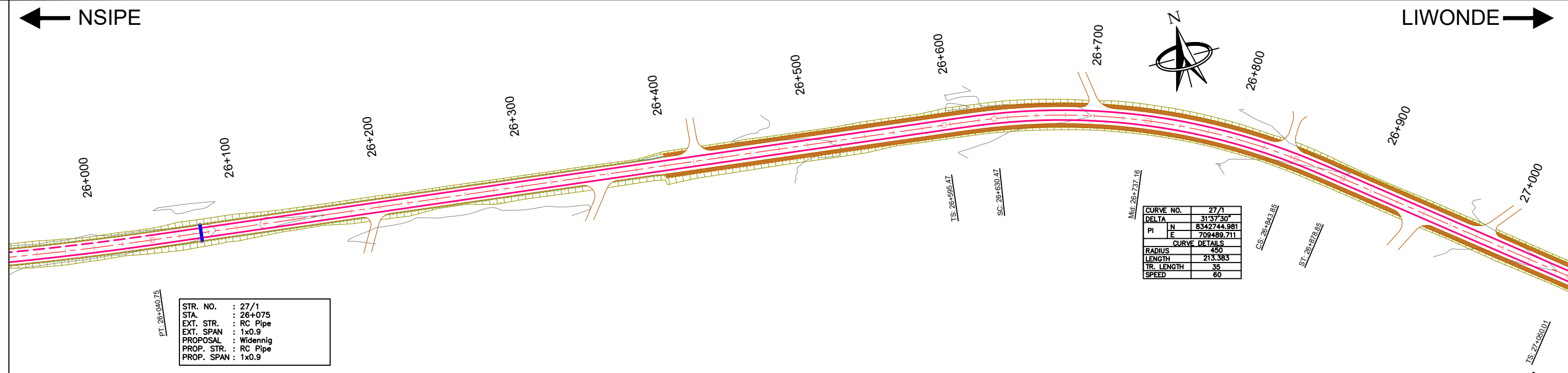










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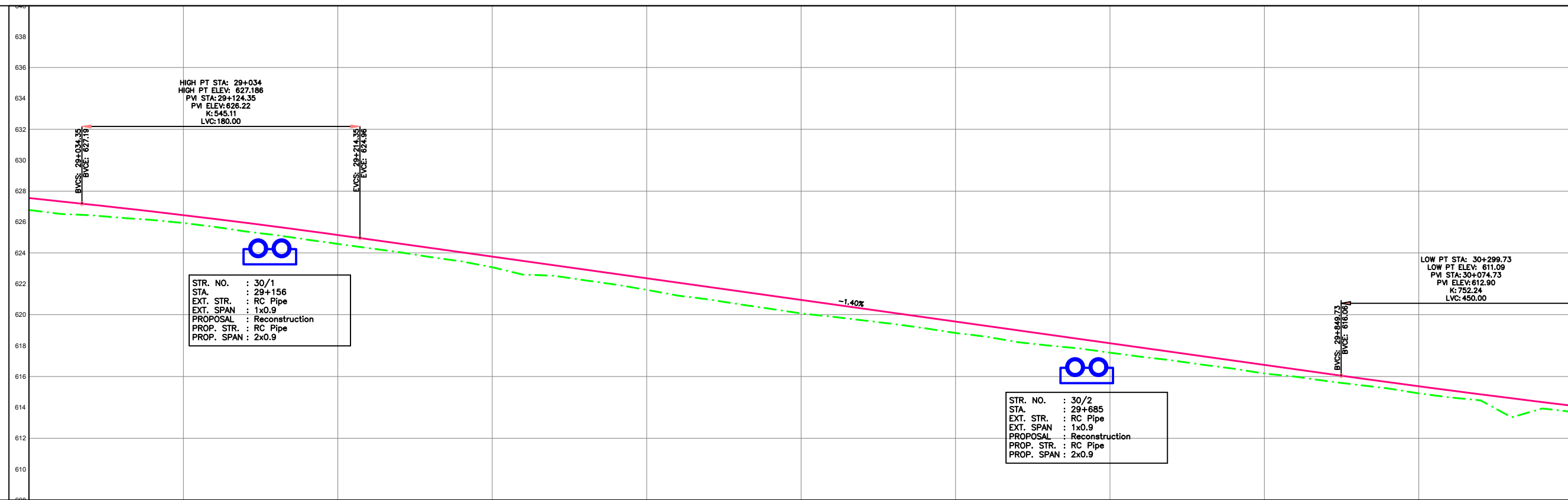
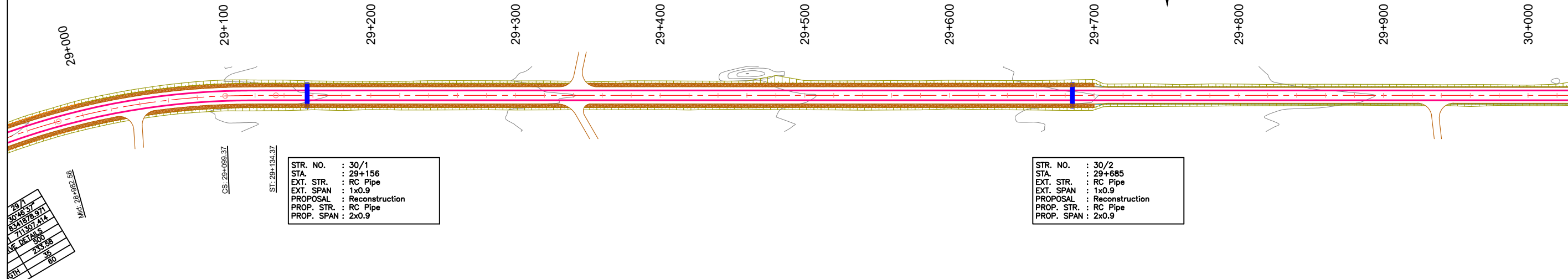




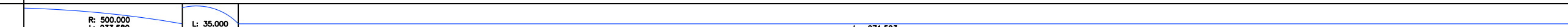


← NSIPE

LIWONDE →



*DATUM LEVEL*

CHAINAGE	28+000	28+020	28+040	28+060	28+080	28+100	28+120	28+140	28+160	28+180	28+200	28+220	28+240	28+260	28+280	28+300	28+320	28+340	28+360	28+380	28+400	28+420	28+440	28+460	28+480	28+500	28+520	28+540	28+560	28+580	28+600	28+620	28+640	28+660	28+680	28+700	28+720	28+740	28+760	28+780	28+800	28+820	28+840	28+860	28+880	28+900	28+920	28+940	28+960	28+980	29+000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
C/L GROUND LEVEL	626.777	626.527	626.434	626.269	626.130	625.933	625.690	625.391	625.148	624.860	624.584	624.305	624.043	623.731	623.453	623.071	622.591	622.524	622.227	621.950	621.610	621.240	620.990	620.673	620.394	620.084	619.874	619.636	619.397	619.126	618.816	618.578	618.228	618.005	617.619	617.543	617.280	617.044	616.764	616.508	616.192	615.992	615.708	615.462	615.229	614.906	614.648	614.456	614.357	614.328	614.120																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
DESIGN CENTRE LINE	627.554	627.340	627.125	626.905	626.678	626.443	626.201	625.952	625.695	625.431	625.160	624.881	624.601	624.321	624.041	623.760	623.480	623.200	622.919	622.639	622.359	622.078	621.798	621.518	621.238	620.957	620.677	620.397	620.116	619.836	619.556	619.275	618.995	618.715	618.435	618.154	617.874	617.594	617.313	617.033	616.753	616.472	616.192	615.913	615.638	615.368	615.104	614.845	614.591	614.343	614.120																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
HORIZONTAL GEOMETRY																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												

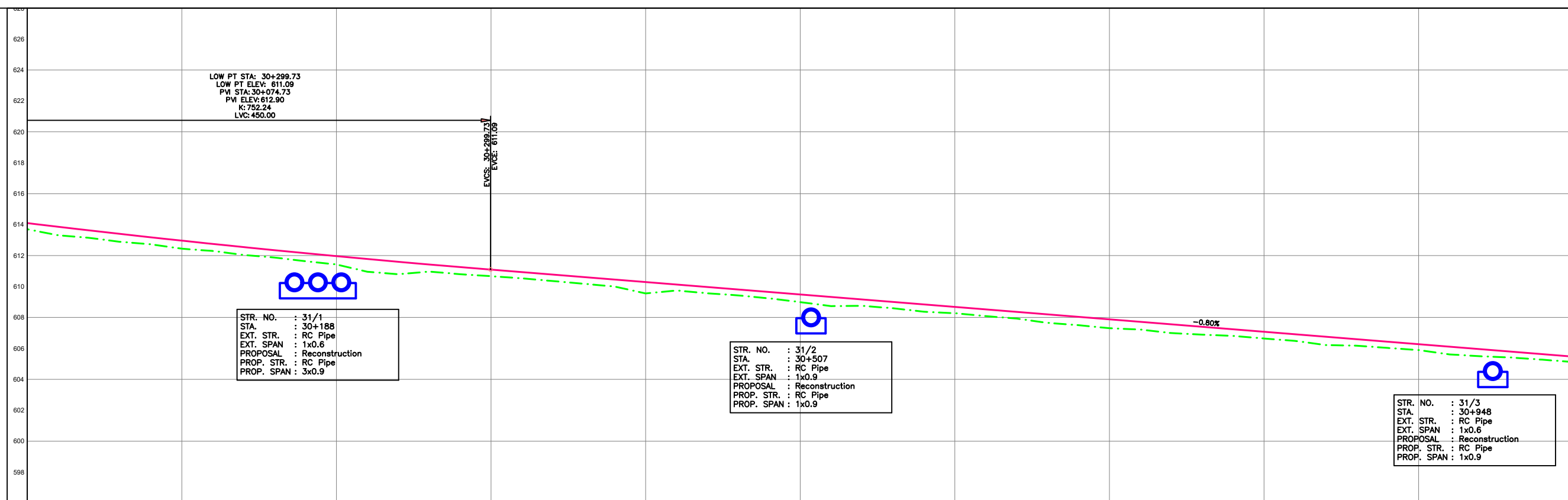
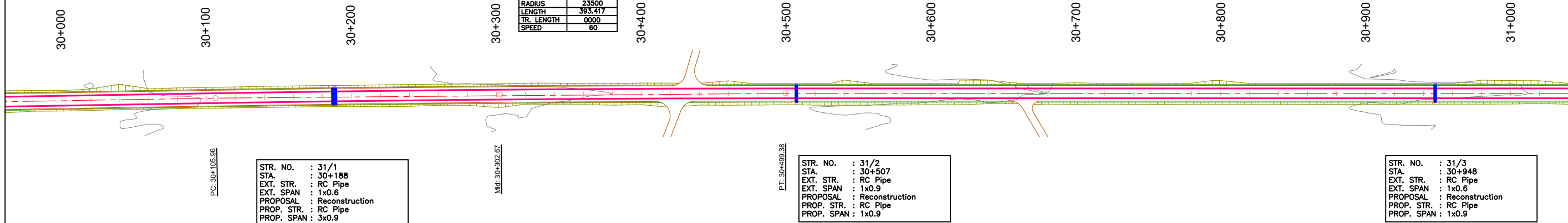
[illegible]

← NSIPE

LIWONDE →



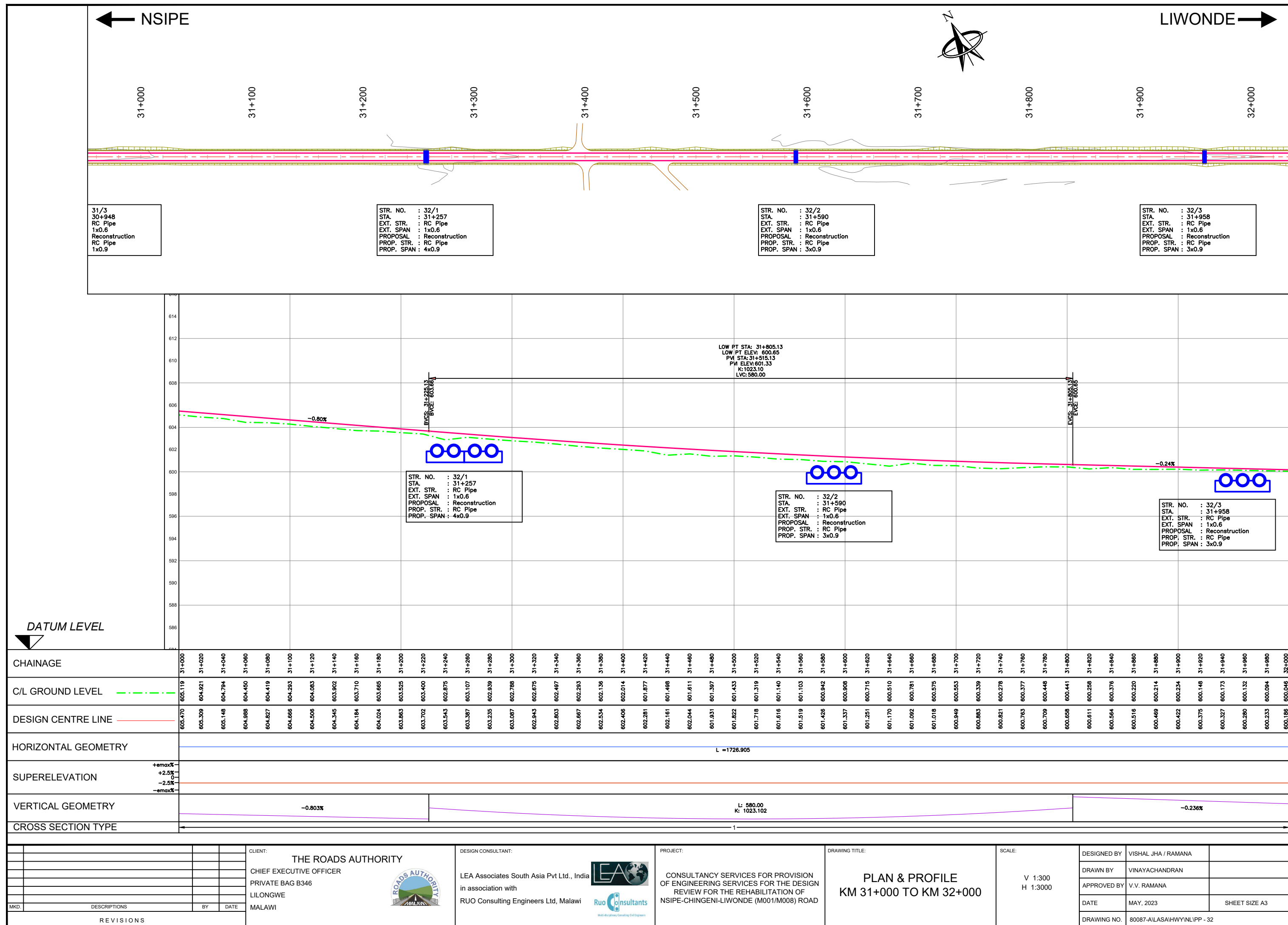
CURVE NO.		31/1
DELTA		0°57'33"
PI	N	8341285.592
	E	712490.384
CURVE DETAILS		
RADIUS		23500
LENGTH		393.417
TR. LENGTH		0000
SPEED		60



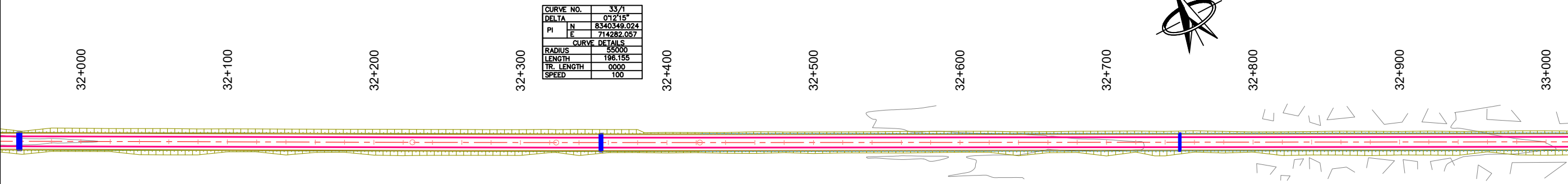
*DATUM LEVEL*

CHAINAGE		30+000	30+020	30+040	30+060	30+080	30+100	30+120	30+140	30+160	30+180	30+200	30+220	30+240	30+260	30+280	30+300	30+320	30+340	30+360	30+380	30+400	30+420	30+440	30+460	30+480	30+500	30+520	30+540	30+560	30+580	30+600	30+620	30+640	30+660	30+680	30+700	30+720	30+740	30+760	30+780	30+800	30+820	30+840	30+860	30+880	30+900	30+920	30+940	30+960	30+980	30+1000			
C/L GROUND LEVEL		613.702	613.312	613.147	612.889	612.725	612.444	612.288	612.038	611.871	611.634	611.426	610.954	610.792	610.866	610.796	610.667	610.527	610.353	610.177	609.997	609.852	609.552	609.742	609.562	609.425	609.231	609.991	609.733	609.751	609.594	608.594	608.371	608.273	608.086	607.926	607.649	607.500	607.303	607.216	607.119	606.990	606.887	606.807	606.639	606.483	606.215	606.174	606.028	605.891	605.611	605.492	605.408	605.269	605.112
DESIGN CENTRE LINE		614.100	613.862	613.630	613.403	613.181	612.965	612.753	612.548	612.347	612.152	611.962	611.778	611.598	611.425	611.256	611.093	610.932	610.771	610.611	610.450	610.288	610.129	609.968	609.808	609.647	609.486	609.326	609.165	609.004	608.844	608.683	608.522	608.362	608.201	608.040	607.880	607.719	607.558	607.398	607.237	607.076	606.916	606.755	606.594	606.434	606.273	606.112	605.952	605.791	605.630	605.470			
HORIZONTAL GEOMETRY																																																							
SUPERELEVATION																																																							
VERTICAL GEOMETRY																																																							
CROSS SECTION TYPE																																																							

				CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	PROJECT:	DRAWING TITLE:	SCALE:	DESIGNED BY	VISHAL JHA / RAMANA	
					CHIEF EXECUTIVE OFFICER					DRAWN BY	VINAYACHANDRAN	
					PRIVATE BAG B346	LEA Associates South Asia Pvt Ltd., India	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	PLAN & PROFILE	V 1:300	APPROVED BY	V.V. RAMANA	
					LILONGWE	in association with		KM 30+000 TO KM 31+000	H 1:3000	DATE	MAY, 2023	SHEET SIZE A3
MKD.	DESCRIPTIONS	BY	DATE		MALAWI	RUO Consulting Engineers Ltd, Malawi				DRAWING NO.	80087-AILASA\HWY\NL\IPP - 31	
REVISIONS												







2/3  
1+958  
C Pipe  
x0.6  
econstruction  
C Pipe  
x0.9

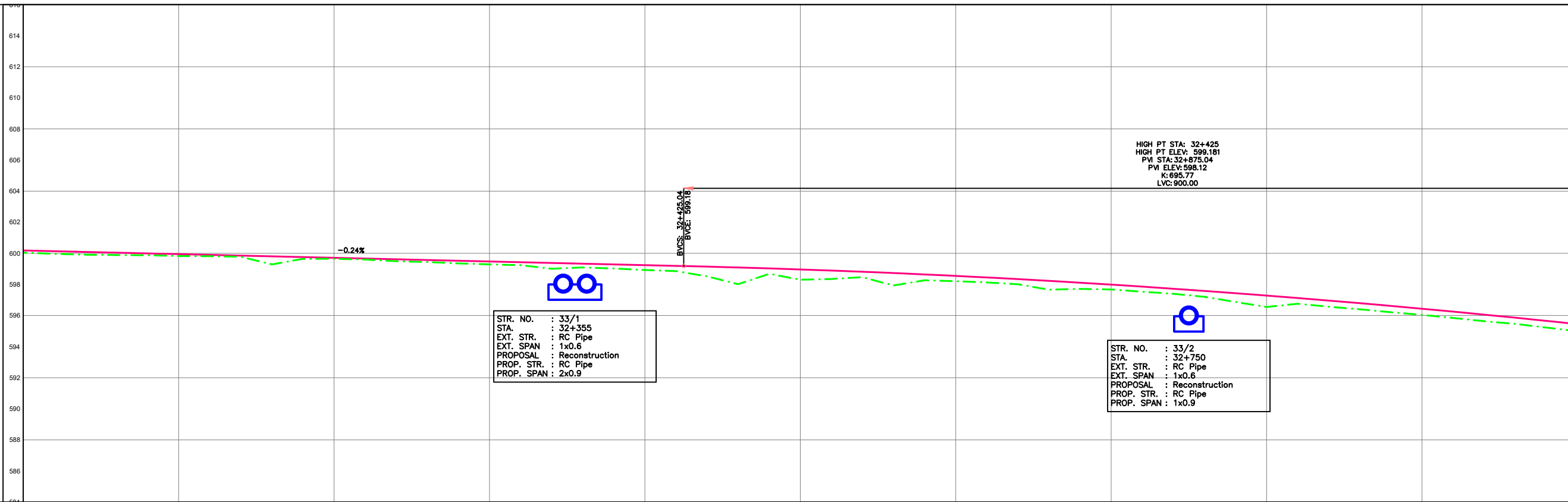
PC: 32+226.20

Mid: 32+324.36

PT: 32+422.44

STR. NO. : 33/1  
STA. : 32+355  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.6  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 2x0.9

STR. NO. : 33/2  
STA. : 32+750  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.6  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 1x0.9



STR. NO. : 33/1  
STA. : 32+355  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.6  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 2x0.9

STR. NO. : 33/2  
STA. : 32+750  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.6  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 1x0.9

DATUM LEVEL

CHAINAGE	32+000	32+020	32+040	32+060	32+080	32+100	32+120	32+140	32+160	32+180	32+200	32+220	32+240	32+260	32+280	32+300	32+320	32+340	32+360	32+380	32+400	32+420	32+440	32+460	32+480	32+500	32+520	32+540	32+560	32+580	32+600	32+620	32+640	32+660	32+680	32+700	32+720	32+740	32+760	32+780	32+800	32+820	32+840	32+860	32+880	32+900	32+920	32+940	32+960	32+980	
C/L GROUND LEVEL	600.046	599.967	599.911	599.890	599.877	599.823	599.814	599.779	599.286	599.645	599.649	599.601	599.483	599.440	599.351	599.289	599.240	599.011	599.093	599.027	598.929	598.854	598.521	598.015	598.680	598.302	598.350	598.464	597.930	598.266	598.205	598.128	598.011	597.658	597.713	597.673	597.533	597.396	597.204	596.872	596.550	596.757	596.566	596.400	596.211	596.042	595.843	595.632	595.463	595.226	
DESIGN CENTRE LINE	600.186	600.138	600.091	600.044	599.996	599.949	599.902	599.855	599.807	599.760	599.713	599.665	599.618	599.571	599.524	599.476	599.429	599.382	599.335	599.287	599.240	599.193	599.144	599.089	599.029	598.963	598.891	598.814	598.731	598.642	598.547	598.447	598.341	598.229	598.111	597.987	597.858	597.723	597.583	597.436	597.284	597.126	596.962	596.793	596.618	596.437	596.250	596.058	595.860	595.656	
HORIZONTAL GEOMETRY	L =1726.905												R: 55000.000 L: 196.154										L =1673.920																												
SUPERELEVATION	+emax% +2.5% 0 -2.5% -emax%																																																		
VERTICAL GEOMETRY	-0.236%																							L: 900.00 K: 695.765																											
CROSS SECTION TYPE	1																																																		

MKD	DESCRIPTIONS	BY	DATE
REVISIONS			

CLIENT:  
**THE ROADS AUTHORITY**  
CHIEF EXECUTIVE OFFICER  
PRIVATE BAG B346  
LILONGWE  
MALAWI

DESIGN CONSULTANT:  
LEA Associates South Asia Pvt Ltd., India  
in association with  
RUO Consulting Engineers Ltd, Malawi

PROJECT:  
CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD

DRAWING TITLE:  
**PLAN & PROFILE  
KM 32+000 TO KM 33+000**

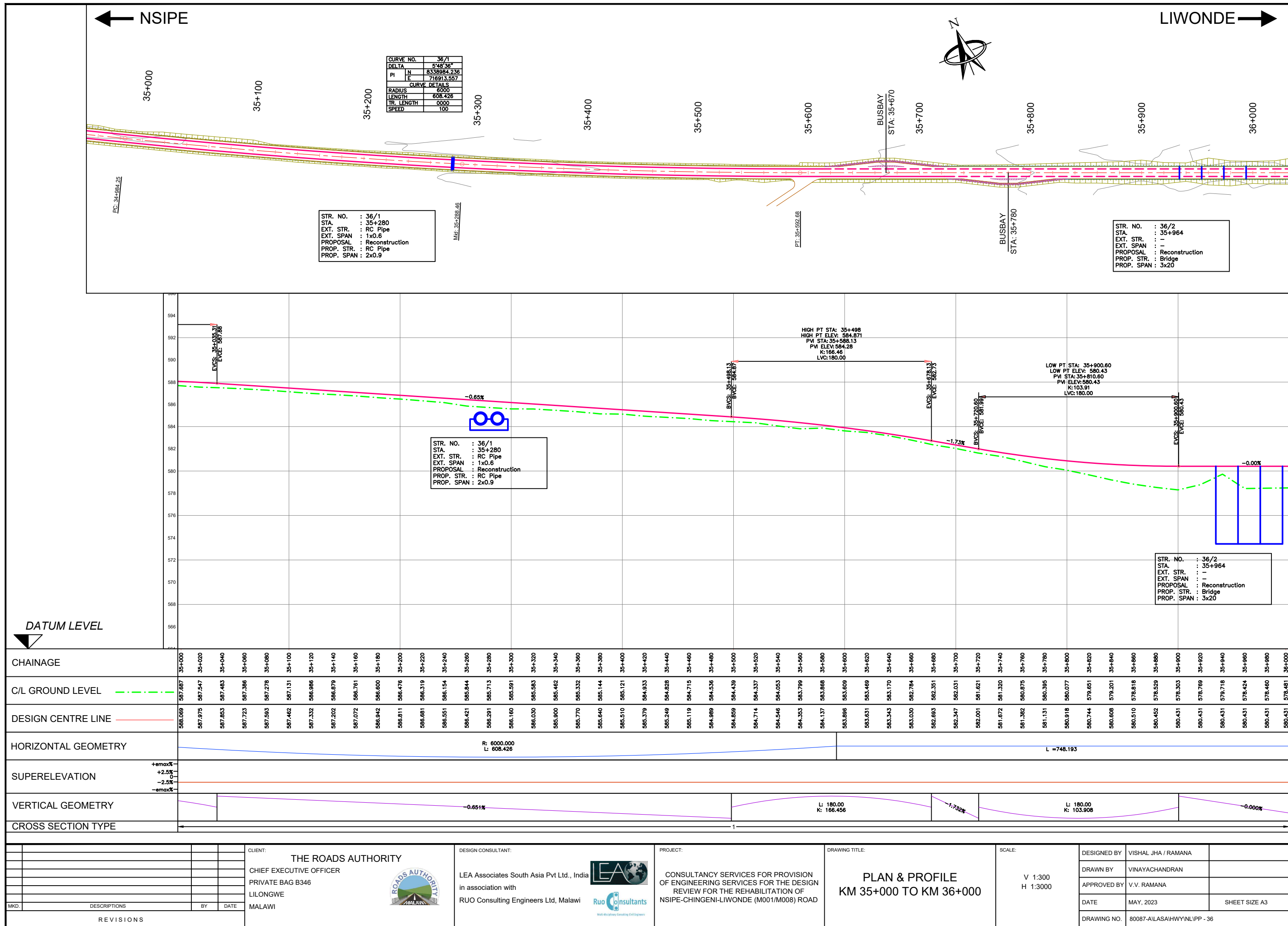
SCALE:  
V 1:300  
H 1:3000

DESIGNED BY: VISHAL JHA / RAMANA  
DRAWN BY: VINAYACHANDRAN  
APPROVED BY: V.V. RAMANA  
DATE: MAY, 2023  
DRAWING NO. 80087-AILASA\HWY\NL\VP - 33

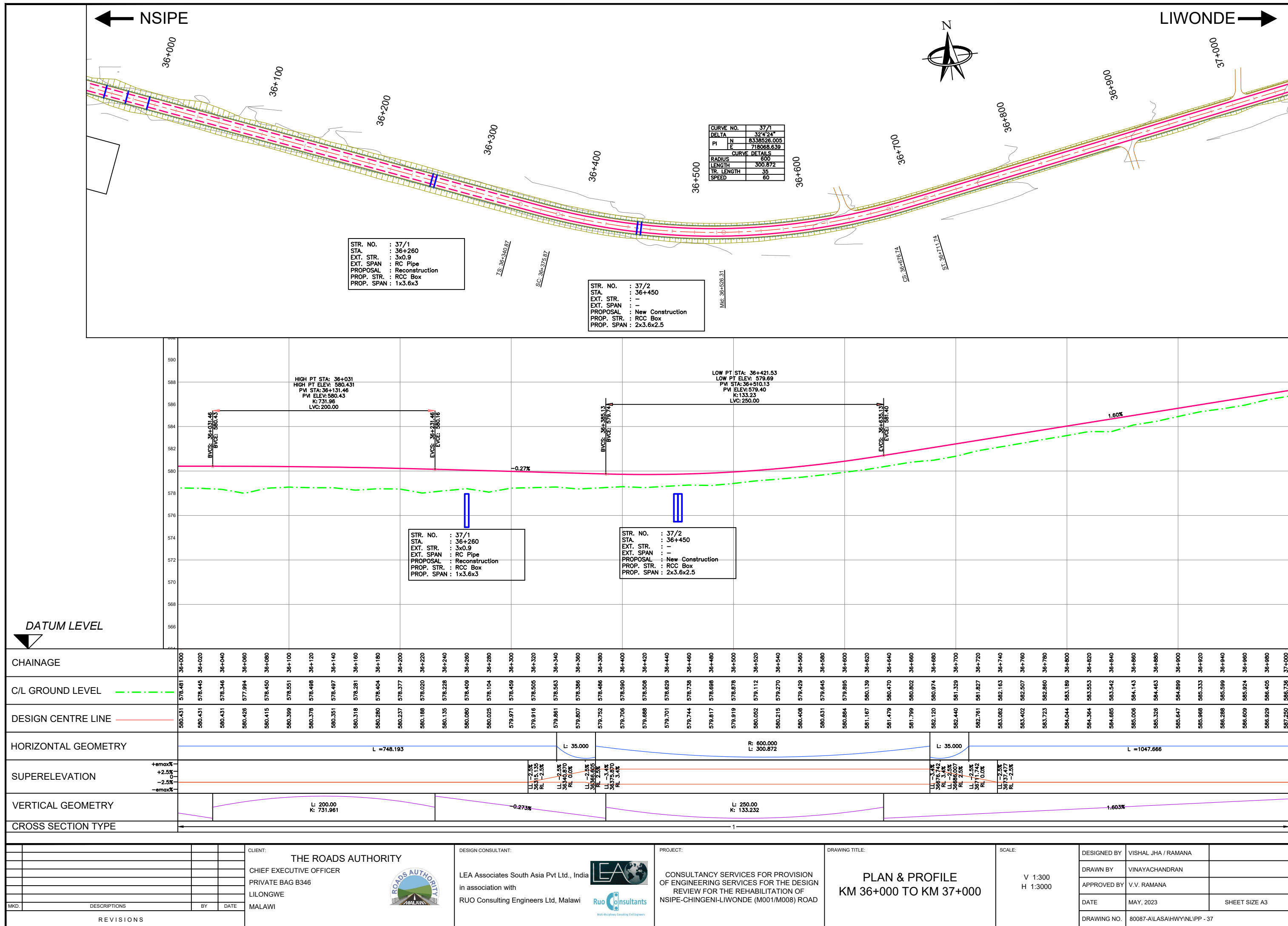
SHEET SIZE A3



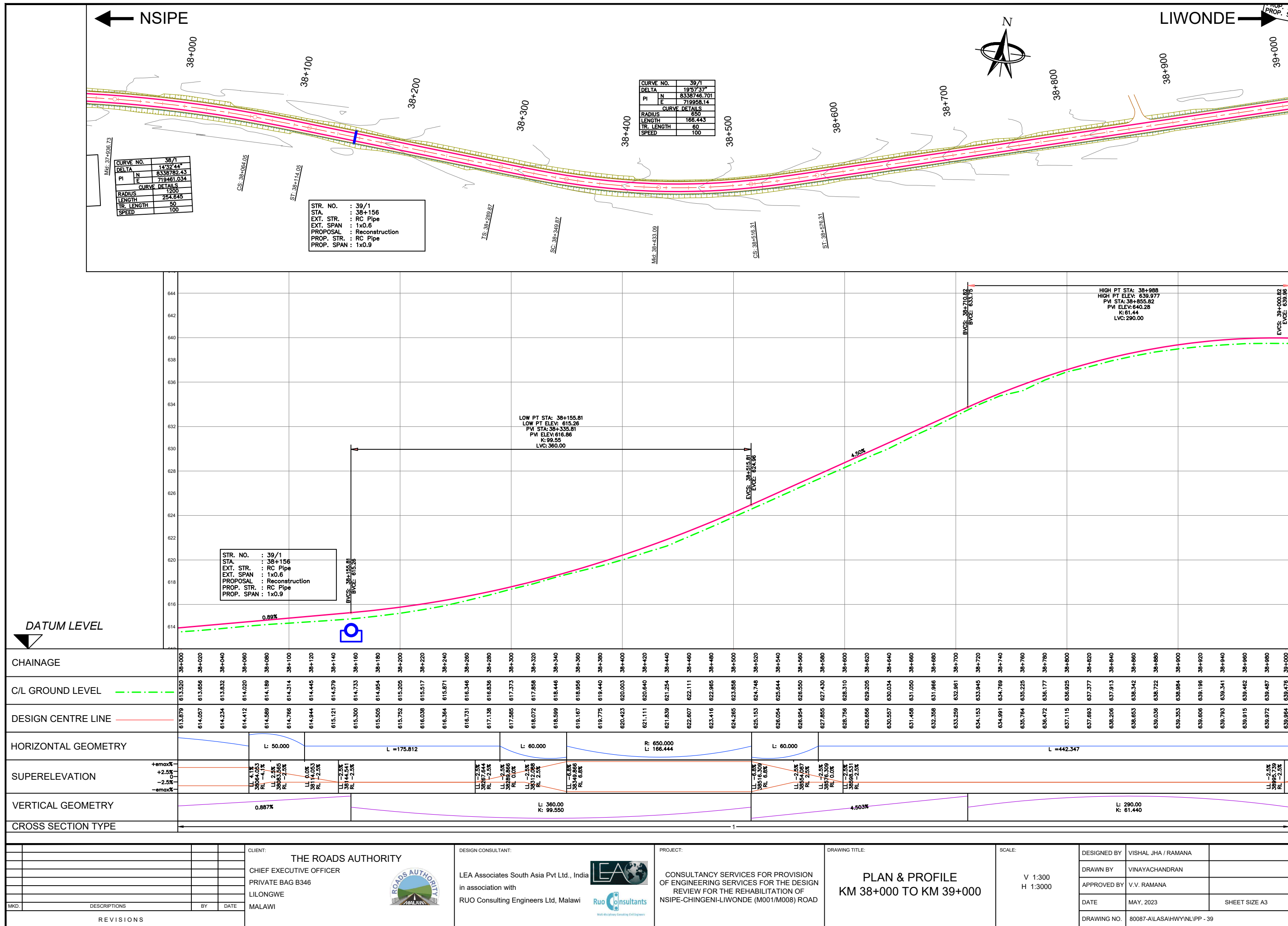
















← NSIPE

LIWONDE →



STR. NO. : 41/1  
STA. : 40+145  
EXT. STR. : RC Pipe  
EXT. SPAN : 3x0.75  
PROPOSAL : Reconstruction  
PROP. STR. : RCC Box  
PROP. SPAN : 1x1.8x1.8

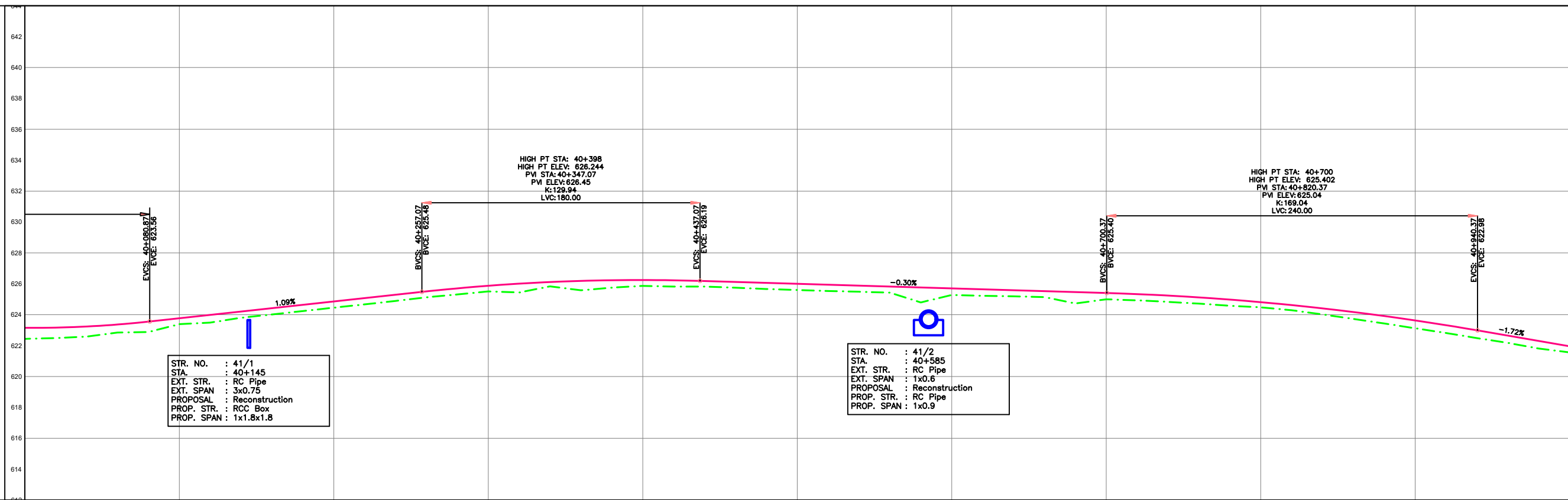
0/2  
9+960  
C Pipe  
0.75  
construction  
C Box  
2.8x1.85

Mid: 40+032.80

CURVE NO.		41/1
DELTA		7°25'3"
PI	N	8338887.432
	E	721531.282
CURVE DETAILS		
RADIUS		2150
LENGTH		278.344
TR. LENGTH		0000
SPEED		100

PT: 40+171.97

STR. NO.	: 41/2
STA.	: 40+585
EXT. STR.	: RC Pipe
EXT. SPAN	: 1x0.6
PROPOSAL	: Reconstruction
PROP. STR.	: RC Pipe
PROP. SPAN	: 1x0.9

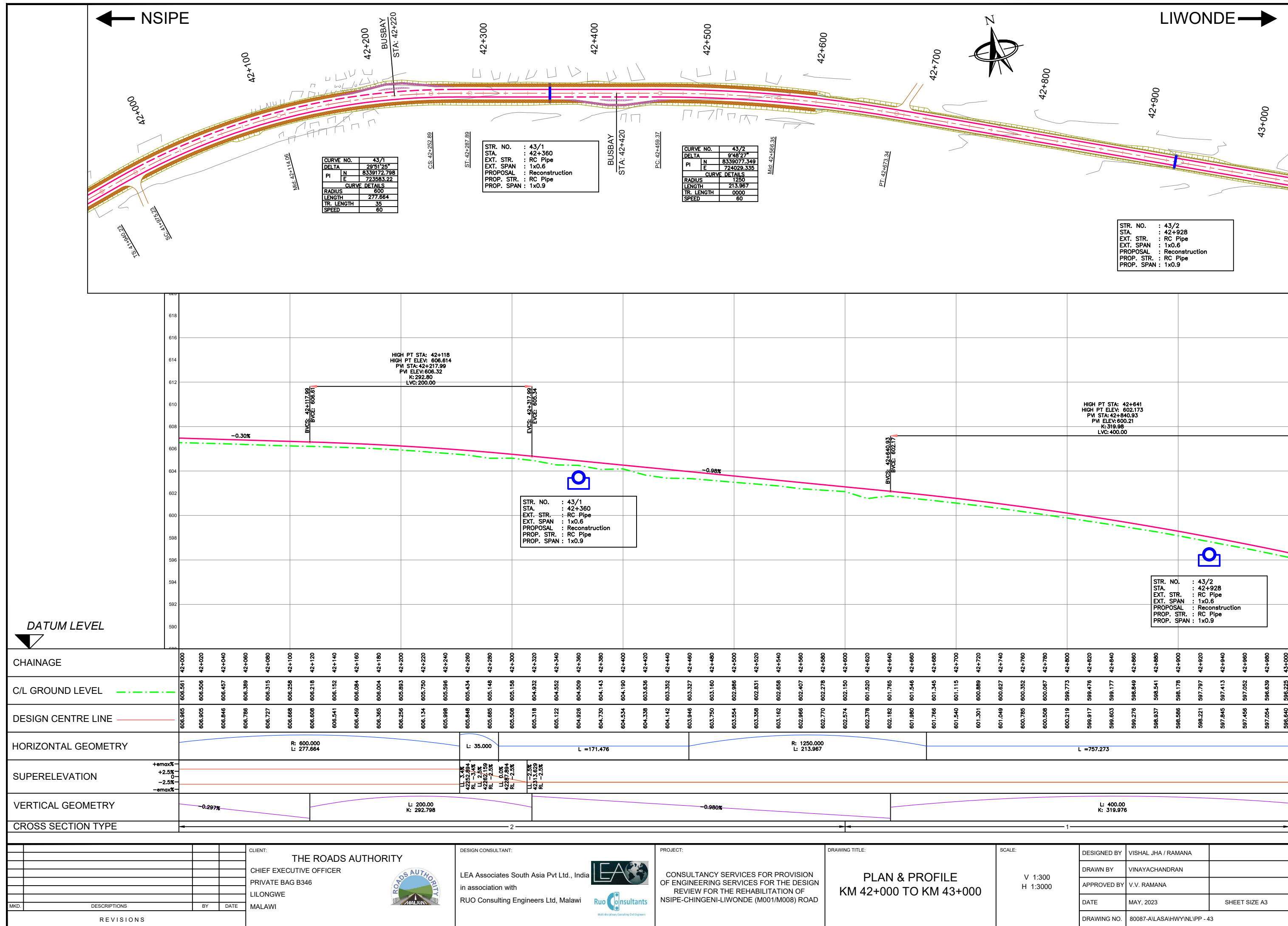


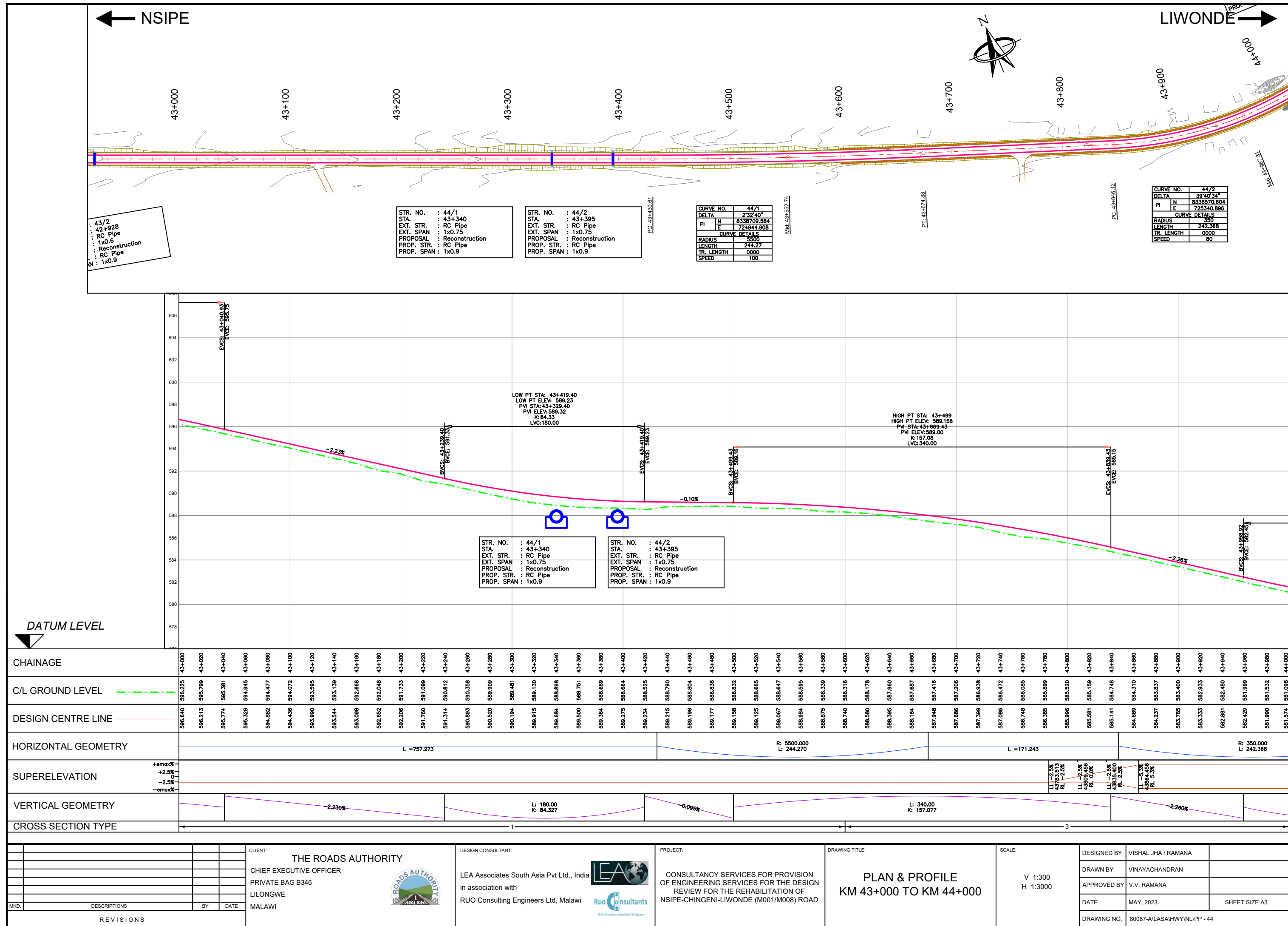
*DATUM LEVEL*

CHAINAGE		40+000 40+020 40+040 40+060 40+080 40+100 40+120 40+140 40+160 40+180 40+200 40+220 40+240 40+260 40+280 40+300 40+320 40+340 40+360 40+380 40+400 40+420 40+440 40+460 40+480 40+500 40+520 40+540 40+560 40+580 40+600 40+620 40+640 40+660 40+680 40+700 40+720 40+740 40+760 40+780 40+800 40+820 40+840 40+860 40+880 40+900 40+920 40+940 40+960 40+980 41+000	
C/L GROUND LEVEL		622.436 622.465 622.582 622.843 622.882 623.390 623.491 623.803 624.015 624.237 624.456 624.668 624.892 625.128 625.312 625.506 625.506 625.440 625.834 625.581 625.751 625.885 625.818 625.822 625.748 625.682 625.598 625.533 625.488 625.425 624.795 625.275 625.223 625.188 625.140 624.725 624.987 624.930 624.831 624.717 624.578 624.475 624.289 624.017 623.729 623.432 623.119 622.817 622.486 622.176 621.812 621.559 621.000	
DESIGN CENTRE LINE		623.152 623.165 623.236 623.365 623.551 623.768 623.986 624.203 624.420 624.638 624.855 625.073 625.290 625.508 625.705 625.872 626.008 626.113 626.188 626.231 626.244 626.226 626.178 626.118 626.059 625.999 625.940 625.880 625.820 625.761 625.701 625.642 625.582 625.523 625.463 625.403 625.332 625.238 625.120 624.978 624.812 624.623 624.410 624.173 623.913 623.629 623.321 622.990 622.647 622.303 621.960 621.559 621.000	
HORIZONTAL GEOMETRY		<div><div><div>R: 2150.000 L: 278.344</div><div></div></div><div>L = 1115.221</div></div>	
SUPERELEVATION	<div>+emax% +2.5% G -2.5% -emax%</div>		
VERTICAL GEOMETRY		<div><div>L: 260.00 K: 69.322</div><div>1.067%</div><div>L: 180.00 K: 129.943</div><div>-0.298%</div><div>L: 240.00 K: 169.041</div></div>	
CROSS SECTION TYPE		1	

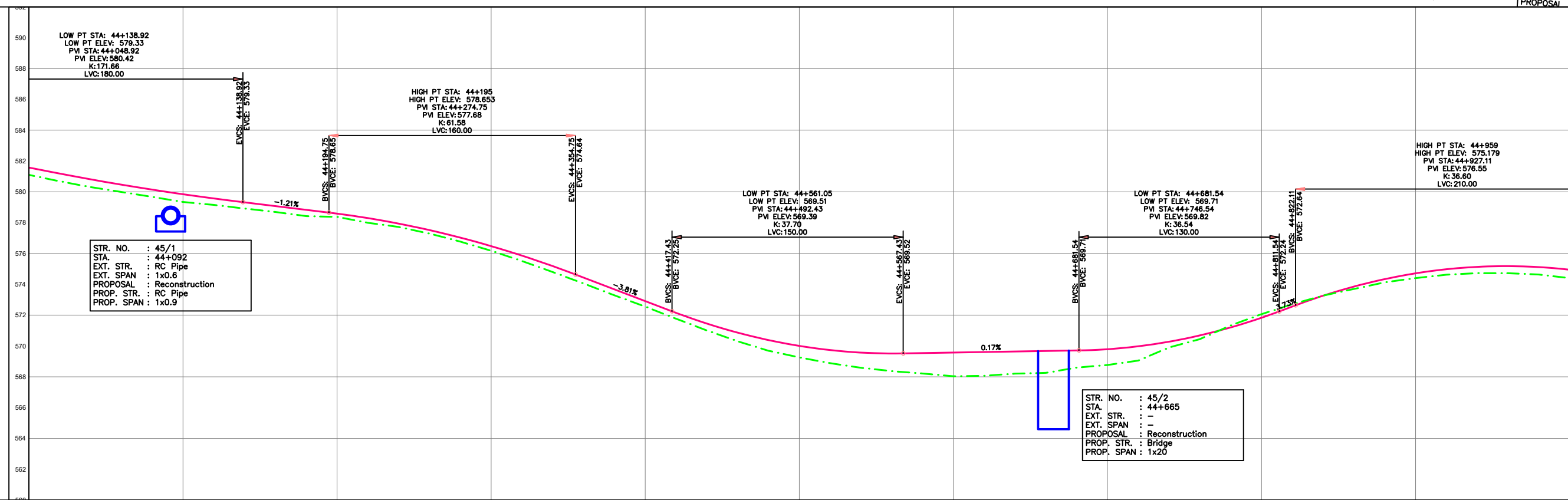
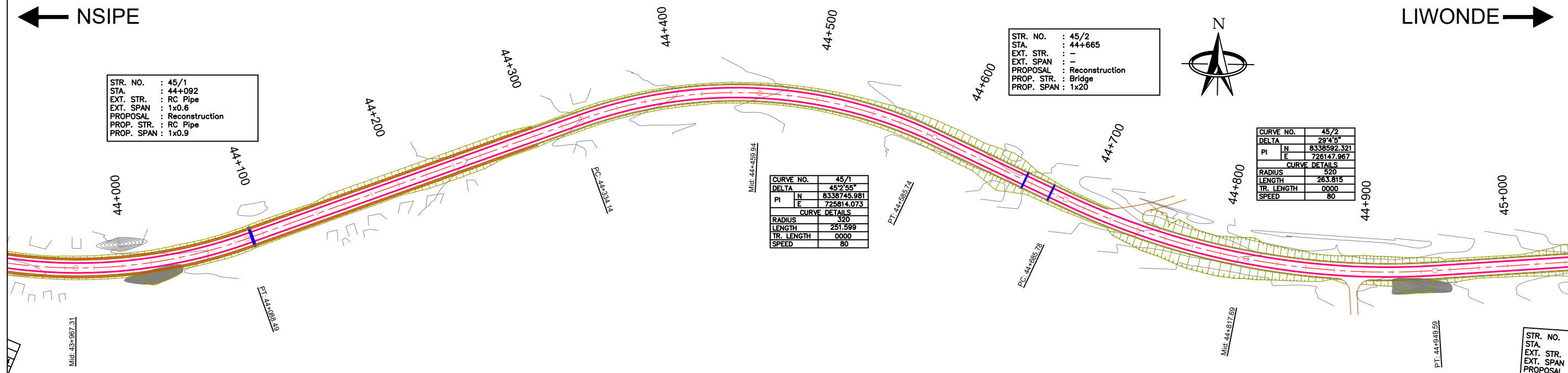
[illegible]











*DATUM LEVEL*

CHAINAGE	444+000	444+020	444+040	444+060	444+080	444+100	444+120	444+140	444+160	444+180	444+200	444+220	444+240	444+260	444+280	444+300	444+320	444+340	444+360	444+380	444+400	444+420	444+440	444+460	444+480	444+500	444+520	444+540	444+560	444+580	444+600	444+620	444+640	444+660	444+680	444+700	444+720	444+740	444+760	444+780	444+800	444+820	444+840	444+860	444+880	444+900	444+920	444+940	444+960	444+980	451+000														
C/L GROUND LEVEL	581.088	580.685	580.306	579.991	579.674	579.341	579.151	578.916	578.692	578.425	578.373	577.992	577.721	577.290	576.769	576.178	575.512	574.796	574.052	573.289	572.556	571.769	571.008	570.304	570.866	570.383	569.691	570.006	569.258	568.884	568.586	568.368	568.214	568.035	568.067	569.606	569.640	568.205	568.674	568.253	568.708	568.597	568.788	568.978	570.277	570.686	571.204	571.831	572.558	573.260	573.853	574.337	574.711	574.976	575.132	575.179	575.116	574.944	574.400	574.625	574.724	574.720	574.636	574.400	451+000
DESIGN CENTRE LINE	581.574	581.182	580.812	580.467	580.144	579.845	579.569	579.316	579.074	578.831	578.587	578.295	577.938	577.517	577.030	576.478	575.862	575.180	574.436	573.674	572.812	572.151	571.455	570.866	570.383	569.691	570.006	569.258	568.884	568.571	568.512	568.539	568.572	568.606	569.640	568.205	568.674	568.253	568.708	568.597	568.788	568.978	570.277	570.686	571.204	571.831	572.558	573.260	573.853	574.337	574.711	574.976	575.132	575.179	575.116	574.944	574.400	574.625	574.724	574.720	574.636	574.400	451+000		
HORIZONTAL GEOMETRY					L = 245.654												R = 320.000 L = 251.600												L = 100.035												R = 520.000 L = 263.815																								
SUPERELEVATION					LL - 5.3% +2.5% +2.5% -2.5% RL 5.3%				LL - 2.5% +2.5% +2.5% -2.5% RL 0.0%				LL - 2.5% +2.5% +2.5% -2.5% RL 0.0%				LL - 5.3% +2.5% +2.5% -2.5% RL -5.3%								LL - 3.3% +2.5% +2.5% -2.5% RL 3.3%								LL - 3.3% +2.5% +2.5% -2.5% RL 0.0%																																
VERTICAL GEOMETRY	L: 180.00 K: 171.662				-1.211%				L: 160.00 K: 61.575				-3.810%				L: 150.00 K: 37.698				0.169%				L: 130.00 K: 36.540				-3.760%				L: 210.00 K: 36.604																																
CROSS SECTION TYPE	3																1																																																

[illegible]





LIWONDE →



CURVE NO.		
DELTA		5
PI	N	833
	E	72
CURVE DET		
RADIUS		
LENGTH		32
TR. LENGTH		0
SPEED		

STR. NO. : 48/2  
STA. : 47+877  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.75  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 1x0.9

STR. NO.	:
STA.	:
EXT. STR.	:
EXT. SPAN	:
PROPOSAL	:
PROP. STR.	:
PROP. SPAN	:

STR. NO. : 48/1  
STA. : 47+790  
EXT. STR. : -  
EXT. SPAN : -  
PROPOSAL : Reconstruction  
PROP. STR. : Bridge  
PROP. SPAN : 1x20

CURVE NO.		48/1
DELTA		51°59'10"
PI	N	8337523.126
	E	728323.799
CURVE DETAILS		
RADIUS		500
LENGTH		453.665
TR. LENGTH		0000
SPEED		80

CHAINAGE

C/L GROUND LEVEL      — . — . — . —

DESIGN CENTRE LINE \_\_\_\_\_

## HORIZONTAL GEOMETRY

SUPERELEVATION

## VERTICAL GEOMETRY

CROSS SECTION TYPE

MKD.	DESCRIPTIONS	BY	DATE

CLIENT:

THE ROADS AUTHORITY

CHIEF EXECUTIVE OFFICER

PRIVATE BAG B346

LILONGWE

MALAWI



DESIGN CONSULTANT:

LEA Associates South Asia Pvt Ltd., India

in association with

RUO Consulting Engineers Ltd, Malawi



PROJECT:

CONSULTANCY SERVICES FOR PROVISION  
OF ENGINEERING SERVICES FOR THE DESIGN  
REVIEW FOR THE REHABILITATION OF  
NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD

DRAWING TITLE:

# PLAN & PROFILE

## KM 47+000 TO KM 48+000

SCALE:

V 1:300  
H 1:3000

DESIGNED BY

VISHAL JHA / RAMANA

DRAWN BY

VINAYACHANDRAN

APPROVED BY

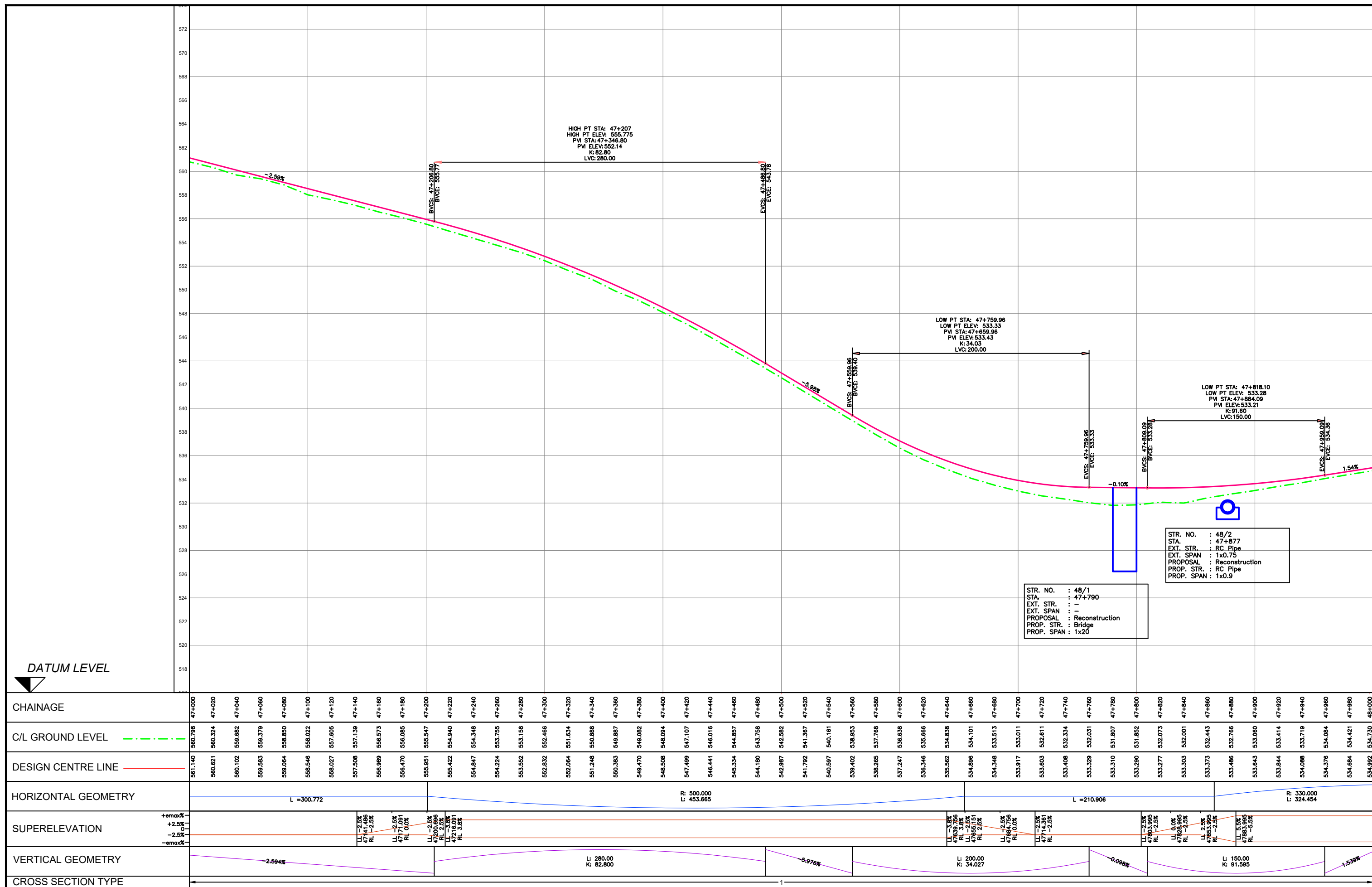
V.V. RAMANA

DATE \_\_\_\_\_

MAY, 2023

SHEET SIZE A3





				CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India	PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:	PLAN & PROFILE KM 47+000 TO KM 48+000	SCALE:	V 1:300 H 1:3000	DESIGNED BY	VISHAL JHA / RAMANA	
					CHIEF EXECUTIVE OFFICER									DRAWN BY	VINAYACHANDRAN	
					PRIVATE BAG B346									APPROVED BY	V.V. RAMANA	
					LILONGWE									DATE	MAY, 2023	SHEET SIZE A3
MKD.	DESCRIPTIONS	BY	DATE	MALAWI		RUO Consulting Engineers Ltd, Malawi								DRAWING NO.	80087-AILASAIHWYNL\PP - 48A	
REVISIONS																

← NSIPE

LIWONDE →



CURVE NO.		49/1
DELTA		56°19'58"
PI	N	8337592.082
	E	728951.416
CURVE DETAILS		
RADIUS		330
LENGTH		324.454
TR. LENGTH		0000
SPEED		80

STR. NO. : 49/2  
STA. : 48+204  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.9  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 1x0.9

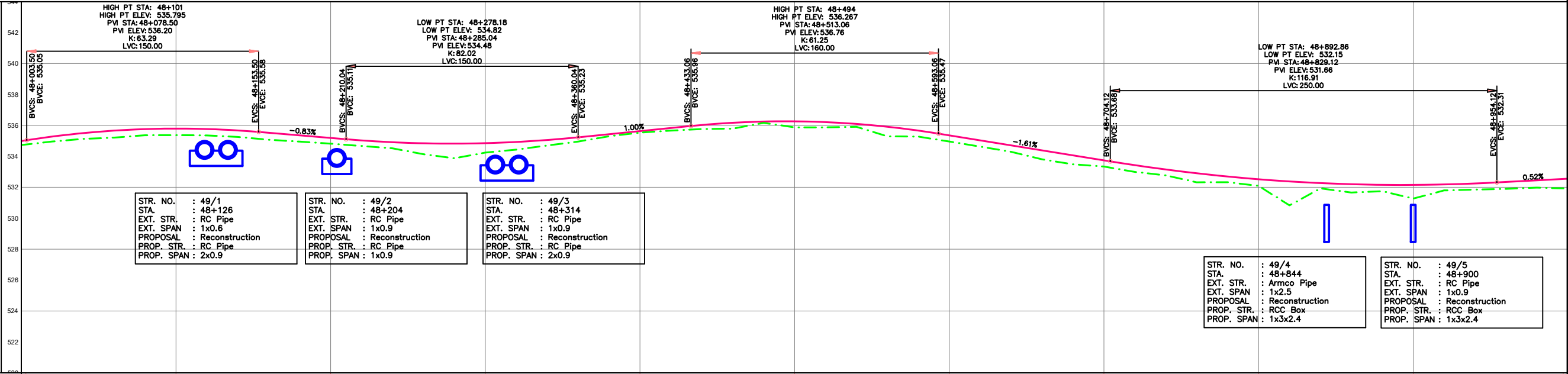
CURVE NO.		49/2
DELTA		27°53'50"
PI	N	8337264.035
	E	729226.066
CURVE DETAILS		
RADIUS		600
LENGTH		292.14
TR. LENGTH		0000
SPEED		80

STR. NO. : 49/1  
STA. : 48+126  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.6  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 2x0.9

STR. NO. : 49/3  
STA. : 48+314  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.9  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 2x0.9

STR. NO. : 49/4  
STA. : 48+844  
EXT. STR. : Armco Pipe  
EXT. SPAN : 1x2.5  
PROPOSAL : Reconstruction  
PROP. STR. : RCC Box  
PROP. SPAN : 1x3x2.4

STR. NO. : 49/5  
STA. : 48+900  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.9  
PROPOSAL : Reconstruction  
PROP. STR. : RCC Box  
PROP. SPAN : 1x3x2.4



*DATUM LEVEL*



CHAINAGE	48+000	48+020	48+040	48+060	48+080	48+100	48+120	48+140	48+160	48+180	48+200	48+220	48+240	48+260	48+280	48+300	48+320	48+340	48+360	48+380	48+400	48+420	48+440	48+460	48+480	48+500	48+520	48+540	48+560	48+580	48+600	48+620	48+640	48+660	48+680	48+700	48+720	48+740	48+760	48+780	48+800	48+820	48+840	48+860	48+880	48+900	48+920	48+940	48+960	48+980	49+000	
C/L GROUND LEVEL	534.720	534.660	535.128	535.213	535.366	535.373	535.354	535.237	535.074	534.892	534.820	534.671	534.321	534.138	533.877	533.444	534.244	534.433	534.703	534.854	535.300	535.534	535.663	535.766	535.792	536.165	535.672	535.674	535.911	535.293	535.276	534.959	534.631	534.293	533.807	533.468	533.341	532.995	532.769	532.323	532.329	532.091	530.631	531.031	531.662	531.748	531.269	531.708	531.652	531.901	531.979	531.920
DESIGN CENTRE LINE	534.992	535.278	535.502	535.663	535.761	535.795	535.767	535.675	535.523	535.357	535.191	535.030	534.913	534.844	534.824	534.853	534.931	535.432	535.631	535.831	536.027	536.171	536.250	536.264	536.212	536.095	535.913	535.665	535.356	535.034	534.711	534.388	534.065	533.742	533.430	533.151	532.907	532.697	532.521	532.379	532.272	532.198	532.159	532.154	532.184	532.247	532.343	532.448	532.553			
HORIZONTAL GEOMETRY	<div><div><div>P: 330.000</div><div>L: 324.454</div></div><div><div>L = 102.119</div></div><div><div>P: 600.000</div><div>L: 292.139</div></div><div><div>L = 500.618</div></div></div>																																																			
SUPERELEVATION	<div><div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div><div>+2.5%</div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[illegible]

← NSIPE

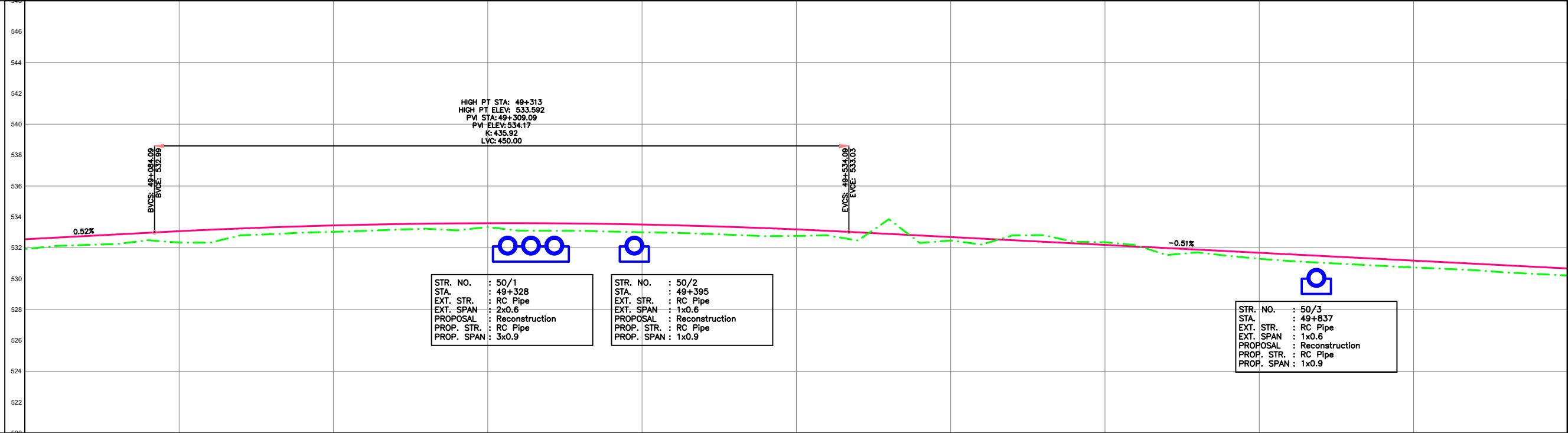
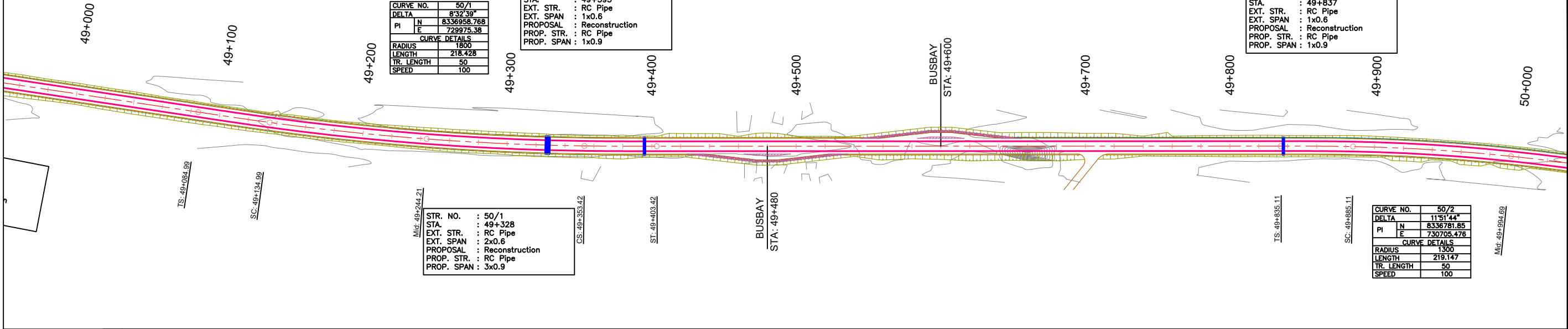
LIWONDE →



CURVE NO.		50/1
DELTA		8°32'39"
PI	N	8336958.768
	E	729975.38
CURVE DETAILS		
RADIUS		1800
LENGTH		218.428
TR. LENGTH		50
SPEED		100

STR. NO.	: 50/2
STA.	: 49+395
EXT. STR.	: RC Pipe
EXT. SPAN	: 1x0.6
PROPOSAL	: Reconstruction
PROP. STR.	: RC Pipe
PROP. SPAN	: 1x0.9

STR. NO. : 50/3  
STA. : 49+837  
EXT. STR. : RC Pipe  
EXT. SPAN : 1x0.6  
PROPOSAL : Reconstruction  
PROP. STR. : RC Pipe  
PROP. SPAN : 1x0.9

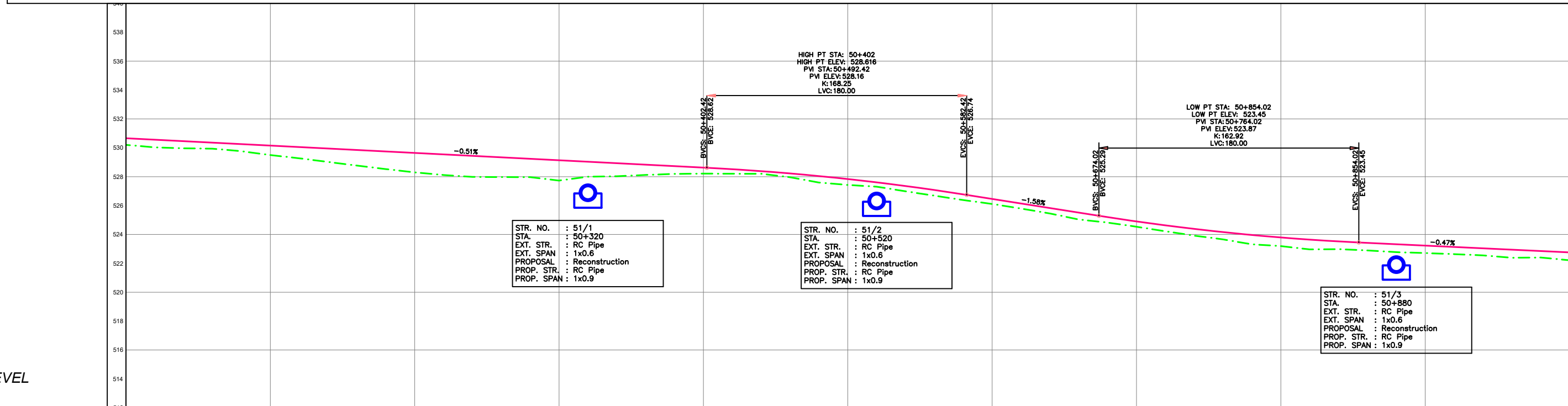
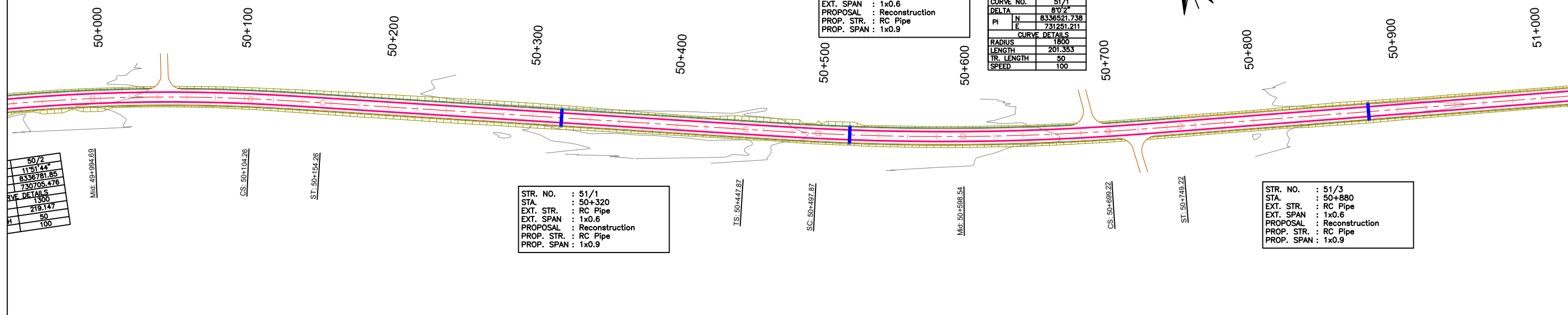


*DATUM LEVEL*

CHAINAGE	49+000	49+020	49+040	49+060	49+080	49+100	49+120	49+140	49+160	49+180	49+200	49+220	49+240	49+260	49+280	49+300	49+320	49+340	49+360	49+380	49+400	49+420	49+440	49+460	49+480	49+500	49+520	49+540	49+560	49+580	49+600	49+620	49+640	49+660	49+680	49+700	49+720	49+740	49+760	49+780	49+800	49+820	49+840	49+860	49+880	49+900	49+920	49+940	49+960	49+980	50+000																																																							
C/L GROUND LEVEL	531.920	532.119	532.187	532.244	532.490	532.335	532.329	532.808	532.881	532.881	533.031	533.091	533.173	533.236	533.130	533.338	533.109	533.101	533.097	533.049	533.007	532.977	532.907	532.833	532.752	532.785	532.801	532.470	533.851	532.311	532.471	532.208	532.795	532.817	532.392	532.355	532.176	531.526	531.705	531.475	531.286	531.145	531.031	530.931	530.826	530.725	530.640	530.548	530.401	530.300	530.201	50+000																																																						
DESIGN CENTRE LINE	532.553	532.658	532.763	532.867	532.972	533.074	533.167	533.251	533.325	533.391	533.447	533.494	533.532	533.561	533.590	533.590	533.592	533.584	533.566	533.540	533.504	533.460	533.406	533.343	533.270	533.189	533.098	532.999	532.897	532.796	532.694	532.592	532.491	532.389	532.288	532.186	532.084	531.983	531.881	531.779	531.678	531.576	531.474	531.373	531.271	531.169	531.068	530.966	530.864	530.763	530.661	50+000																																																						
HORIZONTAL GEOMETRY	L = 500.618		L: 50.000		R: 1800.000 L: 218.428										L: 50.000		L = 431.694																		L: 50.000		R: 1300.000 L: 219.147																																																																					
SUPERELEVATION	LL -2.5% 49+041.589 RL -2.5%		LL -2.5% 49+061.425 RL 0.0%		LL -2.5% 49+081.261 RL 0.0%										LL -2.5% 49+101.097 RL 2.5%		LL -2.5% 49+120.933 RL 2.5%		LL -2.5% 49+140.769 RL 2.5%		LL -2.5% 49+160.605 RL 2.5%		LL -2.5% 49+180.441 RL 2.5%		LL -2.5% 49+200.277 RL 2.5%		LL -2.5% 49+220.113 RL 2.5%		LL -2.5% 49+240.949 RL 2.5%		LL -2.5% 49+260.785 RL 2.5%		LL -2.5% 49+280.621 RL 2.5%		LL -2.5% 49+300.457 RL 2.5%		LL -2.5% 49+320.293 RL 2.5%		LL -2.5% 49+340.129 RL 2.5%		LL -2.5% 49+360.965 RL 2.5%		LL -2.5% 49+380.801 RL 2.5%		LL -2.5% 49+400.637 RL 2.5%		LL -2.5% 49+420.473 RL 2.5%		LL -2.5% 49+440.309 RL 2.5%		LL -2.5% 49+460.145 RL 2.5%		LL -2.5% 49+480.981 RL 2.5%		LL -2.5% 49+500.817 RL 2.5%		LL -2.5% 49+520.653 RL 2.5%		LL -2.5% 49+540.489 RL 2.5%		LL -2.5% 49+560.325 RL 2.5%		LL -2.5% 49+580.161 RL 2.5%		LL -2.5% 49+600.997 RL 2.5%		LL -2.5% 49+620.833 RL 2.5%		LL -2.5% 49+640.669 RL 2.5%		LL -2.5% 49+660.505 RL 2.5%		LL -2.5% 49+680.341 RL 2.5%		LL -2.5% 49+700.177 RL 2.5%		LL -2.5% 49+720.013 RL 2.5%		LL -2.5% 49+740.849 RL 2.5%		LL -2.5% 49+760.685 RL 2.5%		LL -2.5% 49+780.521 RL 2.5%		LL -2.5% 49+800.357 RL 2.5%		LL -2.5% 49+820.193 RL 2.5%		LL -2.5% 49+840.029 RL 2.5%		LL -2.5% 49+860.865 RL 2.5%		LL -2.5% 49+880.701 RL 2.5%		LL -2.5% 49+900.537 RL 2.5%		LL -2.5% 49+920.373 RL 2.5%		LL -2.5% 49+940.209 RL 2.5%		LL -2.5% 49+960.045 RL 2.5%		LL -2.5% 49+980.881 RL 2.5%		LL -2.5% 50+000.717 RL 2.5%	
VERTICAL GEOMETRY	-0.524%				R: 450.00 L: 435.925										-0.508%																																																																																											
CROSS SECTION TYPE																																																																																																										

				CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India	PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:	PLAN & PROFILE KM 49+000 TO KM 50+000	SCALE:	V 1:300 H 1:3000	DESIGNED BY	VISHAL JHA / RAMANA	
					CHIEF EXECUTIVE OFFICER									DRAWN BY	VINAYACHANDRAN	
					PRIVATE BAG B346		in association with							APPROVED BY	V.V. RAMANA	
					LILONGWE									DATE	MAY, 2023	SHEET SIZE A3
MKD.	DESCRIPTIONS	BY	DATE		MALAWI		RUO Consulting Engineers Ltd, Malawi							DRAWING NO.	80087-AILASAIHWYNLPP - 50	
REVISIONS																

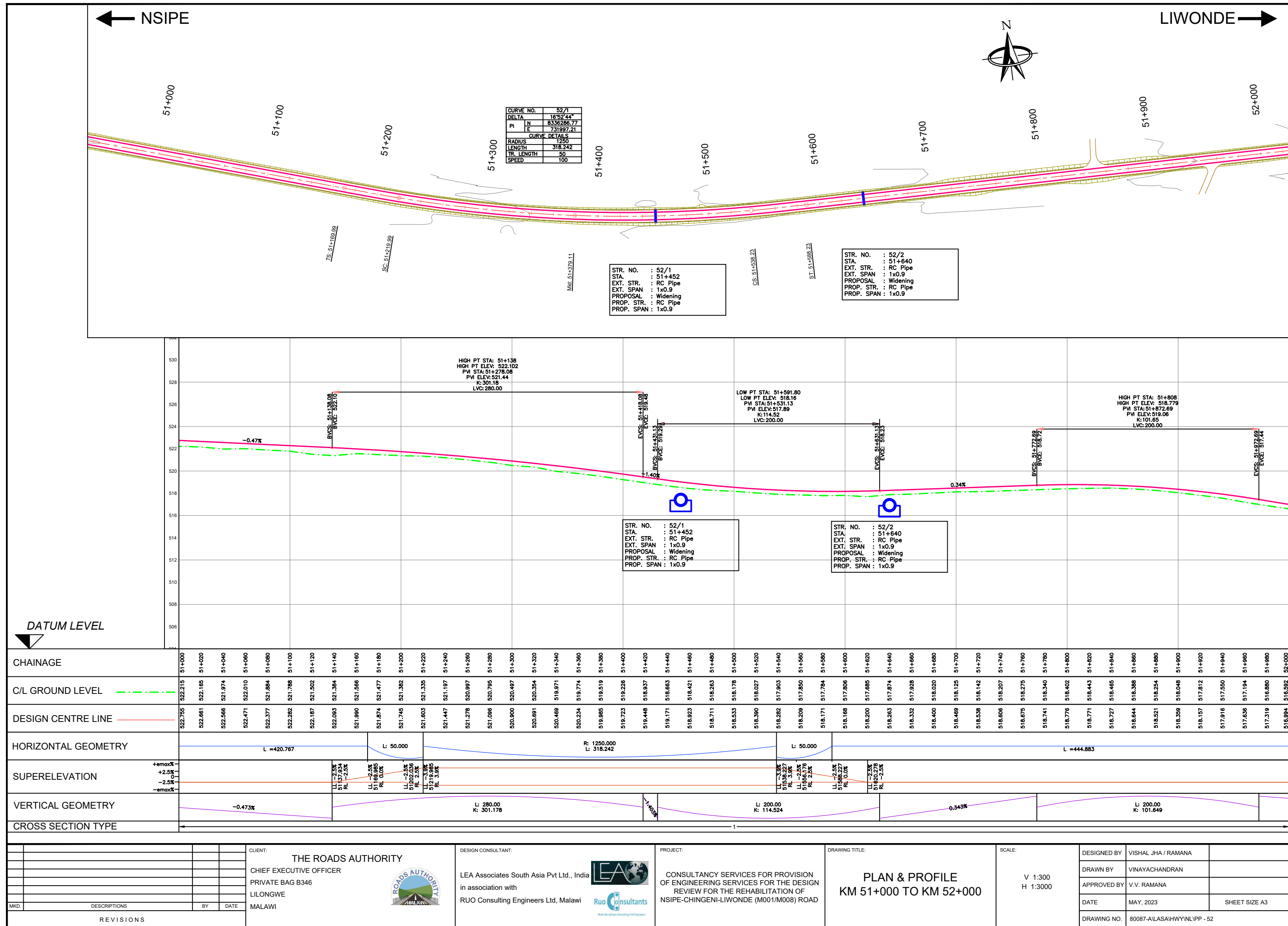
LIWONDE →



*DATUM LEVEL*

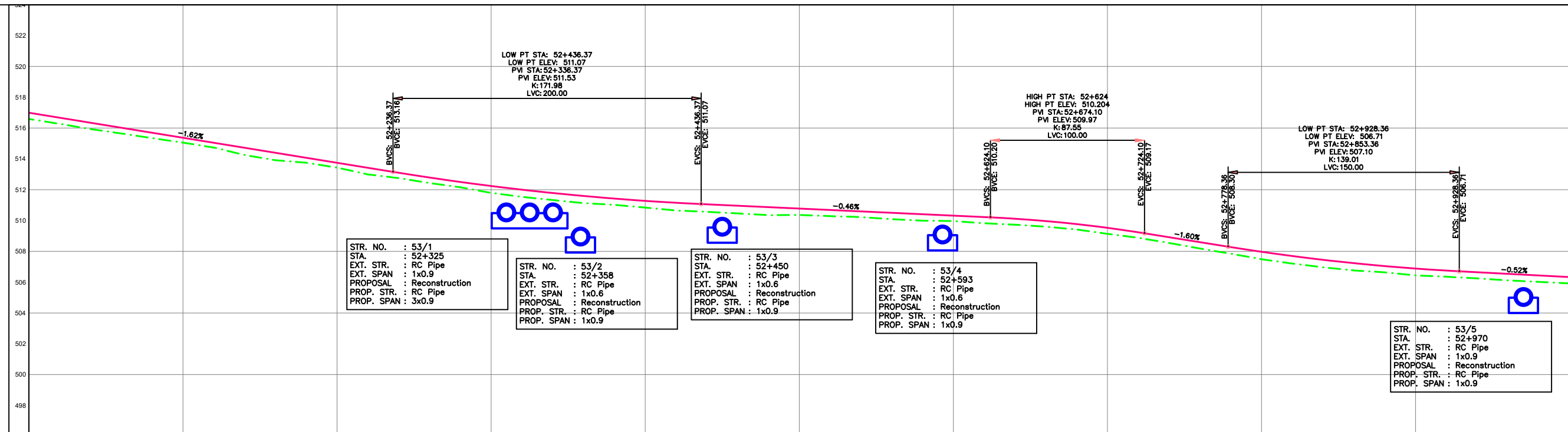
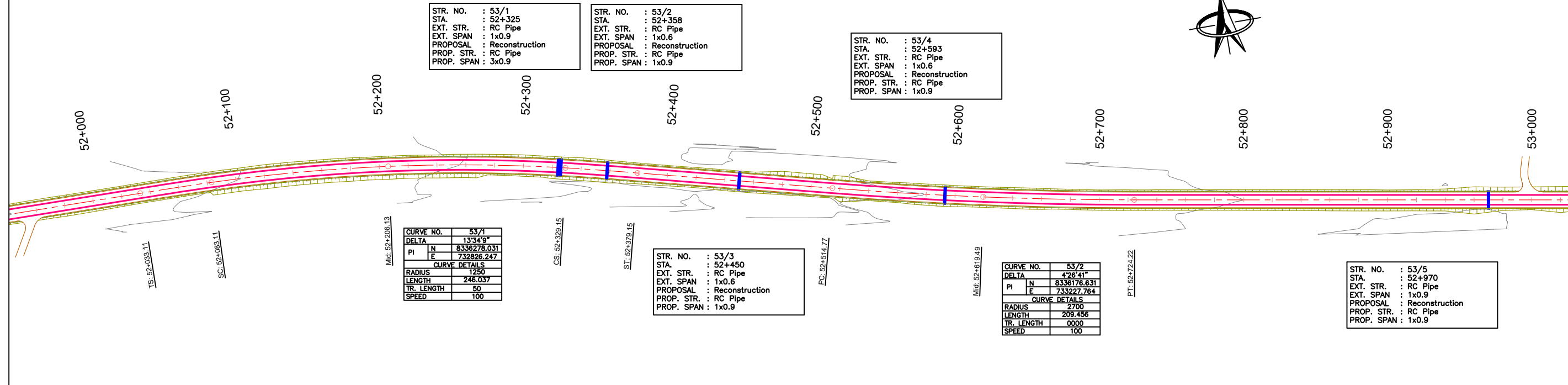
[illegible][illegible]





← NSIPE

LIWONDE →



*DATUM LEVEL*

CHAINAGE	C/L GROUND LEVEL	DESIGN CENTRE LINE
52+000	516.592	516.894
52+020	516.271	516.670
52+040	515.934	516.345
52+060	515.648	516.020
52+080	515.347	515.695
52+100	515.055	515.370
52+120	514.737	515.045
52+140	514.251	514.721
52+160	513.913	514.396
52+180	513.752	514.071
52+200	513.432	513.746
52+220	512.993	513.421
52+240	512.749	513.097
52+260	512.434	512.788
52+280	512.155	512.502
52+300	511.794	512.240
52+320	511.536	512.000
52+340	511.329	511.785
52+360	511.128	511.592
52+380	511.018	511.422
52+400	510.840	511.276
52+420	510.652	511.153
52+440	510.563	511.053
52+460	510.460	510.981
52+480	510.347	510.889
52+500	510.362	510.777
52+520	510.286	510.884
52+540	510.222	510.592
52+560	510.087	510.500
52+580	509.992	510.408
52+600	509.963	510.315
52+620	509.824	510.223
52+640	509.727	510.116
52+660	509.600	509.965
52+680	509.415	509.768
52+700	509.136	509.525
52+720	508.877	509.237
52+740	508.543	508.917
52+760	508.183	508.596
52+780	507.845	508.276
52+800	507.490	507.972
52+820	507.207	507.696
52+840	506.961	507.450
52+860	506.761	507.232
52+880	506.637	507.044
52+900	506.435	506.883
52+920	506.352	506.752
52+940	506.244	506.645
52+960	506.113	506.540
52+980	506.017	506.435
53+000	505.918	506.330

HORIZONTAL GEOMETRY

SUPERELEVATION

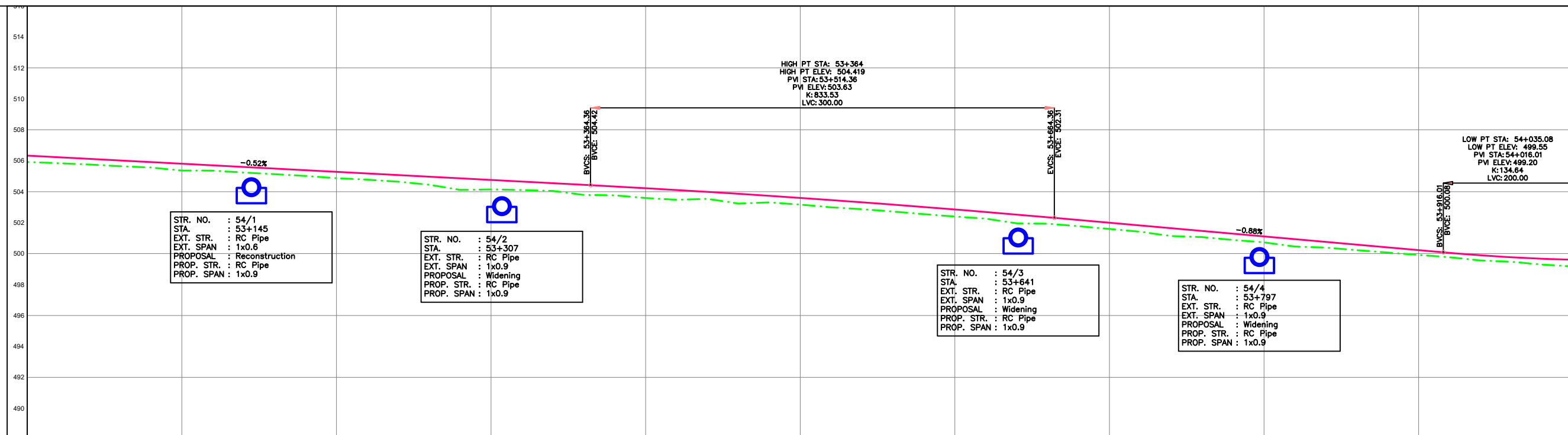
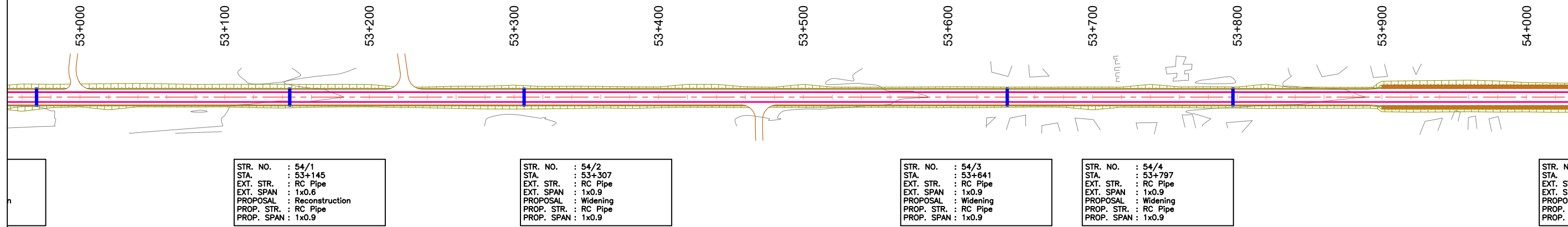
VERTICAL GEOMETRY

CROSS SECTION TYPE

[illegible]

← NSIPE

LIWONDE →



*DATUM LEVEL*

CHAINAGE	53+000 53+020 53+040 53+060 53+080 53+100 53+120 53+140 53+160 53+180 53+200 53+220 53+240 53+260 53+280 53+300 53+320 53+340 53+360 53+380 53+400 53+420 53+440 53+460 53+480 53+500 53+520 53+540 53+560 53+580 53+600 53+620 53+640 53+660 53+680 53+700 53+720 53+740 53+760 53+780 53+800 53+820 53+840 53+860 53+880 53+900 53+920 53+940 53+960 53+980 54+000
C/L GROUND LEVEL	505.918 505.842 505.795 505.648 505.563 505.363 505.360 505.238 505.131 505.016 504.871 504.778 504.646 504.451 504.114 504.146 504.105 504.049 503.791 503.705 503.590 503.475 503.538 503.234 503.307 503.167 502.991 502.867 502.718 502.547 502.394 502.258 501.952 501.932 501.768 501.590 501.410 501.130 501.064 500.880 500.725 500.453 500.387 500.220 500.066 499.910 499.763 499.556 499.470 499.289 499.100
DESIGN CENTRE LINE	506.330 506.225 506.120 506.015 505.911 505.806 505.701 505.596 505.491 505.386 505.281 505.176 505.072 504.967 504.862 504.757 504.652 504.547 504.442 504.336 504.225 504.109 503.988 503.883 503.733 503.598 503.458 503.313 503.164 503.010 502.851 502.687 502.518 502.345 502.168 501.991 501.814 501.637 501.460 501.284 501.107 500.930 500.753 500.576 500.399 500.222 500.046 499.880 499.764 499.667 499.500
HORIZONTAL GEOMETRY	L = 2047.344
SUPERELEVATION	+emax% +2.5% 0 -2.5% -emax%
VERTICAL GEOMETRY	-0.524% L: 300.00 K: 833.535 -0.884% L: 200.00 K: 134.644
CROSS SECTION TYPE	1 2

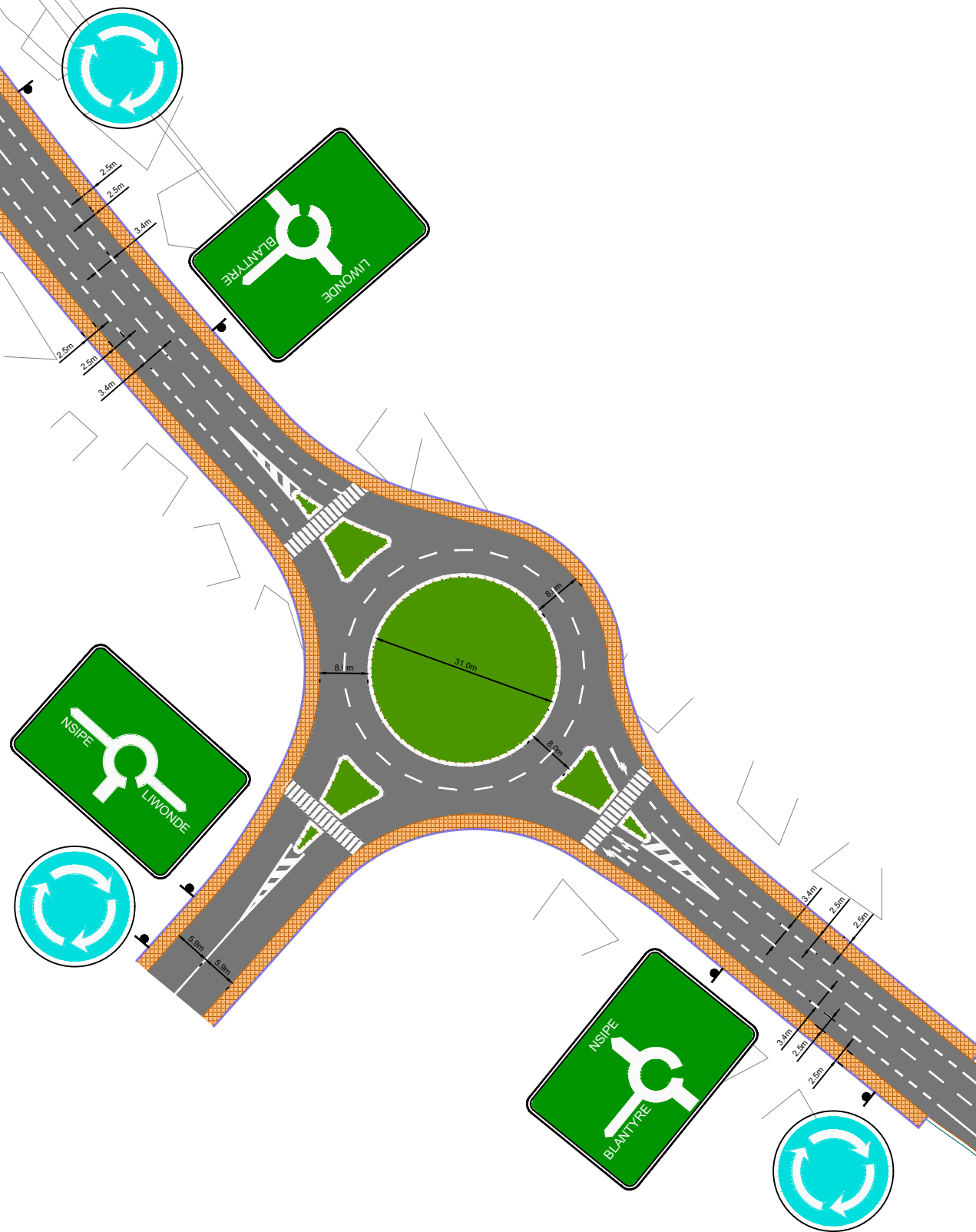
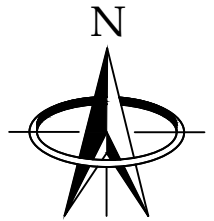
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# **MAJOR INTERSECTION DRAWINGS**





MKD.	DESCRIPTIONS	BY	DATE
REVISIONS			

THE ROADS AUTHORITY

CHIEF EXECUTIVE OFFICER

PRIVATE BAG B346

LILONGWE

MALAWI

DESIGN CONSULTANT:

LEA Associates South Asia Pvt Ltd., India

in association with

RUO Consulting Engineers Ltd, Malawi

PROJECT:

CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD

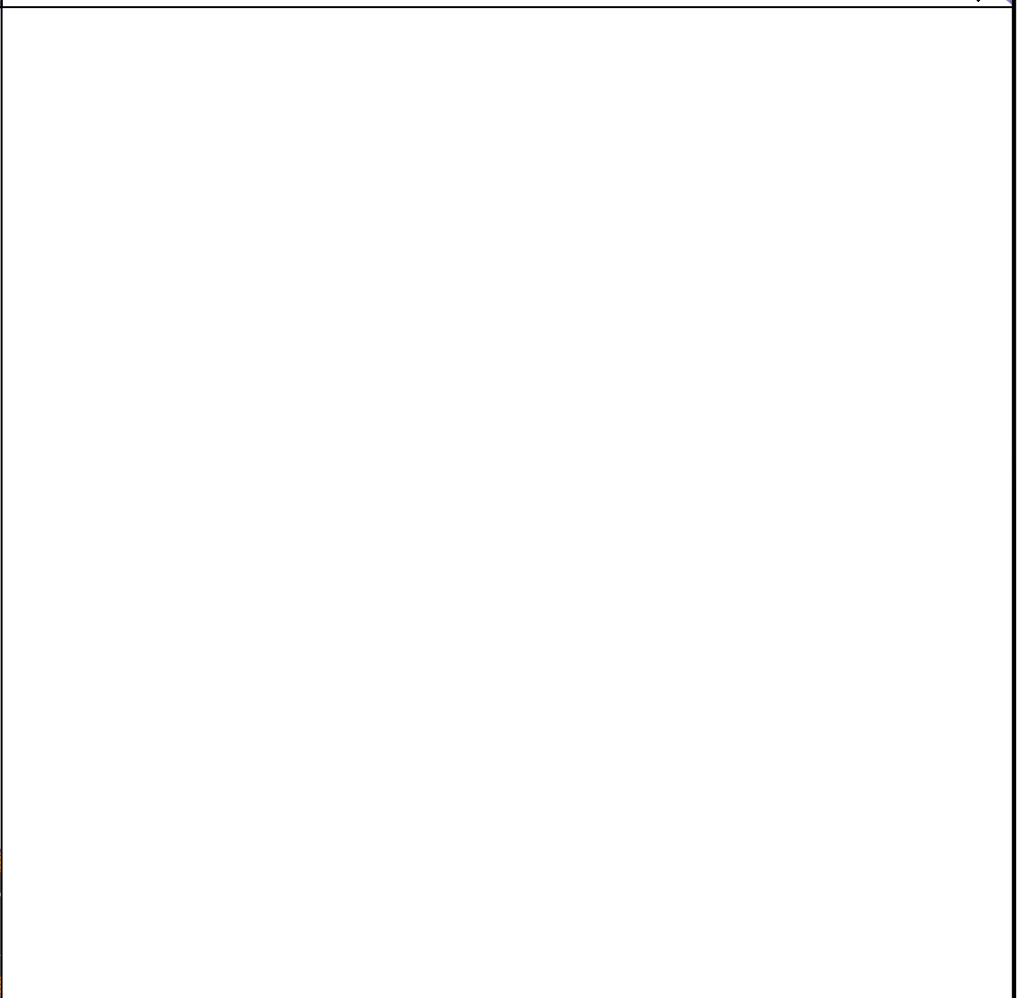
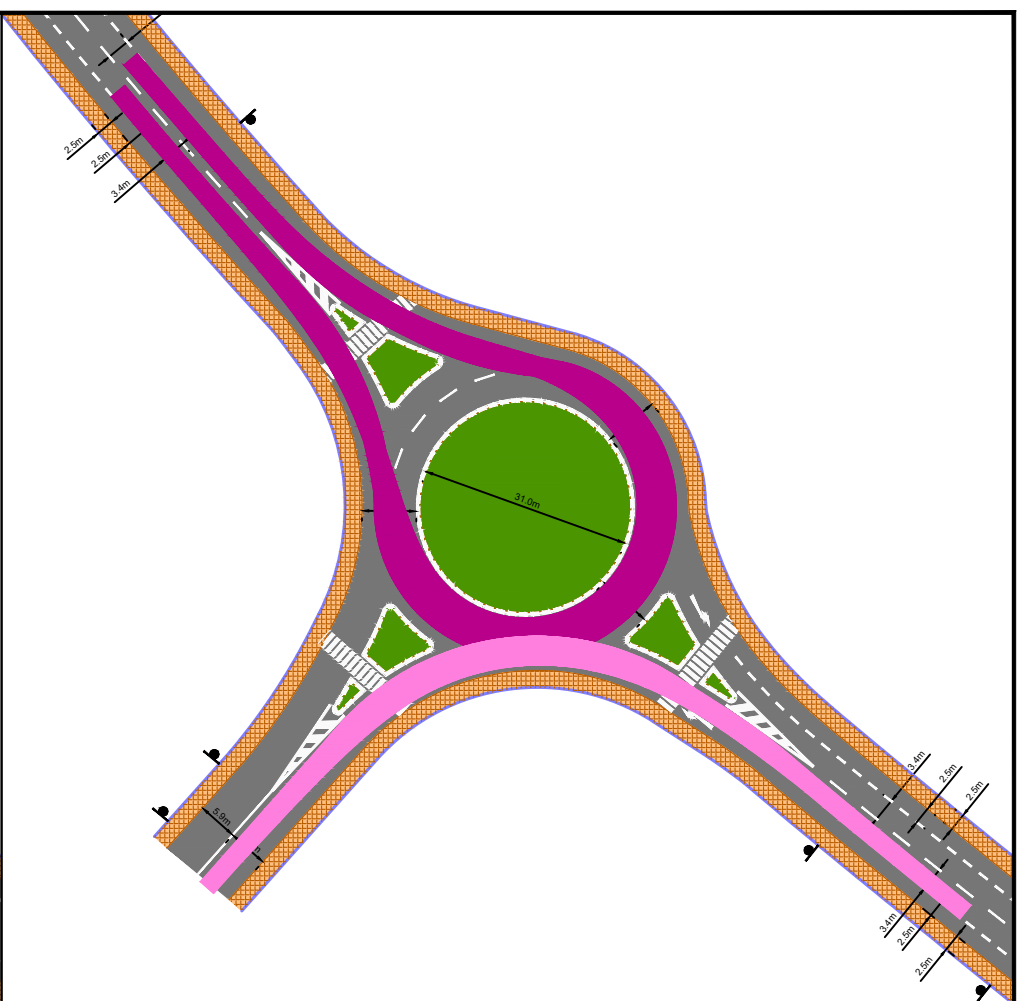
DRAWING TITLE:

MAJOR INTERSECTION AT KM 20+020

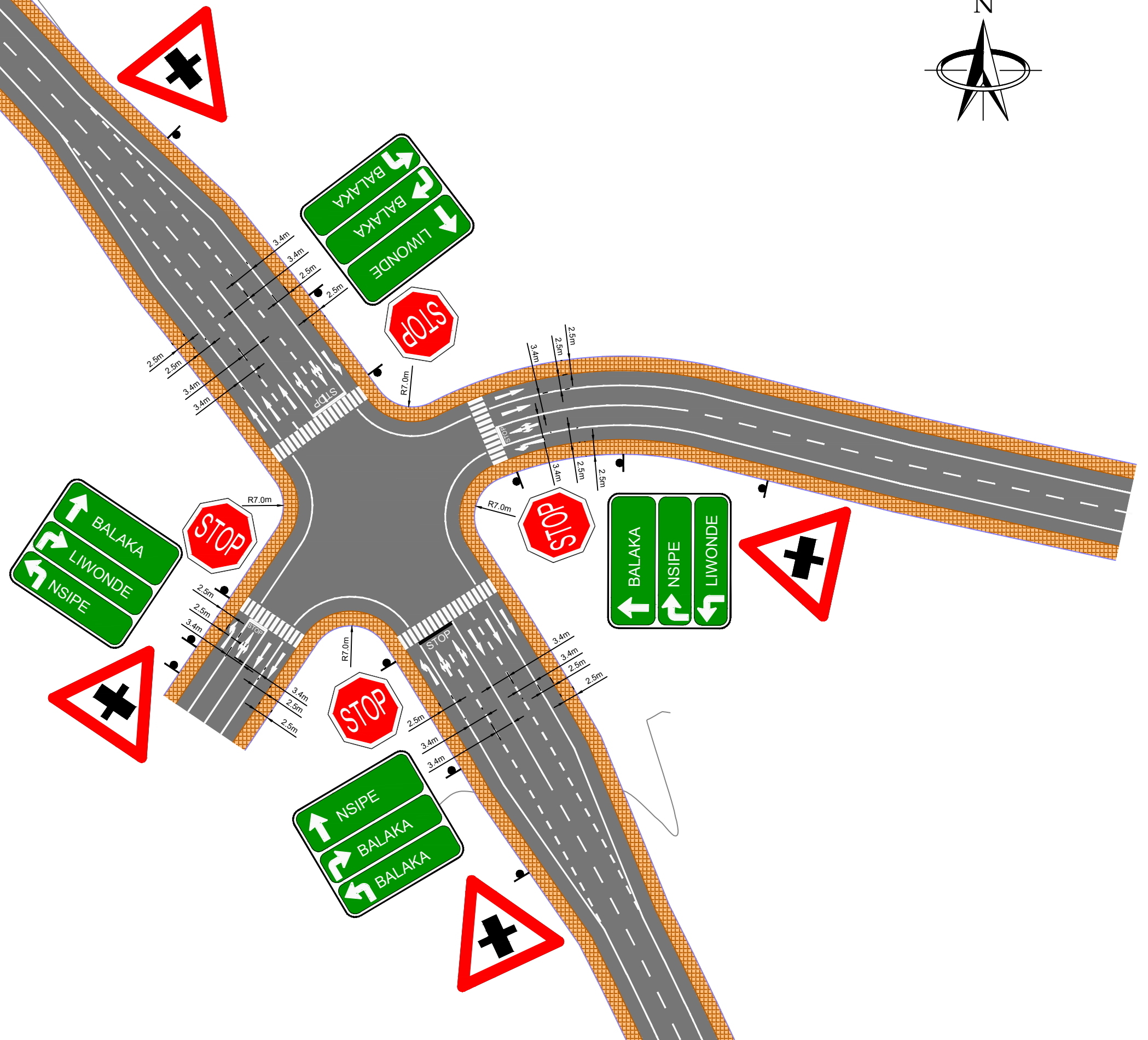
SCALE:



1 : 1000

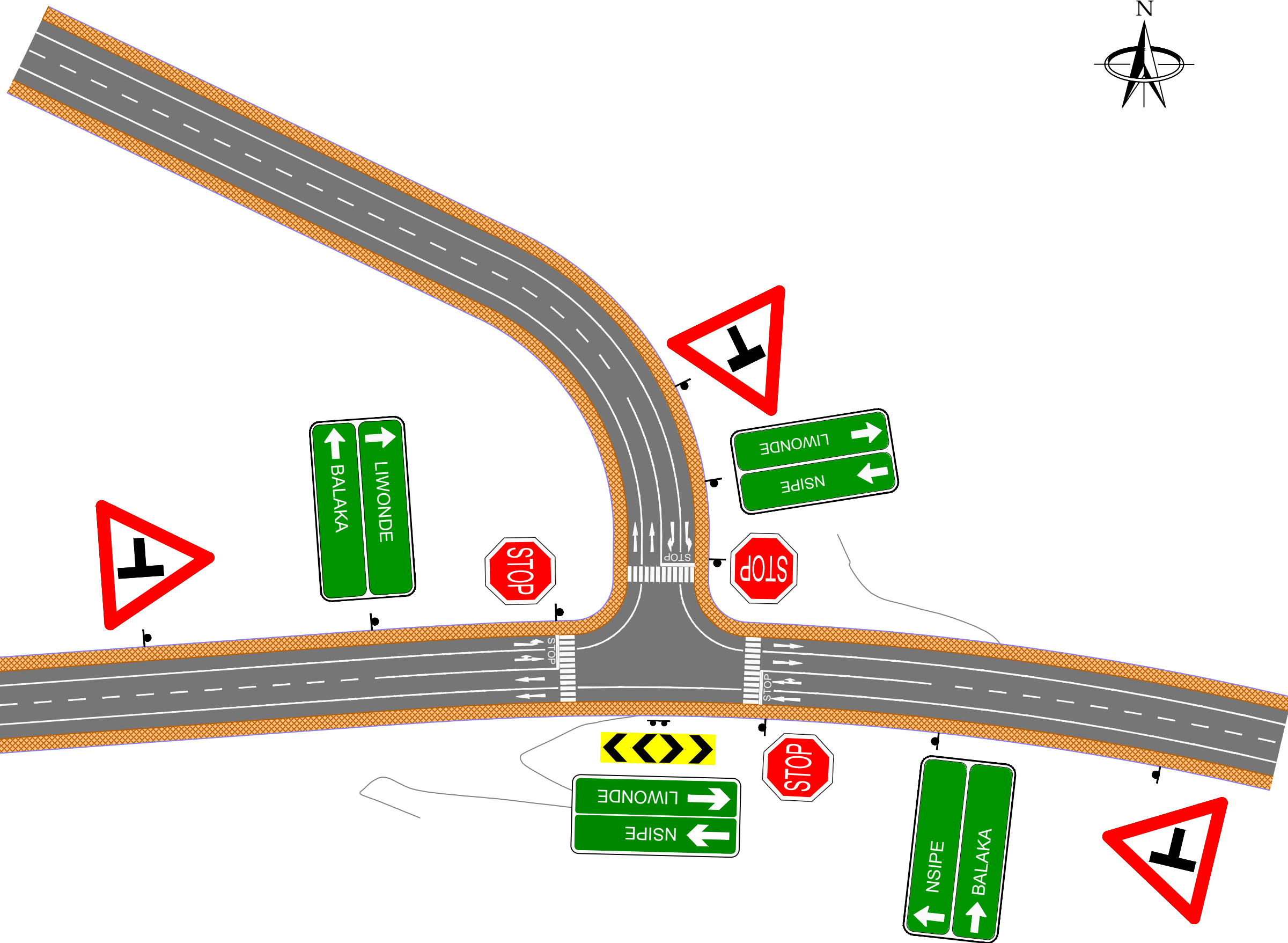
DESIGNED BY	VISHAL JHA / RAMANA	
DRAWN BY	VINAYACHANDRAN	
APPROVED BY	V.V. RAMANA	
DATE	MAY, 2023	SHEET SIZE A3
DRAWING NO.	80087-ALASAIHWYNLMJINT - 02 (SHEET 1 OF 2)	

[illegible]



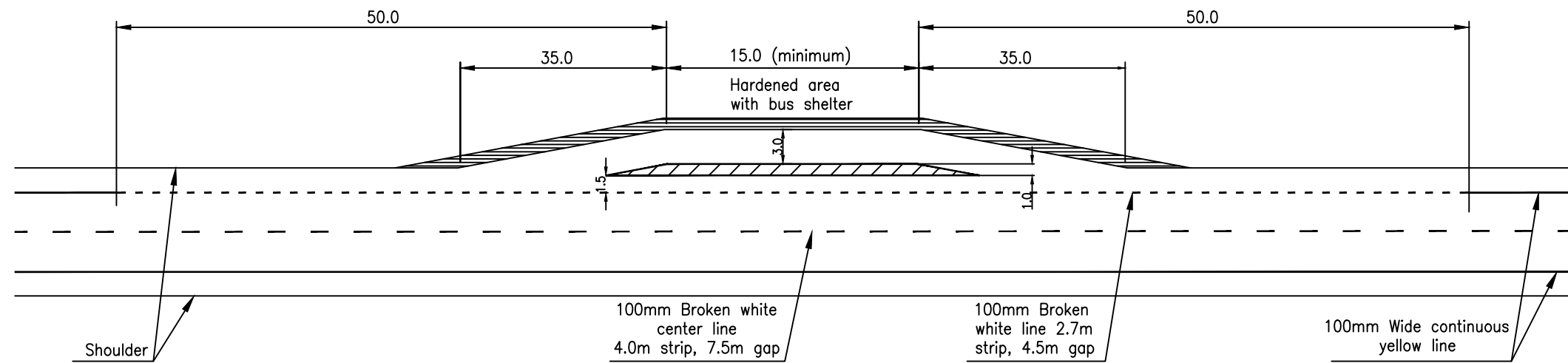


				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: <b>MAJOR INTERSECTION          AT KM 27+300</b>		SCALE: 1 : 750		DESIGNED BY VISHAL JHA / RAMANA			
														DRAWN BY VINAYACHANDRAN			
														APPROVED BY V.V. RAMANA			
MKD. DESCRIPTIONS BY DATE														DATE MAY, 2023		SHEET SIZE A3	
REVISIONS														DRAWING NO. 80087-A\LASAIHWY\NL\MJ\INT - 04			

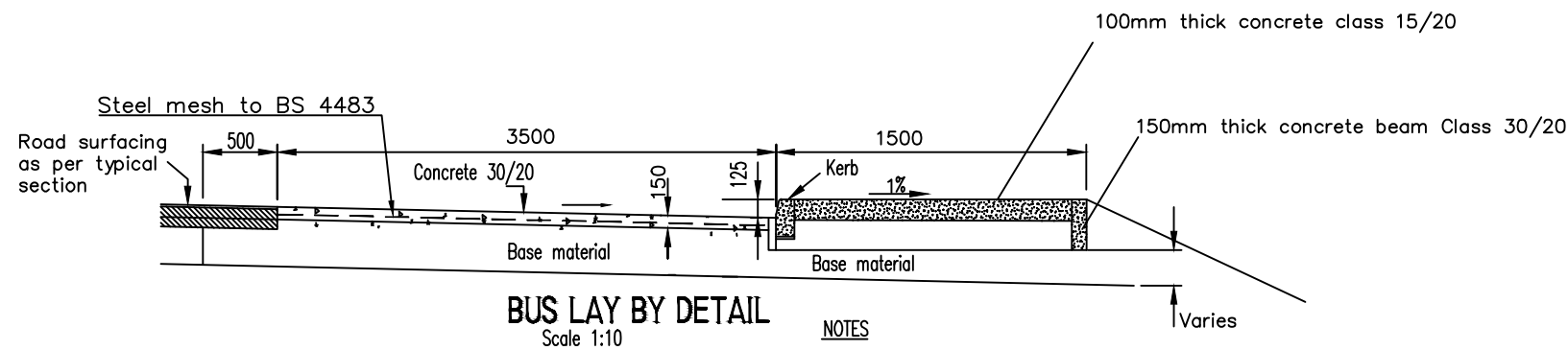


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# **MISCELLANEOUS DRAWINGS**



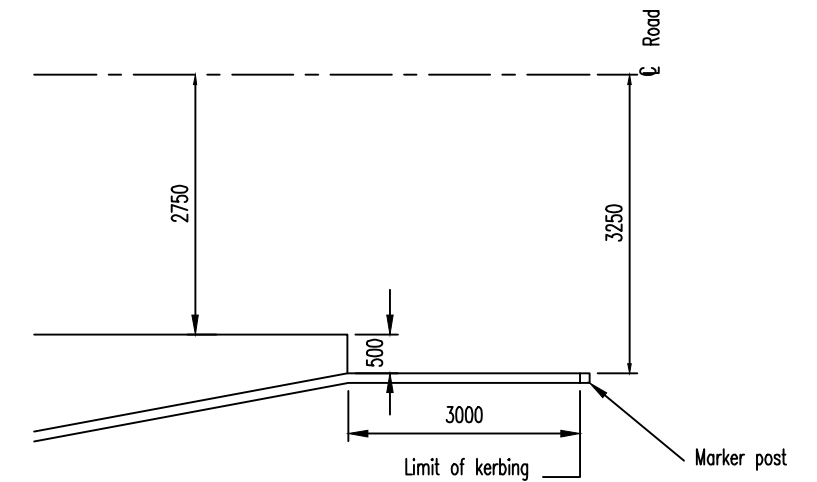
**PLAN**  
Scale 1:250



**BUS LAY BY DETAIL**  
Scale 1:10

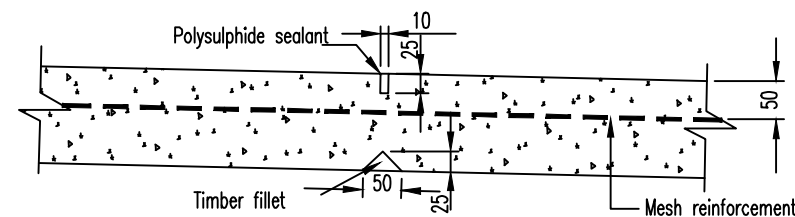
**NOTES**

- Concrete to bus bay reinforced with one layer of A 142 mesh placed 50mm below surface
- Kerb detail as per drainage control kerb.
- Three end kerbs to be ramped down to finished road level.
- Drainage outlets to be provided as directed by the Engineer.
- All dimensions are in millimeter.



**DETAIL AT END OF BUS LAY-BY**  
Scale 1:50

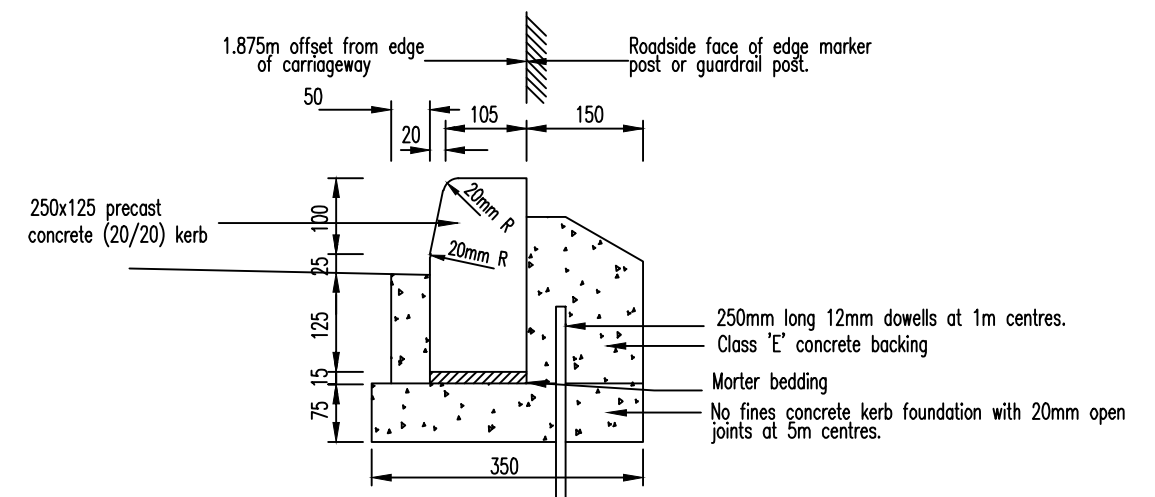
LHS	RHS
4+910	4+815
7+120	7+020
9+060	8+965
10+880	11+080
15+560	15+100
17+420	17+160
20+400	19+820
25+580	25+820
35+670	35+780
39+680	39+520
42+220	42+420
46+340	46+120
49+600	49+480



**BUS LAY BY  
TRANSVERSE JOINT DETAIL**  
Scale 1:5

**NOTE**

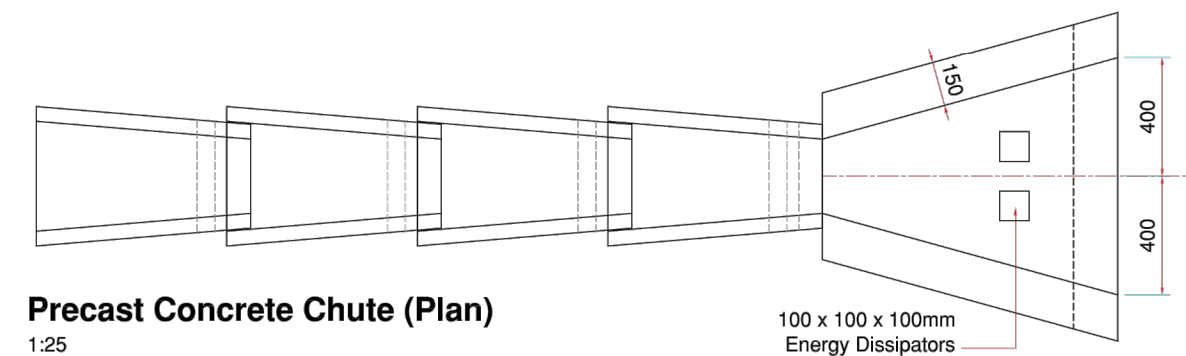
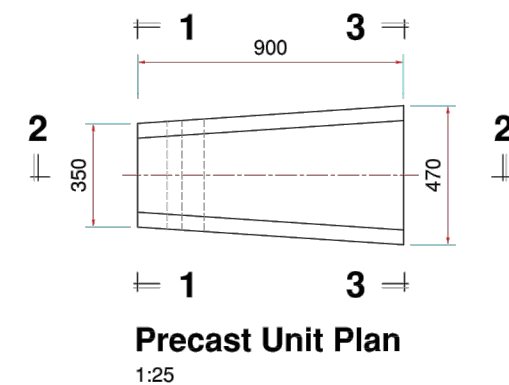
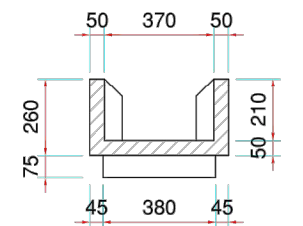
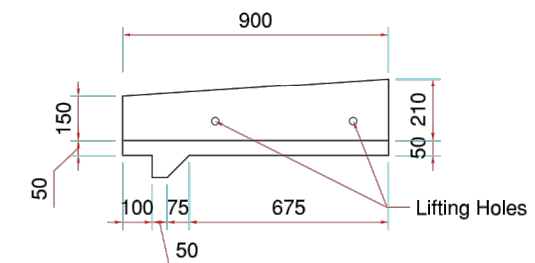
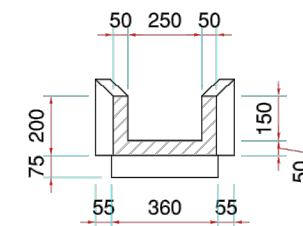
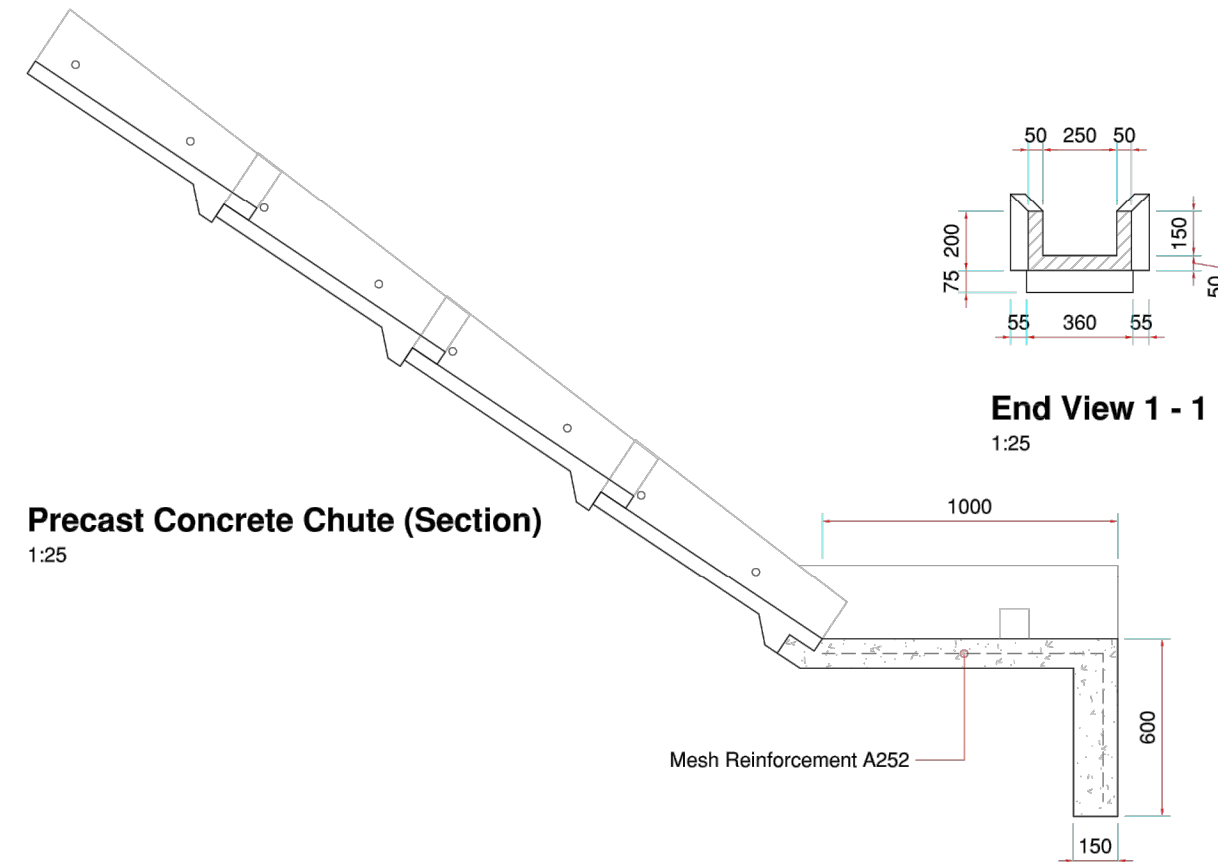
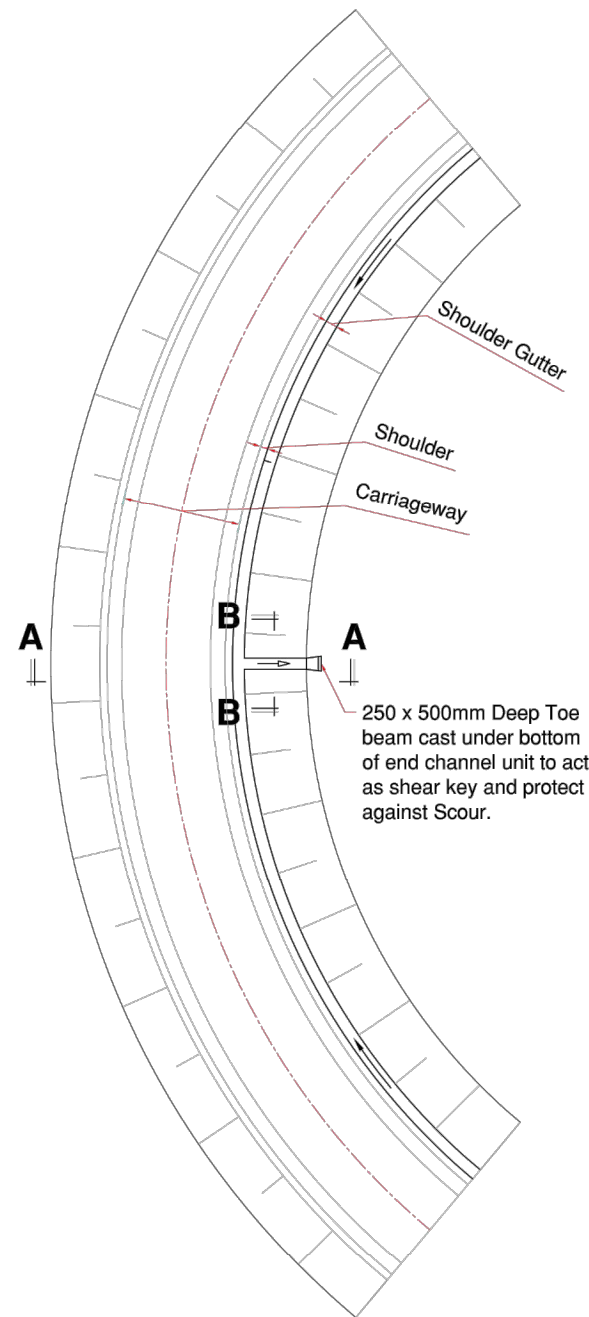
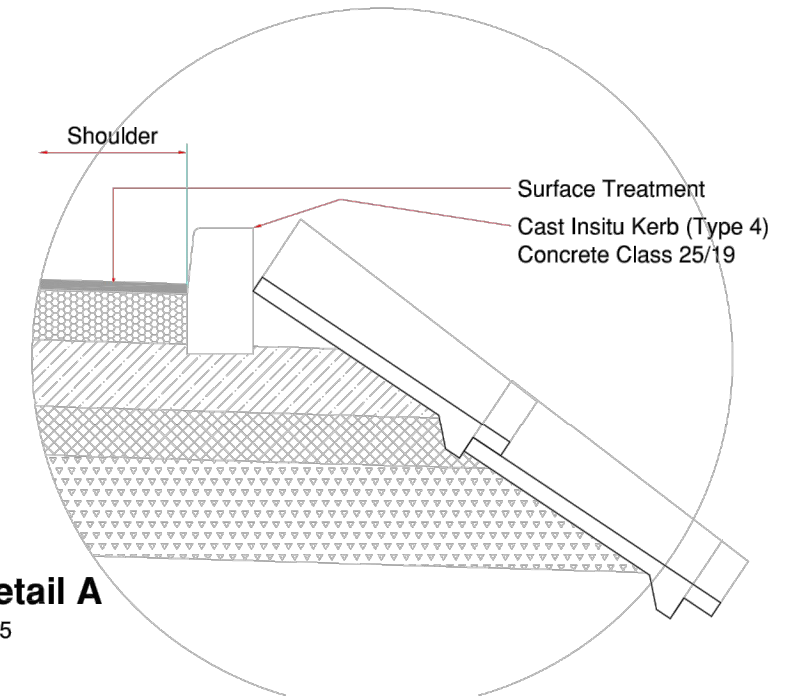
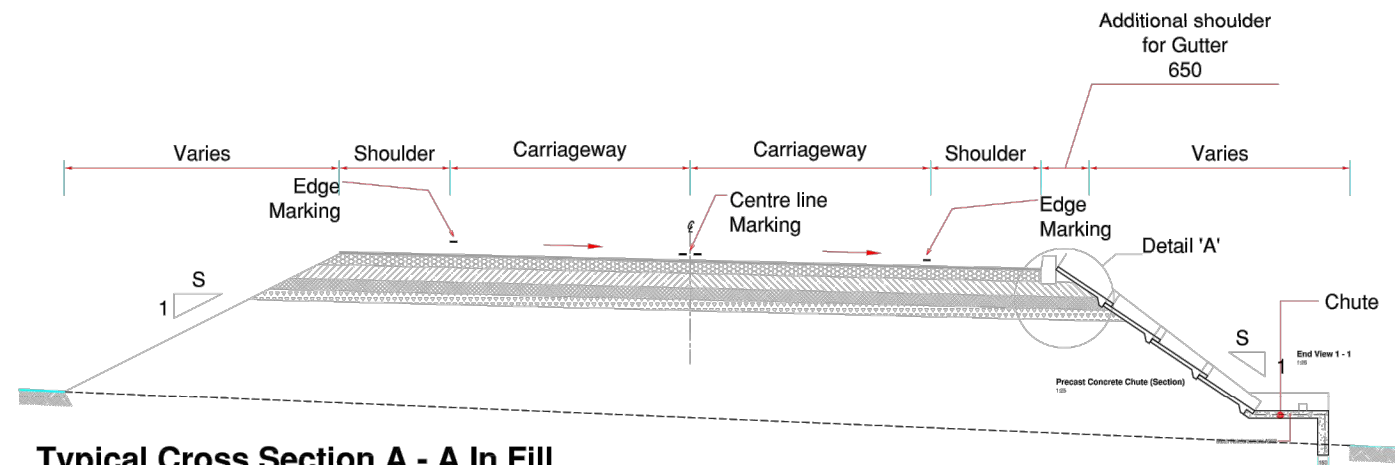
Drainage control kerbs to be placed as indicated on the plan and profile drawings or as instructed by the Engineer.



**DRAINAGE CONTROL KERB DETAIL**  
Scale 1:5

MKD.	REVISIONS	BY	DATE	CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI	DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE: BUS BAY AND KERB DETAILS	SCALE: N.T.S	DESIGNED BY	VISHAL JHA / RAMANA	
									DRAWN BY	VINAYACHANDRAN	
									APPROVED BY	RAMANA	
									DATE	MAY, 2023	SHEET SIZE A3
									DRAWING NO.	80087-A/LASAI/HWYN/LMISC -01	











Note:  
All dimensions are in mm unless otherwise stated.

				CIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:	CONCRETE CHUTE DRAIN DETAILS	SCALE:	N.T.S.	DESIGNED BY	VISHAL JHA / RAMANA	
					CHIEF EXECUTIVE OFFICER									DRAWN BY	VINAYACHANDRAN	
					PRIVATE BAG B346									APPROVED BY	RAMANA	
					LILONGWE									DATE	MAY, 2023	SHEET SIZE A3
MKD.					MALAWI									DRAWING NO.	80087-A/LASAIHWYNLMISC - 02	
				<b>REVISIONS</b>												



S.NO.	DIMENSION	PCC	RCC
		H-0.85m	H-1.0m
1	w	800	1000
2	w1	950	1150
3	t1	200	150
4	t2	200	150
5	t3	200	150

S.NO.	BAR MARKED	SHAPE OF BAR	PCC DRAIN	RCC DRAIN
1	b1		8 $\Phi$ @ 150 c/c	8 $\Phi$ @ 200 c/c
2	b2		8 $\Phi$ @ 150 c/c	8 $\Phi$ @ 175 c/c
3	b3		8 $\Phi$ @ 150 c/c	10 $\Phi$ @ 175 c/c
4	b4		8 $\Phi$ @ 150 c/c	8 $\Phi$ @ 200 c/c

S.NO.	BAR MARKED	SHAPE OF BAR	PCC DRAIN	RCC DRAIN
1	c1		8 $\Phi$ 150 c/c	10 $\Phi$ 200 c/c
2	c2		8 $\Phi$ 150 c/c	10 $\Phi$ 200 c/c



CLIENT:


**THE ROADS AUTHORITY**

CHIEF EXECUTIVE OFFICER

PRIVATE BAG B346

LILONGWE

MALAWI

The logo of The Roads Authority Malawi is a circular emblem. It features a stylized road with a green center and grey sides, leading towards a blue sky with a white sun. The road is flanked by green hills. The words "ROADS AUTHORITY" are written in a semi-circle at the top, and "MALAWI" is written at the bottom. The emblem is flanked by two stylized buildings.

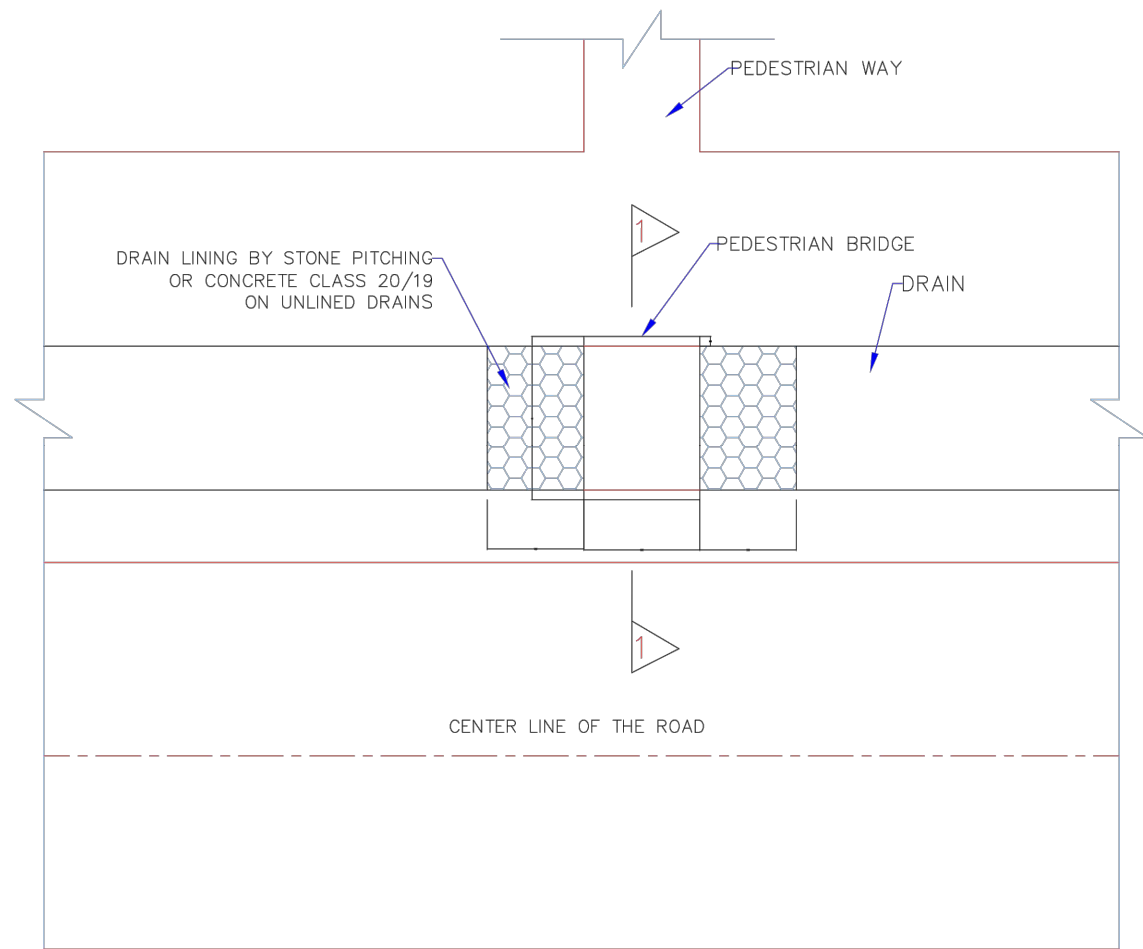
PROJECT:

CONSULTANCY SERVICES FOR PROVISION  
OF ENGINEERING SERVICES FOR THE DESIGN  
REVIEW FOR THE REHABILITATION OF  
NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD

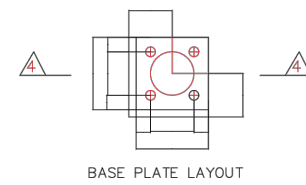
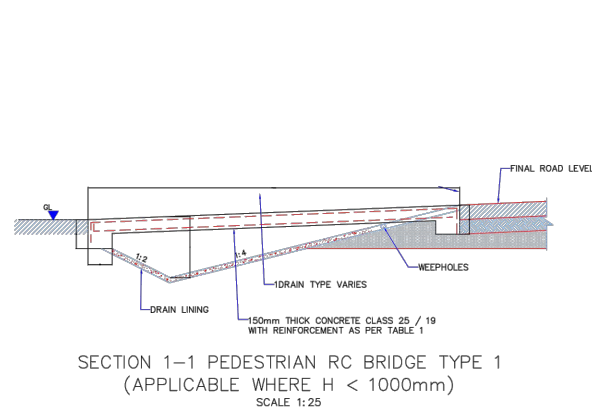
SCALE:

N.T.S

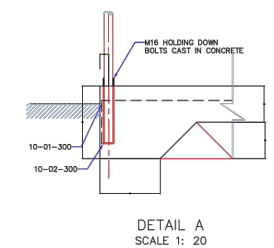
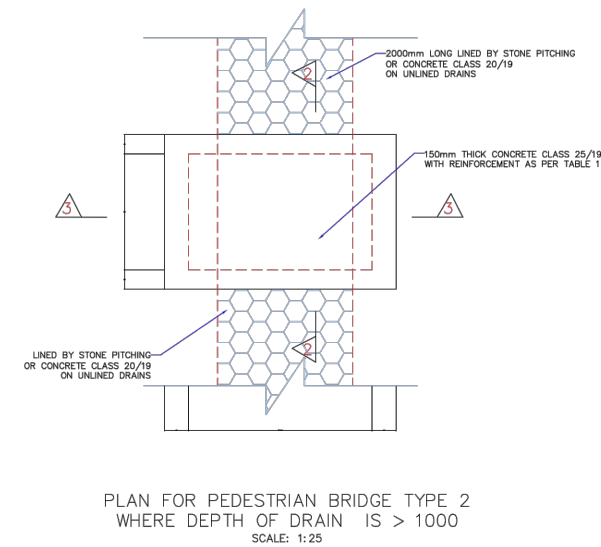
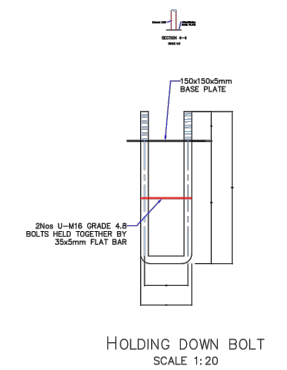
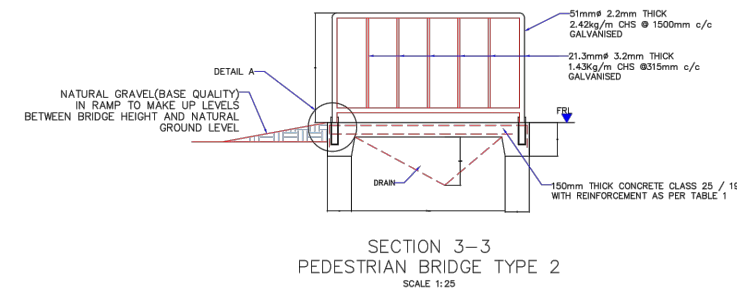
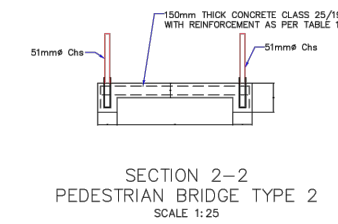
DESIGNED BY	VISHAL JHA / RAMANA	
DRAWN BY	VINAYACHANDRAN	
APPROVED BY	RAMANA	
DATE	MAY, 2023	SHEET SIZE A3
DRAWING NO.	80087-AILASAIHWYINLMISC - 03	



PLAN FOR PEDESTRIAN BRIDGE TYPE 1  
FOR DRAINS H0.6538x  
SCALE 1:50



DRAIN SPAN	W	MESH
2400	3000	REF.395
3000	3600	REF.395
3600	4200	REF.617



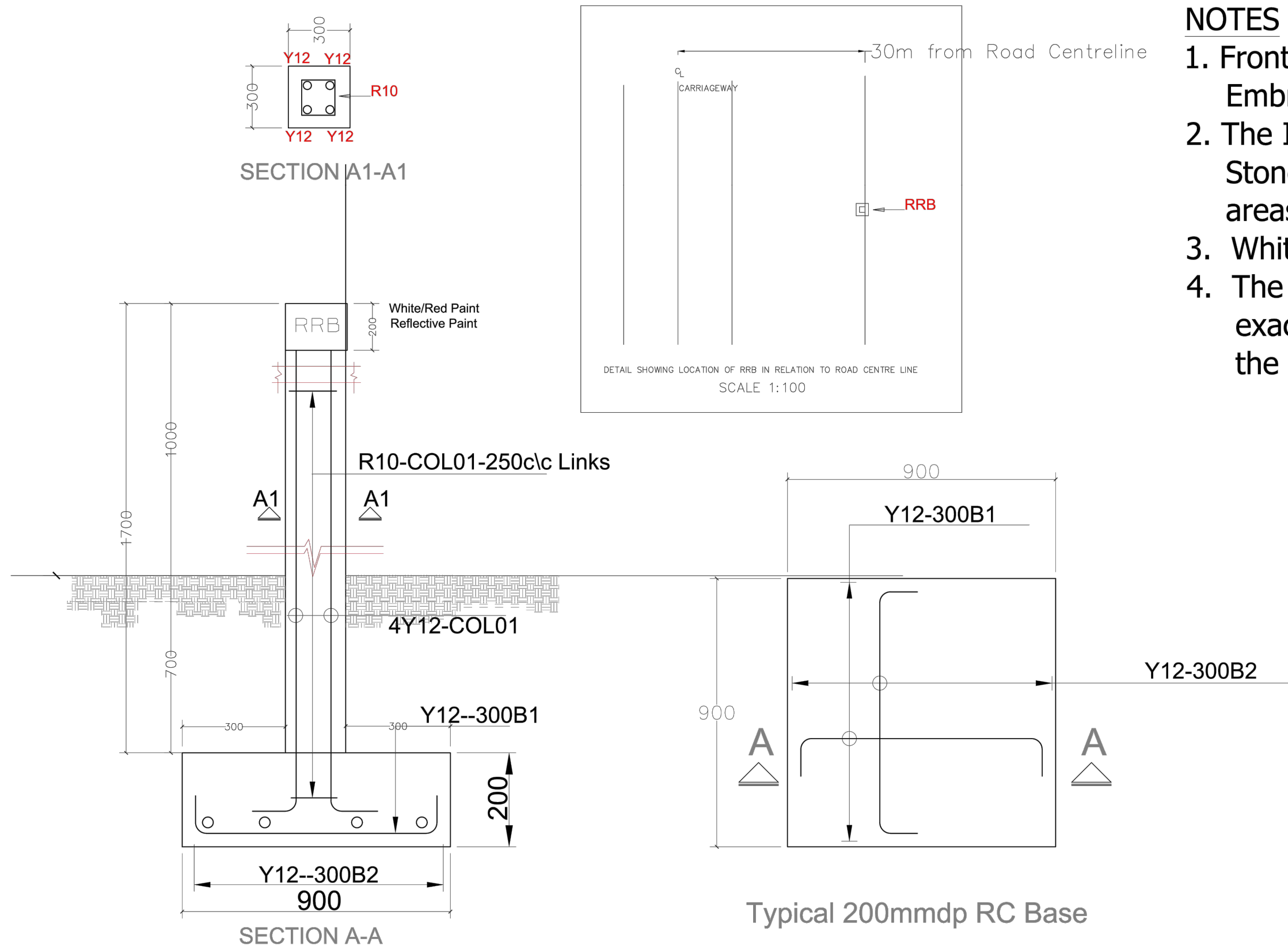
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				CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India	PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW OF THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:	DETAILS OF ROAD RESERVE BOUNDARY	SCALE:	N.T.S	DESIGNED BY	VISHAL JHA / RAMANA		
					CHIEF EXECUTIVE OFFICER									DRAWN BY	VINAYACHANDRAN		
					PRIVATE BAG B346									APPROVED BY	RAMANA		
					LILONGWE									DATE	MAY, 2023	SHEET SIZE A3	
MKD.					DESCRIPTIONS									DRAWING NO.	80087-A/LASA/HWY/NL/WISC - 06		
					REVISIONS												





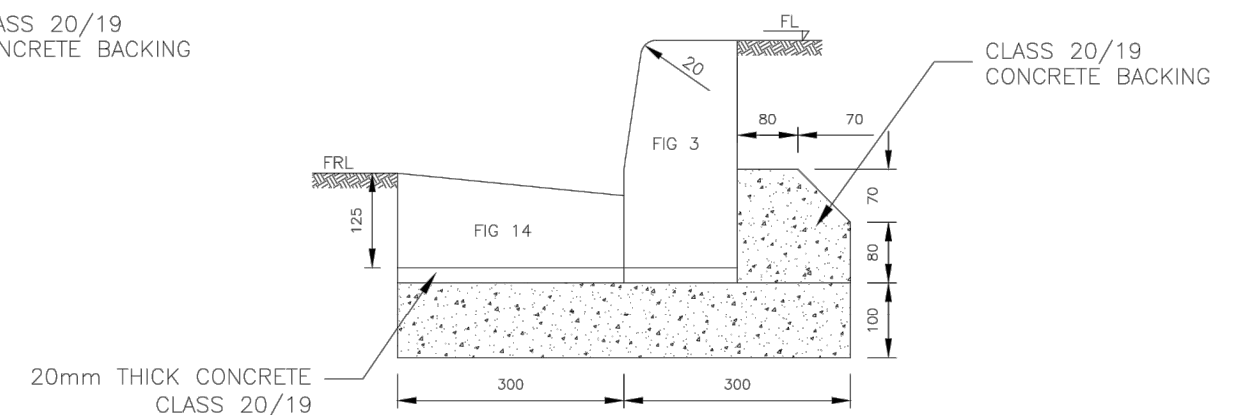
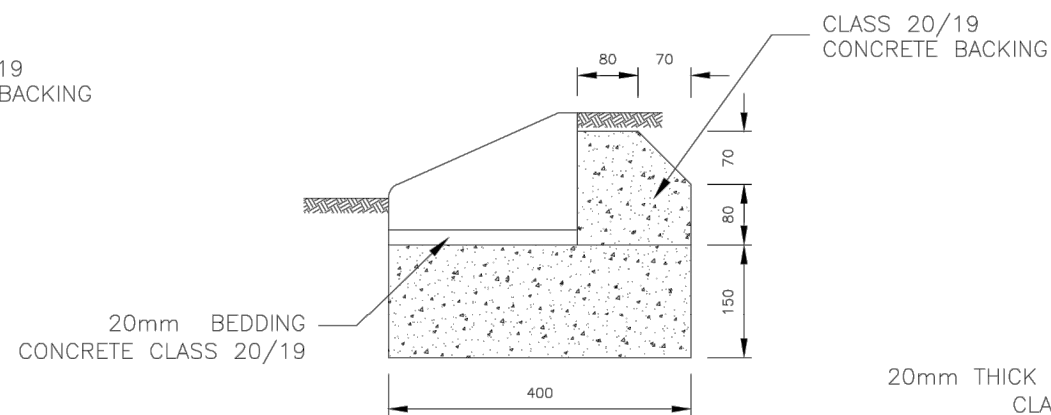
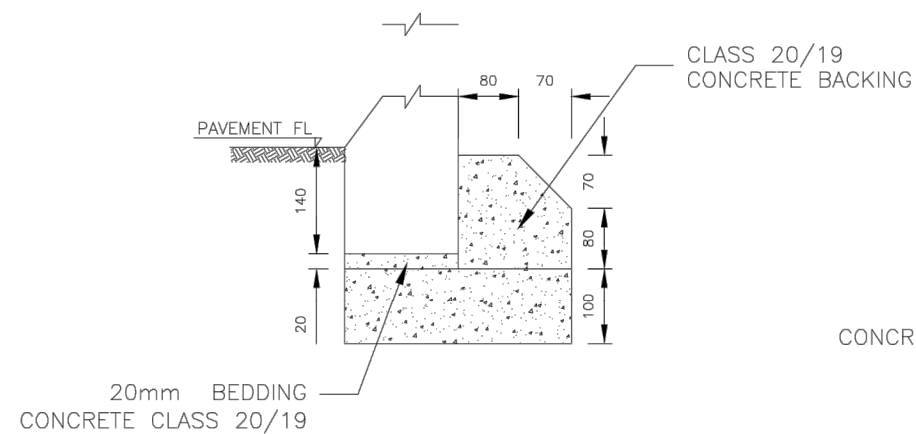
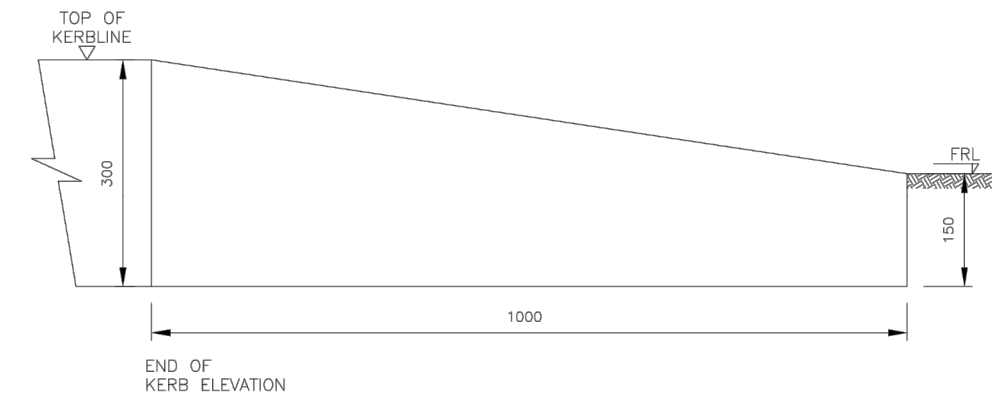
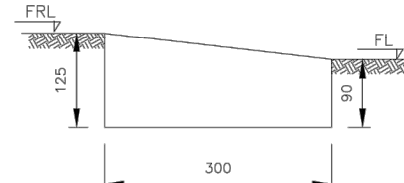
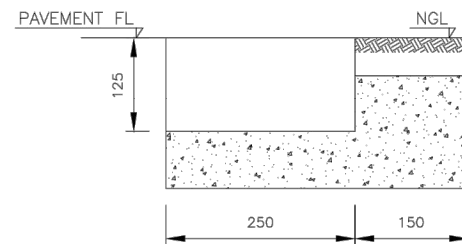
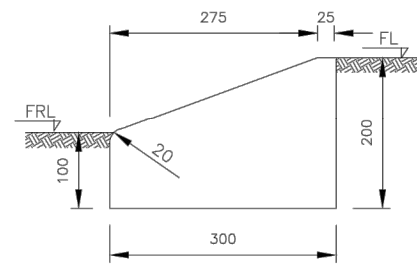
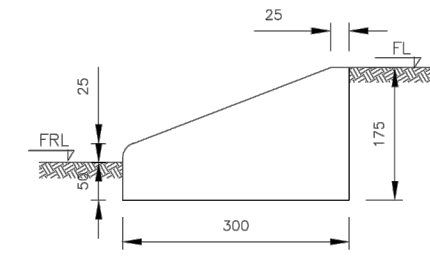
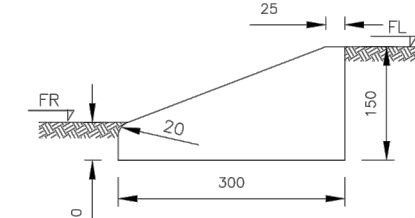
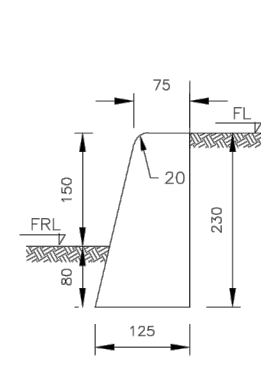
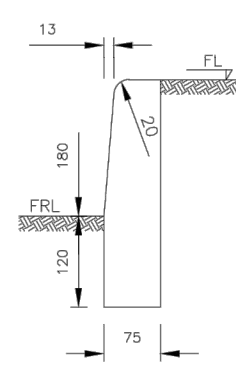
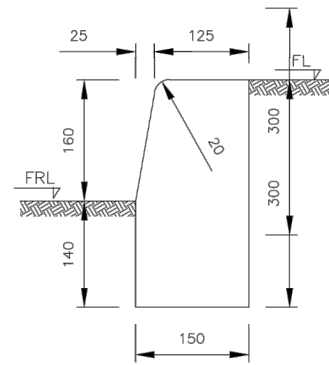
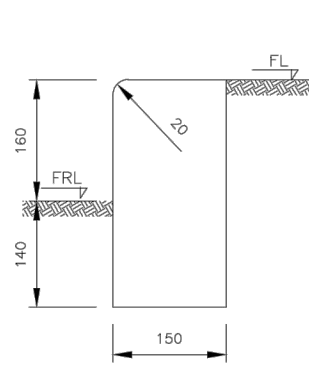






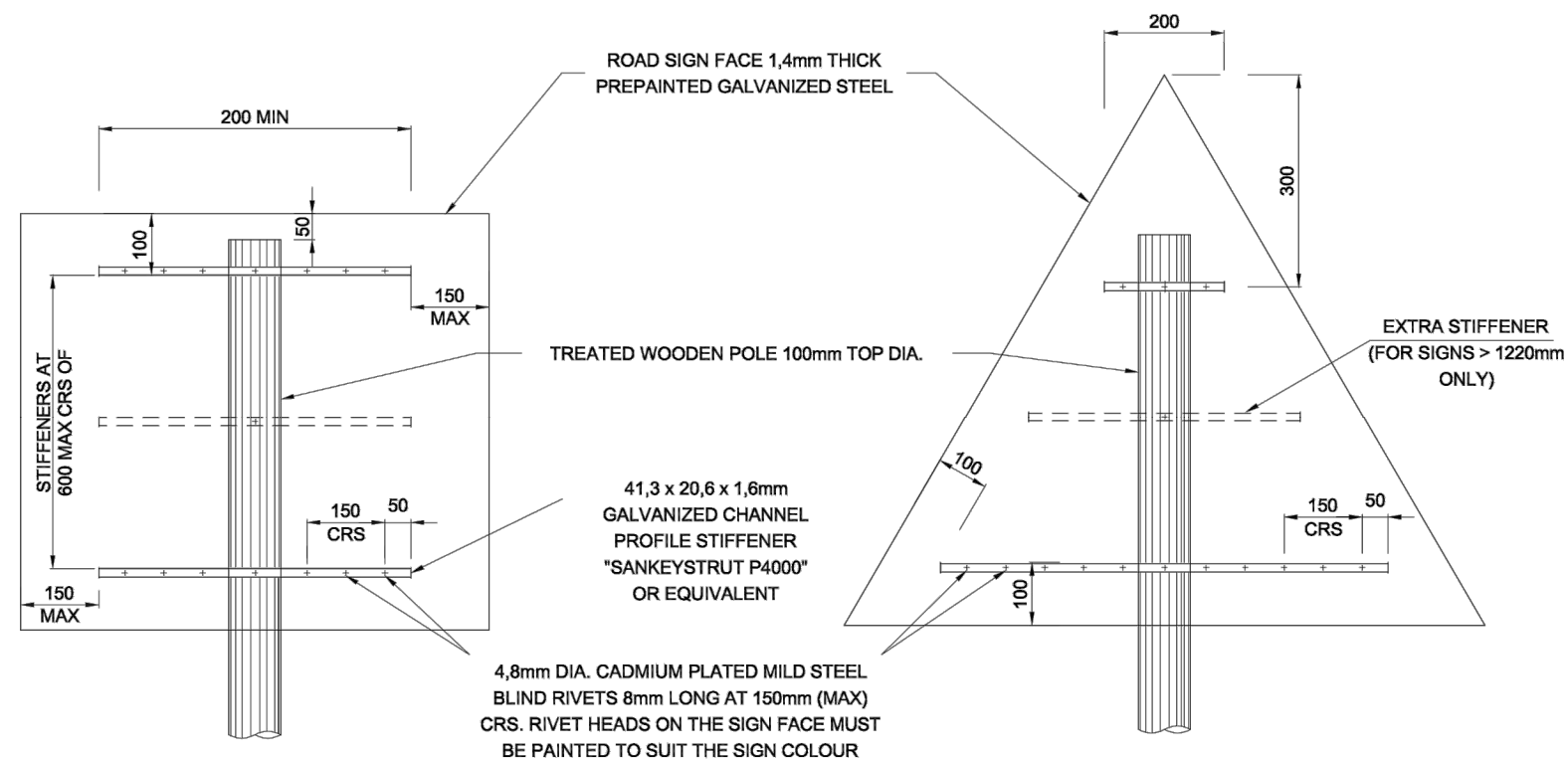
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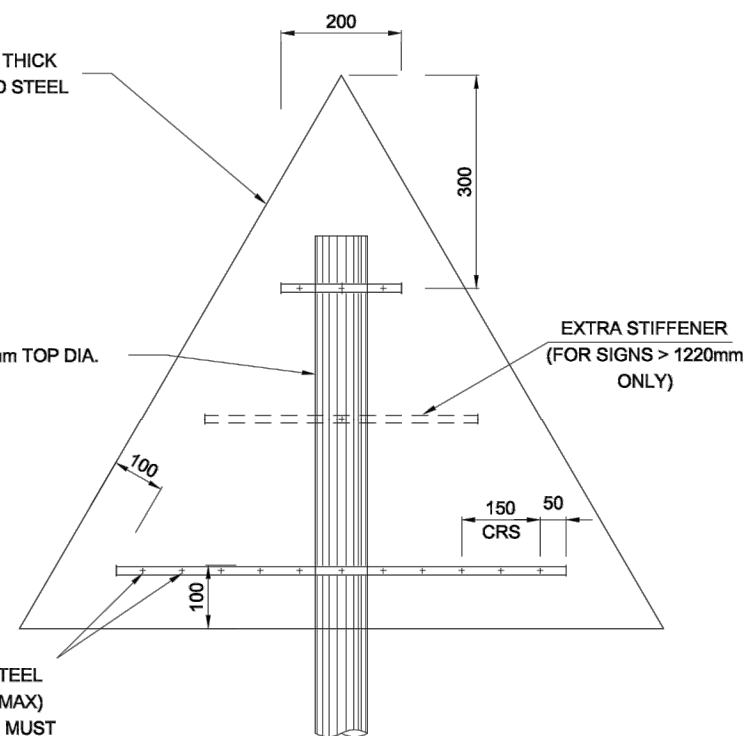


				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW OF THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: KERBSTONE DETAILS		SCALE: N.T.S		DESIGNED BY VISHAL JHA / RAMANA			
														DRAWN BY VINAYACHANDRAN			
														APPROVED BY RAMANA			
MKD. _____ DESCRIPTIONS _____ BY _____ DATE _____														DATE MAY, 2023		SHEET SIZE A3	
REVISIONS														DRAWING NO. 80087-A/LASA/HWY/NL/MISC - 12			

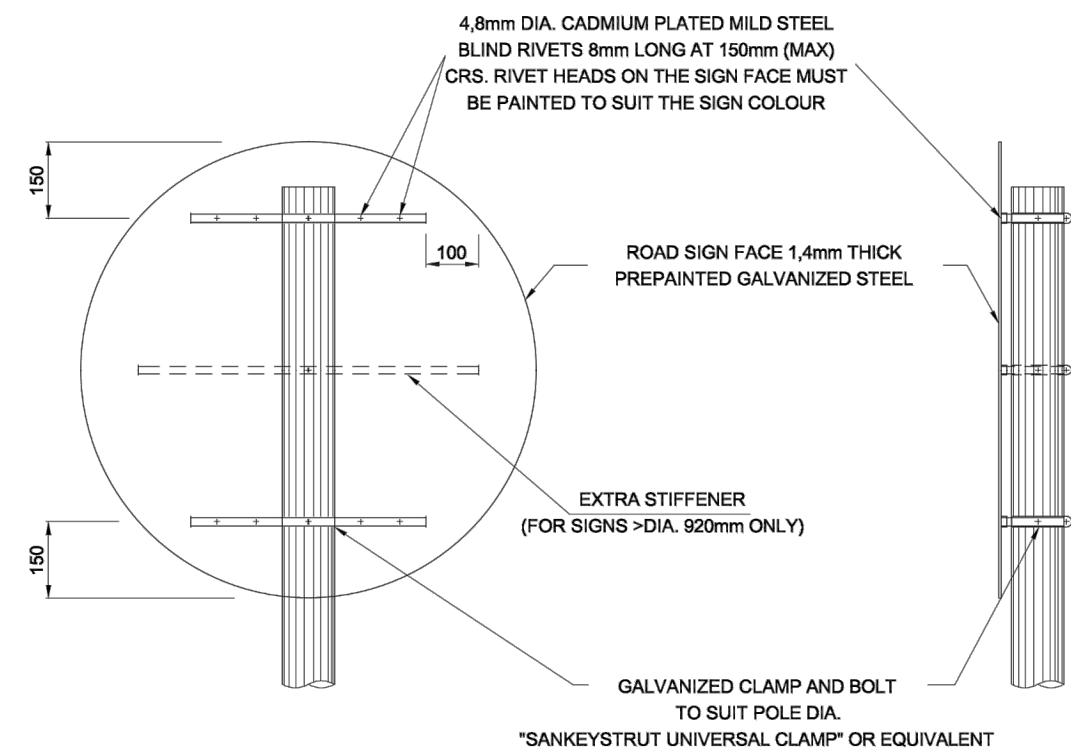




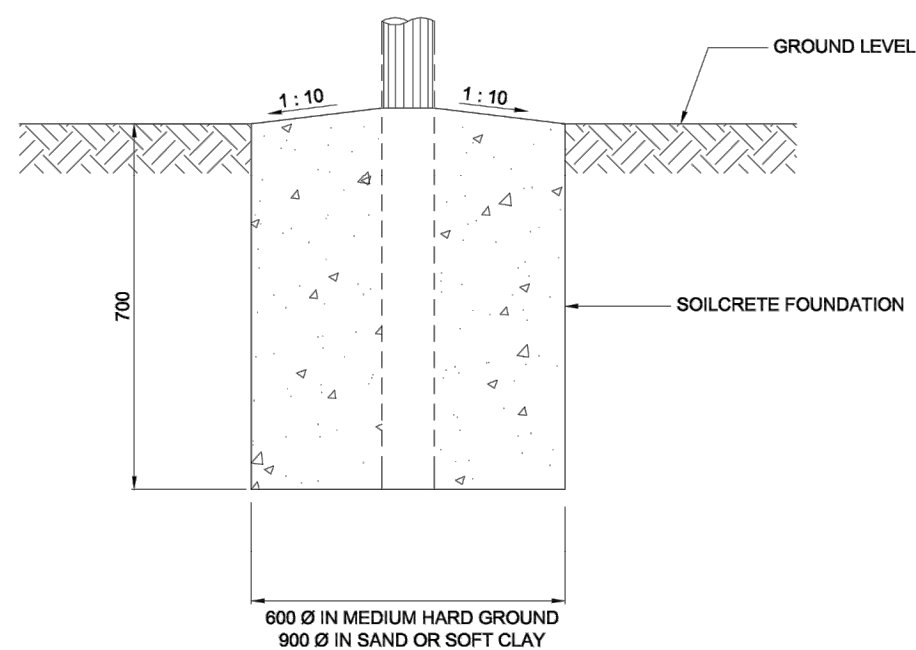
### REAR ELEVATION



### REAR ELEVATION



### REAR ELEVATION



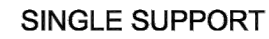
## TYPICAL FOUNDATION

- NOTES :

THE ROAD SIGN FACES SHALL BE MANUFACTURED AND ERECTED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS :

1. DETAILS ON THIS DRAWING ARE APPLICABLE TO ROAD SIGNS SMALLER THAN 1,5m² REQUIRING DOUBLE / SINGLE SUPPORTS.
2. BOLTS, WASHERS AND NUTS SHALL COMPLY WITH THE REQUIREMENTS OF SANS 1700-5-1 AND SHALL BE GALVANISED IN ACCORDANCE WITH THE REQUIREMENTS OF SANS 121 : 2000 (ISO 1461 : 1999).
3. BLIND RIVETS SHALL BE 4.8mm DIA CADMIUM PLATED MILD STEEL.
4. REFERENCE MUST BE MADE TO THE RELEVANT ROAD SIGNS DETAIL DRAWING FOR DETAILS OF THE ROAD SIGN SYMBOLS AND LEGEND FOR EACH INDIVIDUAL SIGN.

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE:		SCALE: N.T.S		DESIGNED BY: VISHAL JHA / RAMANA			
														DRAWN BY: VINAYACHANDRAN			
														APPROVED BY: RAMANA			
MKD. _____ DESCRIPTIONS _____ BY _____ DATE _____														DATE: MAY, 2023		SHEET SIZE A3	
REVISIONS														DRAWING NO. 80087-A/LASA/HWYN/L/MISC -14			



## REINFORCEMENT FOR CIRCULAR ROAD SIGNS

SCALE 1 : 20



## REINFORCEMENT FOR STOP SIGNS

SCALE 1 : 20



## DOUBLE SUPPORT

- ## REINFORCEMENT FOR TRIANGULAR ROAD SIGNS

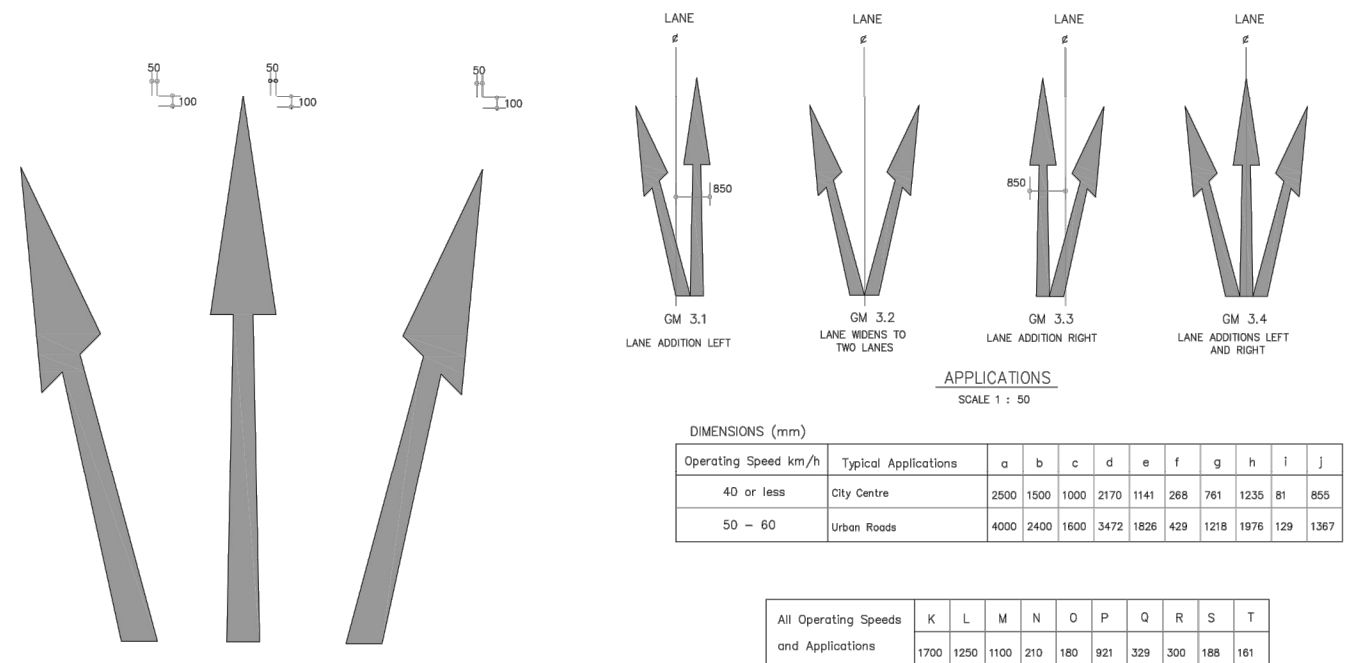
SCALE 1 : 20

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: MOUNTING DETAILS OF STOP SIGN		SCALE: N.T.S		DESIGNED BY VISHAL JHA / RAMANA			
														DRAWN BY VINAYACHANDRAN			
														APPROVED BY RAMANA			
MKD. _____ DESCRIPTIONS _____ BY _____ DATE _____														DATE MAY, 2023		SHEET SIZE A3	
REVISIONS														DRAWING NO. 80087-A/LASA/HWY/NL/MISC - 15			







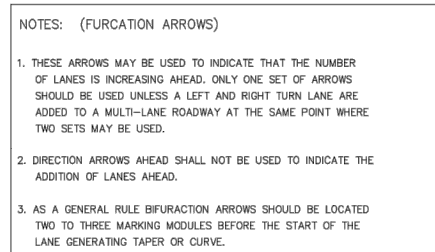


Operating Speed km/h	Typical Applications	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
40 or less	City Centre	2500	600	350	450	884	200	417	1000	1700	250	550	1250	700	380	1450	58	30	29
50 – 90	Urban/Rural Expressway	4000	960	560	720	1406	320	666	1600	2720	400	880	2000	1120	608	2320	93	48	46

All Operating Speeds and Applications	N	O	P	Q	R	S	T
	210	180	350	300	500	400	600

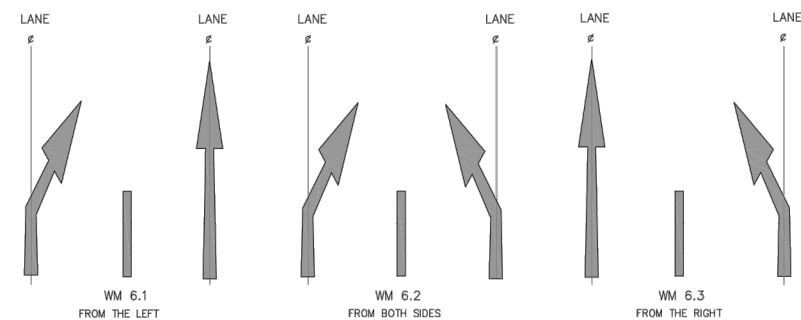
ARROW AREA / (m <sup>2</sup> )				
α	RM8.1/RM8.5 WM7.1/WM7.5	RM8.2/RM8.4 WM7.2/WM7.4	RM8.3 WM7.3	RM8.6 WM7.6
2500	0.67	0.89	0.66	1.03
4000	1.14	1.43	1.06	1.68

1. THESE ARROWS MAY BE USED IN LANES TO INDICATE THAT DRIVERS SHALL PROCEED ONLY IN THE DIRECTION OR DIRECTIONS SHOWN. THEY SHOULD ONLY BE USED IF THE JUNCTION CONCERNED REQUIRED TURNING MOVEMENT CONTROL BY LANE.
2. THE FINAL ARROW NEAREST THE POINT OF TURN OR STRAIGHT ON MOVEMENT SHALL BE YELLOW. ANY ARROWS MARKED IN ADVANCE OF THIS POINT TO WARN DRIVERS OF THE MANDATORY MOVEMENT AHEAD SHALL BE WHITE.
3. A MANDATORY OR WARNING DIRECTION ARROW SHALL NOT BE USED IN ADVANCE OF A WIDENING OF THE ROADWAY TO A GREATER NUMBER OF LANES. THIS SHALL BE INDICATED IF NECESSARY, BY USING FURNISHING ARROWS.



ARROW AREA / (m <sup>2</sup> )			
α	GM3.1/GM3.3	GM3.2	GM3.4
2500	1.30	1.27	1.93
4000	2.07	2.04	3.09

FURCATION ARROWS



APPLICATIONS  
SCALE 1 : 50

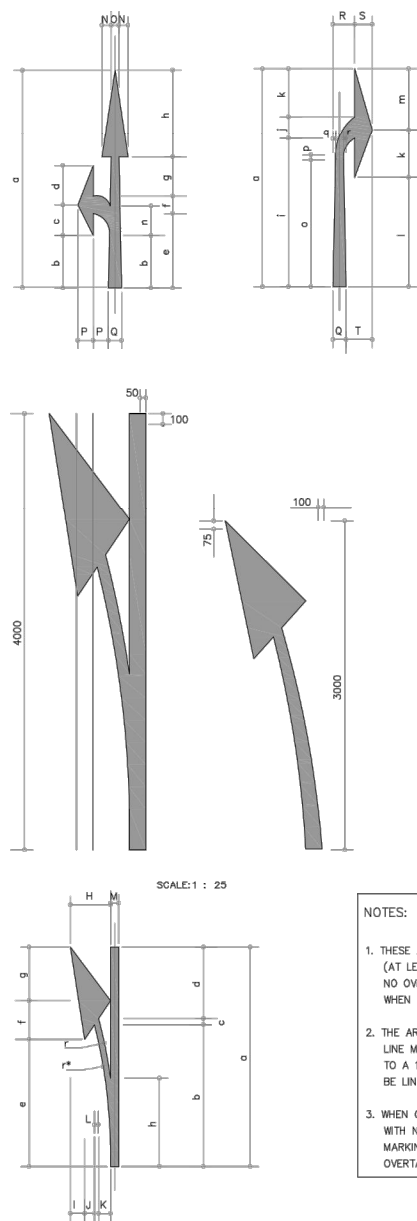
DIMENSIONS (mm)												
Operating Speed km/h	Typical Applications	a	b	c	d	e	f	g	h	i	j	k
40 or less	City Centre	4000	2400	1600	3200	1271	847	227	855	1696	1277	1126
50 – 60	Urban Roads	5000	3000	2000	4000	1589	1058	284	1069	2120	1596	1407

All Operating Speeds and Applications	M	N	O	P	Q	R	S	T	U	V
	300	210	180	1300	898	402	155	370	32	390

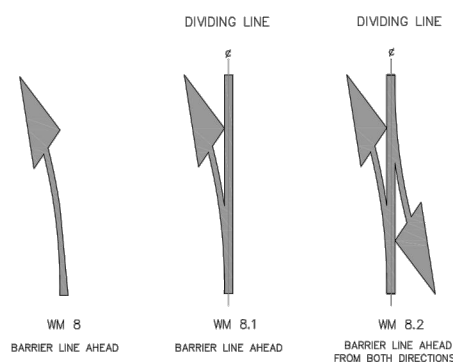
1. IT IS RECOMMENDED THAT THREE SETS OF ARROWS BE USED ON HIGH SPEED ROADS, SPACED AT FOUR MODULE INTERVALS BEFORE THE END OF THE LANE LINE. SINGLE ARROWS SETS MAY BE USED ON LOWER SPEED ROADS.
2. THE BENT ARROWS MAY BE USED IN ADDITION TO THE THREE-ARROW SETS ALONG THE LENGTH OF THE LANE REDUCTION TAPER.

ARROW AREA / (m <sup>2</sup> )		
α	WM6.1/WM6.3	WM6.2
4000	2.08	2.06
5000	2.61	2.58

LANE REDUCTION ARROWS



## MANDATORY DIRECTION ARROWS



DIMENSIONS (mm)										
Typical Applications	a	b	c	d	e	f	g	h	r	r*
Urban	3000	1941	83	976	1741	528	731	1206	5620	5820

All Applications	H	I	J	K	L	M
	735	260	181	219	75	100 or 150

MARKING SPACING

ARROW AREA / (m <sup>2</sup> )	
a	Per Arrow
3000	0.62
4000	0.82

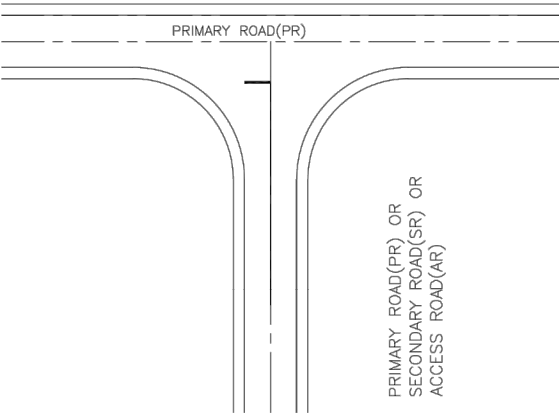
### BARRIER LINE AHEAD ARROWS

1. THESE ARROWS SHOULD BE USED IN MULTIPLES OF THREE (AT LEAST) IN ADVANCE OF THE START OF A SECTION OF NO OVERTAKING LINE, NO CROSSING LINE OR PAINTED ISLAND WHEN SUCH BARRIER LINES REPLACE A DIVIDING LINE.
2. THE ARROWS MAY BE MARKED ON TOP OF EXISTING DIVIDING LINE MARKINGS (IF THE EXISTING LINE IS A CENTRE LINE TO A 12m or 7.2m MODULE THE POINT OF THE ARROW SHOULD BE LINED UP WITH THE FORWARD END OF THE LINE).
3. WHEN OVERTAKING SECTIONS ARE REGULARLY INTERSPERSED WITH NO OVERTAKING SECTIONS AND ARE SHORT IN LENGTH MARKING WM 8.2 MAY BE USED AT THE CENTRE OF THE OVERTAKING SECTION.

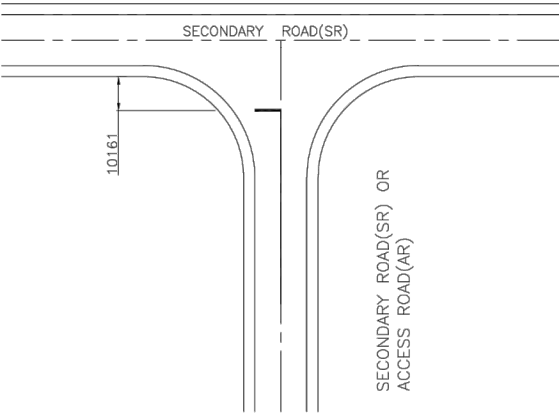
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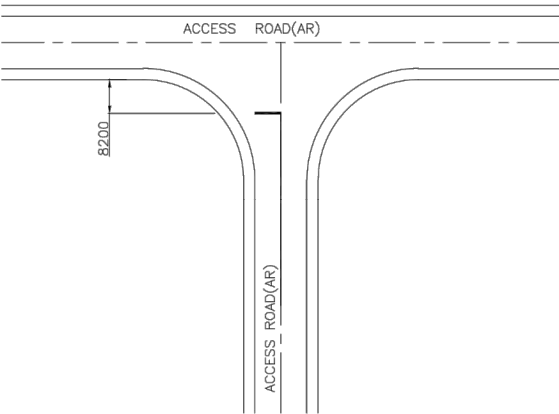




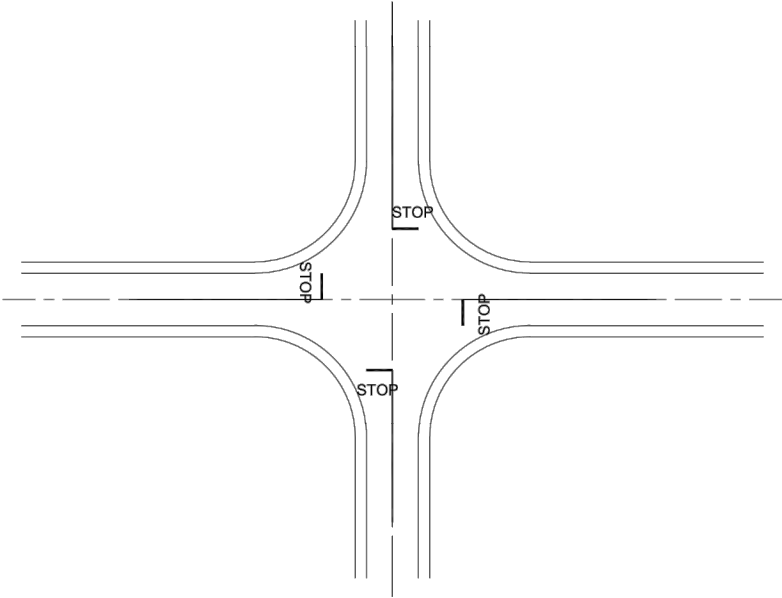
PRIMARY ROAD, SECONDARY ROAD AND ACCESS ROAD INTERSECTION WITH A PRIMARY ROAD



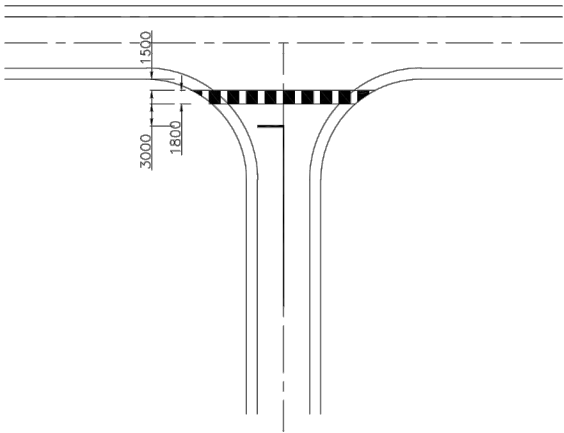
SECONDARY ROAD AND ACCESS ROAD INTERSECTION WITH A SECONDARY ROAD



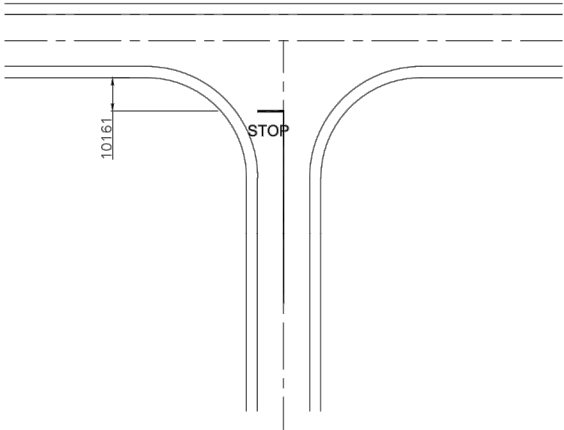
ACCESS ROAD INTERSECTION WITH AN ACCESS ROAD



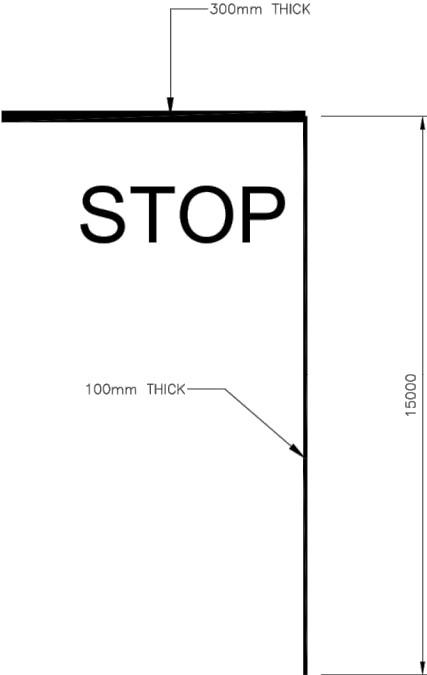
TYPICAL FOUR WAY JUNCTION



TYPICAL STOP SIGNAGE AT JUNCTIONS WITH PEDESTRIAN CROSSING



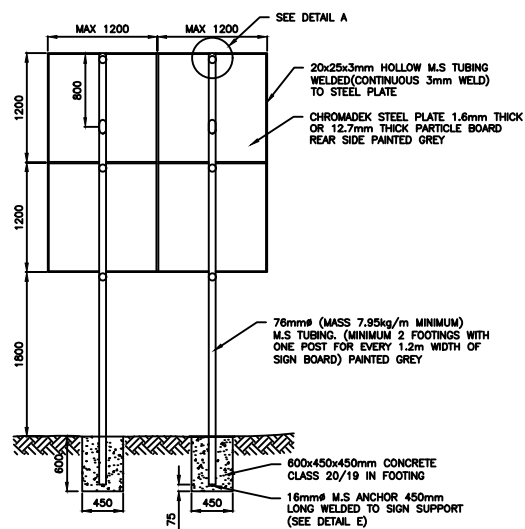
TYPICAL STOP SIGNAGE AT JUNCTIONS WITH NO PEDESTRIAN CROSSING



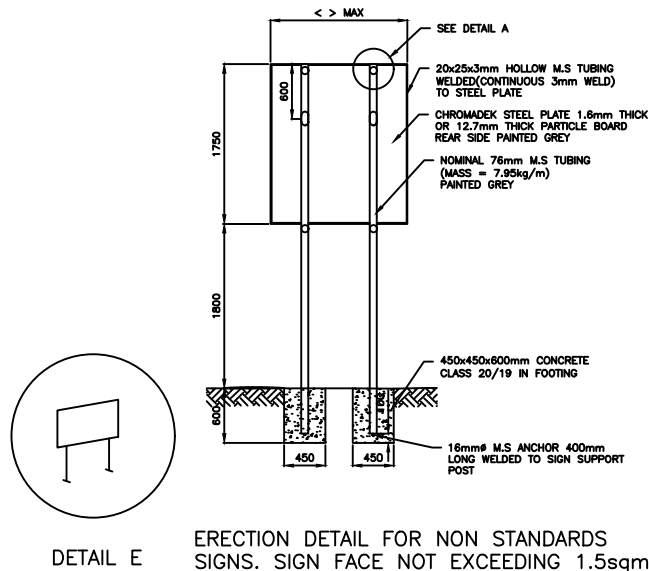
L = 15m FOR ACCESS ROAD  
L = 30m FOR SECONDARY ROAD  
L = 60m FOR PRIMARY ROAD

STOP MARK  
SCALE 1 : 100

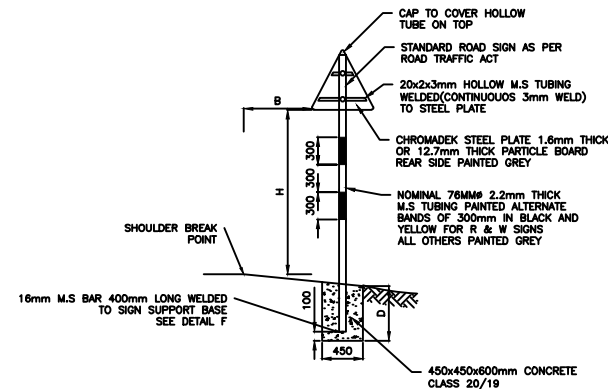
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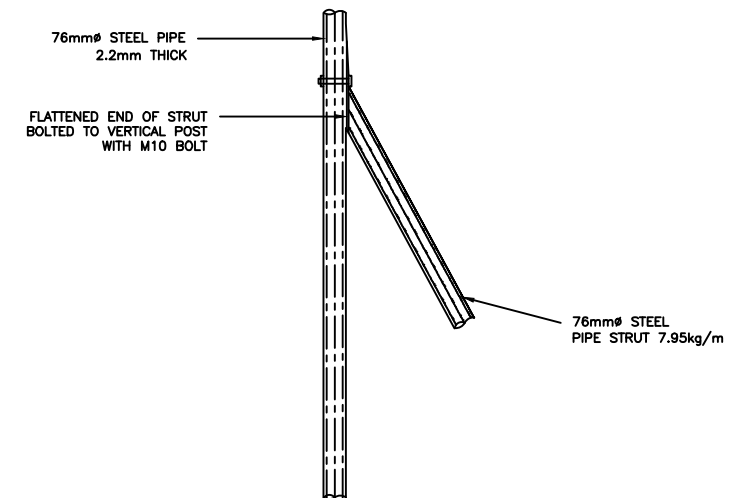
ERECTION DETAIL FOR NON STANDARDS  
SIGNS. SIGN FACE EXCEEDING 1.5sqm



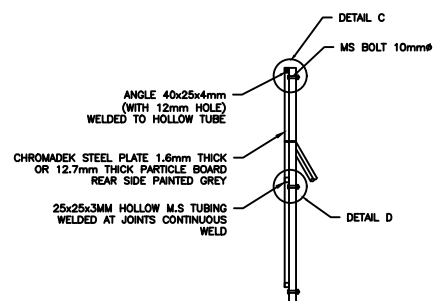
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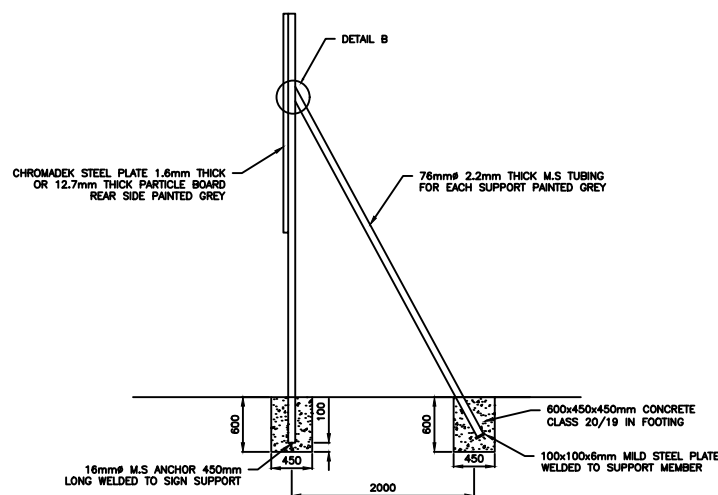
STANDARD SIGN PLACEMENT DETAIL



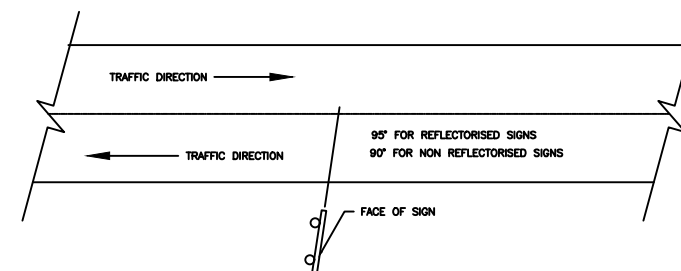
DETAIL B  
SCALE 1:25



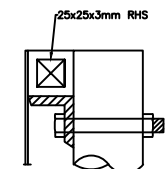
DETAIL A



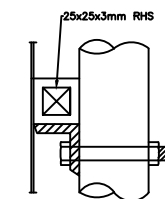
SIDE ELEVATION DETAIL  
FOR NON STANDARD SIGNS  
SCALE 1:40



SIGN FACING DETAIL



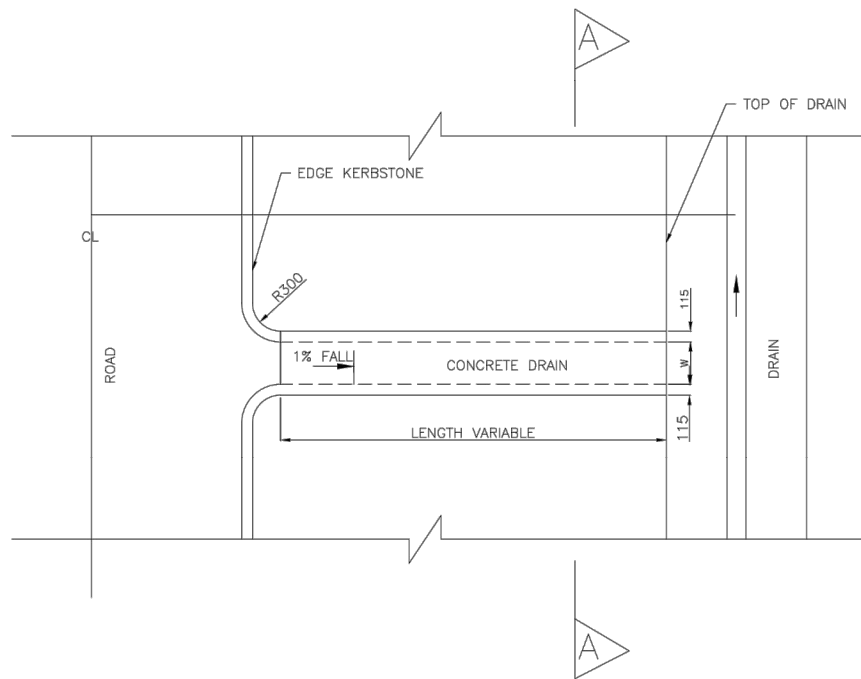
DETAIL C



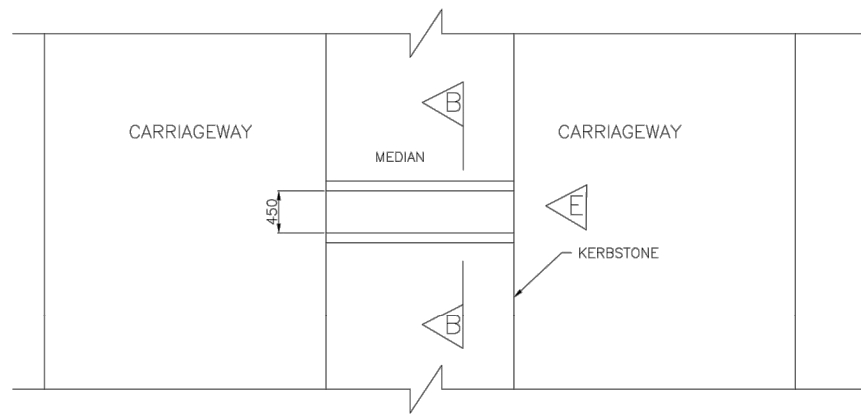
DETAIL D  
SCALE 1:4

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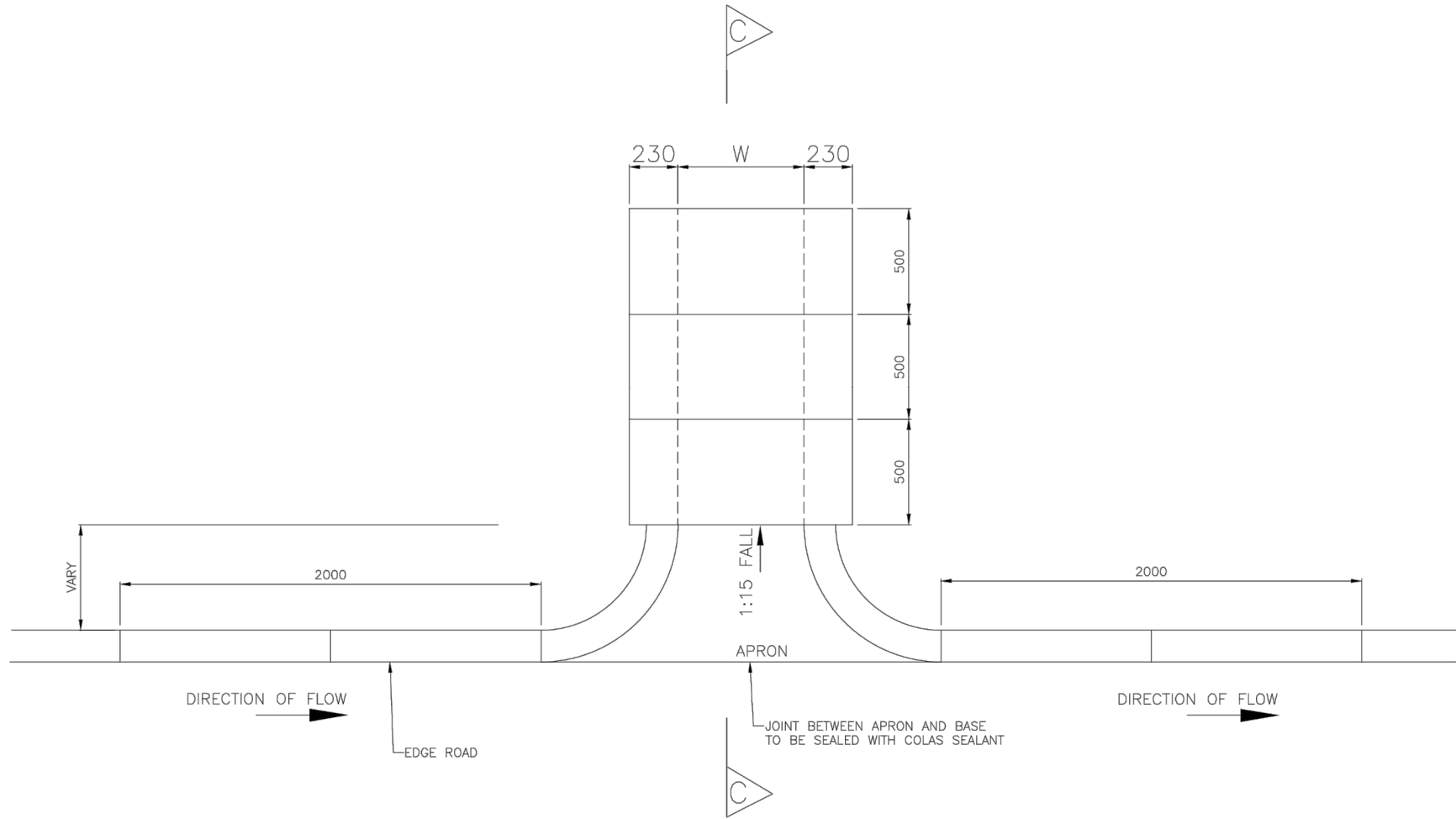


TYPICAL CONCRETE OUTLETS AND CHUTE PLANE

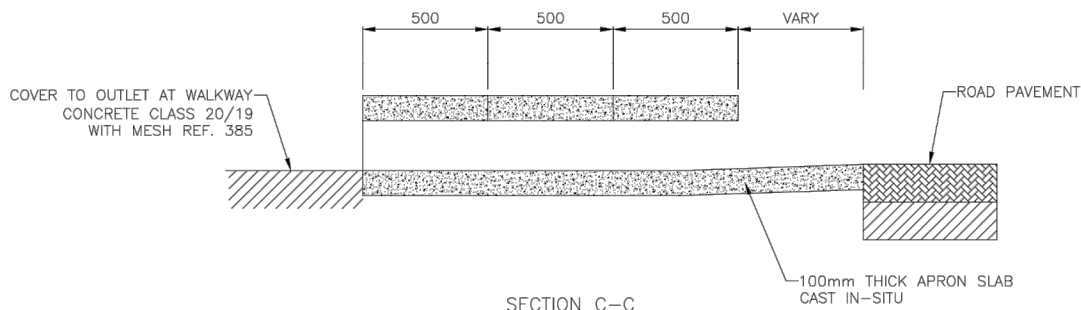


DUAL CARRIAGEWAYS ROAD PLAN

SCALE 1: 40

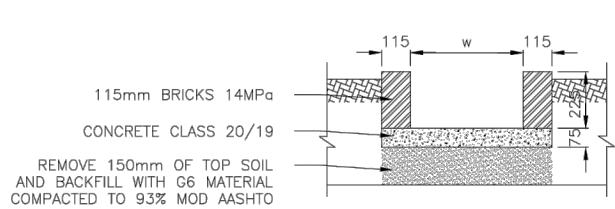


TYPICAL PLAN AT OUTLETS  
SCALE 1: 15

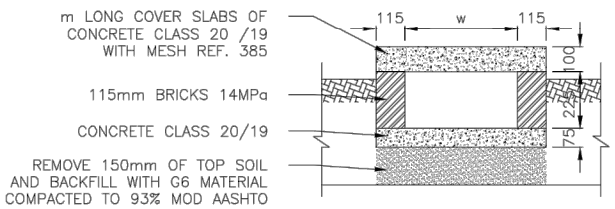


SECTION C-C  
SCALE 1: 15

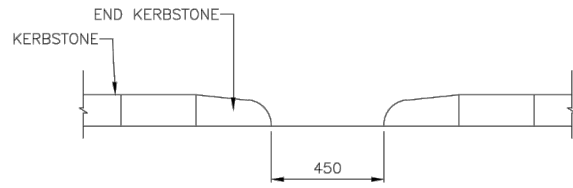
CHUTE	COVER	W
TYPE 1	OPEN	W=450
TYPE 2	COVERED	W=450
TYPE 3	COVERED	W=600



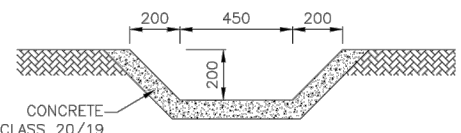
SECTION A-A OPEN CHUTES



SECTION A-A COVERED CHUTES  
IN WALKWAYS



ELEVATION E



SECTION B-B

SCALE 1: 15

NOTES

DATE

ISSUED BY STATUS PROJECT TITLE

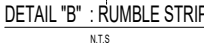
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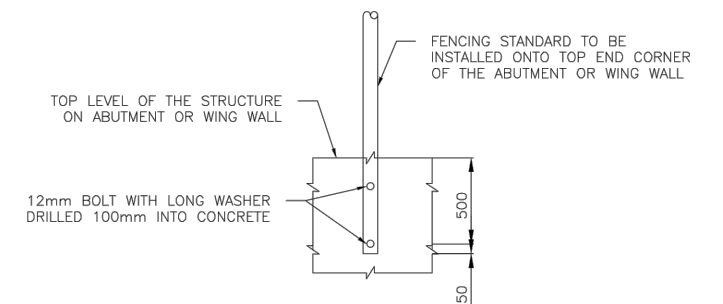




- ## NOTES
1. ALL UNITS ARE IN METERS UNLESS STATED OTHERWISE
  2. SPEED HUMP TO BE CONSTRUCTED USING ASPHALT CONCRETE
  3. RUMBLE STRIPS AND SPEED HUMPS TO EXTEND 0.8m INTO THE SHOULDER
  4. PEDESTRIAN CROSSING MARKINGS TO BE 0.5m WIDE STRIPS 4.0m LONG AS SHOWN
  5. PEDESTRIAN CROSSING WARNING SIGNS SHALL BE INSTALLED 300m IN ADVANCE OF THE CROSSING AND INFORMATORY SIGN SHALL BE INSTALLED AT THE CROSSING ON EITHER SIDE
  6. TWO SETS OF RUMBLE STRIPS SHALL BE CONSTRUCTED ON EITHER SIDE OF THE CROSSING
  7. LOCATION FOR PEDESTRIAN CROSSING TO BE DETERMINED ON SITE

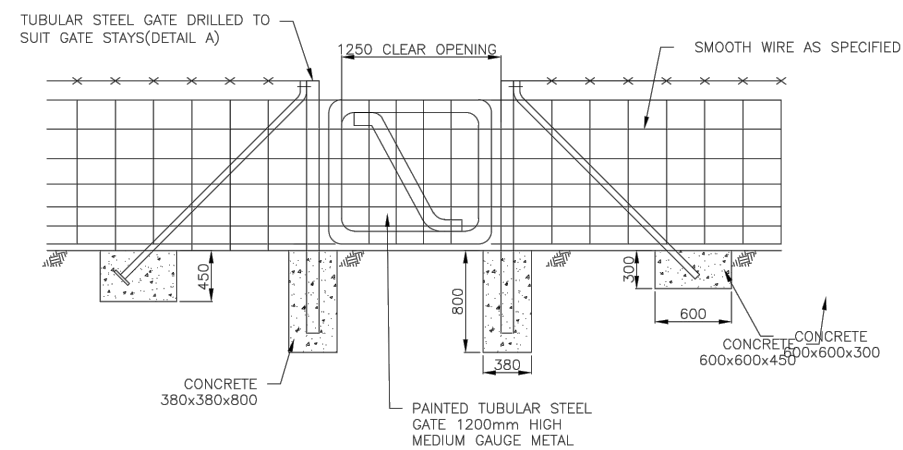
			CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	PROJECT:	DRAWING TITLE:	SCALE:	DESIGNED BY	VISHAL JHA / RAMANA	
			CHIEF EXECUTIVE OFFICER		LEA Associates South Asia Pvt Ltd., India			N.T.S	DRAWN BY	VINAYACHANDRAN	
			PRIVATE BAG B346		in association with		CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		APPROVED BY	RAMANA	
MKD.			LILONGWE		RUO Consulting Engineers Ltd, Malawi				DATE	MAY, 2023	SHEET SIZE A3
			REVISIONS						DRAWING NO.	80087-AILASAIHWYNLMISC -	





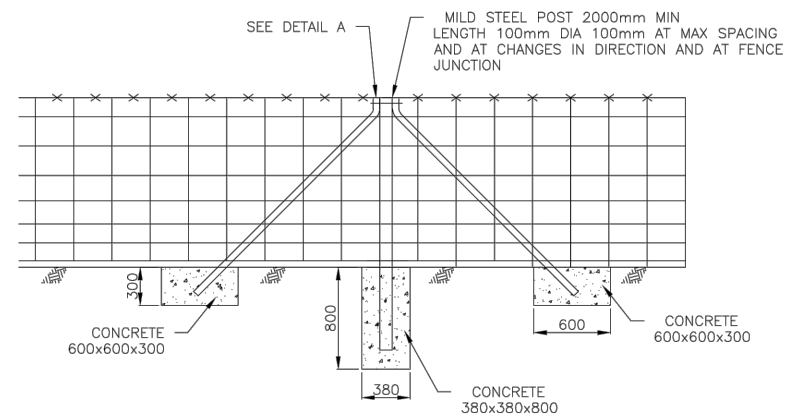
## FIXING STANDARD AT CATTLE GRID WING WALL

SCALE 1: 20



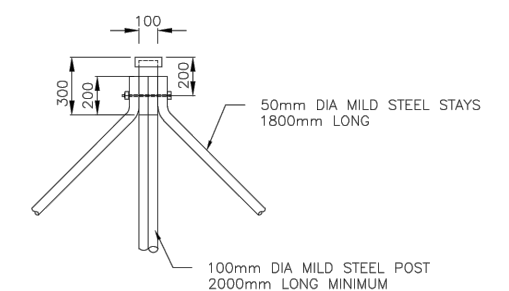
STOCK PROOF FENCE STANDARD AND DROPPERS

PEDESTRIAN GATE



FENCE DETAIL DRAINAGE CHANNEL/DITCHES

## END CORNER AND STRAINING POST

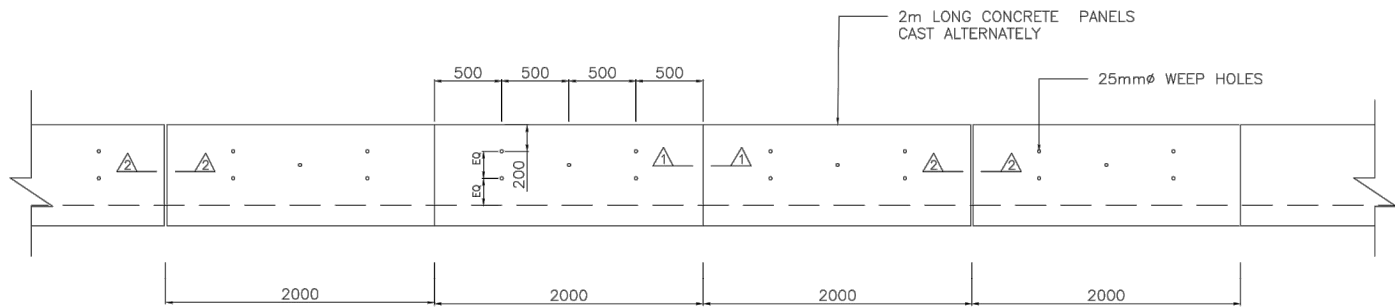


DETAIL A

SCALE 1: 20

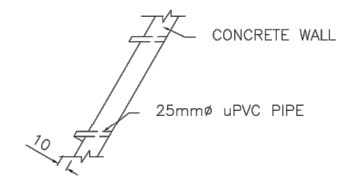
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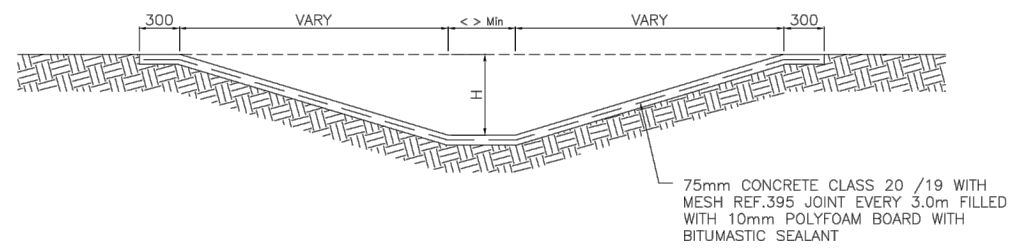


VEE OR TRAPEZOIDAL LINED DRAIN SIDE WALL ELEVATION

SCALE 1: 300

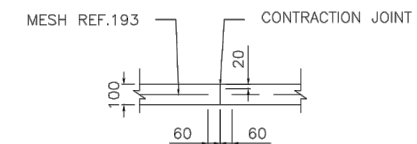


SECTION THROUGH SIDE PANEL

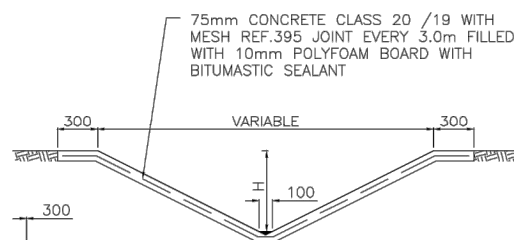


TYPICAL SECTION OF LINED TRAPEZOIDAL  
SIDE SLOPES VARY 'H' Min 300mm

SCALE 1: 300

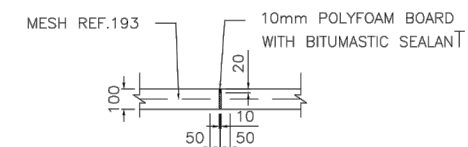


SECTION 2-2  
EXPANSION JOINT



TYPICAL SECTION OF LINED VEE DRAIN  
SIDE SLOPES VARY 'H' Min 300mm

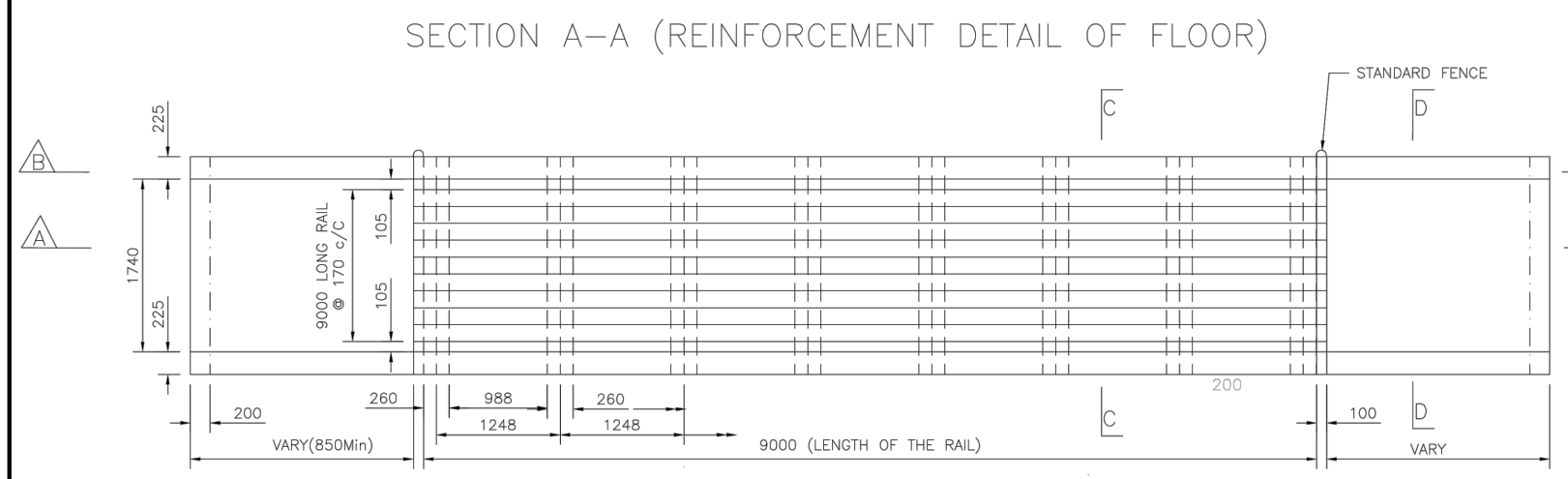
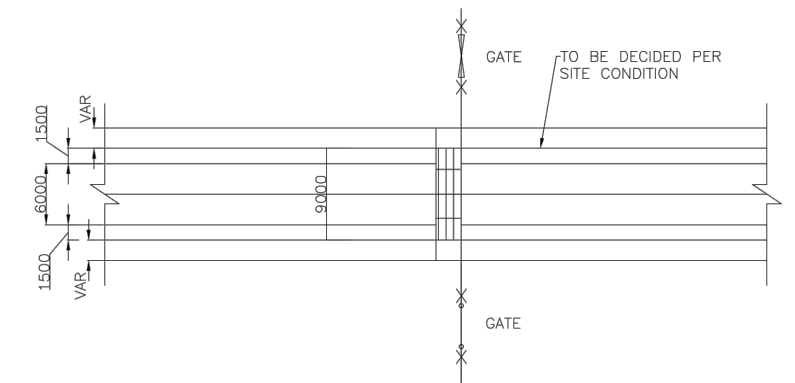
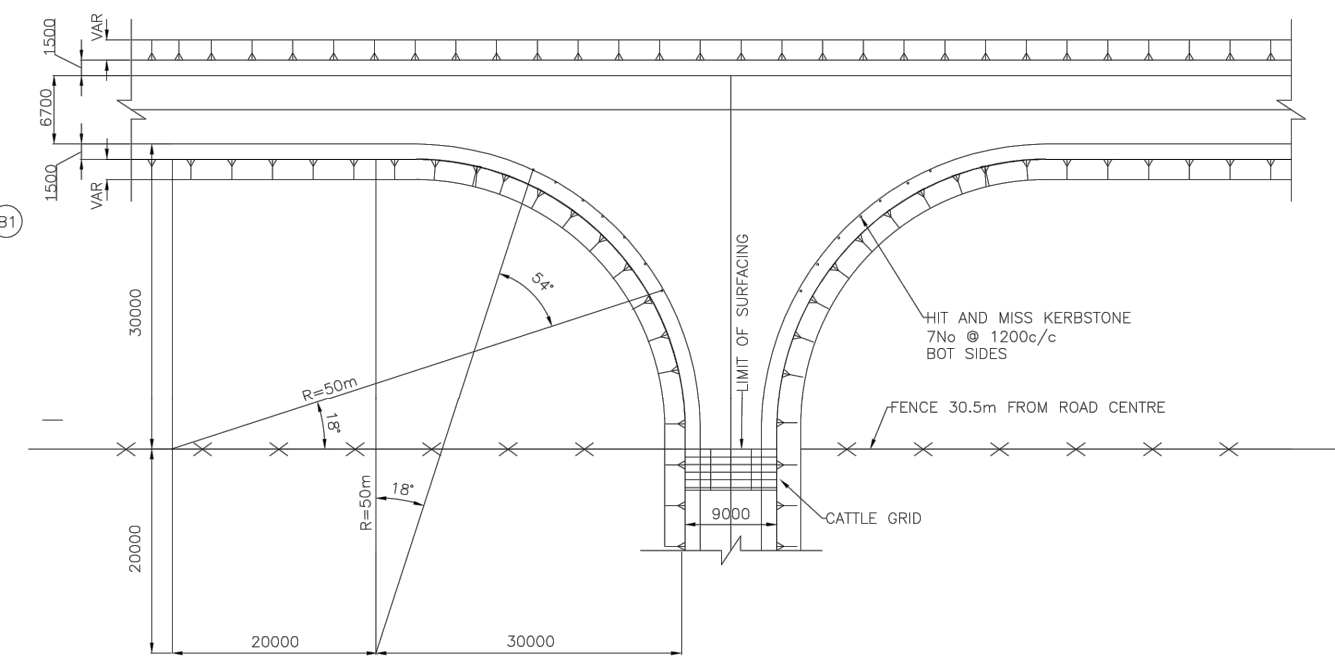
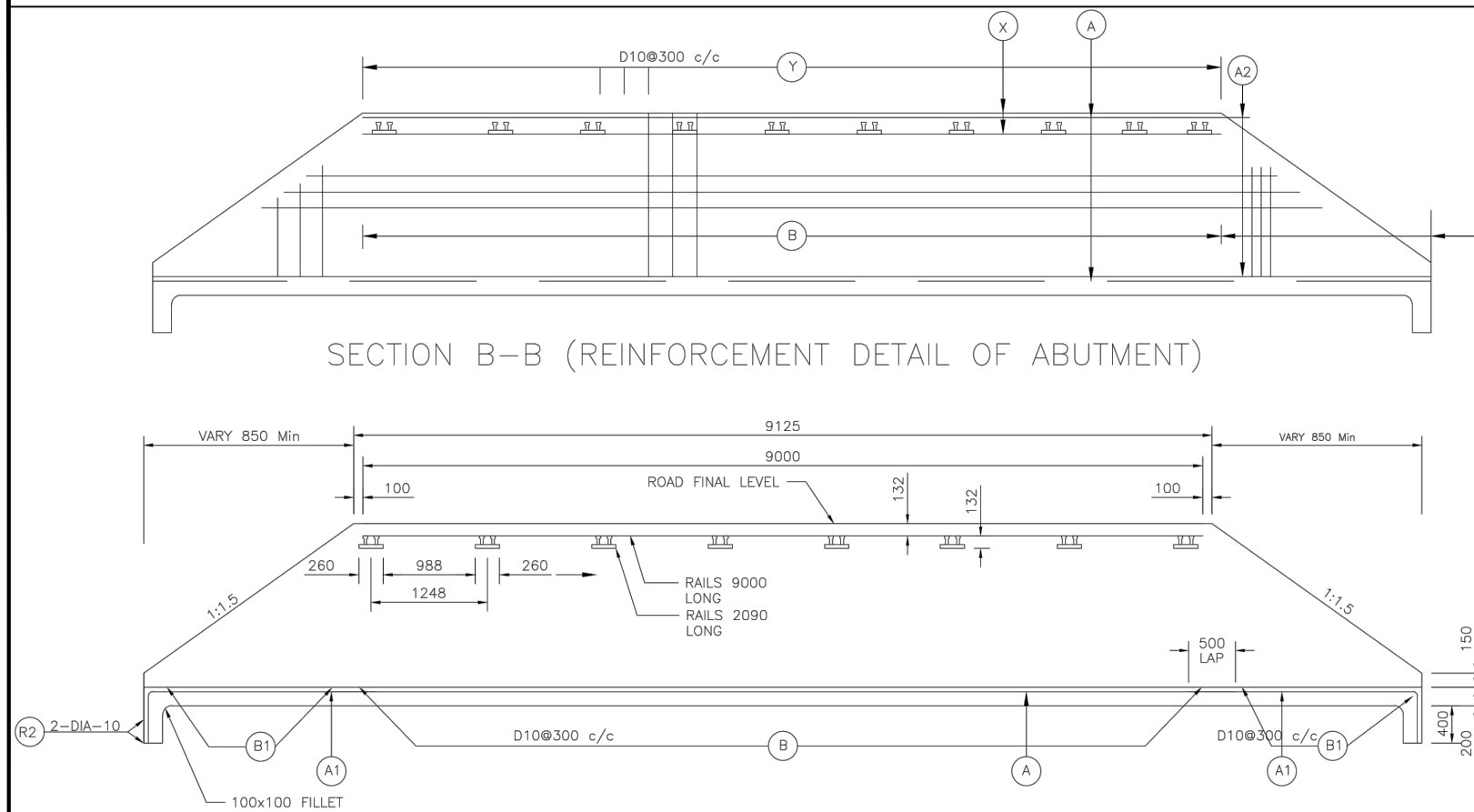
SCALE 1: 300



SECTION 2-2  
EXPANSION JOINT

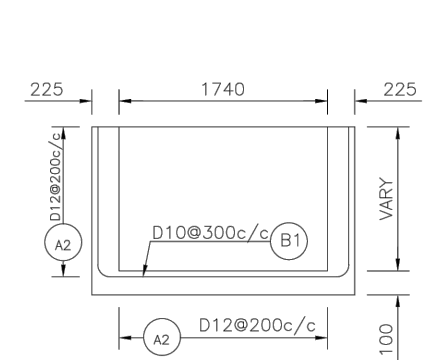
DEPTH H(m)	SIDE SLOPE
H<0.6	1:4
0.6<H<0.9	1:3
0.9<H<1.5	1:2
H>1.5	1:1.5

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

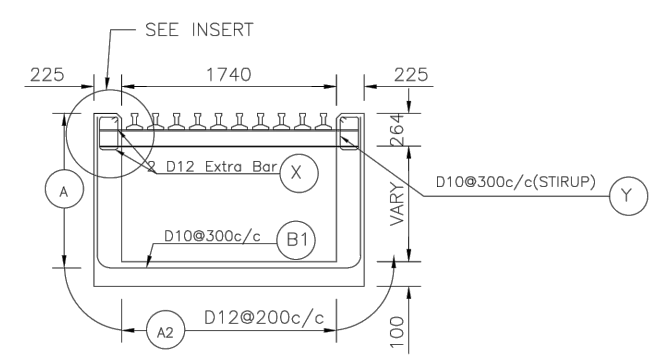


BAR SCHEDULE

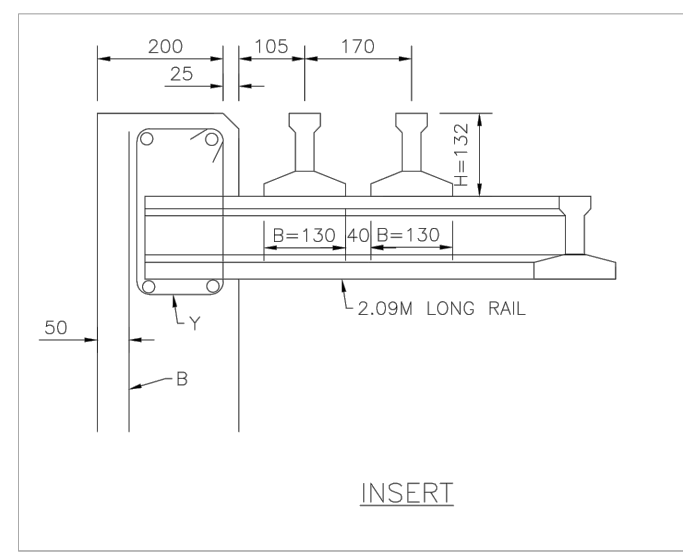
MEMBER	BAR NAME	DIA mm	SPACING	Nos	SHAPE
WALL & FLOOR	A	12	200	FLOOR = 12 WALL = VAR	9000
FLOOR	A1	12	200	VARIES	VARY
WALL	A2	12	200	VARIES	VARY
WALL & FLOOR	B	10	300	31	2140 VAR
DO	B1	10	300	VARIES	2140 VAR
CUT OFF	B2	10		4	2140
BEAM	X	12		4	9000
DO	Y	10	300	31	265 165



SECTION D-D

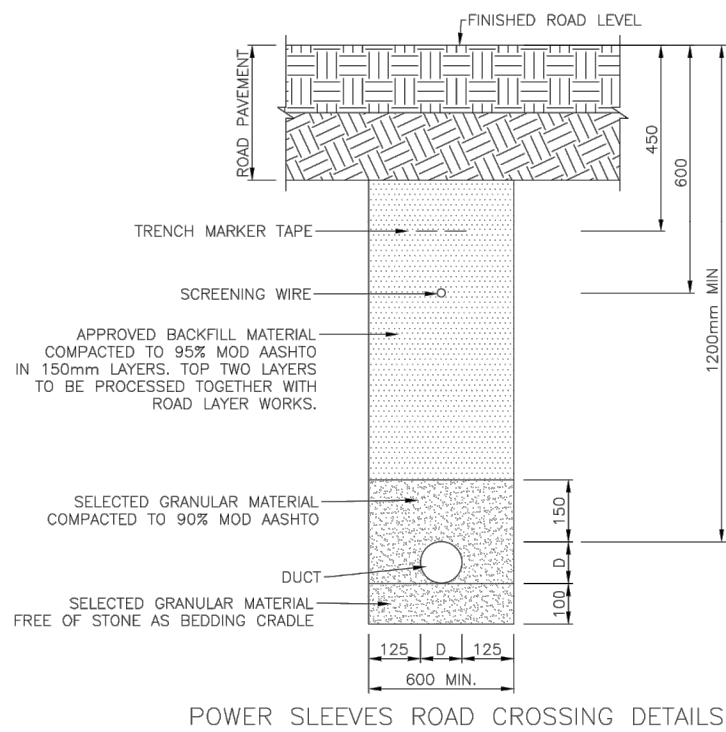


SECTION C-C



INSERT





ROAD CL

ROAD RESERVE BPDARY

PVC PIPE 110mm DIA SET OUT 0.4m FROM SLEEVE END 600mm EMBEDDED IN GROUND AND 250mm STICKING OUT OF GROUND

TERMINATION TO BE THE CENTER OF BPC WAY SLEEVE

MARKER POST OR PVC PIPE

EDGE OF THE ROAD

SCALE 1:150

[illegible]



SCALE 1:75

TABLE 2	
MIN LENGTH OF GUARDRAIL REQUIRED (EXCLUDING TERMINAL SECTIONS)	
DESIGN SPEED Km/h	MIN LENGTH
60	12 SECTIONS (45.72m)
70	14 SECTIONS (53.34m)
80	16 SECTIONS (60.96m)

[illegible]



PLAN

SCALE: 1 : 10



### DETAIL B : FRONT ELEVATION HALF SPACING OF POSTS

5. GALVANIZING:  
GUARDRAILS: (SANS 121/ISO 1461): TYPE A1 ARTICLES.  
BOLTS AND WASHERS: (SANS 121/ISO 1461) TYPE C1 ARTICLES.

6. TIMBER POSTS:  
POSTS SHALL COMPLY WITH THE REQUIREMENTS OF SANS 457 AND SHALL  
CARRY THE SANS MARK.

7. REFLECTIVE PLATES:  
THE OUTER SURFACES SHALL BE COATED WITH ENGINEERING GRADE  
RETRO-REFLECTIVE MATERIAL WHICH COMPLIES WITH THE  
PROVISIONS OF CKS 191 IN THE COLOURS SHOWN

[illegible]



1. LENGTH OF GUARDRAIL = 4 128
2. NORMAL SPACING OF POSTS = 3 810

1. THE HOLES FOR TIMBER POSTS SHALL BE OF SUFFICIENT SIZE TO PERMIT PROPER SETTING OF THE POSTS AND TO ALLOW SUFFICIENT ROOM FOR BACKFILLING.
2. AT LEAST 1,0m OF POST SHALL BE EMBEDDED IN THE GROUND
3. HOLES FOR TIMBER POSTS SHALL BE SPACED TO SUIT THE STANDARD LENGTH OF GUARDRAIL SUPPLIED.
4. HOLES SHALL BE BACKFILLED WITH (12:1) SOIL CEMENT MIXTURE AT OPTIMUM MOISTURE CONTENT IN COMPACTED LAYERS NOT EXCEEDING 100mm.
5. WHERE JOINTED, THE END OF THE GUARDRAIL WHICH OVERLAPS ON THE SIDE OF THE TRAFFIC SHALL POINT IN THE DIRECTION OF THE TRAFFIC MOVEMENT.

1. WHERE THE ROAD IS IN FILL > 3.0m.
2. WHERE THERE IS PERMANENT WATER ADJACENT TO THE ROADWAY.
3. ON ALL BRIDGE APPROACHES.
4. AT OBSTRUCTIONS 1.0m AWAY FROM THE SHOULDER BREAKPOINT.
5. AT ANY DANGER POINT WHERE THE OFF-SHOULDER HAZARD IS GREATER THAN THE HAZARD OF THE GUARDRAIL.

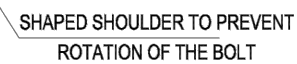
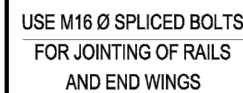
THE ABOVE CRITERIA ARE TO BE APPLIED WITH DISCRETION  
AND THE POSITION OF ALL GUARDRAILS MUST BE CONFIRMED  
WITH THE ENGINEER PRIOR TO THE ERECTION THEREOF.

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: TYPICAL MOUNTING DETAILS FOR GUARD RAIL ELEMENTS 2		SCALE: N.T.S		DESIGNED BY VISHAL JHA / RAMANA			
														DRAWN BY VINAYACHANDRAN			
														APPROVED BY RAMANA			
MKD.				DESCRIPTIONS		BY		DATE						DATE		SHEET SIZE A3	
				REVISIONS										DRAWING NO.		80087-A/LASAI/HWY/NL/MISC - 35	





### DETAIL OF GUARDRAIL REFLECTIVE PLATES



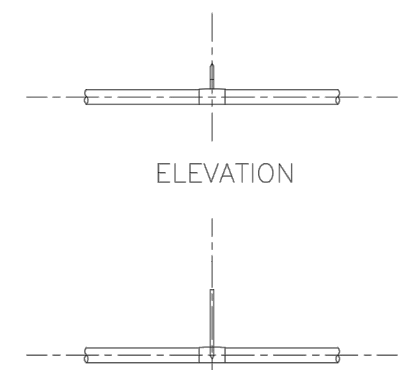
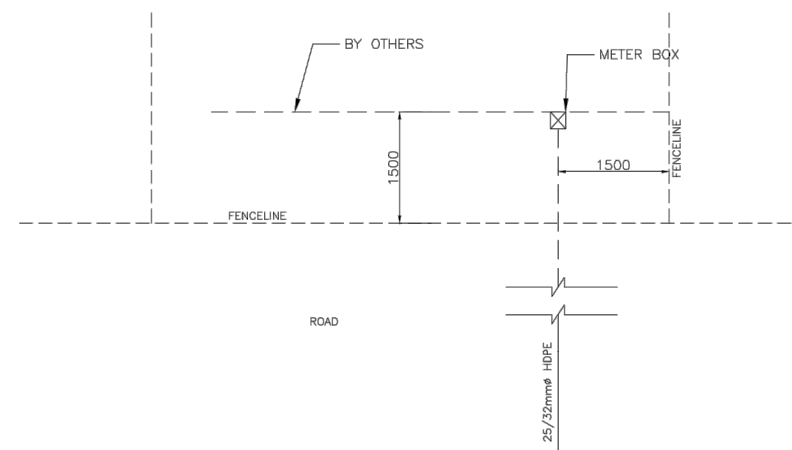
SCALE 1:20

SCALE 1:10

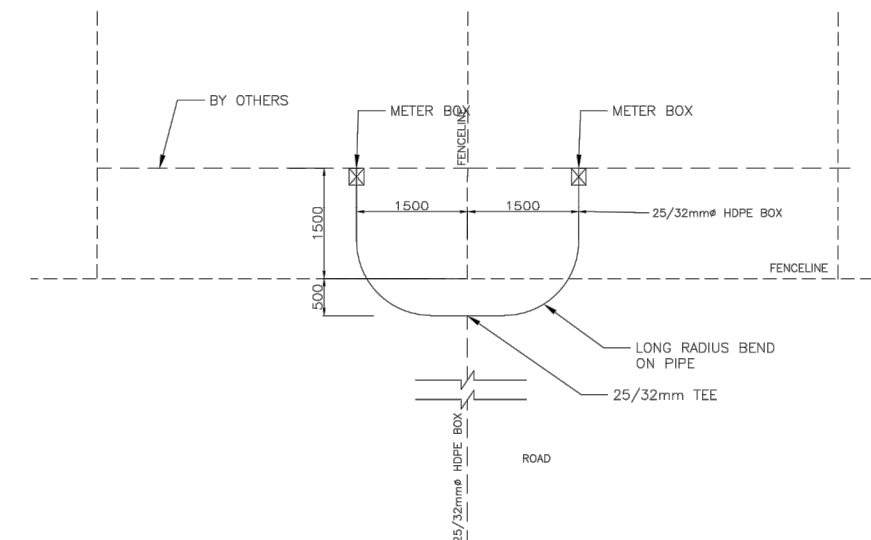
SCALE 1:2

[illegible]





DETAIL 2  
TYPICAL SADDLE FERRULE CONNECTION



25/32mm $\varnothing$  FERRULE AND SADDLE TO SUIT PIPE DIAMETER SEE DETAIL 2

uPVC MAINLINE

25/32mm TEE

LONG RADIUS BEND ON PIPE

2250

500

1500

1500

25/32mm $\varnothing$  HDPE BOX

METER BOX

FENCELINE

FENCELINE

TYPICAL TWO PLOTS CONNECTION

			CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:	WATER RETICULATION DETAILS PLOT CONNECTION	SCALE:	N.T.S	DESIGNED BY	VISHAL JHA / RAMANA	
				CHIEF EXECUTIVE OFFICER									DRAWN BY	VINAYACHANDRAN	
				PRIVATE BAG B346									APPROVED BY	RAMANA	
				LILONGWE									DATE	MAY, 2023	SHEET SIZE A3
MKD.				DESCRIPTIONS	BY	DATE							DRAWING NO.	80087-A/LASA/HWWYNLWMISC - 38	
				REVISIONS											



INTERNAL PIPE DIA(mm)	T-JUNCTION BLOCK	
	B	H
80 OR LESS	600	300
100	600	350
150	750	550
200	950	700
250	1200	900
300	1350	1100

INTERNAL PIPE DIA(mm)	BEND			
	45 DEGREE		90 DEGREE	
	B	H	B	H
75 OR LESS	300	300	400	400
100	350	350	550	450
150	550	500	800	650
200	750	650	1050	900
250	900	750	1300	1000
300	1050	800	1500	1150

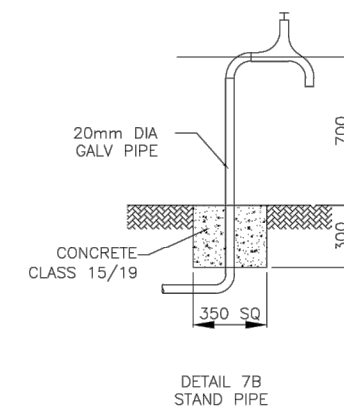
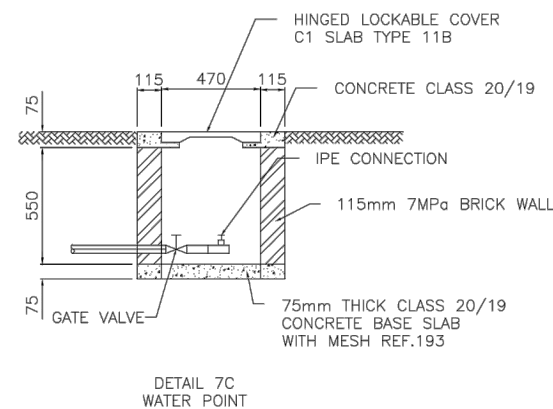
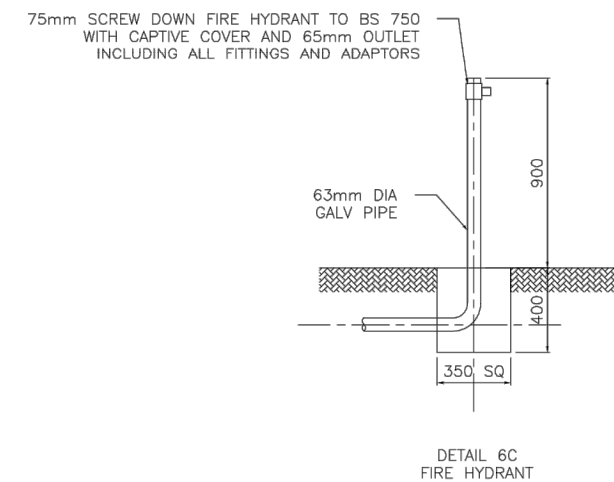
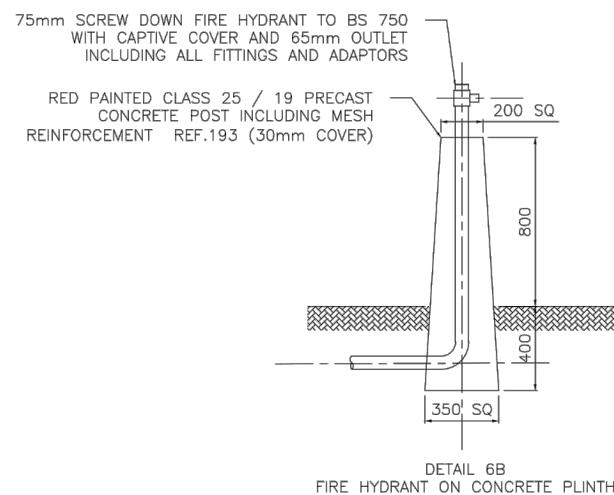
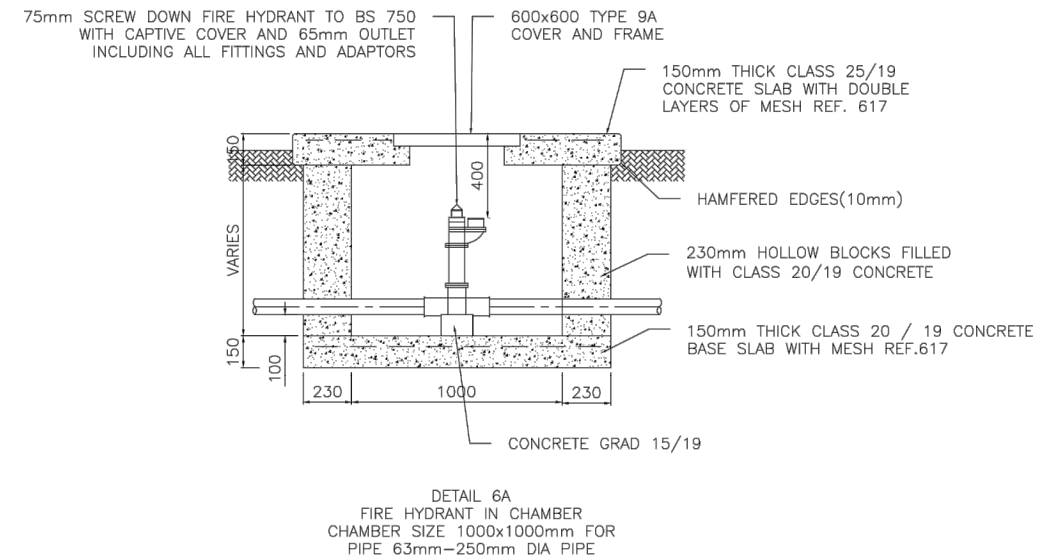
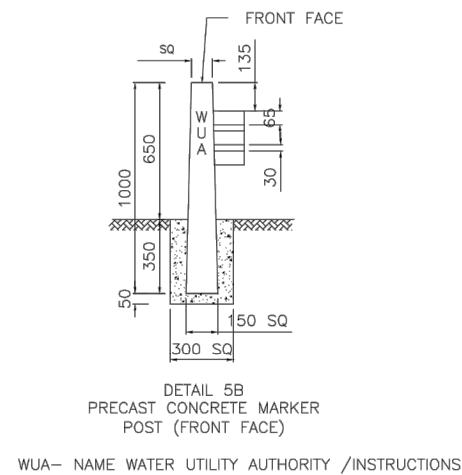
INTERNAL PIPE DIA(mm)	T-JUNCTION BLOCK	
	B	H
80 OR LESS	600	300
100	600	350
150	750	550
200	950	700
250	1200	900
300	1350	1100

REDUCER	B	H	L
110x90	250	600	250
160x90	300	650	400
160x110	300	650	350
250x160	300	850	500
200x160	300	700	400
250x200	450	750	300
315x200	450	1650	350
315x250	450	1250	350

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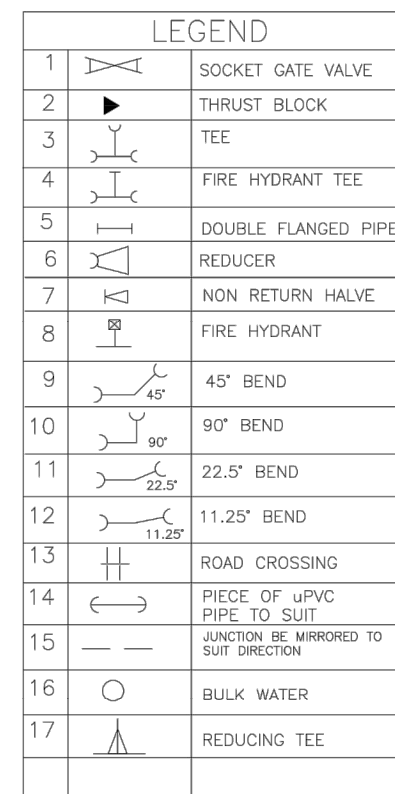






- |                  |             |              |        |
|------------------|-------------|--------------|--------|
| SINGLE AIR VALVE | S<br>A<br>V | WASHOUT      | W      |
| DOUBLE AIR VALVE | D<br>A<br>V | LINE VALVE   | L<br>V |
| PIPE DIAMETER    | 1<br>6<br>0 | FIRE HYDRANT | F<br>H |
| TEE              | T<br>E<br>E |              |        |

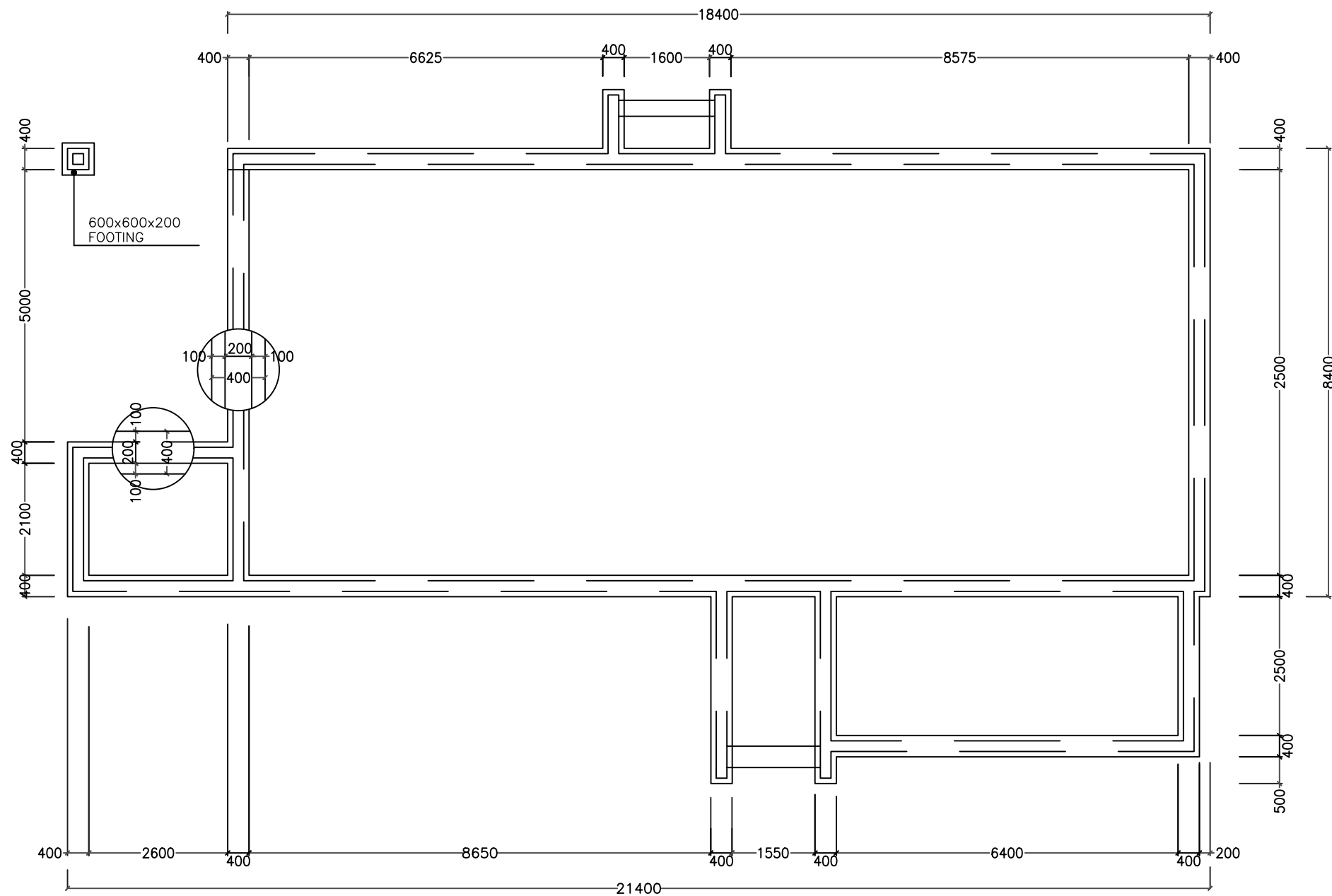
				CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India 	PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:	WATER RETICULATION DETAILS WATER MARKERS AND FIRE HYDRANTS	SCALE:  N.T.S.	DESIGNED BY	VISHAL JHA / RAMANA	
				CHIEF EXECUTIVE OFFICER									DRAWN BY	VINAYACHANDRAN	
				PRIVATE BAG B346									APPROVED BY	RAMANA	
				LILONGWE									DATE	MAY, 2023	SHEET SIZE A3
				MALAWI			RUO Consulting Engineers Ltd, Malawi 						DRAWING NO.	80087-A/LASA/HWYNLMISC - 41	
MKD.	DESCRIPTIONS	BY	DATE												
REVISIONS															

[illegible]

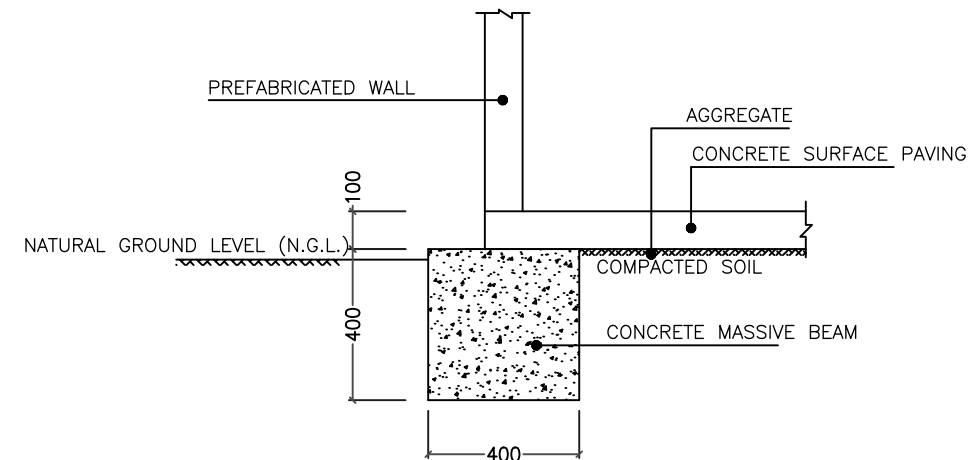








FOUNDATION FOR FLOOR  
SCALE 1:50



FOUNDATION SECTION  
SCALE 1:10

NOTES:

1. THE SUPPLIED DIMENSIONS ARE ADAPTED FOR THE GROUNDS OF FOUNDATIONS WITH CAPACITY ABOVE OF 100 KN/m. IN CASE OF GROUNDS WITH INFERIOR CAPACITY THE MATERIAL MUST BE SUBSTITUTED BY SELECTED MATERIAL.
2. ALL THE DIMENSIONS ARE IN mm UNLESS INDICATED.
3. ALL BUILDINGS ARE PREFABRICATED.
4. THE CONTRACTOR WILL HAVE TO CONFIRM AND CHECK ALL THE DIMENSIONS BEFORE EXECUTING THE WORKS.

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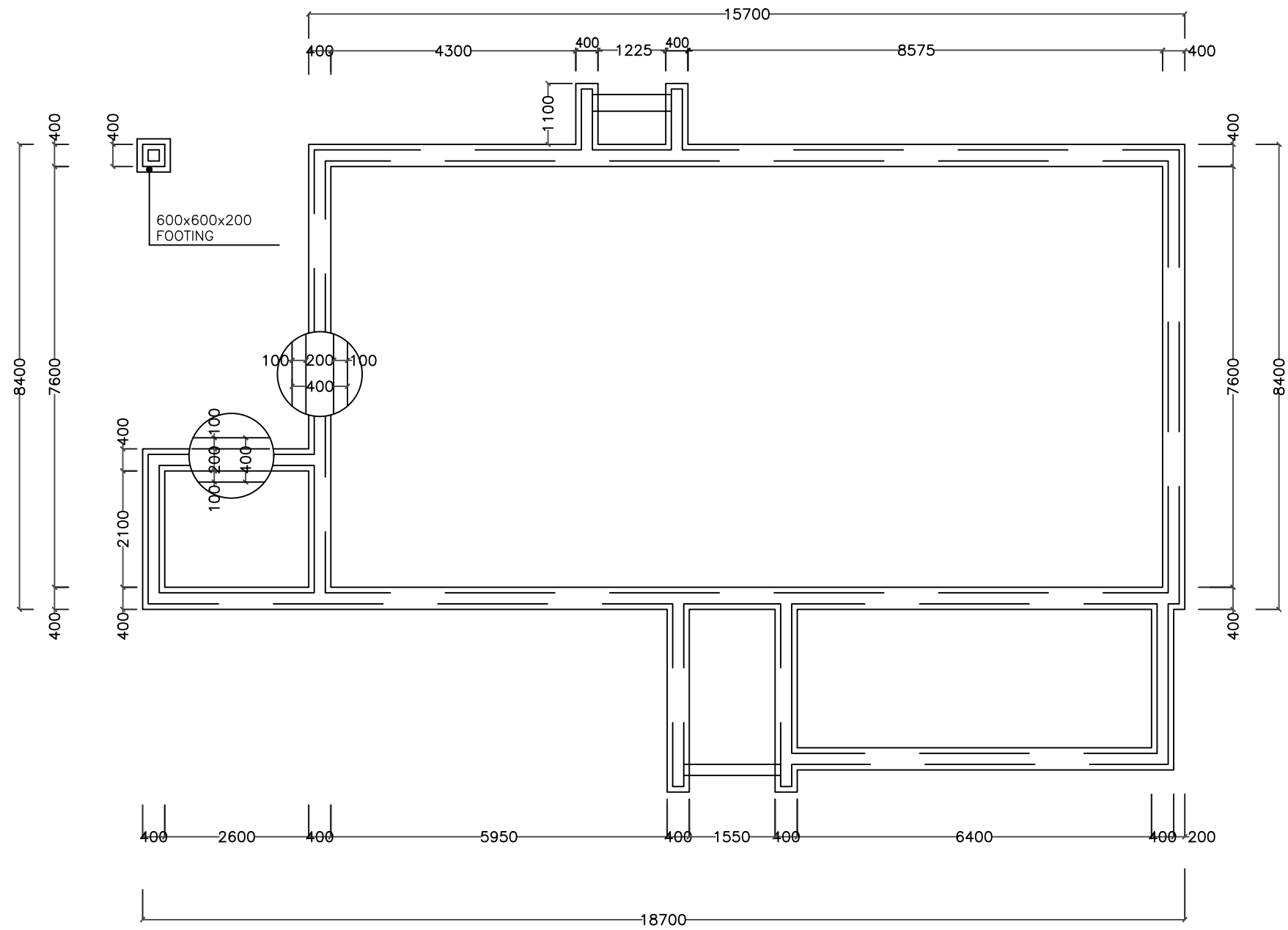


1. ALL DIMENSION ARE IN mm UNLESS INDICATED.
2. THE RECOMMENDATIONS OF THE MANUFACTURERS MUST BE RESPECTED TO THE PROCEEDINGS OF TRANSPORT AND PLACING/ FIXATION OF THE COVERING AND FALSE ROOF.

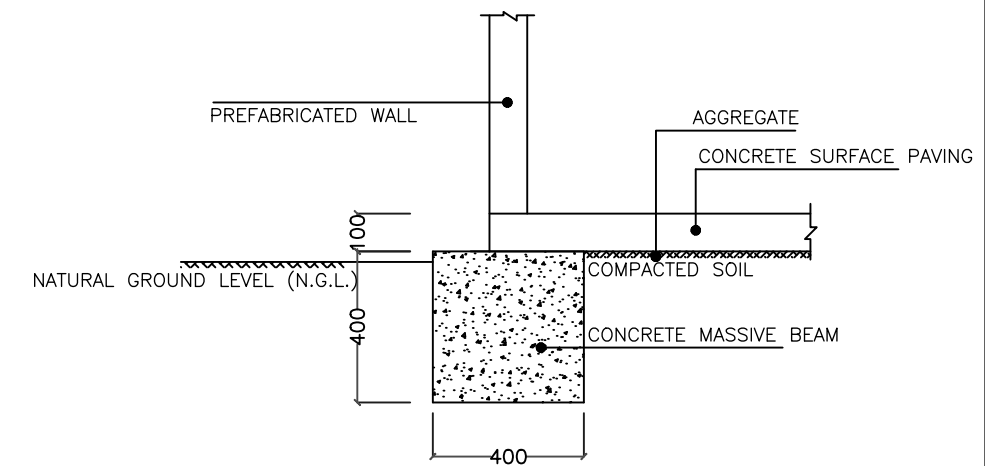
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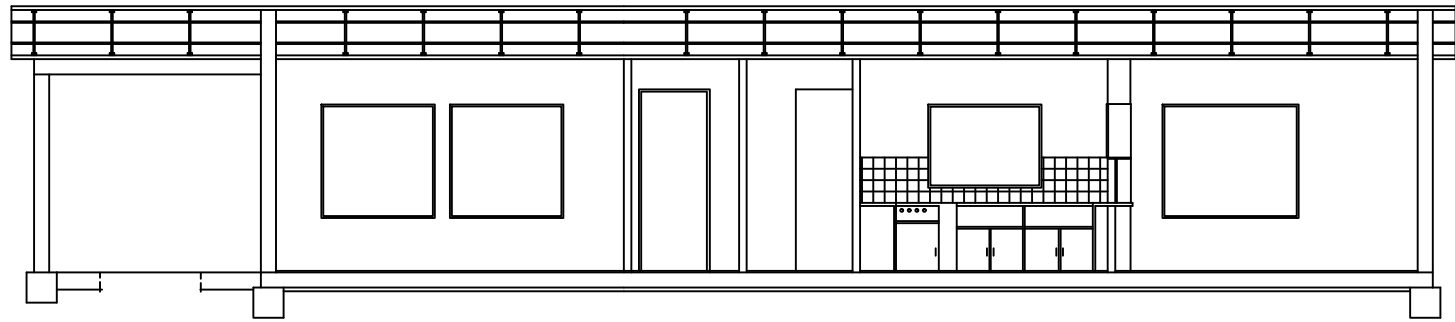


FOUNDATION FOR FLOOR  
SCALE 1:50

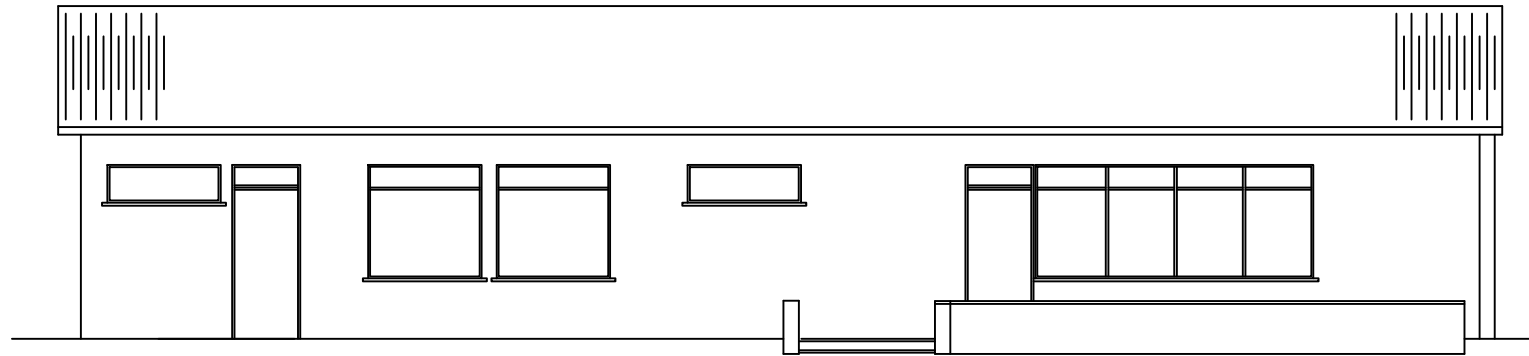


FOUNDATION SECTION  
SCALE 1:10

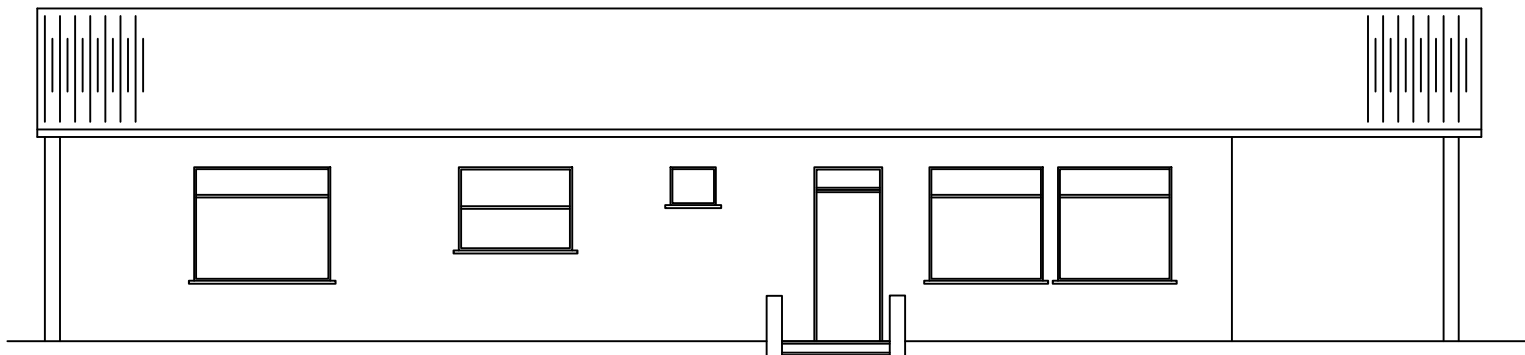
				CLIENT: <div>THE ROADS AUTHORITY</div> <div>CHIEF EXECUTIVE OFFICER</div> <div>PRIVATE BAG B346</div> <div>LILONGWE</div> <div>MALAWI</div>		DESIGN CONSULTANT: <div>LEA Associates South Asia Pvt Ltd., India</div> <div>in association with</div> <div>RUO Consulting Engineers Ltd, Malawi</div>		PROJECT: <div>CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD</div>		DRAWING TITLE: <div>HOUSE TYPE II - FOUNDATIONS</div>		SCALE: <div>N.T.S</div>		DESIGNED BY <div>VISHAL JHA / RAMANA</div>			
												DRAWN BY <div>VINAYACHANDRAN</div>					
												APPROVED BY <div>RAMANA</div>					
MKD.				DESCRIPTIONS		BY		DATE				DATE <div>MAY, 2023</div>		SHEET SIZE A3			
REVISIONS												DRAWING NO.		80087-AILASAIHWYINLMISC -49			



HOUSE TYPE II – SECTION A–A

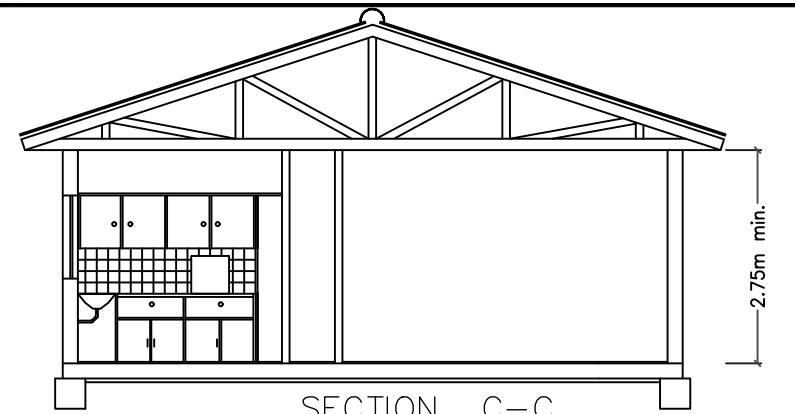


FRONTAL VIEW

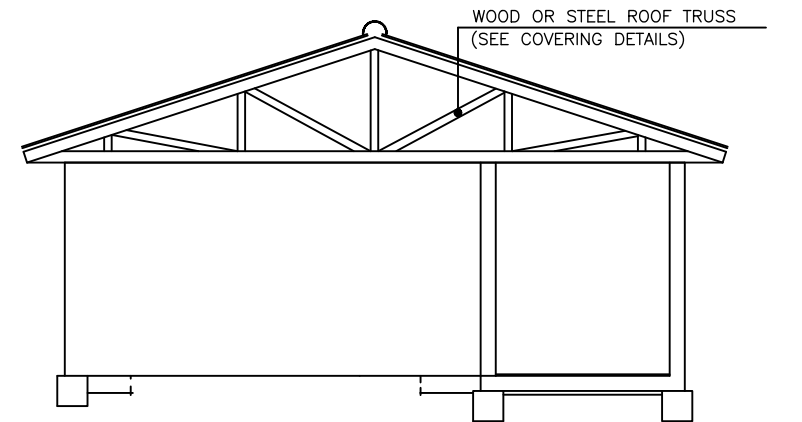


BACK VIEW

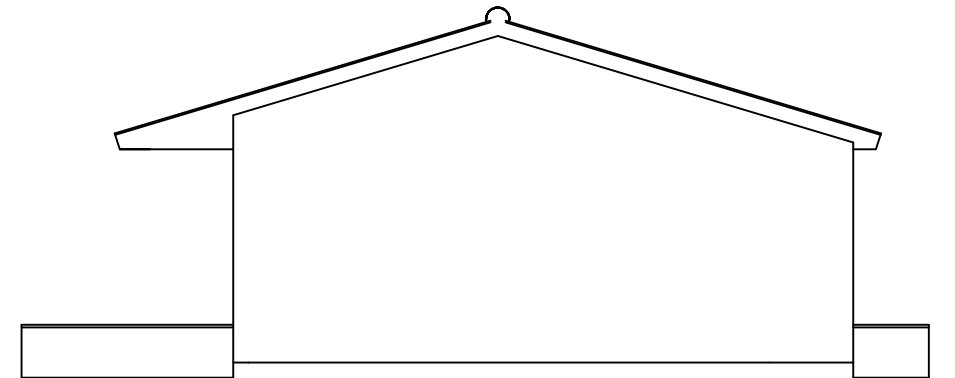
NOTES:  
1. ALL BUILDINGS ARE PREFABRICATED.



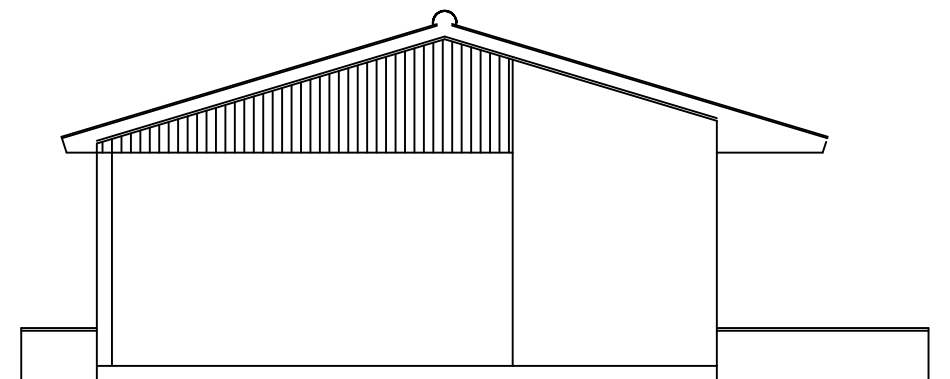
SECTION C–C



SECTION B–B

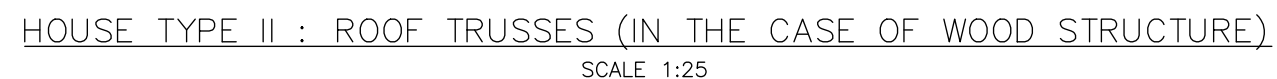


RIGHT SIDE VIEW



LEFT SIDE VIEW

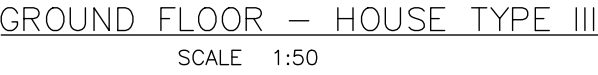
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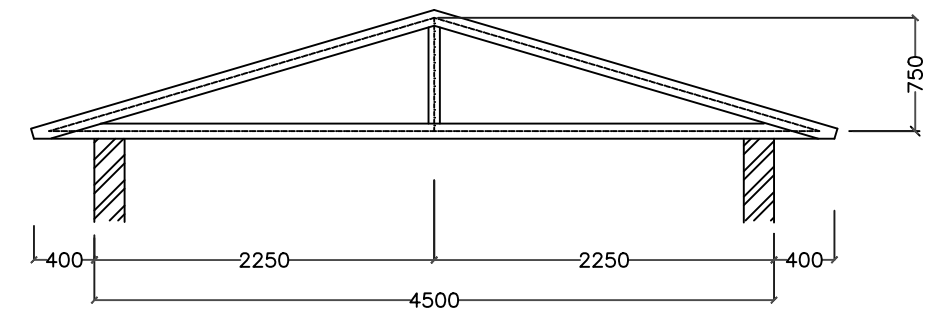
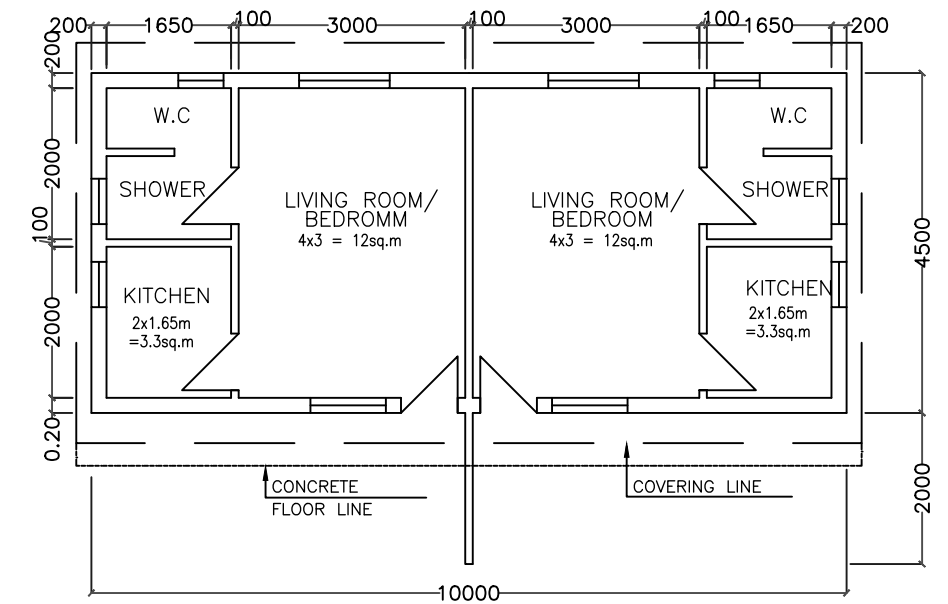
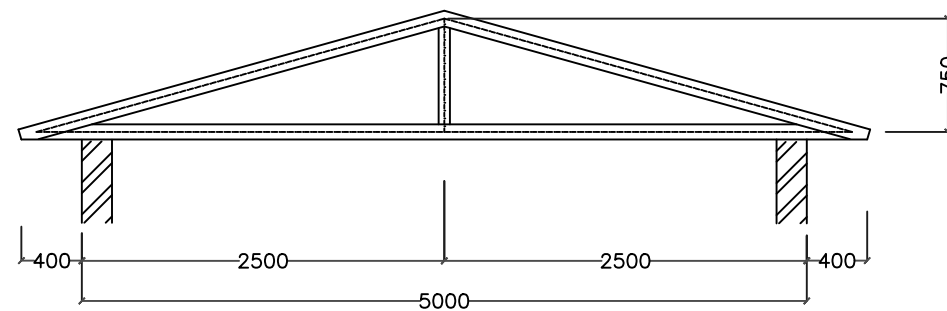
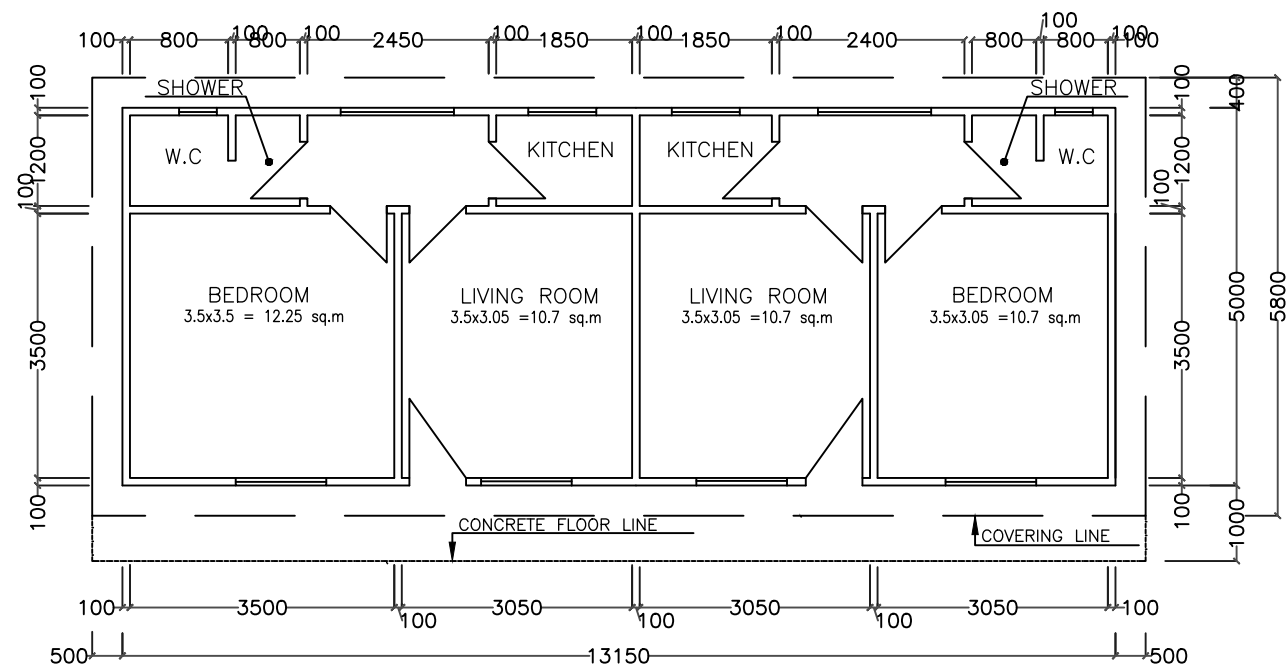
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1. THE SUPPLIED DIMENSIONS ARE ADAPTED FOR THE GROUNDS OF FOUNDATIONS WITH CAPACITY ABOVE OF 100 KN/m. IN CASE OF GROUNDS WITH INFERIOR CAPACITY THE MATERIAL MUST BE SUBSTITUTED BY SELECTED MATERIAL.
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[illegible]

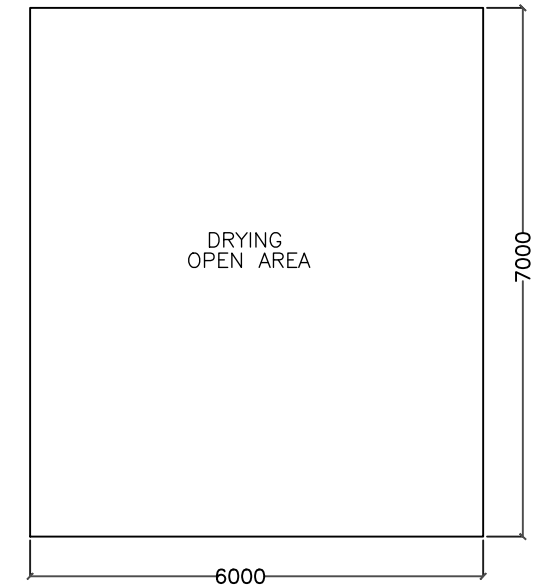


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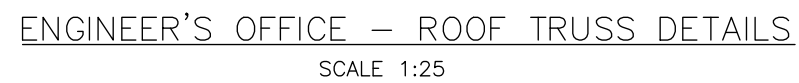
[illegible]

				CLIENT:	THE ROADS AUTHORITY	DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE:	OFFICE OF THE WORKS - GROUND FLOOR & DETAILS	SCALE:	N.T.S	DESIGNED BY	VISHAL JHA / RAMANA	
					CHIEF EXECUTIVE OFFICER									DRAWN BY	VINAYACHANDRAN	
					PRIVATE BAG B346									APPROVED BY	RAMANA	
					LILONGWE									DATE	MAY, 2023	SHEET SIZE A3
					MALAWI									DRAWING NO.	80087-A/LASA/HWYNL/MISC -54	
MKD.	DESCRIPTIONS	BY	DATE													
				REVISIONS												



				CLIENT: <div>THE ROADS AUTHORITY</div> <div>CHIEF EXECUTIVE OFFICER</div> <div>PRIVATE BAG B346</div> <div>LILONGWE</div> <div>MALAWI</div>		DESIGN CONSULTANT: <div>LEA Associates South Asia Pvt Ltd., India</div> <div>in association with</div> <div>RUO Consulting Engineers Ltd, Malawi</div>		PROJECT: <div>CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW OF THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD</div>		DRAWING TITLE: <div>LABORATORIES - GROUND FLOOR &amp; DETAILS</div>		SCALE: <div>N.T.S</div>		DESIGNED BY <div>VISHAL JHA / RAMANA</div>			
												DRAWN BY <div>VINAYACHANDRAN</div>					
												APPROVED BY <div>RAMANA</div>					
MKD. DESCRIPTIONS BY DATE												DATE <div>MAY, 2023</div>		SHEET SIZE A3			
REVISIONS												DRAWING NO. <div>80087-ALASA\HWY\NL\MISC -55</div>					





1. ALL DIMENSION ARE IN mm UNLESS INDICATED.
2. THE RECOMMENDATIONS OF THE MANUFACTURERS MUST BE RESPECTED TO THE PROCEEDINGS OF TRANSPORT AND PLACING/ FIXATION OF THE COVERING AND FALSE ROOF.

[illegible]

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Sl. No.	Proposed Chainage	Type of Structure	Skew Angle (degree)	Proposed Culvert Dimensions		Height of Fill (Minimum) (mm)	Reference Drawing
	(m)			No. of cell	Dia. Of Pipe		
				(Nos)	(mm)		
1	27909.000	RC Pipe	0	4	900	600	80087A\LASA\STR\NCL\PC - 04
2	31257.000	RC Pipe	0	4	900	600	80087A\LASA\STR\NCL\PC - 04

Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Proposed Culvert Dimensions		Height of Fill (Minimum)	Reference Drawing
	(m)			(degree)	No. of cell (Nos)		
	1		17620.000	RC Pipe	0	1	
2	19180.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
3	23160.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC-WD - 02
4	26075.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
5	28466.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
6	28710.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
7	37800.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
8	46970.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
9	51452.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
10	51640.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
11	53307.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
12	53641.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01
13	53797.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC-WD - 01

Sl. No.	Proposed Chaining	Type of Structure	Skew Angle (degree)	Proposed Culvert Dimensions		Height of Fill (Minimum) (mm)	Reference Drawing
	(m)			No. of cell (Nos)	Dia. Of Pipe (mm)		
	1			720.000	RC Pipe	0	
2	1390.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
3	5970.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
4	11685.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
5	25303.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
6	28180.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
7	30188.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
8	31590.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
9	31958.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
10	34320.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
11	49328.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03
12	52325.000	RC Pipe	0	3	900	600	80087A\LASA\STR\NCL\PC - 03

Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Proposed Culvert Dimensions		Height of Fill (Minimum)	Reference Drawing
	(m)			(degree)	No. of cell		
			(Nos)		(mm)	(mm)	
1	4370.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
2	6880.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
3	10740.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
4	12045.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
5	14252.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
6	17066.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
7	27791.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
8	29156.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
9	29685.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
10	32355.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
11	35280.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
12	45216.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
13	45410.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
14	48126.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02
15	48314.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 02

Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Proposed Culvert Dimensions		Height of Fill (Minimum)	Reference Drawing
				No. of cell	Dia. Of Pipe		
	(m)		(degree)	(Nos)	(mm)	(mm)	
1	2010.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
2	3270.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
3	3670.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
4	3760.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
5	4055.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
6	4780.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
7	5195.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
8	8593.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
9	8715.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
10	9620.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
11	10105.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 01
12	11265.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
13	13035.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
14	13242.000	RC Pipe	0	2	900	600	80087A\LASA\STR\NCL\PC - 01
15	13520.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
16	18158.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
17	18810.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
18	19892.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
19	20910.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
20	21248.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
21	22515.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
22	22822.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
23	23800.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
24	24758.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
25	25705.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
26	27085.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
27	27695.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
28	30507.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
29	30948.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
30	32750.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
31	37838.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
32	37898.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
33	38156.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
34	39047.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
35	40585.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
36	41333.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
37	42360.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
38	42928.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
39	43340.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
40	43395.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
41	44092.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
42	45838.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
43	46115.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
44	46570.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
45	47877.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
46	48204.000	RC Pipe	0	1	900	600	80087A\LASA\STR\NCL\PC - 01
47	49395.000	RC Pipe	0	1	900	600	800

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## SCHEDULE OF BOX CULVERTS FOR NEWCONSTRUCTION/ RECONSTRUCTION

Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Proposed Culvert Dimensions							Height of Fill (Minimum)	Reference Drawing
				No. of cell	Span	Clear Opening Height	Thickness of Box					
	Top Slab		Bottom Slab				End Wall	Mid Wall	(mm)			
	(m)		(degree)	(Nos)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	
1	8400.000	RC Box	0	1	1800	1800	275	325	275		1000	80087A\LASA\STR\NCL\BOX - 01
2	12680.000	RC Box	0	1	2000	2000	275	325	275		1000	80087A\LASA\STR\NCL\BOX - 01
3	14440.000	RC Box	0	3	3500	2500	350	400	350	300	1000	80087A\LASA\STR\NCL\BOX - 03
4	15150.000	RC Box	0	1	2500	2500	275	325	275		1000	80087A\LASA\STR\NCL\BOX - 01
5	16315.000	RC Box	0	1	3600	3000	350	400	350		1000	80087A\LASA\STR\NCL\BOX - 01
6	33163.000	RC Box	0	1	2000	2000	275	325	275		1000	80087A\LASA\STR\NCL\BOX - 01
7	33545.000	RC Box	0	1	3000	2400	300	350	275		1000	80087A\LASA\STR\NCL\BOX - 01
8	34680.000	RC Box	0	1	2000	2000	275	325	275		1000	80087A\LASA\STR\NCL\BOX - 01
9	36260.000	RC Box	0	1	3600	3000	350	400	350		1000	80087A\LASA\STR\NCL\BOX - 01
10	36450.000	RC Box	0	2	3500	2500	350	400	350	300	1000	80087A\LASA\STR\NCL\BOX - 02
11	37225.000	RC Box	0	2	2500	2500	275	325	275	275	1000	80087A\LASA\STR\NCL\BOX - 02
12	39960.000	RC Box	0	1	2800	1850	300	350	275		1000	80087A\LASA\STR\NCL\BOX - 01
13	40145.000	RC Box	0	1	1800	1800	275	325	275		1000	80087A\LASA\STR\NCL\BOX - 01
14	45048.000	RC Box	0	1	2800	1850	300	350	275		1000	80087A\LASA\STR\NCL\BOX - 01
15	48844.000	RC Box	0	1	3000	2400	350	400	350		1000	80087A\LASA\STR\NCL\BOX - 01
16	48900.000	RC Box	0	1	3000	2400	350	400	350		1000	80087A\LASA\STR\NCL\BOX - 01

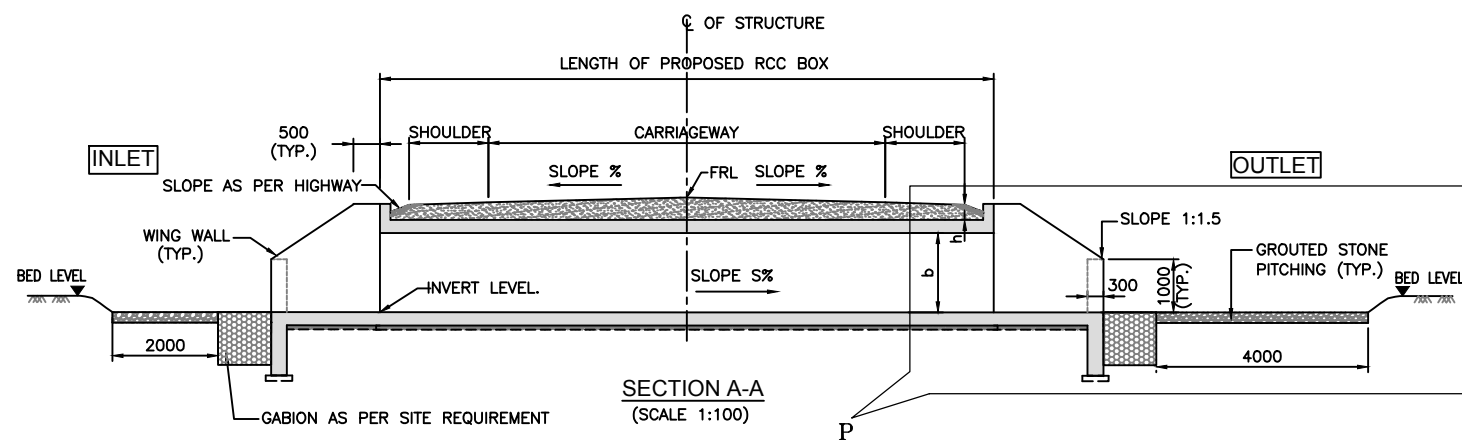
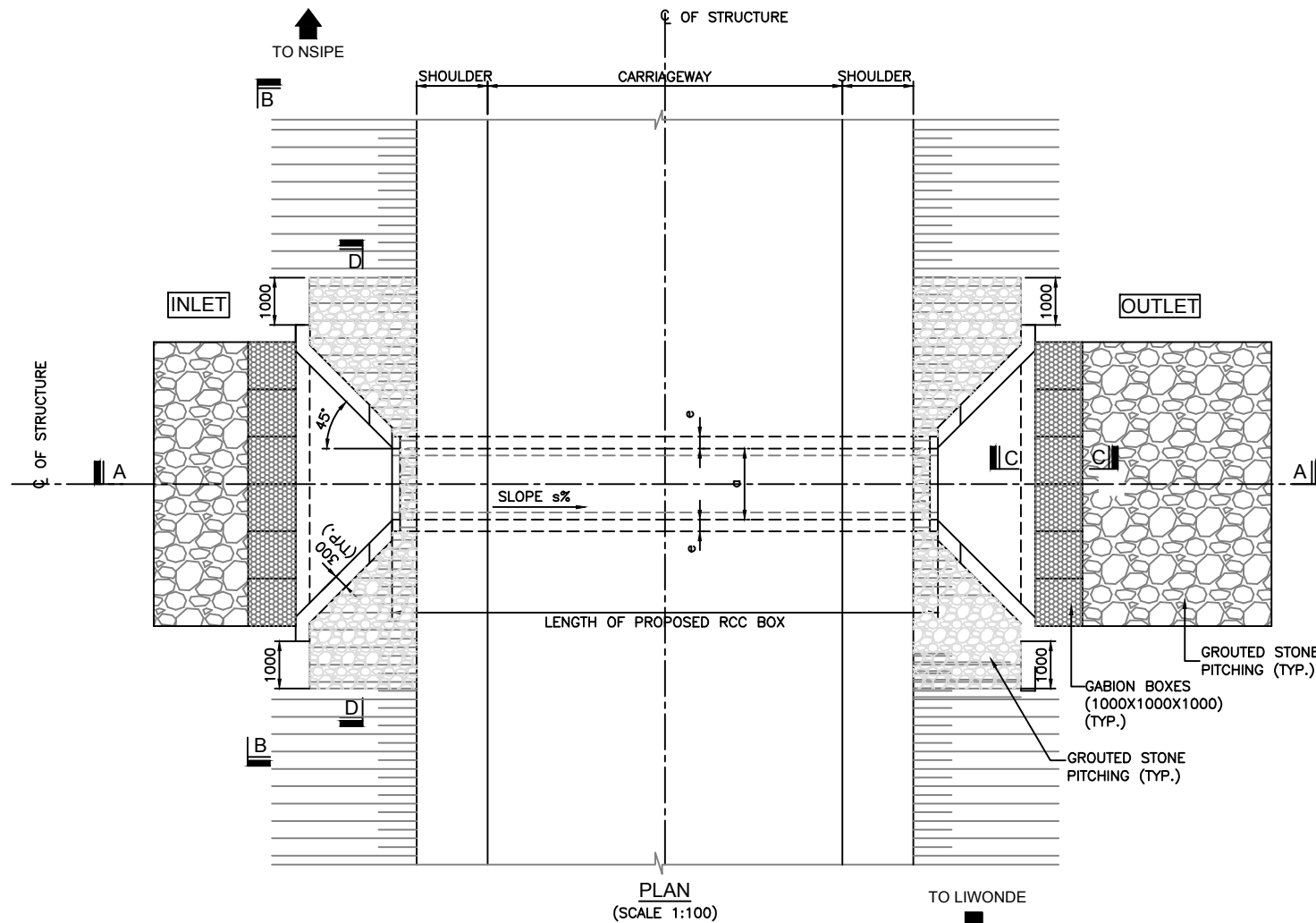
## SCHEDULE OF WIDENING FOR BOX CULVERTS

Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Proposed Culvert Dimensions							Height of Fill (Minimum)	Reference Drawing
	(m)			(degree)	No. of cell	Span	Clear Opening Height (mm)	Thickness of Box				
			Top Slab					Bottom Slab	End Wall	Mid Wall		
											(mm)	
1	1695.000	RC Box	0	1	1800	1800	275	325	275		1000	80087A\LASA\STR\NCL\BOX-WD - 01
2	2923.000	RC Box	0	1	2000	2000	275	325	275		1000	80087A\LASA\STR\NCL\BOX-WD - 01
3	7315.000	RC Box	0	1	3500	2500	350	400	350		1000	80087A\LASA\STR\NCL\BOX-WD - 01
4	7885.000	RC Box	0	1	2500	2500	275	325	275		1000	80087A\LASA\STR\NCL\BOX-WD - 01
5	16465.000	RC Box	0	1	3600	3000	350	400	350		1000	80087A\LASA\STR\NCL\BOX-WD - 01

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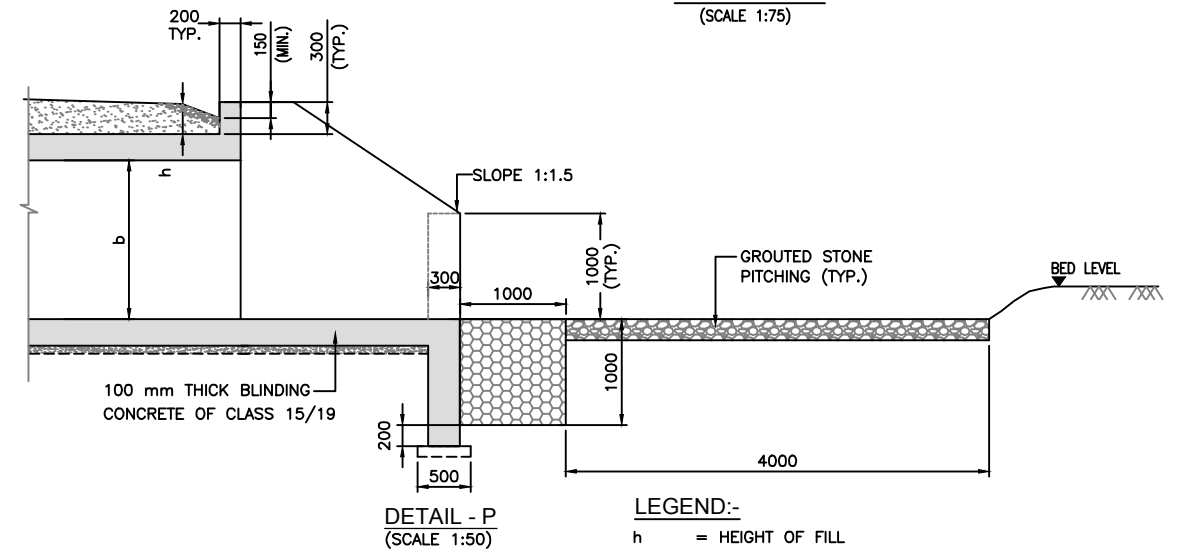
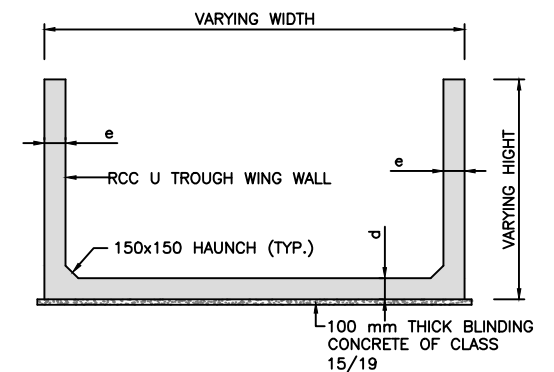
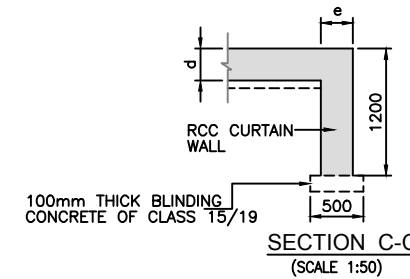
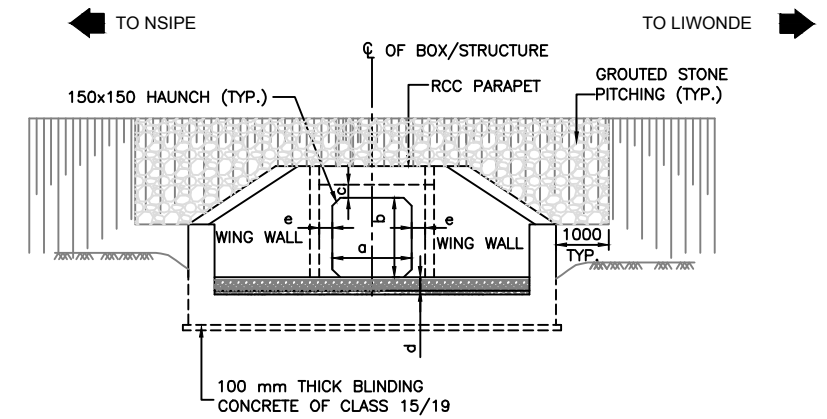
Design Chainages (km)	Type of Structures	Proposed Structures	Reccomendation
01+695	RCC Box	1x3.0x2.4	Widennig
02+923	RCC Box	1x3.0x2.4	Widennig
07+315	RCC Box	1x3.6x3.0	Widennig
07+885	RCC Box	1x2.8x1.85	Widennig
08+400	RCC Box	1x1.8x1.8	Reconstruction
12+680	RCC Box	1x2.0x2.0	Reconstruction
14+440	RCC Box	3x3.5x2.5	Reconstruction
15+150	RCC Box	1x2.5x2.5	Reconstruction
16+315	RCC Box	1x3.6x3.0	Reconstruction
16+465	RCC Box	1x2.0x2.5	Widennig
33+163	RCC Box	1x2.0x2.0	Reconstruction
33+545	RCC Box	1x3.6x2.4	Reconstruction
34+680	RCC Box	1x2.0x2.0	Reconstruction
36+260	RCC Box	1x3.6x3.0	Reconstruction
36+450	RCC Box	2x3.6x2.5	New Construction
37+225	RCC Box	2x2.5x2.5	Reconstruction
39+960	RCC Box	1x2.8x1.85	Reconstruction
40+145	RCC Box	1x1.8x1.8	Reconstruction
45+048	RCC Box	1x2.8x1.85	Reconstruction
48+844	RCC Box	1x3.0x2.4	Reconstruction
48+900	RCC Box	1x3.0x2.4	Reconstruction

MKD.	DESCRIPTIONS	BY	DATE	REVISIONS	CLIENT: THE ROADS AUTHORITY CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI	DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE: SCHEDULE OF BOX CULVERTS	SCALE: AS SHOWN	DESIGNED BY	MANGAL	
										DRAWN BY	RAJU	
										APPROVED BY	R.BHATTACHARYA	
										DATE	MAY, 2023	SHEET SIZE A3
										DRAWING NO.	80087A\LASA\STR\RA\NCL\SC-01	(Sheet 2 OF 2)



DIMENSION TABLE :-

TYPE	SPAN (a) (mm.)	CLEAR HEIGHT (b) (mm.)	TOP SLAB (c) (mm.)	BOTTOM SLAB (d) (mm.)	WALL THICKNESS (e) (mm.)	FILL HEIGHT (h) (m.)
1800X1800	1800	1800	275	325	275	BETWEEN 1m. & 3m.
2000X2000	2000	2000	300	325	275	BETWEEN 1m. & 3m.
2500X2500	2500	2500	300	325	275	BETWEEN 1m. & 3m.



LEGEND:-

h = HEIGHT OF FILL  
FRL = FINISHED ROAD LEVEL  
TYP. = TYPICAL  
MIN. = MINIMUM  
RCC = REINFORCED CEMENT CONCRETE

NOTES

- ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
- THE GRADE OF CONCRETE FOR BOX CULVERT IS C 25/19, UNLESS MENTIONED OTHERWISE.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
- ALL BOX FOR CONSTRUCTION SHALL BE AS PER SATCC TECHNICAL SPECIFICATIONS (LATEST)

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: TYPICAL DIMENSION DRAWING OF SINGLE CELL BOX CULVERTS (FOR SPAN 1.8M, 2.0M & 2.5M) RECONSTRUCTION / NEW CONSTRUCTION		SCALE: AS SHOWN		DESIGNED BY MANGAL	
														DRAWN BY RAJU	
														APPROVED BY R.BHATTACHARYA	
														DATE MAY, 2023	SHEET SIZE A3
														DRAWING NO. 80087A/LASA/STR/RAINCL/BOX-01	(Sheet 1 OF 2)



























(SHOWING REINFORCEMENT DETAILS)  
(SCALE 1:25)



TOP FACE BAR SHOWN THUS -----  
 BOTTOM FACE BAR SHOWN THUS \_\_\_\_\_  
 TYP. = TYPICAL

REINFORCEMENT SCHEDULE :-

SL. No.	BAR MKD.	BAR SHAPE	REINFORCEMENT	REMARKS
1	bs1		12 $\Phi$ - $\Phi$ 100 c/c	
2	bs2		16 $\Phi$ - $\Phi$ 125 c/c	
3	bs3		12 $\Phi$ - $\Phi$ 100 c/c	
4	bs4		12 $\Phi$ - $\Phi$ 100 c/c	
5	bs6		12 $\Phi$ - $\Phi$ 200 c/c	
6	ts1		16 $\Phi$ - $\Phi$ 250 c/c	
7	ts2		12 $\Phi$ - $\Phi$ 100 c/c	
8	ts3		16 $\Phi$ - $\Phi$ 125 c/c	
9	ts4		12 $\Phi$ - $\Phi$ 100 c/c	
10	ts5		12 $\Phi$ - $\Phi$ 100 c/c	
11	w1		12 $\Phi$ - $\Phi$ 300 c/c	
12	w2		12 $\Phi$ - $\Phi$ 300 c/c	
13	w5		16 $\Phi$ - $\Phi$ 250 c/c	
14	h1		10 $\Phi$ - $\Phi$ 200 c/c	
15	L1		450 mm.	
16	L2		450 mm.	
17	L4		450 mm.	
18	bs7		12 $\Phi$ - $\Phi$ 200 c/c	
19	bs8		12 $\Phi$ - $\Phi$ 200 c/c	
20	bs9		12 $\Phi$ - $\Phi$ 200 c/c	
21	c1		12 $\Phi$ - 4Nos	
22	c2		12 $\Phi$ - 6Nos	
23	c3		10 $\Phi$ - $\Phi$ 200 c/c	
24	r1		10 $\Phi$ - $\Phi$ 150 c/c	
25	r2		12 $\Phi$ - $\Phi$ 150 c/c	
26	r3		10 $\Phi$ - $\Phi$ 200 c/c	
27	r4		10 $\Phi$ - $\Phi$ 150 c/c	



NOTES:-

1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
2. REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF 460 N/mm<sup>2</sup> UNLESS NOTED OTHERWISE.
3. THE GRADE OF CONCRETE FOR BOX CULVERT INCLUDING WING WALL, CURTAIN WALL, HEAD WALL ETC., SHALL BE C 25/19, UNLESS NOTED OTHERWISE.
4. MINIMUM CLEAR COVER TO REINFORCEMENT SHALL BE 40mm.
5. LAPS SHALL BE STAGGERED AND SUITABLY PLACED. NOT MORE THAN 50% OF ANY REINFORCEMENT SHALL BE LAPPED AT ANY SECTION.

MKD.	DESCRIPTIONS	BY	DATE
REVISIONS			

CLIENT:


THE ROADS AUTHORITY

CHIEF EXECUTIVE OFFICER

PRIVATE BAG B346

LILONGWE

MALAWI



ACCELERATING MALAWI'S  
ECONOMIC GROWTH

DESIGN CONSULTANT:

LEA Associates South Asia Pvt Ltd., India  
in association with  
RUO Consulting Engineers Ltd, Malawi

**LEA** Associates  
South Asia Pvt Ltd., India  
in association with  
RUO Consulting Engineers Ltd, Malawi

**Ruo** Consultants  
Multi-disciplinary Consulting Civil Engineers

PROJECT:

CONSULTANCY SERVICES FOR PROVISION  
OF ENGINEERING SERVICES FOR THE DESIGN  
REVIEW FOR THE REHABILITATION OF  
NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD

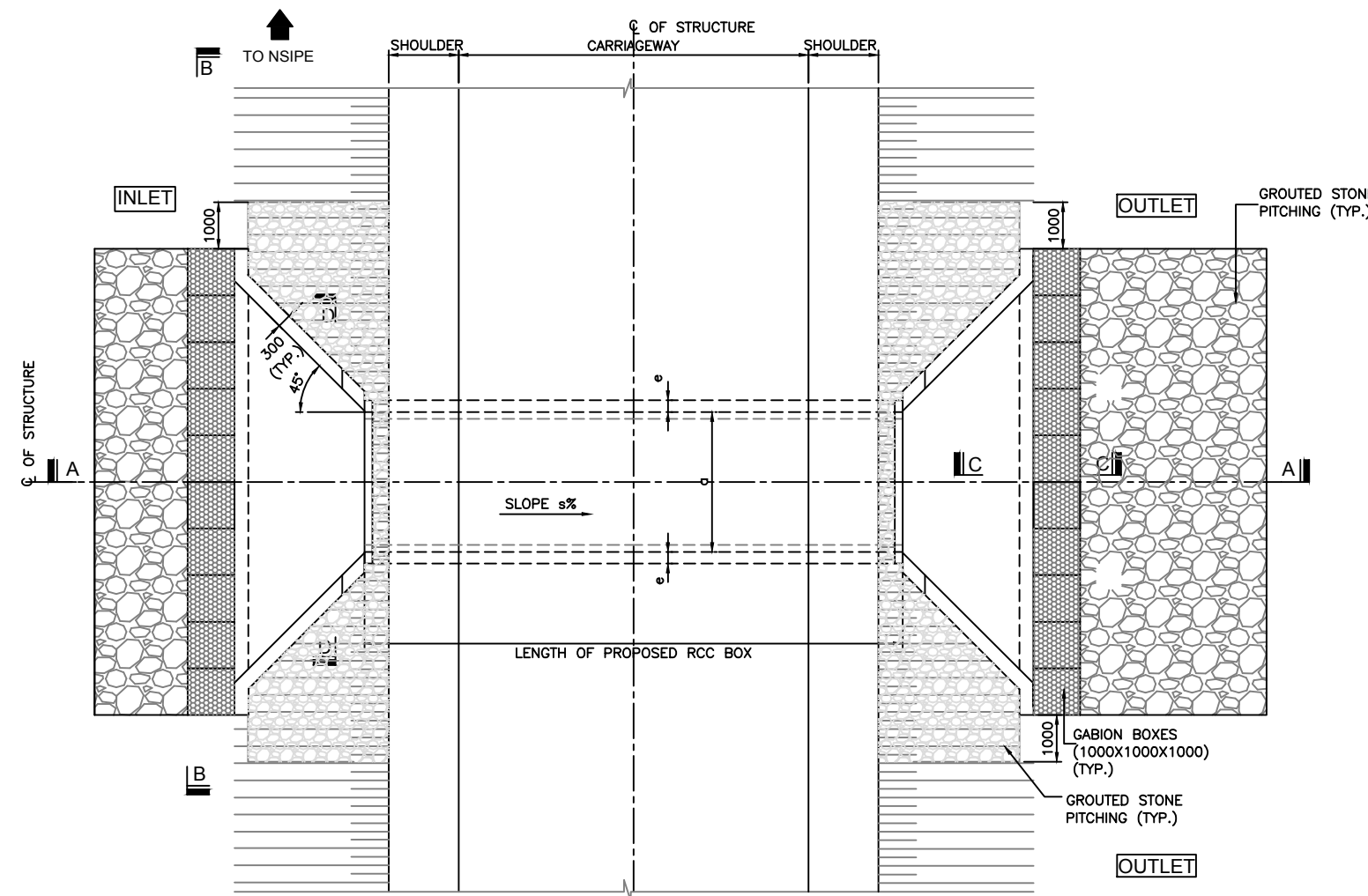
DRAWING TITLE:

TYPICAL DIMENSION DRAWING OF  
SINGLE CELL BOX CULVERTS (FOR  
SPAN 1.8M, 2.0M & 2.5M)  
RECONSTRUCTION / NEW  
CONSTRUCTION

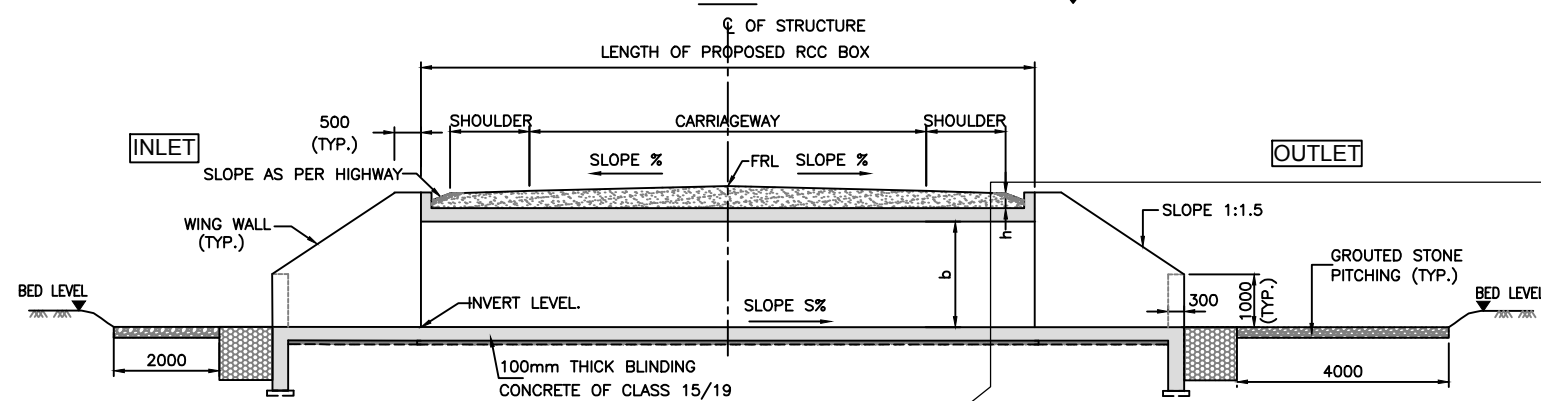
(SHEET 2 OF 2)

SCALE:		
AS SHOWN	DESIGNED BY	MANGAL
	DRAWN BY	RAJU
	APPROVED BY	R.BHATTACHARYA
	DATE	MAY, 2023
	SHEET SIZE A3	
DRAWING NO.		80087A\ASA\STR\A\NCL\BOX-01 (Sheet 2 of 2)





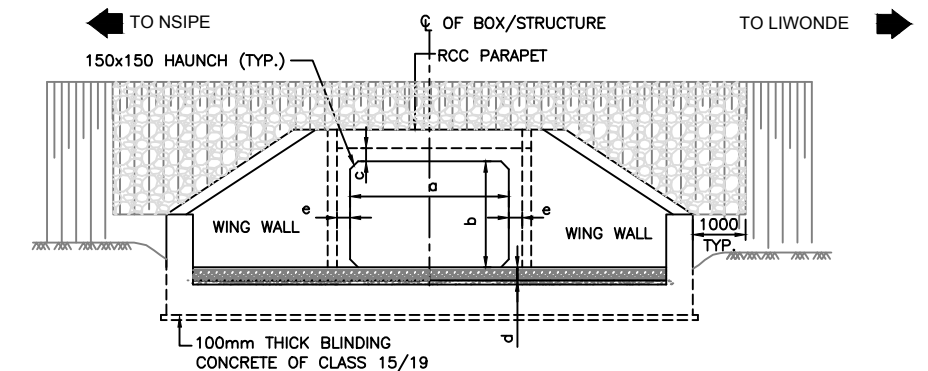
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PLAN



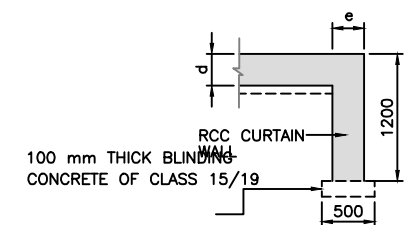
SECTION A-A  
(SCALE 1:100)

DIMENSION TABLE :-

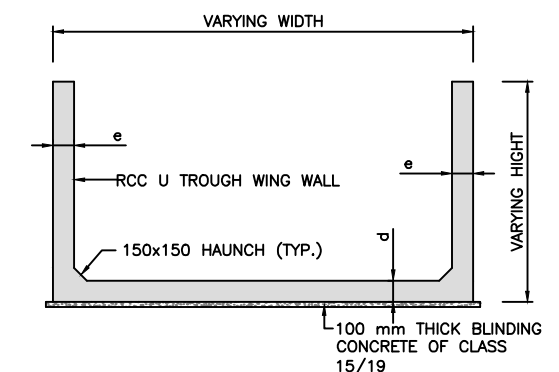
TYPE	SPAN (a) (mm.)	CLEAR HEIGHT (b) (mm.)	TOP SLAB (c) (mm.)	BOTTOM SLAB (d) (mm.)	WALL THICKNESS (e) (mm.)	FILL HEIGHT (h) (m.)
3000X1850	3000	1850	350	400	350	BETWEEN 1m. & 3m.
3000X2400	3000	2400	350	400	350	BETWEEN 1m. & 3m.
3600X2500	3600	2500	350	400	350	BETWEEN 1m. & 3m.



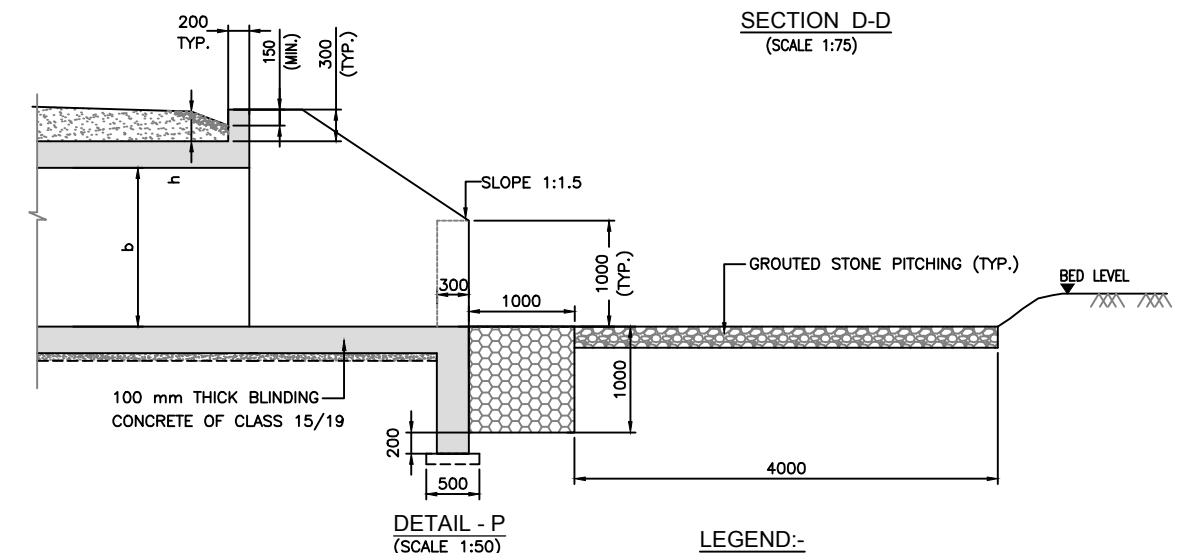
SECTION B-B  
(SCALE 1:100)



SECTION C-C  
(SCALE 1:50)



SECTION D-D  
(SCALE 1:75)



DETAIL - P  
(SCALE 1:50)

LEGEND:-

h = HEIGHT OF FILL  
FRL = FINISHED ROAD LEVEL  
TYP. = TYPICAL  
MIN. = MINIMUM  
RCC = REINFORCED CEMENT CONCRETE

NOTES

- ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
- THE GRADE OF CONCRETE FOR BOX CULVERT IS C 25/19, UNLESS MENTIONED OTHERWISE.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
- ALL BOX FOR CONSTRUCTION SHALL BE AS PER SATCC TECHNICAL SPECIFICATIONS (LATEST)

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: TYPICAL DIMENSION DRAWING OF SINGLE CELL BOX CULVERTS (FOR SPAN 3.0M) RECONSTRUCTION / NEW CONSTRUCTION		SCALE: AS SHOWN		DESIGNED BY MANGAL	
														DRAWN BY RAJU	
														APPROVED BY R.BHATTACHARYA	
														DATE MAY, 2023	SHEET SIZE A3
														DRAWING NO. 80087A/LASA/STR/RAINCL/BOX-02	(Sheet 1 of 2)





(SHOWING REINFORCEMENT DETAILS)  
(SCALE 1:25)



LEGENDS:-

TOP FACE BAR SHOWN THUS  
 BOTTOM FACE BAR SHOWN THUS  
 TYP. = TYPICAL

REINFORCEMENT SCHEDULE :-

SL. No.	BAR MKD.	BAR SHAPE	REINFORCEMENT	REMARKS
1	bs1		16 # - @ 200 c/c	
2	bs2		16 # - @ 125 c/c	
3	bs3		12 # - @ 100 c/c	
4	bs4		12 # - @ 100 c/c	
5	bs6		12 # - @ 200 c/c	
6	ts1		16 # - @ 200 c/c	
7	ts2		16 # - @ 200 c/c	
8	ts3		16 # - @ 125 c/c	
9	ts4		12 # - @ 100 c/c	
10	ts5		12 # - @ 100 c/c	
11	w1		12 # - @ 200 c/c	
12	w2		12 # - @ 200 c/c	
13	w5		16 # - @ 200 c/c	
14	h1		10 # - @ 200 c/c	
15	L1		600 mm.	
16	L2		600 mm.	
17	L4		600 mm.	
18	bs7		12 # - @ 200 c/c	
19	bs8		12 # - @ 200 c/c	
20	bs9		12 # - @ 200 c/c	
21	c1		12 # - 4Nos	
22	c2		12 # - 6Nos	
23	c3		10 # - @ 200 c/c	
24	r1		10 # - @ 200 c/c	
25	r2		12 # - @ 150 c/c	
26	r3		10 # - @ 200 c/c	
27	r4		10 # - @ 150 c/c	



NOTES:-

1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
2. REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF 460 N/mm<sup>2</sup> UNLESS NOTED OTHERWISE.
3. THE GRADE OF CONCRETE FOR BOX CULVERT INCLUDING WING WALL, CURTAIN WALL, HEAD WALL ETC., SHALL BE C 25/19, UNLESS NOTED OTHERWISE.
4. MINIMUM CLEAR COVER TO REINFORCEMENT SHALL BE 40mm.
5. LAPS SHALL BE STAGGERED AND SUITABLY PLACED. NOT MORE THAN 50% OF ANY REINFORCEMENT SHALL BE LAPPED AT ANY SECTION.

MKD.	DESCRIPTIONS	BY	DATE
REVISIONS			

CLIENT:


THE ROADS AUTHORITY

CHIEF EXECUTIVE OFFICER

PRIVATE BAG B346

LILONGWE

MALAWI



ACCELERATING MALAWI'S

DESIGN CONSULTANT:

LEA Associates South Asia Pvt Ltd., India  
in association with  
RUO Consulting Engineers Ltd, Malawi



PROJECT:

CONSULTANCY SERVICES FOR PROVISION  
OF ENGINEERING SERVICES FOR THE DESIGN  
REVIEW FOR THE REHABILITATION OF  
NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD

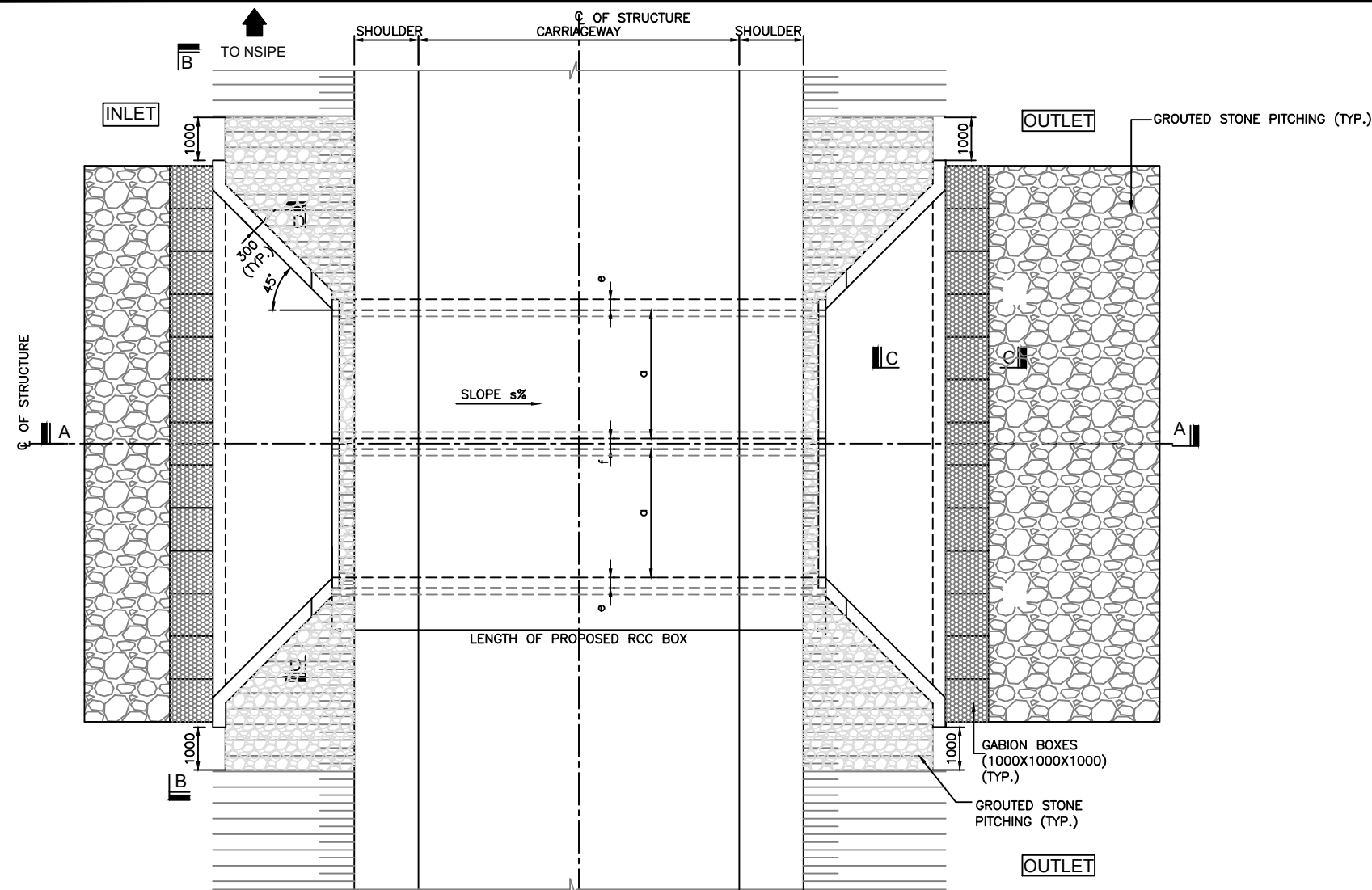
DRAWING TITLE:

TYPICAL DIMENSION DRAWING  
OF SINGLE CELL BOX CULVERTS  
(FOR SPAN 3.0M )  
RECONSTRUCTION / NEW  
CONSTRUCTION

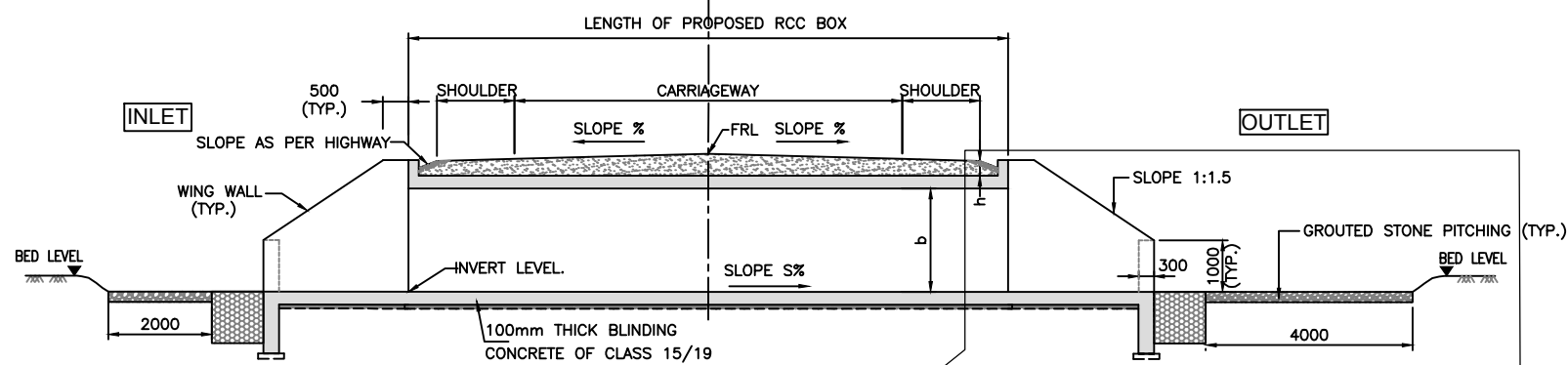
SCALE:

AS SHOWN

DESIGNED BY	MANGAL	
DRAWN BY	RAJU	
APPROVED BY	R.BHATTACHARYA	
DATE	MAY, 2023	SHEET SIZE A3
DRAWING NO.	80087A/LASA/STR/RAINCL/BOX-02	(Sheet 2 OF 2)



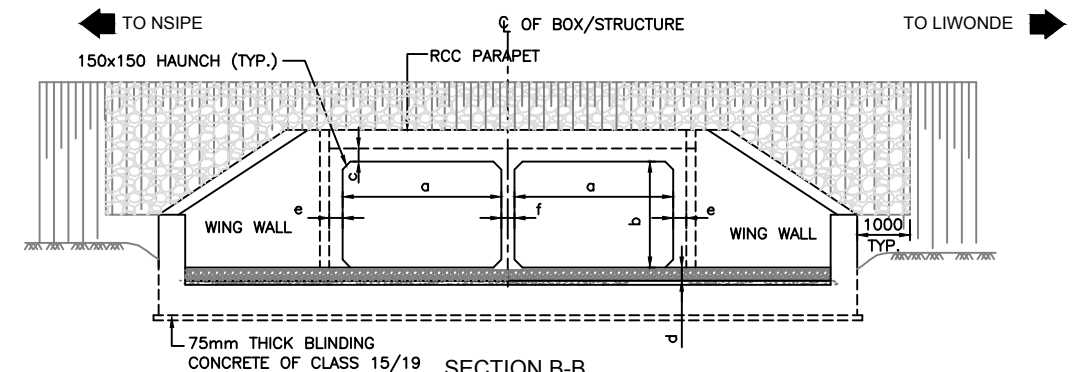
PLAN  
(SCALE 1:100)



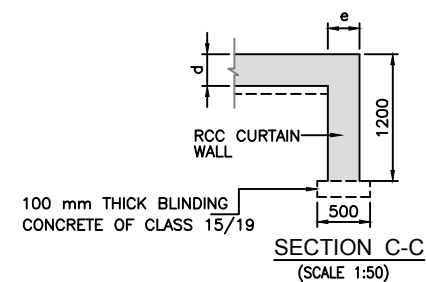
SECTION A-A  
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DIMENSION TABLE :-

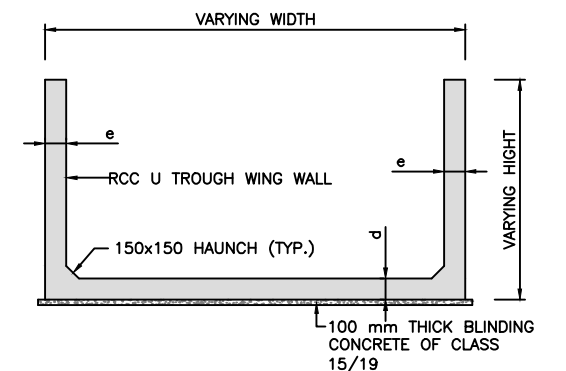
TYPE	SPAN (a) (mm.)	CLEAR HEIGHT (b) (mm.)	TOP SLAB (c) (mm.)	BOTTOM SLAB (d) (mm.)	WALL THICKNESS (e) (mm.)	INNER WALL THICKNESS (f) (mm.)	FILL HEIGHT (h) (m.)
2X(2500X2500)	2500	2500	300	350	300	300	BETWEEN 1m. & 3m.
2X(3600X3000)	3600	3000	350	400	350	300	BETWEEN 1m. & 3m.



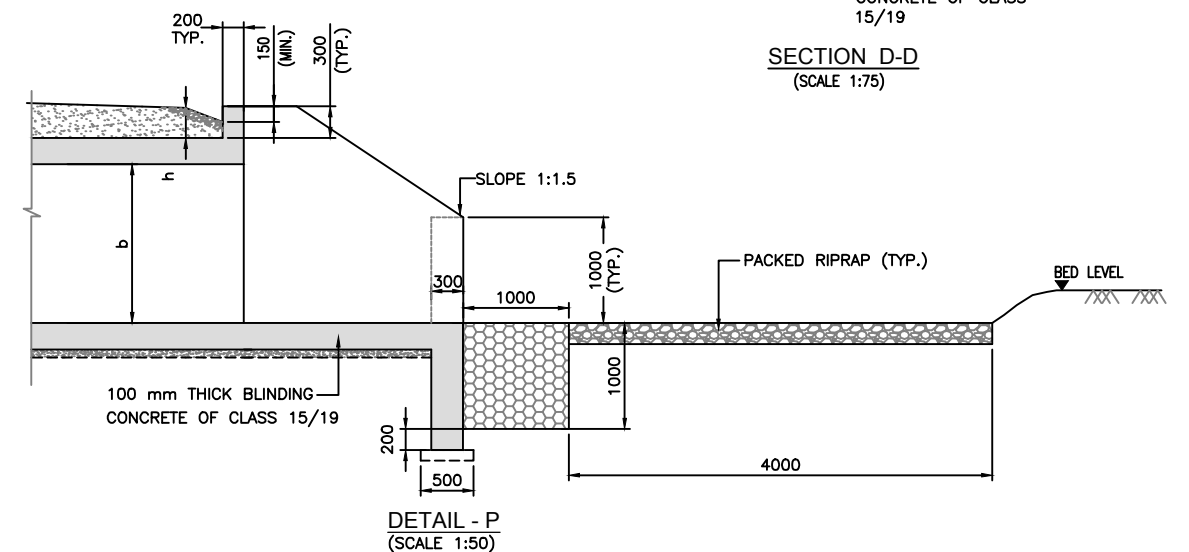
SECTION B-B  
(SCALE 1:100)



SECTION C-C  
(SCALE 1:50)



SECTION D-D  
(SCALE 1:75)



DETAIL - P  
(SCALE 1:50)

#### NOTES

1. ALL DIMENSIONS ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
2. THE GRADE OF CONCRETE FOR BOX CULVERT IS C 25/19, UNLESS MENTIONED OTHERWISE.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
4. ALL BOX FOR CONSTRUCTION SHALL BE AS PER SATCC TECHNICAL SPECIFICATIONS (LATEST)

#### LEGEND:-

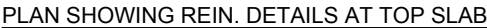
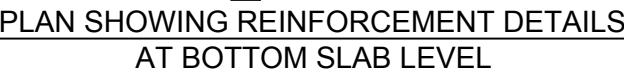
h = HEIGHT OF FILL  
FRL = FINISHED ROAD LEVEL  
TYP. = TYPICAL  
MIN. = MINIMUM  
RCC = REINFORCED CEMENT CONCRETE

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: TYPICAL DIMENSION AND REINFORCEMENT DRAWING OF DOUBLE CELL R.C.C BOX CULVERTS FOR RECONSTRUCTION 2500mm. x 2500mm. (NORMAL INLET & NORMAL OUTLET)		SCALE: AS SHOWN		DESIGNED BY MANGAL	
														DRAWN BY RAJU	
														APPROVED BY R.BHATTACHARYA	
														DATE MAY, 2023	SHEET SIZE A3
														DRAWING NO. 80087A/LASA/STR/RAINCL/BOX-03	(Sheet 1 OF 2)









### REINFORCEMENT SCHEDULE :-

SL. No.	BAR MKD.	BAR SHAPE	REINFORCEMENT	REMARKS
1	bs1		16 $\Phi$ - @ 200 c/c	
2	bs2		16 $\Phi$ - @ 150 c/c	
3	bs3		12 $\Phi$ - @ 100 c/c	
4	bs4		12 $\Phi$ - @ 100 c/c	
5	bs6		12 $\Phi$ - @ 150 c/c	
6	ts1		16 $\Phi$ - @ 200 c/c	
7	ts2		16 $\Phi$ - @ 200 c/c	
8	ts3		16 $\Phi$ - @ 150 c/c	
9	ts4		12 $\Phi$ - @ 100 c/c	
10	ts5		16 $\Phi$ - @ 200 c/c	
11	w1		12 $\Phi$ - @ 200 c/c	
12	w2		12 $\Phi$ - @ 200 c/c	
13	w3		12 $\Phi$ - @ 200 c/c	
14	w4		16 $\Phi$ - @ 200 c/c	
15	w5		16 $\Phi$ - @ 200 c/c	
16	h1		10 $\Phi$ - @ 200 c/c	
17	L1		900 mm.	
18	L2		900 mm.	
19	L3		900 mm.	
20	L4		900 mm.	
21	bs7		12 $\Phi$ - @ 200 c/c	
22	bs8		12 $\Phi$ - @ 200 c/c	
23	bs9		12 $\Phi$ - @ 150 c/c	
24	c1		12 $\Phi$ - 4Nos	
25	c2		12 $\Phi$ - 6Nos	
26	c3		10 $\Phi$ - @ 200 c/c	
27	r1		10 $\Phi$ - @ 150 c/c	
28	r2		12 $\Phi$ - @ 150 c/c	
29	r3		10 $\Phi$ - @ 200 c/c	
30	r4		10 $\Phi$ - @ 150 c/c	

**LEGENDS:-**

TOP FACE BAR SHOWN THUS -----

BOTTOM FACE BAR SHOWN THUS \_\_\_\_\_

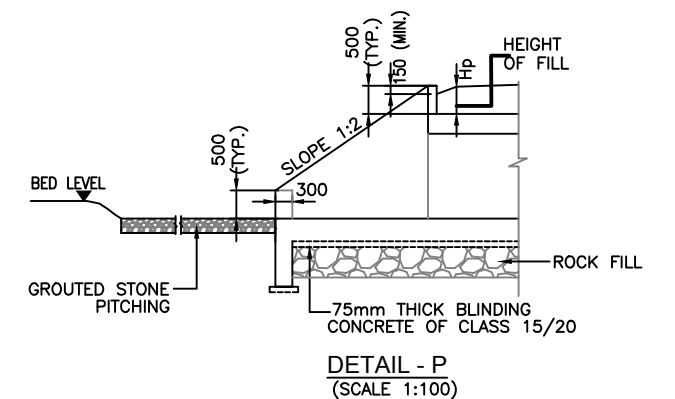
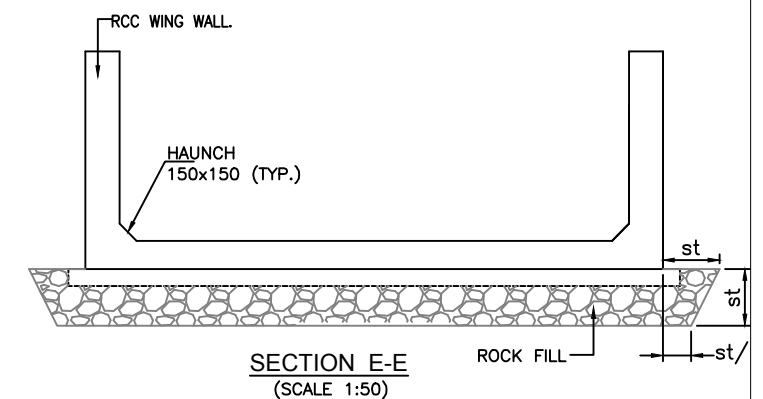
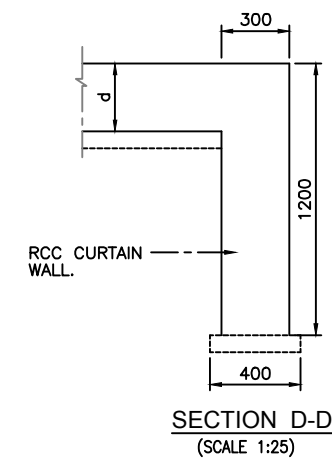
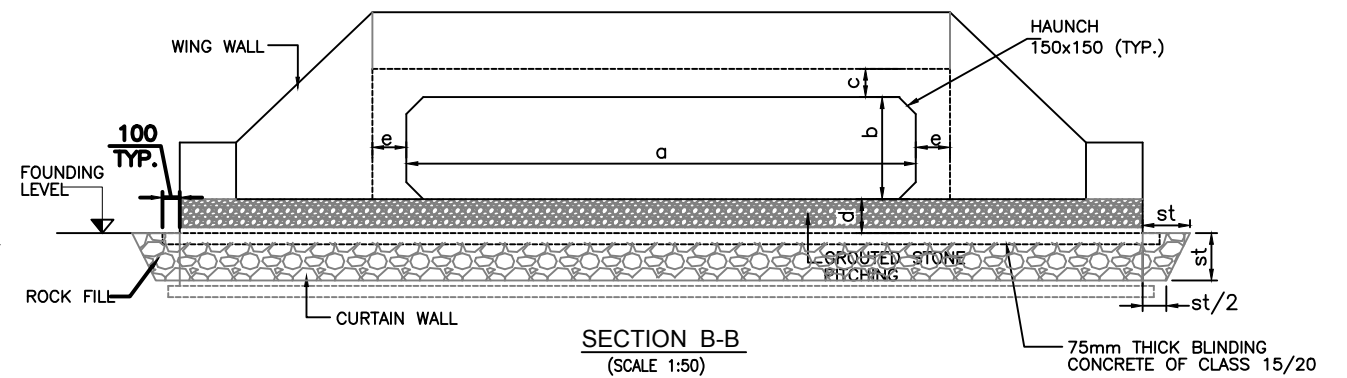
NOTES:-

1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
2. REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF 460.
3. THE GRADE OF CONCRETE FOR BOX CULVERT SHALL BE 30/19.
4. LAPS SHALL BE STAGGERED AND SUITABLY PLACED. NOT MORE THAN 50% OF ANY REINFORCEMENT SHALL BE LAPPED AT ANY SECTION.
5. CLEAR COVER TO ANY REINFORCEMENT SHALL BE AS FOLLOWS 40mm.

[illegible]





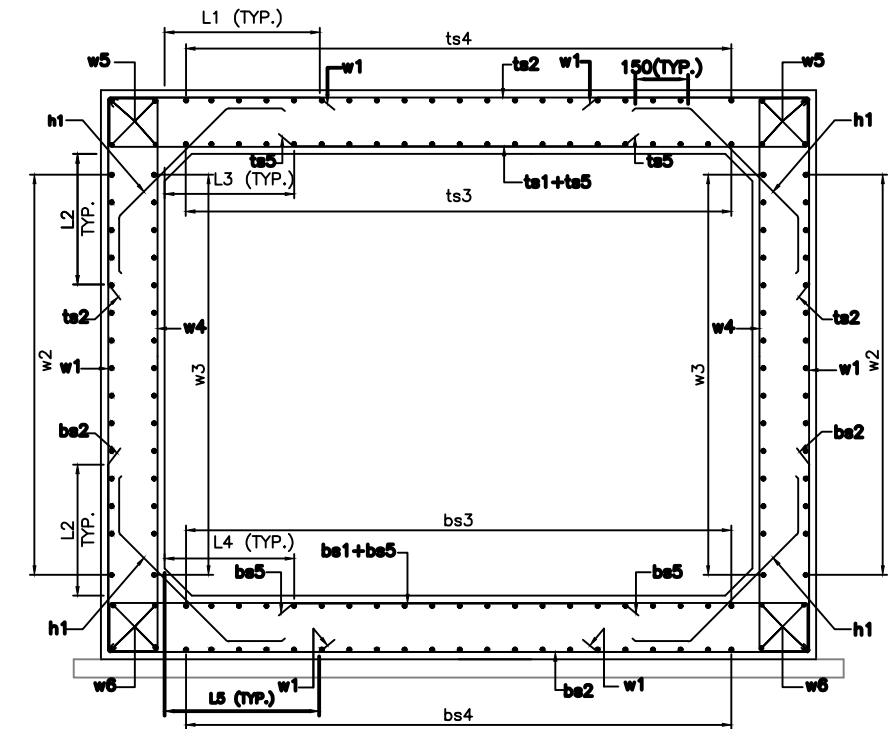
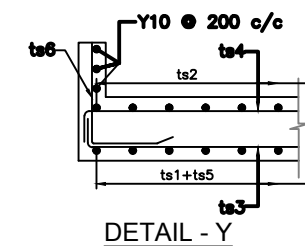
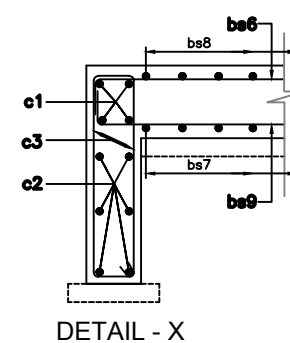
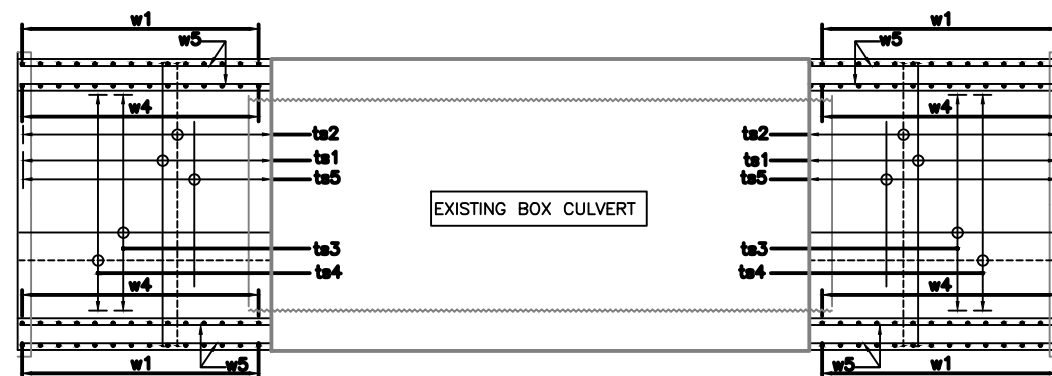
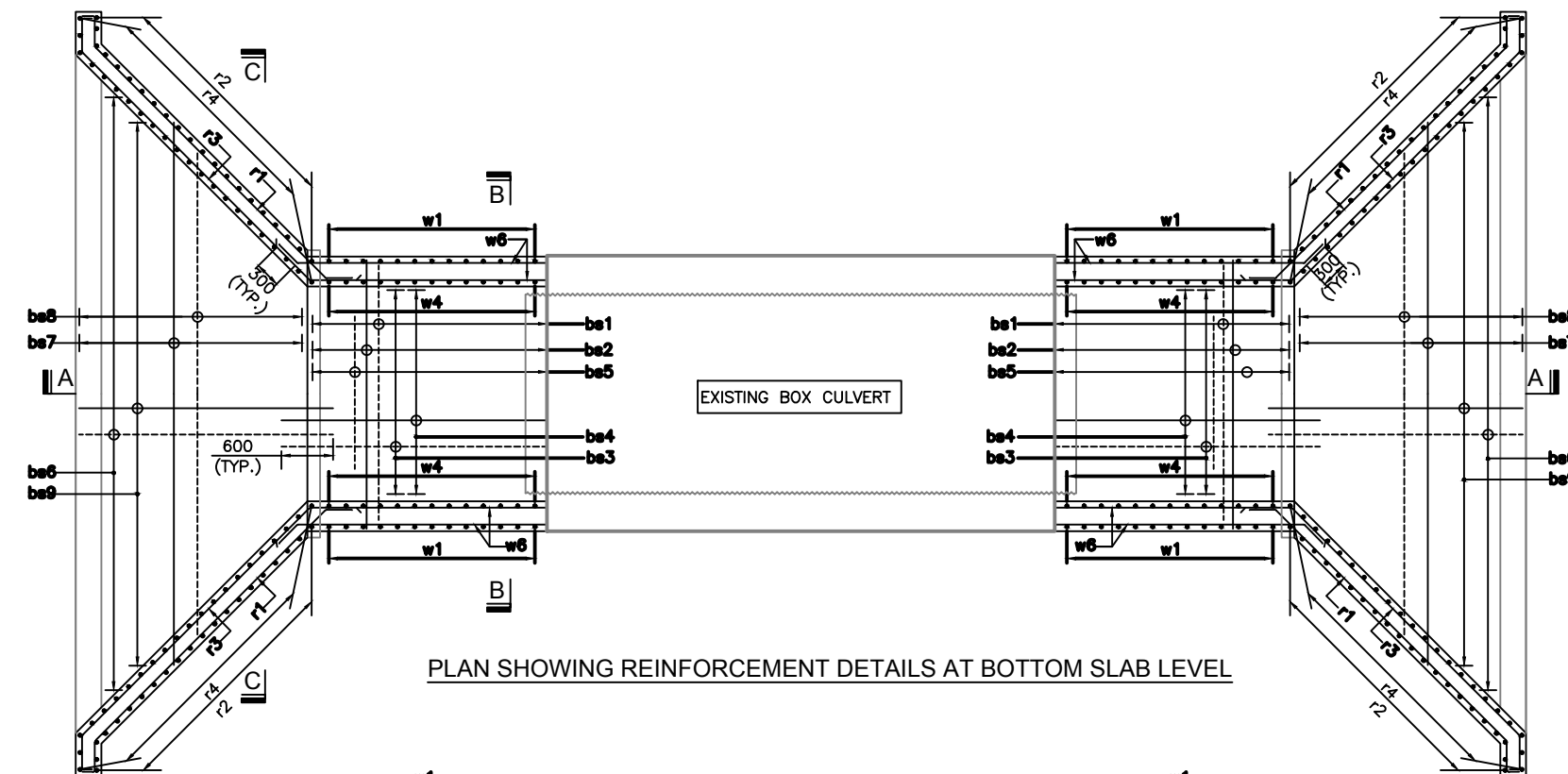
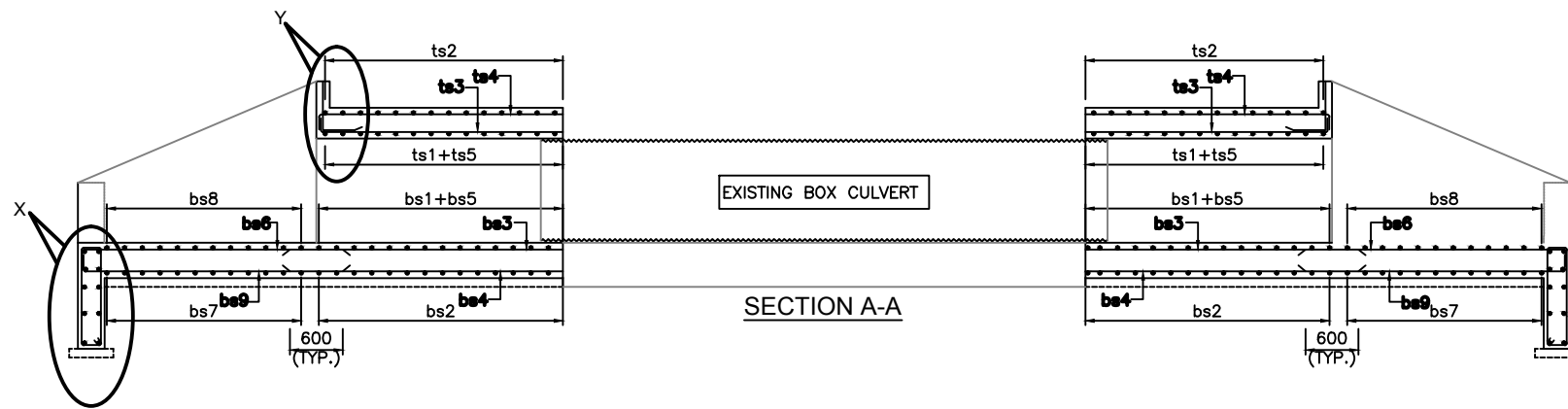


CMP = CORRUGATED METAL PIPE  
ID = DIAMETER OF CMP      c = THICKNESS OF TOP SLAB  
a = CLEAR SPAN OF BOX      d = THICKNESS OF BOTTOM SLAB  
b = CLEAR HEIGHT OF BOX      e = EXTERNAL WALL THICKNESS

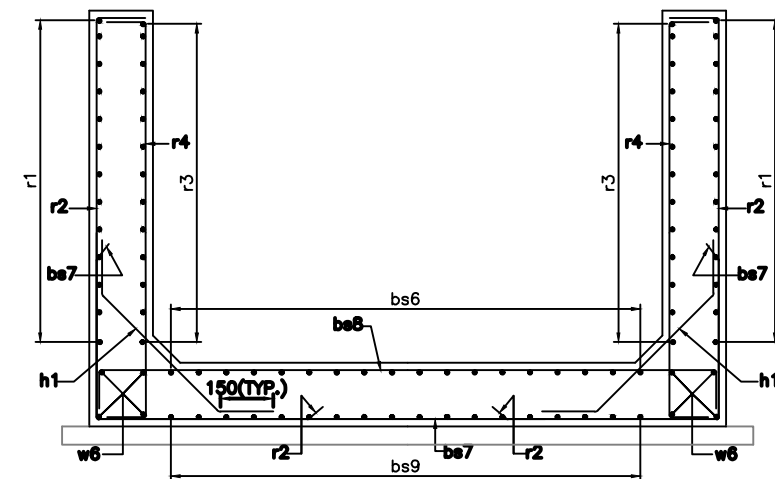
1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
2. ALL CONCRETE TO BE CLASS 25/19 UNLESS MENTIONED OTHERWISE.
3. MINIMUM CLEAR COVER TO REINFORCEMENT IS 40 MM.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
5. ALL BOX FOR CONSTRUCTION SHALL BE AS PER SATCC. TECHNICAL SPECIFICATIONS (LATEST)
6. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH OTHER RELEVANT DRAWINGS.

- THE GROUND IMPROVEMENT TECHNIQUE AS SHOWN IN THE DRAWING FOR IMPROVEMENT OF SBC TO 10T/SQ.M SHALL BE STRICTLY FOLLOWED. STABILITY AND SAFETY OF THE STRUCTURE CAN NOT BE ENSURED WITHOUT/INSUFFICIENT GROUND IMPROVEMENT.
- TOP FOUNDATION SOIL OF SPECIFIED THICKNESS (st) SHALL BE REPLACED WITH ROCK FILL HAVING ALROUND PROJECTION, AS SHOWN IN RELEVANT SECTION OF THE DRAWING.

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SECTION B-B



SECTION C-C

#### LEGENDS:-

TOP FACE BAR SHOWN THUS -----  
BOTTOM FACE BAR SHOWN THUS -----


#### NOTES:-

1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSION TO BE FOLLOWED.
2. REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF 460 N/mm<sup>2</sup>.
3. THE GRADE OF CONCRETE FOR BOX CULVERT INCLUDING WING WALL, CURTAIN WALL, HEAD WALL ETC., SHALL BE 25/19, UNLESS NOTED OTHERWISE.
4. LAPS SHALL BE STAGGERED AND SUITABLY PLACED. NOT MORE THAN 50% OF ANY REINFORCEMENT SHALL BE LAPPED AT ANY SECTION.
5. CLEAR COVER TO ANY REINFORCEMENT SHALL BE 40mm.

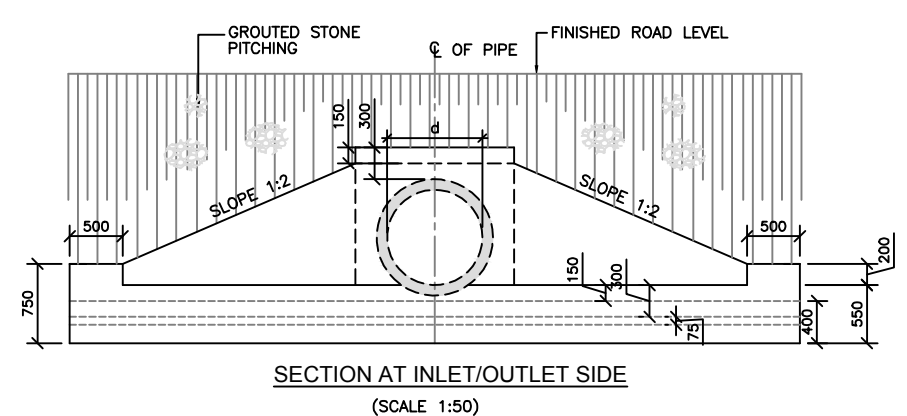
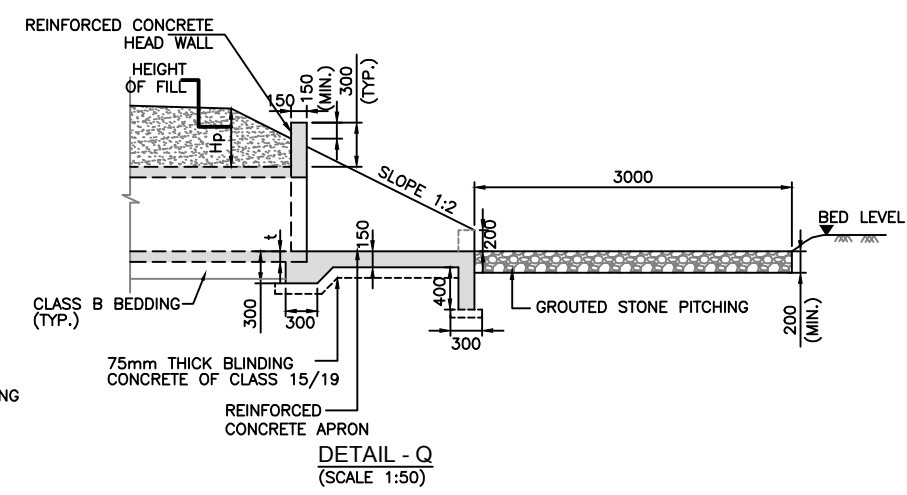
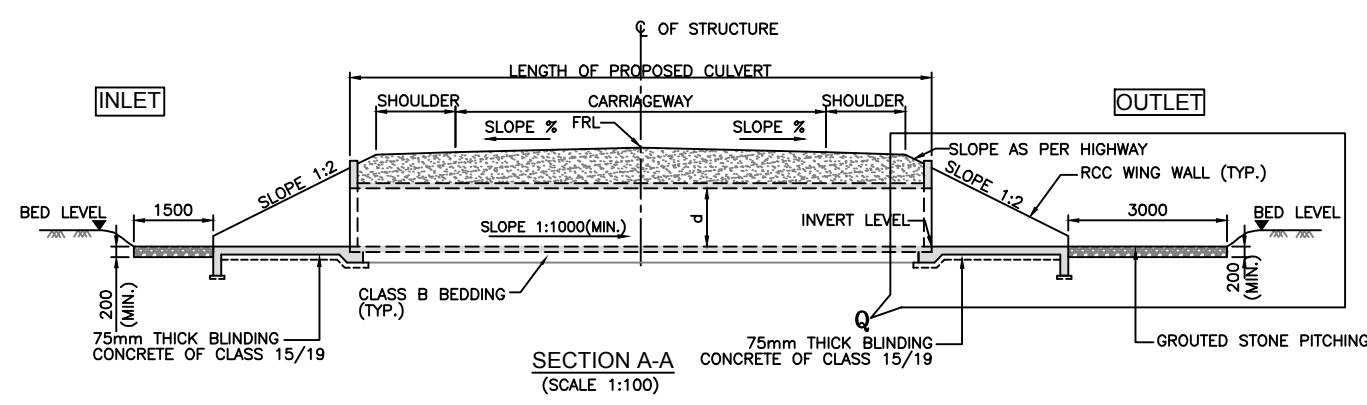
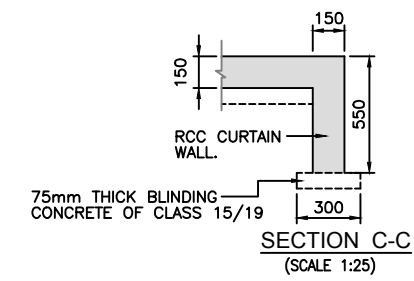
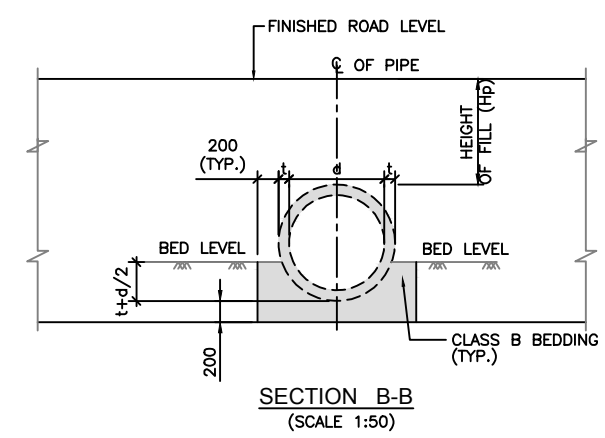
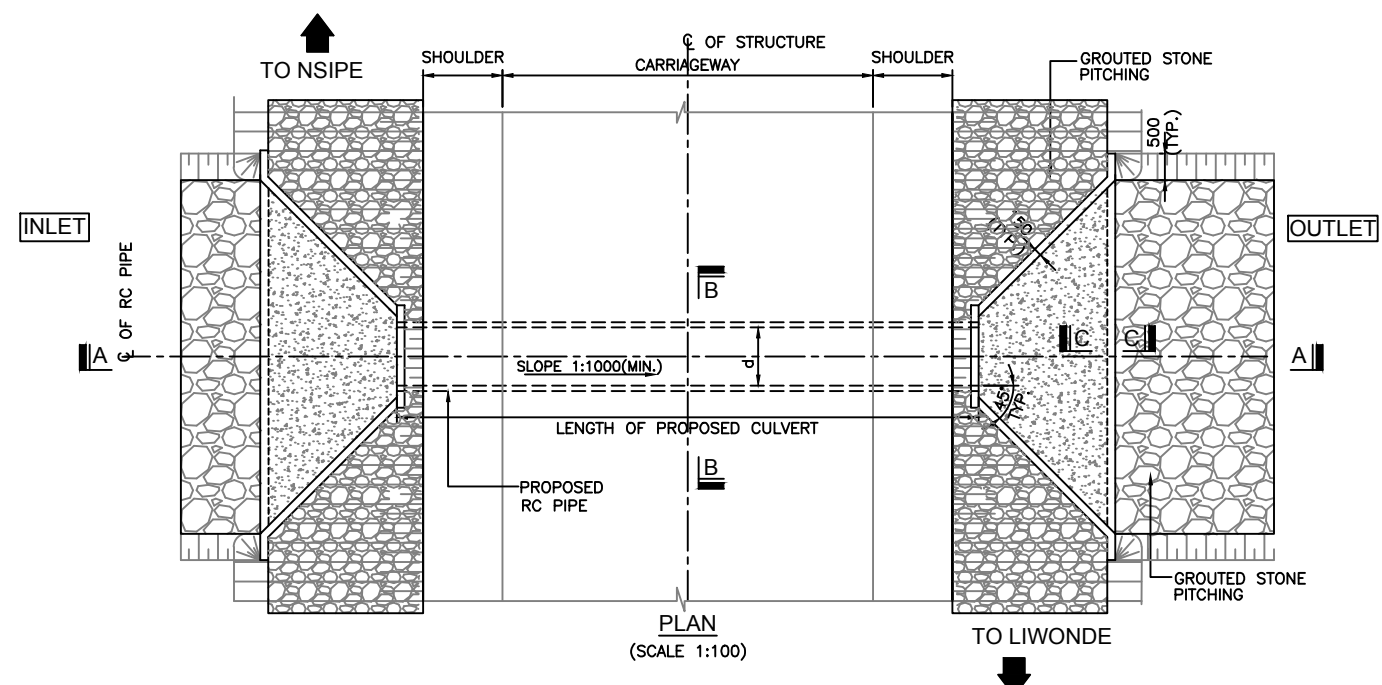
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			CHIEF EXECUTIVE OFFICER				LEA Associates South Asia Pvt Ltd., India		CONSULTANCY SERVICES FOR PROVISION		TYPICAL DIMENSION AND		AS SHOWN		DRAWN BY		RAJU	
			PRIVATE BAG B346				in association with		REVIEW FOR THE REHABILITATION OF		SINGLE CELL BOX CULVERT				APPROVED BY		R.BHATTACHARYA	
			LILONGWE				RUO Consulting Engineers Ltd, Malawi		NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		WIDENED WITH SINGLE CELL BOX				DATE		MAY, 2023	
			MALAWI								CULVERT				DRAWING NO.		80087A\LASA\STR\RA\NCL\BOX-05	
																	SHEET SIZE A3	
																	(Sheet 2 OF 3)	

REINFORCEMENT SCHEDULE

DESIGN CHAINAGE		(km)	SPAN UP TO 3.0m	
Size (a x b)		(m)	SPAN UP TO 3.6m	
BAR MARK	BAR SHAPE	REMARKS	Description	Description
ts1			Y 16 @ 125 mm c/c	Y 16 @ 125 mm c/c
ts2			Y 16 @ 200 mm c/c	Y 16 @ 200 mm c/c
ts3			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
ts4			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
ts5			-	-
ts6			Y 10 @ 150 mm c/c	Y 10 @ 150 mm c/c
w1			Y 16 @ 125 mm c/c	Y 16 @ 125 mm c/c
w1a			-	-
w2			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
w3			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
w4			Y 12 @ 150 mm c/c	Y 12 @ 150 mm c/c
w4a			-	-
w5			Y 10 4-Nos	Y 10 4-Nos
w6			Y 10 4-Nos	Y 10 4-Nos
bs1			Y 20 @ 150 mm c/c	Y 20 @ 150 mm c/c
bs2			Y 20 @ 150 mm c/c	Y 20 @ 150 mm c/c
bs3			Y 12 @ 200 mm c/c	Y 12 @ 200 mm c/c
bs4			Y 12 @ 200 mm c/c	Y 12 @ 200 mm c/c
bs5			-	-
bs6			Y 12 @ 200 mm c/c	Y 12 @ 200 mm c/c
bs7			Y 20 @ 150 mm c/c	Y 20 @ 150 mm c/c
bs8			Y 20 @ 150 mm c/c	Y 20 @ 150 mm c/c
bs9			Y 12 @ 200 mm c/c	Y 12 @ 200 mm c/c
h1			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
c1			Y 12 4-Nos	Y 12 4-Nos
c2			Y 12 6-Nos	Y 12 6-Nos
c3			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
r1			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
r2			Y 16 @ 125 mm c/c	Y 16 @ 125 mm c/c
r3			Y 10 @ 200 mm c/c	Y 10 @ 200 mm c/c
r4			Y 12 @ 150 mm c/c	Y 12 @ 150 mm c/c
L1			300 mm	300 mm
L2			300 mm	300 mm
L3			-	-
L4			-	-
L5			300 mm	300 mm
L6			-	-

				CLIENT: <div>THE ROADS AUTHORITY</div> <div>CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI</div> <div></div>	DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi <div></div>	PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE: <div>TYPICAL DIMENSION AND REINFORCEMENT DRAWING OF SINGLE CELL BOX CULVERT WIDENED WITH SINGLE CELL BOX CULVERT</div>	SCALE: <div>AS SHOWN</div>	DESIGNED BY	MANGAL	
									DRAWN BY	RAJU	
									APPROVED BY	R.BHATTACHARYA	
									DATE	MAY, 2023	SHEET SIZE A3
MKD.	DESCRIPTIONS	BY	DATE						DRAWING NO.	80087A\LASA\STR\RA\NCL\BOX-05	(Sheet 3 OF 3)
REVISIONS											





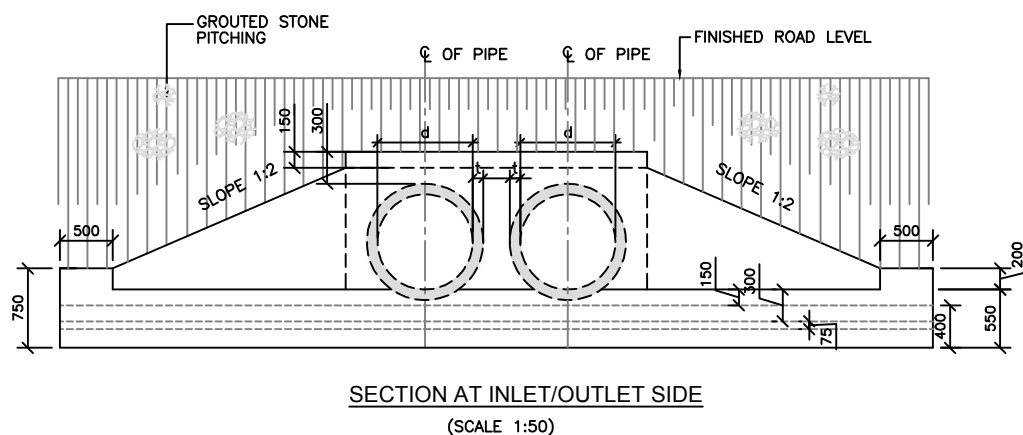
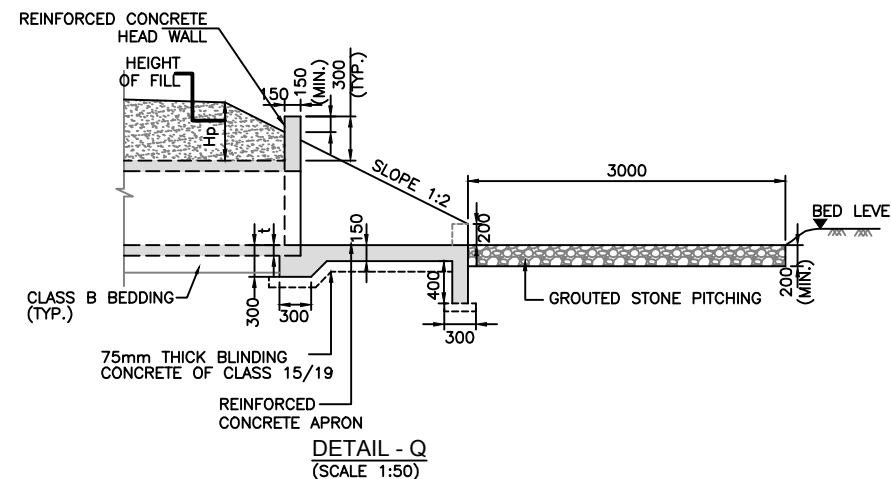
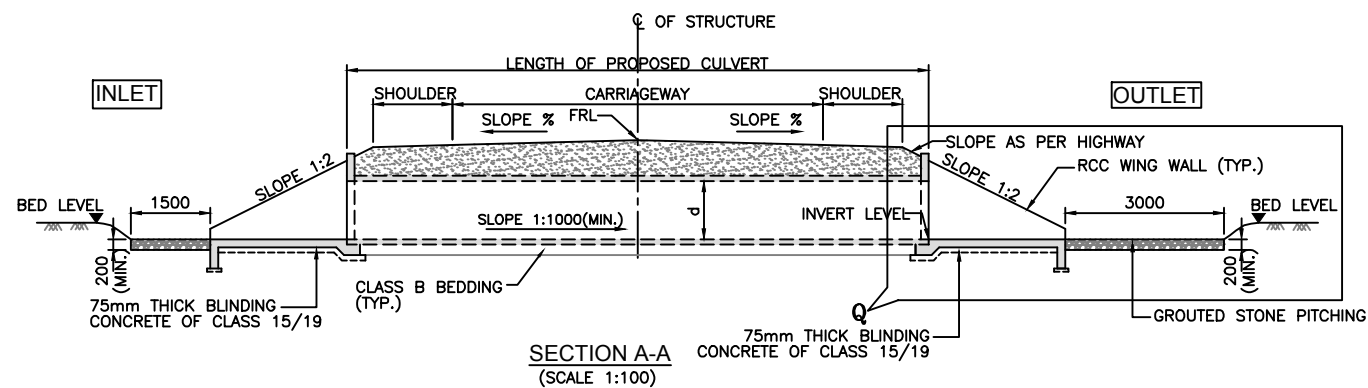
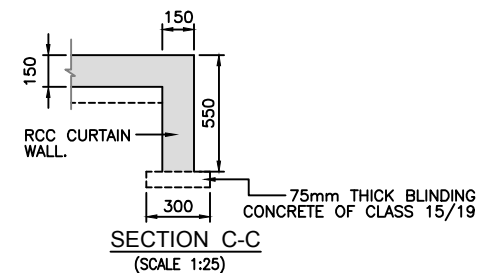
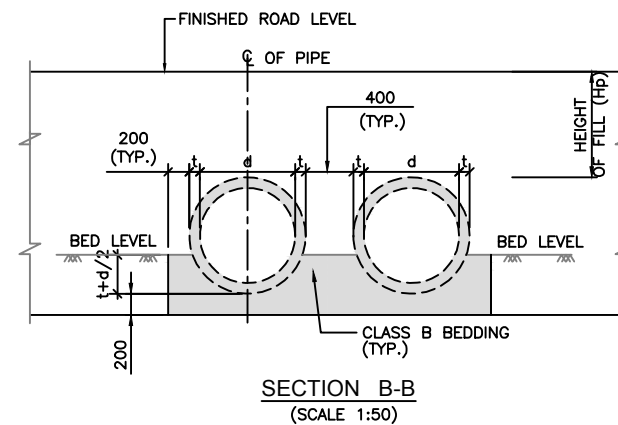
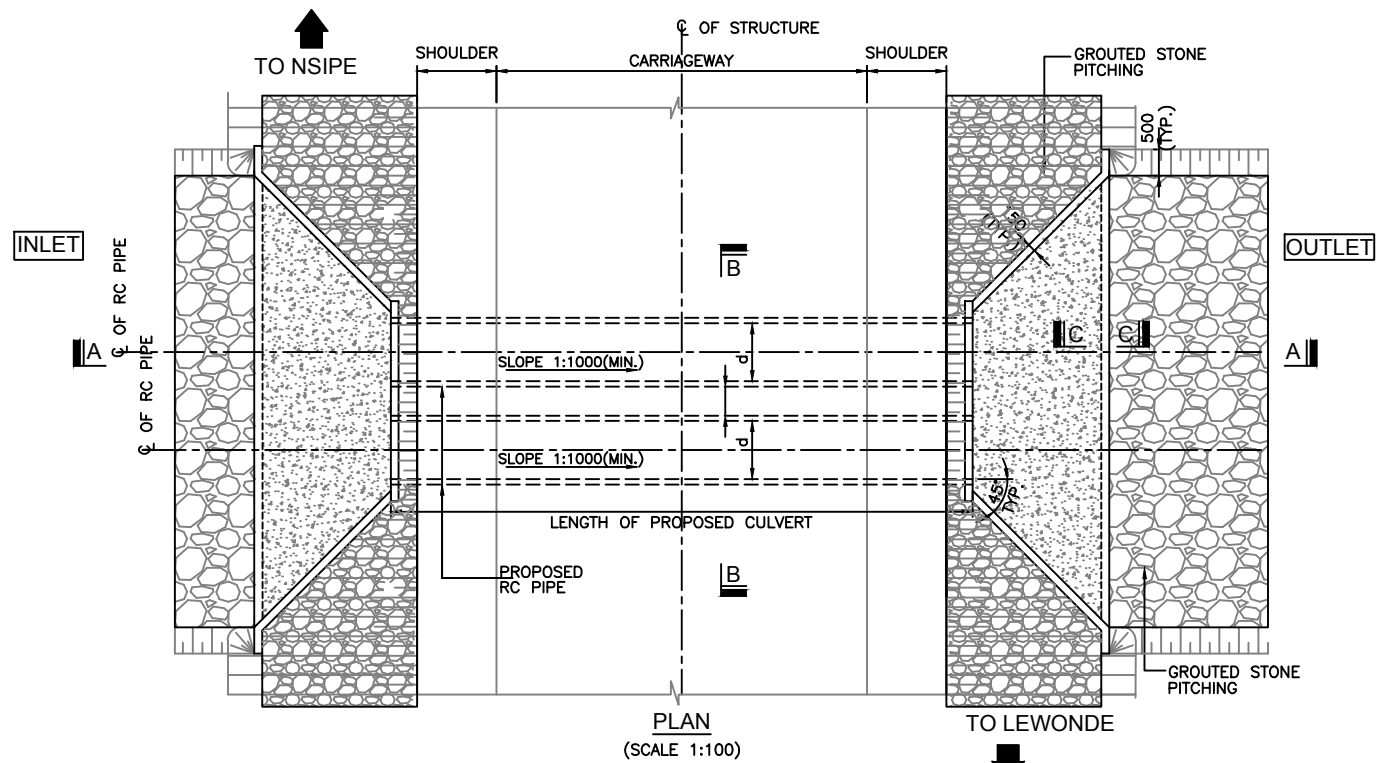
- LEGEND:-**
- t = THICKNESS OF PIPE
  - d = INTERNAL DIAMETER OF THE PIPE
  - RC PIPE = REINFORCED CONCRETE PIPE
  - RCC = REINFORCED CEMENT CONCRETE
  - TYP. = TYPICAL
  - MIN. = MINIMUM
  - FRL = FINISHED ROAD LEVEL

- NOTES**
- ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE.
  - DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
  - ALL CONCRETE TO BE CLASS 25/19 UNLESS MENTIONED OTHERWISE.
  - THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
  - ALL PIPES FOR CONSTRUCTION SHALL BE OF CLASS 75D AS PER SATCC TECHNICAL SPECIFICATIONS FOR BRIDGES & CULVERTS
  - FOR REINFORCEMENT DETAIL REFER SEPARATE DRAWING.
  - THE BACKFILL OVER THE CULVERT SHALL BE AS PER SATCC STANDARD SPECIFICATIONS.

				CLIENT:		THE ROADS AUTHORITY		DESIGN CONSULTANT:		PROJECT:		DRAWING TITLE:		SCALE:		DESIGNED BY:			
						CHIEF EXECUTIVE OFFICER		LEA Associates South Asia Pvt Ltd., India		CONSULTANCY SERVICES FOR PROVISION		TYPICAL DIMENSION DRAWING OF SINGLE		AS SHOWN		MANGAL			
						PRIVATE BAG B346		in association with		REVIEW FOR THE DESIGN		CELL PIPE CULVERTS FOR				RAJU			
						LILONGWE		RUO Consulting Engineers Ltd, Malawi		ENGINEERING SERVICES FOR THE		RECONSTRUCTION / NEW CONSTRUCTION				APPROVED BY:			
						MALAWI				REVIEW FOR THE REHABILITATION OF						R.BHATTACHARYA			
										NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD						DATE		MAY, 2023	
																DRAWING NO.		80087A\LASA\STR\RAINCL\PC-01	
																		SHEET SIZE A3	
																		(Sheet 1 OF 2)	







**SCHEDULE OF DOUBLE CELL PIPE CULVERTS**

Sl. No.	Proposed Chainage (m)	Type of Structure	Skew Angle (degree)	Direction of Flow	Proposed Culvert Dimensions		Height of Fill (Minimum) (mm)	Reference Drawing
					No. of cell (Nos)	Dia. Of Pipe (mm)		
1	4370.000	RC Pipe	0	Right to Left	2	900	600	80087A\LASA\STR\NCL\PC - 02
2	6880.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\NCL\PC - 02
3	10740.000	RC Pipe	0	Right to Left	2	900	600	80087A\LASA\STR\NCL\PC - 02
4	12045.000	RC Pipe	0	Right to Left	2	900	600	80087A\LASA\STR\NCL\PC - 02
5	14252.000	RC Pipe	0	Right to Left	2	900	600	80087A\LASA\STR\NCL\PC - 02
6	17066.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\NCL\PC - 02
7	27791.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\NCL\PC - 02
8	35280.000	RC Pipe	0	Right to Left	2	900	600	80087A\LASA\STR\NCL\PC - 02
9	45216.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\NCL\PC - 02
10	45410.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\NCL\PC - 02
11	48126.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\NCL\PC - 02
12	48314.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\NCL\PC - 02

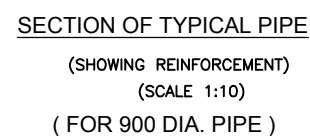
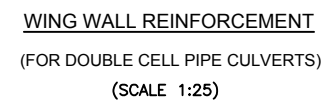
**LEGEND:-**

t = THICKNESS OF PIPE  
d = INTERNAL DIAMETER OF THE PIPE  
RC PIPE = REINFORCED CONCRETE PIPE  
RCC = REINFORCED CEMENT CONCRETE  
TYP. = TYPICAL  
MIN. = MINIMUM  
FRL = FINISHED ROAD LEVEL

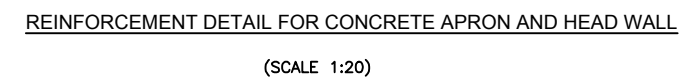
**NOTES**

1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE.
2. DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
3. ALL CONCRETE TO BE CLASS 25/19 UNLESS MENTIONED OTHERWISE.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
5. ALL PIPES FOR CONSTRUCTION SHALL BE OF CLASS 75D AS PER SATCC TECHNICAL SPECIFICATIONS FOR BRIDGES & CULVERTS
6. FOR REINFORCEMENT DETAIL REFER SEPARATE DRAWING.
7. THE BACKFILL OVER THE CULVERT SHALL BE AS PER SATCC STANDARD SPECIFICATIONS.

				CLIENT: <b>THE ROADS AUTHORITY</b>		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: TYPICAL DIMENSION DRAWING OF DOUBLE CELL PIPE CULVERTS FOR RECONSTRUCTION / NEW CONSTRUCTION		SCALE: AS SHOWN		DESIGNED BY MANGAL	
				CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI										DRAWN BY RAJU	
														APPROVED BY R.BHATTACHARYA	
														DATE MAY, 2023	SHEET SIZE A3
														DRAWING NO. 80087A\LASA\STR\RAINCL\PC-02	(Sheet 1 OF 2)



INTERNAL DIAMETER	THICKNESS	LONGITUDINAL REIF.	HOOP REINF. FOR MAX. CUSHION (H)	
			H=UPTO 2.50m	2.5m > H ≤ 4.5m
d (mm)	t (mm)	P1	P2	
900	100	16 Nos. - Y10	Y8 @ 75	Y10 @ 100

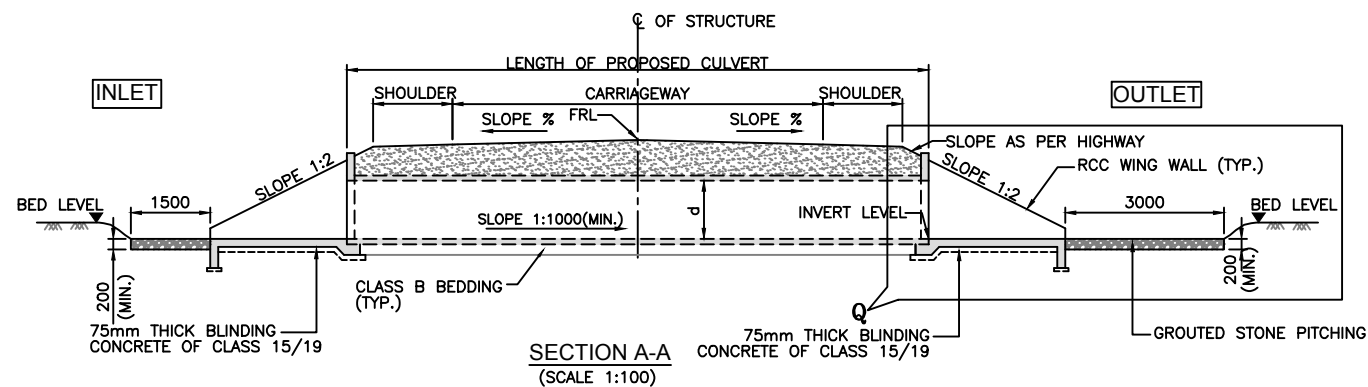
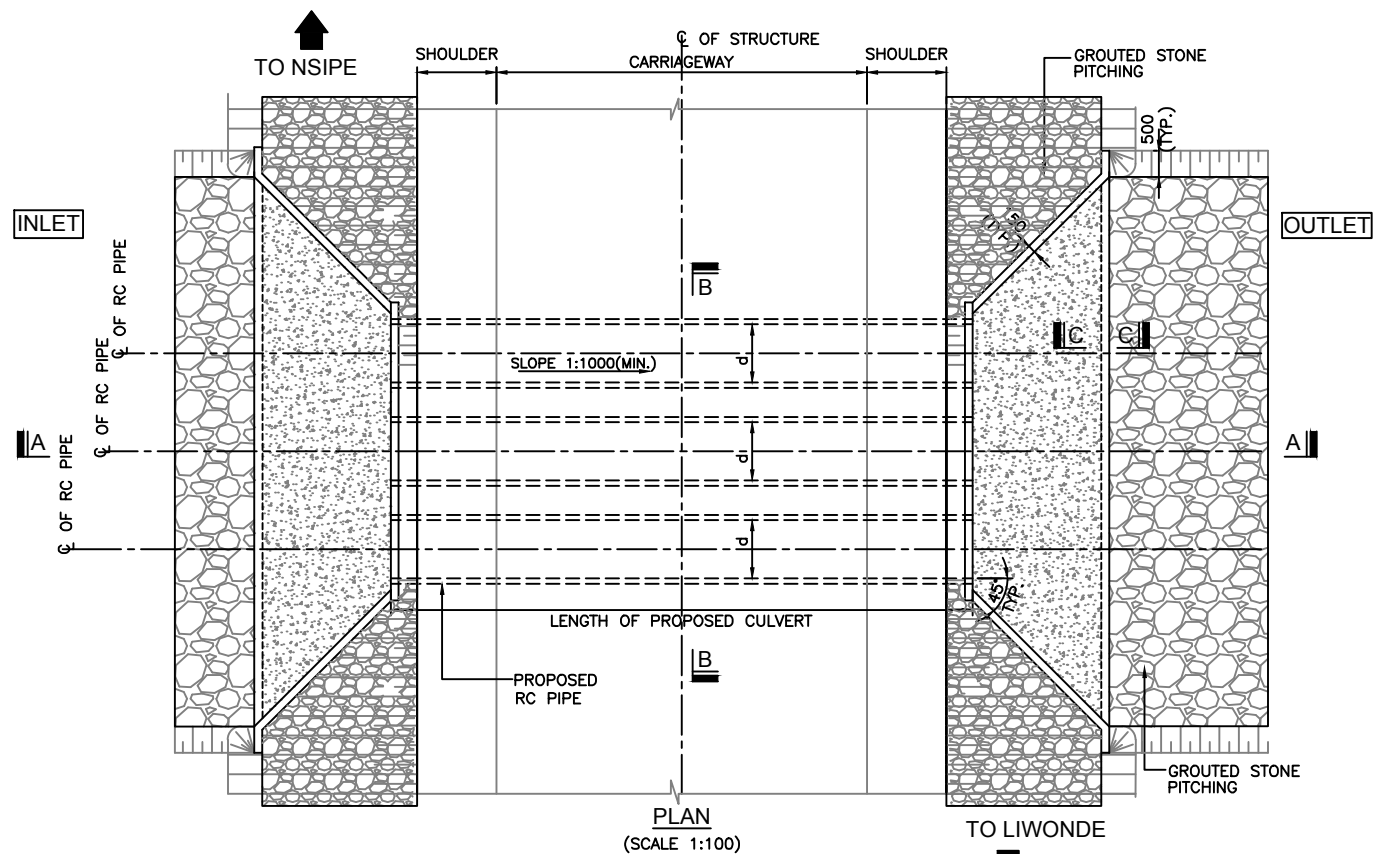


t = THICKNESS OF PIPE  
d = INTERNAL DIAMETER OF THE PIPE

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE.
2. REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF 460 N/mm<sup>2</sup> UNLESS NOTED OTHERWISE.
3. THE GRADE OF CONCRETE FOR CULVERT INCLUDING WING WALL, CURTAIN WALL, HEAD WALL ETC., SHALL BE CLASS 25/19, UNLESS NOTED OTHERWISE.
4. DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
5. FOR SCHEDULE OF CULVERT DETAILS REFER RELEVANT DRAWINGS.
6. MINIMUM CLEAR COVER OF REINFORCEMENT SHALL BE 40mm.

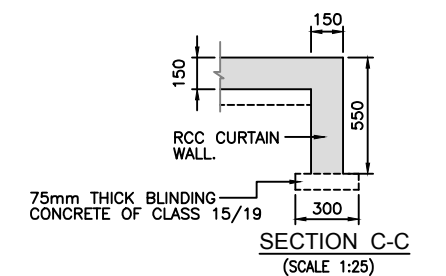
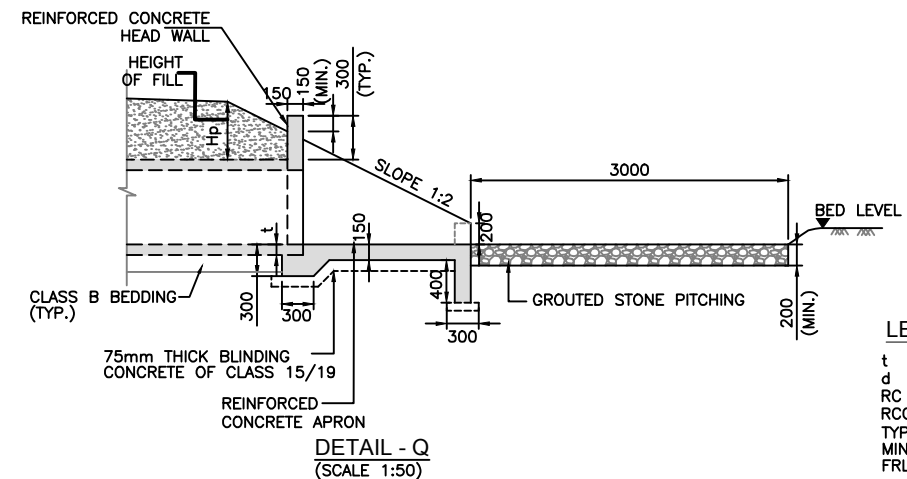
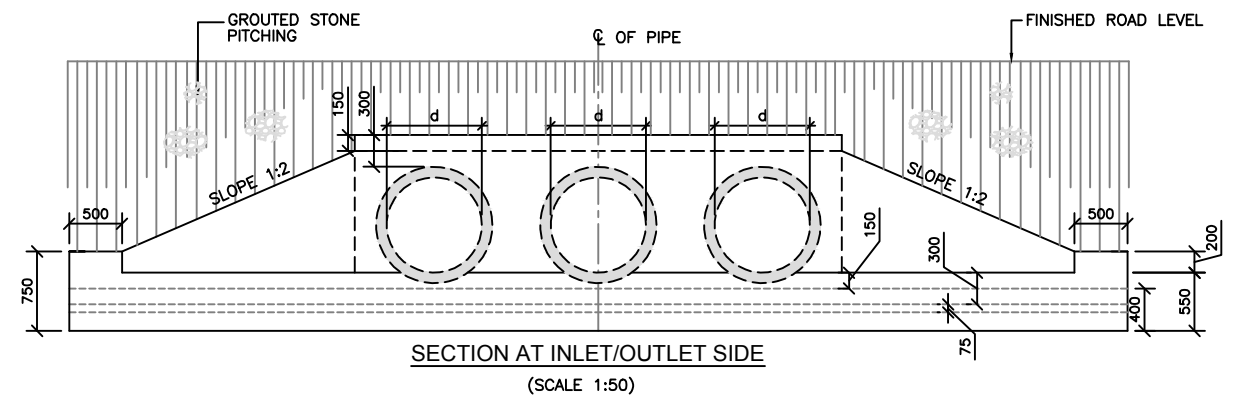
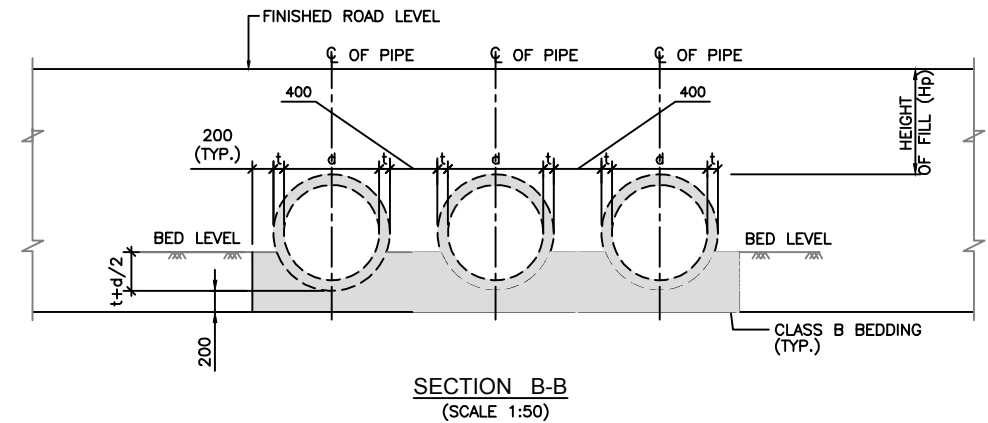
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SCHEDULE OF TRIPLE CELL PIPE CULVERTS

Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Direction of Flow	Proposed Culvert Dimensions		Height of Fill (Minimum)	Reference Drawing
	(m)				No. of cell	Dia. Of Pipe		
			(degree)		(Nos)	(mm)	(mm)	
1	1390.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
2	5970.000	RC Pipe	0	Right to Left	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
3	11685.000	RC Pipe	0	Right to Left	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
4	23160.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
5	25303.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
6	28180.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
7	31958.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
8	34320.000	RC Pipe	0	Right to Left	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
9	49328.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03
10	52325.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC - 03



LEGEND:-

- t = THICKNESS OF PIPE
- d = INTERNAL DIAMETER OF THE PIPE
- RC PIPE = REINFORCED CONCRETE PIPE
- RCC = REINFORCED CEMENT CONCRETE
- TYP. = TYPICAL
- MIN. = MINIMUM
- FRL = FINISHED ROAD LEVEL

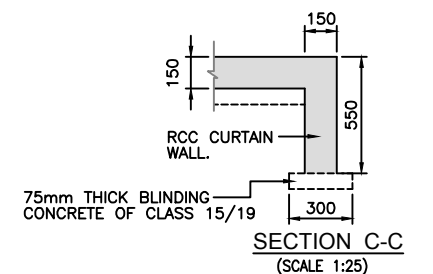
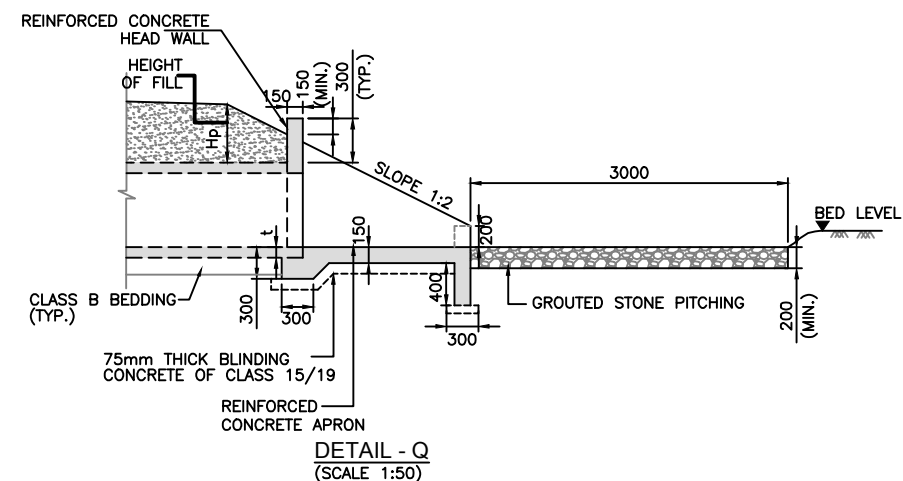
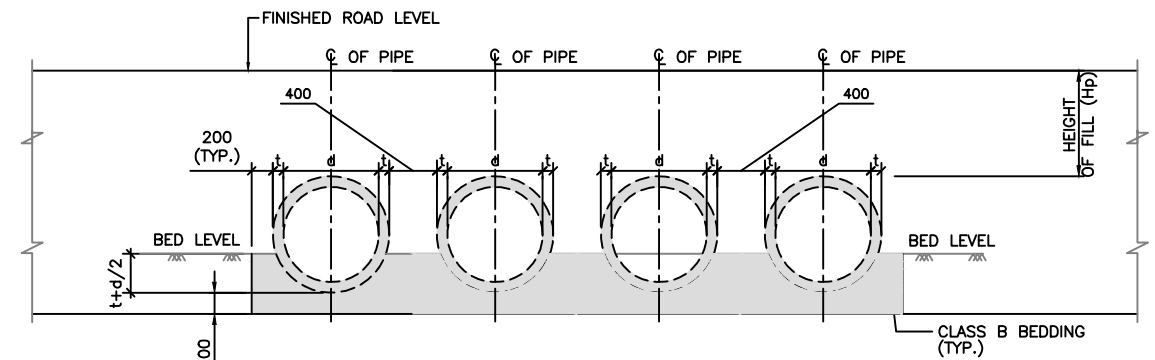
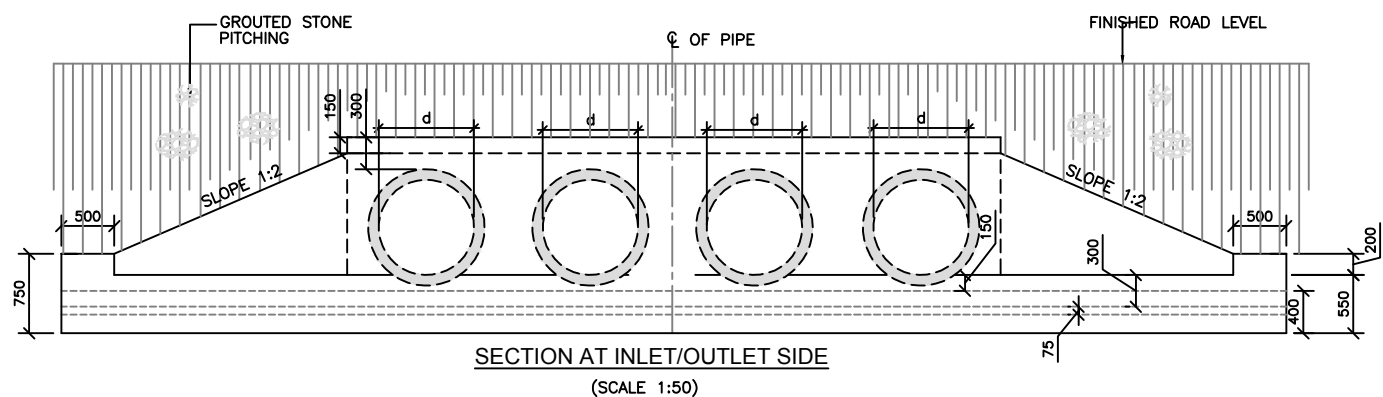
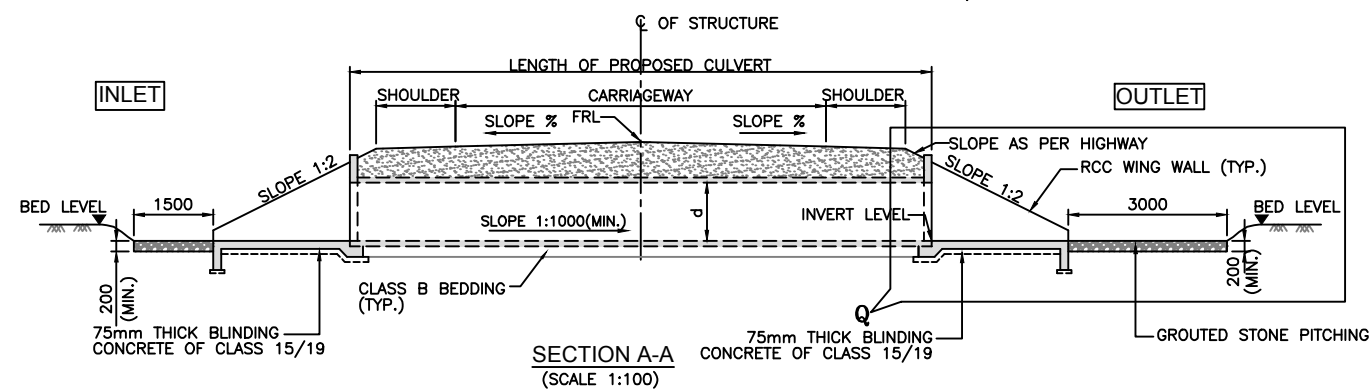
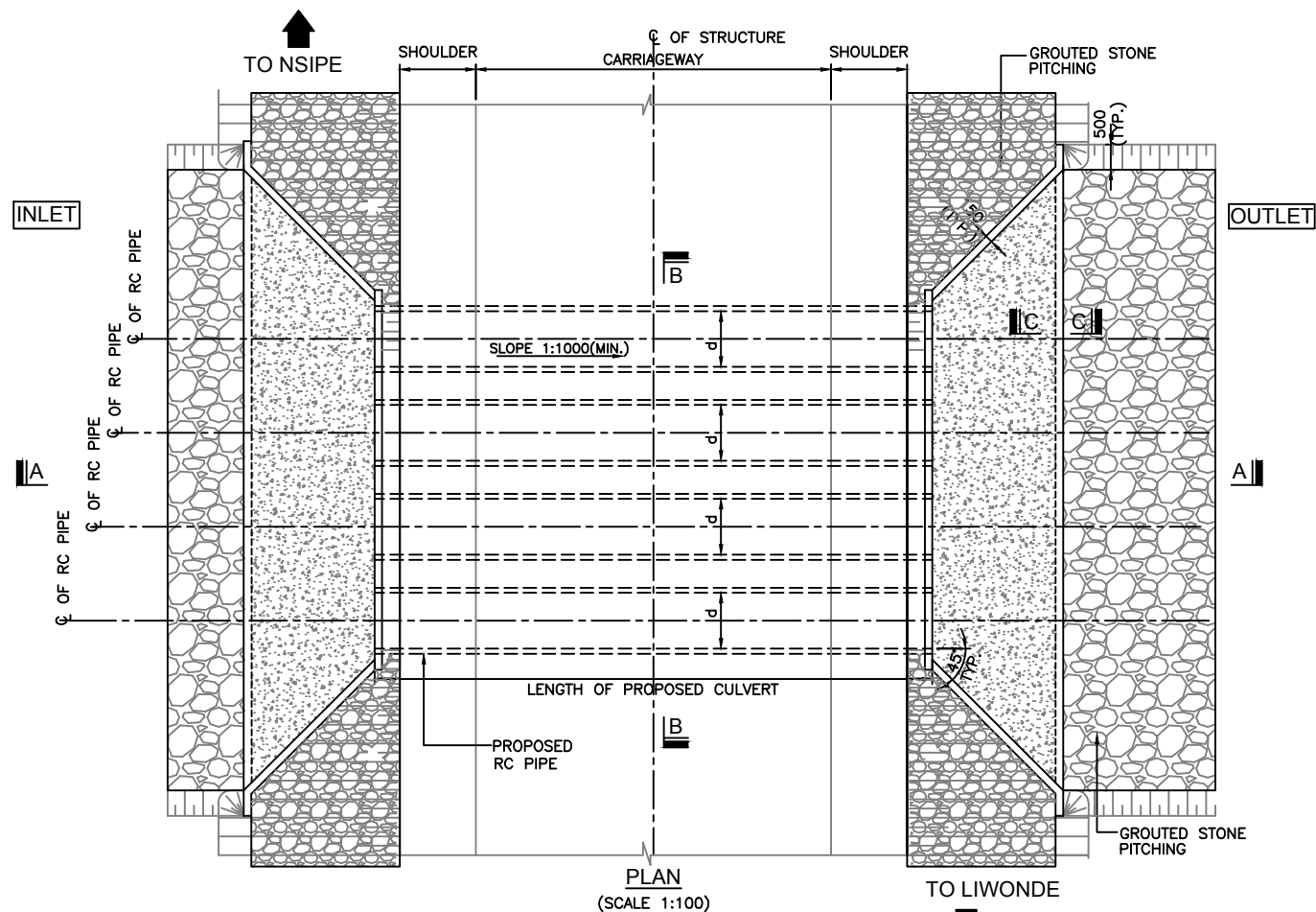
NOTES

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- DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
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- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
- ALL PIPES FOR CONSTRUCTION SHALL BE OF CLASS 75D AS PER SATCC TECHNICAL SPECIFICATIONS FOR BRIDGES & CULVERTS
- FOR REINFORCEMENT DETAIL REFER SEPARATE DRAWING.
- THE BACKFILL OVER THE CULVERT SHALL BE AS PER SATCC STANDARD SPECIFICATIONS.

				CLIENT:		DESIGN CONSULTANT:		PROJECT:		DRAWING TITLE:		SCALE:		DESIGNED BY:			
				THE ROADS AUTHORITY		LEA Associates South Asia Pvt Ltd., India		CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		TYPICAL DIMENSION DRAWING OF TRIPLE CELL PIPE CULVERTS FOR RECONSTRUCTION / NEW CONSTRUCTION		AS SHOWN		MANGAL			
				CHIEF EXECUTIVE OFFICER		in association with								DRAWN BY:			
				PRIVATE BAG B346		RUO Consulting Engineers Ltd, Malawi								APPROVED BY:			
				LILONGWE										DATE:			
				MALAWI										MAY, 2023		SHEET SIZE A3	
														DRAWING NO.		80087A\LASA\STR\RA\NCL\PC-03	
																(Sheet 1 OF 2)	







**SCHEDULE OF FOUR CELL PIPE CULVERTS**

Sl. No.	Proposed Chainage (m)	Type of Structure	Skew Angle (degree)	Direction of Flow	Proposed Culvert Dimensions		Height of Fill (Minimum)	Reference Drawing
					No. of cell (Nos)	Dia. Of Pipe (mm)		
1	27909.000	RC Pipe	0	Left to Right	4	900	600	80087A\LASA\STR\NCL\RA\PC - 04
2	31257.000	RC Pipe	0	Right to Left	4	900	600	80087A\LASA\STR\NCL\RA\PC - 04

**LEGEND:-**

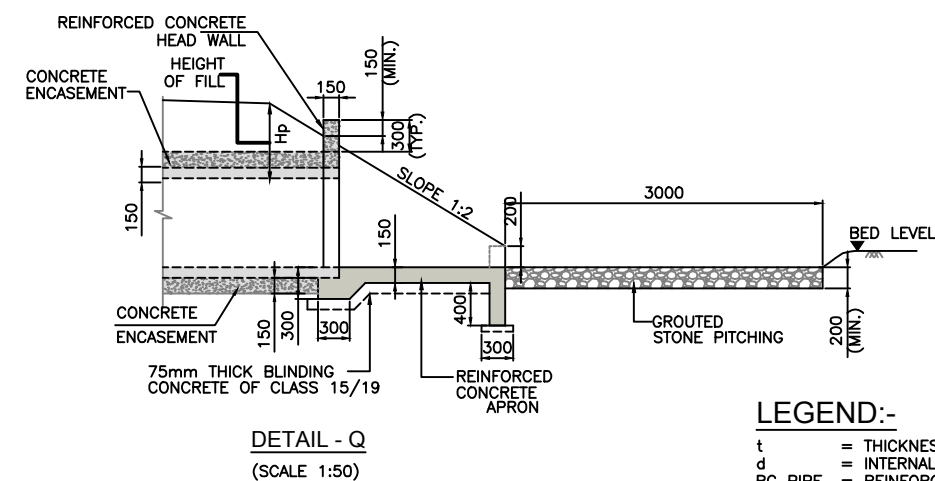
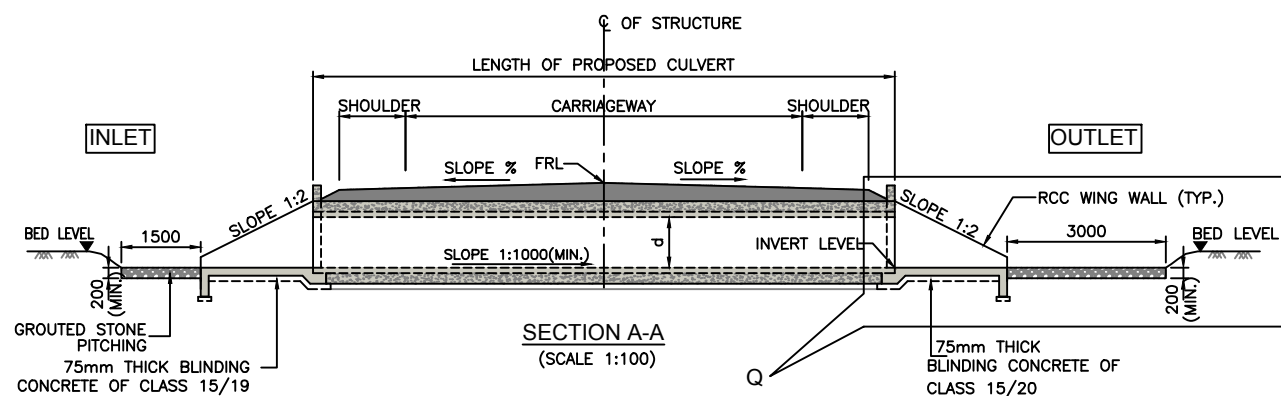
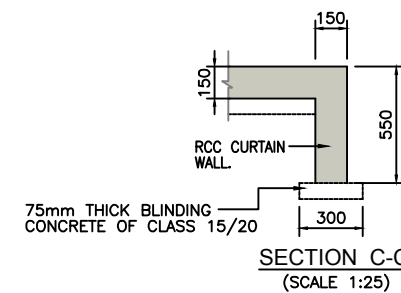
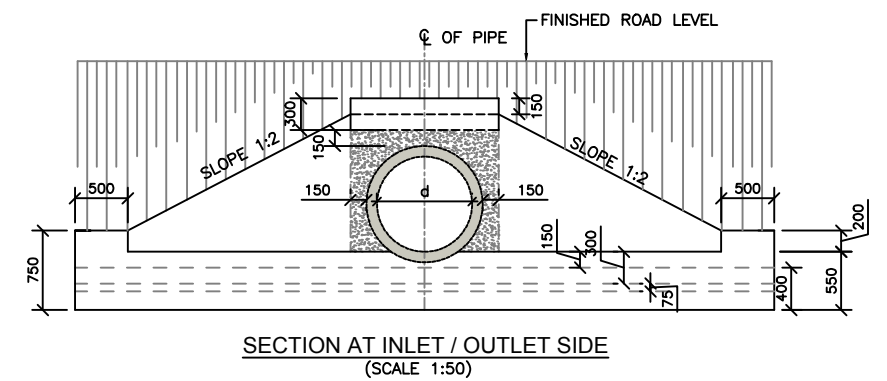
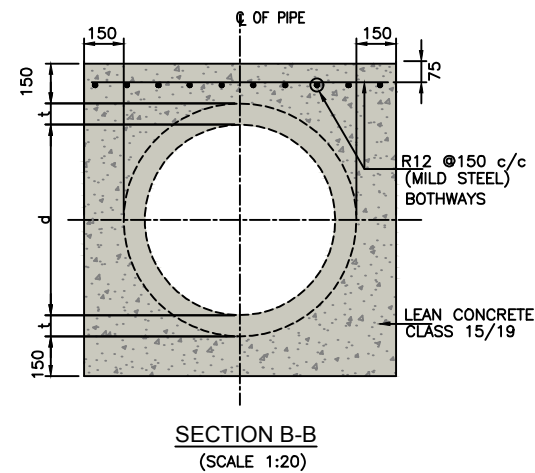
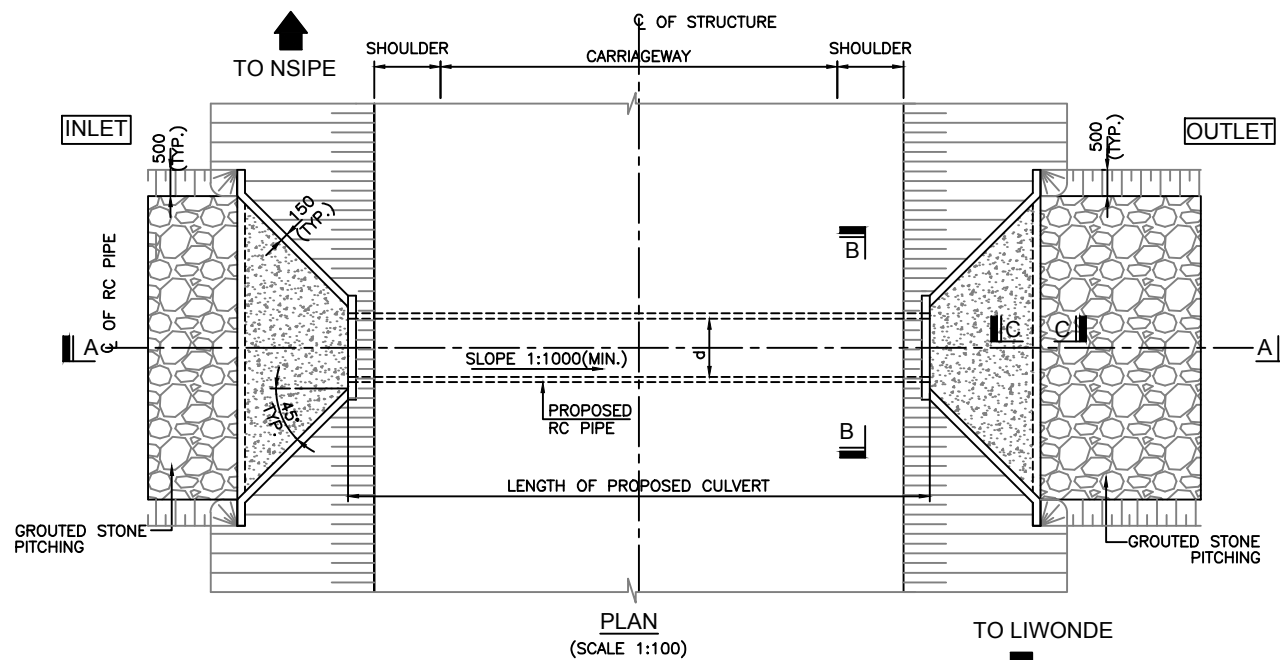
t = THICKNESS OF PIPE  
d = INTERNAL DIAMETER OF THE PIPE  
RC PIPE = REINFORCED CONCRETE PIPE  
RCC = REINFORCED CEMENT CONCRETE  
TYP. = TYPICAL  
MIN. = MINIMUM  
FRL = FINISHED ROAD LEVEL

**NOTES**

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- FOR REINFORCEMENT DETAIL REFER SEPARATE DRAWING.
- THE BACKFILL OVER THE CULVERT SHALL BE AS PER SATCC STANDARD SPECIFICATIONS.

				CLIENT: <b>THE ROADS AUTHORITY</b>		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: TYPICAL DIMENSION DRAWING OF FOUR CELL PIPE CULVERTS FOR RECONSTRUCTION / NEW CONSTRUCTION		SCALE: AS SHOWN		DESIGNED BY MANGAL	
				CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI										DRAWN BY RAJU	
														APPROVED BY R.BHATTACHARYA	
														DATE MAY, 2023	SHEET SIZE A3
														DRAWING NO. 80087A\LASA\STR\RAINCL\PC-04	(Sheet 1 OF 2)





SCHEDULE OF SINGLE CELL PIPE CULVERTS (ENCASING)

Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Direction of Flow	Proposed Culvert Dimensions		Height of Fill (Less than)	Reference Drawing
	(m)				No. of cell	Dia. Of Pipe		
			(degree)		(Nos)	(mm)	(mm)	
1	4780.000	RC Pipe	0	Left to Right	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
2	5195.000	RC Pipe	0	Right to Left	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
3	18158.000	RC Pipe	0	Right to Left	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
4	20910.000	RC Pipe	0	Left to Right	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
5	21248.000	RC Pipe	0	Left to Right	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
6	22515.000	RC Pipe	0	Left to Right	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
7	22822.000	RC Pipe	0	Right to Left	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
8	24758.000	RC Pipe	0	Left to Right	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
9	25705.000	RC Pipe	0	Left to Right	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
10	27085.000	RC Pipe	0	Right to Left	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
11	32750.000	RC Pipe	0	Right to Left	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01
12	54130.000	RC Pipe	0	Left to Right	1	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 01

#### LEGEND:-

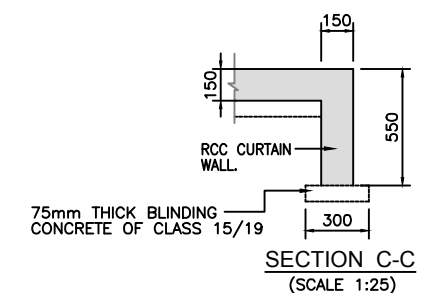
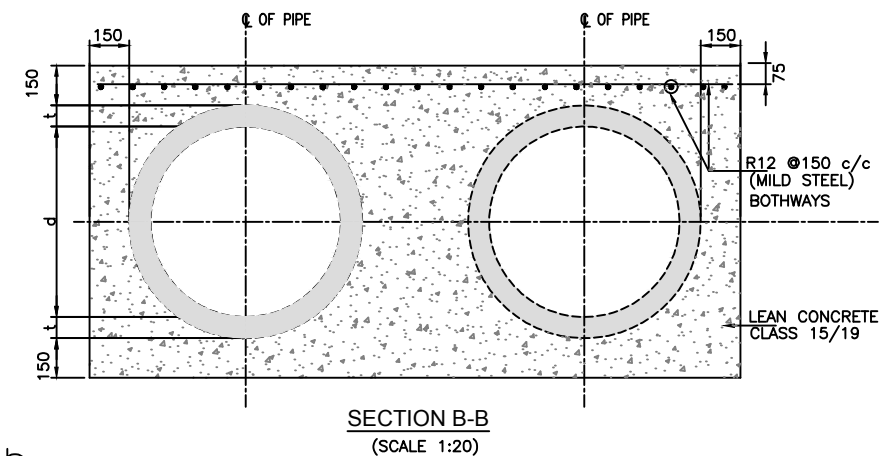
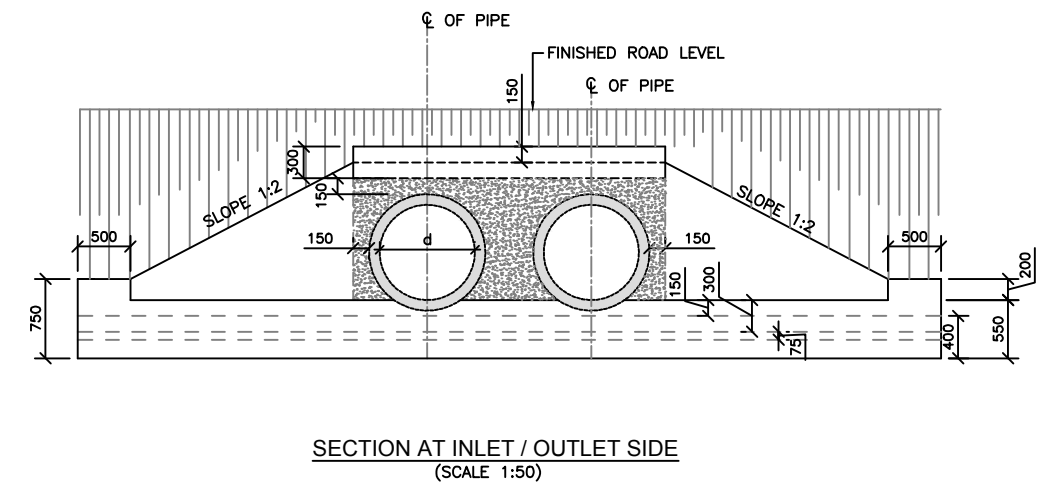
t = THICKNESS OF PIPE  
d = INTERNAL DIAMETER OF THE PIPE  
RC PIPE = REINFORCED CONCRETE PIPE  
RCC = REINFORCED CEMENT CONCRETE  
TYP. = TYPICAL  
MIN. = MINIMUM  
FRL = FINISHED ROAD LEVEL

#### NOTES:

- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE.
- DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
- ALL PIPES FOR CONSTRUCTION SHALL BE AS PER RA TECHNICAL SPECIFICATIONS (LATEST)
- ALL CONCRETE TO BE CLASS 25/19 UNLESS MENTIONED OTHERWISE.
- REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF 460 N/mm<sup>2</sup> UNLESS NOTED OTHERWISE.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
- THE BACKFILL OVER THE CULVERT SHALL BE AS PER SATCC STANDARD SPECIFICATIONS.
- FOR DETAIL OF REINFORCEMENT OF WING WALL REFER DRAWING NO. 80087A\LASA\STR\RA\NCL\PC-01 (SHEET 2 OF 2)

				CLIENT:		DESIGN CONSULTANT:		PROJECT:		DRAWING TITLE:		SCALE:		DESIGNED BY:			
				THE ROADS AUTHORITY		LEA Associates South Asia Pvt Ltd., India		CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		TYPICAL DIMENSION DRAWING OF SINGLE CELL PIPE CULVERTS FOR RECONSTRUCTION / NEW CONSTRUCTION (ENCASING)		AS SHOWN		MANGAL			
				CHIEF EXECUTIVE OFFICER		in association with								DRAWN BY:			
				PRIVATE BAG B346		RUO Consulting Engineers Ltd, Malawi								APPROVED BY:			
				LILONGWE										DATE:			
				MALAWI										MAY, 2023		SHEET SIZE A3	
														DRAWING NO.		80087A\LASA\STR\RA\NCL\PC-EN-01	
																(Sheet 1 OF 1)	



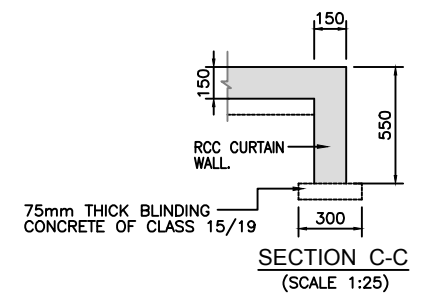
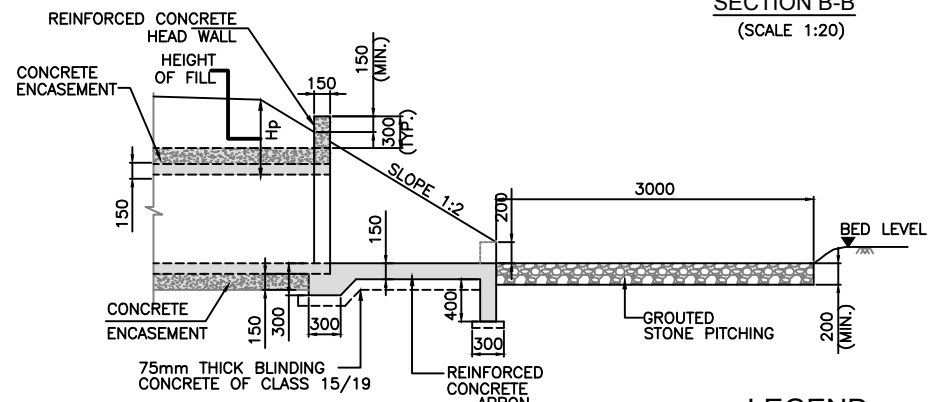
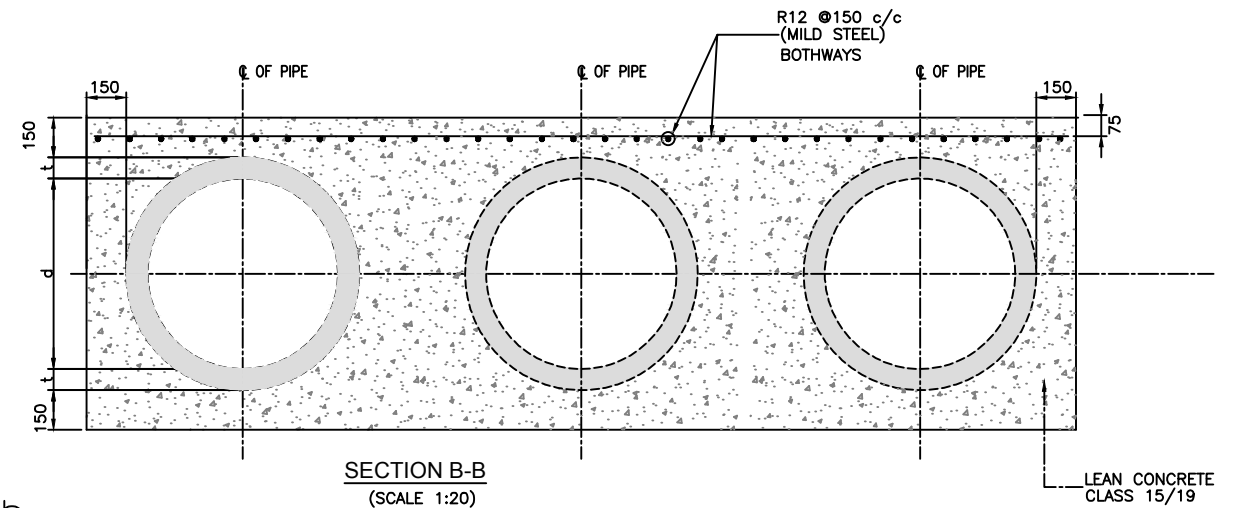
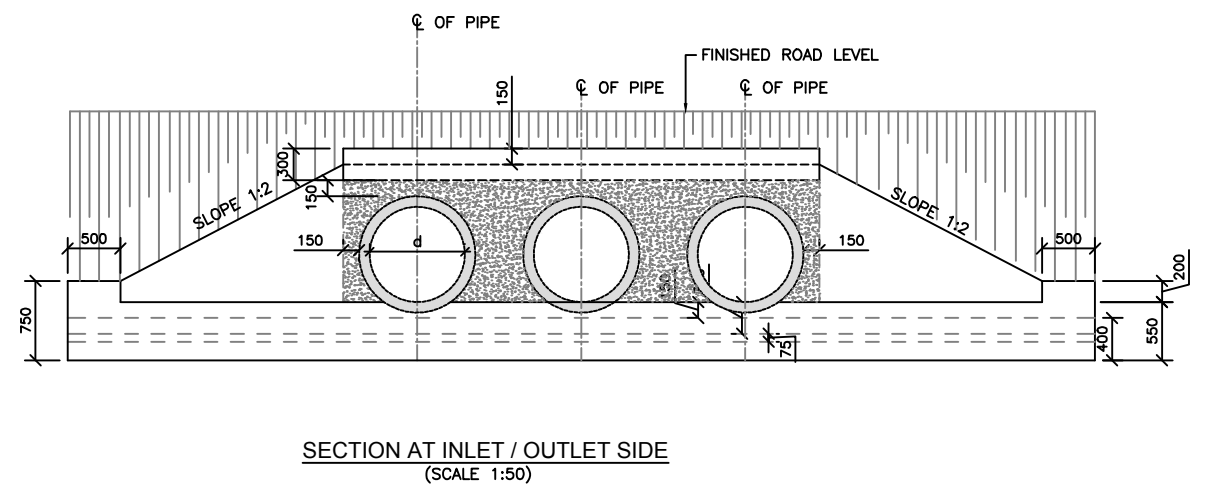
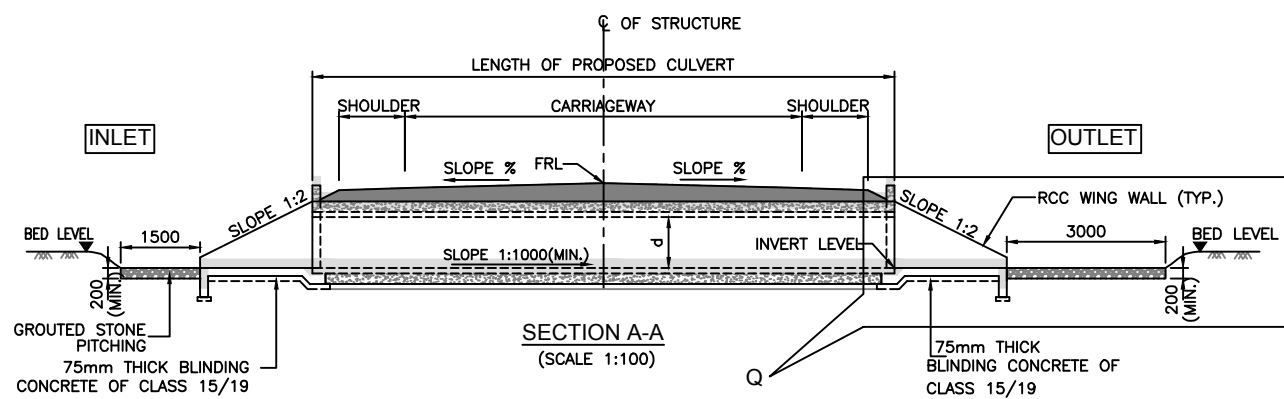
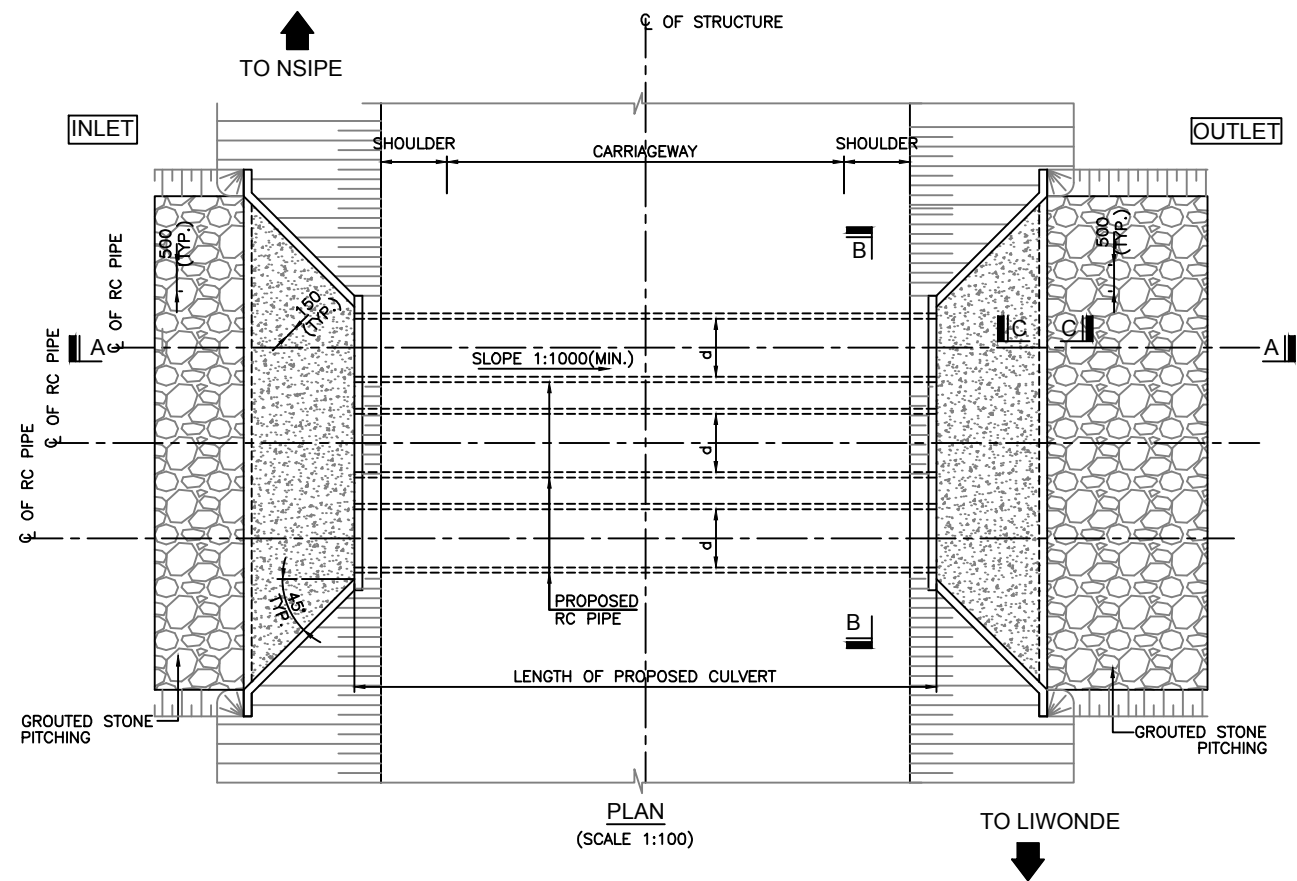


Sl. No.	Proposed Chainage	Type of Structure	Skew Angle	Direction of Flow	Proposed Culvert Dimensions		Height of Fill (Less than)	Reference Drawing
	(m)				(degree)	(Nos)		
1	29156.000	RC Pipe	0	Left to Right	2	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 02
2	29685.000	RC Pipe	0	Right to Left	2	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 02
3	32355.000	RC Pipe	0	Right to Left	2	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 02

t	= THICKNESS OF PIPE
d	= INTERNAL DIAMETER OF THE PIPE
RC PIPE	= REINFORCED CONCRETE PIPE
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TYP.	= TYPICAL
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3. ALL PIPES FOR CONSTRUCTION SHALL BE AS PER RA TECHNICAL SPECIFICATIONS (LATEST)
4. ALL CONCRETE TO BE CLASS 25/19 UNLESS MENTIONED OTHERWISE.
5. REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF 460 N/mm<sup>2</sup>, UNLESS NOTED OTHERWISE.
6. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH RELEVANT HIGHWAY DRAWINGS. FRL & CAMBER/SUPERELEVATION AT PARTICULAR LOCATION SHALL BE VERIFIED WITH THE HIGHWAY DRAWING. DISCREPANCY, IF ANY IS TO BE IMMEDIATELY BROUGHT INTO THE NOTICE OF ENGINEER FOR NECESSARY MODIFICATION IN THE DRAWING.
7. THE BACKFILL OVER THE CULVERT SHALL BE AS PER SATCC STANDARD SPECIFICATIONS.
8. FOR DETAIL OF REINFORCEMENT OF WING WALL  
REFER DRAWING NO. 80087A\LASA\STR\RA\NCL\PC-02 (SHEET 2 OF 2)

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#### LEGEND:-

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- FOR DETAIL OF REINFORCEMENT OF WING WALL REFER DRAWING NO. 80087A\LASA\STR\RA\NCL\PC-03 (SHEET 2 OF 2)

#### SCHEDULE OF TRIPLE CELL PIPE CULVERTS (ENCASING)

Sl. No.	Proposed Chainage (m)	Type of Structure	Skew Angle (degree)	Direction of Flow	Proposed Culvert Dimensions		Height of Fill (Less than)	Reference Drawing
					No. of cell (Nos)	Dia. Of Pipe (mm)		
1	720.000	RC Pipe	0	Right to Left	3	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 03
2	30188.000	RC Pipe	0	Left to Right	3	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 03
3	31590.000	RC Pipe	0	Right to Left	3	900	600	80087A\LASA\STR\RA\NCL\PC-EN - 03

				CLIENT:		DESIGN CONSULTANT:		PROJECT:		DRAWING TITLE:		SCALE:		DESIGNED BY:			
				THE ROADS AUTHORITY		LEA Associates South Asia Pvt Ltd., India		CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		TYPICAL DIMENSION DRAWING OF TRIPLE CELL PIPE CULVERTS FOR RECONSTRUCTION / NEW CONSTRUCTION (ENCASING)		AS SHOWN		MANGAL			
				CHIEF EXECUTIVE OFFICER		in association with								DRAWN BY:			
				PRIVATE BAG B346		RUO Consulting Engineers Ltd, Malawi								APPROVED BY:			
				LILONGWE										DATE:			
				MALAWI										MAY, 2023		SHEET SIZE A3	
														DRAWING NO.		80087A\LASA\STR\RA\NCL\PC-EN-03	
																(Sheet 1 OF 1)	





[illegible]

(D) WORKMANSHIP/DETAILING

- I. Minimum cover to any reinforcement shall be as specified in sheet 1 of the General Notes.
- II. For ensuring proper cover to reinforcement, the mortar blocks of same grade as of parent concrete shall be provided & should be able to withstand the crushing during construction.
- V. Supporting chairs of 12mm dia. shall be provided at suitable intervals.
- VI. Sharp edges of concrete shall be chamfered(10mmx10mm)
- VII. Form work details shall be submitted by the contractor for the approval and that shall be load tested before use.
- VIII. Proper compaction of concrete shall be ensured by use of form and /or needle vibrators. Use of full width screed vibrators for compaction of concrete in deck slab shall be ensured.
- IX. Shuttering plates shall be suitably stiffened to enable the compaction by form vibrators.
- X. All setting out dimensions, reduced levels, concrete dimensions to be verified on site before construction commences. Any discrepancy to be brought to the notice of Engineer immediately.

### Construction joints

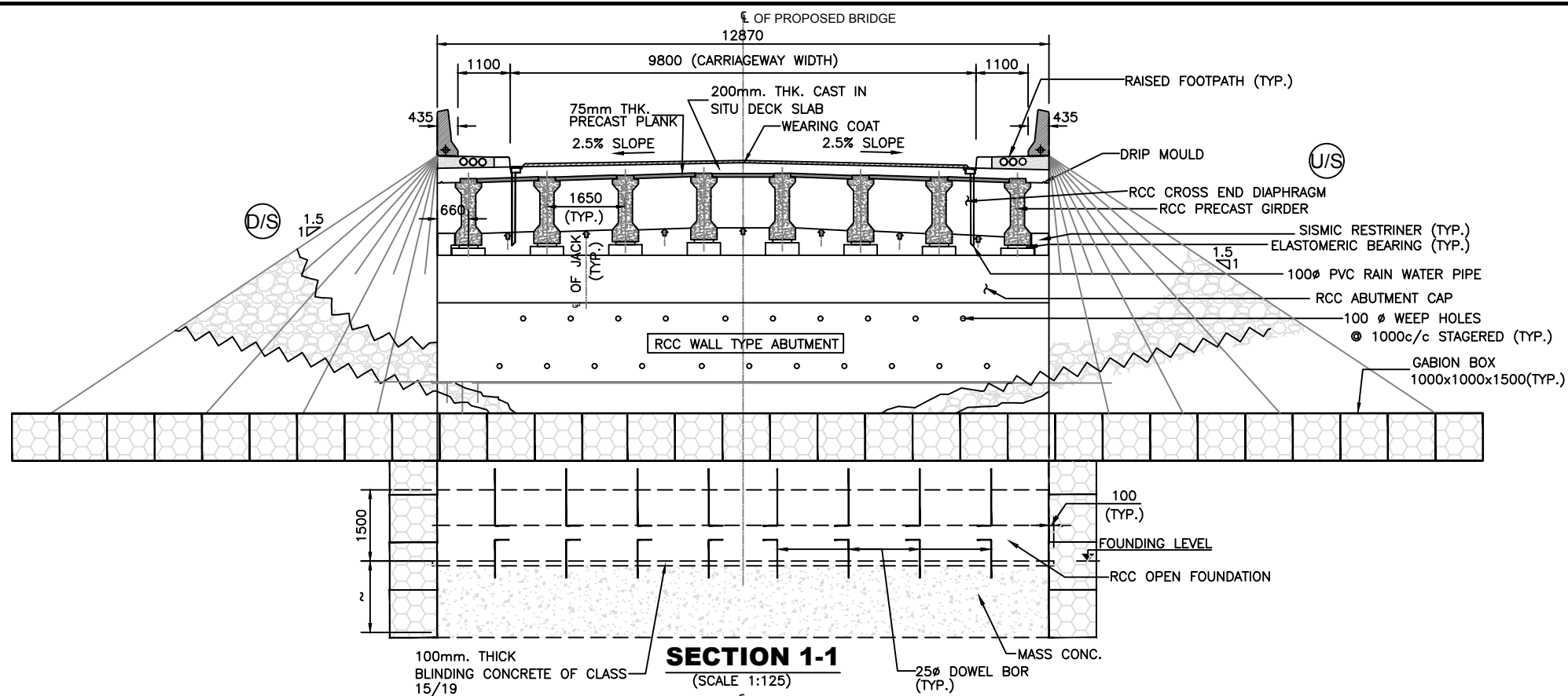
- I. Construction joints shall be provided only at locations shown in the drawings. Concreting operation shall be carried out continuously up to the construction joints.
- II. The concrete surface at the joint shall be brushed with a stiff brush after casting while the concrete is still fresh and it has only slightly hardened.
- III. Before new concrete is poured, the surface of old concrete shall be prepared as under:—
  - a) For hardened concrete, the surface shall be thoroughly cleaned to remove debris and laitance and made rough so that 1/4 of the size of aggregate is exposed but without dislodging the aggregate or structurally damaging the concrete.
  - b) For partially hardened concrete, the surface shall be treated by wire brush followed by an air jet. The old surface shall be soaked with water, without leaving puddles, immediately before starting concreting to prevent absorption of water from new concrete.
- IV. New concrete shall be thoroughly compacted in the region of the joint.

[illegible]



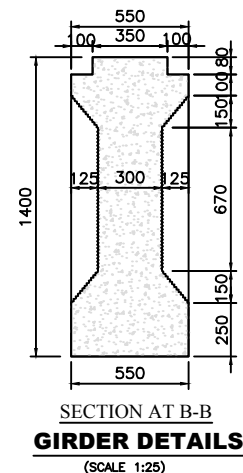
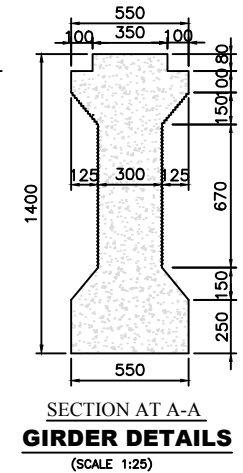
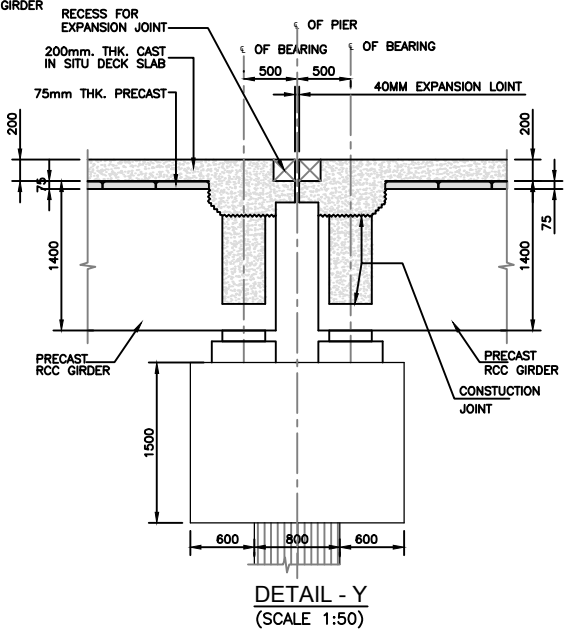
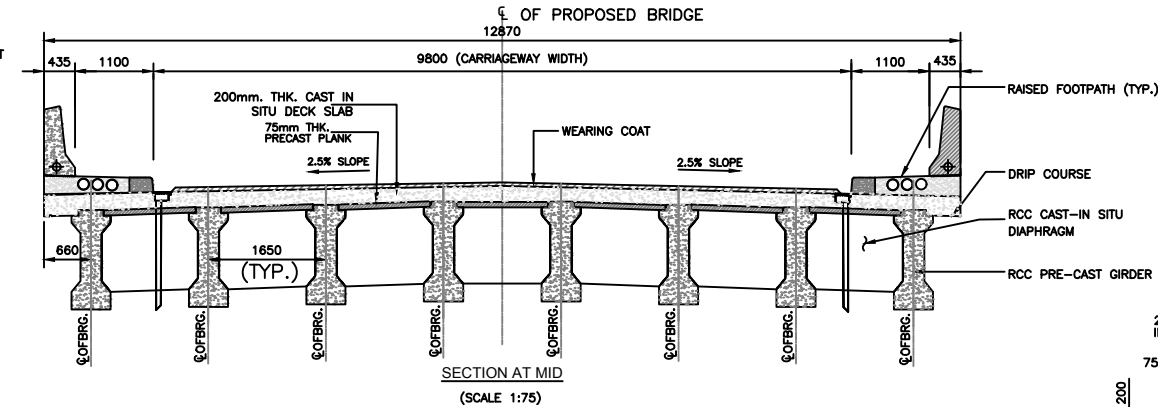
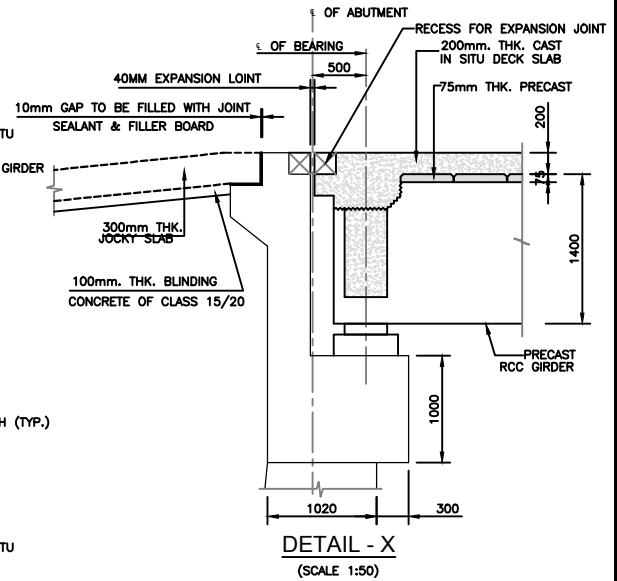








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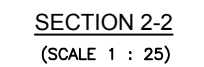
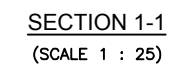
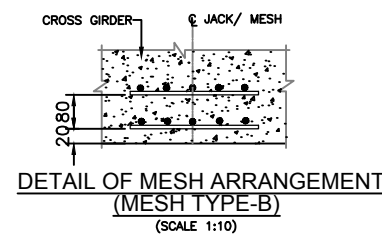
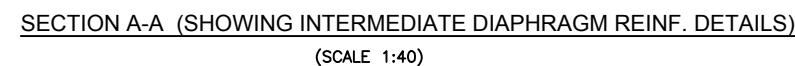
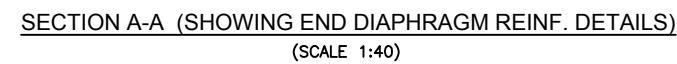
- ### NOTES :
1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES UNLESS NOTED OTHERWISE.
  2. DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
  3. CONCRETE GRADE FOR RCC 'T' GIRDER SHALL BE CLASS 40/19.
  4. GRADE OF STEEL SHALL BE H.Y.S.D. GRADE 460
  5. THE CONCRETE COVER FOR REINFORCEMENT SHALL BE 40mm.
  6. THE SUPERSTRUCTURE IS DESIGNED FOR TWO LANES OF HA AND ONE LANE OF HB LOADING.




















- SPECIAL NOTES:**
1. DIMENSIONED LENGTH OF GIRDER IS REQUIRED LENGTH OF FINISHED PRODUCT.
  2. RCC GIRDER SHALL BE CAST HORIZONTAL.
  3. LIFTING OF RCC GIRDER CAN BE DONE AFTER 7 DAYS OF CASTING OR AFTER ATTAINING MINIMUM CONCRETE CUBE STRENGTH OF 30 MPa, WHICHEVER IS LATER.
  4. RCC GIRDER SHALL BE LIFTED ONLY BY USING LIFTING LOOP BARS AND SHALL BE STACKED ON TEMPORARY SUPPORTS.
  5. LIFTING, STACKING & HANDLING OF RCC GIRDER SHALL BE DONE WITH DUE CARE SO THAT NO DAMAGE TAKES PLACE IN THE CONCRETE.
  6. ERECTION OF PRECAST GIRDERS TO DESIRED LOCATION SHALL BE DONE NOT BEFORE 21 DAYS OF CASTING.
  7. BEFORE CASTING OF DECK SLAB THE ENTIRE SURFACE OF THE PRECAST GIRDER SHALL BE THOROUGHLY CLEANED WITH COMPRESSED AIR TO REMOVE DUST AND LOOSE PARTICLE FROM THE SURFACE. CONSTRUCTION JOINT TREATMENT SHALL BE DONE AS PER CODAL PROVISION.
  8. SHUTTERING WILL BE PLACED IN BETWEEN GIRDERS BEFORE CASTING OF DECK SLAB.
  9. CASTING OF DECK SLAB OVER THE PRECAST GIRDERS SHALL BE DONE AFTER 28 DAYS OF CASTING OF RCC GIRDERS. THE DECK SLAB SHALL BE CAST TO THE REQUIRED WIDTH OF SUPER STRUCTURE SHOWN IN THE DIMENSION DRAWING.
  10. CASTING OF CRASH BARRIERS & LAYING OF WEARING COAT ETC. SHALL BE DONE AFTER 28 DAYS OF CASTING OF DECK SLAB.
  11. TOP SURFACE OF GIRDER SHALL BE ROUGHENED.
  12. NO. OF OUTER GIRDERS = 2 ; NO. OF INNER GIRDERS = 6 (FOR EACH SPAN)
  13. WEIGHT OF EACH PRECAST GIRDER = 32.0T (APPROX)

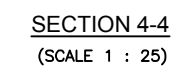
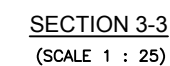
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					CHIEF EXECUTIVE OFFICER									DRAWN BY	RAJU	
					PRIVATE BAG B346									APPROVED BY	R.BHATTACHARYA	
					LILONGWE									DATE	MAY, 2023	SHEET SIZE A3
					MALAWI									DRAWING NO.	80087AILASAISTRIRAINCLISS-01	(SHEET 1 OF 4)
MKD.	DESCRIPTIONS	BY	DATE													
REVISIONS																





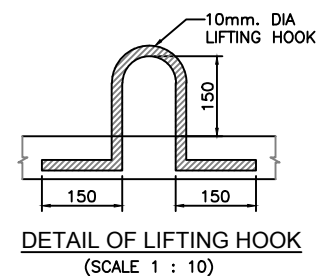
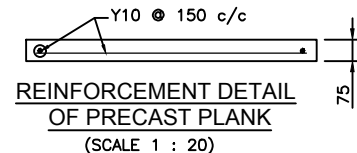
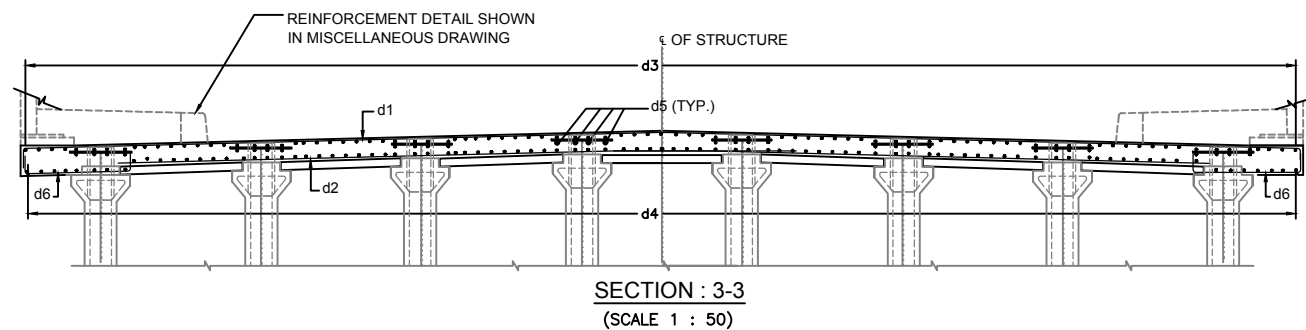
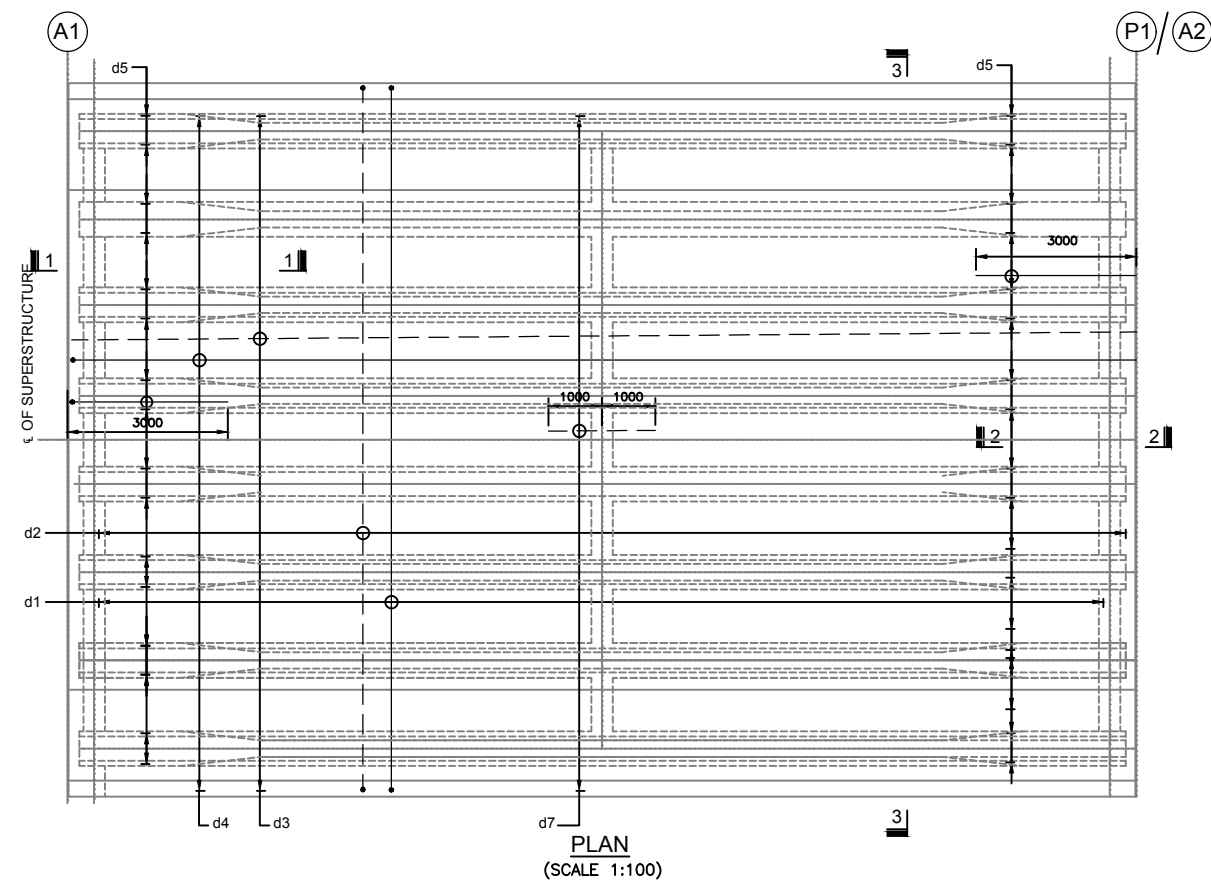


SL. No.	BAR MARK	BAR DIA.	NUMBER/ SPACING	BAR SHAPE	REMARKS
1	cg1	Y25	3-Nos.		
2	cg2	Y20	3-Nos.		
3	cg3	Y20	3-Nos.		
4	cg4	Y12	7X2=14 Nos.		
5	cg5	Y12	7X2=14 Nos.		
6	cg6	2L-12Y	150c/c		
7	cg7	Y32	3-Nos.		
8	cg8	Y32	3-Nos.		
8a	cg8	Y32	3-Nos.		
9	cg9	Y32	3-Nos.		
9a	cg9	Y32	3-Nos.		
10	cg10	Y32	3-Nos.		
10a	cg10	Y32	3-Nos.		
11	cg11	Y16	3-Nos.		
12	cg12	Y16	3-Nos.		
13	cg13	Y16	3-Nos.		
14	cg14	Y16	3-Nos.		
15	cg15	Y16	3-Nos.		
16	cg16	Y16	3-Nos.		



1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES UNLESS NOTED OTHERWISE.
2. DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
3. CONCRETE GRADE FOR RCC 'T' GIRDER SHALL BE CLASS 40/19.
4. GRADE OF STEEL SHALL BE H.Y.S.D. GRADE 460
5. THE CONCRETE COVER FOR REINFORCEMENT SHALL BE 40mm.
6. THE SUPERSTRUCTURE IS DESIGNED FOR TWO LANES OF HA AND ONE LANE OF HB LOADING.









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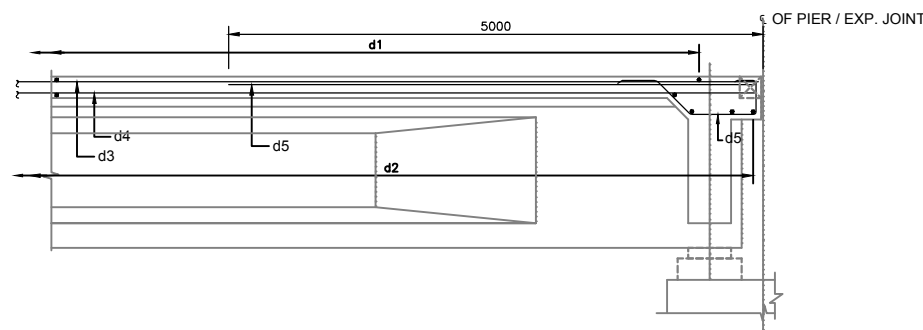
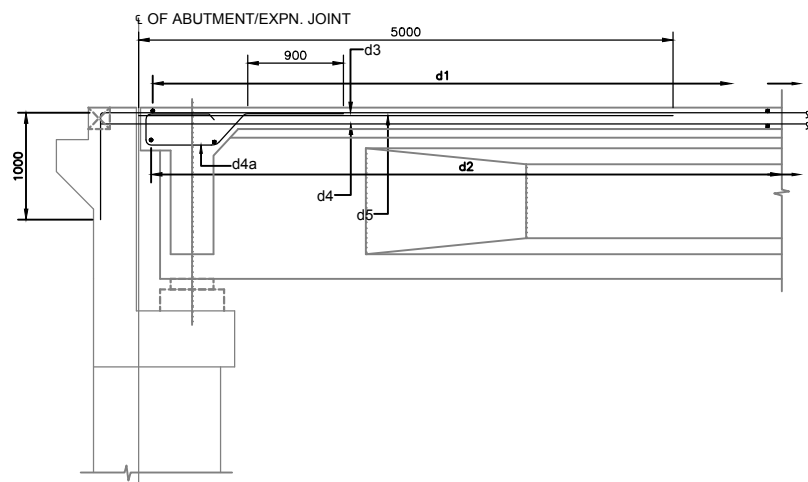


#### LEGEND

TOP BAR SHOWN THUS   
BOTTOM BAR SHOWN THUS 

#### SCHEDULE OF REINFORCEMENT

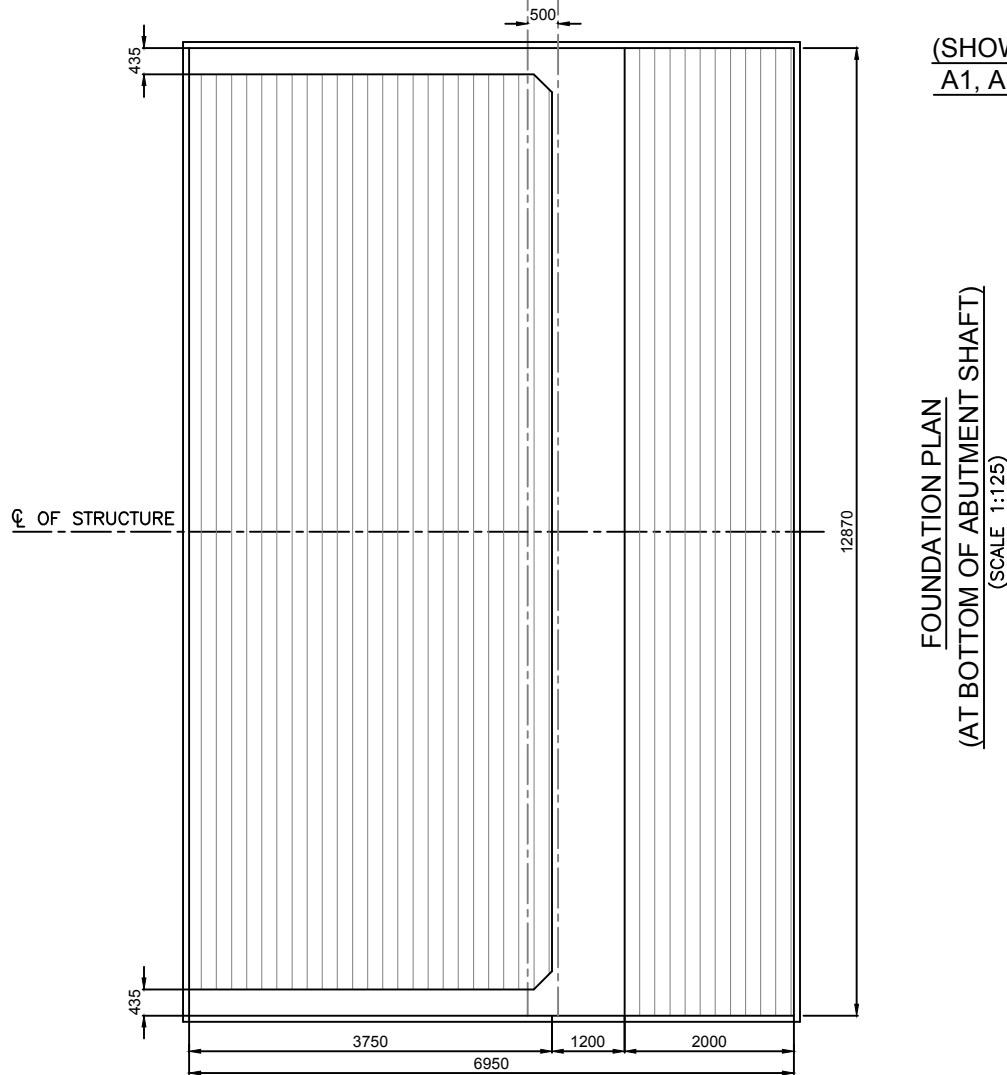
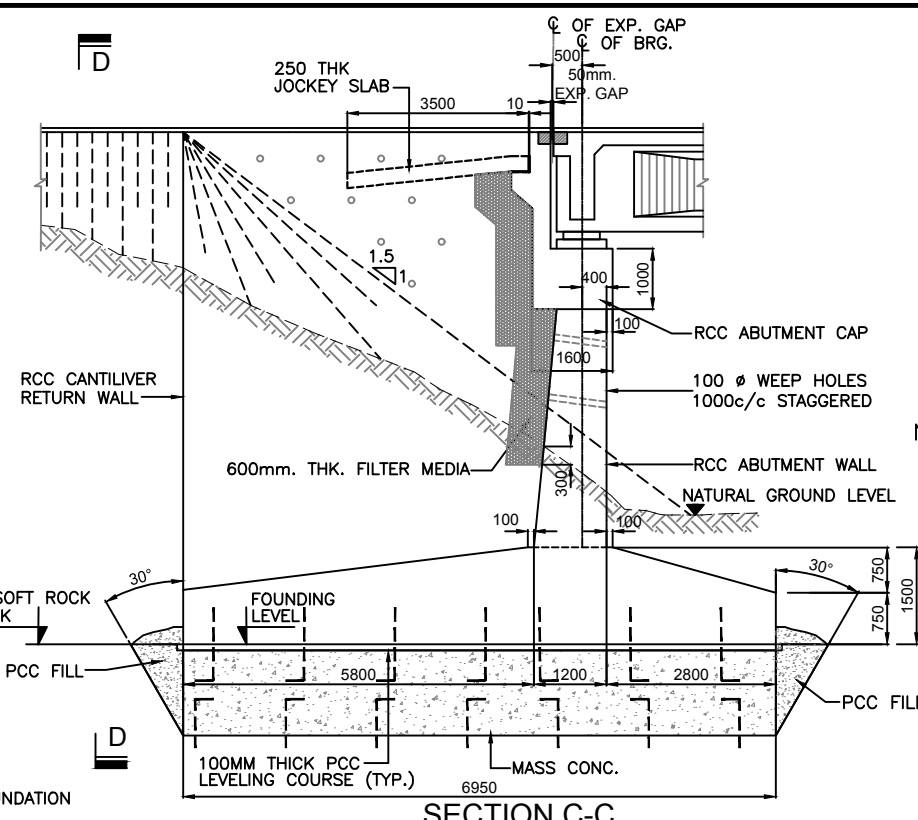
BAR MKD.	DESCRIPTION	BAR SHAPE
d1	Y12 @ 150 c/c	
d2	Y12 @ 150 c/c	
d3	Y10 @ 200 c/c	
d4	Y10 @ 200 c/c	
d4a	Y10 @ 125 c/c	
d5	Y10 @ 125 c/c	
d6	Y10 @ 125 c/c	
d7	Y10 @ 125 c/c	



#### NOTES :

- ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS IN METRES UNLESS NOTED OTHERWISE.
- DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.
- GRADE OF STEEL – HYSD GRADE 460
- GRADE OF CONCRETE:
  - PRECAST 'I' GIRDER---- CLASS 40/19
  - DECK----- CLASS 40/19
- THE CONCRETE COVER FOR REINFORCEMENT SHALL BE 40mm.

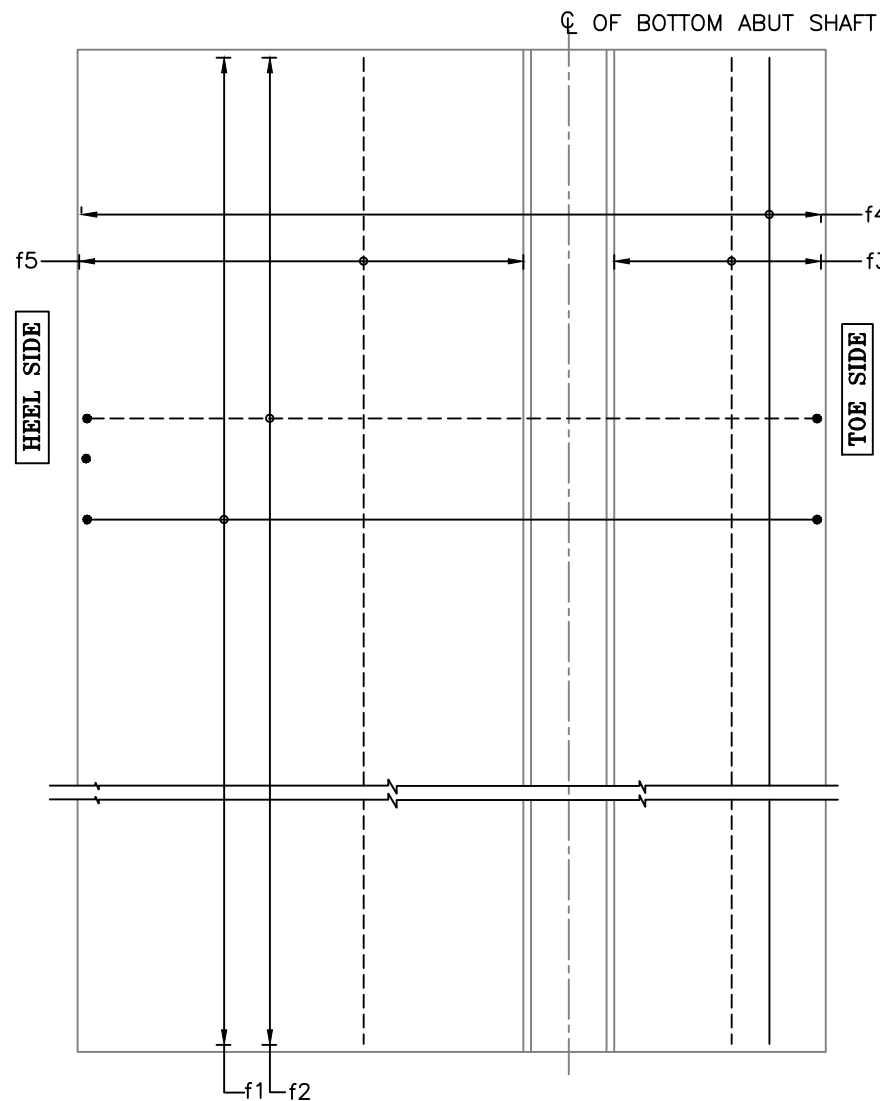
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				CHIEF EXECUTIVE OFFICER			in association with				DRAWN BY	RAJU									
				PRIVATE BAG B346			RUO Consulting Engineers Ltd, Malawi				APPROVED BY	R.BHATTACHARYA									
				LILONGWE							DATE	MAY, 2023	SHEET SIZE A3								
				MALAWI							DRAWING NO.	80087A\LASA\STR\RAINCL\SS-01 (SHEET 4 OF 4)									
MKD.	DESCRIPTIONS		BY	DATE																	
REVISIONS																					



ABUTMENT LOCATION	ABUT. CAP TOP LVL. (m.)	BED. LVL. (m.)	FDN. LVL. (m.)
A1	578.371m	576.500	573.000
A2	578.371m	576.500	573.000

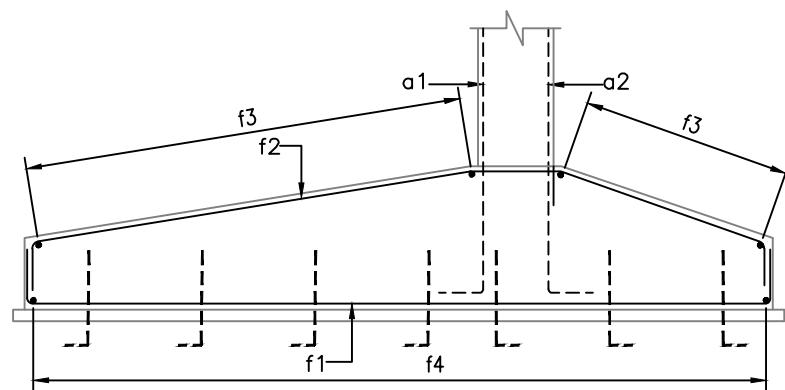
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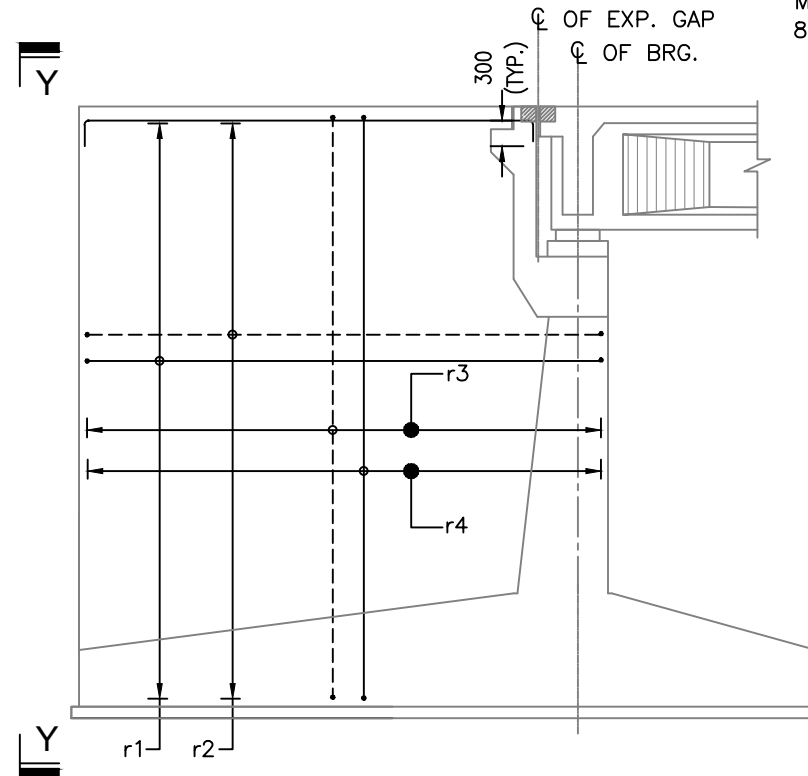
**FOUNDATION PLAN**

(SCALE 1:100)



**REINFORCEMENT DETAILS OF FOUNDATION**

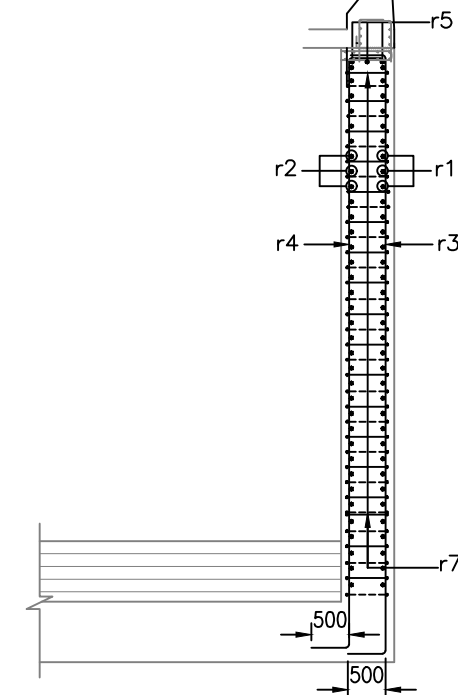
(SCALE 1:100)



**RETURN WALL REINFORCEMENT**

(SHOWING REINFORCEMENT DETAILS OF ABUTMENT A1,  
ABUTMENT A2 WILL BE MIRROR IMAGE)  
(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:100)

FOR DETAIL REFER  
MISC. DRAWING  
80087A\LASA\STR\RA\NCL\MISC-02



**SECTION Y-Y  
SHOWING REINFORCEMENT  
DETAILS OF RETURN WALL**

(SCALE 1:100)

**TABLE 1 :-  
SCHEDULE OF REINFORCEMENT**

	SL. No.	BAR MARKING	DIA.	NUMBER/ SPACING	BAR SHAPE	REMARKS
RETURN WALL	1	r1	16	100 c/c		
	2	r2	25	100 c/c		
	3	r3	16	100 c/c		
	4	r4	25	100 c/c		
	5	r5	16	5 Nos.		
	6	r7	12	200 c/c		STAGGERED IN PLAN ON ALT. BARS
FOUNDATION	6	f1	25	150 c/c		
	7	f2	25	150 c/c		
	8	f3	20	150 c/c		
	9	f4	20	150 c/c		
	10	f5	16	150 c/c		LENGTH VARIES

**NOTES:**

- ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
- GRADE OF STEEL SHALL BE Fe.460 (H.Y.S.D BAR CONFORMING BS).
- CLEAR COVER TO OUTERMOST REINFORCEMENT SHALL BE AS FOLLOWS:
  - FOUNDATION ————— 75mm
  - SUBSTRUCTURE (OUTER FACE) ————— 50mm
  - SUBSTRUCTURE (EARTH FACE) ————— 75mm
- GRADE OF CONCRETE --
  - SUB STRUCTURE—C30/19
  - RETURN WALL—C30/19
  - BLINDING CONCRETE—C15/19
- THE LAP LENGTH FOR ANY REINFORCEMENT SHALL BE CONSIDERED AS GIVEN BELOW D—DIA. OF BAR.

PERCENTAGE OF LAPPED BARS RELATIVE TO TOTAL CROSS-SECTIONAL AREA	<25%	33%	50%	>50%
LAP LENGTH	40d	48d	50d	60d

- THE REQUIRED NET SAFE BEARING CAPACITY OF 35t/m<sup>2</sup> AT FOUNDING LEVEL IS CONFIRMED THROUGH ENGINEERING ASSESSMENT USING GEOTECHNICAL INVESTIGATION DATA.

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE: <b>DIMENSION AND REINF. DETAILS OF ABUT. A1 &amp; A2 FOR BRIDGE AT 35+964 OVER LIWAWAZI RIVER (3x20.0m SPAN)</b>	SCALE: AS SHOWN	DESIGNED BY MANGAL	
										DRAWN BY RAJU	
										APPROVED BY R.BHATTACHARYA	
										DATE MAY, 2023	SHEET SIZE A3
										DRAWING NO. 80087A\LASA\STR\RA\NCL\FDN-01	(SHEET 2 OF 4)



IF ROCK LEVEL IS ENCOUNTERED AT DIFFERENT LEVEL THAN MENTIONED IN TABLE  
THEN FOUNDING LEVEL SHALL BE MINIMUM 1.5m IN TO HARD ROCK.



(SHOWING REINFORCEMENT DETAILS OF ABUTMENT A1,  
ABUTMENT A2 WILL BE MIRROR IMAGE)  
(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:100)



(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:30)

1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

2. GRADE OF STEEL SHALL BE Fe.460 (H.Y.S.D BAR CONFORMING TO BS).
3. CLEAR COVER TO OUTERMOST REINFORCEMENT SHALL BE AS FOLLOWS:
  - a) FOUNDATION \_\_\_\_\_ 75mm
  - b) SUBSTRUCTURE (OUTER FACE) \_\_\_\_\_ 50mm
  - c) SUBSTRUCTURE (EARTH FACE) \_\_\_\_\_ 75mm
4. GRADE OF CONCRETE --
  - SUB STRUCTURE—C30/19
  - BLINDING CONCRETE—C15/19
5. THE LAP LENGTH FOR ANY REINFORCEMENT SHALL BE CONSIDERED AS GIVEN BELOW D—DIA. OF BAR.

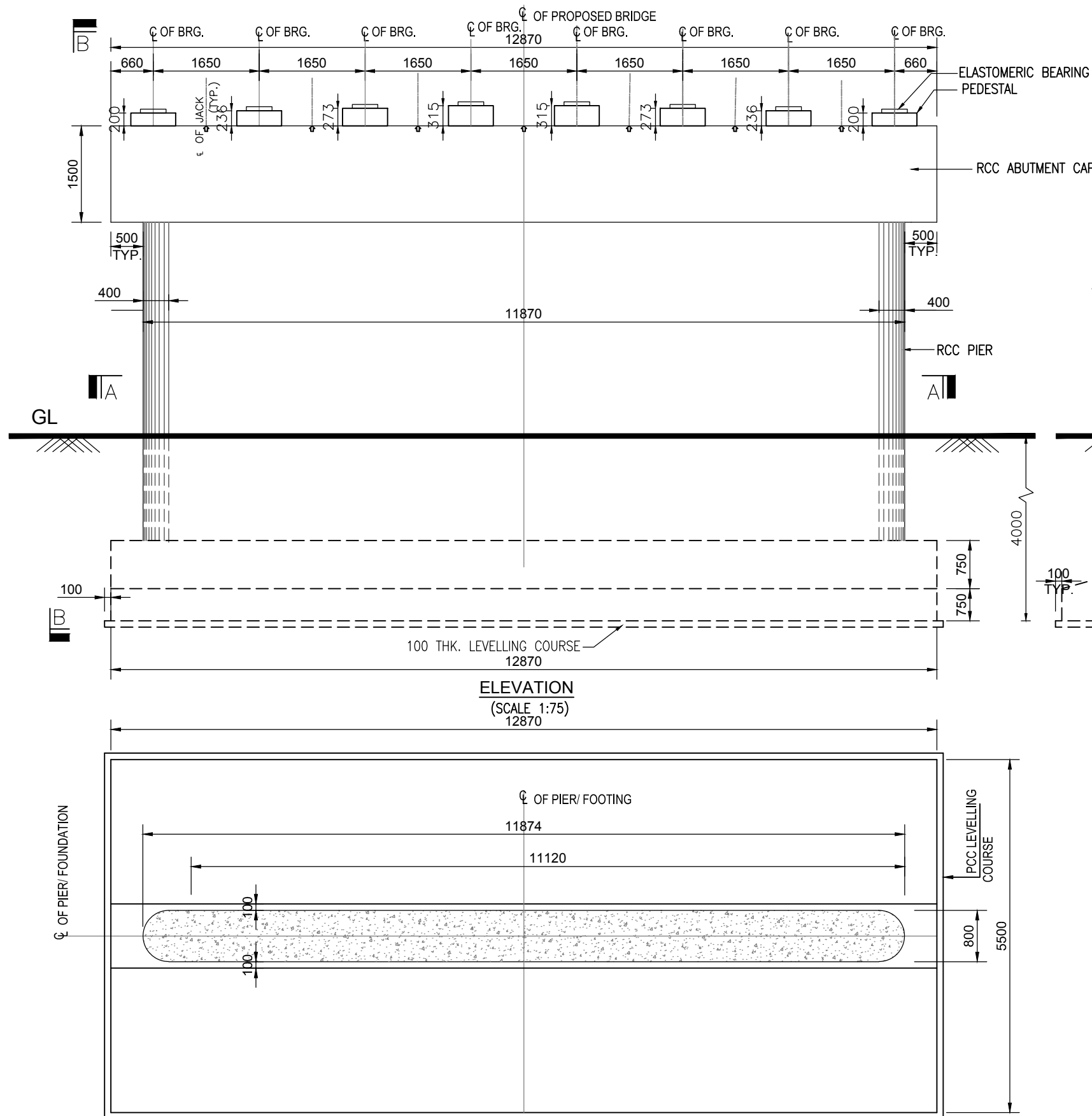
PERCENTAGE OF LAPPED BARS RELATIVE TO TOTAL CROSS-SECTIONAL AREA	<25%	33%	50%	>50%
LAP LENGTH	40d	48d	50d	60d

LEGEND :

TOP BARS/OUTER FACE SHOWN THUS -----  
 BOTTOM BARS/EARTH FACE SHOWN THUS \_\_\_\_\_

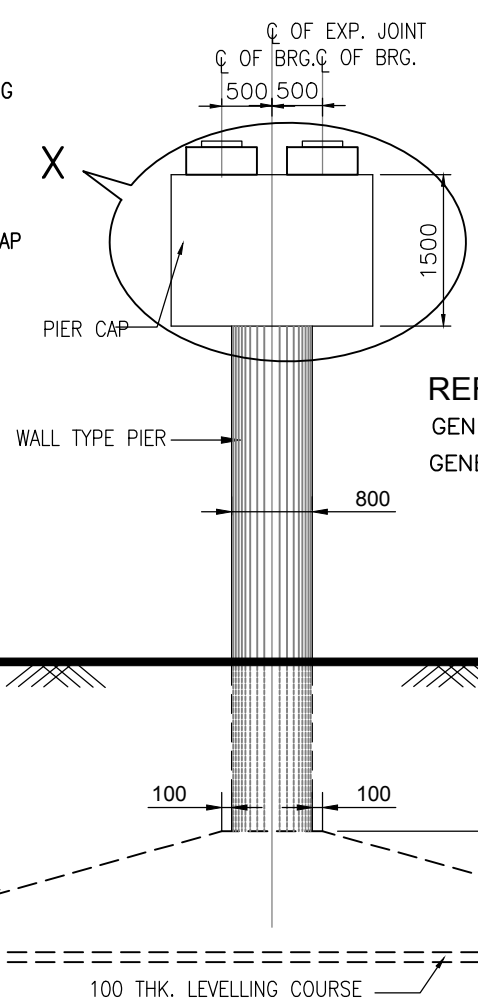
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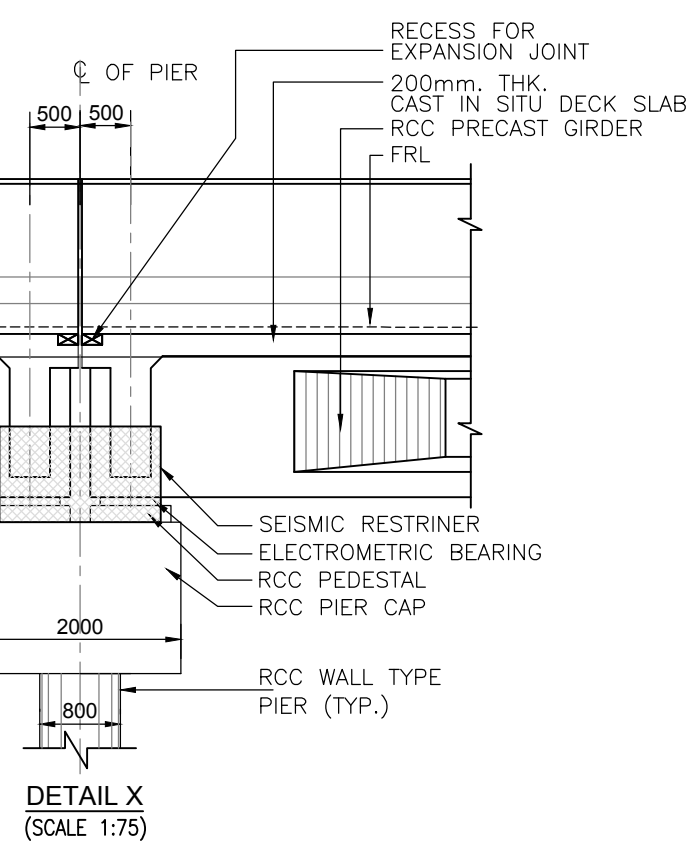


**SECTION A-A  
(FOUNDATION PLAN)**  
(SCALE 1:75)

IF ROCK LEVEL IS ENCOUNTERED AT DIFFRENT LEVEL THAN MENTIONED IN TABLE  
THEN FOUNDING LEVEL SHALL BE MINIMUM 1.5m IN TO HARD ROCK.



**VIEW B-B  
SCALE 1:75**



**DETAIL X  
(SCALE 1:75)**

**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
2. GRADE OF CONCRETE FOR SUBSTRUCTURE OF CLASS C30/19 GRADE OF STEEL Fe 460 AS PER BS OF MINIMUM YEILD STRENGTH 460 N/mm<sup>2</sup>.
3. CLEAR COVER TO PIER AND PIER CAP REINFORCEMENT SHALL BE 50mm. FOR FOUNDATION COVER WILL BE 75mm.
4. SAFE BEARING CAPACITY SHOULD BE 35t/m<sup>2</sup> WHICH SHALL BE VARIED BEFORE START OF WORKS.

**REFERENCE DRAWINGS :-**

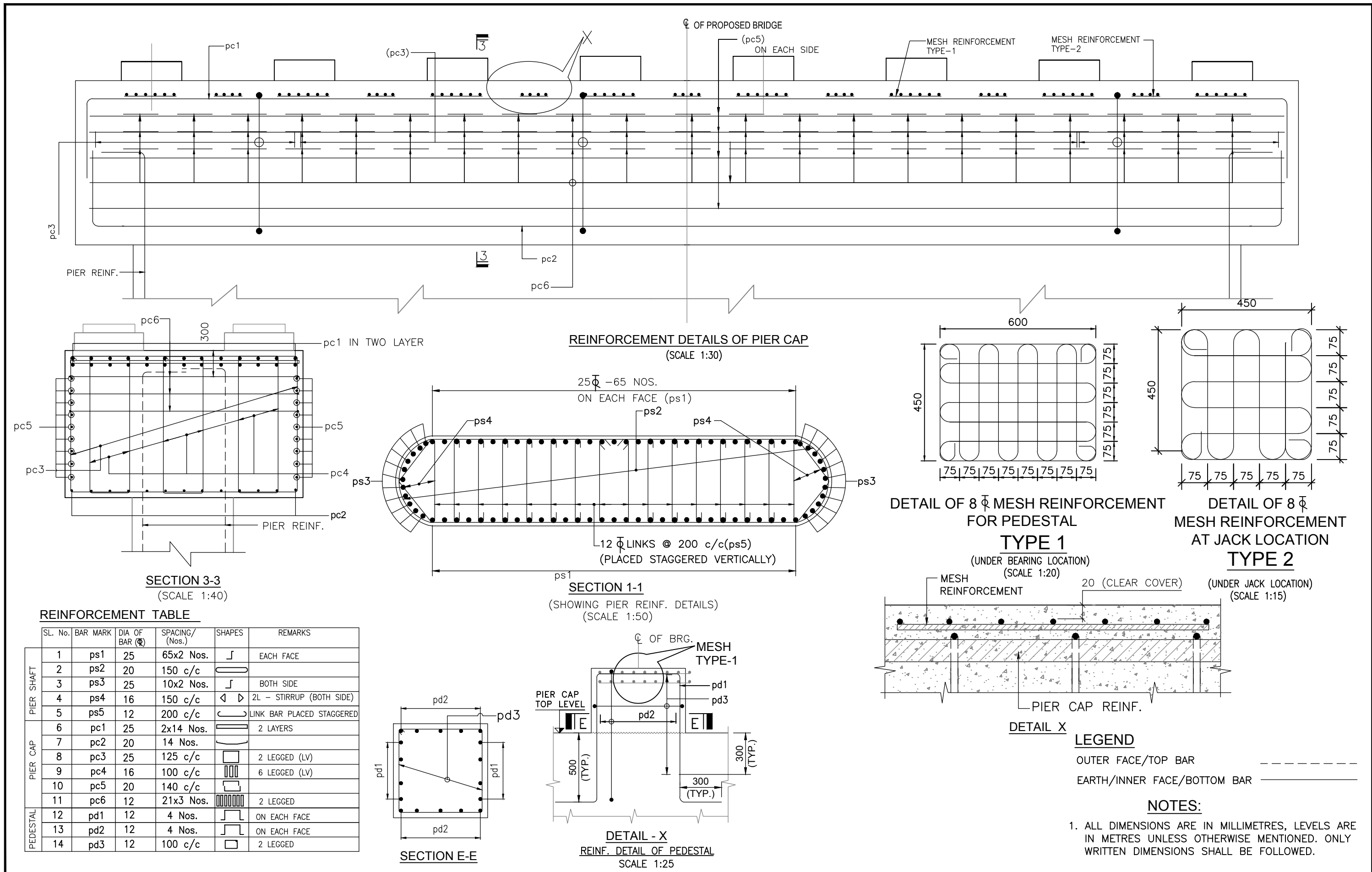
GENERAL NOTES ————— 80087A\LASA\STR\RA\NCL\GN-01  
GENERAL ARRANGEMENT ————— 80087A\LASA\STR\RA\NCL\GA-01

**LEVEL TABLE**

LOCATION	FRL (m)	ABUT. /PIER CAP TOP LEVEL(m)	FOUNDING LEVEL (m)
A1	580.431	578.371	573.000
P1	580.431	578.371	568.500
P2	580.431	578.371	568.500
A2	580.431	578.371	573.000







SECTION 3-3  
(SCALE 1:40)

REINFORCEMENT DETAILS OF PIER CAP  
(SCALE 1:30)

SECTION 1-1  
(SHOWING PIER REINF. DETAILS)  
(SCALE 1:50)

DETAIL OF 8 MESH REINFORCEMENT  
FOR PEDESTAL  
TYPE 1  
(UNDER BEARING LOCATION)  
(SCALE 1:20)

DETAIL OF 8 MESH REINFORCEMENT  
AT JACK LOCATION  
TYPE 2  
(SCALE 1:15)

DETAIL X

LEGEND

OUTER FACE/TOP BAR

EARTH/INNER FACE/BOTTOM BAR

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

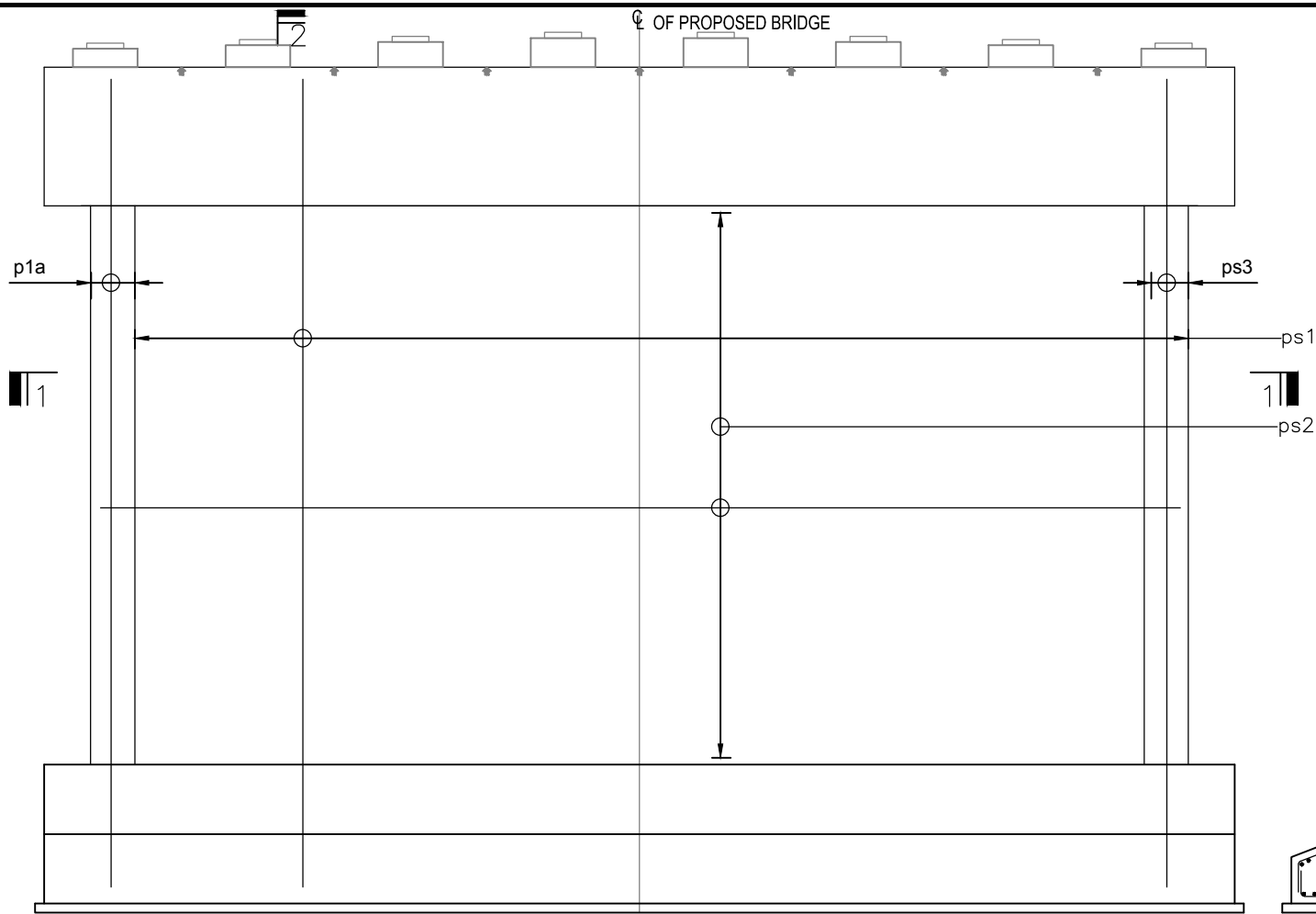
REINFORCEMENT TABLE

SL. No.	BAR MARK	DIA OF BAR (mm)	SPACING/ (Nos.)	SHAPES	REMARKS
1	ps1	25	65x2 Nos.	J	EACH FACE
2	ps2	20	150 c/c	J	
3	ps3	25	10x2 Nos.	J	BOTH SIDE
4	ps4	16	150 c/c	◁ ▷	2L - STIRRUP (BOTH SIDE)
5	ps5	12	200 c/c	—	LINK BAR PLACED STAGGERED
6	pc1	25	2x14 Nos.	—	2 LAYERS
7	pc2	20	14 Nos.	—	
8	pc3	25	125 c/c	□	2 LEGGED (LV)
9	pc4	16	100 c/c	□	6 LEGGED (LV)
10	pc5	20	140 c/c	□	
11	pc6	12	21x3 Nos.	□	2 LEGGED
12	pd1	12	4 Nos.	J	ON EACH FACE
13	pd2	12	4 Nos.	J	ON EACH FACE
14	pd3	12	100 c/c	□	2 LEGGED

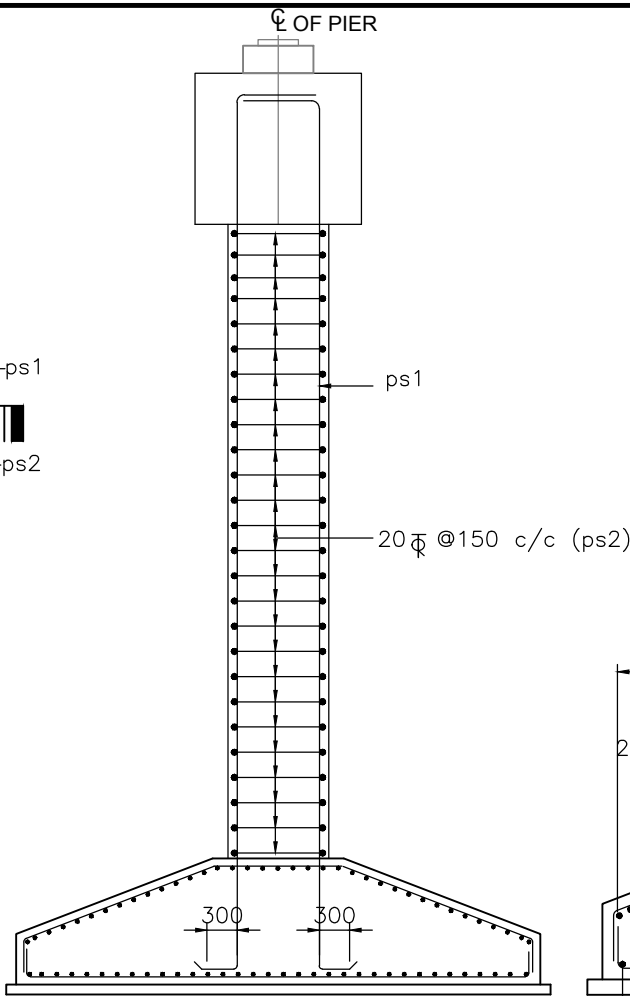
SECTION E-E

DETAIL - X  
REINF. DETAIL OF PEDESTAL  
SCALE 1:25

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: DIMENSION AND REINF. DETAILS OF PIER FOR BRIDGE AT CH:35+964 OVER LIWAWAZI RIVER ( 3x20.0m SPAN )		SCALE: AS SHOWN		DESIGNED BY MANGAL	
														DRAWN BY RAJU	
														APPROVED BY R.BHATTACHARYA	
														DATE MAY, 2023	SHEET SIZE A3
														DRAWING NO. 80087A/LASA/STR/RAINCL/DD-01	(SHEET 3 OF 4)



REINFORCEMENT DETAILS  
(SCALE 1:75)

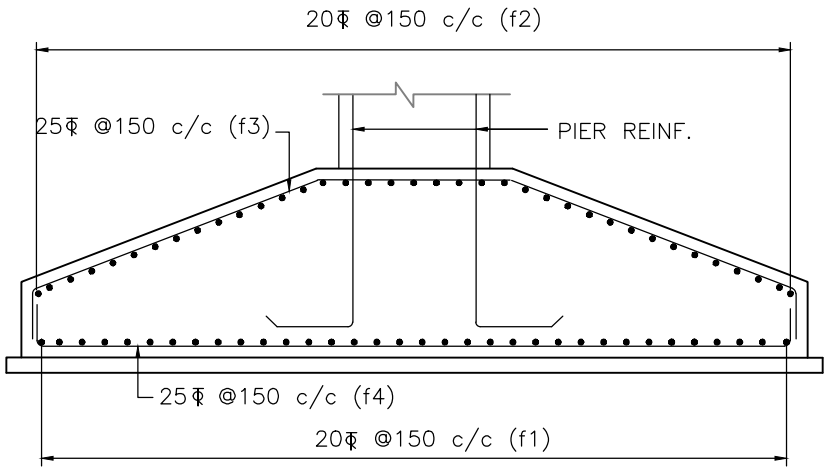


SECTION 2-2  
SCALE 1:75

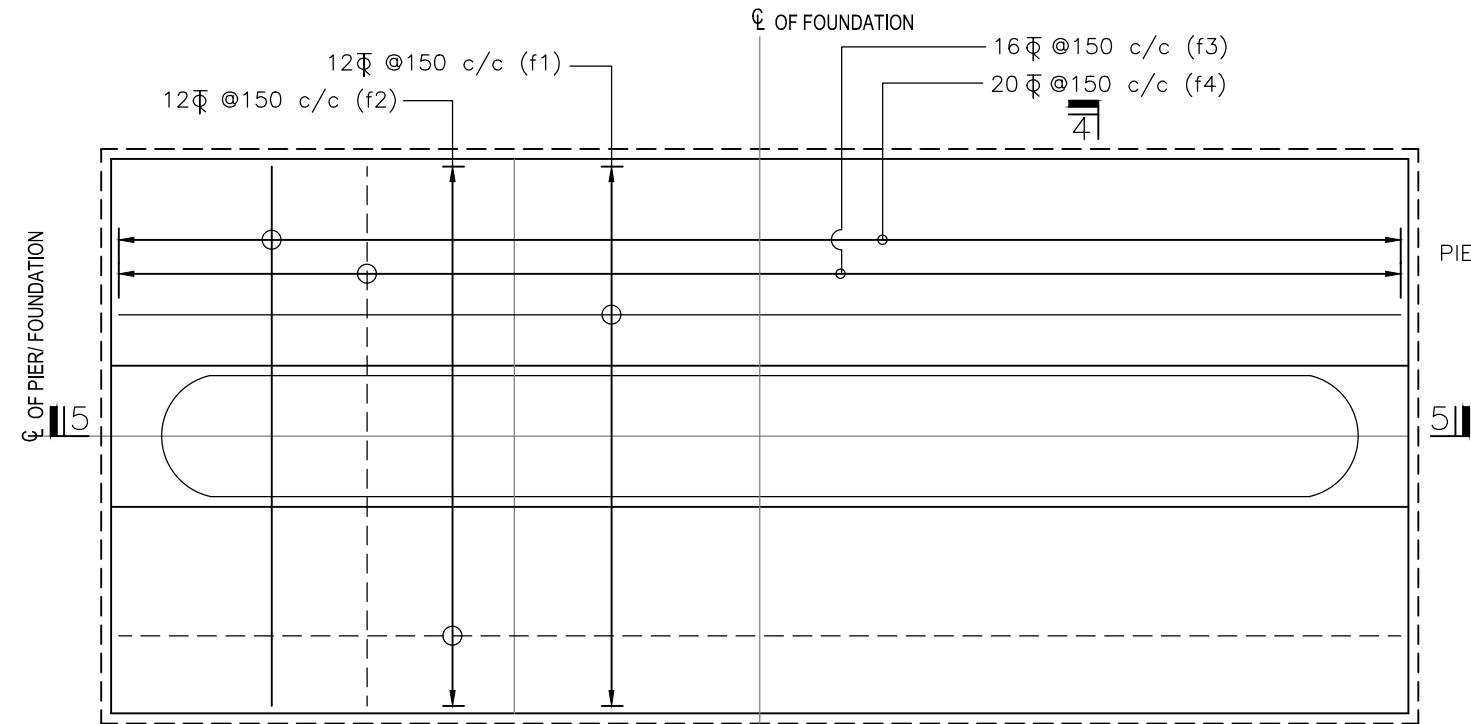
NOTES:  
1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

REINFORCEMENT TABLE

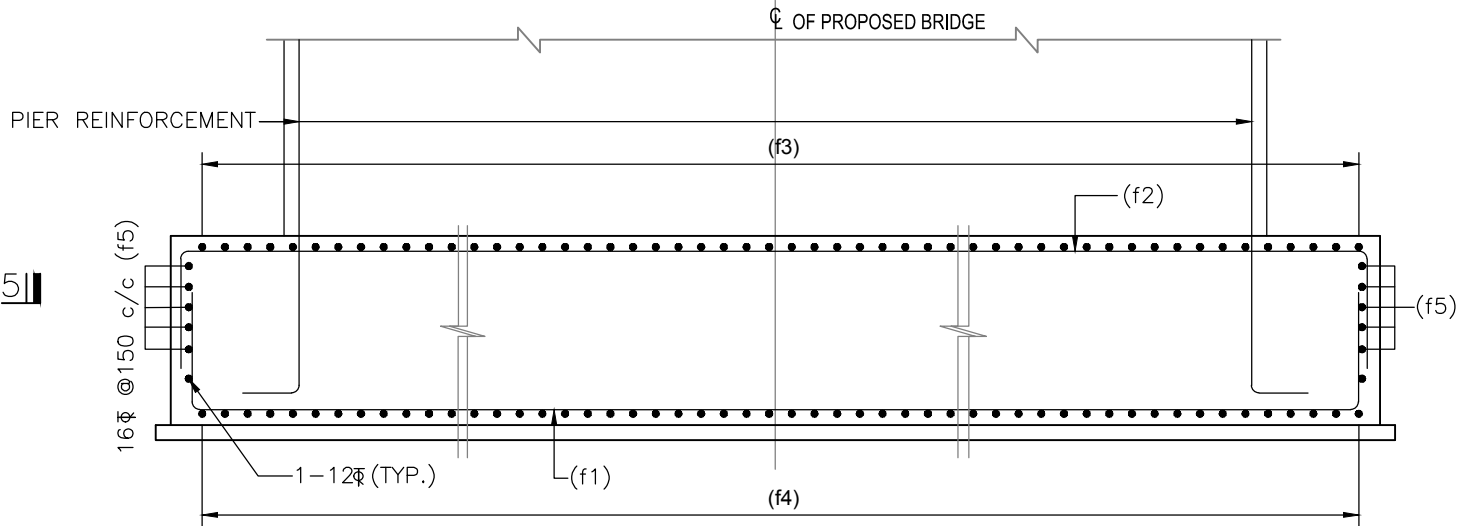
SL. No.	BAR MARK	DIA OF BAR (Φ)	SPACING/ (Nos.)	SHAPES	REMARKS
1	f5	Y16	150 c/c		
2	f4	Y25	150 c/c		
3	f3	Y25	150 c/c		
4	f2	Y12	150 c/c		
5	f1	Y12	150 c/c		



SECTION 4-4  
(SCALE 1:50)



FOUNDATION PLAN  
(SCALE 1:75)



SECTION 5-5  
(SCALE 1:50)

NO.	REVISIONS	DATE
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CLIENT:	THE ROADS AUTHORITY
CHIEF EXECUTIVE OFFICER	
PRIVATE BAG B346	
LILONGWE	
MALAWI	



DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India
in association with	
RUO Consulting Engineers Ltd, Malawi	



PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD
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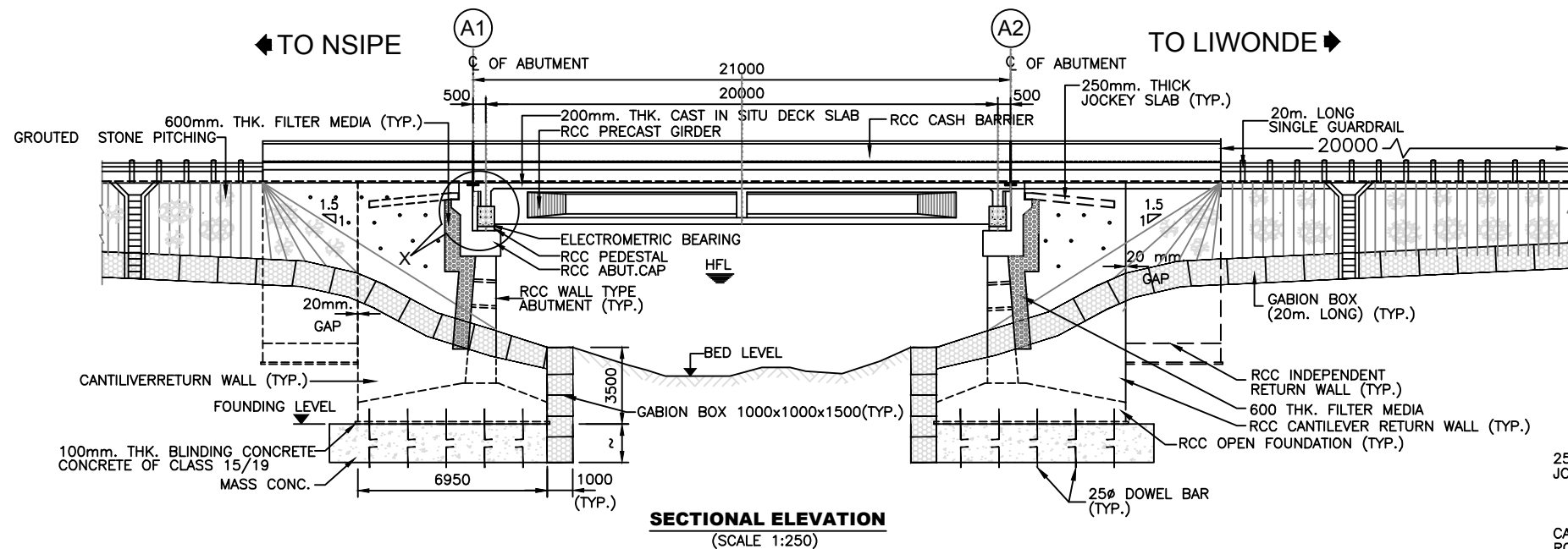
DRAWING TITLE:	DIMENSION AND REINF. DETAILS OF PIER FOR BRIDGE AT CH:35+964 OVER LIWAWAZI RIVER ( 3x20.0m SPAN )
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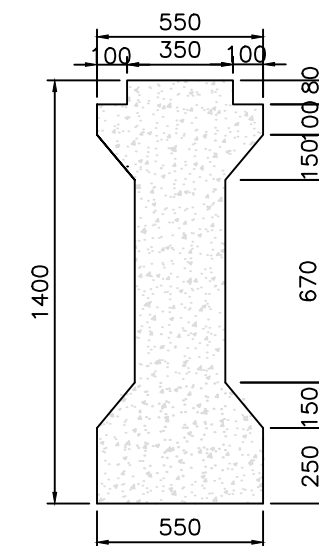
SCALE:	AS SHOWN
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DESIGNED BY	MANGAL	
DRAWN BY	RAJU	
APPROVED BY	R.BHATTACHARYA	
DATE	MAY, 2023	SHEET SIZE A3
DRAWING NO.	80087A\LASA\STR\RAINCL\DD-01	(SHEET 4 OF 4)

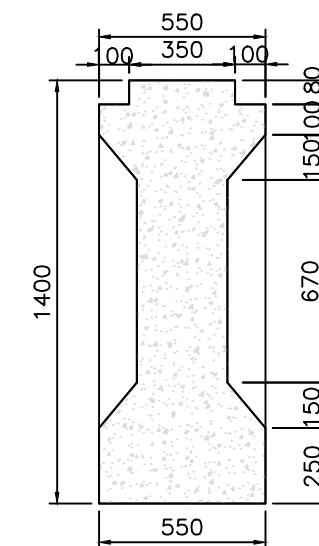




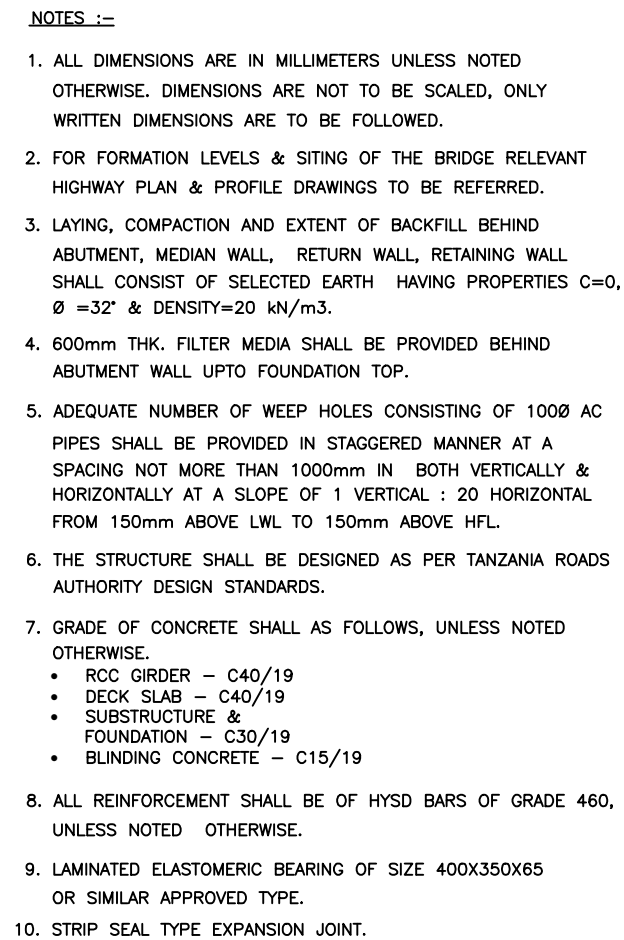




SECTION AT A-A  
**GIRDER DETAILS**  
(SCALE 1:25)



SECTION AT B-B  
**GIRDER DETAILS**  
(SCALE 1:25)

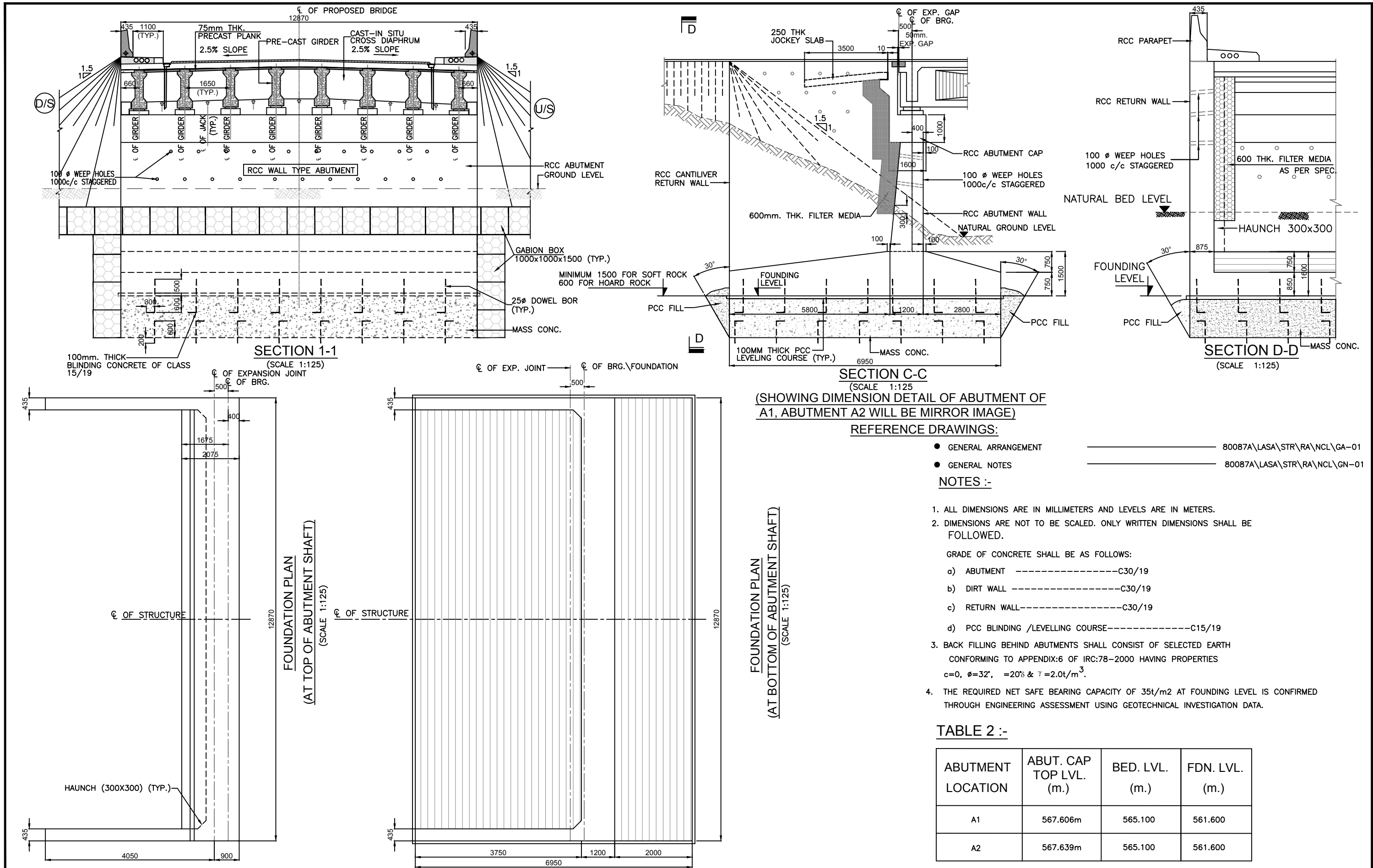


U/S ————— UP STREAM

D/S ————— DOWN STREAM

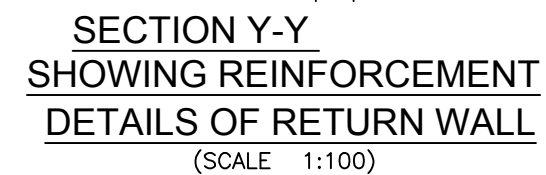
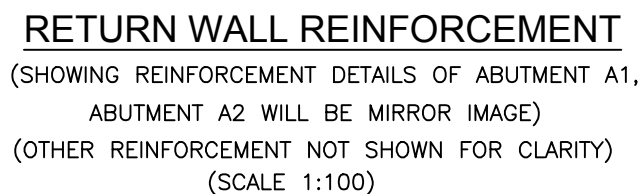
(i) DESIGN DISCHARGE ————— 119.73 m<sup>3</sup>/Sec.  
(ii) DESIGN HFL ————— 565.587m.  
(iii) VELOCITY ————— 1.9m/s.  
(iv) FREE BOARD ————— 1.0m.

[illegible]



CLIENT: THE ROADS AUTHORITY				DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India				PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD				DRAWING TITLE: DIMENSION AND REINF. DETAILS OF ABUT. A1 & A2 FOR BRIDGE AT 44+665 OVER CHIMWALIRE RIVER (1x20.0m SPAN)				SCALE: AS SHOWN				DESIGNED BY: MANGAL			
CHIEF EXECUTIVE OFFICER				LEA Associates South Asia Pvt Ltd., India				CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD				DRAWING TITLE: DIMENSION AND REINF. DETAILS OF ABUT. A1 & A2 FOR BRIDGE AT 44+665 OVER CHIMWALIRE RIVER (1x20.0m SPAN)				SCALE: AS SHOWN				DRAWN BY: RAJU			
PRIVATE BAG B346				in association with				RUI Consulting Engineers Ltd, Malawi				RUI Consultants				APPROVED BY: R.BHATTACHARYA				DATE: MAY, 2023			
LILONGWE				MALAWI				RUI Consultants				DATE: MAY, 2023				DRAWING NO. 80087A\LASA\STR\RA\NCL\FDN-02 (SHEET 1 OF 4)				SHEET SIZE A3			
REVISIONS				MKD.				DESCRIPTIONS				BY				DATE							





**TABLE 1 :-**  
**SCHEDULE OF REINFORCEMENT**

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
2. GRADE OF STEEL SHALL BE Fe.460 (H.Y.S.D BAR CONFORMING BS).
3. CLEAR COVER TO OUTERMOST REINFORCEMENT SHALL BE AS FOLLOWS:
  - a) FOUNDATION ————— 75mm
  - b) SUBSTRUCTURE (OUTER FACE) ————— 50mm
  - c) SUBSTRUCTURE (EARTH FACE) ————— 75mm
4. GRADE OF CONCRETE --
  - SUB STRUCTURE—C30/19
  - RETURN WALL—C30/19
  - BLINDING CONCRETE—C15/19
5. THE LAP LENGTH FOR ANY REINFORCEMENT SHALL BE CONSIDERED AS GIVEN BELOW D—DIA. OF BAR.

6. THE REQUIRED NET SAFE BEARING CAPACITY OF 35t/m2 AT FOUNDING LEVEL IS CONFIRMED THROUGH ENGINEERING ASSESSMENT USING GEOTECHNICAL INVESTIGATION DATA.

				CLIENT: <b>THE ROADS AUTHORITY</b>  CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT:  LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT:  CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE:  DIMENSION AND REINF. DETAILS OF ABUT. A1 & A2 FOR BRIDGE AT 44+665 OVER CHIMWALIRE RIVER (1x20.0m SPAN)		SCALE:  AS SHOWN		DESIGNED BY MANGAL  DRAWN BY RAJU  APPROVED BY R.BHATTACHARYA  DATE MAY, 2023  DRAWING NO. 80087A\LASA\STR\RAINCL\FDN-02		(SHEET 2 OF 4)	
MKD. DESCRIPTIONS BY DATE				REVISIONS													





IF ROCK LEVEL IS ENCOUNTERED AT DIFFERENT LEVEL THAN MENTIONED IN TABLE-2  
THEN FOUNDING LEVEL SHALL BE MINIMUM 1.5m IN TO HARD ROCK.



(SHOWING REINFORCEMENT DETAILS OF ABUTMENT A1,  
ABUTMENT A2 WILL BE MIRROR IMAGE)  
(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:100)



(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:30)

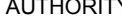


1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

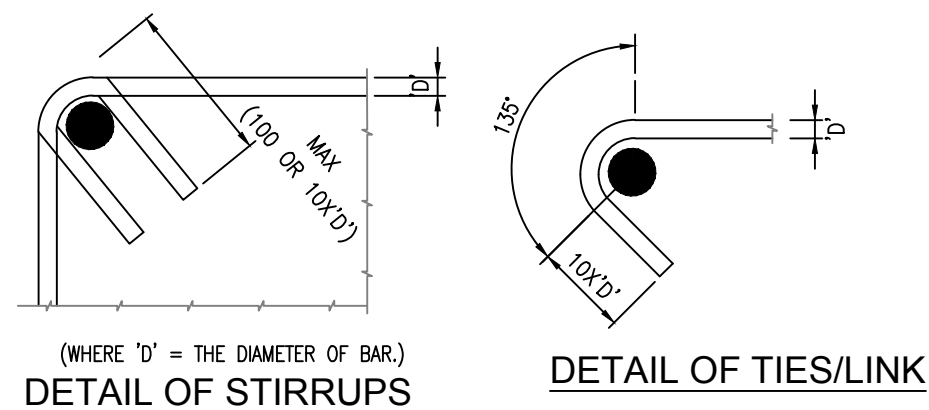
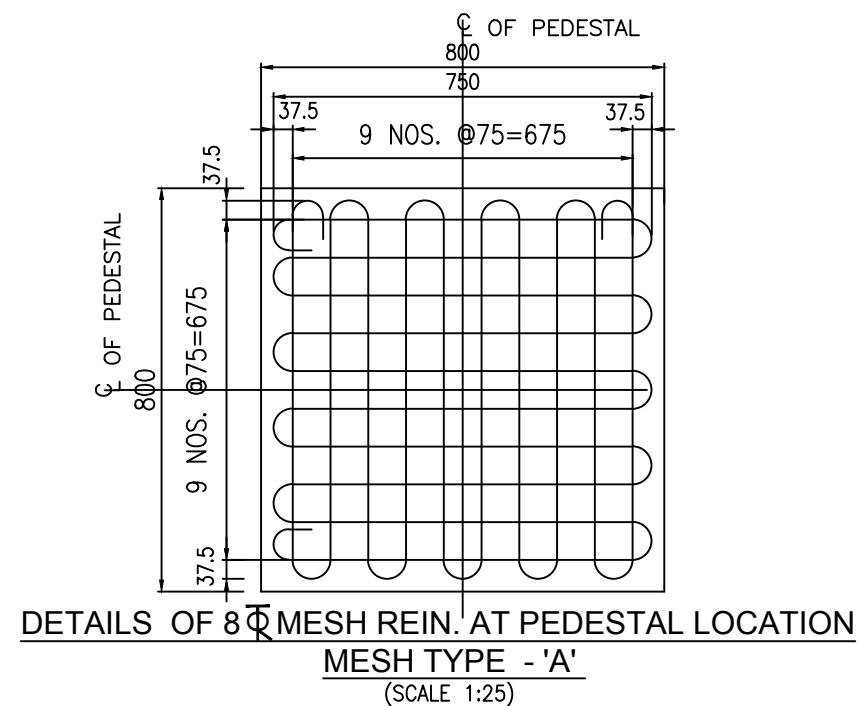
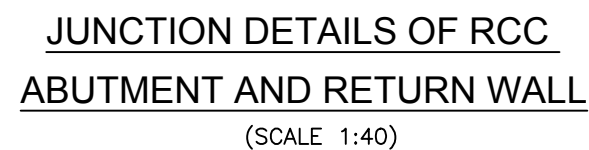
2. GRADE OF STEEL SHALL BE Fe.460 (H.Y.S.D BAR CONFORMING TO BS).
3. CLEAR COVER TO OUTERMOST REINFORCEMENT SHALL BE AS FOLLOWS:
  - a) FOUNDATION \_\_\_\_\_ 75mm
  - b) SUBSTRUCTURE (OUTER FACE) \_\_\_\_\_ 50mm
  - c) SUBSTRUCTURE (EARTH FACE) \_\_\_\_\_ 75mm
4. GRADE OF CONCRETE --
  - SUB STRUCTURE—C30/19
  - BLINDING CONCRETE—C15/19
5. THE LAP LENGTH FOR ANY REINFORCEMENT SHALL BE CONSIDERED AS GIVEN BELOW D—DIA. OF BAR.
























PERCENTAGE OF LAPPED BARS RELATIVE TO TOTAL CROSS-SECTIONAL AREA	<25%	33%	50%	>50%
LAP LENGTH	40d	48d	50d	60d

LEGEND :

TOP BARS/OUTER FACE SHOWN THUS -----  
 BOTTOM BARS/EARTH FACE SHOWN THUS \_\_\_\_\_

				CLIENT:  THE ROADS AUTHORITY  CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT:  LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT:  CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE:  DIMENSION AND REINF. DETAILS OF ABUT. A1 & A2 FOR BRIDGE AT 44+665 OVER CHIMWALIRE RIVER (1x20.0m SPAN)		SCALE:  AS SHOWN		DESIGNED BY MANGAL			
												DRAWN BY RAJU					
												APPROVED BY R.BHATTACHARYA					
MKD. _____ DESCRIPTIONS _____ BY _____ DATE _____												DATE MAY, 2023				SHEET SIZE A3	
REVISIONS												DRAWING NO.		80087A\LASA\STR\RA\NCL\FDN-02 (SHEET 3 OF 4)			

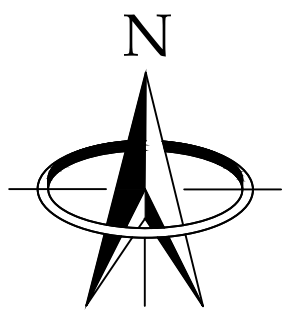
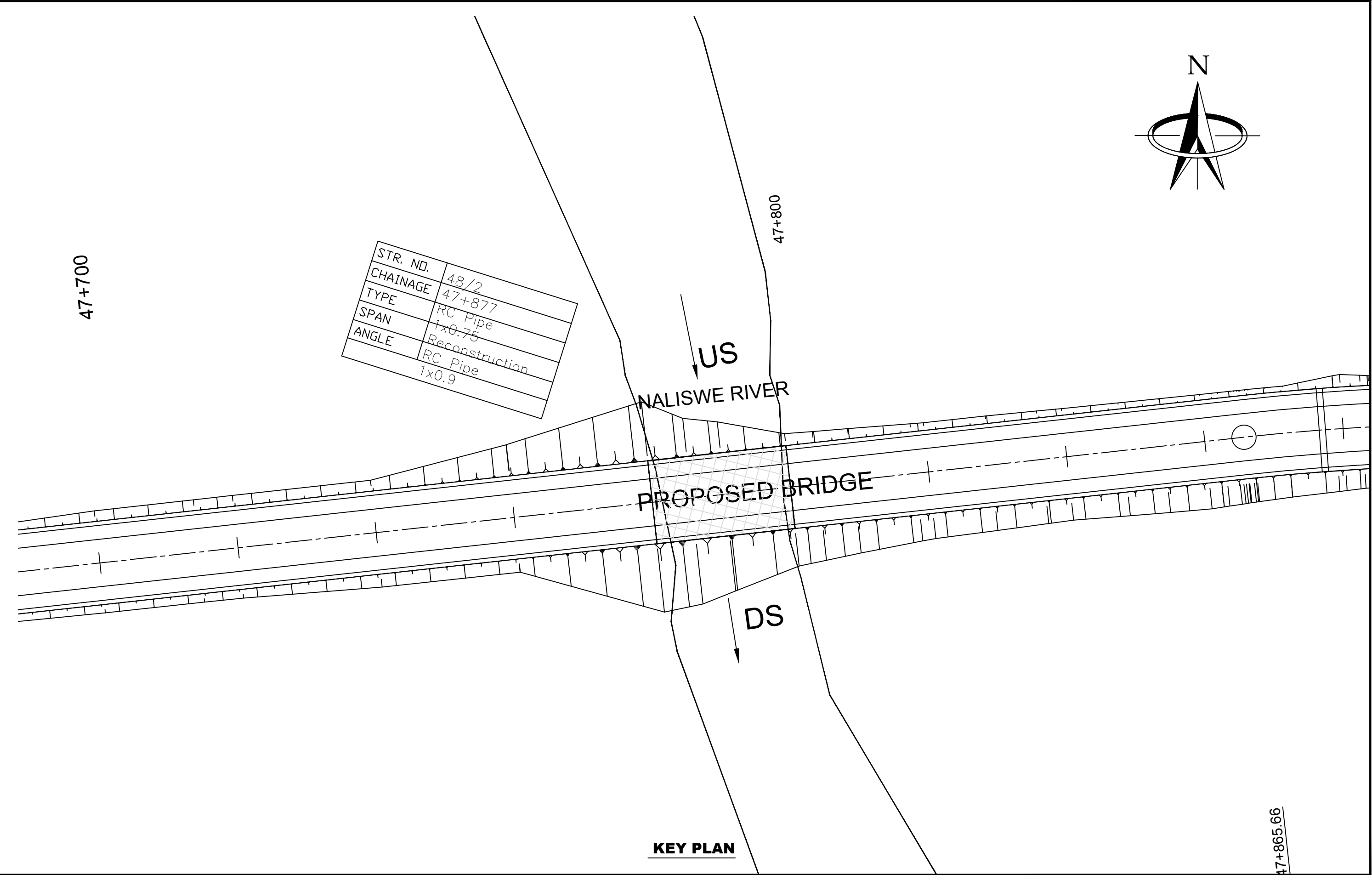


	SL. No.	BAR MARKING	DIA.	NUMBER/ SPACING	BAR SHAPE	REMARKS
ABUTMENT SHAFT	1	a1	20	150 c/c		
	2	a2	25	150 c/c		
	3	a2a	32	150 c/c		IN 2nd LAYER
	4	a3	20	150 c/c		
	5	a4	20	150 c/c		
	6	a5	12	150 c/c (VERTICALLY)		STAGGERED IN PLAN ON ALT. BARS
	7	a6	25	5 Nos.		EACH SIDE
	8	h1	12	200 c/c		
ABUTMENT CAP	9	c1	12	10 Nos.		EQUAL SPACING
	10	c2		NOT IN USE		
	11	c3	12	9 Nos.		EQUAL SPACING
	12	c4	12	6 Nos.		(EACH FACE)
	13	c5	20	100 c/c		
	14	c6	12	2L-500c/c		IN 2 LAYER
	15	c7	12	1 Nos.		
DIRT WALL	16	d1	20	150 c/c		
	17	d2	12	150 c/c		
	18	d3	12	100 c/c		
	19	d4	12	100 c/c		
	20	d5	12	7 Nos.		
	21	d6	10	400 c/c		IN 3 LAYER PROVIDED IN TOP 400mm.
PEDASTAL						
	22	pd1	16	150 c/c		
	23	pd2	12	150 c/c		
	24	pd3	12	150 c/c		2L-STIRRUP

1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
2. GRADE OF CONCRETE FOR SUBSTRUCTURE OF CLASS C30/19  
GRADE OF STEEL Fe 460 AS PER BS  
OF MINIMUM YIELD STRENGTH 460 N/mm<sup>2</sup>.
3. CLEAR COVER TO PIER AND PIER CAP REINFORCEMENT  
SHALL BE 50mm. FOR FOUNDATION COVER WILL BE 75mm.
4. SAFE BEARING CAPACITY SHOULD BE 35t/m<sup>2</sup> WHICH SHALL  
BE VARIED BEFORE START OF WORKS.

GENERAL NOTES-----80087A\LASA\STR\RA\NCL\GN-01

				CLIENT: THE ROADS AUTHORITY		DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India		PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE: DIMENSION AND REINF. DETAILS OF ABUT. A1 & A2 FOR BRIDGE AT 44+665 OVER CHIMWALIRE RIVER (1x20.0m SPAN)		SCALE: AS SHOWN		DESIGNED BY MANGAL			
				CHIEF EXECUTIVE OFFICER		in association with		LEA				DRAWN BY RAJU					
				PRIVATE BAG B346		RUO Consulting Engineers Ltd, Malawi		RUO Consultants				APPROVED BY R.BHATTACHARYA					
				LILONGWE				Multi-disciplinary Consulting Civil Engineers				DATE MAY, 2023				SHEET SIZE A3	
				MALAWI								DRAWING NO. 80087A\LASA\STR\RA\NCL\FDN-02				(SHEET 4 OF 4)	
MKD. DESCRIPTIONS BY DATE																	
REVISIONS																	

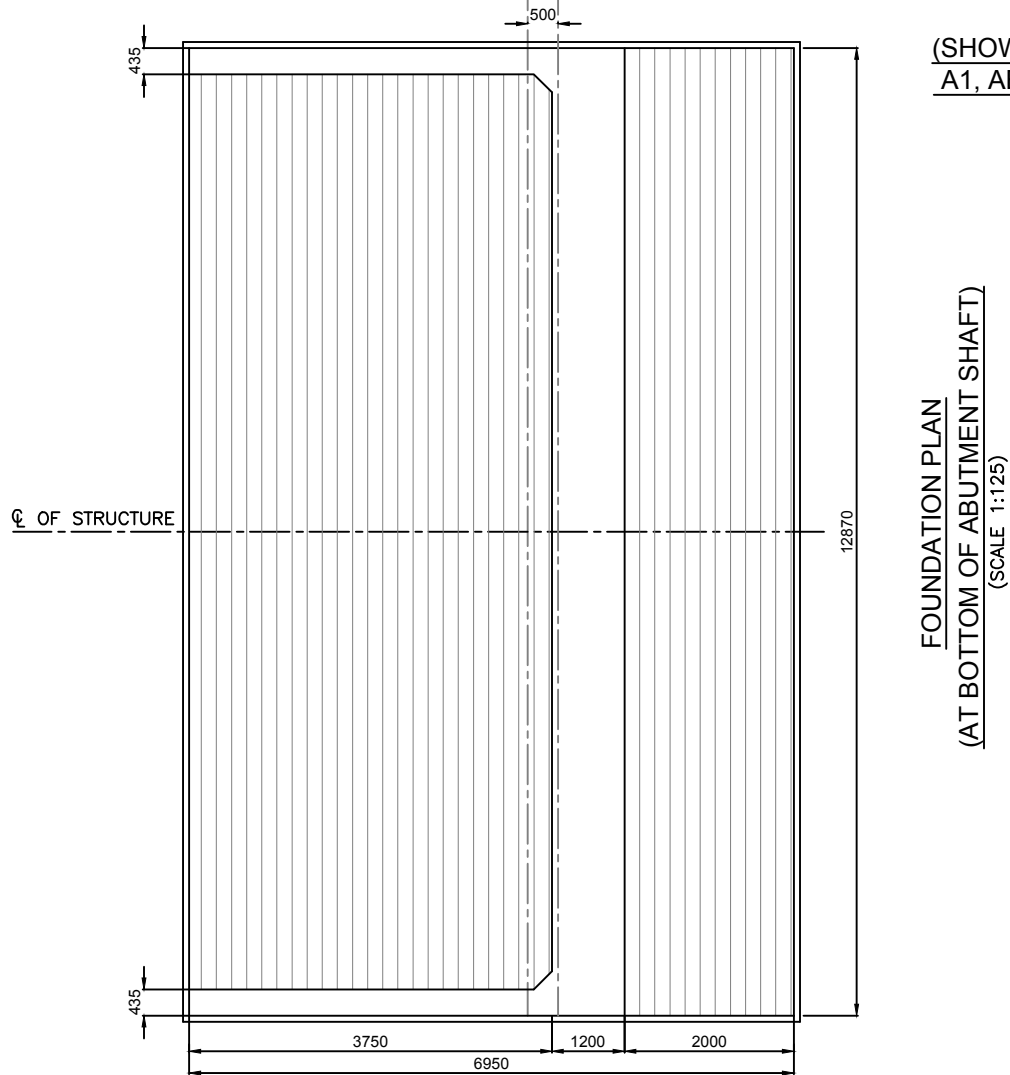
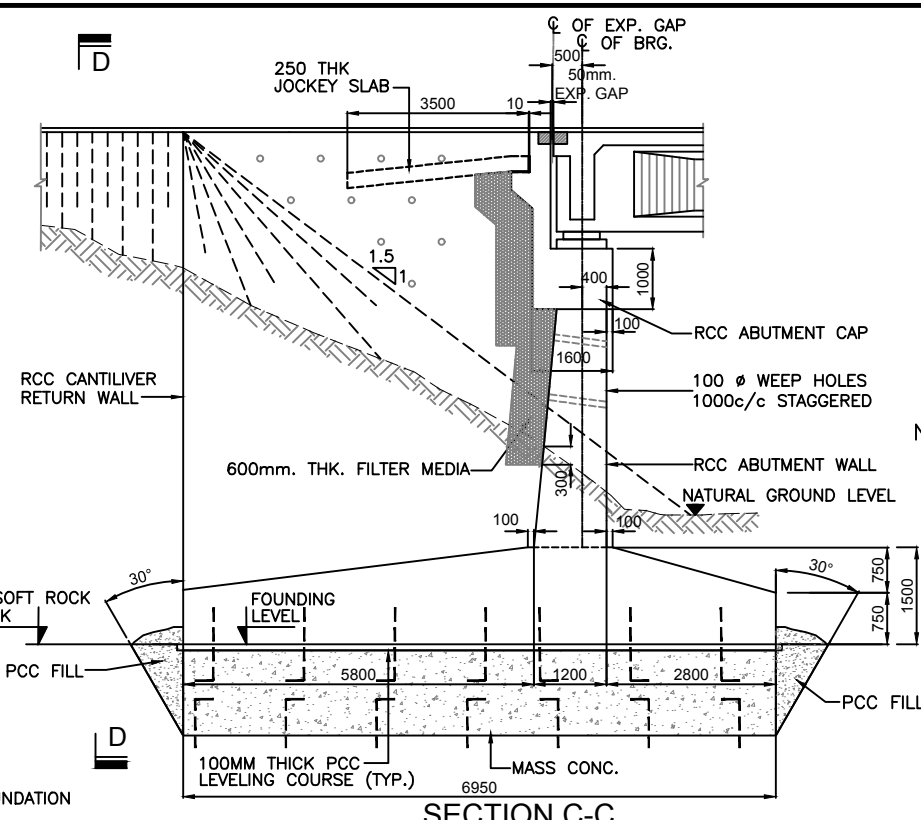


			CLIENT:		THE ROADS AUTHORITY		DESIGN CONSULTANT:		PROJECT:		DRAWING TITLE:		SCALE:		DESIGNED BY: MANGAL			









● GENERAL ARRANGEMENT \_\_\_\_\_ 80087A\LASA\STR\RA\NCL\GA-01

● GENERAL NOTES \_\_\_\_\_ 80087A\LASA\STR\RA\NCL\GN-01

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS.
2. DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

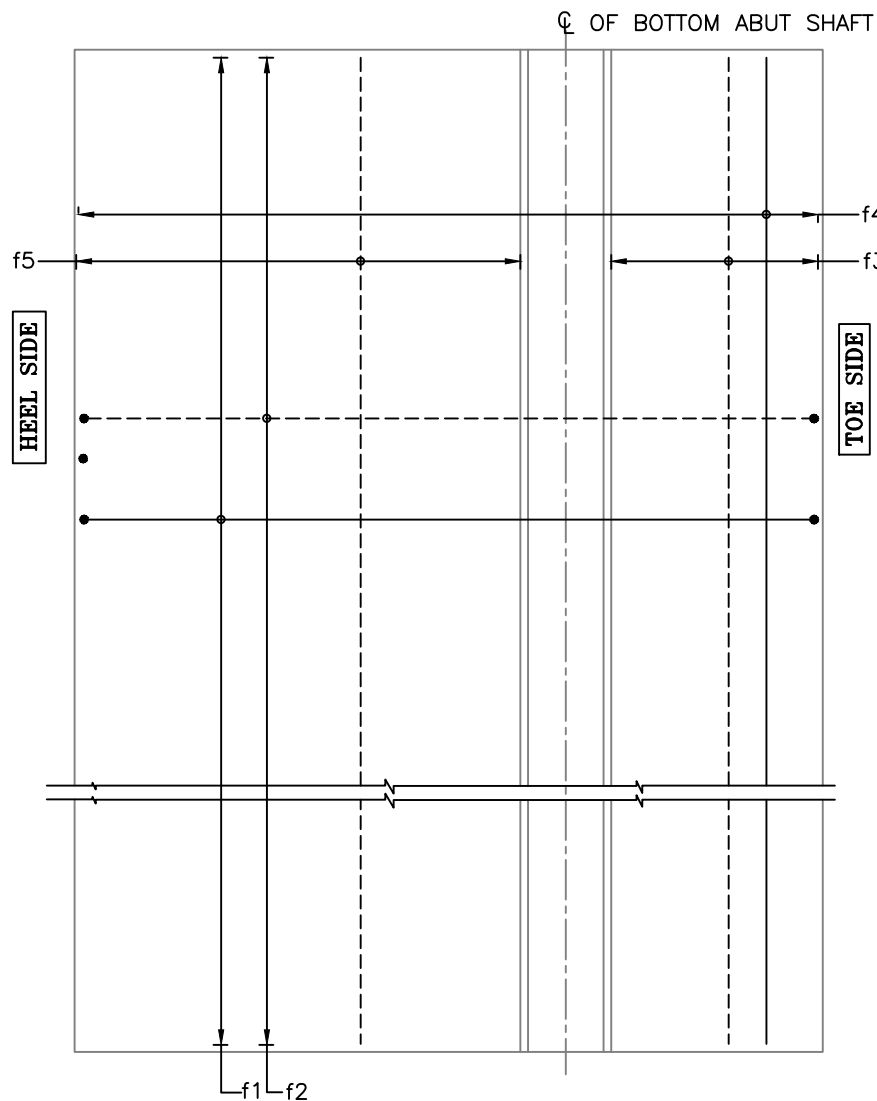
GRADE OF CONCRETE SHALL BE AS FOLLOWS:

- a) ABUTMENT -----C30/19
- b) DIRT WALL -----C30/19
- c) RETURN WALL-----C30/19
- d) PCC BLINDING /LEVELLING COURSE-----C15/19

3. BACK FILLING BEHIND ABUTMENTS SHALL CONSIST OF SELECTED EARTH CONFORMING TO APPENDIX:6 OF IRC:78-2000 HAVING PROPERTIES  
 $c=0$ ,  $\phi=32^\circ$ ,  $\gamma=2.0t/m^3$ .
4. THE REQUIRED NET SAFE BEARING CAPACITY OF 35t/m<sup>2</sup> AT FOUNDING LEVEL IS CONFIRMED THROUGH ENGINEERING ASSESSMENT USING GEOTECHNICAL INVESTIGATION DATA.

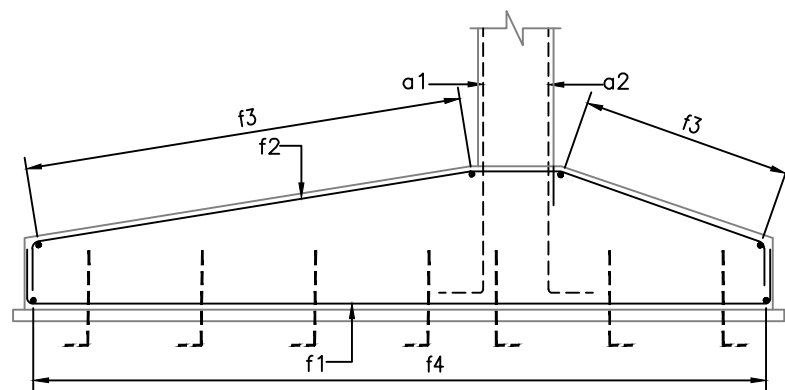
ABUTMENT LOCATION	ABUT. CAP TOP LVL. (m.)	BED. LVL. (m.)	FDN. LVL. (m.)
A1	531.250m	529.000	525.500
A2	531.230m	529.000	525.500

[illegible]



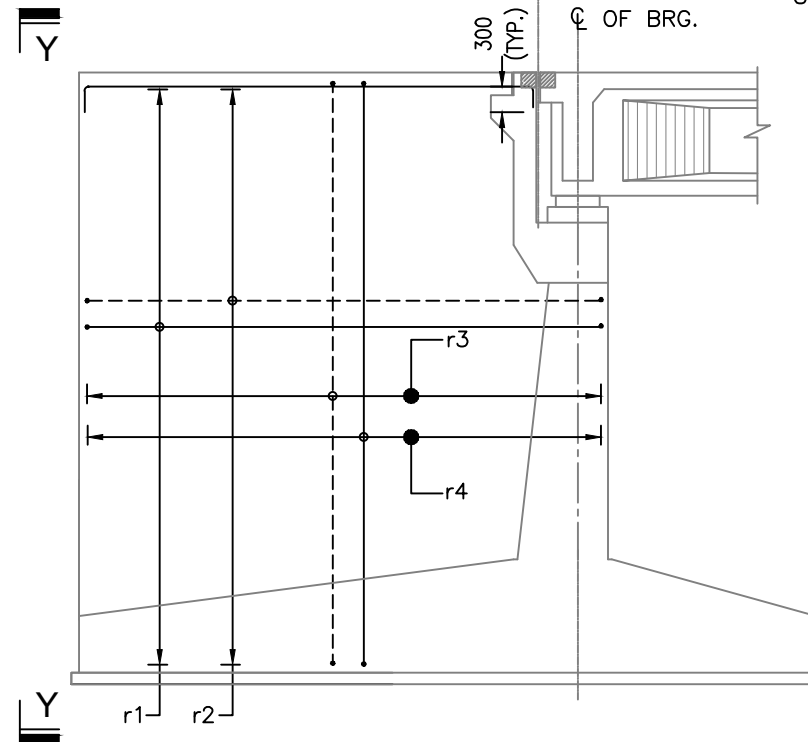
**FOUNDATION PLAN**

(SCALE 1:100)



**REINFORCEMENT DETAILS OF FOUNDATION**

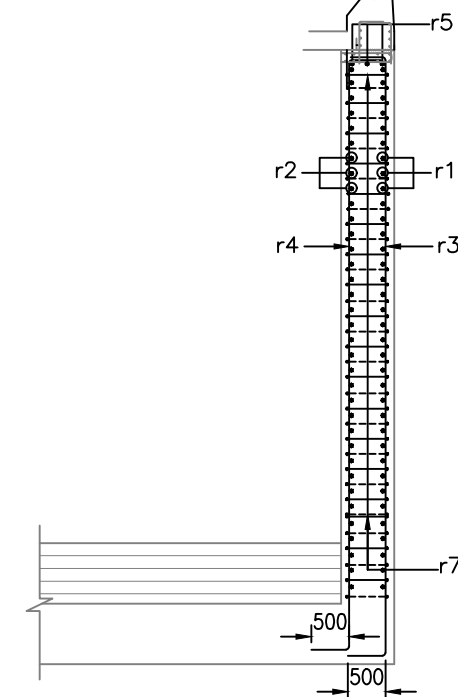
(SCALE 1:100)



**RETURN WALL REINFORCEMENT**

(SHOWING REINFORCEMENT DETAILS OF ABUTMENT A1,  
ABUTMENT A2 WILL BE MIRROR IMAGE)  
(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:100)

FOR DETAIL REFER  
MISC. DRAWING  
80087A\LASA\STR\RA\NCL\MISC-02



**SECTION Y-Y  
SHOWING REINFORCEMENT  
DETAILS OF RETURN WALL**

(SCALE 1:100)

**TABLE 1 :-  
SCHEDULE OF REINFORCEMENT**

	SL. No.	BAR MARKING	DIA.	NUMBER/ SPACING	BAR SHAPE	REMARKS
RETURN WALL	1	r1	16	100 c/c		
	2	r2	25	100 c/c		
	3	r3	16	100 c/c		
	4	r4	25	100 c/c		
	5	r5	16	5 Nos.		
	6	r7	12	200 c/c		STAGGERED IN PLAN ON ALT. BARS
FOUNDATION	6	f1	25	150 c/c		
	7	f2	25	150 c/c		
	8	f3	20	150 c/c		
	9	f4	20	150 c/c		
	10	f5	16	150 c/c		LENGTH VARIES

**NOTES:**

- ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
- GRADE OF STEEL SHALL BE Fe.460 (H.Y.S.D BAR CONFORMING BS).
- CLEAR COVER TO OUTERMOST REINFORCEMENT SHALL BE AS FOLLOWS:
  - FOUNDATION ————— 75mm
  - SUBSTRUCTURE (OUTER FACE) ————— 50mm
  - SUBSTRUCTURE (EARTH FACE) ————— 75mm
- GRADE OF CONCRETE ---
  - SUB STRUCTURE—C30/19
  - RETURN WALL—C30/19
  - BLINDING CONCRETE—C15/19
- THE LAP LENGTH FOR ANY REINFORCEMENT SHALL BE CONSIDERED AS GIVEN BELOW D—DIA. OF BAR.

PERCENTAGE OF LAPPED BARS RELATIVE TO TOTAL CROSS-SECTIONAL AREA	<25%	33%	50%	>50%
LAP LENGTH	40d	48d	50d	60d

- THE REQUIRED NET SAFE BEARING CAPACITY OF 35t/m<sup>2</sup> AT FOUNDING LEVEL IS CONFIRMED THROUGH ENGINEERING ASSESSMENT USING GEOTECHNICAL INVESTIGATION DATA.

				CLIENT: <b>THE ROADS AUTHORITY</b>		DESIGN CONSULTANT:	PROJECT:	DRAWING TITLE:	SCALE:	DESIGNED BY:	MANGAL	
				CHIEF EXECUTIVE OFFICER		LEA Associates South Asia Pvt Ltd., India	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DIMENSION AND REINF. DETAILS OF ABUT. A1 & A2 FOR BRIDGE AT 47+790 OVER NALISWE RIVER (1x20.0m SPAN)	AS SHOWN	DRAWN BY:	RAJU	
				PRIVATE BAG B346		in association with				APPROVED BY:	R.BHATTACHARYA	
				LILONGWE		RUO Consulting Engineers Ltd, Malawi				DATE:	MAY, 2023	SHEET SIZE A3
MKD.				REVISIONS						DRAWING NO.:	80087A\LASA\STR\RA\NCL\FDN-03	(SHEET 2 OF 4)



IF ROCK LEVEL IS ENCOUNTERED AT DIFFERENT LEVEL THAN MENTIONED IN TABLE-2  
THEN FOUNDING LEVEL SHALL BE MINIMUM 1.5m IN TO HARD ROCK.



(SHOWING REINFORCEMENT DETAILS OF ABUTMENT A1,  
ABUTMENT A2 WILL BE MIRROR IMAGE)  
(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:100)



(OTHER REINFORCEMENT NOT SHOWN FOR CLARITY)  
(SCALE 1:30)

1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS MENTIONED OTHERWISE. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.

2. GRADE OF STEEL SHALL BE Fe.460 (H.Y.S.D BAR CONFORMING TO BS).
3. CLEAR COVER TO OUTERMOST REINFORCEMENT SHALL BE AS FOLLOWS:
  - a) FOUNDATION ————— 75mm
  - b) SUBSTRUCTURE (OUTER FACE) ————— 50mm
  - c) SUBSTRUCTURE (EARTH FACE) ————— 75mm
4. GRADE OF CONCRETE --
  - SUB STRUCTURE—C30/19
  - BLINDING CONCRETE—C15/19
5. THE LAP LENGTH FOR ANY REINFORCEMENT SHALL BE CONSIDERED AS GIVEN BELOW D—DIA. OF BAR.

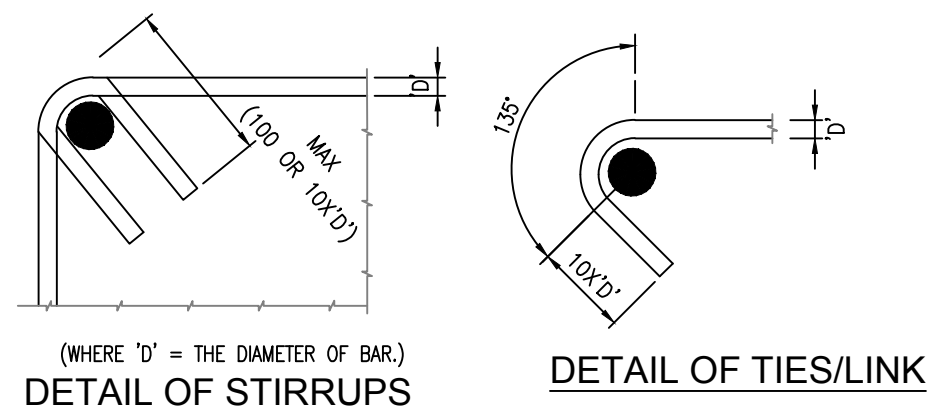
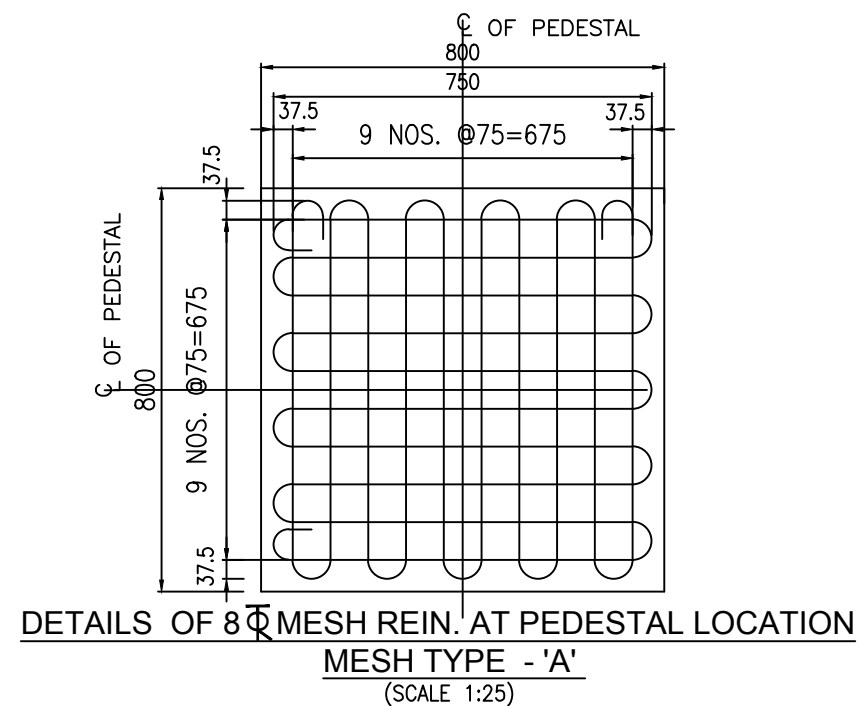
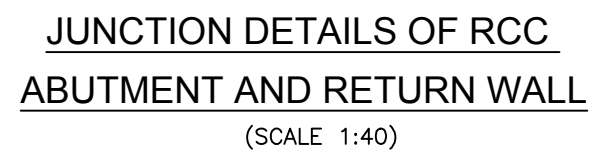
PERCENTAGE OF LAPPED BARS RELATIVE TO TOTAL CROSS-SECTIONAL AREA	<25%	33%	50%	>50%
LAP LENGTH	40d	48d	50d	60d
























LEGEND :

TOP BARS/OUTER FACE SHOWN THUS -----  
 BOTTOM BARS/EARTH FACE SHOWN THUS \_\_\_\_\_

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	SL. No.	BAR MARKING	DIA.	NUMBER/ SPACING	BAR SHAPE	REMARKS
ABUTMENT SHAFT	1	a1	20	150 c/c		
	2	a2	25	150 c/c		
	3	a2a	32	150 c/c		IN 2nd LAYER
	4	a3	20	150 c/c		
	5	a4	20	150 c/c		
	6	a5	12	150 c/c (VERTICALLY)		STAGGERED IN PLAN ON ALT. BARS
	7	a6	25	5 Nos.		EACH SIDE
	8	h1	12	200 c/c		
ABUTMENT CAP	9	c1	12	10 Nos.		EQUAL SPACING
	10	c2		NOT IN USE		
	11	c3	12	9 Nos.		EQUAL SPACING
	12	c4	12	6 Nos.		(EACH FACE)
	13	c5	20	100 c/c		
	14	c6	12	2L-500c/c		IN 2 LAYER
	15	c7	12	1 Nos.		
DIRT WALL	16	d1	20	150 c/c		
	17	d2	12	150 c/c		
	18	d3	12	100 c/c		
	19	d4	12	100 c/c		
	20	d5	12	7 Nos.		
	21	d6	10	400 c/c		IN 3 LAYER PROVIDED IN TOP 400mm.
PEDASTAL						
	22	pd1	16	150 c/c		
	23	pd2	12	150 c/c		
	24	pd3	12	150 c/c		2L-STIRRUP

NOTES:

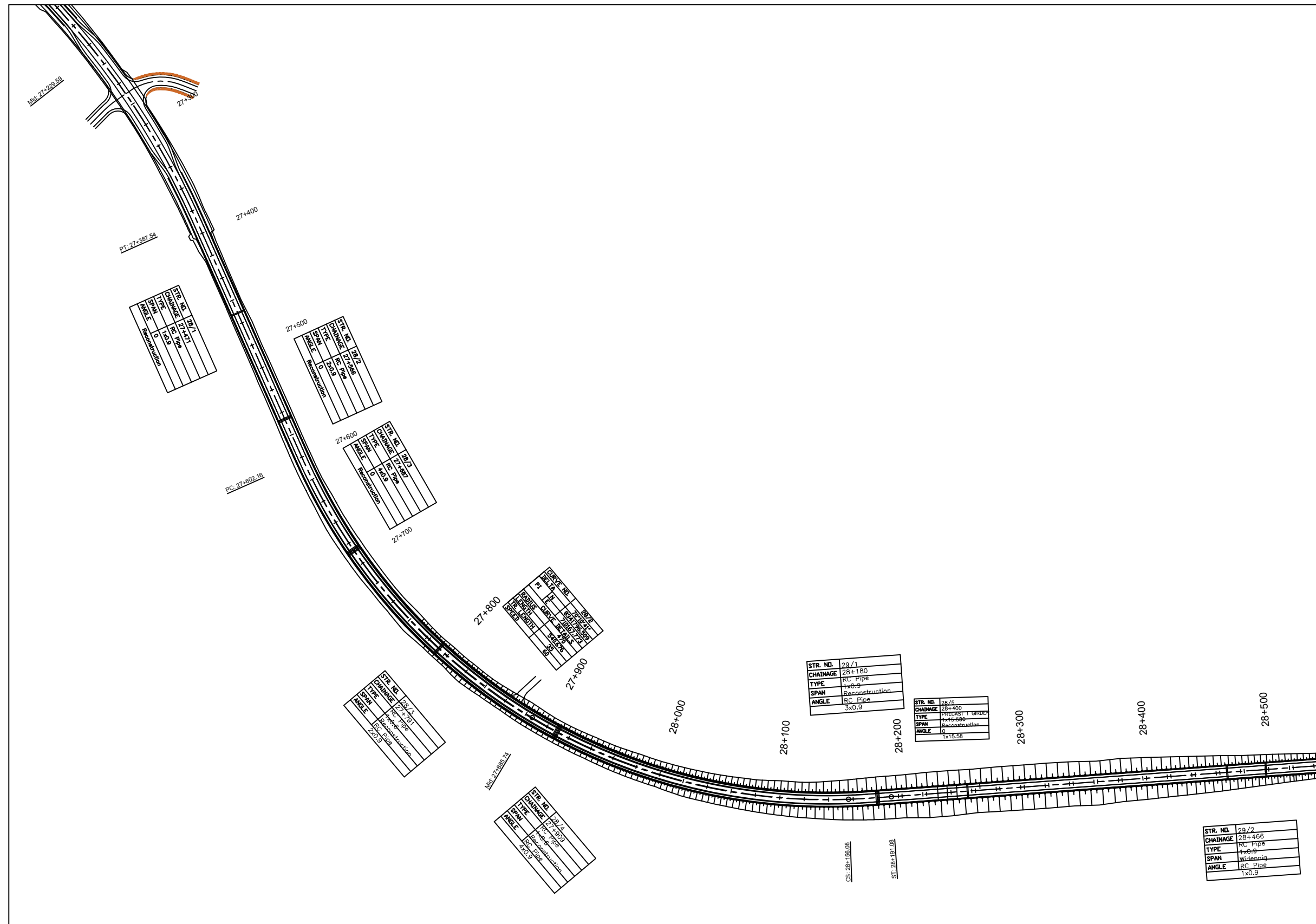
1. ALL DIMENSIONS ARE IN MILLIMETRES, LEVELS ARE IN METRES UNLESS OTHERWISE MENTIONED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
2. GRADE OF CONCRETE FOR SUBSTRUCTURE OF CLASS C30/19  
GRADE OF STEEL Fe 460 AS PER BS  
OF MINIMUM YIELD STRENGTH 460 N/mm<sup>2</sup>.
3. CLEAR COVER TO PIER AND PIER CAP REINFORCEMENT  
SHALL BE 50mm. FOR FOUNDATION COVER WILL BE 75mm.
4. SAFE BEARING CAPACITY SHOULD BE 35t/m<sup>2</sup> WHICH SHALL  
BE VARIED BEFORE START OF WORKS.

REFERENCE DRAWINGS :-

GENERAL NOTES-----80087A\LASA\STR\RA\NCL\GN-01

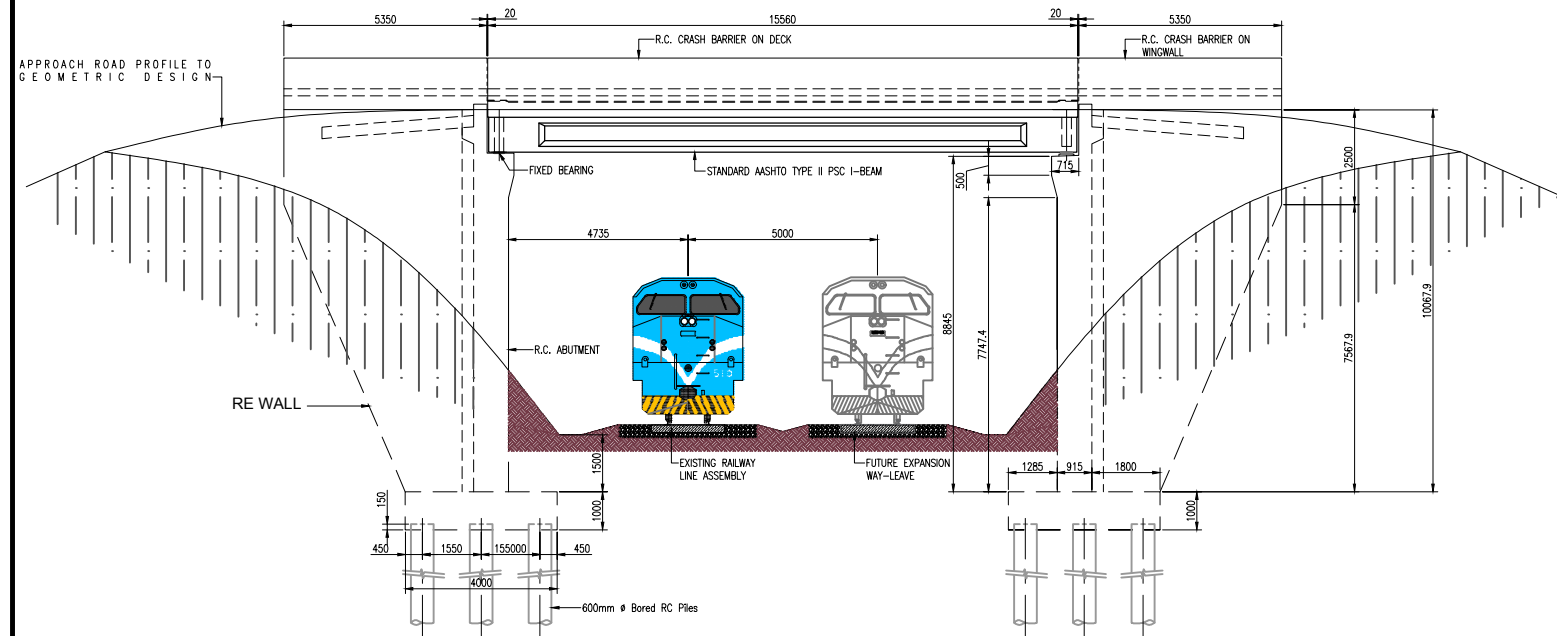
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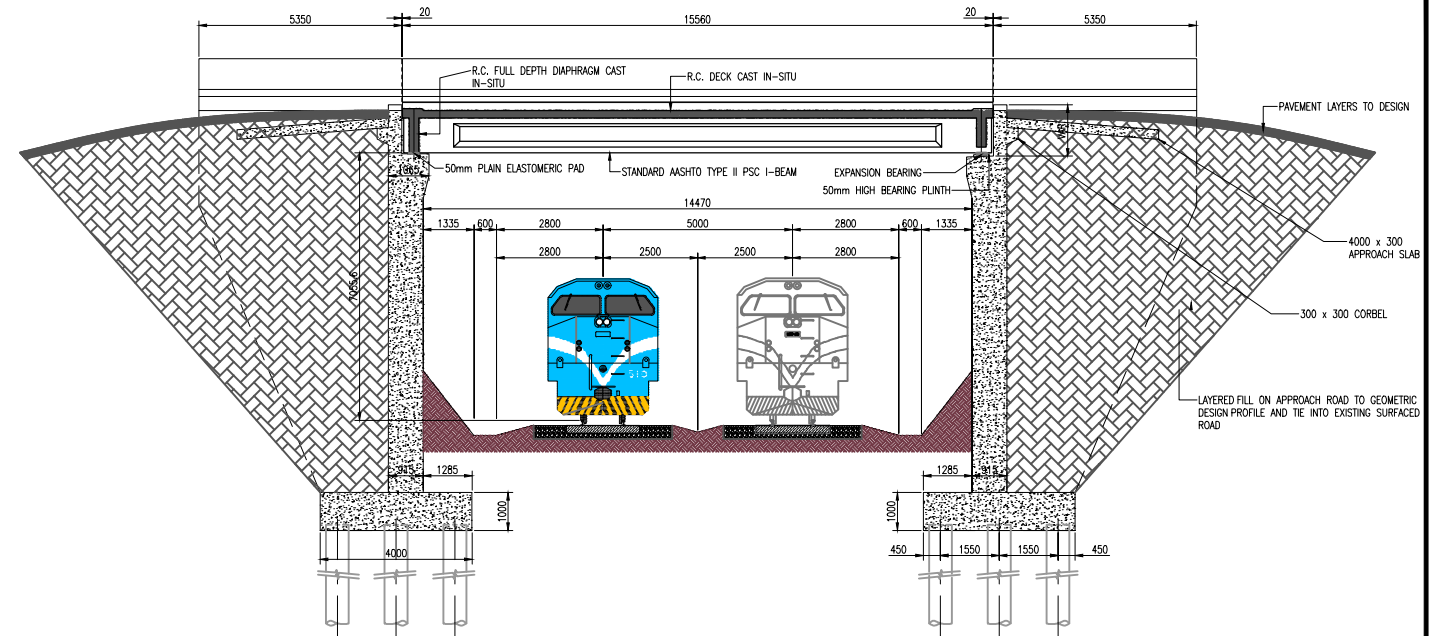


## KEY PLAN

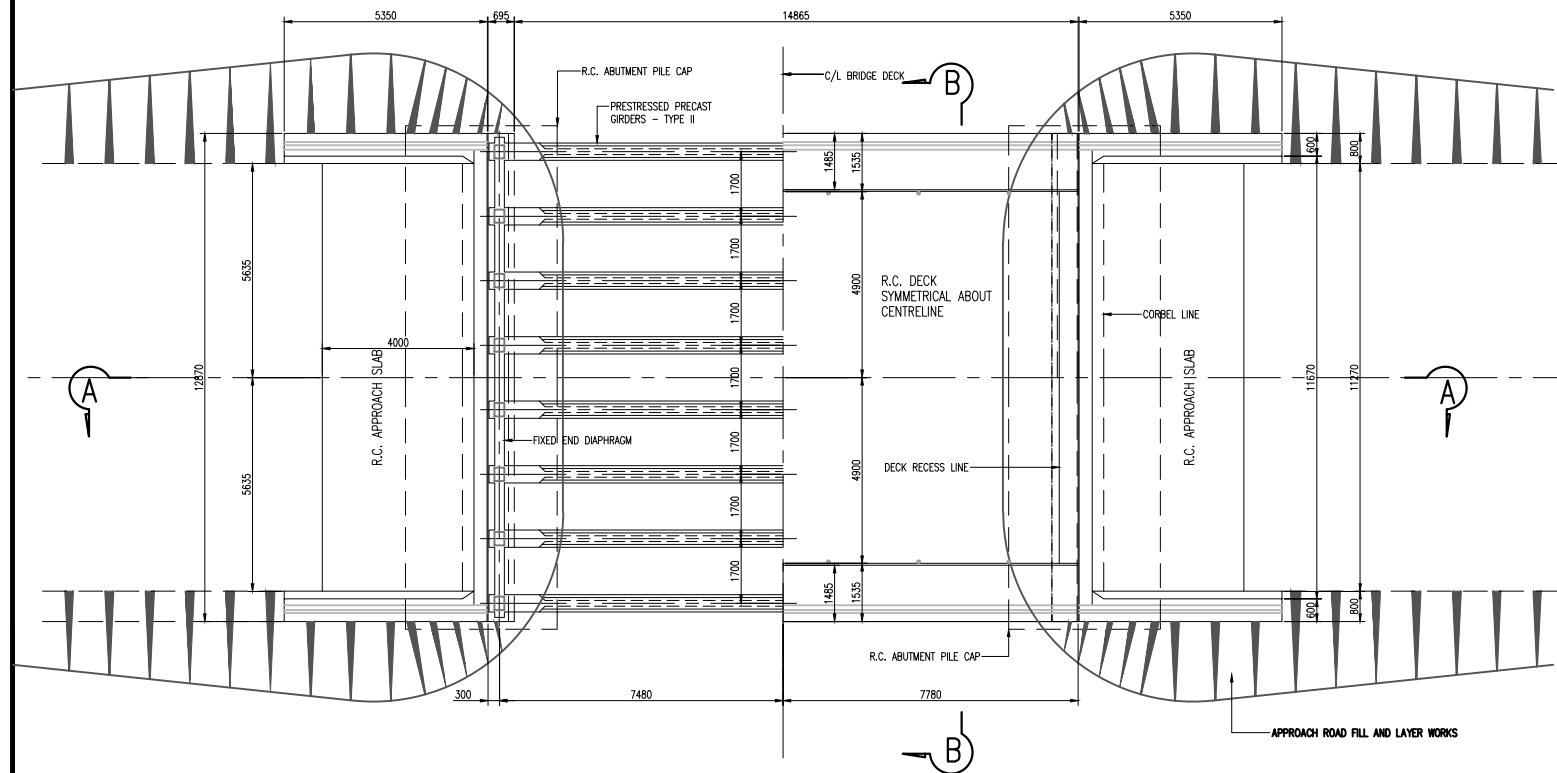
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												DRAWN BY RAJU					
												APPROVED BY R.BHATTACHARYA					
												DATE MAY, 2023		SHEET SIZE A3			
MKD.				DESCRIPTIONS		BY		DATE				DRAWING NO. 80087A/LASA/STR/RAIN/CLIGA-ROB-01		(Sheet 1 OF 3)			
REVISIONS																	



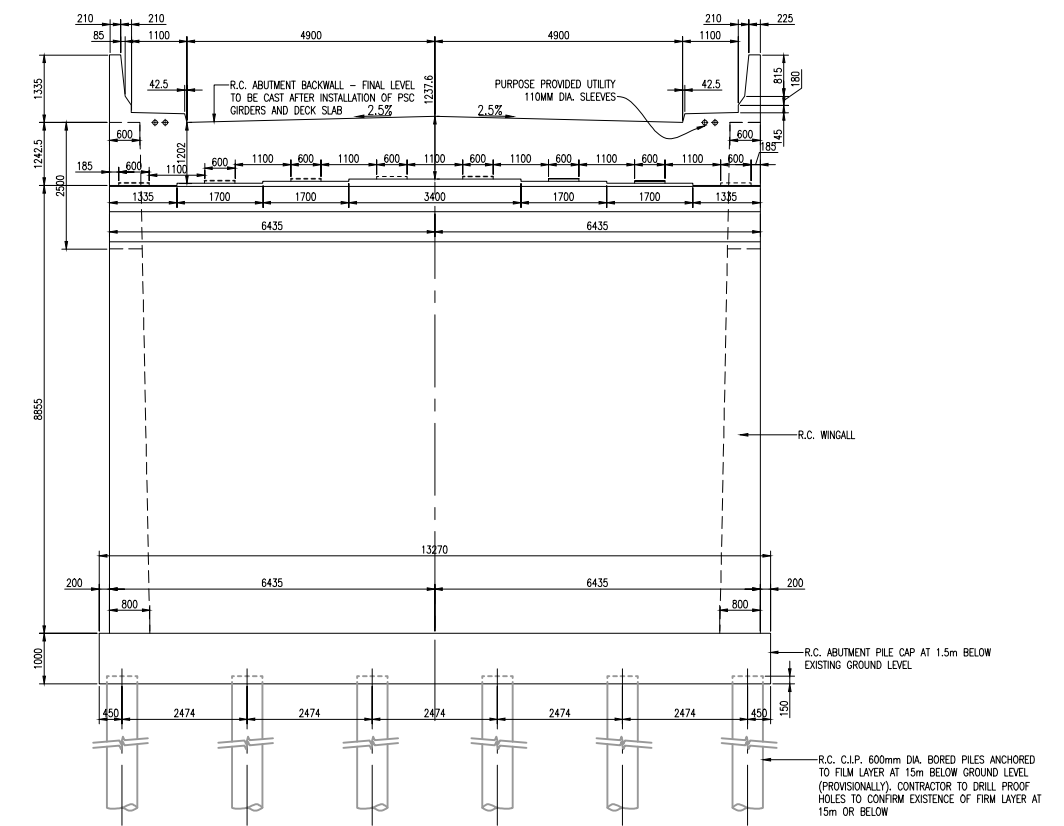
LONGITUDINAL ELEVATION  
SCALE 1:100



SECTION X-X  
SCALE 1:100



PLAN  
SCALE 1:100



ELEVATION ON ABUTMENT  
SCALE 1:75

NO.	DESCRIPTIONS	BY	DATE
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CLIENT:  
**THE ROADS AUTHORITY**  
CHIEF EXECUTIVE OFFICER  
PRIVATE BAG B346  
LILONGWE  
MALAWI



DESIGN CONSULTANT:  
LEA Associates South Asia Pvt Ltd., India  
in association with  
RUO Consulting Engineers Ltd, Malawi

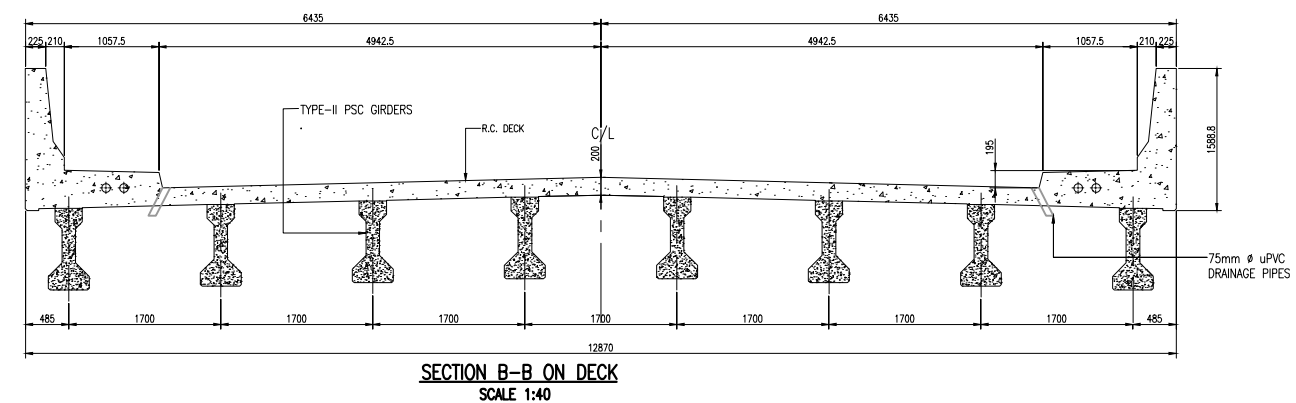
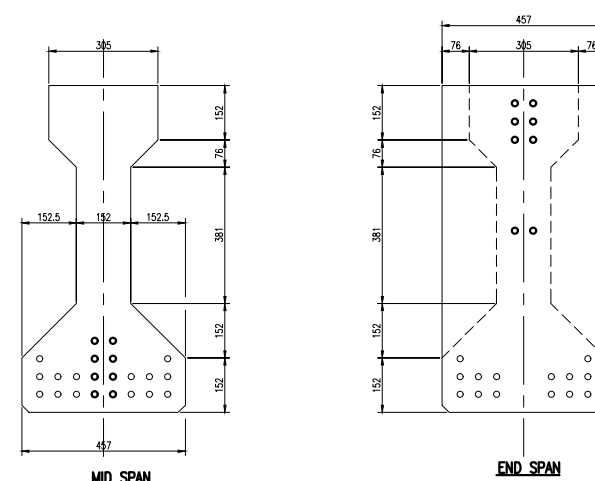
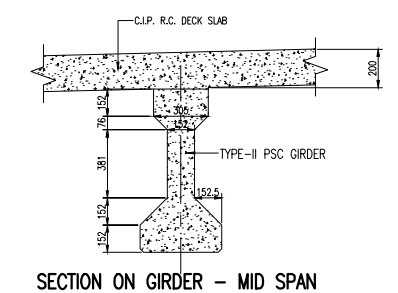
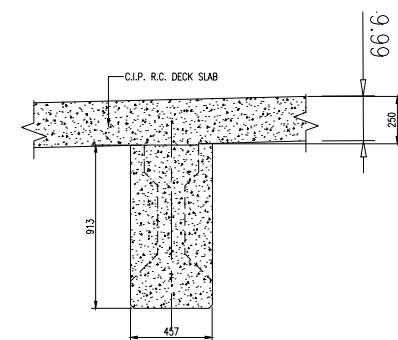
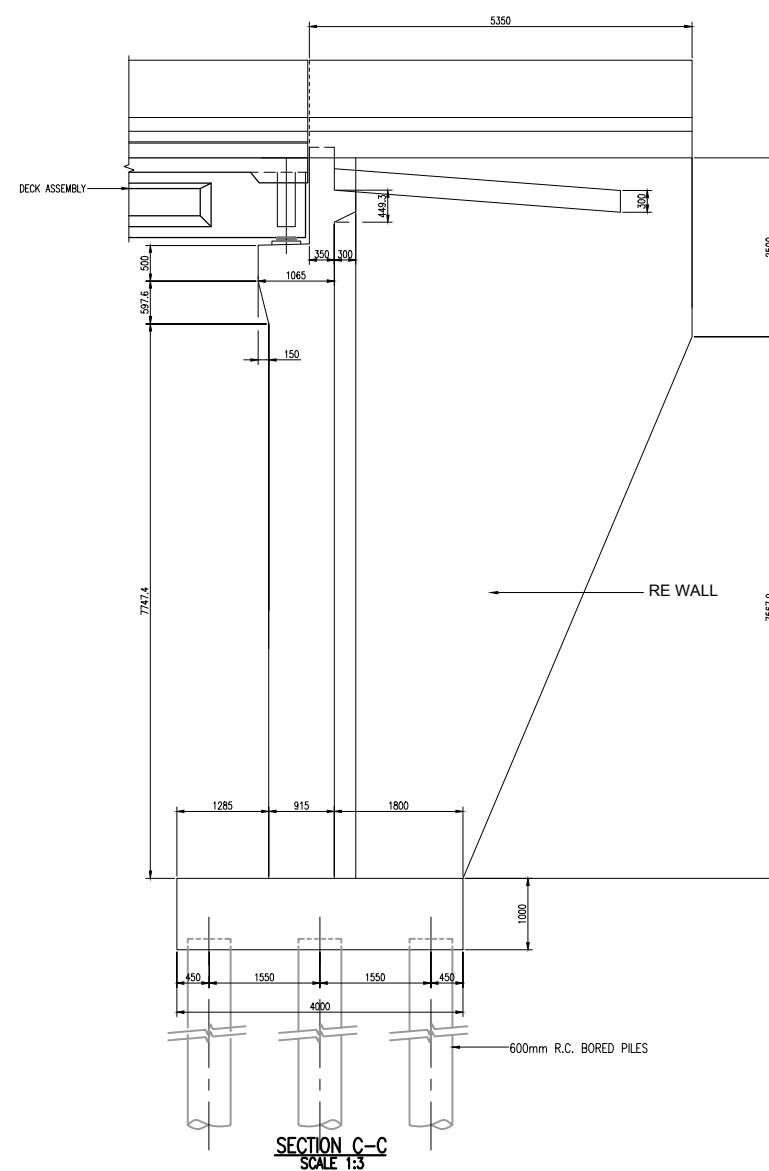
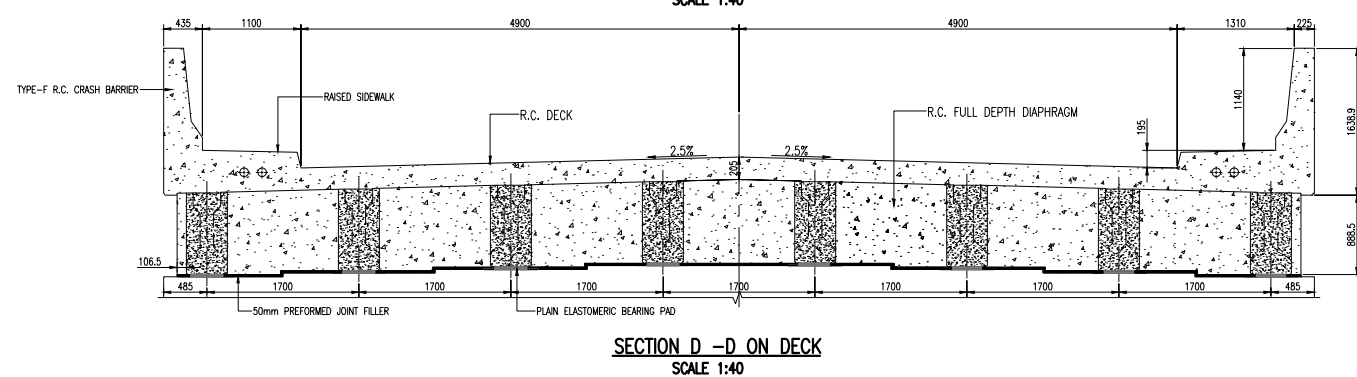
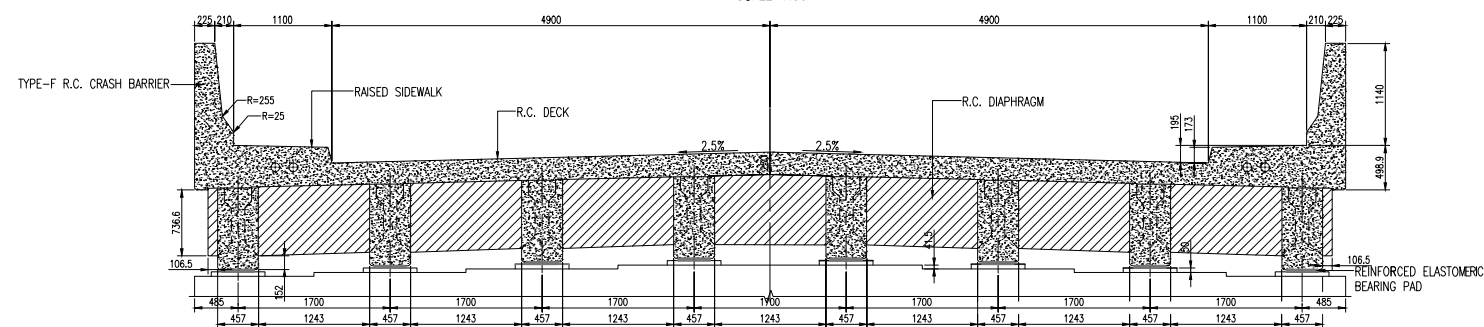
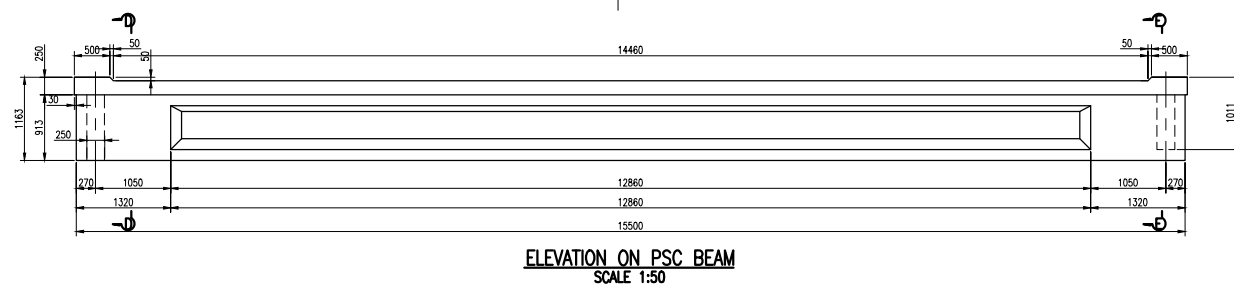
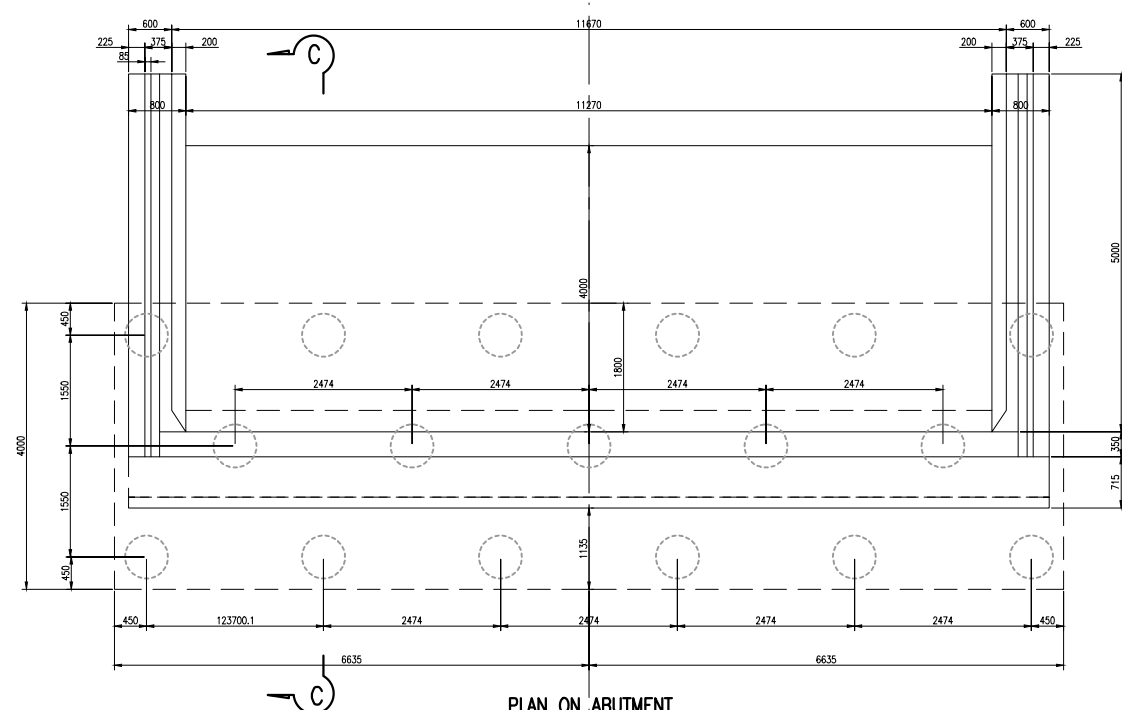


PROJECT:  
CONSULTANCY SERVICES FOR PROVISION  
OF ENGINEERING SERVICES FOR THE DESIGN  
REVIEW FOR THE REHABILITATION OF  
NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD

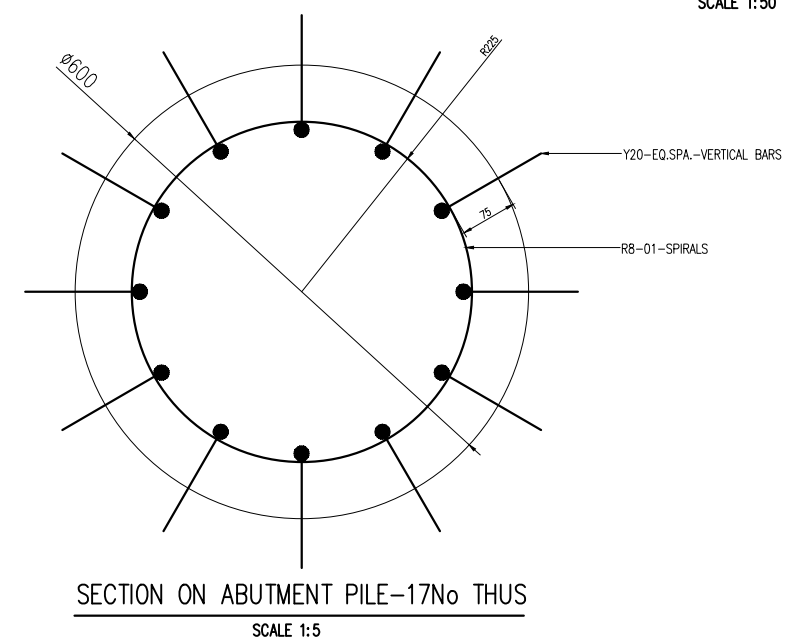
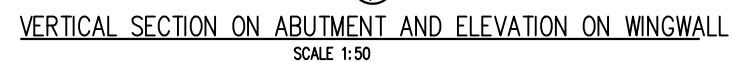
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**GENERAL ARRANGEMENT  
DRAWING OF ROAD OVER  
RAIL BRIDGE AT CH:28+240  
ON M008 IN BALAKA DISTRICT**

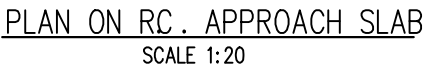
SCALE:  
AS SHOWN

DESIGNED BY	MANGAL	
DRAWN BY	RAJU	
APPROVED BY	R.BHATTACHARYA	
DATE	MAY, 2023	SHEET SIZE A3
DRAWING NO.	80087A/LASA/STR/RAINCL/GA-ROB-01	(Sheet 2 OF 3)

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PRESTRESSING STRANDS  
Furnish material conforming to BS5896 or  
(ASTM A416) - GRADE 1860 LOW-RELAXATION UNCOATED SEVEN-WIRE  
STRANDS. THE STRANDS SHALL BE 12.7mm DIAMETER WITH A TOTAL  
CROSS SECTION AREA OF 98.71 SQ.MM

**CLEARANCE FOR PRETENSIONED STRANDS**

- 1.0 Strands may be bundled in groups consisting 3 vertically, 2 horizontally and separated at the ends
- 2.0 The minimum distance between strand groups or individual strands is 50mm measured between centres on adjacent strands
- 3.0 Approval is required by the Engineer for deviation

**PRESTRESSING**  
 1.0 Straight strand jacking force = 138 kN  
 2.0 Harped strand jacking force = 138 kN

- ABBREVIATIONS  
T - TOP  
B - BOTTOM  
AB - ALTERNATE BARS  
NF - NEAR FACE  
FF - FAR FACE  
EF - EACH FACE  
STGD- STAGGERED  
EQ.SPA.- EQUAL SPACING

MINIMUM LAP SPLICES FOR REINFORCING STEEL IN I-BEAMS DECKS,  
ABUTMENTS, WINGWALLS AND DIAPHRAGMS SHALL BE:

600mm	for 12mm bars
800mm	for 16mm bars
1000mm	for 20mm bars
1250mm	for 25mm bars

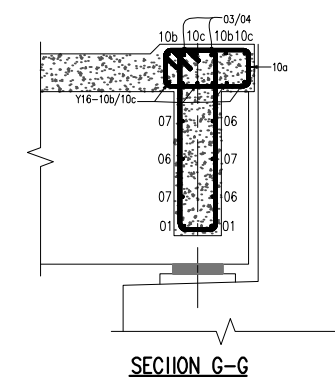
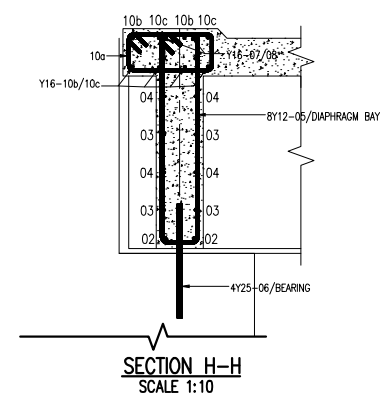
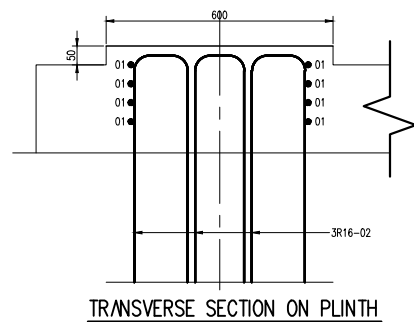
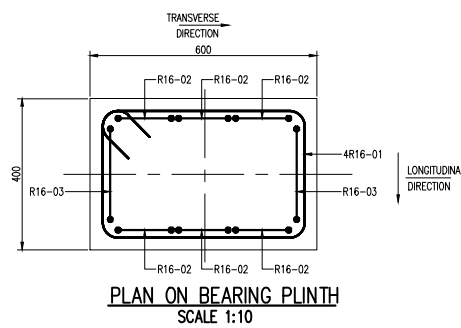
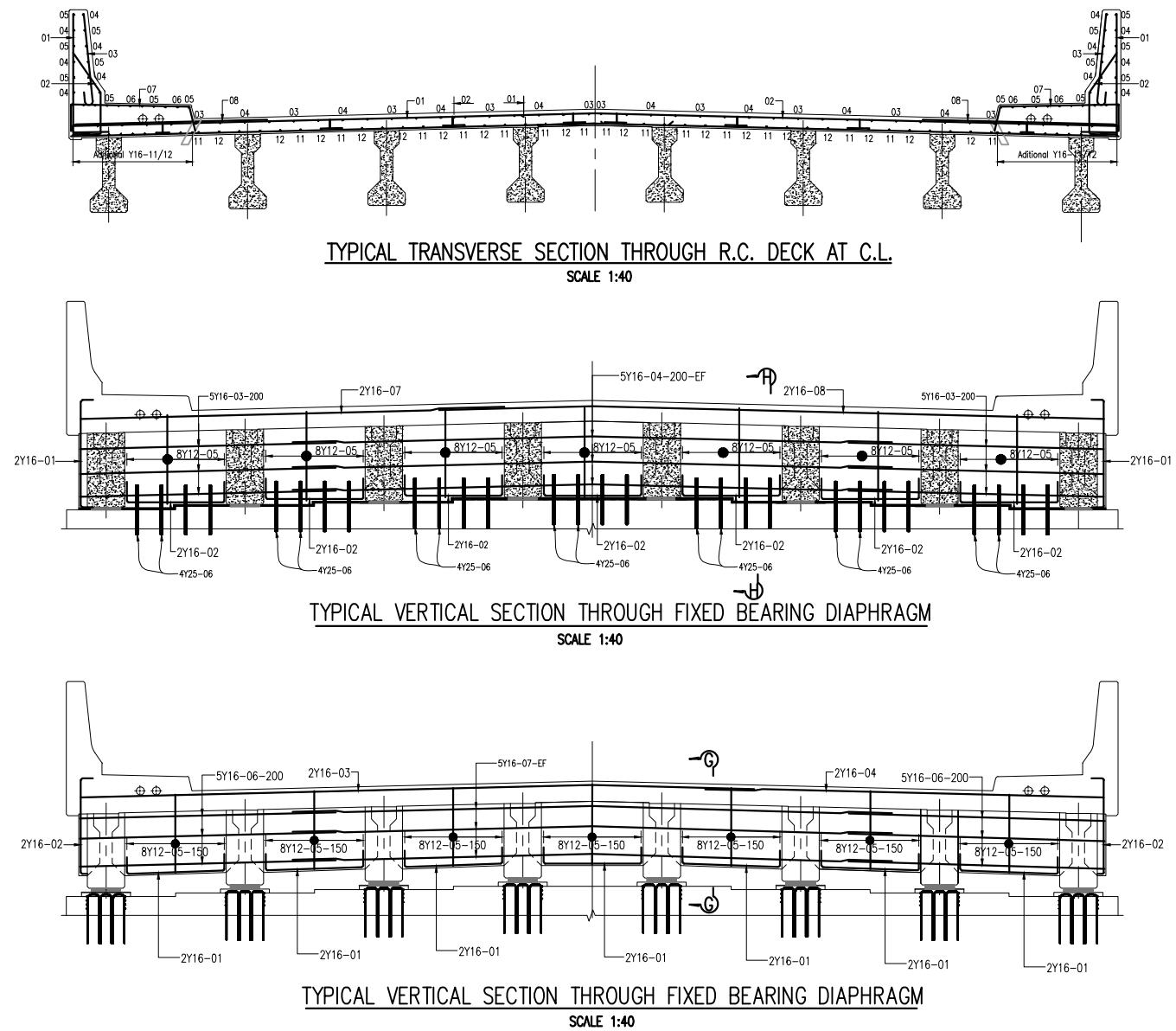
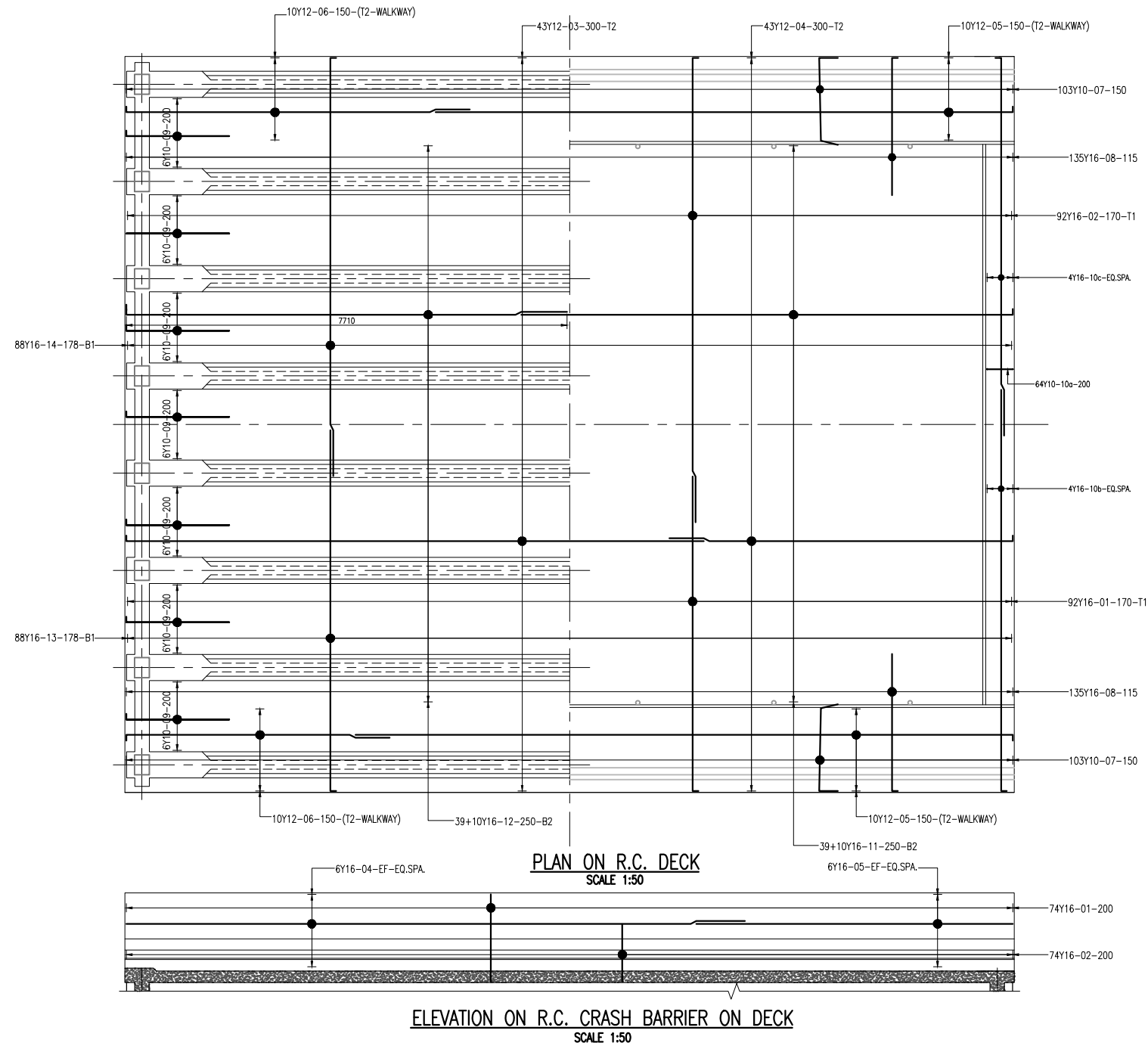
REINFORCING STEEL - Min YIELD STRENGTH 420 MPa

REINFORCED CONCRETE PILES

- 1.0 PILES SHALL BE 508mm DIA. BSP ENCASED PILES
- 2.0 WORKING LOAD PER PILE = 80 Ton
- 3.0 THE VERTICAL PILE TEST LOAD SHALL BE 100 Ton
- 4.0 THE VERTICAL PILE TEST LOAD SHALL BE APPLIED IN EIGHT INCREMENTS. FOUR INCREMENTS TO THE WORKING LOAD AND A FURTHER FOUR INCREMENTS TO THE TEST LOAD
- 5.0 THE SETTLEMENT AT THE HEAD OF THE TEST PILE UNDER WORKING LOAD SHALL NOT EXCEED 5mm AND AFTER APPLICATION AND REMOVAL OF THE TEST LOAD SHALL NOT EXCEED 5mm

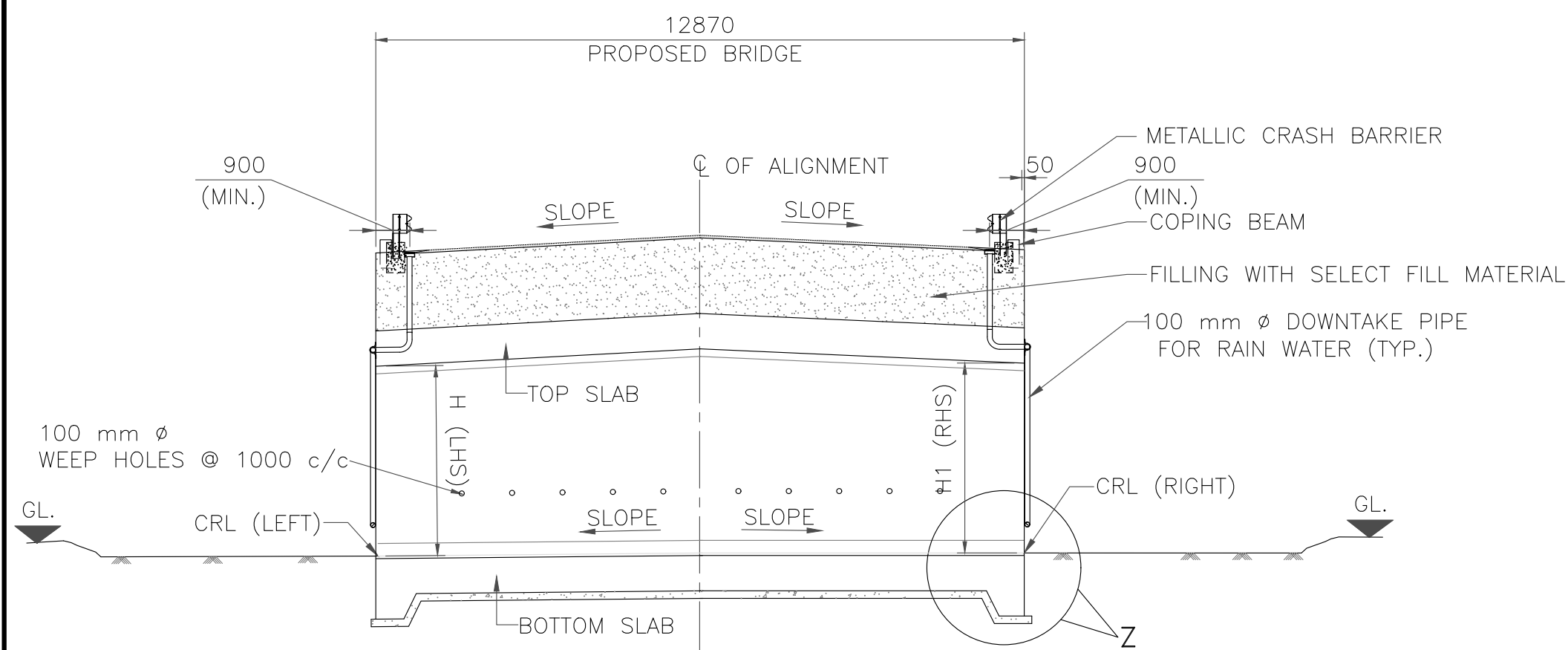
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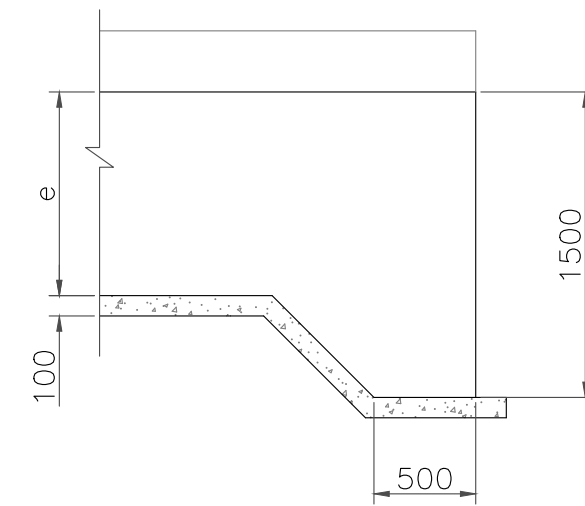
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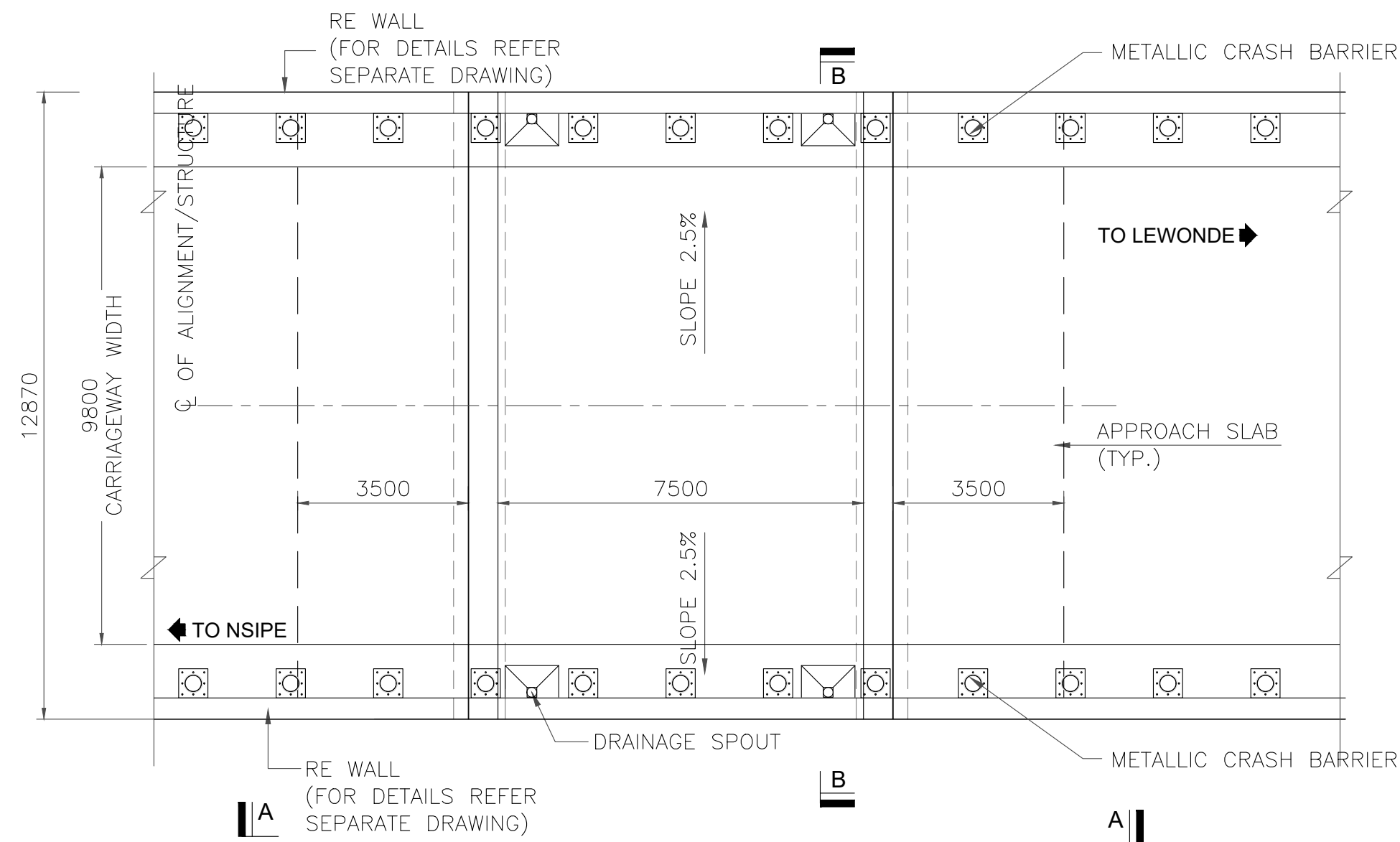


**SECTION B-B**  
(SCALE 1:150)

# 20mm EXP. GAP FILLED BY COMPRESSIBLE FIBRE BOARD WITH POLYSULPHIDE SEALANT.



**DETAIL - Z**



**PLAN**  
(SCALE 1:150)

**TABLE-1 : PROPOSED DETAILS OF UNDERPASS**

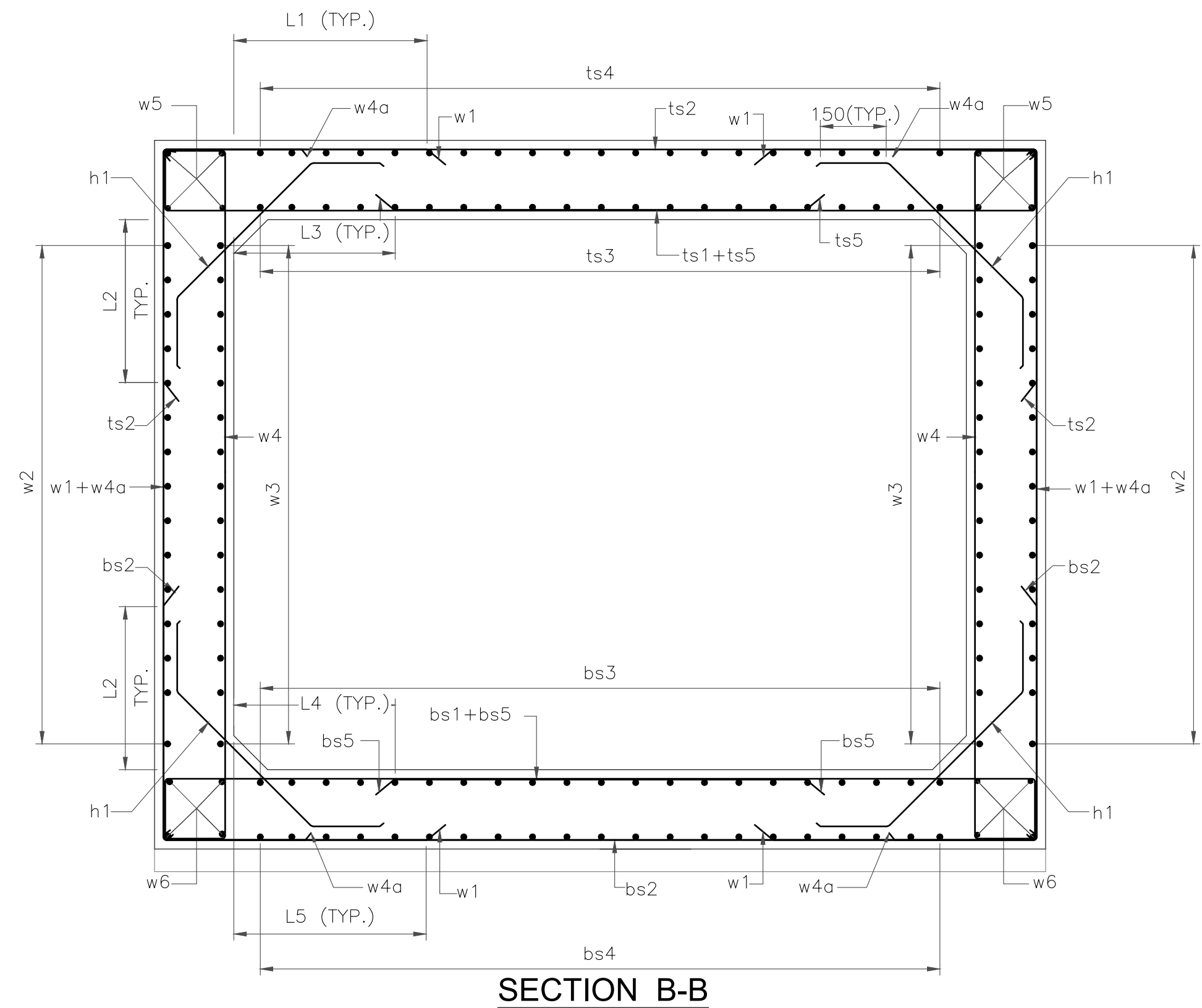
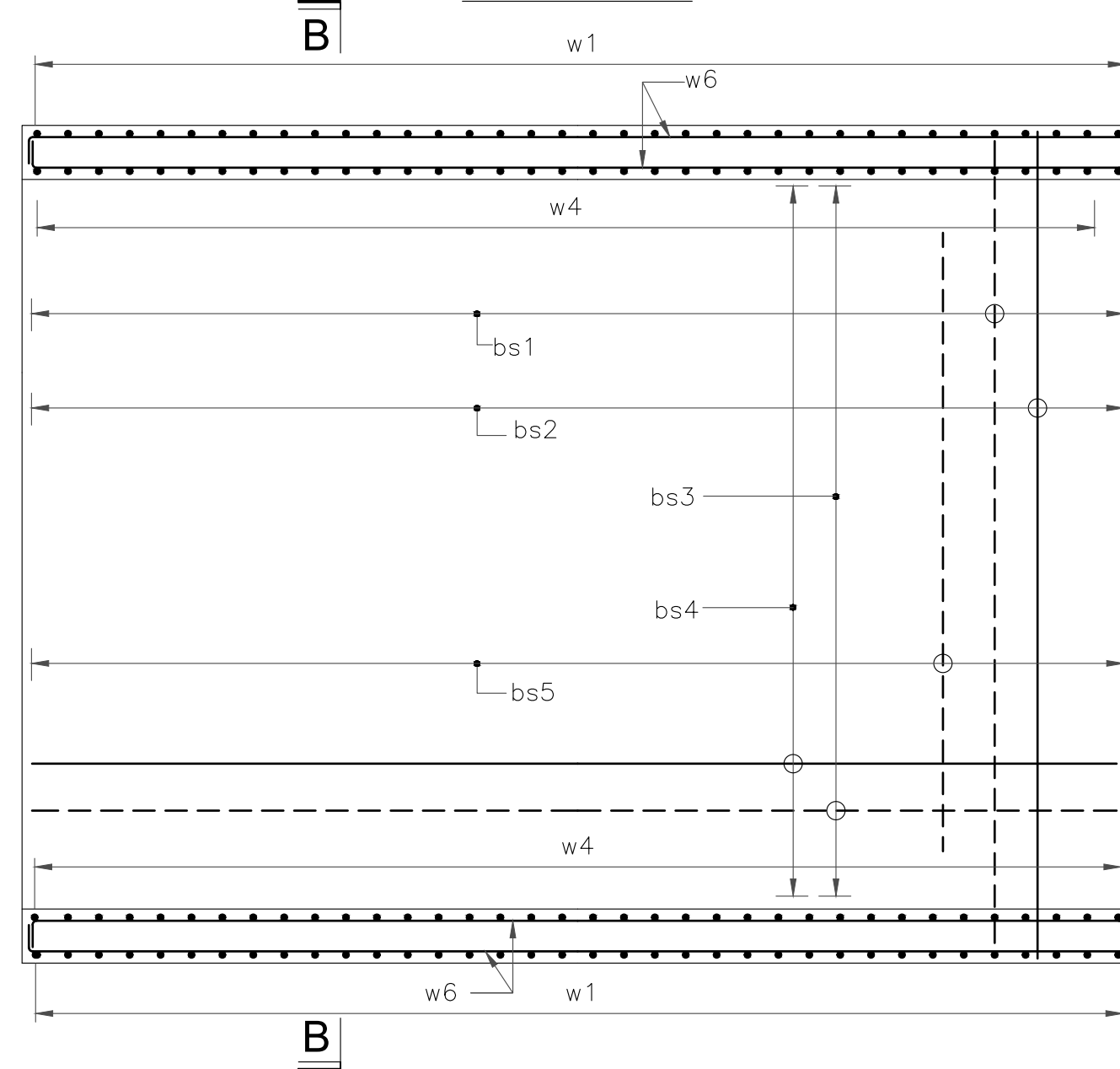
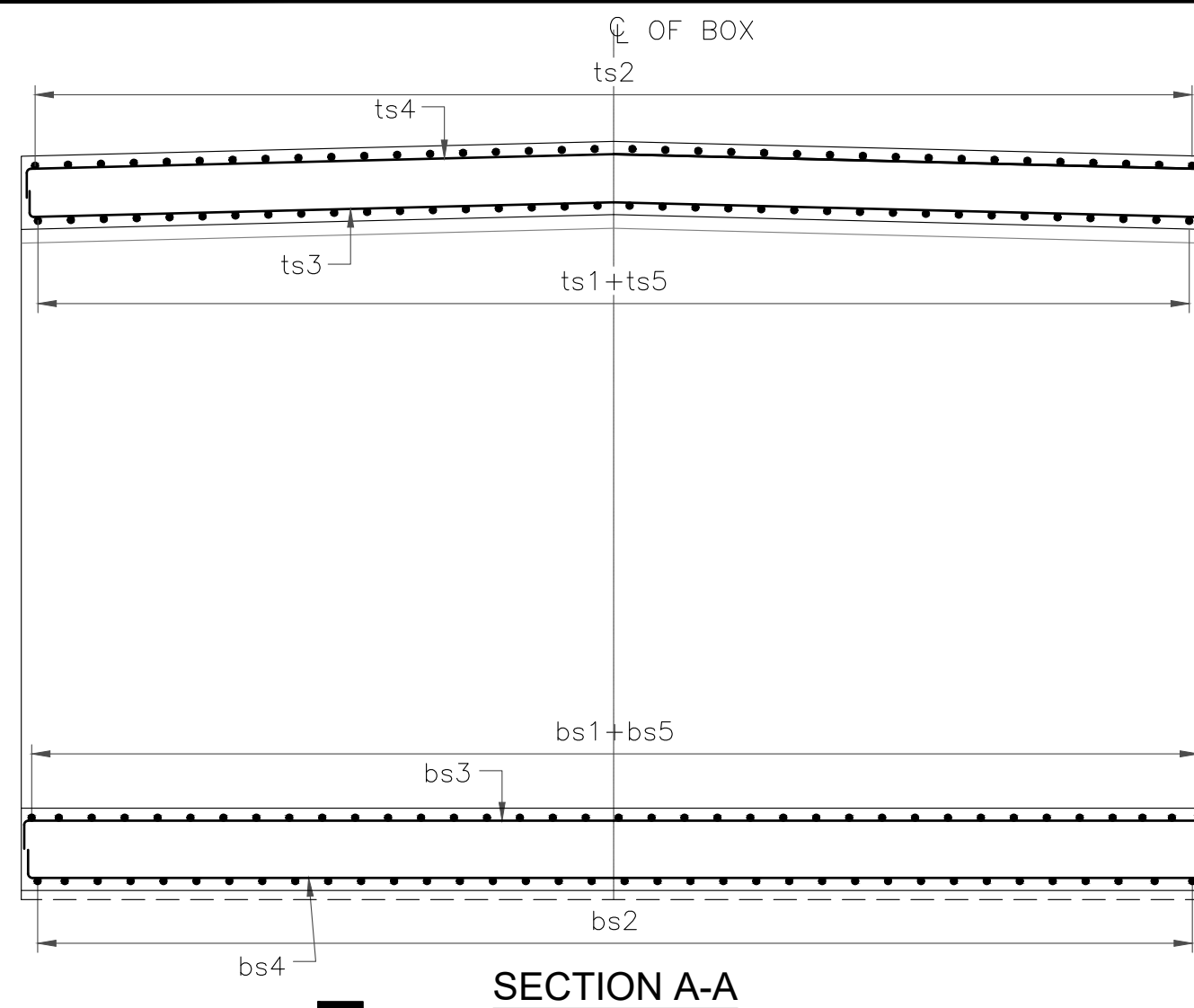
CHAINAGE	FRL	CROSS ROAD LEVEL	CLEAR SPAN	CLEAR HEIGHT
(KM)	(m)	(m)	(mm)	(mm)
28+215.50	641.026	633.176	7500	5500
28+323.75	641.063	633.176	7500	5500

**NOTES:**

- ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
- DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
- THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SHEET 2 OF 2 OF THIS DRAWING.

				CLIENT: <b>THE ROADS AUTHORITY</b> CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI	DESIGN CONSULTANT: LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi	PROJECT: CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD	DRAWING TITLE: <b>TYPICAL GENERAL ARRANGEMENT DRAWING OF VEHICULAR UNDERPASS</b> 1x7.5x5.5m	SCALE: AS SHOWN	DESIGNED BY MANGAL	
									DRAWN BY RAJU	
									APPROVED BY R.BHATTACHARYA	
									DATE MAY, 2023	SHEET SIZE A3
									DRAWING NO. 80087A\LASA\STR\RAINCL\VUP\GA-01	(Sheet 1 OF 2)








LEGENDS:-

TOP FACE BAR SHOWN THUS 




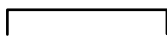








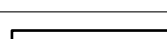





BOTTOM FACE BAR SHOWN THUS \_\_\_\_\_

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS AND LEVELS ARE IN METERS UNLESS OTHERWISE SPECIFIED.
2. DIMENSIONS ARE NOT TO BE SCALED. ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED.
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH SHEET 2 OF 2 OF THIS DRAWING.

				CLIENT: <div>THE ROADS AUTHORITY</div> <div>CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI</div> <div></div>		DESIGN CONSULTANT: <div>LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi</div> <div> </div>		PROJECT: <div>CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD</div>		DRAWING TITLE: <div>TYPICAL REINFORCEMENT DETAIL OF VEHICULAR UNDERPASS</div>		SCALE: <div>AS SHOWN</div>		DESIGNED BY MANGAL			
												DRAWN BY RAJU					
												APPROVED BY R.BHATTACHARYA					
												DATE MAY, 2023		SHEET SIZE A3			
												DRAWING NO.		80087A/LASA/STR/R/INCL/VUP/REINF-01 <div>1(Sheet 1 OF 2)</div>			
MKD.				DESCRIPTIONS				BY				DATE					
REVISIONS																	



SL. NO.	BAR MARK	DESCRIPTION	BAR SHAPE	REMARKS
1	ts1	Y25 @ 150 c/c		EQUAL SPACING
2	ts2	Y25 @ 150 c/c		
3	ts3	Y16 @ 150 c/c		
4	ts4	Y16 @ 150 c/c		
5	ts5	Y20 @ 150 c/c		
6	w1	Y32 @ 150 c/c		
7	w2	Y16 @ 150 c/c		
8	w3	Y16 @ 150 c/c		
9	w4	Y20 @ 150 c/c		
10	w4a	Y20 @ 150 c/c		
11	w5	4 NOS.-Y10		
12	w6	4 NOS.-Y10		
13	bs1	Y20 @ 200 c/c		
14	bs2	Y20 @ 200 c/c		
15	bs3	Y20 @ 200 c/c		
16	bs4	Y20 @ 200 c/c		
17	bs5	Y25 @ 200 c/c		
18	h1	Y10 @ 200 c/c		
19	L1	2250 mm.		
20	L2	1650 mm.		
21	L3	1125 mm.		
22	L4	1125 mm.		
23	L5	2250 mm.		

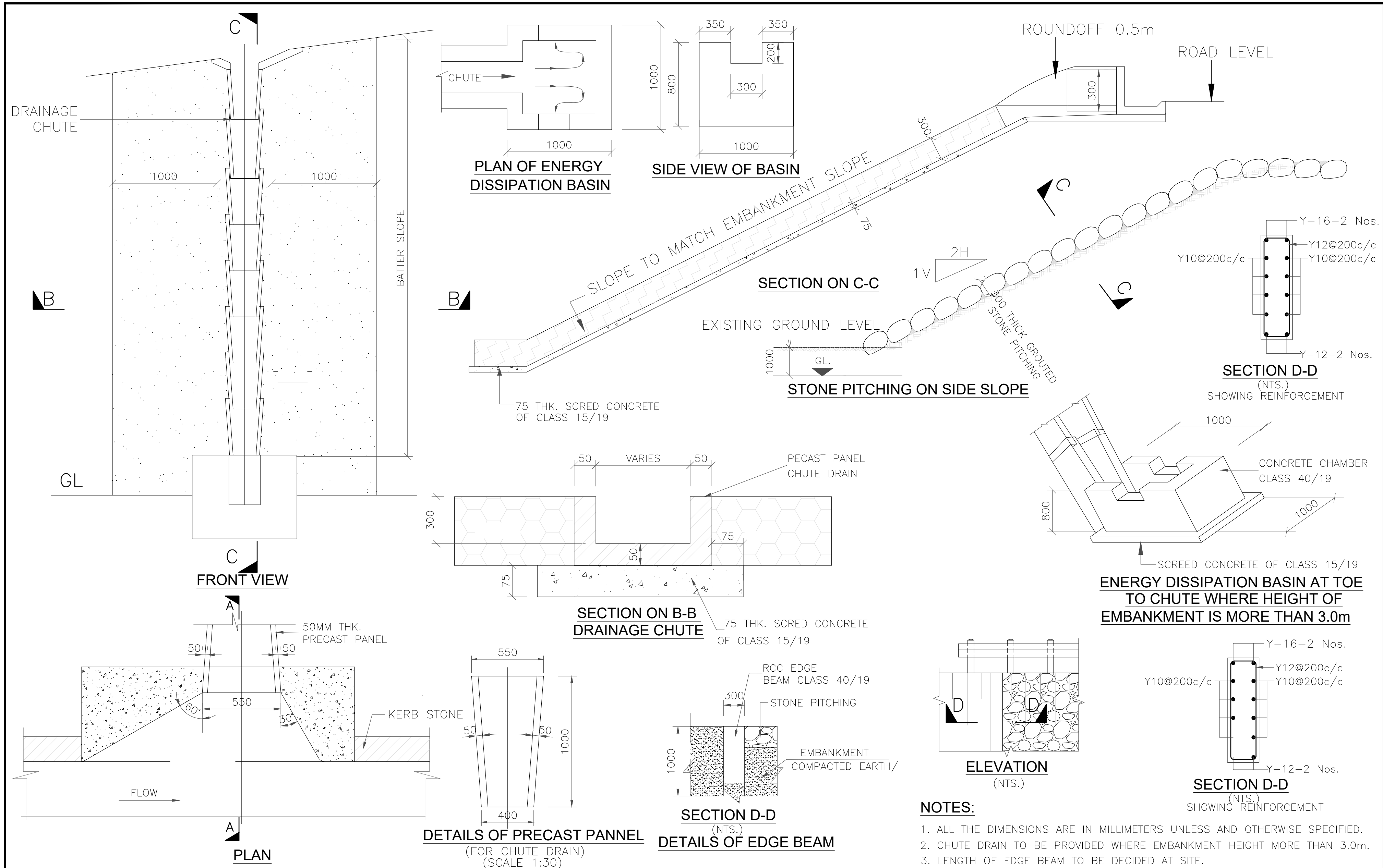
1. ALL DIMENSION ARE IN MM AND LEVELS ARE IN METERS UNLESS MENTIONED OTHERWISE.  
ONLY WRITTEN DIMENSION TO BE FOLLOWED.
2. REINFORCEMENT SHALL BE OF H.Y.S.D. BARS (TMT) OF  
460 N/mm<sup>2</sup>, UNLESS NOTED OTHERWISE.
3. THE GRADE OF CONCRETE FOR BOX CULVERT INCLUDING WING WALL, CURTAIN WALL,  
HEAD WALL ETC., SHALL BE CLASS 40/19, UNLESS NOTED OTHERWISE.
4. LAPS SHALL BE STAGGERED AND SUITABLY PLACED. NOT MORE THAN 50% OF ANY REINFORCEMENT  
SHALL BE LAPPED AT ANY SECTION.
5. ALL MAIN REINFORCEMENT SHALL BE FULLY ANCHORED ON BOTH SIDE
6. CONCRETE COVER FOR REINFORCEMENT SHALL BE AS FOLLOWS:
  - FOR TOP SLAB 40mm (BOTH FACE)
  - FOR SIDE WALL 50mm (BOTH FACE)
  - FOR BOTTOM SLAB 50mm (TOP FACE)  
75mm (BOTTOM FACE)

TOP FACE BAR SHOWN THUS 

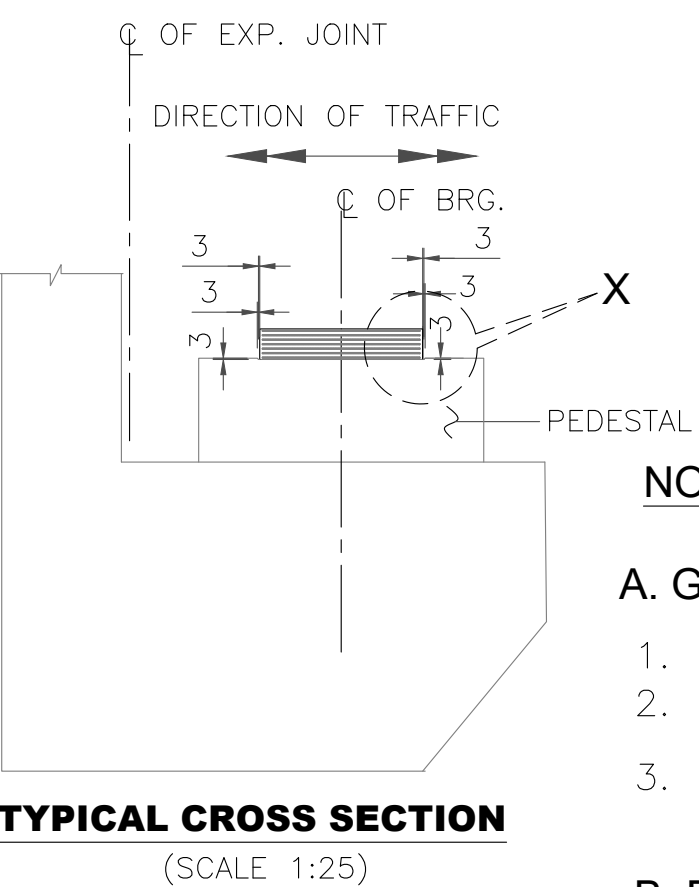
BOTTOM FACE BAR SHOWN THUS 

[illegible]





				CLIENT: <b>THE ROADS AUTHORITY</b>		DESIGN CONSULTANT: <b>LEA Associates South Asia Pvt Ltd., India</b>		PROJECT: <b>CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD</b>		DRAWING TITLE: <b>CHUTE DRAIN AND EDGE BEAM DETAILS</b>		SCALE: <b>AS SHOWN</b>		DESIGNED BY: <b>MANGAL</b>	
				CHIEF EXECUTIVE OFFICER		in association with <b>RUO Consulting Engineers Ltd, Malawi</b>								DRAWN BY: <b>RAJU</b>	
				PRIVATE BAG B346										APPROVED BY: <b>R.BHATTACHARYA</b>	
				LILONGWE										DATE: <b>MAY, 2023</b>	SHEET SIZE <b>A3</b>
				MALAWI										DRAWING NO. <b>80087A/LASA/STR/RA/NCL/CHUTEMISC-01</b>	(Sheet 1 OF 1)
REVISIONS															
MKD.	DESCRIPTIONS	BY	DATE												

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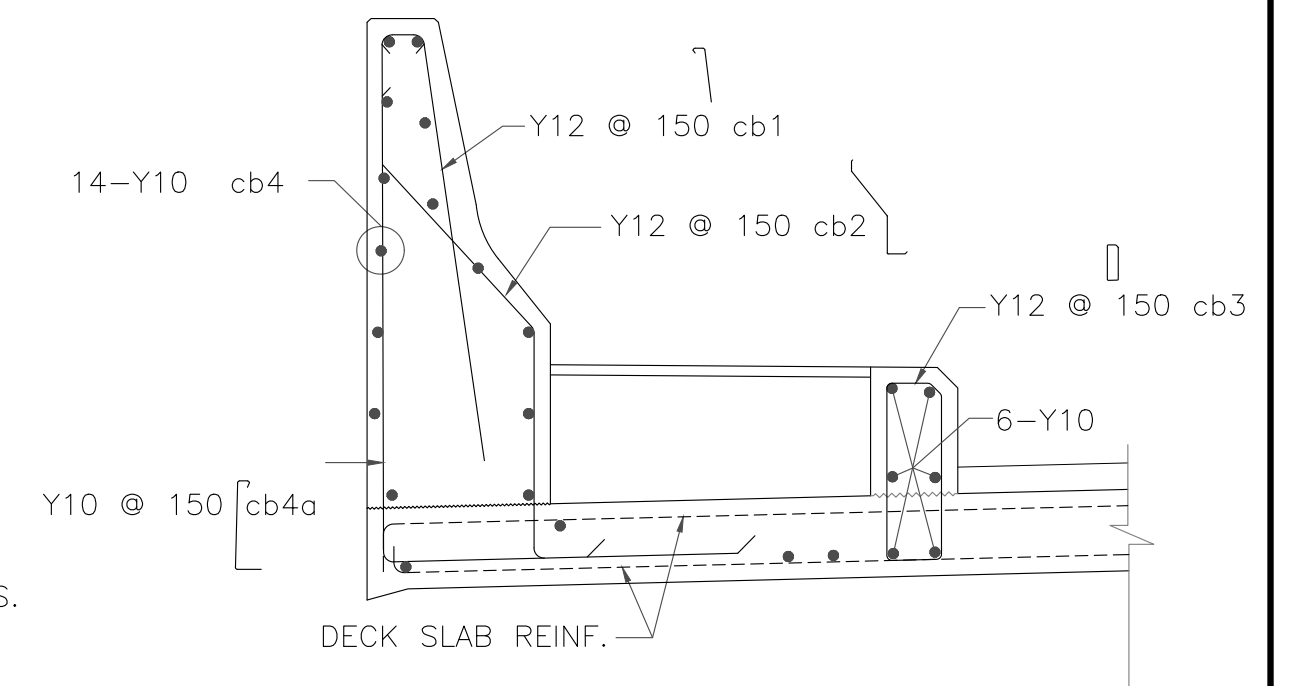
(SCALE— 1:75)



(SCALE- 1:50)

**TYPICAL CROSS SECTION SHOWING STRIP SEAL**  
**TYPE EXPANSION JOINT ARRANGEMENT**

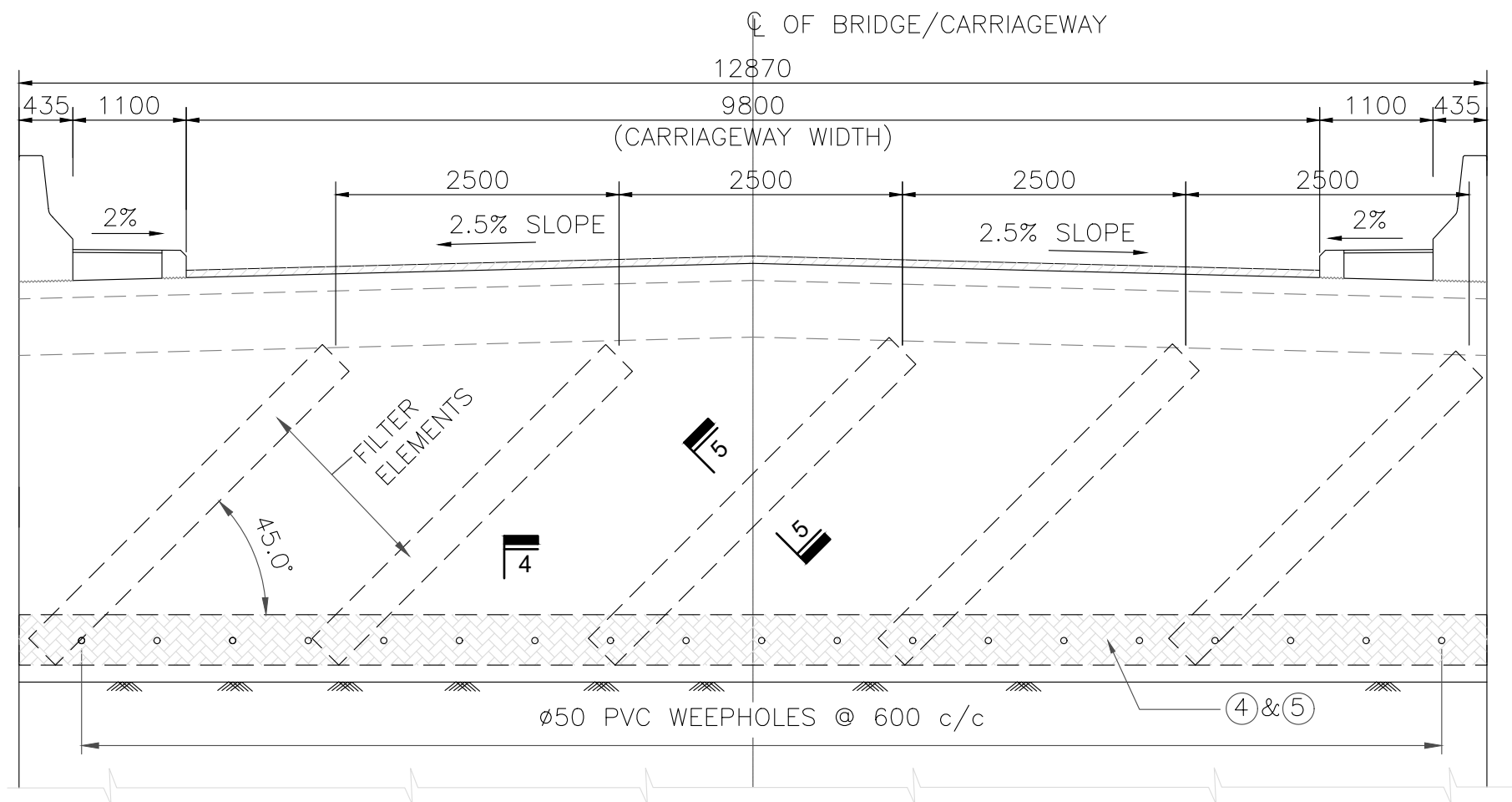
### DIMENSION & REINFORCEMENT DETAIL OF

(SCALE 1:25)



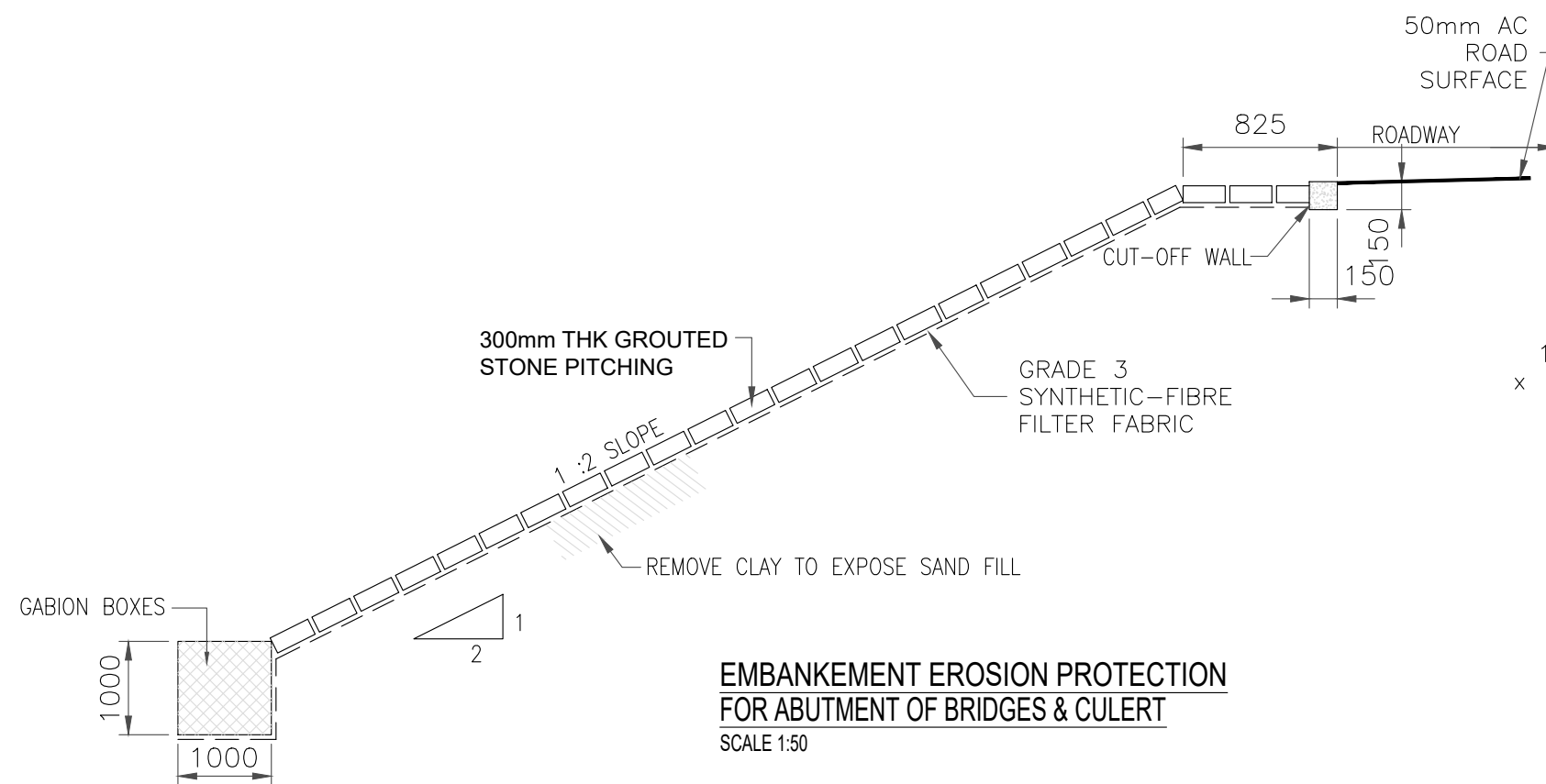
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				CHIEF EXECUTIVE OFFICER				LEA Associates South Asia Pvt Ltd., India				CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DETAILS OF JOCKEY SLAB AND RCC PARAPET AND EXPANSION JOINT		AS SHOWN		DRAWN BY		RAJU			
				PRIVATE BAG B346				in association with										APPROVED BY		R.BHATTACHARYA			
				LILONGWE				RUO Consulting Engineers Ltd, Malawi										DATE		MAY, 2023		SHEET SIZE A3	
MKD.				DESCRIPTIONS		BY		DATE															
REVISIONS																							



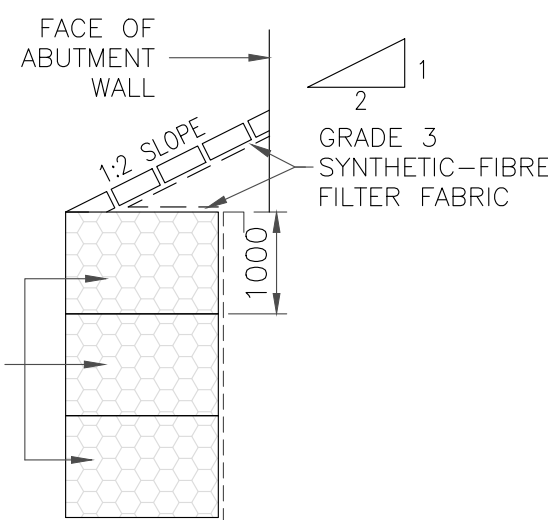


**TYPICAL DRAINAGE DETAIL AT ABUTMENT**

(SCALE 1:75)



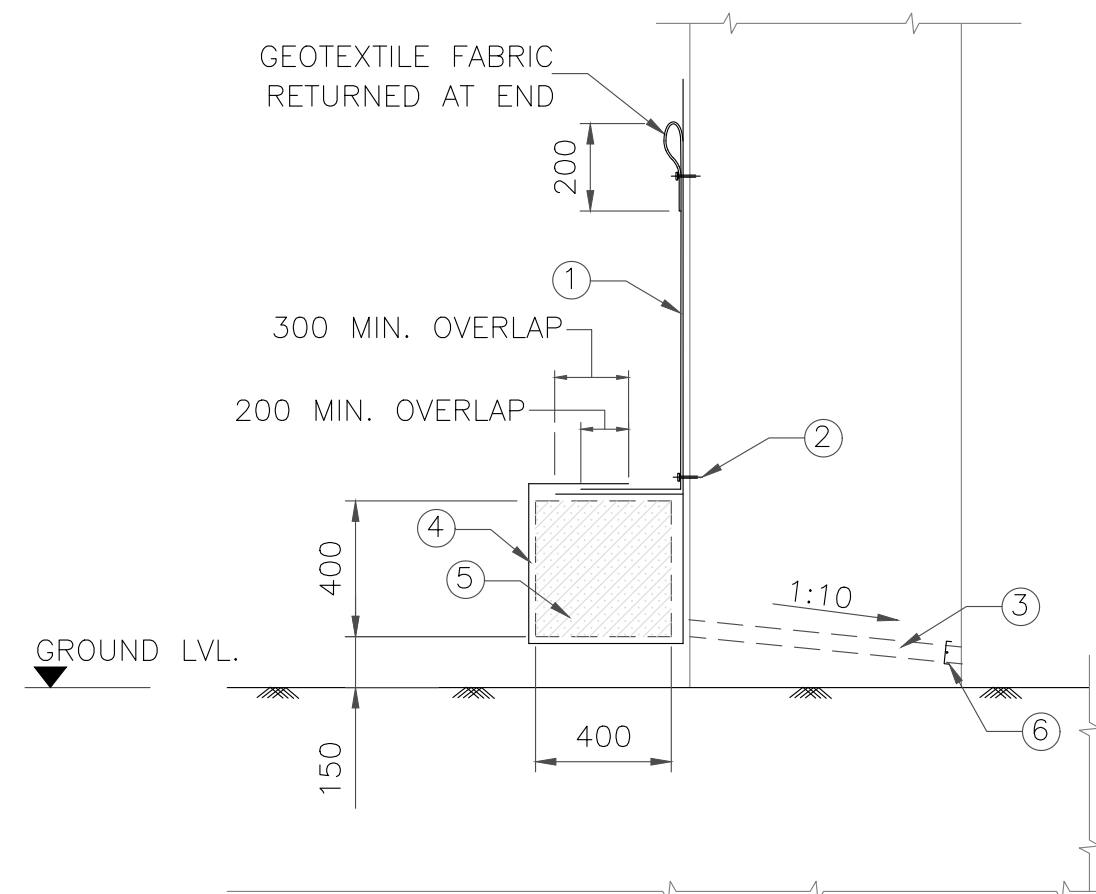
**EMBANKMENT EROSION PROTECTION FOR ABUTMENT OF BRIDGES & CULERT**  
SCALE 1:50



**EROSION PROTECTION FOR ABUTMENT OF BRIDGES**  
SCALE 1:50

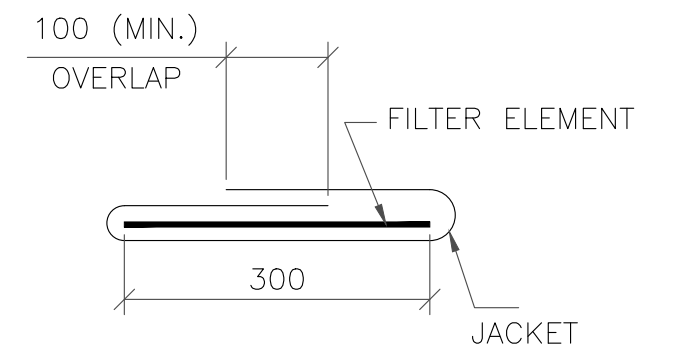
**NOTES :-**

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. DIMENSIONS ARE NOT TO BE SCALED, ONLY WRITTEN DIMENSIONS
3. FOR ALL OTHER NOTES REFER 'GENERAL NOTES' DRAWING. SHALL BE FOLLOWED.



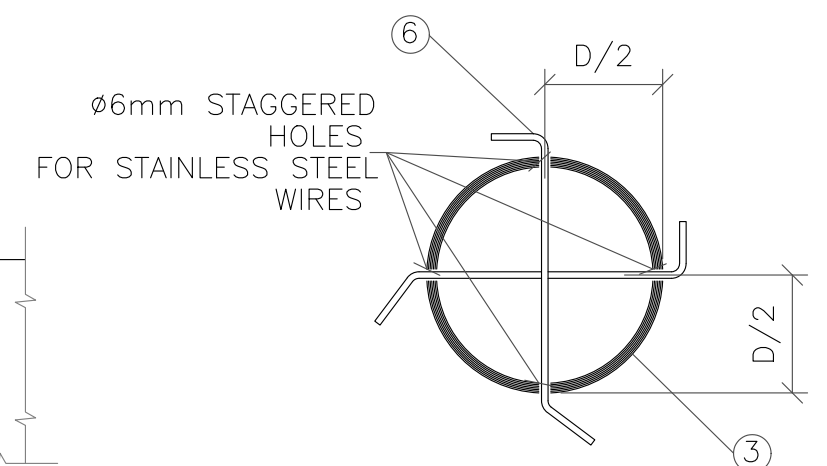
**SECTION 4 - 4**

(SCALE 1:30)



**SECTION 5 - 5**

(SCALE 1:10)



**SECTION THROUGH WEEPHOLES**

(N.T.S)

**LEGEND :**

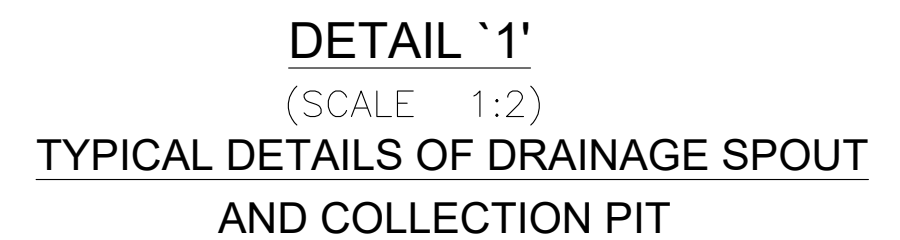
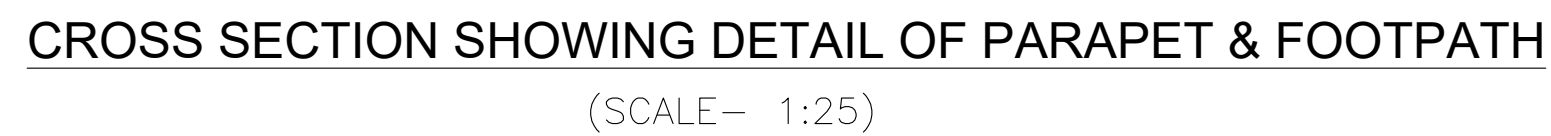
- ① 300mm WIDE FILTER ELEMENTS SECURED TO BACK FACE OF STRUCTURE AT 45° SLOPE.
- ② CONCRETE NAILS WITH 25 x 25mm HOOP IRON WASHERS TO SECURE FILTER ELEMENTS TO STRUCTURE AT 1000 CRS.
- ③ Ø50mm UPVC WEEPHOLES. TEMPORARY PLUGS TO BE INSTALLED TO PREVENT INGRESS OF GROUT DURING PLACING OF CONCRETE.
- ④ GEOTEXTILE SURROUND TO CRUSHED STONE FILTER WITH 300mm MIN. OVERLAP.
- ⑤ SUBSOIL DRAIN WITH 20mm CRUSHED STONE FILTER.
- ⑥ Ø3,15mm STAINLESS STEEL WIRE BARRIER.

**DRAINAGE NOTES :**

1. THE FILTER ELEMENTS SHALL CONSIST OF CORE COMPLETELY ENVELOPED IN A GEOTEXTILE JACKET
2. THE GEOTEXTILE JACKET SHALL :
  - 2.1 BE UV RESISTANT
  - 2.2 RESIST THE PASSAGE OF 100 MICRONS OR LARGER SOIL PARTICLES.
3. THE GEOTEXTILE JACKET SHALL BE OVERLAPPED NOT LESS THAN 100mm AT THE SEAM AND ZIG-ZAG STITCHED FOR THE FULL LENGTH OF THE SEAM. (NOT LESS THAN 3 STITCHES FOR CENTIMETRE.)
4. THE GEOTEXTILE FABRIC SHALL BE RETURNED AT THE END OF EACH FILTER ELEMENT IN ORDER TO PREVENT INGRESS OF BACKFILL MATERIAL.
5. THE CONTRACTOR SHALL ENSURE THAT THE FILTER ELEMENTS ARE NOT DAMAGED AND/OR TORN DURING INSTALLATION OR BACKFILLING BEHIND THE STRUCTURE AND THE USE OF TEMPORARY PROTECTIVE BOARDS RAISED PROGRESSIVELY WITH THE BACKFILL IS RECOMMENDED.

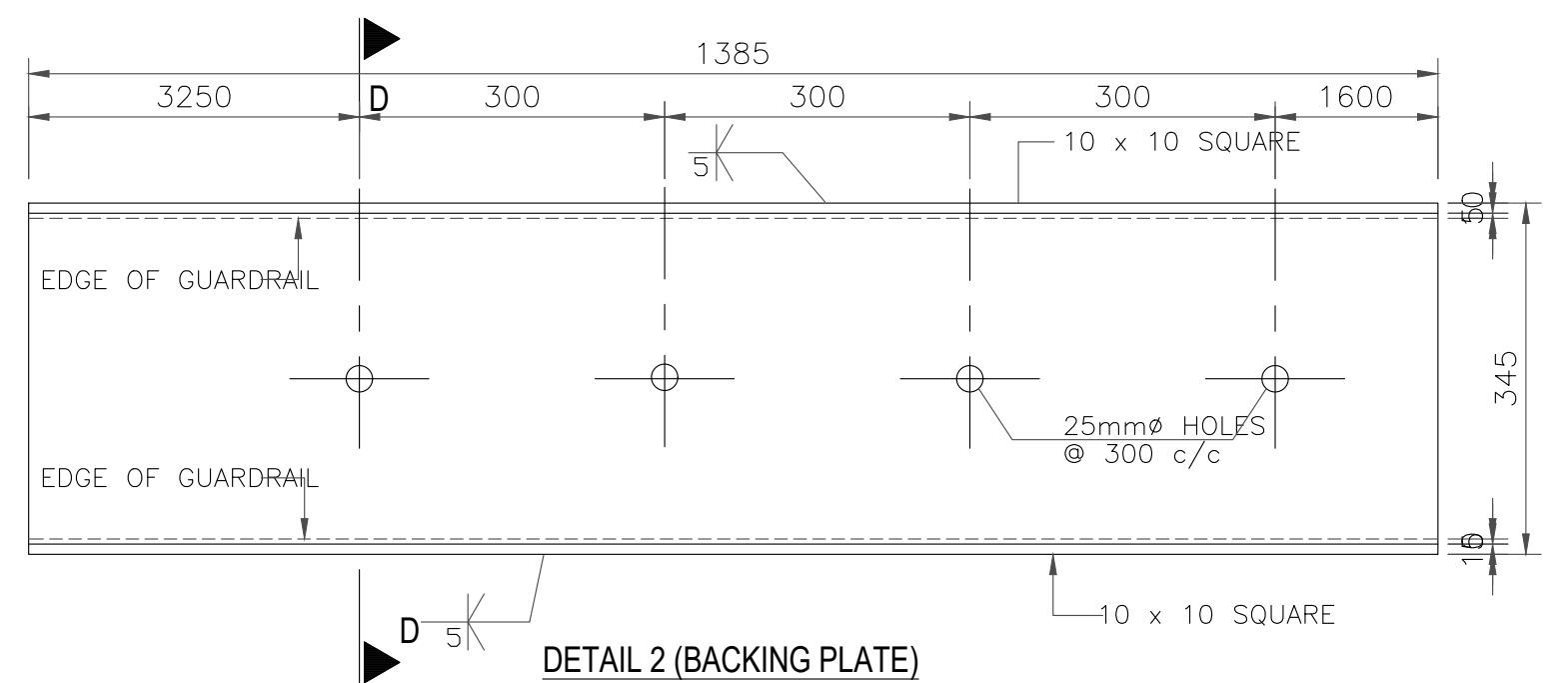
				CLIENT:	THE ROADS AUTHORITY		DESIGN CONSULTANT:	LEA Associates South Asia Pvt Ltd., India		PROJECT:	CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE:	DETAILS OF MISCELLANEOUS ITEMS		SCALE:	AS SHOWN		DESIGNED BY	MANGAL	
					CHIEF EXECUTIVE OFFICER			in association with											DRAWN BY	RAJU	
					PRIVATE BAG B346			RUO Consulting Engineers Ltd, Malawi											APPROVED BY	R.BHATTACHARYA	
					LILONGWE														DATE	MAY, 2023	
					MALAWI															SHEET SIZE A3	
																			DRAWING NO.	80087A/LASA/STR/RA/NCL/MISC-03	
																				(Sheet 1 OF 2)	



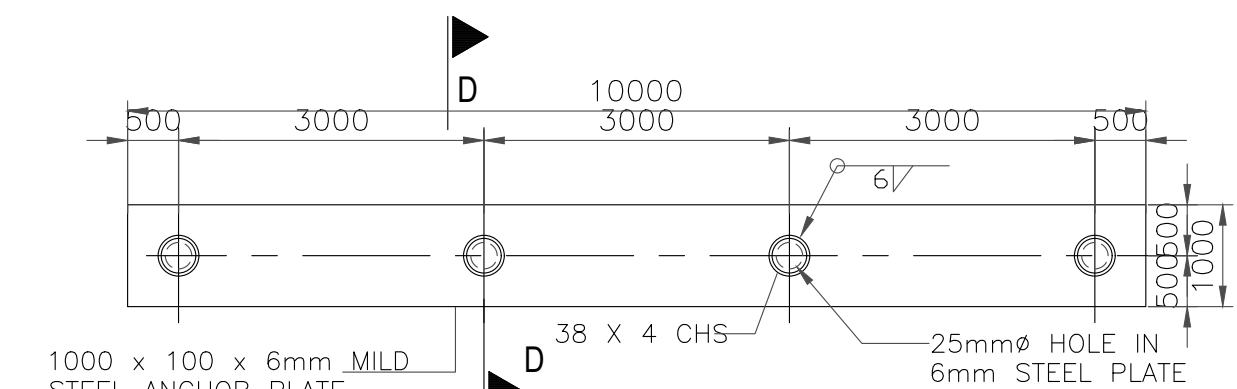


				CLIENT:  THE ROADS AUTHORITY  CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT:  LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT:  CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE:  DETAILS OF MISCELLANEOUS ITEMS		SCALE:  AS SHOWN		DESIGNED BY MANGAL			
														DRAWN BY RAJU			
														APPROVED BY R.BHATTACHARYA			
														DATE MAY, 2023		SHEET SIZE A3	
MKD. DESCRIPTIONS BY DATE														DRAWING NO. 80087\ALASA\STR\RAINCL\MISC-03		(Sheet 2 OF 2)	
REVISIONS																	

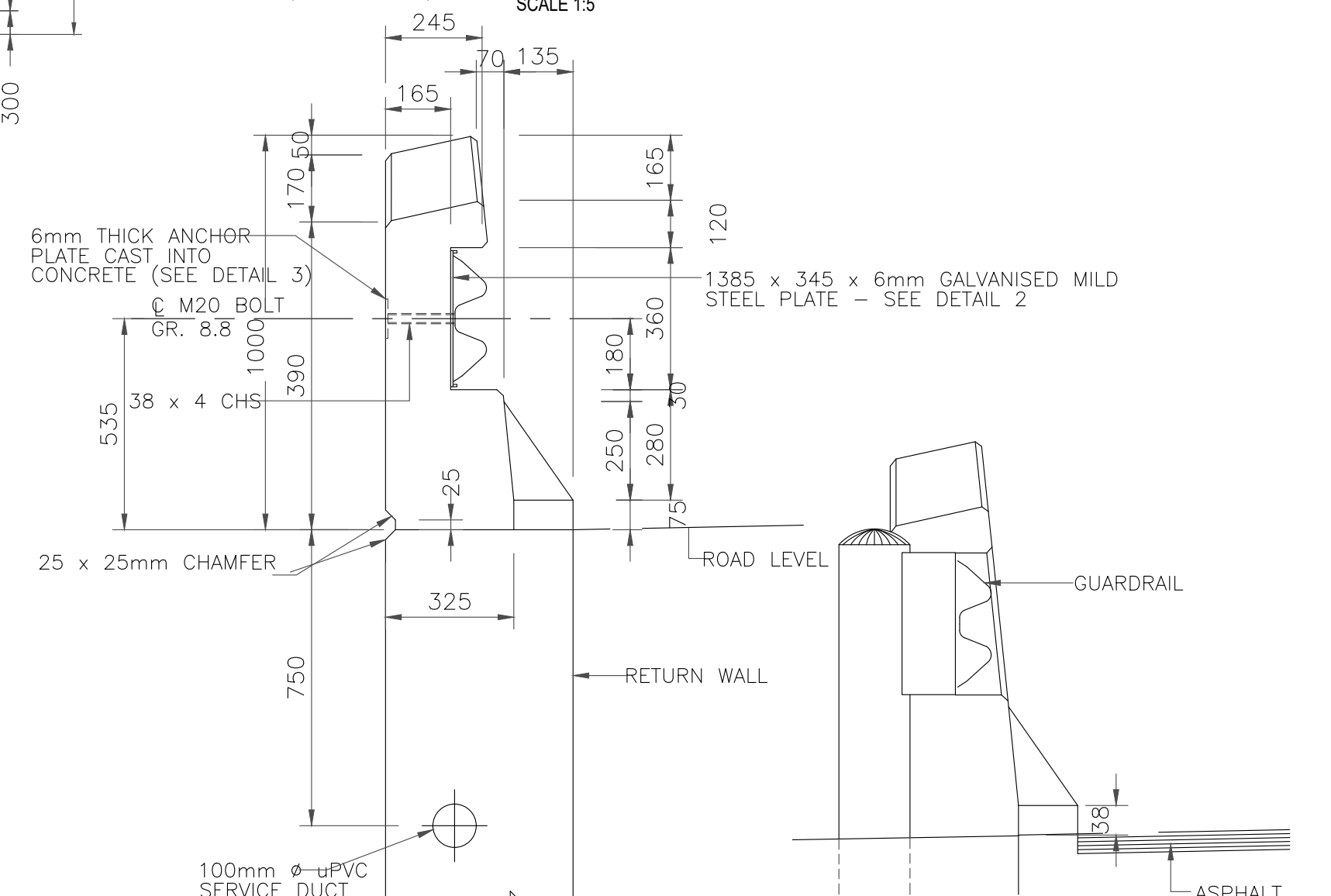




SCALE 1:10



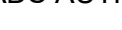


SCALE 1:5



SCALE 1:20

SCALE 1:20

## SCALE 1:25

				CLIENT:  THE ROADS AUTHORITY  CHIEF EXECUTIVE OFFICER PRIVATE BAG B346 LILONGWE MALAWI		DESIGN CONSULTANT:  LEA Associates South Asia Pvt Ltd., India in association with RUO Consulting Engineers Ltd, Malawi		PROJECT:  CONSULTANCY SERVICES FOR PROVISION OF ENGINEERING SERVICES FOR THE DESIGN REVIEW FOR THE REHABILITATION OF NSIPE-CHINGENI-LIWONDE (M001/M008) ROAD		DRAWING TITLE:  DIMENSION & REINFORCEMENT DETAILS OF END BLOCK		SCALE:  AS SHOWN		DESIGNED BY MANGAL			
														DRAWN BY RAJU			
														APPROVED BY R.BHATTACHARYA			
MKD. DESCRIPTIONS BY DATE												DATE MAY, 2023		SHEET SIZE A3			
REVISIONS														DRAWING NO. 80087\ALASA\STR\RAINCL\MISC-05		(Sheet 1 OF 1)	