

## 5. Outline Design Drawings

List of Basic Design Drawings

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TANZANIA NATIONAL ROADS AGENCY  
THE UNITED OF TANZANIA  
TENDER DOCUMENTS  
FOR  
THE PROJECT  
FOR  
THE IMPROVEMENT  
OF  
MASASI-MANGAKA ROAD

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DRAWINGS

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AUGUST 2009

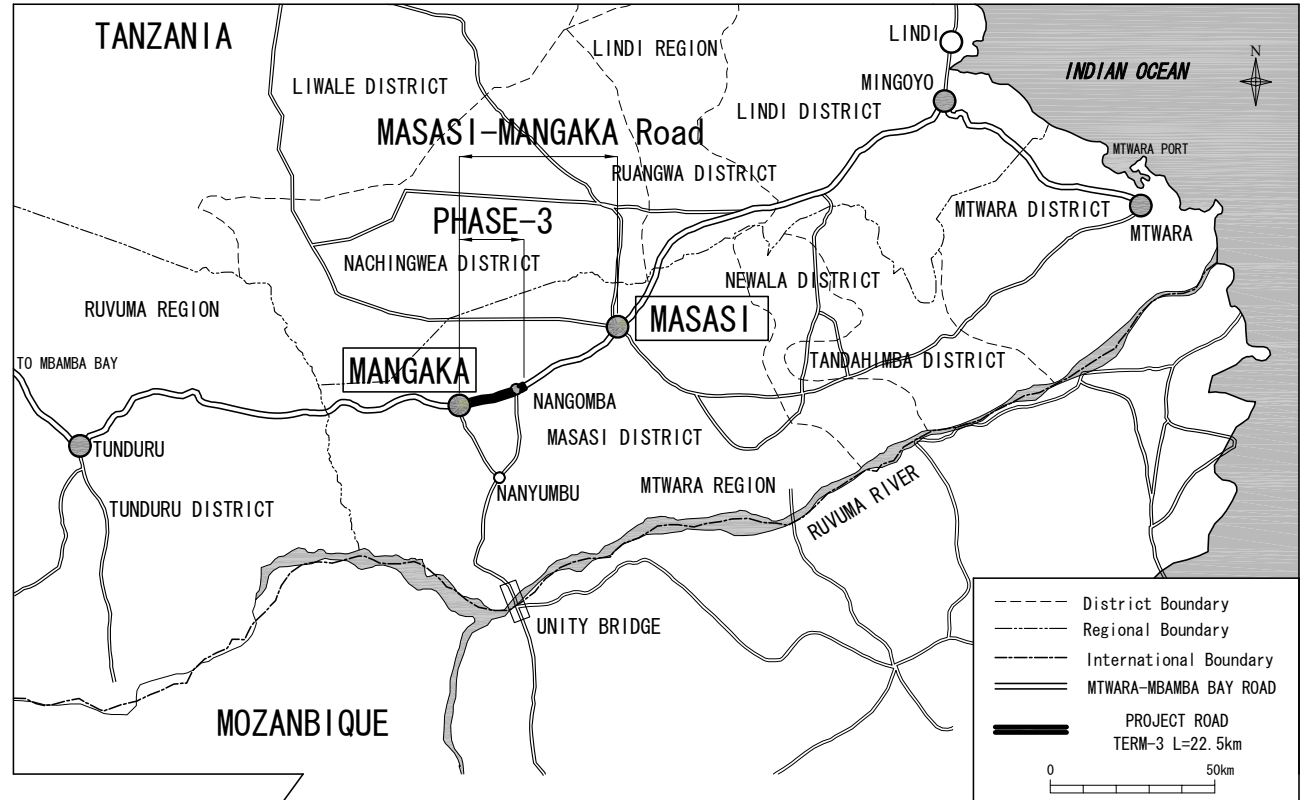
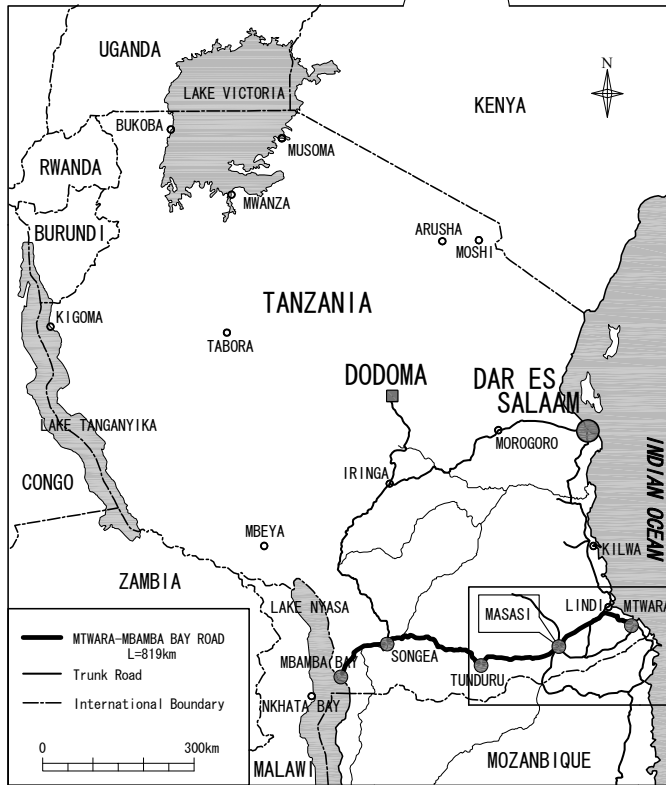
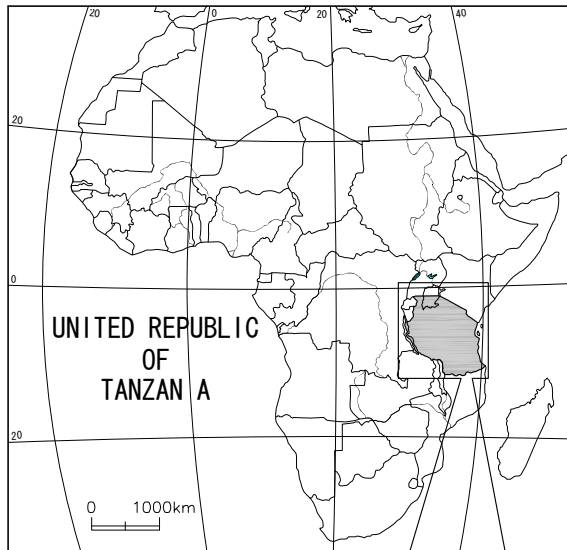
INGEROSEC CORPORATION



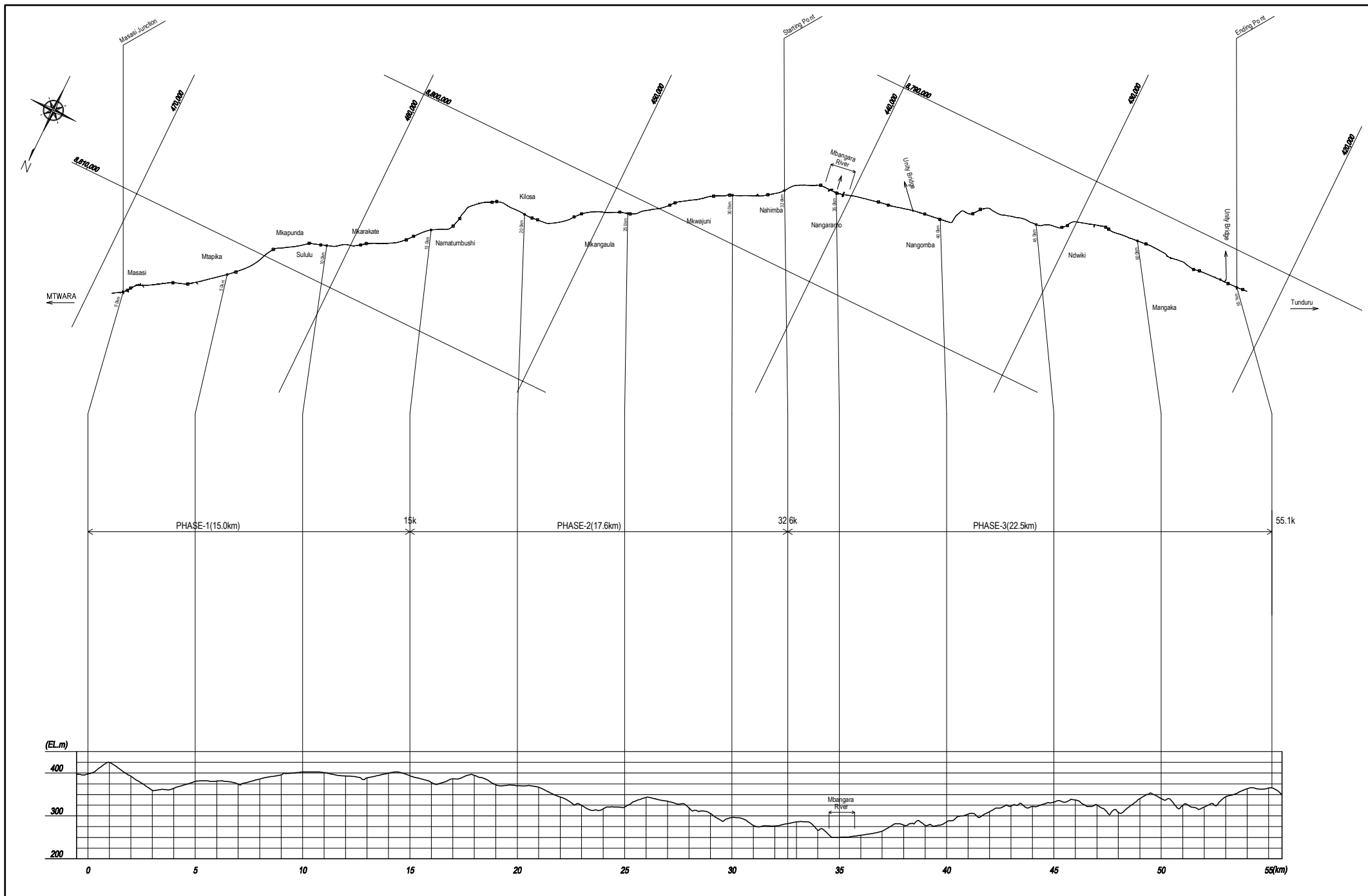
# INDEX OF DRAWINGS

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE
MR 03 A-1	INDEX OF DRAWINGS	MR 03 F-1	LOCATION AND DIMENSION OF BOX CULVERT
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MR 03 E-2	PLAN AND PROFILE (2/23)	MR 03 F-9	BOX CULVERT 5x4x4 INLET/OUTLET BAR ARRANGEMENT (2/2)
MR 03 E-3	PLAN AND PROFILE (3/23)	MR 03 F-10	BOX CULVERT 4x3x1 INLET/OUTLET BAR ARRANGEMENT (1/2)
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MR 03 E-5	PLAN AND PROFILE (5/23)	MR 03 F-12	LOCATION AND DIMENSION OF PIPE CULVERT
MR 03 E-6	PLAN AND PROFILE (6/23)	MR 03 F-13	PIPE CULVERT 360° ENCASMENT BAR ARRANGEMENT
MR 03 E-7	PLAN AND PROFILE (7/23)	MR 03 F-14	TRANSVERSE PIPE CULVERT INLET/OUTLET BAR ARRANGEMENT
MR 03 E-8	PLAN AND PROFILE (8/23)	MR 03 F-15	BRIDGE1 (KM.34+683.8)
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MR 03 E-10	PLAN AND PROFILE (10/23)	MR 03 F-17	BRIDGE3 (KM.35+259.0)
MR 03 E-11	PLAN AND PROFILE (11/23)	MR 03 G-1	INCIDENTAL WORKS-1 (DITCH AND ENTRANCE CULVERT)
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MR 03 E-21	PLAN AND PROFILE (21/23)		
MR 03 E-22	PLAN AND PROFILE (22/23)		
MR 03 E-23	PLAN AND PROFILE (23/23)		

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAW NG TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION,JAPAN	The Project for the Improvement of Masasi-Mangaka Road	INDEX OF DRAWINGS	Prepared by:	MR 03 A-1
				Checked by:	



Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PROJECT LOCATION MAP	Prepared by:	MR 03 B-1
				Checked by:	

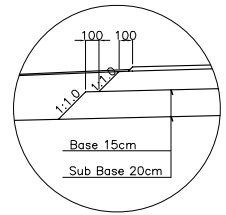
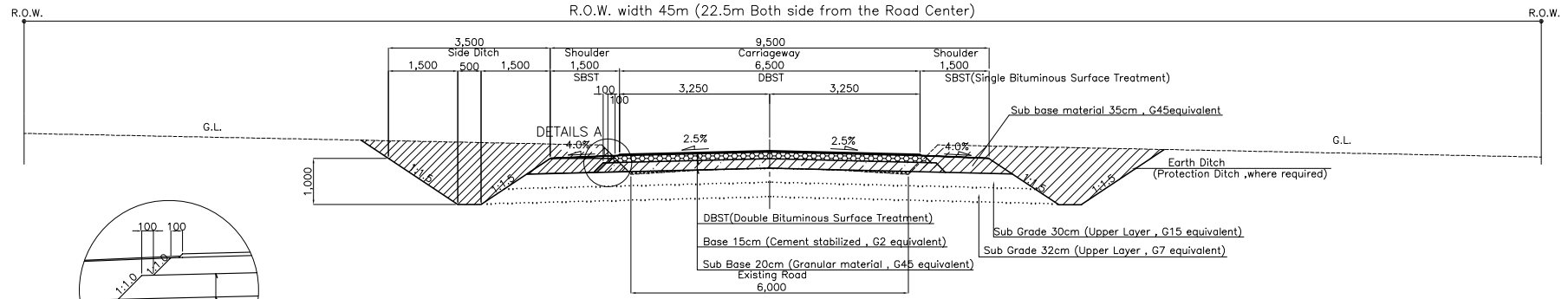


Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
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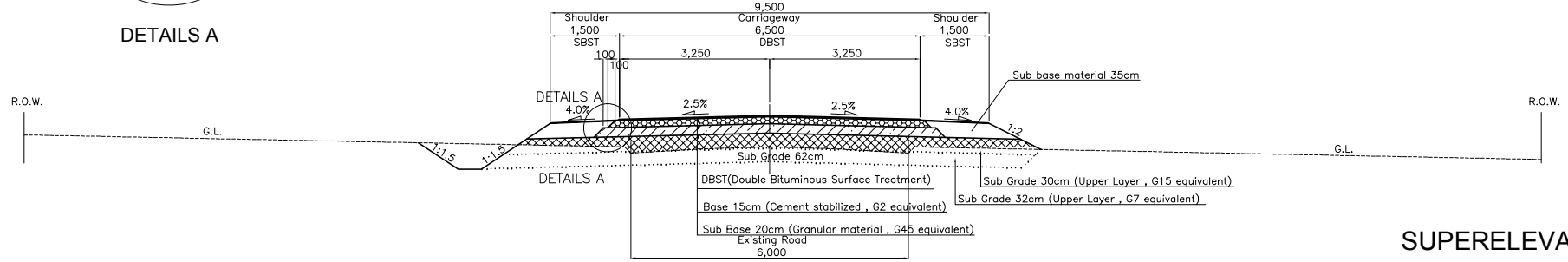
# TYPICAL CROSS SECTION

## EXCAVATION SECTION

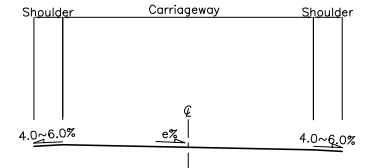


DETAILS A

## EMBANKMENT SECTION

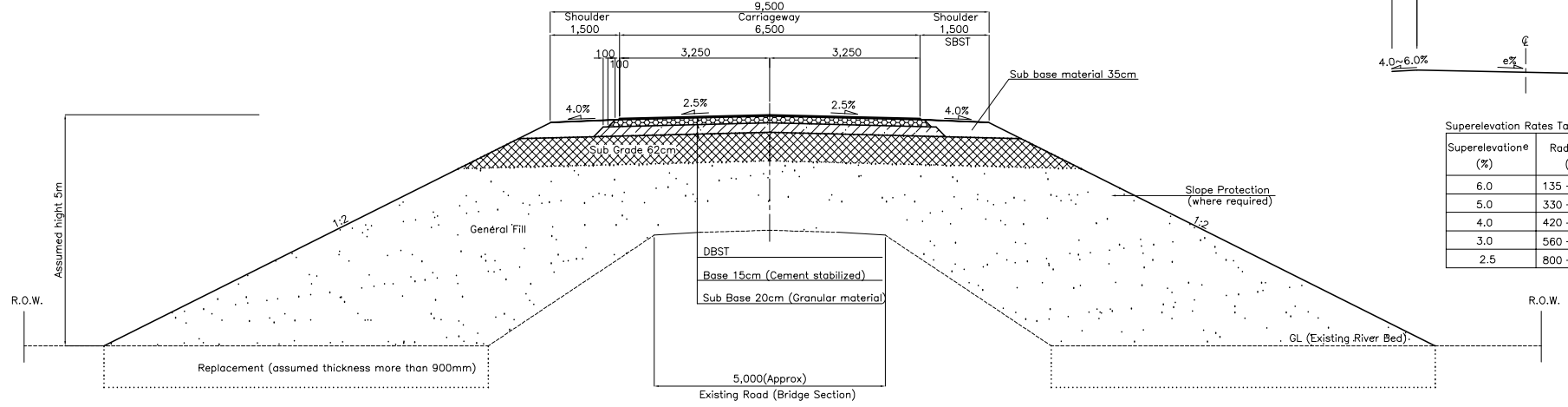


## SUPERELEVATION



Superelevation (%)	Radius R (m)
6.0	135 - 330
5.0	330 - 420
4.0	420 - 560
3.0	560 - 800
2.5	800 - 3000

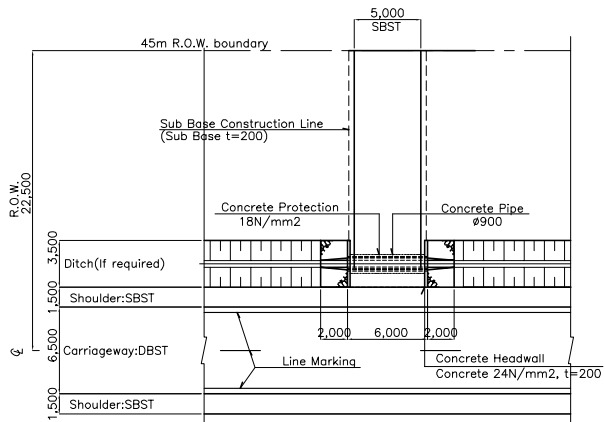
## HIGH EMBANKMENT SECTION (at Mbangara River)



Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORSTION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	TYPICAL CROSS SECTION	Prepared by:	MR 03 C-1
			SCALE 1:100	Checked by:	

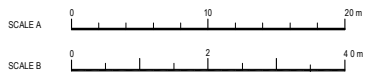
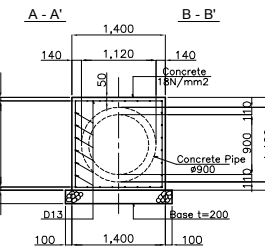
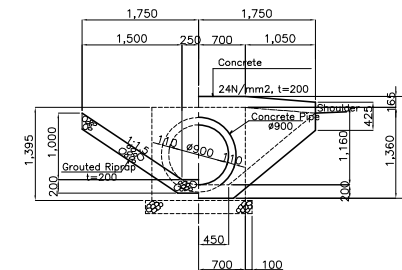
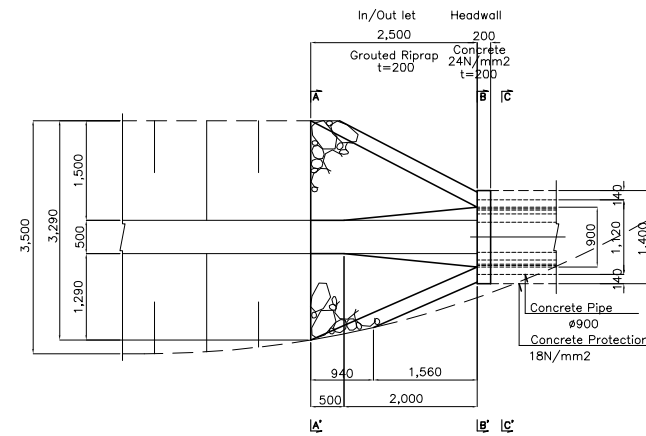
**DETAIL OF ENTRANCE**

Scale A



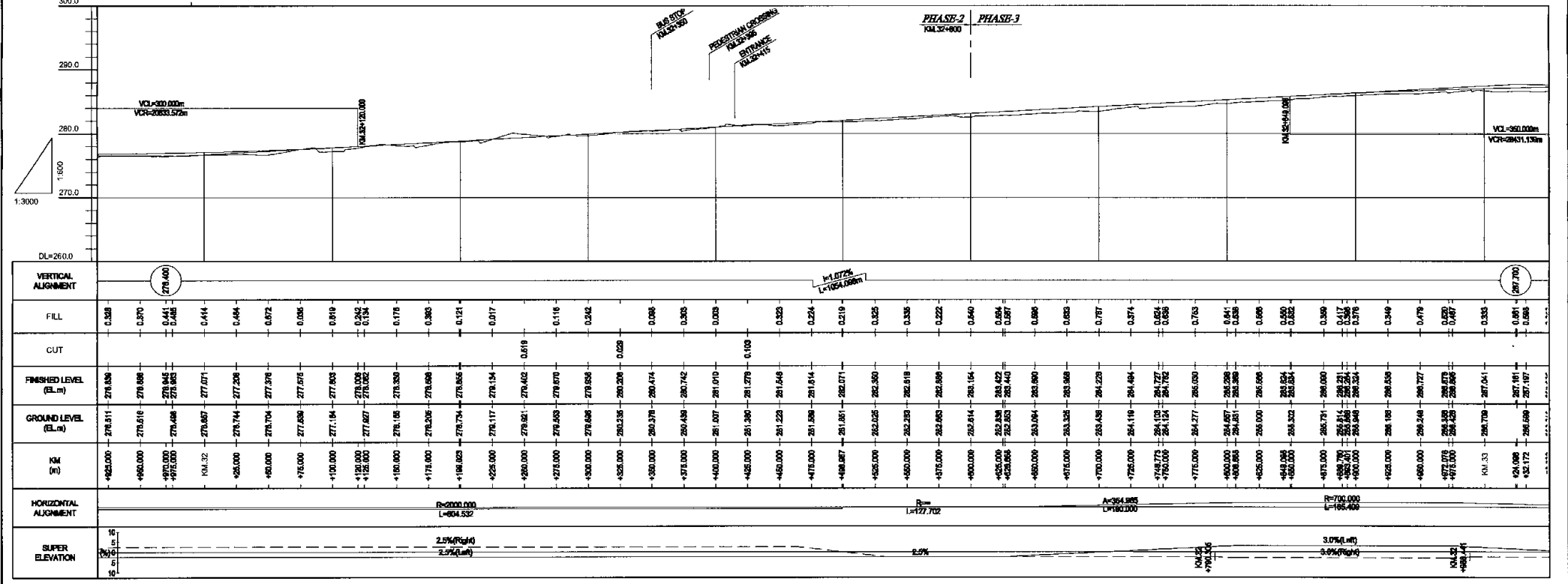
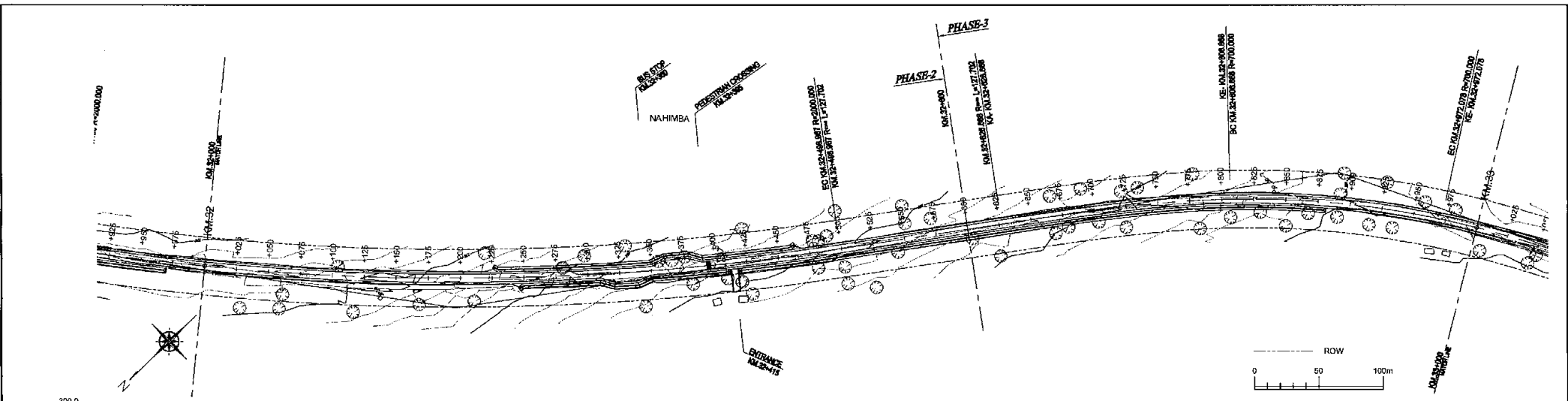
**DETAIL OF INLET/OUTLET**

Scale B

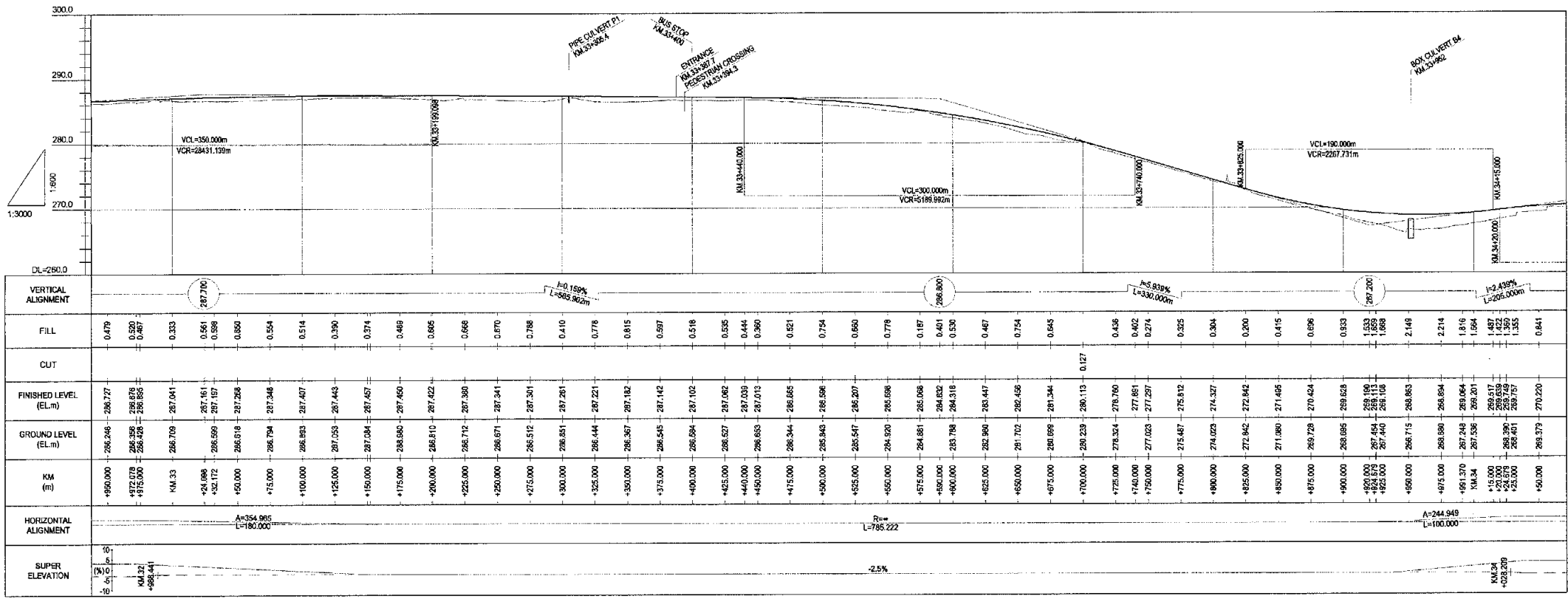
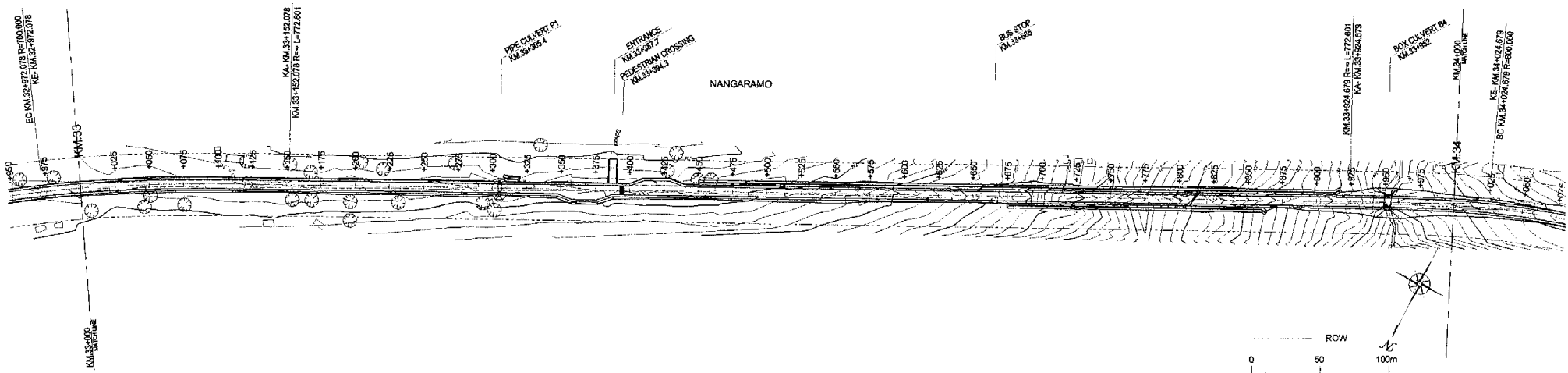


Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	ENTRANCE	Prepared by:	MR 03 D-1
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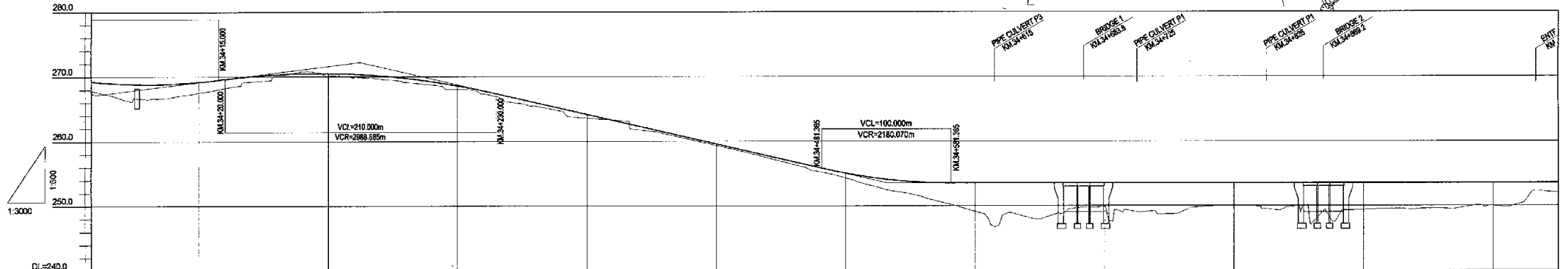
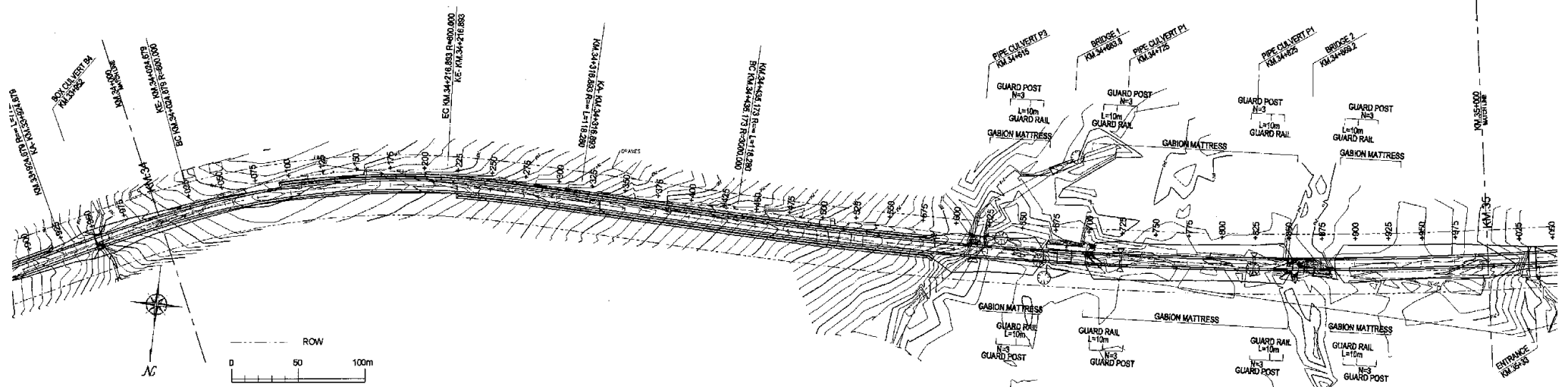




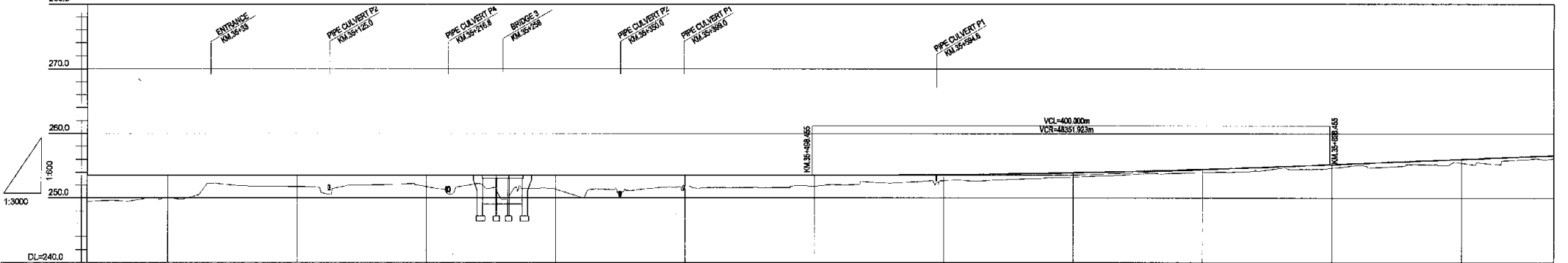
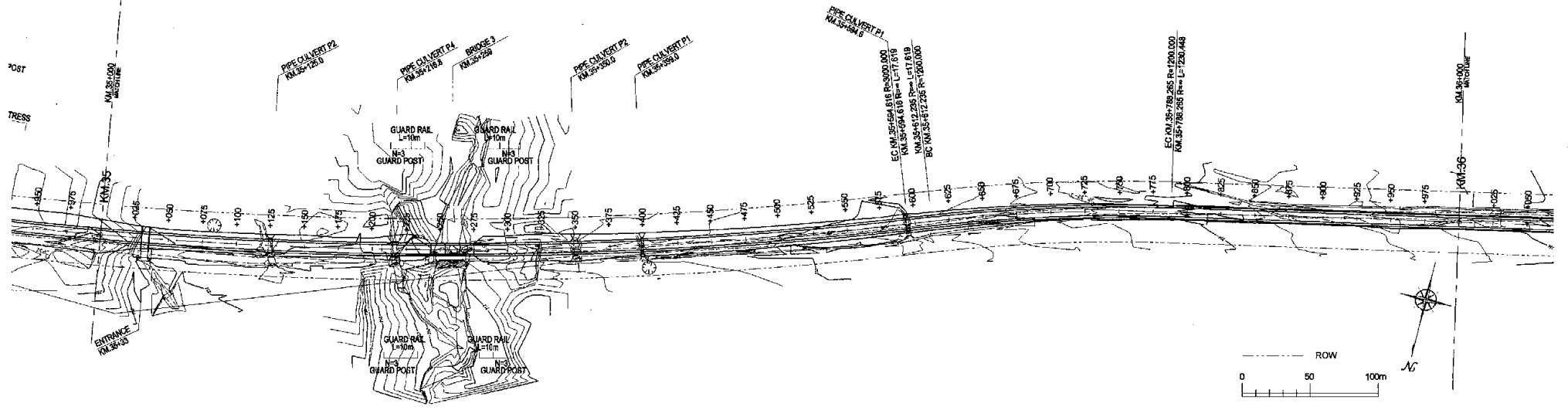
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	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (0/23)	Prepared by:	MR 03 E-0
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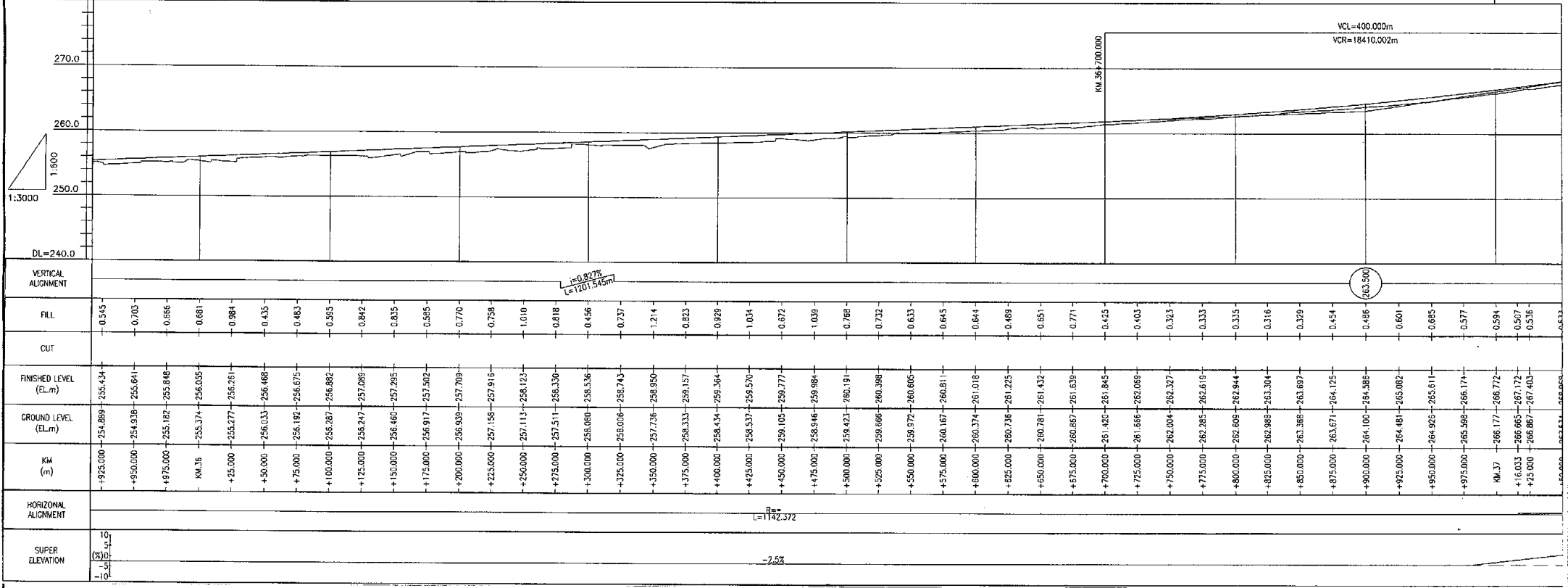
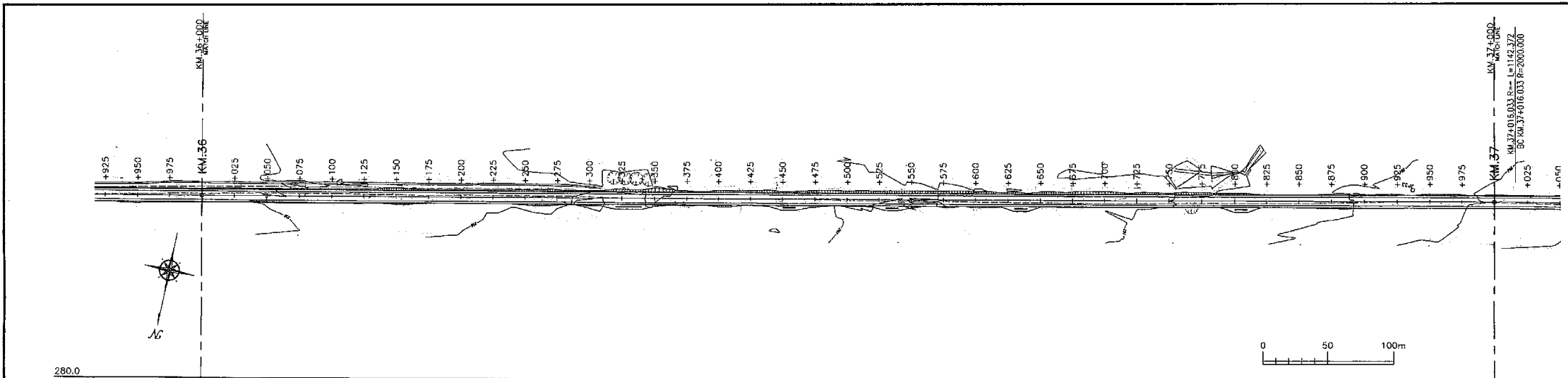
Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (1/23)	Prepared by:	MR 03 E-1
				Checked by:	



VERTICAL ALIGNMENT	FILL	CUT	FINISHED LEVEL (EL.m)	GROUND LEVEL (EL.m)	KM (m)	HORIZONTAL ALIGNMENT	SUPER ELEVATION (%)
267.200	1.533		269.190	269.190	24.000	A=244.949 L=100.000	10
	1.659		268.113	267.454	24.000		6
	2.146		268.106	267.440	24.000		2
	2.214		268.894	268.890	24.000		0
	1.816		269.084	267.246	24.000		-2
	1.684		269.201	267.526	24.000		-4
	1.687		269.517	268.837	24.000		-6
	1.422		269.530	268.748	24.000		-8
	1.355		269.751	268.401	24.000		-10
	0.841		270.220	268.378	24.000		
		0.139	270.474	270.474	24.000		
	0.414		270.520	270.106	24.000	R=600.000 L=192.214	3.0% (Left)
	0.477		270.380	269.913	24.000		3.0% (Right)
	0.480		269.887	269.887	24.000		
	0.491		270.356	269.675	24.000		
	0.531		269.983	269.452	24.000		
	0.571		268.400	268.826	24.000		
	0.585		268.609	268.024	24.000		
	0.476		267.856	267.460	24.000		
	0.472		267.699	267.157	24.000		
	0.478		267.284	266.801	24.000		
	0.634		268.468	266.332	24.000		
	0.628		268.455	266.327	24.000		
	0.462		265.919	264.857	24.000		
	0.599		264.173	263.674	24.000		
	0.089		263.388	263.306	24.000		
	0.162		263.026	263.189	24.000		
	0.377		261.679	261.502	24.000		
	0.253		260.732	260.479	24.000		
	0.246		259.586	259.340	24.000		
	0.290		258.439	258.149	24.000		
	0.325		257.572	257.647	24.000		
	0.386		257.262	258.007	24.000		
	0.745		256.145	255.401	24.000		
	0.820		255.854	255.854	24.000		
	0.762		255.078	254.317	24.000		
	1.419		254.289	252.870	24.000		
	1.628		254.133	251.396	24.000		
	1.925		253.786	251.361	24.000		
	3.067		253.569	250.502	24.000		
	3.377		253.590	250.592	24.000		
	4.431		253.560	248.128	24.000		
	4.711		253.560	248.849	24.000		
	5.632		253.560	247.928	24.000		
	4.005		253.560	246.555	24.000		
	3.899		253.560	246.862	24.000		
	4.528		253.560	246.032	24.000		
	4.843		253.560	246.717	24.000		
	3.784		253.560	246.796	24.000		
	3.536		253.560	250.024	24.000		
	4.053		253.560	248.307	24.000		
	3.551		253.560	250.026	24.000		
	6.308		253.560	247.752	24.000		
	4.193		253.560	248.387	24.000		
	4.033		253.560	248.327	24.000		
	4.012		253.560	248.548	24.000		
	3.890		253.560	249.870	24.000		
	3.571		253.560	248.988	24.000		
	3.178		253.560	250.381	24.000		
	2.718		253.560	250.844	24.000		
					24.000	R=3000.000 L=1159.443	

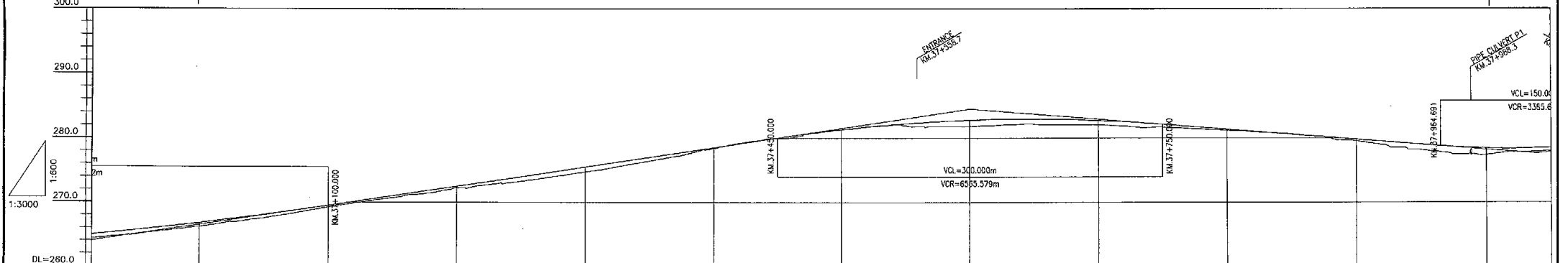
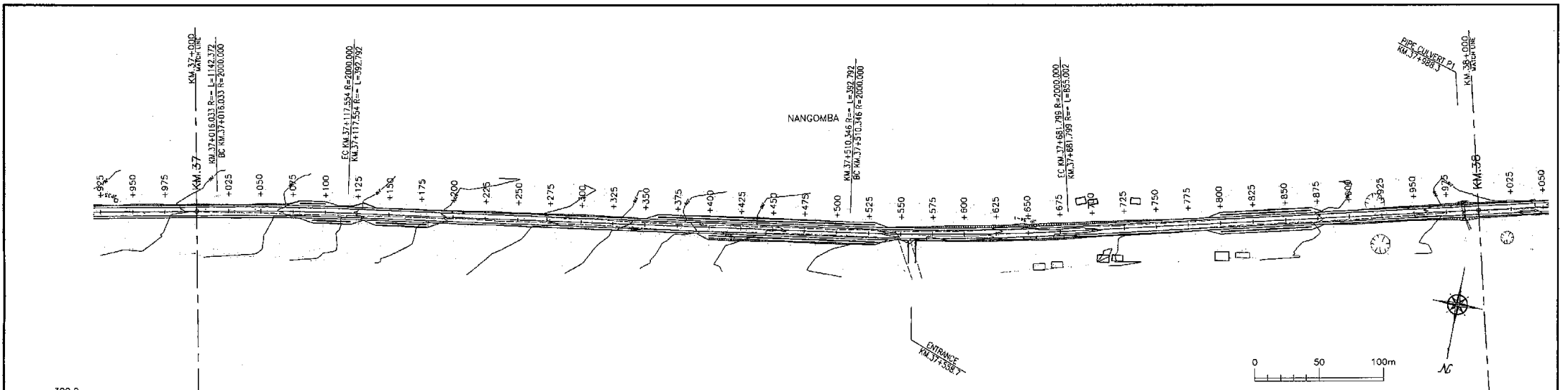


VERTICAL ALIGNMENT	+50.000% L=1167.030m		253.500	
FILL	4.012	3.886	3.671	3.178
CUT	1.544	1.743	1.821	3.038
FINISHED LEVEL (EL.m)	253.560	253.560	253.560	253.560
GROUND LEVEL (EL.m)	249.548	249.670	249.888	250.381
KM (m)	+650.000	+675.000	+700.000	+725.000
HORIZONTAL ALIGNMENT	R=3000.000 L=1159.443		R=1200.000 L=179.030	
SUPER ELEVATION	-2.5%		2.5%(Left) -2.5%(Right)	



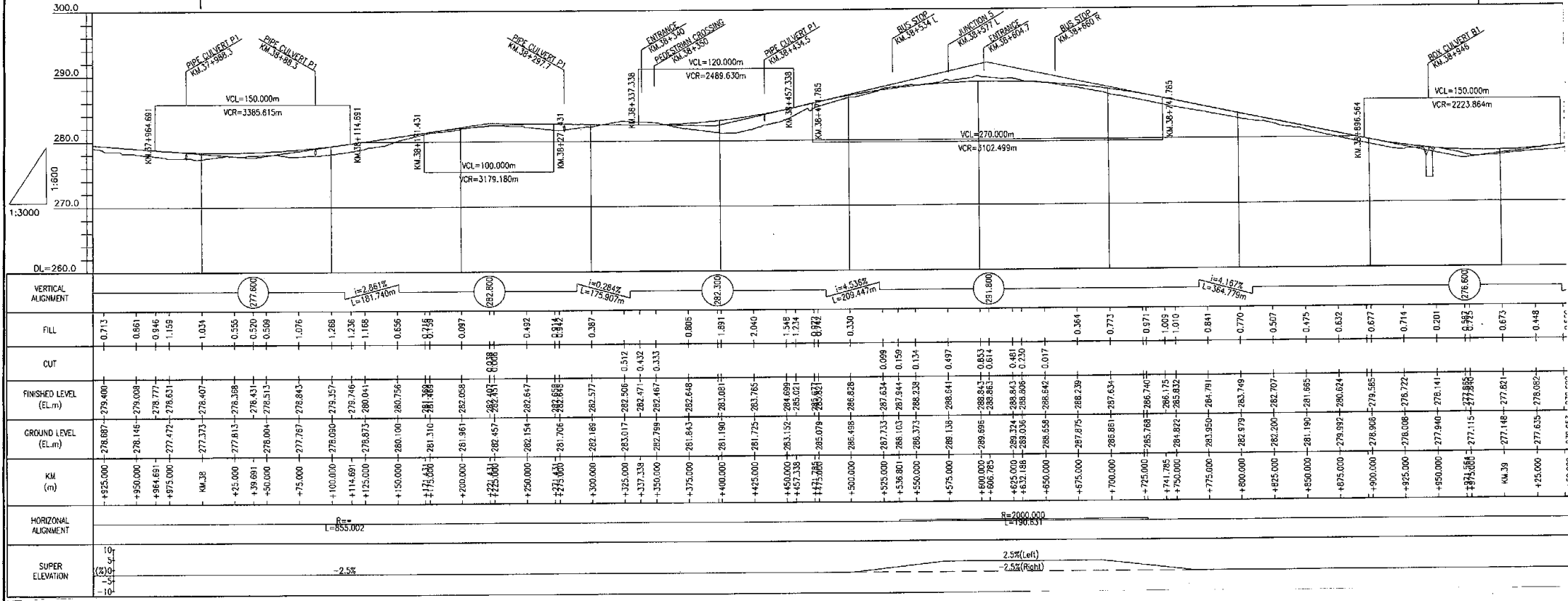
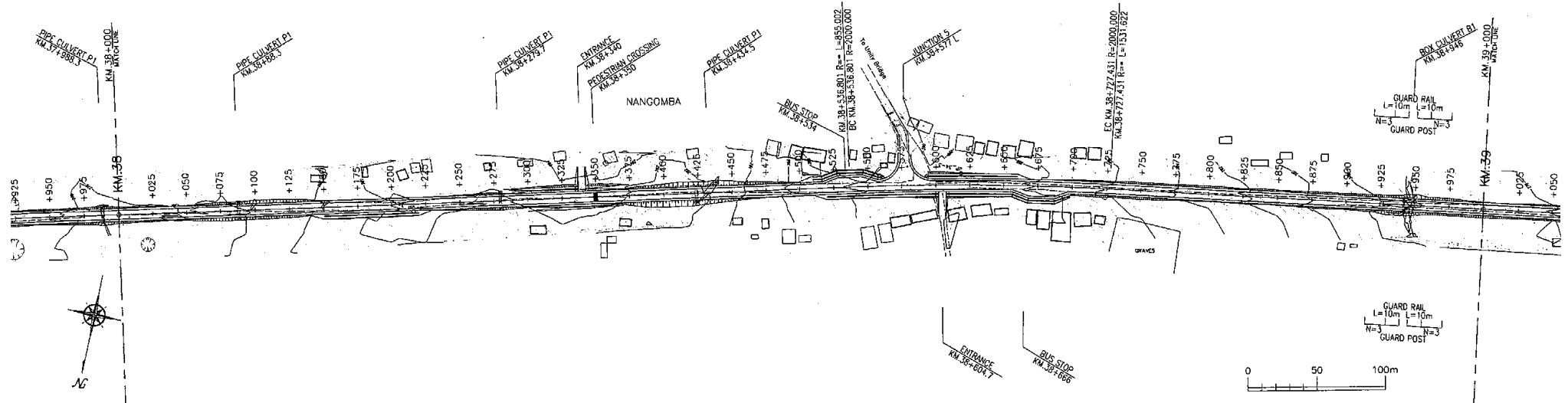
VERTICAL ALIGNMENT	
FILL	0.545
CUT	0.702
FINISHED LEVEL (EL.m)	254.889
GROUND LEVEL (EL.m)	254.939
KM (m)	925.000
HORIZONTAL ALIGNMENT	
SUPER ELEVATION	10%

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	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (4/23)	Prepared by:	
				Checked by:	

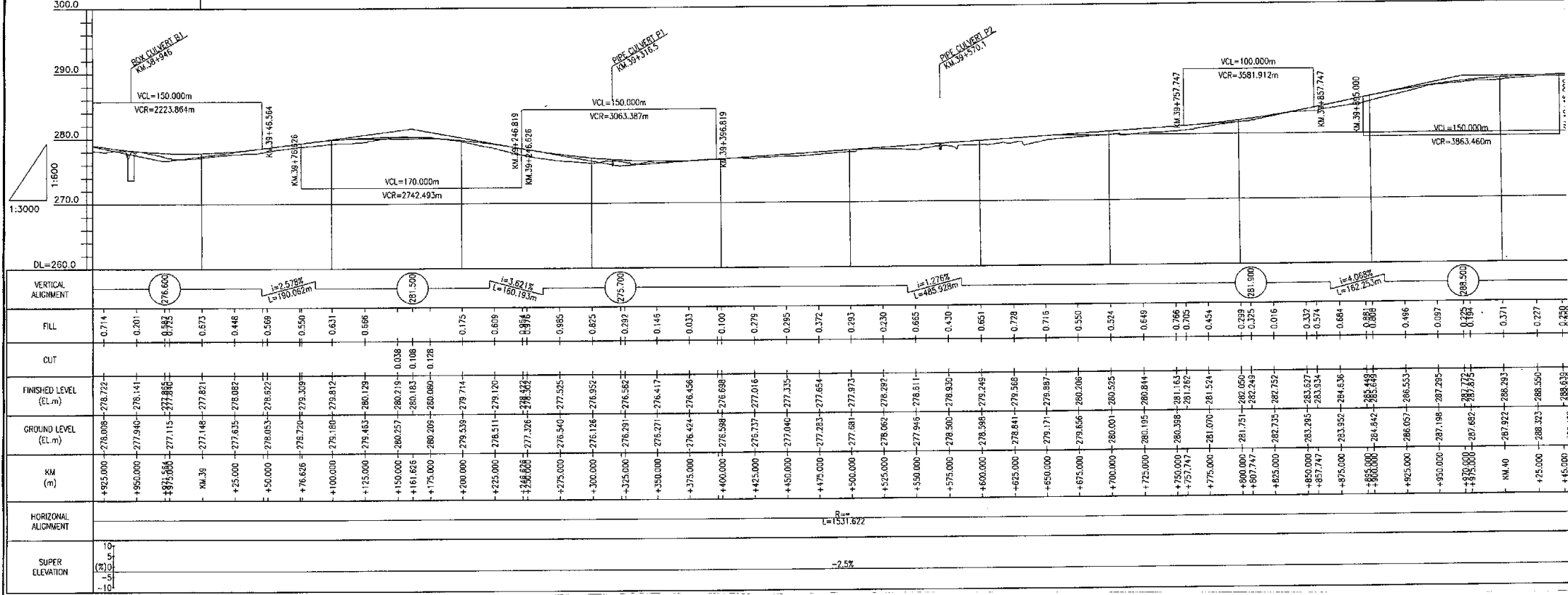
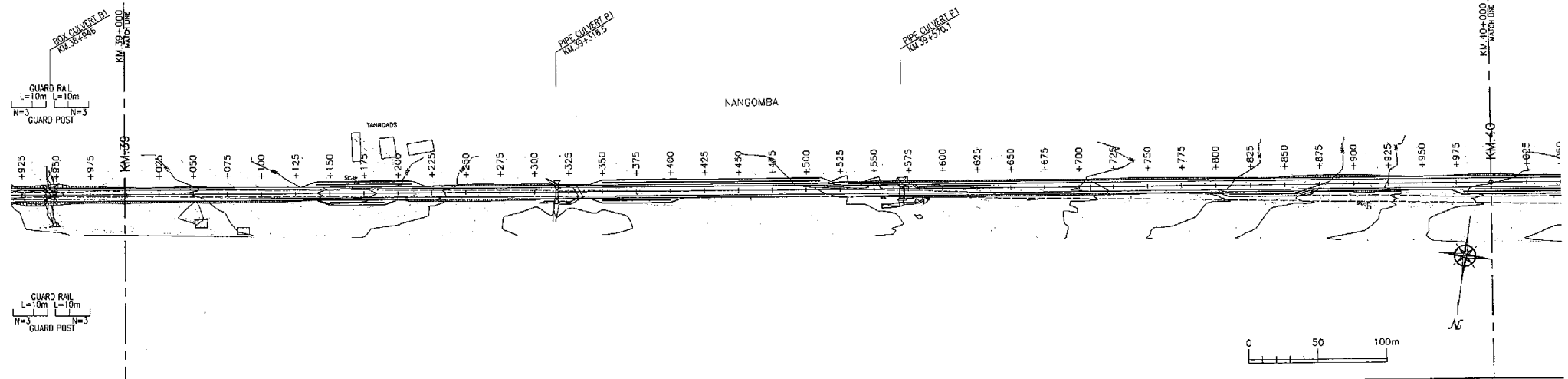


VERTICAL ALIGNMENT	FILL	CUT	FINISHED LEVEL (EL.m)	GROUND LEVEL (EL.m)	KM (m)	HORIZONTAL ALIGNMENT	SUPER ELEVATION
	0.601		264.481	265.082	+925.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.585		266.611	266.926	+950.000		
	0.577		266.174	265.598	+975.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.594		266.772	266.534	+1000.000		
	0.607		267.172	266.077	+1125.000	R=392.792	-2.5%
	0.336		267.400	270.250	+125.000		
	0.533		268.088	268.534	+150.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.451		268.767	268.345	+175.000		
	0.421		268.767	268.345	+200.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.240		269.500	269.500	+225.000		
	0.210		270.027	270.250	+250.000	R=392.792	-2.5%
	0.159		270.250	270.250	+275.000		
	0.305		271.000	271.000	+300.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.405		271.750	271.750	+325.000		
	0.247		272.500	272.500	+350.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.464		273.250	273.250	+375.000		
	0.693		274.000	274.000	+400.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.728		274.750	274.750	+425.000		
	0.740		275.500	275.500	+450.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.702		276.250	276.250	+475.000		
	0.559		277.000	277.000	+500.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.439		277.750	277.750	+525.000		
	0.111		278.500	278.500	+550.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.037		280.000	280.000	+575.000		
	0.006		280.702	280.702	+600.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.017		281.310	281.310	+625.000		
	0.051		281.533	281.533	+650.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.043		281.822	281.822	+675.000		
	0.331		282.238	282.238	+700.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.728		282.560	282.560	+725.000		
	0.973		282.789	282.789	+750.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.881		282.918	282.918	+775.000		
	0.804		282.954	282.954	+800.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.796		282.895	282.895	+825.000		
	0.770		282.852	282.852	+850.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.700		282.740	282.740	+875.000		
	0.710		282.491	282.491	+900.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.457		282.146	282.146	+925.000		
	0.310		281.754	281.754	+950.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.164		281.361	281.361	+975.000		
	0.094		280.969	280.969	+1000.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.052		280.577	280.577	+1025.000		
	0.011		280.184	280.184	+1050.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.254		279.792	279.792	+1075.000		
	0.713		279.400	279.400	+1100.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.361		279.008	279.008	+1125.000		
	0.946		278.777	278.777	+1150.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	1.159		278.631	278.631	+1175.000		
	1.034		278.407	278.407	+1200.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.355		278.368	278.368	+1225.000		
	0.570		278.431	278.431	+1250.000	R=2000.000 L=701.321	2.5%(Left) -2.5%(Right)
	0.277		277.600	277.600	+1275.000		

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug, 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (5/23)	Prepared by:	MR 03 E-5
				Checked by:	

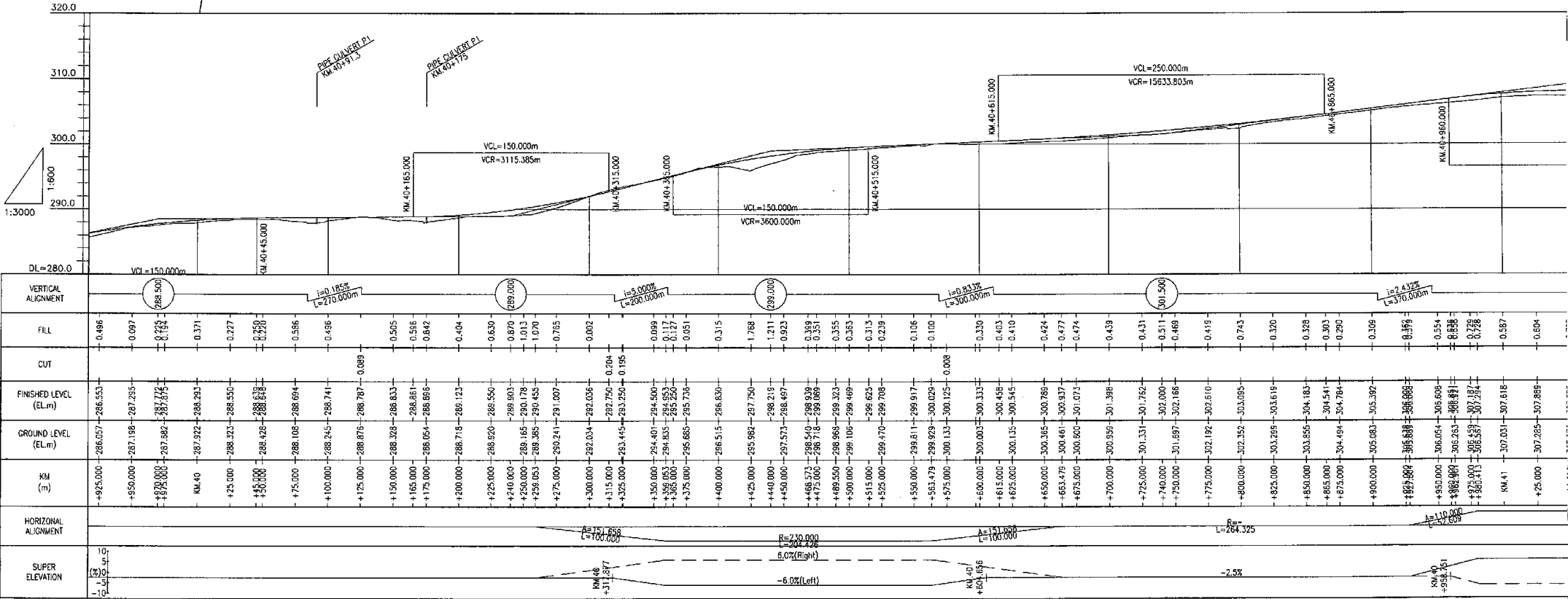
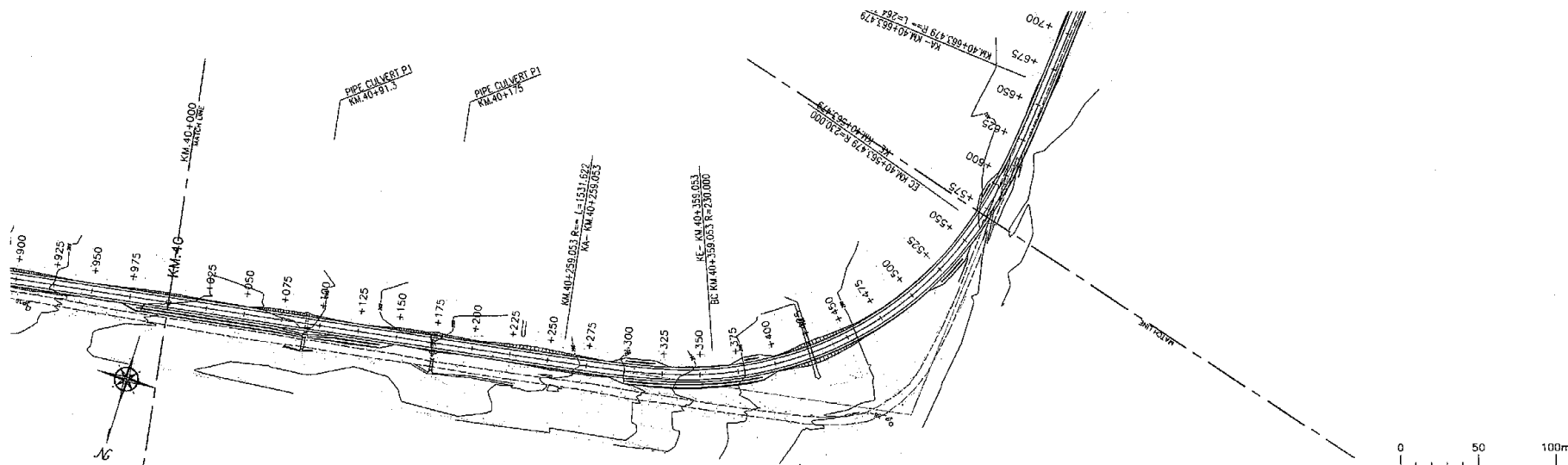


Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (6/23)	Prepared by:	MR 03 E-6
				Checked by:	

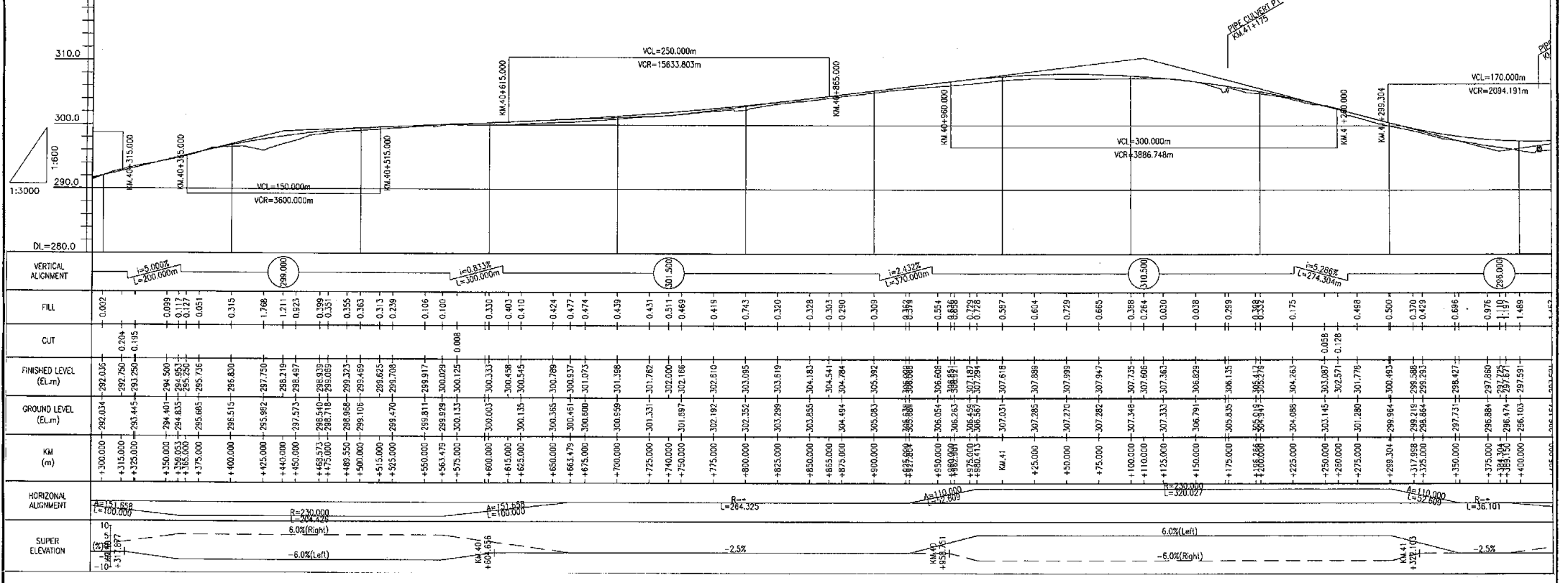
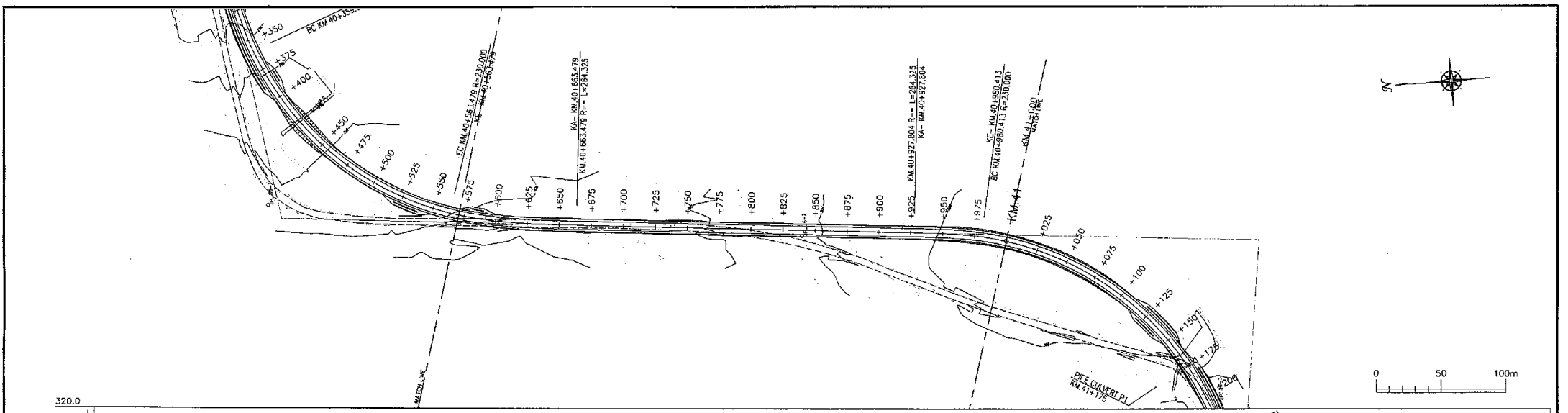


Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug, 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (7/23)	Prepared by:	
				Checked by:	
					MR 03 E-7

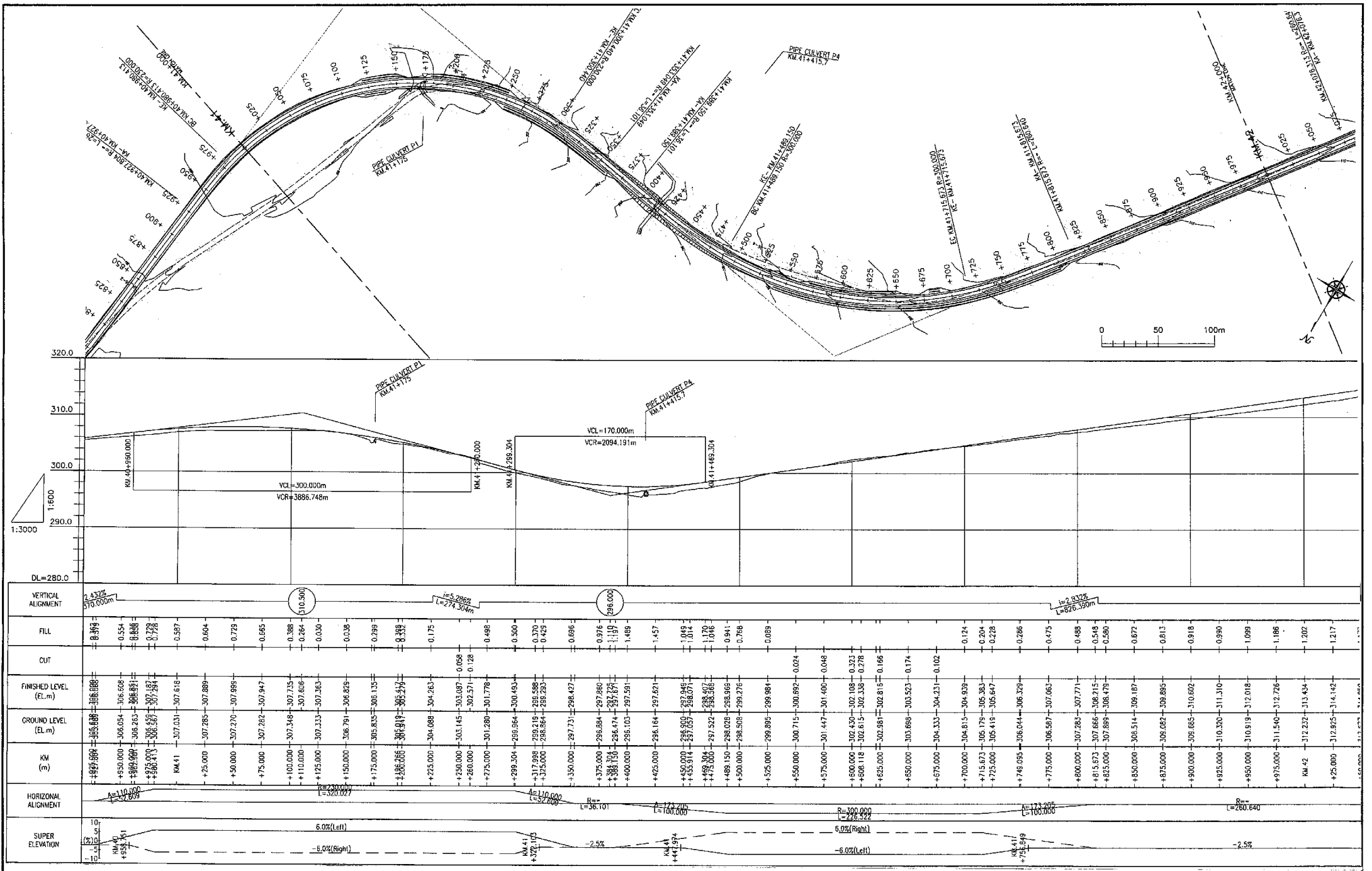




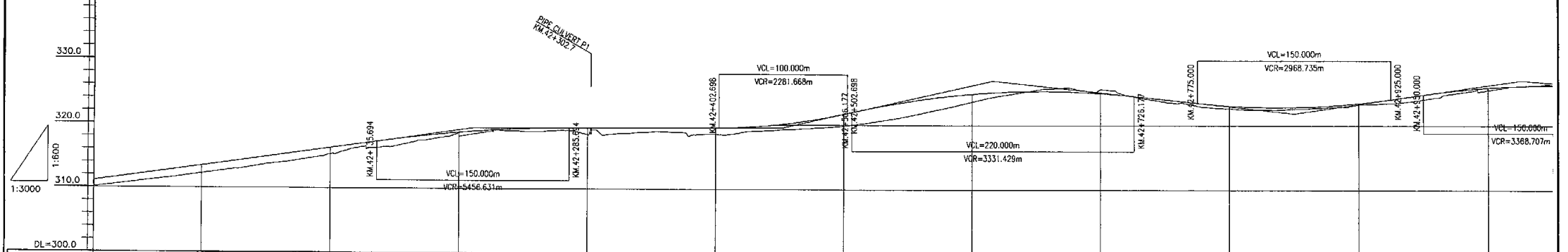
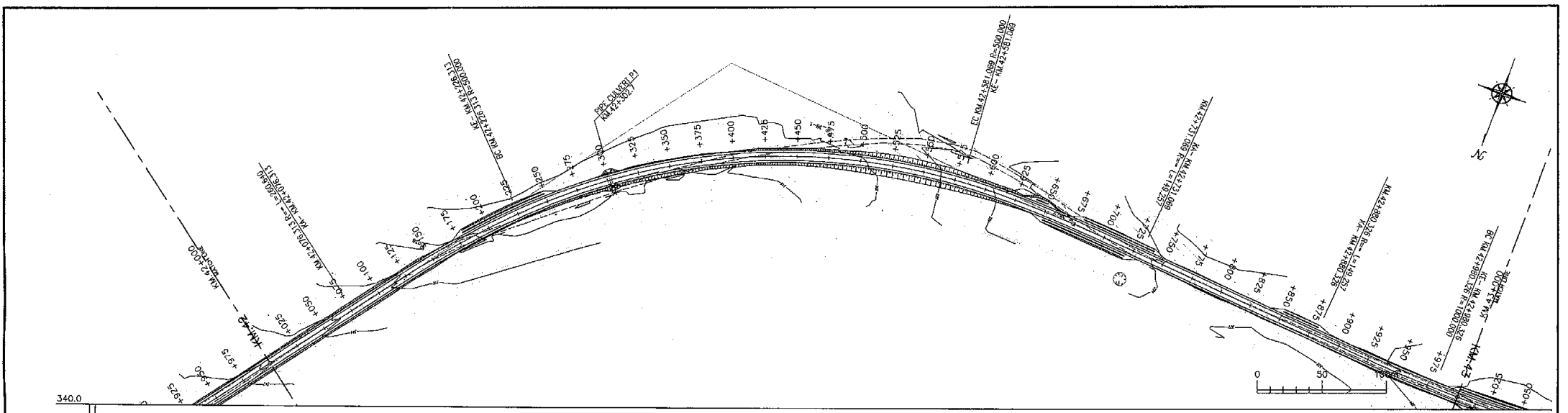
Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:	
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (8/23)	Prepared by:		MR 03 E-8
				Checked by:		



<b>Tanzania National Roads Agency (TANROADS)</b> of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (9/23)	Prepared by:	MR 03 E-9
				Checked by:	

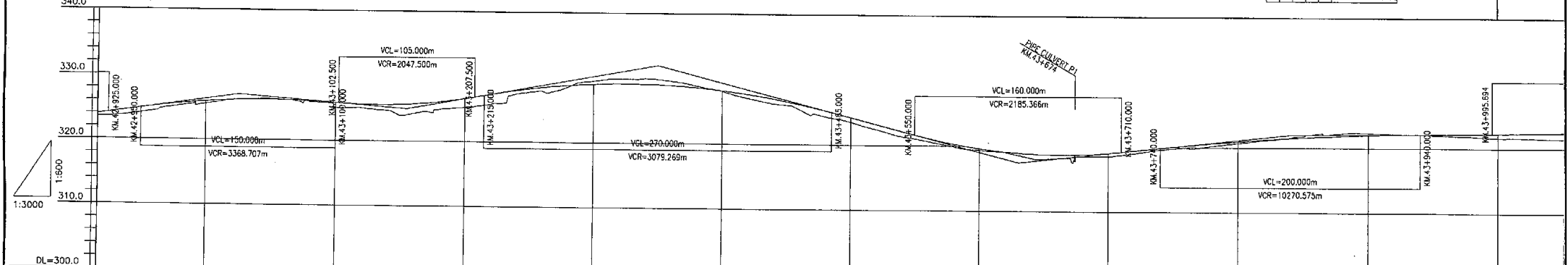
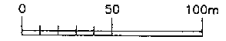
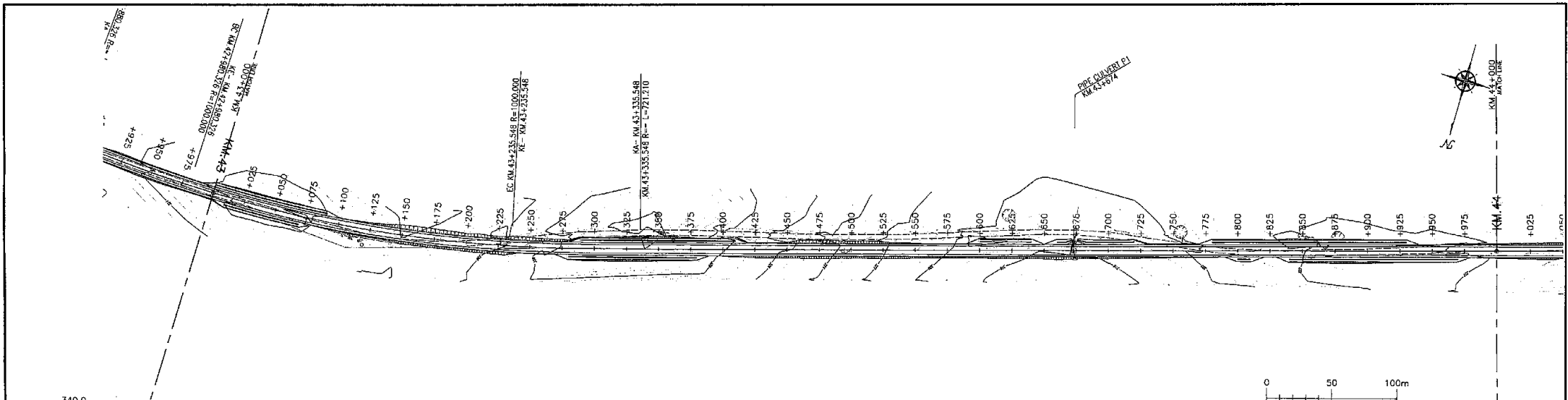


<b>Tanzania National Roads Agency (TANROADS)</b> of The United Republic of Tanzania	CONSULTANTS: <b>INGEROSEC CORPORATION, JAPAN</b>	PROJECT NAME: <b>The Project for the Improvement of Masasi-Mangaka Road</b>	DRAWING TITLE: <b>PLAN AND PROFILE (10/23)</b>	Date: Aug. 2009	DRAWING No.:
				Prepared by:	<b>MR 03 E-10</b>
					Checked by:



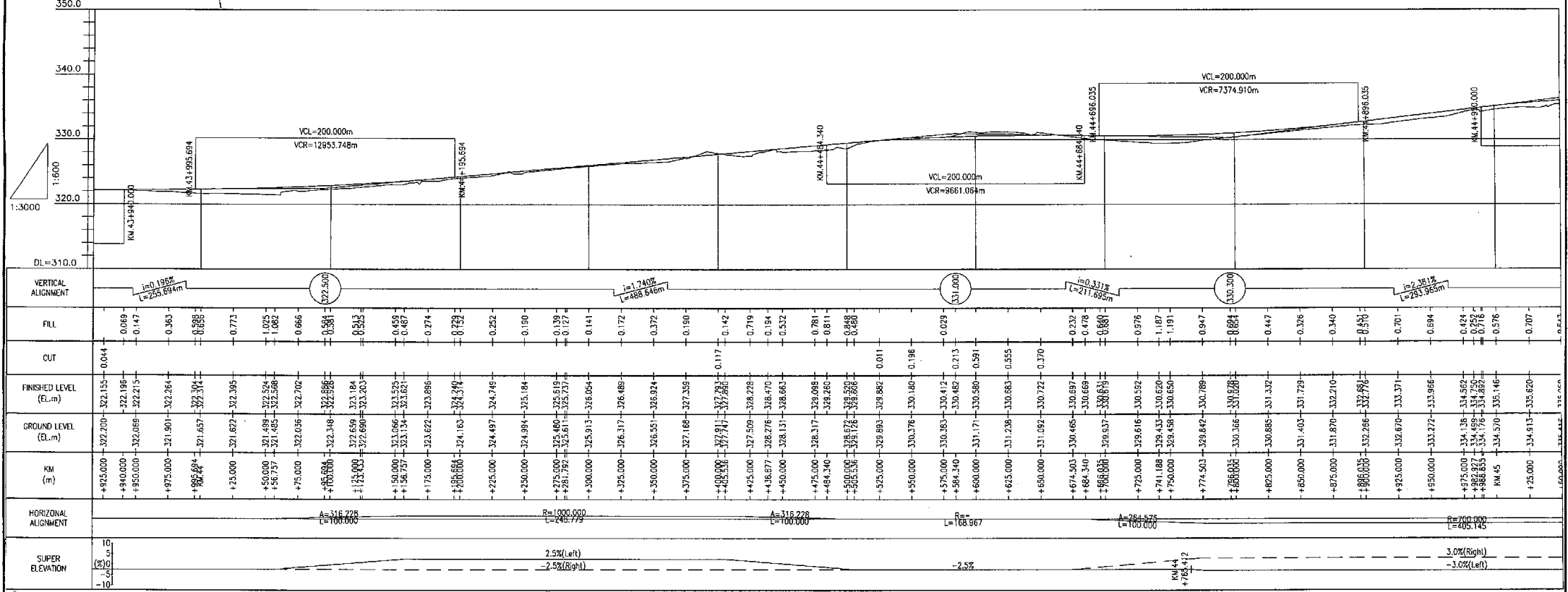
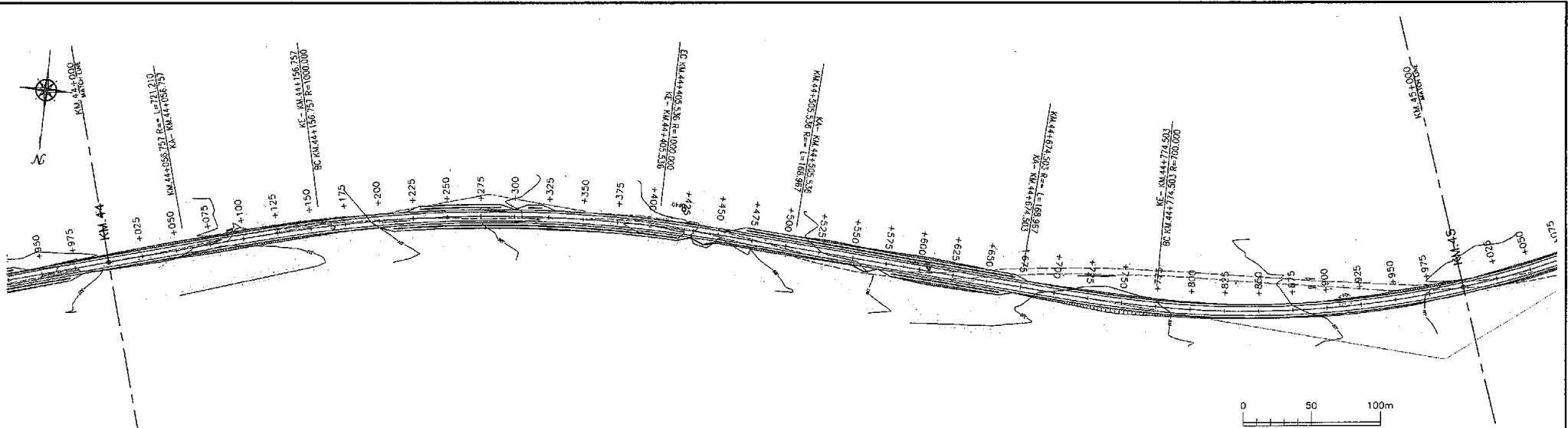
VERTICAL ALIGNMENT	FILL	CUT	FINISHED LEVEL (EL.m)	GROUND LEVEL (EL.m)	KM	HORIZONTAL ALIGNMENT	SUPER ELEVATION
	-0.990		311.310	310.320	+825.000	R=273.861 L=260.640	10% -2.5%
	-1.088		312.018	310.919	+850.000		
	-1.186		312.726	311.540	+875.000		
	-1.202		313.434	312.232	KM 42		
	-1.217		314.142	312.925	+25.000		
	-1.173		314.850	313.677	+50.000		
	-1.203		315.558	314.386	+75.000		
	-0.987		316.266	315.278	+100.000		
	-0.553		316.973	316.42	+125.000		
	-0.989		317.276	316.684	+135.684		
	-1.103		317.665	316.580	+150.000		
	-0.721		318.248	317.506	+175.000		
	-0.414		318.718	318.304	+200.000		
	-0.426		318.885	318.084	+210.084		
	-0.163		318.074	318.911	+225.000		
	-0.423		319.316	318.892	+250.000		
	-0.414		319.445	319.029	+275.000		
	-0.410		319.462	319.084	+285.684		
	-1.046		318.474	318.426	+300.000		
	-0.885		319.484	318.600	+325.000		
	-0.644		319.515	318.671	+350.000		
	-0.759		319.536	318.777	+375.000		
	-1.025		319.556	318.531	+400.000		
	-1.067		319.583	318.516	+411.527		
	-0.672		318.696	319.051	+428.000		
	-0.844		320.088	319.246	+450.000		
	-1.229		320.764	319.535	+475.000		
	-1.826		321.714	319.686	+500.000		
	-1.948		321.988	319.177	+525.000		
	-2.224		322.775	320.551	+525.000		
	-2.255		323.637	321.402	+550.000		
	-1.864		324.330	322.487	+575.000		
	-1.743		324.460	322.746	+581.069		
	-1.221		324.356	323.635	+600.000		
	-0.742		325.094	324.094	+616.177		
	-0.596		325.175	324.665	+628.000		
	-0.339		325.275	324.865	+631.177		
	-0.181		325.305	325.487	+650.000		
	-0.607		325.249	325.856	+675.000		
	-0.647		325.005	325.651	+700.000		
	-0.038		324.573	324.307	+725.000		
	-0.348		324.038	323.660	+750.000		
	-0.428		323.504	323.075	+775.000		
	-0.383		323.074	322.697	+800.000		
	-0.399		322.856	322.457	+825.000		
	-0.258		322.847	322.590	+850.000		
	-0.218		323.050	322.881	+875.000		
	-0.197		323.462	323.265	+900.000		
	-0.586		324.086	323.500	+925.000		
	-0.758		324.674	324.066	+940.000		
	-0.801		325.450	324.610	+975.000		
	-0.403		325.500	325.468	KM 43		
	-0.020		326.165	326.145	+25.000		

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (11/23)	Prepared by:	MR 03 E-11
				Checked by:	

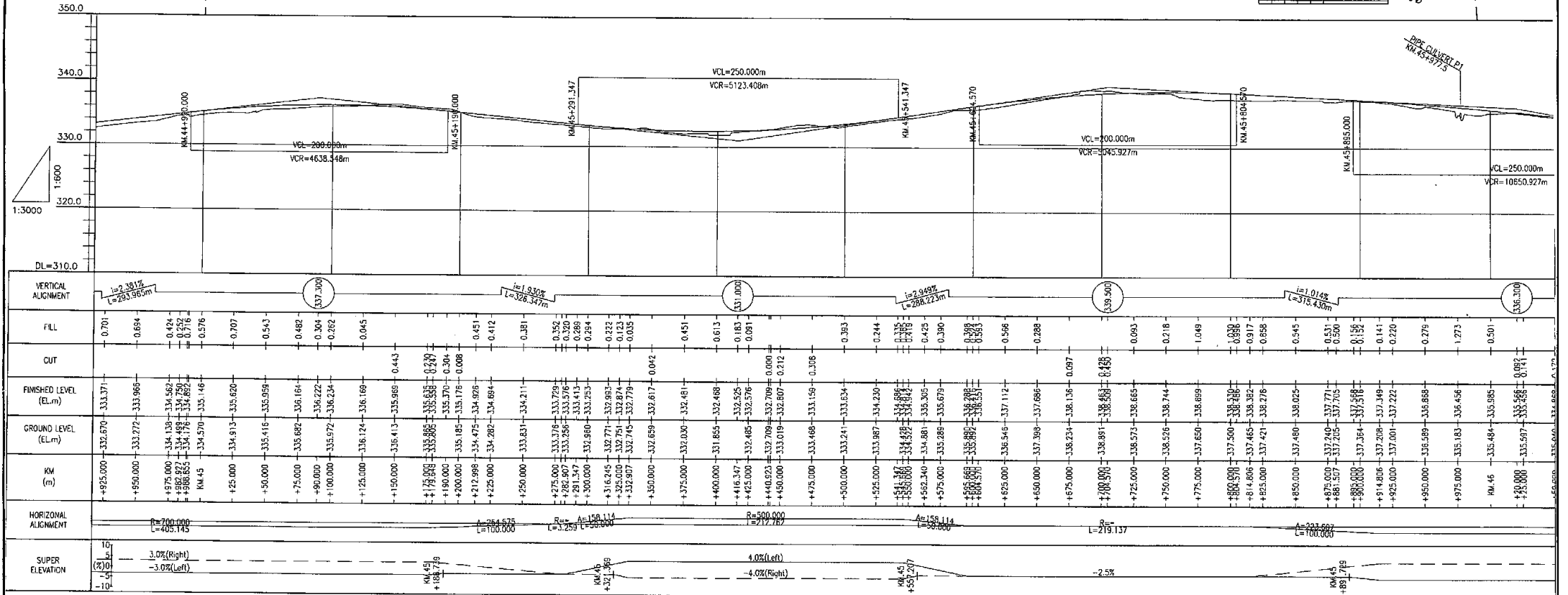
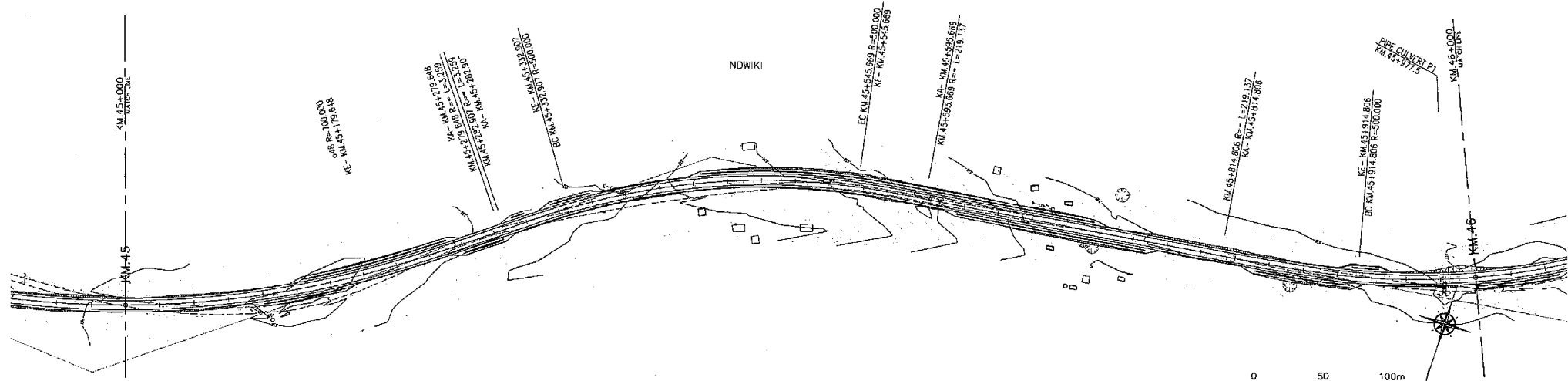


VERTICAL ALIGNMENT	FILL	CUT	FINISHED LEVEL (EL.m)	GROUND LEVEL (EL.m)	KM (m)	HORIZONTAL ALIGNMENT	SUPER ELEVATION
$i = -2.914\%$ $L = 175.000m$	-0.586		323.500	323.500	+925.000	$R = 1800.000$ $L = 255.221$	10% (Right) -2.5% (Left)
$i = 1.536\%$ $L = 140.000m$	-0.754		324.000	324.000	+884.886		
$i = 3.590\%$ $L = 195.000m$	-0.38		325.000	325.000	+845.000		
$i = 5.170\%$ $L = 280.000m$	0.403		326.000	326.000	+805.000		
$i = 1.96\%$ $L = 255.694m$	0.020	0.088	327.000	327.000	+765.000		
	0.492		328.000	328.000	+725.000		
	0.783		329.000	329.000	+685.000		
	0.852		330.000	330.000	+645.000		
	0.665		331.000	331.000	+605.000		
	1.698		332.000	332.000	+565.000		
	1.534		333.000	333.000	+525.000		
	1.355		334.000	334.000	+485.000		
	1.456		335.000	335.000	+445.000		
	1.305		336.000	336.000	+405.000		
	1.586		337.000	337.000	+365.000		
	0.660		338.000	338.000	+325.000		
	0.515		339.000	339.000	+285.000		
	0.892		340.000	340.000	+245.000		
	0.385		341.000	341.000	+205.000		
	0.477		342.000	342.000	+165.000		
	0.735		343.000	343.000	+125.000		
	0.751		344.000	344.000	+85.000		
	0.809		345.000	345.000	+45.000		
	0.388		346.000	346.000	+5.000		
	0.094		347.000	347.000	-35.000		
	0.686		348.000	348.000	-75.000		
	0.572		349.000	349.000	-115.000		
	0.929		350.000	350.000	-155.000		
	0.872		351.000	351.000	-195.000		
	0.712		352.000	352.000	-235.000		
	0.797		353.000	353.000	-275.000		
	0.595		354.000	354.000	-315.000		
	0.406		355.000	355.000	-355.000		
	0.253		356.000	356.000	-395.000		
	0.443		357.000	357.000	-435.000		
	0.656		358.000	358.000	-475.000		
	0.246		359.000	359.000	-515.000		
	0.506		360.000	360.000	-555.000		
	0.489		361.000	361.000	-595.000		
	0.374		362.000	362.000	-635.000		
	0.256		363.000	363.000	-675.000		
	0.263		364.000	364.000	-715.000		
	0.450		365.000	365.000	-755.000		
	0.264		366.000	366.000	-795.000		
	0.100		367.000	367.000	-835.000		
	0.069		368.000	368.000	-875.000		
	0.147		369.000	369.000	-915.000		
	0.353		370.000	370.000	-955.000		
	0.659		371.000	371.000	-995.000		
	0.773		372.000	372.000	-1035.000		

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (12/23)	Prepared by:	MR 03 E-12
				Checked by:	



<b>Tanzania National Roads Agency (TANROADS)</b> of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (13/23)	Prepared by:	MR 03 E-13
				Checked by:	



VERTICAL ALIGNMENT	FILL	CUT	FINISHED LEVEL (EL.m)	GROUND LEVEL (EL.m)	KM	HORIZONTAL ALIGNMENT	SUPER ELEVATION (%)
	0.701		333.371	332.670	+4925.000	R=700.000 L=405.145	10% 3.0% (Right) -3.0% (Left)
	0.854		333.966	333.272	+4950.000		
	0.426		334.562	334.138	+4975.000		
	0.252		334.750	334.488	+4988.927		
	0.716		334.862	334.176	+4986.855		
	0.576		335.146	334.570	KA 45		
	0.707		335.620	334.913	+4925.000		
	0.543		335.958	335.418	+5000.000		
	0.482		336.164	335.882	+75.000		
	0.304		336.222	336.222	+90.000		
	0.262		336.234	335.972	+100.000		
	0.043		336.168	336.124	+125.000		
	0.443		335.969	335.413	+150.000		
	0.397		335.588	335.085	+175.000		
	0.304		335.370	335.370	+190.000		
	0.451		334.976	335.185	+200.000		
	0.412		334.894	334.282	+225.000		
	0.381		334.211	333.631	+250.000		
	0.592		333.728	333.178	+275.000		
	0.220		333.576	333.286	+285.000		
	0.284		333.253	332.880	+300.000		
	0.232		332.993	332.771	+316.245		
	0.123		332.874	332.751	+325.000		
	0.035		332.779	332.745	+332.907		
	0.042		332.617	332.659	+350.000		
	0.451		332.461	332.000	+375.000		
	0.613		332.468	331.855	+400.000		
	0.183		332.526	332.485	+416.347		
	0.081		332.576	332.405	+425.000		
	0.000		332.709	332.709	+440.523		
	0.212		332.807	333.019	+450.000		
	0.106		333.159	333.488	+475.000		
	0.383		333.634	333.241	+500.000		
	0.244		334.230	333.987	+525.000		
	0.335		334.866	334.639	+541.347		
	0.425		335.305	334.881	+562.340		
	0.390		335.679	335.288	+575.000		
	0.388		336.286	335.890	+585.668		
	0.524		336.634	336.187	+600.000		
	0.596		337.112	336.546	+625.000		
	0.288		337.666	337.399	+650.000		
	0.087		338.136	338.234	+675.000		
	0.438		338.633	338.891	+700.000		
	0.093		338.665	338.573	+725.000		
	0.036		338.744	338.526	+750.000		
	0.917		338.868	337.465	+814.806		
	0.858		338.278	337.421	+825.000		
	0.545		338.025	337.480	+850.000		
	0.531		337.771	337.248	+875.000		
	0.520		337.705	337.295	+881.517		
	0.156		337.588	337.384	+890.000		
	0.141		337.449	337.208	+914.806		
	0.220		337.222	337.000	+925.000		
	0.279		336.688	336.589	+950.000		
	1.273		336.456	335.163	+975.000		
	0.501		335.985	335.484	KA 46		
	0.097		335.565	335.597	+430.000		
	0.141		335.668	335.597	+430.000		
	0.141		335.668	335.597	+430.000		

Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

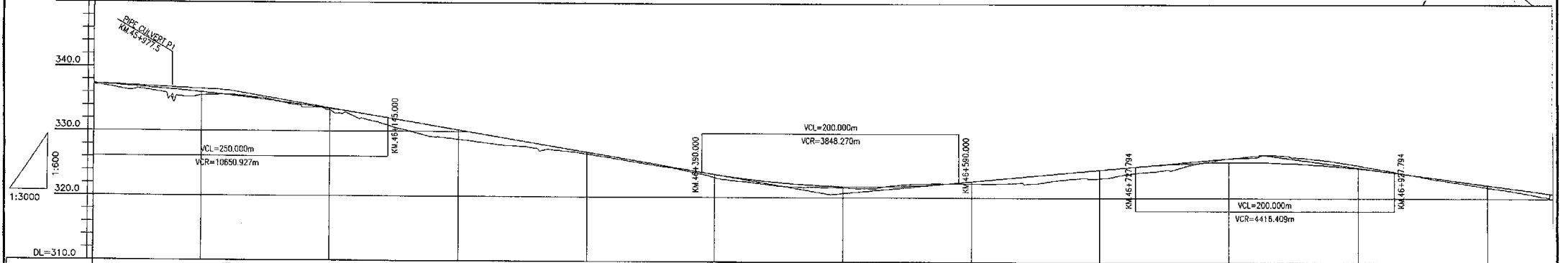
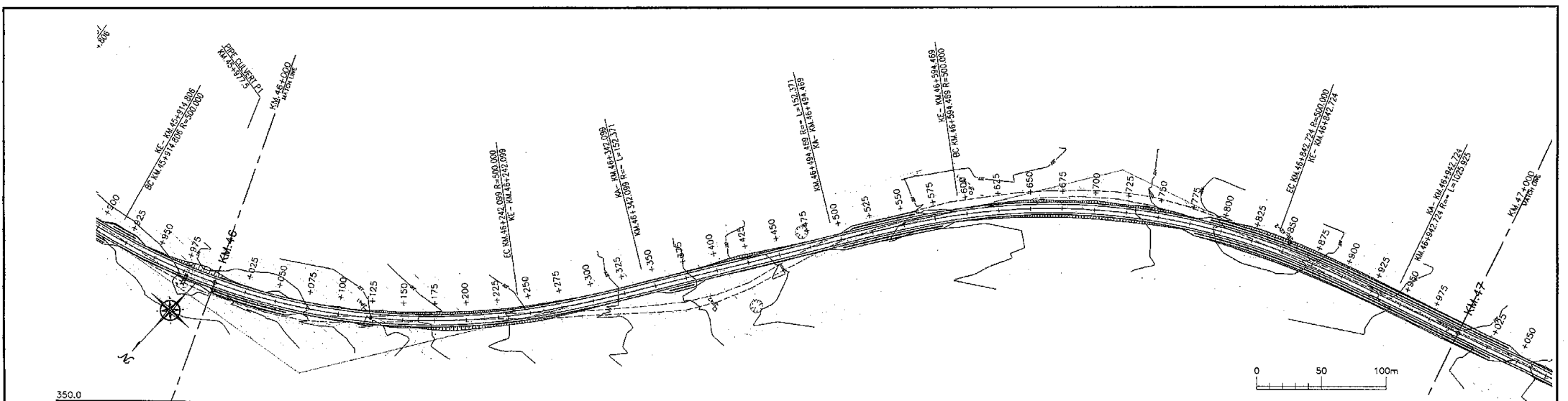
CONSULTANTS:  
**INGEROSEC CORPORATION, JAPAN**

PROJECT NAME:  
**The Project for the Improvement of Masasi-Mangaka Road**

DRAWING TITLE:  
**PLAN AND PROFILE (14/23)**

Date: Aug. 2008  
Prepared by:  
Checked by:

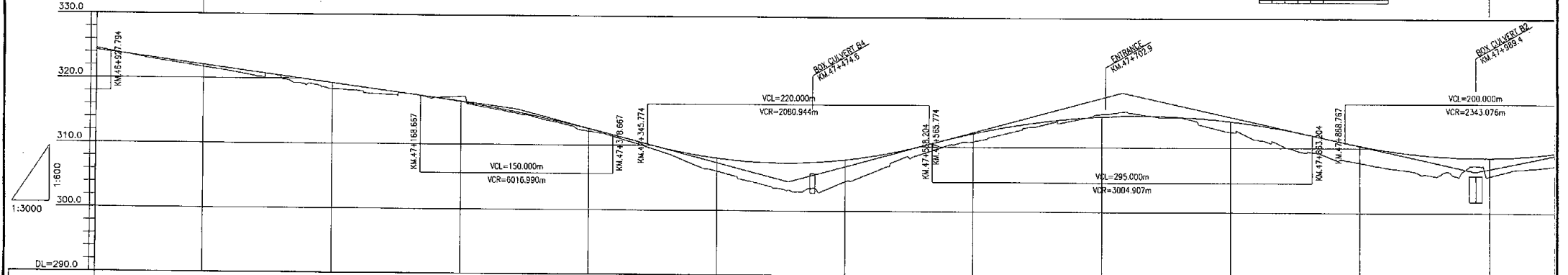
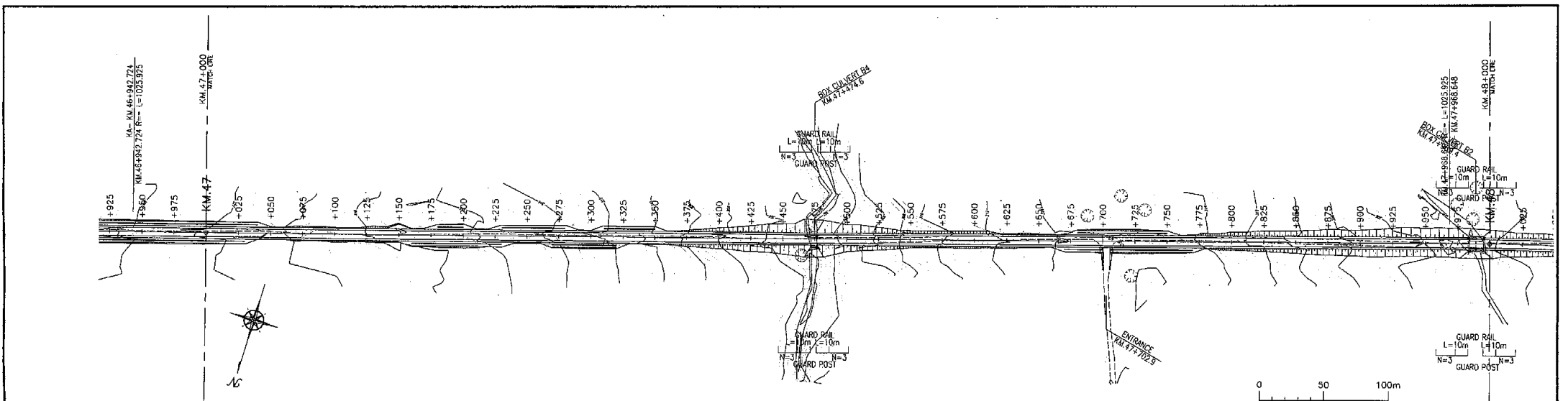
DRAWING No.:  
**MR 03 E-14**



VERTICAL ALIGNMENT	FILL	CUT	FINISHED LEVEL (EL.m)	GROUND LEVEL (EL.m)	KM (m)	HORIZONTAL ALIGNMENT	SUPER ELEVATION (%)
	0.270		+337.000 - +337.222	+337.000 - +337.222	+925.000		
	0.279		+336.868	+336.868	+950.000		
	1.273		+336.456	+335.183	+975.000		
	0.501		+335.995	+335.484	KM 46		
			+335.508	+335.597	+980.000		
			+335.040	+335.040	+50.000		
			+334.049	+334.049	+75.000		
			+333.958	+333.717	+84.557		
			+333.724	+333.756	+92.843		
			+333.516	+333.353	+100.000		
			+332.751	+332.052	+125.000		
			+331.530	+330.625	+150.000		
			+330.249	+328.380	+175.000		
			+329.409	+328.863	+200.000		
			+328.687	+328.180	+225.000		
			+328.047	+327.831	+242.089		
			+327.472	+327.749	+250.000		
			+326.844	+327.218	+275.000		
			+326.284	+326.626	+300.000		
			+325.838	+325.830	+325.000		
			+325.538	+325.257	+342.099		
			+325.219	+325.017	+350.000		
			+324.869	+324.153	+375.000		
			+324.539	+323.882	+390.000		
			+324.219	+323.034	+400.000		
			+323.844	+322.425	+425.000		
			+323.512	+321.788	+450.000		
			+323.193	+321.655	+475.000		
			+322.865	+321.788	+490.000		
			+322.519	+321.527	+500.000		
			+322.166	+321.489	+525.000		
			+321.818	+321.509	+550.000		
			+321.437	+322.206	+561.171		
			+321.057	+322.089	+575.000		
			+320.677	+322.219	+590.000		
			+320.297	+322.226	+605.000		
			+320.000	+322.246	+650.000		
			+320.000	+322.873	+675.000		
			+320.000	+323.038	+700.000		
			+320.000	+324.354	+721.211		
			+320.000	+324.744	+727.794		
			+320.000	+325.216	+750.000		
			+320.000	+325.479	+775.000		
			+320.000	+325.800	+800.000		
			+320.000	+326.528	+825.000		
			+320.000	+326.479	+842.724		
			+320.000	+326.417	+850.000		
			+320.000	+325.887	+875.000		
			+320.000	+325.113	+900.000		
			+320.000	+324.668	+925.000		
			+320.000	+324.081	+942.724		
			+320.000	+323.584	+950.000		
			+320.000	+323.292	+975.000		
			+320.000	+322.736	+995.000		
			+320.000	+322.082	KM 47		
			+320.000	+321.388	+125.000		

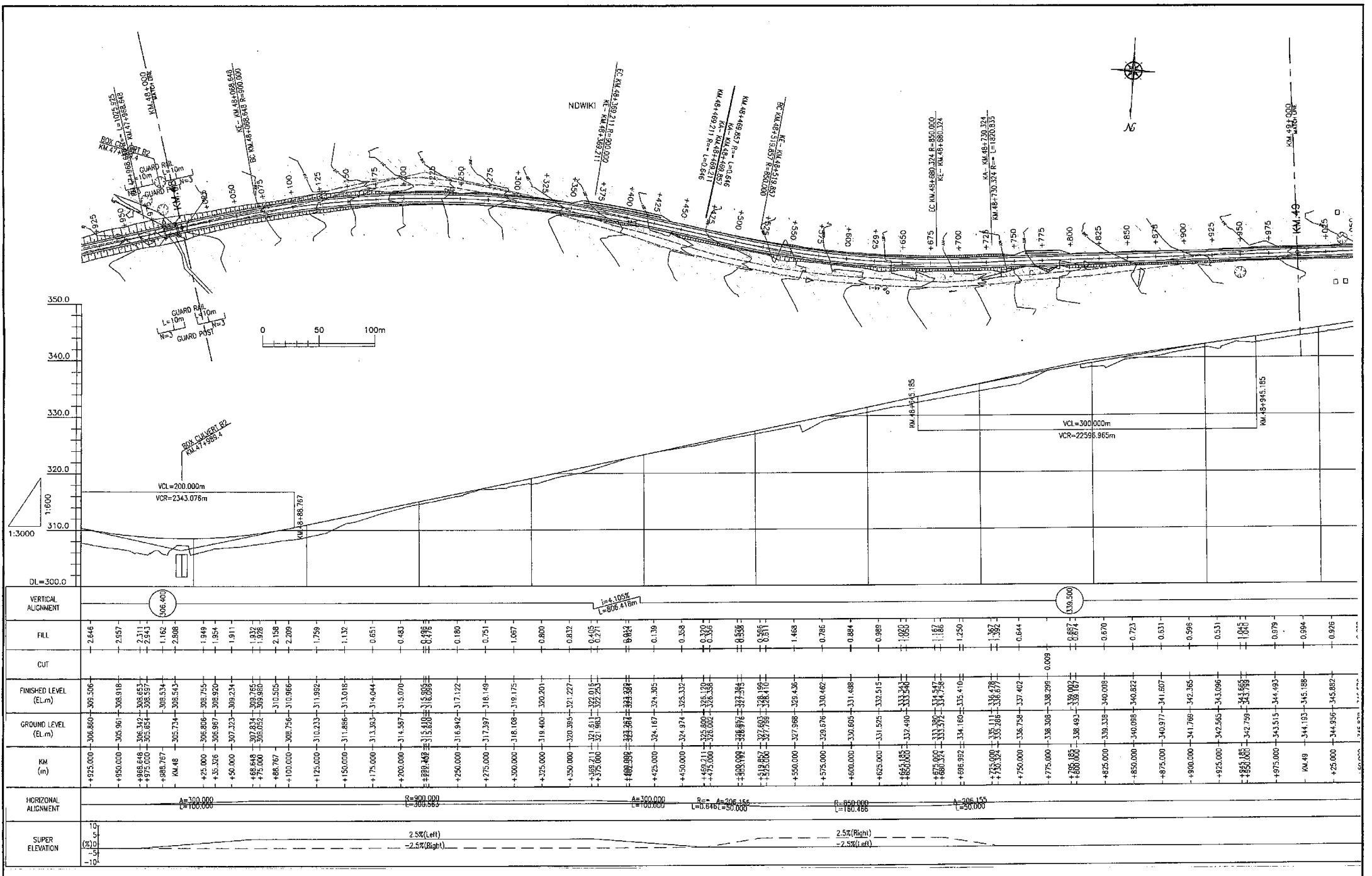
Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING NO.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (15/23)	Prepared by:	MR 03 E-15
				Checked by:	



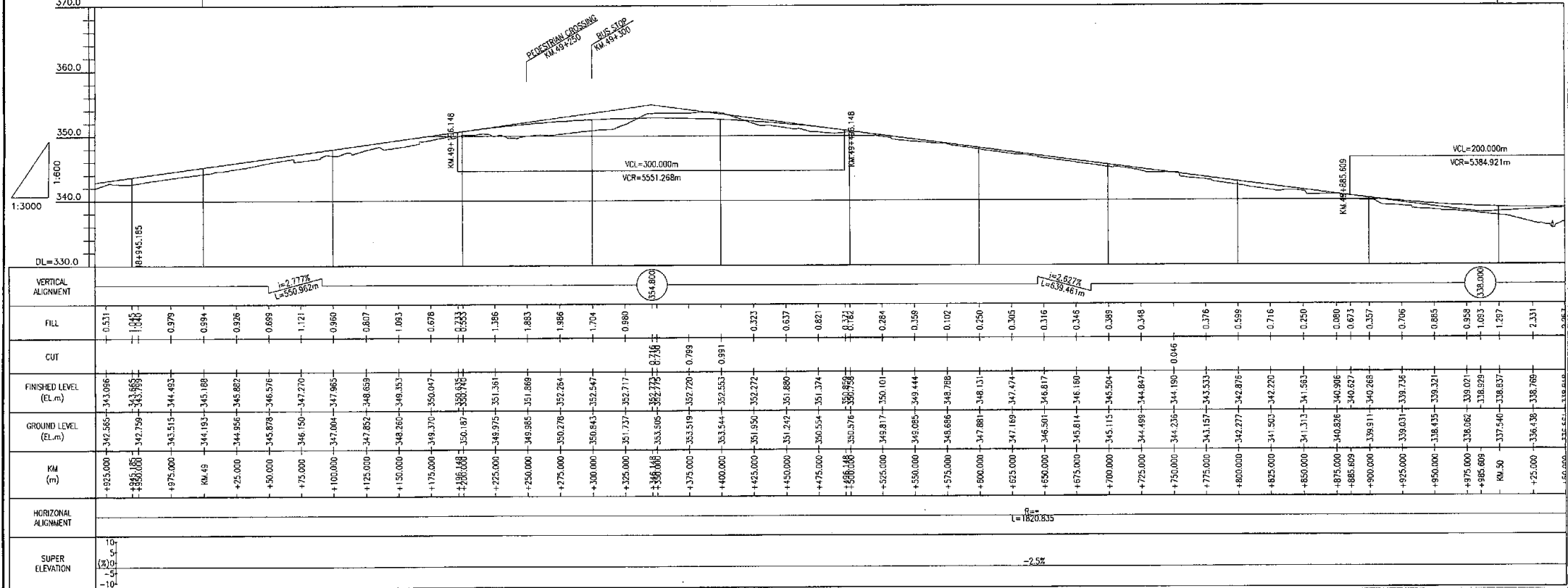
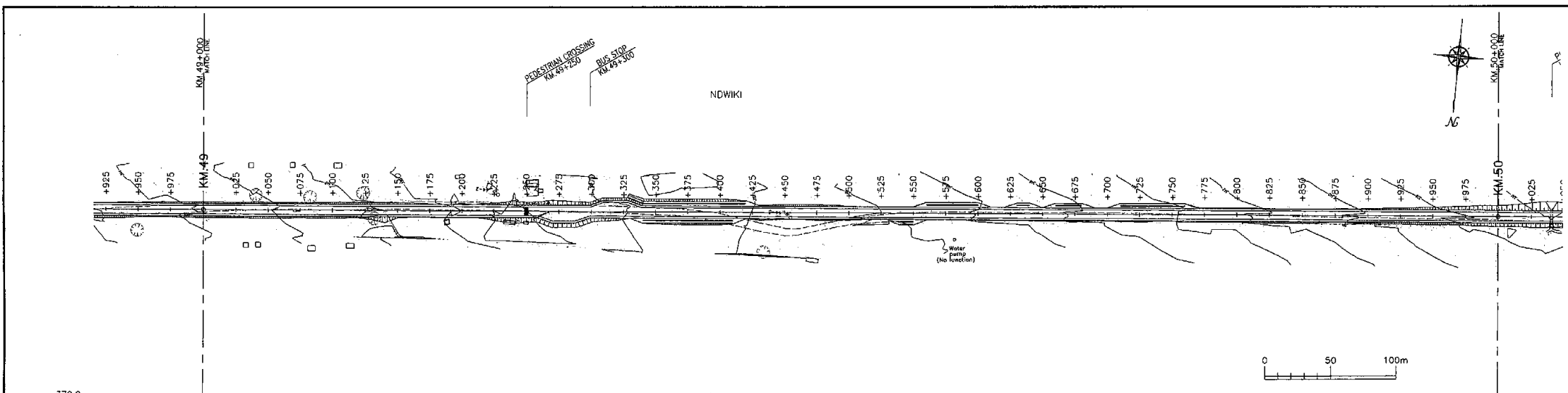


VERTICAL ALIGNMENT	FILL	CUT	FINISHED LEVEL (EL.m)	GROUND LEVEL (EL.m)	KM (m)	HORIZONTAL ALIGNMENT	SUPER ELEVATION
	0.145		324.081	324.081	+925.000	$i=2.693\%$ $L=415.873m$	10
	0.041		323.695	323.695	+942.724		5
	0.117		323.409	323.409	+950.000		0
	0.253		322.736	322.736	+975.000		-5
	0.352		322.062	322.062	KM 47		-10
	0.458		321.389	321.389	+925.000		
	0.018		320.716	320.716	+950.000		
	0.736		320.042	320.042	+975.000		
	0.931		319.368	319.368	+1000.000		
	0.877		318.695	318.695	+125.000		
	0.448		318.022	318.022	+150.000		
	0.021		317.349	317.349	+168.667		
	0.168		316.676	316.676	+175.000		
	0.771		316.003	316.003	+200.000		
	0.200		315.330	315.330	+225.000		
	0.214		314.657	314.657	+243.667		
	0.168		313.984	313.984	+250.000		
	0.208		313.311	313.311	+275.000		
	0.403		312.638	312.638	+300.000		
	0.234		311.965	311.965	+318.667		
	0.266		311.292	311.292	+325.000		
	0.574		310.619	310.619	+345.724		
	0.574		309.946	309.946	+360.000		
	1.237		309.273	309.273	+375.000		
	1.989		308.600	308.600	+400.000		
	2.994		307.927	307.927	+425.000		
	3.995		307.254	307.254	+450.000		
	4.161		306.581	306.581	+453.724		
	3.995		305.908	305.908	+475.000		
	3.351		305.235	305.235	+500.000		
	2.315		304.562	304.562	+525.000		
	1.314		303.889	303.889	+550.000		
	1.146		303.216	303.216	+565.724		
	1.021		302.543	302.543	+575.000		
	1.255		301.870	301.870	+600.000		
	0.987		301.197	301.197	+625.000		
	0.588		300.524	300.524	+650.000		
	0.341		299.851	299.851	+675.000		
	0.129		299.178	299.178	+700.000		
	0.972		298.505	298.505	+715.704		
	1.657		297.832	297.832	+725.000		
	2.301		297.159	297.159	+750.000		
	2.806		296.486	296.486	+825.000		
	2.610		295.813	295.813	+850.000		
	2.736		295.140	295.140	+863.704		
	2.680		294.467	294.467	+875.000		
	2.600		293.794	293.794	+886.767		
	2.846		293.121	293.121	+900.000		
	2.857		292.448	292.448	+925.000		
	2.311		291.775	291.775	+950.000		
	2.944		291.102	291.102	+966.648		
	1.164		290.429	290.429	+975.000		
	2.600		289.756	289.756	+986.767		
	1.946		289.083	289.083	KM 49		
	1.951		288.410	288.410	+925.000		
			287.737	287.737	+950.000		
			287.064	287.064	+966.648		
			286.391	286.391	+975.000		
			285.718	285.718	+986.767		
			285.045	285.045	+1000.000		

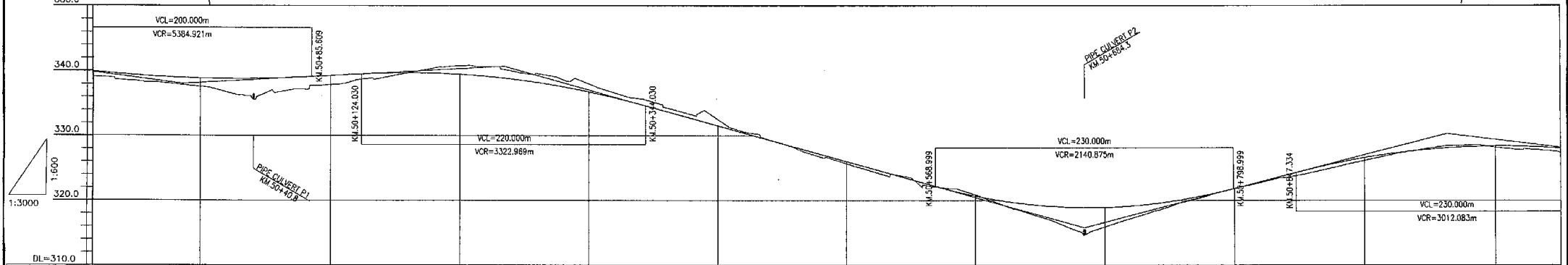
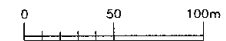
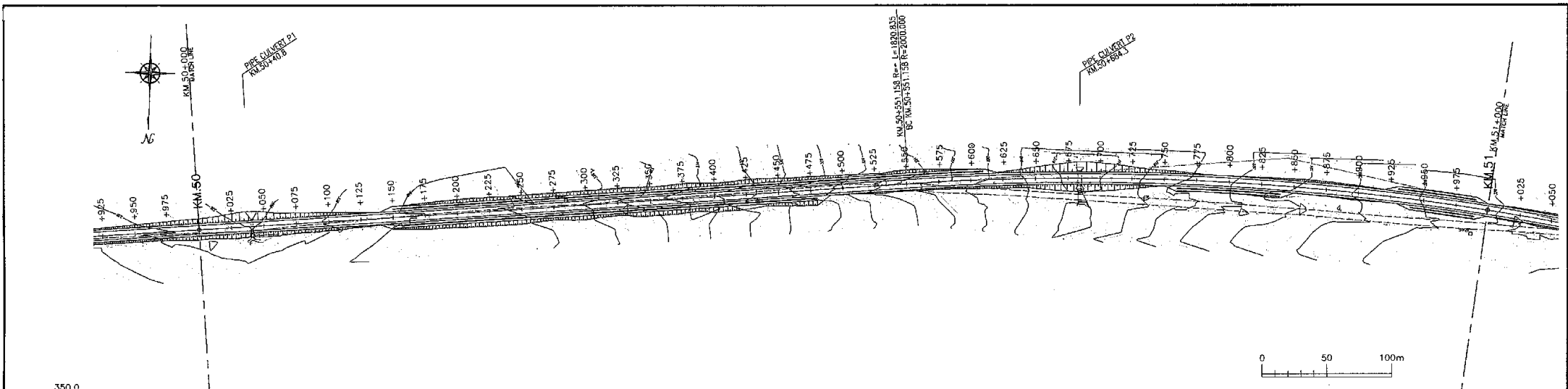
Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug, 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (16/23)	Prepared by:	MR 03 E-16
				Checked by:	



Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (17/23)	Prepared by:	MR 03 E-17
				Checked by:	

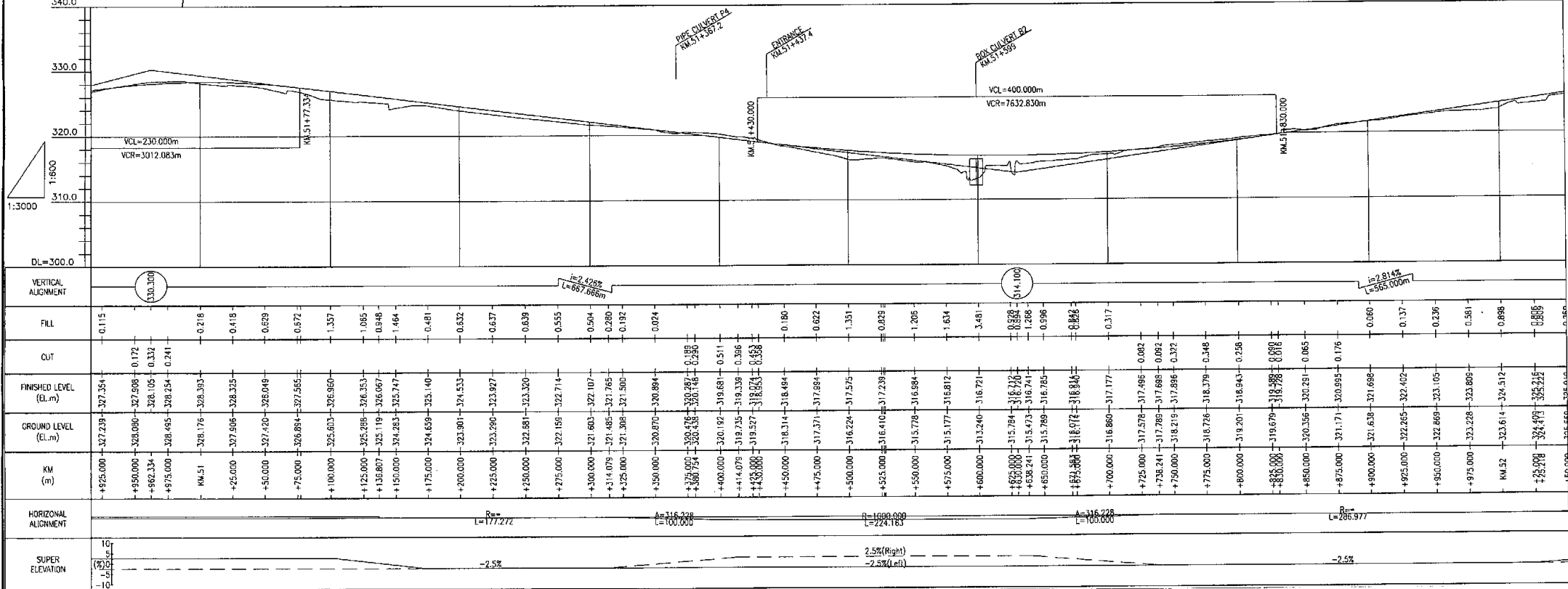
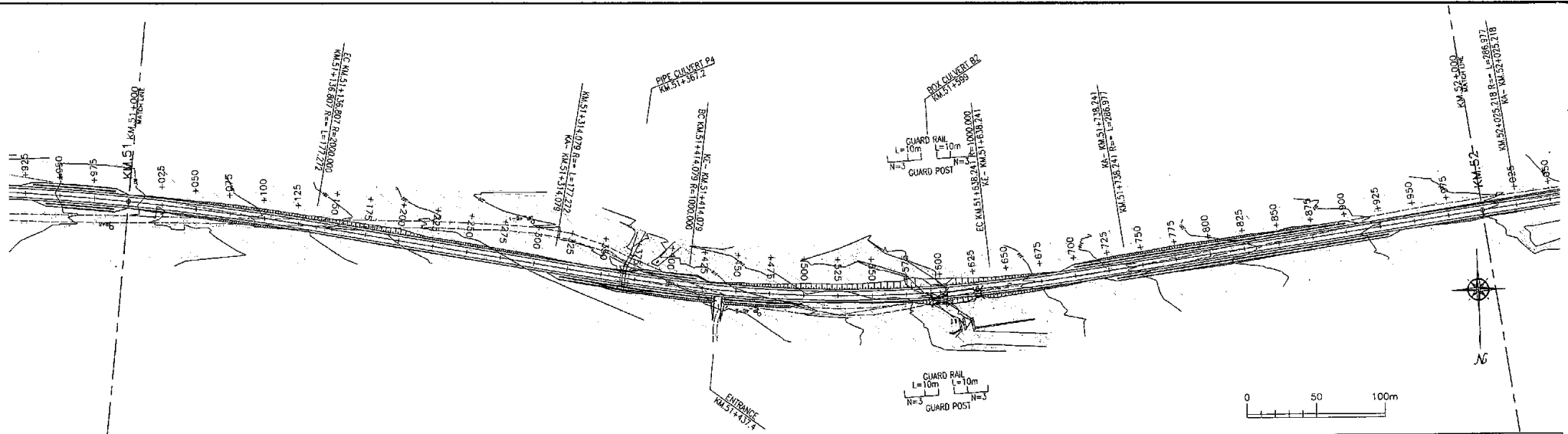


Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (18/23)	Prepared by:	MR 03 E-18
				Checked by:	

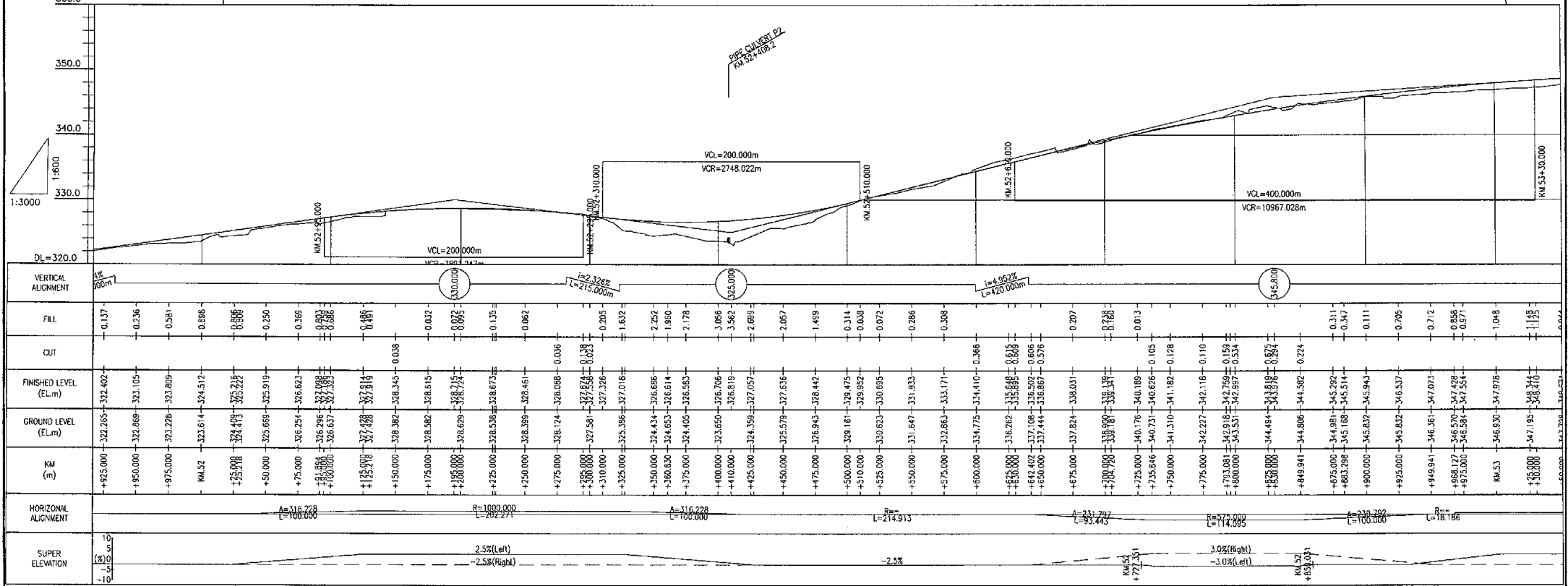
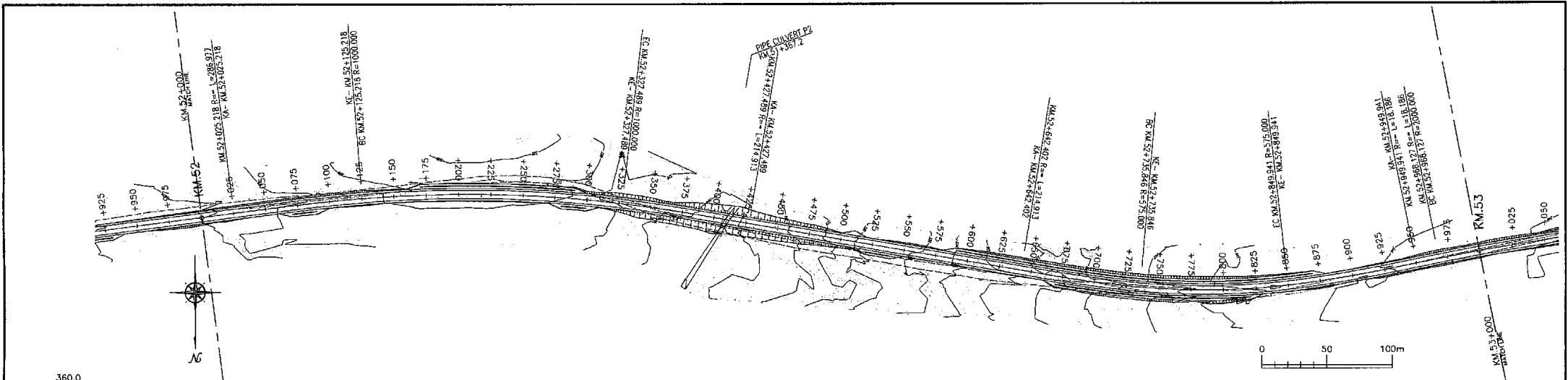


VERTICAL ALIGNMENT	DL=310.0	
FILL	0.706	0.885
OUT	-0.356	-0.297
FINISHED LEVEL (EL.m)	339.716	339.321
GROUND LEVEL (EL.m)	339.031	338.435
KM (m)	4925.000	4950.000
HORIZONTAL ALIGNMENT	R=2000.000 L=385.648	
SUPER ELEVATION	2.5% (Left) -2.5% (Right)	

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (19/23)	Prepared by:	MR 03 E-19
				Checked by:	

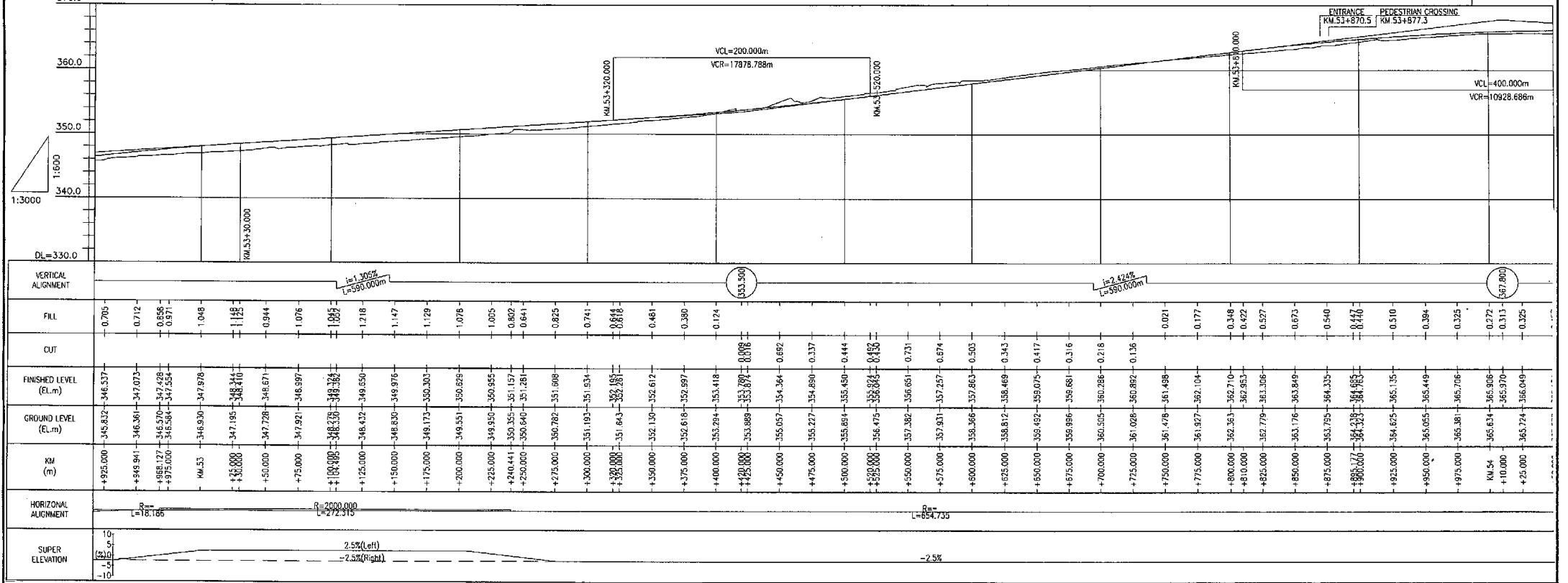
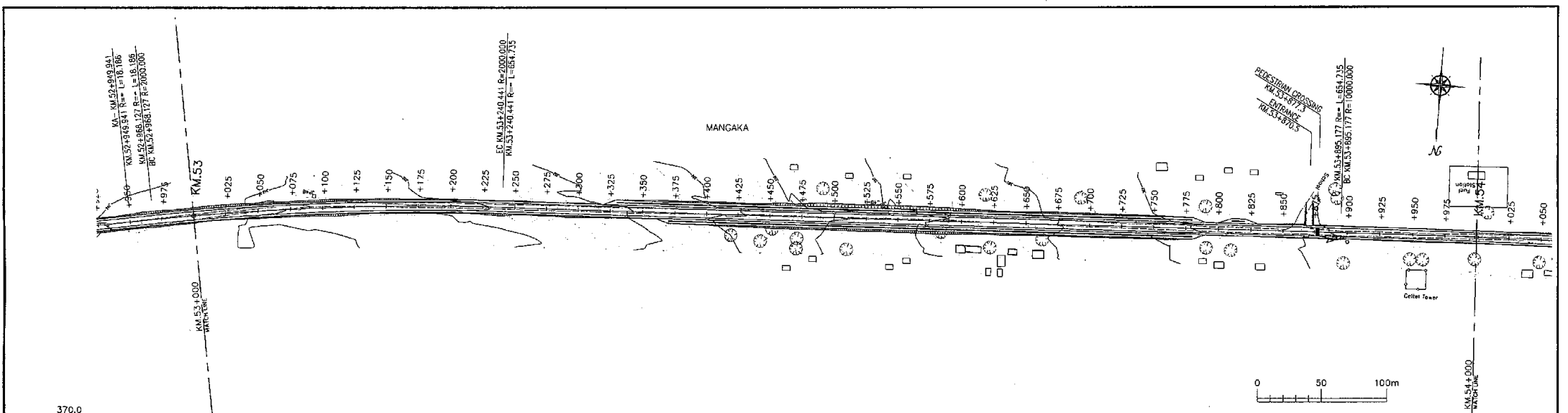


<b>Tanzania National Roads Agency (TANROADS)</b> of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (20/23)	Prepared by:	MR 03 E-20
				Checked by:	

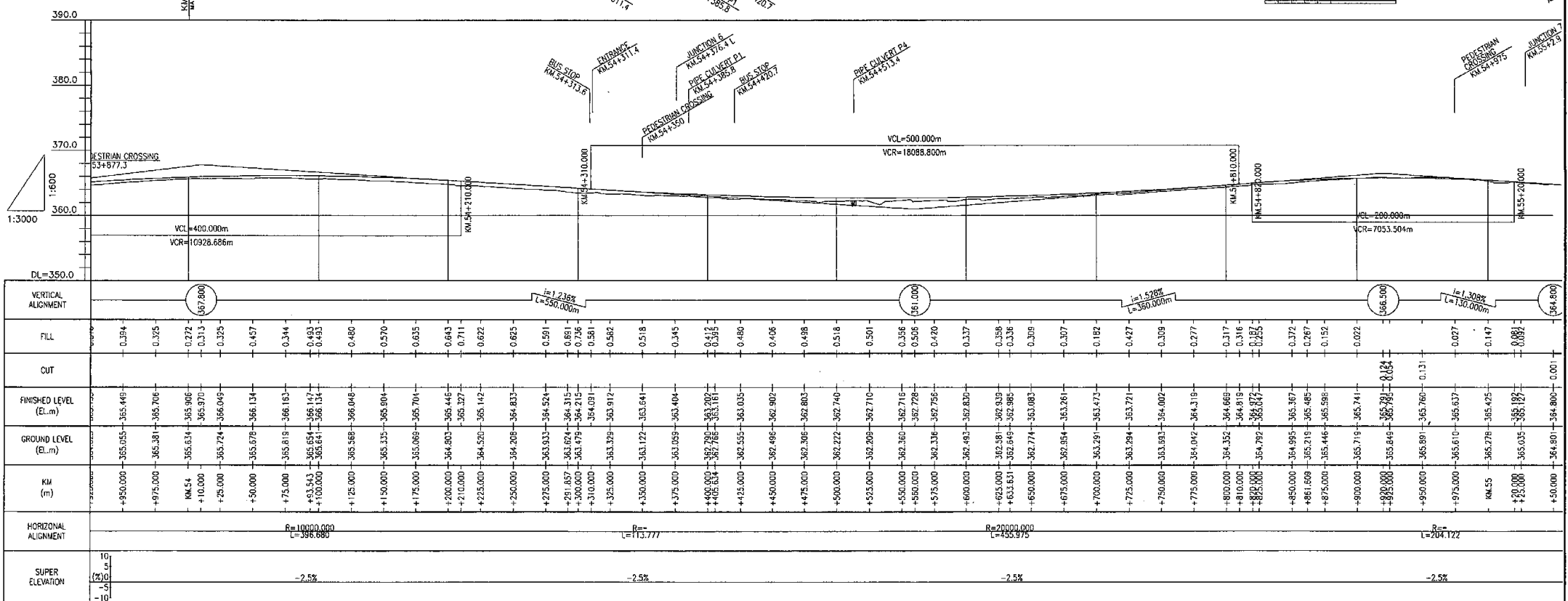
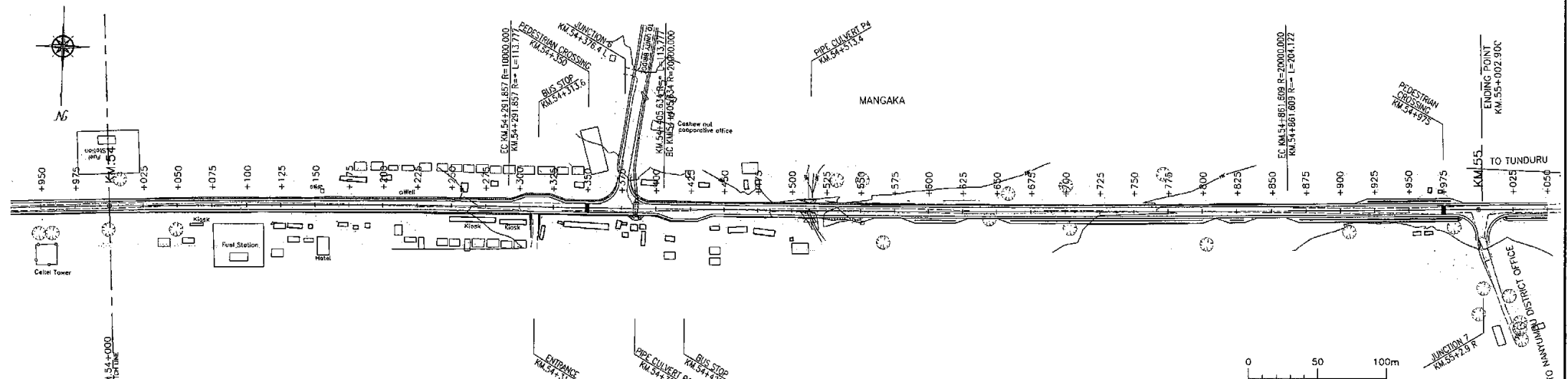


VERTICAL ALIGNMENT	DL=320.0	330.0	340.0	350.0	360.0
FILL	0.137	0.236	0.581	0.886	0.886
CUT	0.250	0.369	0.503	0.637	0.886
FINISHED LEVEL (EL.m)	322.855	323.105	323.809	324.512	325.215
GROUND LEVEL (EL.m)	322.718	322.869	323.228	324.619	325.215
KM (m)	+925.000	+950.000	+975.000	+1000.000	+1025.000
HORIZONTAL ALIGNMENT	A=316.228, R=1000.000, L=100.000				
SUPER ELEVATION	-2.5% (Left), -2.5% (Right), 3.0% (Right), -3.0% (Left)				

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING NO.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (21/23)	Prepared by:	MR 03 E-21
				Checked by:	

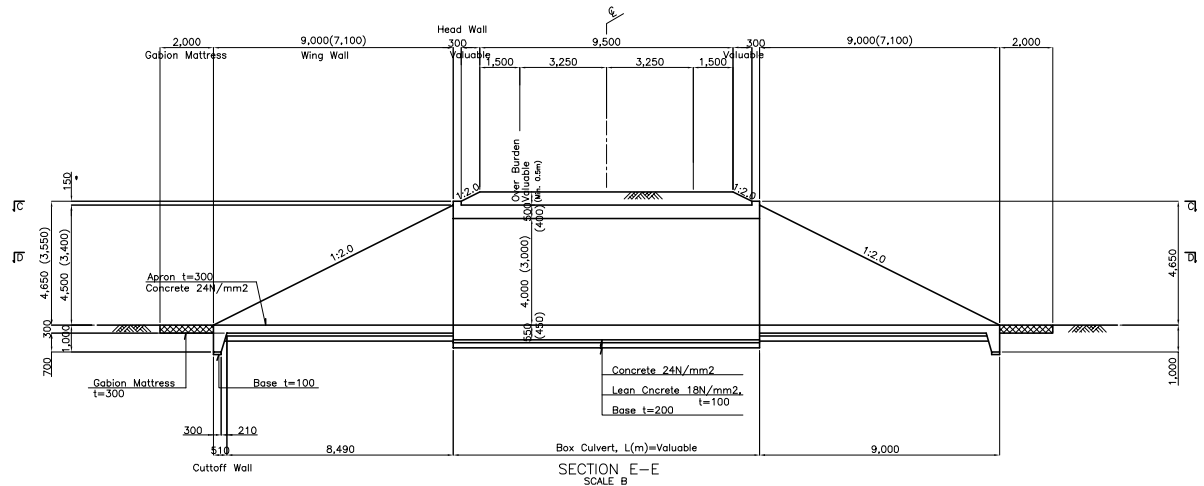
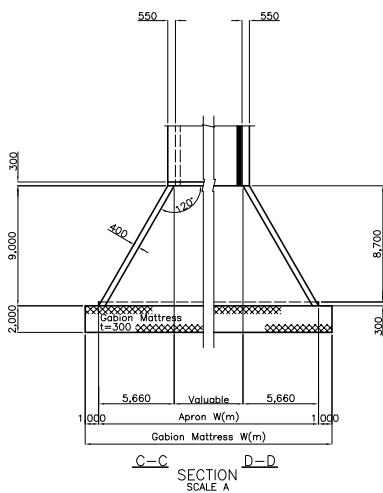
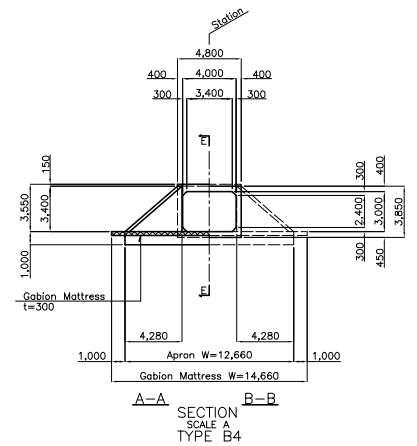
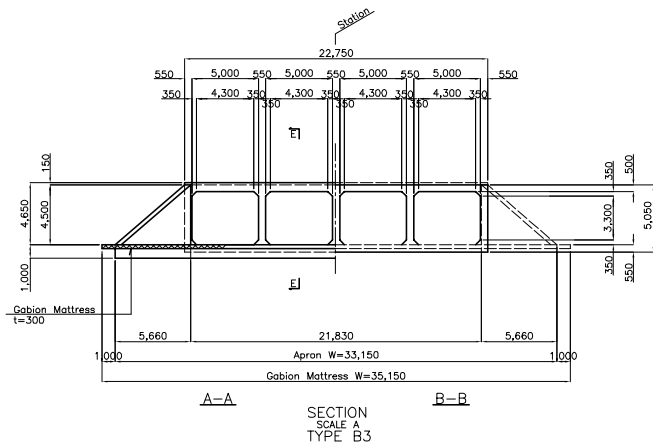
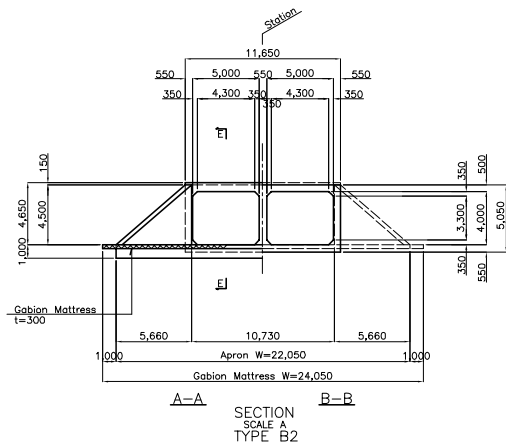
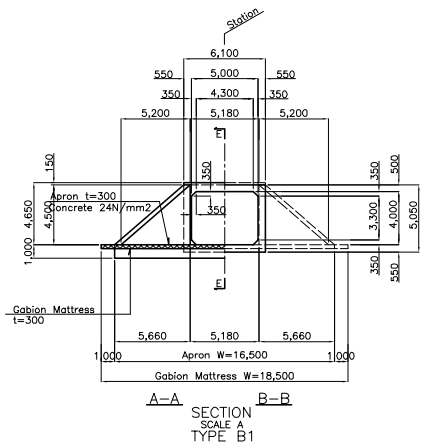


Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (22/23)	Prepared by:	MR 03 E-22
				Checked by:	

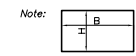
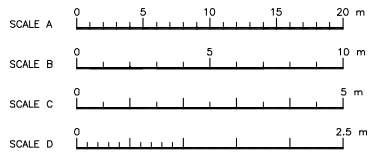


<p>Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania</p>	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	PLAN AND PROFILE (23/23)	Prepared by:	MR 03 E-23
				Checked by:	





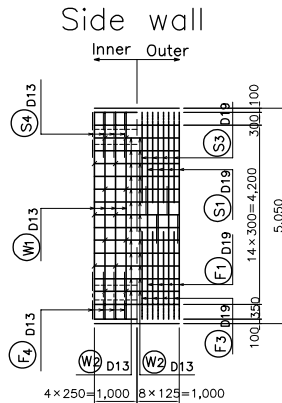
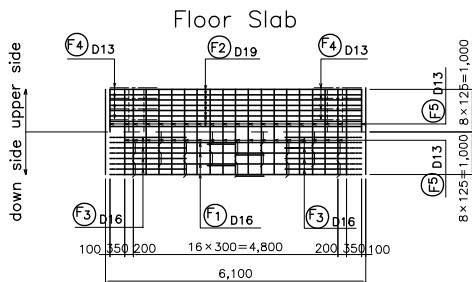
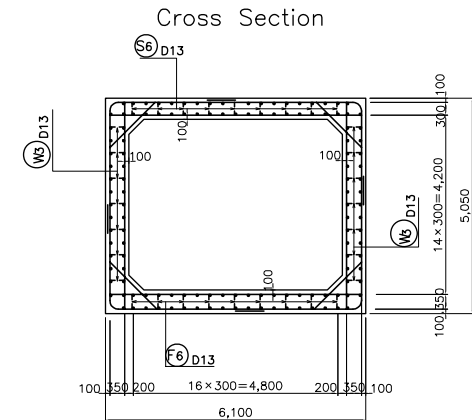
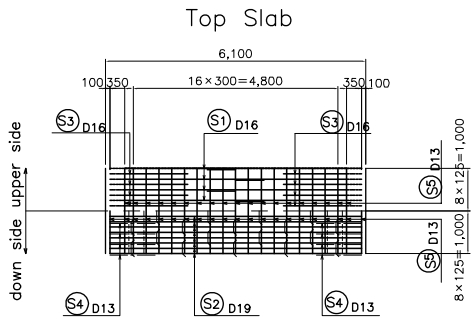
Note: Dimensions with ( ) are for Box Culvert Type B4.



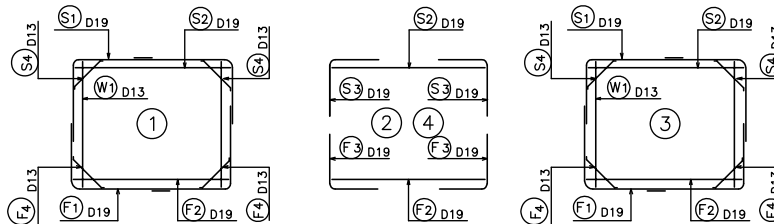
Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for Upgrading the Improvement of Masasi-Mangaka Road	LOCATION AND DIMENSION OF BOX CULVERT	Prepared by:	MR 03 F-1
				Checked by:	

# BOX CULVERT 5.0x4.0

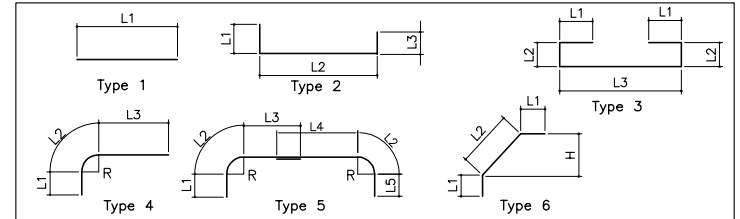
SCALE F



Main Bar Arrangement



## Bar Arrangement List



Class	Type	D	Q'ty	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	R (mm)
S1	5	D19	4	11,860	2,865							200
S2	1	D19	8	5,900	5,900							
S3	4	D19	8	3,860	1,920	314	1,625					200
S4	6	D13	8	1,700	100	1,497	100				1,059	
S5	1	D13	42	1,000	1,000							
S6	3	D13	18	1,150	100	332	282					
W1	1	D13	8	4,850	4,850							
W2	1	D13	52	1,000	1,000							
W3	2	D13	28	580	100	379	100					
F1	5	D19	4	11,960	2,250	314	3,415	2,750	2,915			200
F2	1	D19	8	5,900	5,900							
F3	4	D19	8	3,760	1,849	314	1,590					200
F4	6	D13	8	1,770	100	1,568					1,109	
F5	1	D13	42	1,000	1,000							
F6	3	D13	18	1,250	100	382	282					

## Reinforced Bar Weight List

Class	D	L (mm)	Q'ty	Unit Weight (kg/m)	Weight (kg/bar)	Total Weight (kg)	Remark
S1	D19	11,860	4	2.25	26.685	106.740	—
S2	D19	5,900	8	2.25	13.275	106.200	—
S3	D19	3,860	8	2.25	8.685	69.480	—
S4	D13	1,700	8	0.995	1.692	13.536	—
S5	D13	1,000	42	0.995	0.995	41.790	—
S6	D13	1,150	18	0.995	1.144	20.592	—
W1	D13	4,850	8	0.995	4.826	38.608	—
W2	D13	1,000	52	0.995	0.995	51.740	—
W3	D13	580	28	0.995	0.577	16.156	—
F1	D19	11,960	4	2.25	26.910	107.640	—
F2	D19	5,900	8	2.25	13.275	106.200	—
F3	D19	3,760	8	2.25	8.460	67.680	—
F4	D13	1,770	8	0.995	1.761	14.088	—
F5	D13	1,000	42	0.995	0.995	41.790	—
F6	D13	1,250	18	0.995	1.244	22.392	—

SCALE F 0 5 6.25 m

Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for Upgrading the Improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BOX CULVERT 5.0x4.0x1  
MAIN BODY BAR ARRANGEMENT

Date: Aug. 2009

Prepared by:

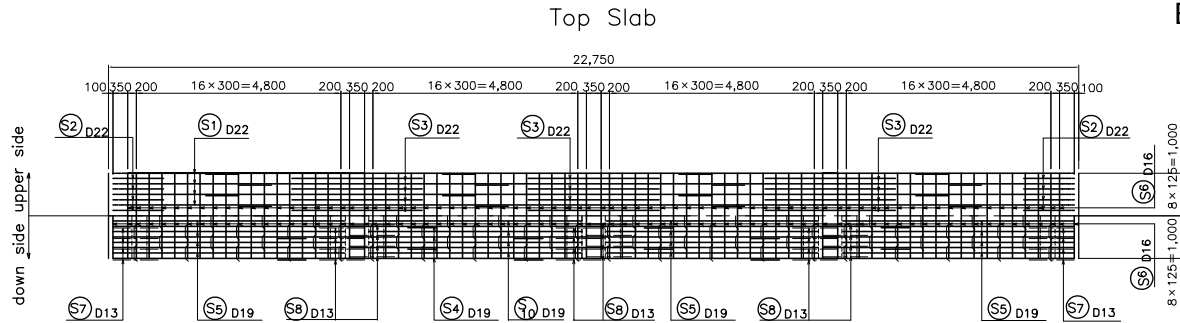
Checked by:

DRAWING No.:

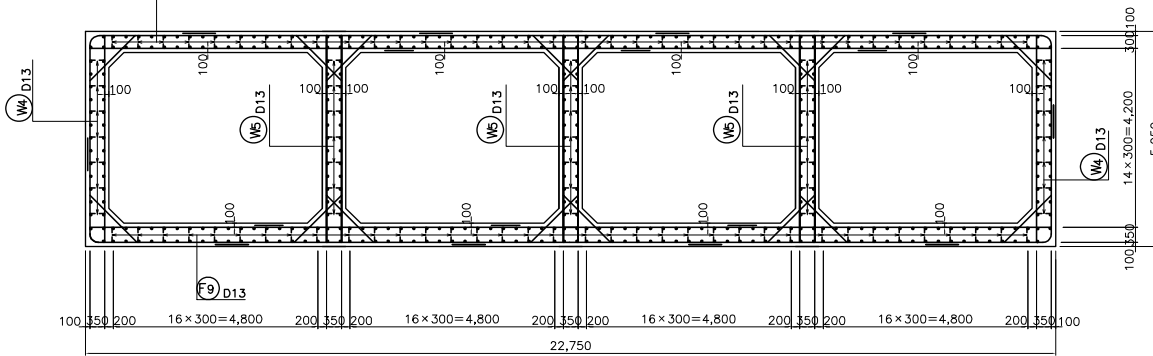
MR 03 F-2

# BOX CULVERT 5.0×4.0-4 (1/2)

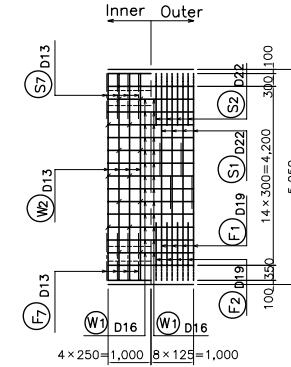
SCALE F



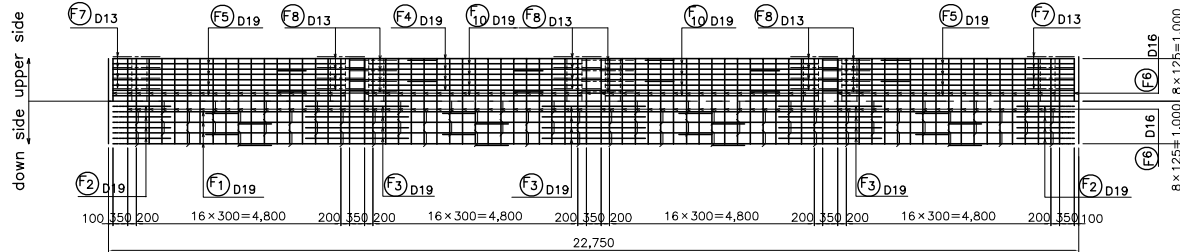
Cross Section



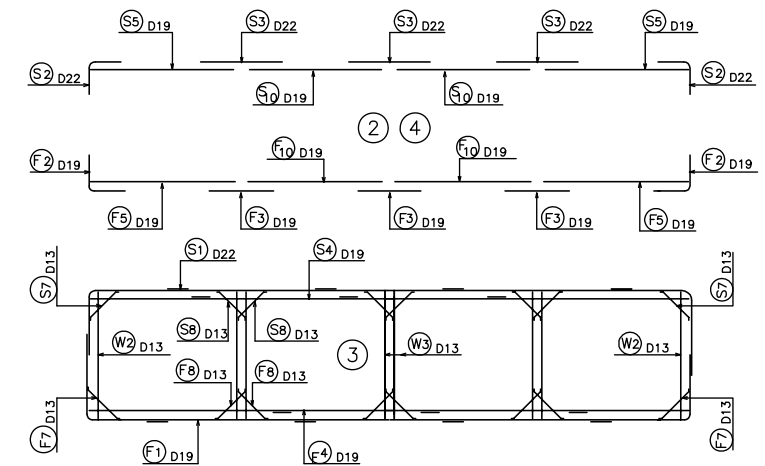
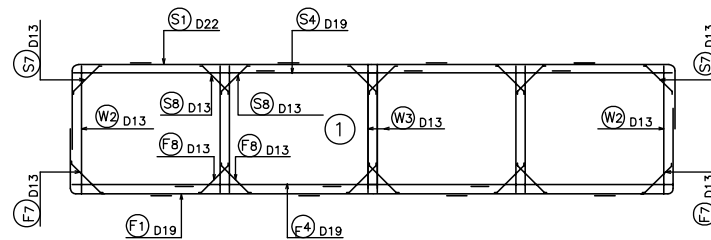
Side wall



Floor Slab



Main Bar Arrangement



SCALE F 0 5 6.25 m

Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for Upgrading the Improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BOX CULVERT 5.0×4.0×4  
MAIN BODY BAR ARRANGEMENT(1/2)

Date: Aug. 2009  
Prepared by:  
Checked by:

DRAWING No.:  
MR 03 F-3

# BOX CULVERT 5.0x4.0-4 (2/2)

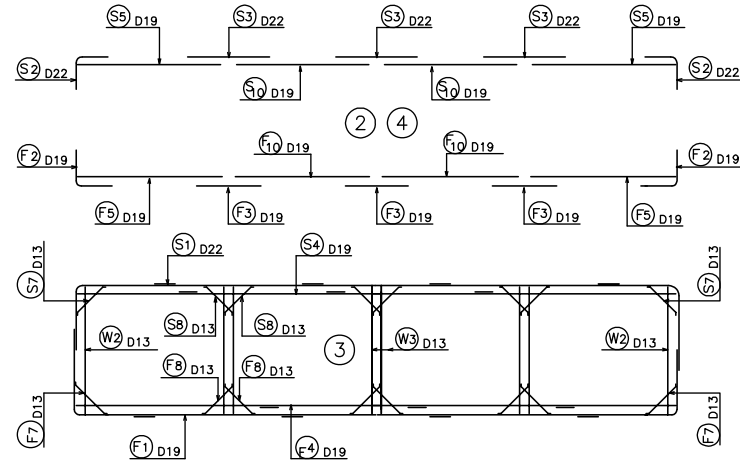
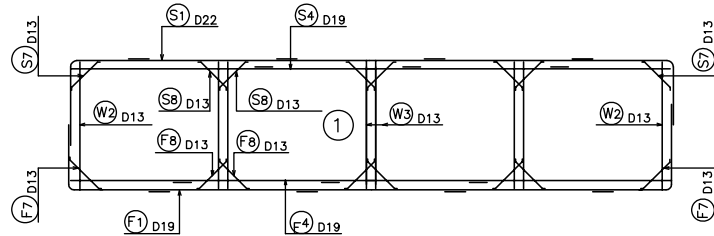
Reinforced Bar Weight List

Class	D	L (mm)	Q'ty	Unit Weight (kg/m)	Weight (kg/bar)	Total Weight (kg)	Remark
S1	D22	30,990	4	3.04	94.210	376.840	
S2	D22	2,310	8	3.04	7.022	56.176	
S3	D22	3,060	12	3.04	9.302	111.624	
S4	D19	24,550	4	2.25	55.238	220.952	
S5	D19	5,430	8	2.25	12.218	97.744	
S6	D16	1,000	154	1.56	1.560	240.240	
S7	D13	1,700	8	0.995	1.692	13.536	
S8	D13	1,700	24	0.995	1.692	40.608	
S9	D13	1,160	72	0.995	1.154	83.088	
S10	D19	5,000	8	2.25	11.250	90.000	
W1	D16	1,000	130	1.56	1.560	202.800	
W2	D13	4,850	8	0.995	4.826	38.608	
W3	D13	4,850	24	0.995	4.826	115.824	
W4	D13	590	28	0.995	0.587	16.436	
W5	D13	580	42	0.995	0.577	24.234	
F1	D19	30,710	4	0.995	69.098	276.392	
F2	D19	2,620	8	2.25	5.895	47.160	
F3	D19	2,420	12	2.25	5.445	65.340	
F4	D19	24,550	4	2.25	55.238	220.952	
F5	D19	5,720	8	2.25	12.870	102.960	
F6	D16	1,000	154	1.56	1.560	240.240	
F7	D13	1,770	8	0.995	1.761	14.088	
F8	D13	1,770	24	0.995	1.761	42.264	
F9	D13	1,250	72	0.995	1.244	89.568	
F10	D19	5,000	8	2.25	11.250	90.000	

Bar Arrangement List

Class	Type	D	Q'ty	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	L7 (mm)	L8 (mm)	H (mm)	R (mm)
S1	5	D22	4	30,990	2,935	365	2,715	6,320	6,320	6,320	3,485	2,165		235
S2	4	D22	8	2,310	978	369	958							235
S3	1	D22	12	3,060										
S4	7	D19	4	24,550	7,583	6,215	6,215	4,533						
S5	1	D19	8	5,430	5,430									
S6	1	D16	154	1,000	1,000									
S7	6	D13	8	1,700	100	1,497	100						1,058	
S8	6	D13	24	1,700	100	1,497	100						1,058	
S9	3	D13	72	1,160	100	334	285							
S10	1	D19	8	5,000	5,000									
W1	1	D16	130	1,000	1,000									
W2	1	D13	8	4,850	4,850									
W3	1	D13	24	4,850	4,850									
W4	2	D13	28	590	100	381	100							
W5	2	D13	42	580	100	376	100							
F1	5	D19	4	30,710	2,250	314	3,415	6,215	6,215	6,215	2,750	3,020		200
F2	4	D19	8	2,620	1,152	314	1,153							200
F3	1	D19	12	2,420	2,414									
F4	7	D19	4	24,550	4,533	6,215	6,215	7,583						
F5	1	D19	8	5,720	5,715									
F6	1	D16	154	1,000	1,000									
F7	6	D13	8	1,770	100	1,568	100						1,109	
F8	6	D13	24	1,770	100	1,568	100						1,109	
F9	3	D13	72	1,250	100	382	282							
F10	1	D19	8	5,000	5,000									

Main Bar Arrangement



Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for Upgrading the Improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BOX CULVERT 5.0x4.0x4  
MAIN BODY BAR ARRANGEMENT(2/2)

Date: Aug. 2009

Prepared by:

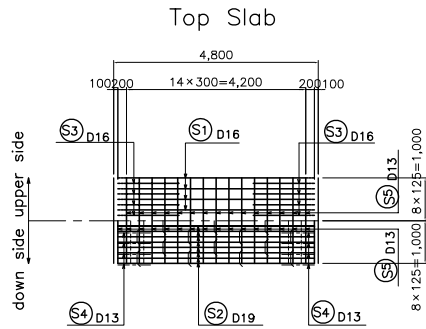
Checked by:

DRAWING No.:

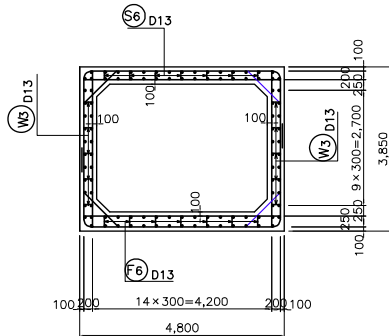
MR 03 F-4

# BOX\_CULVERT 4.0x3.0

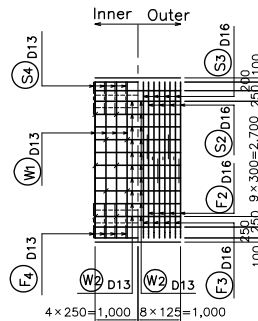
SCALE F



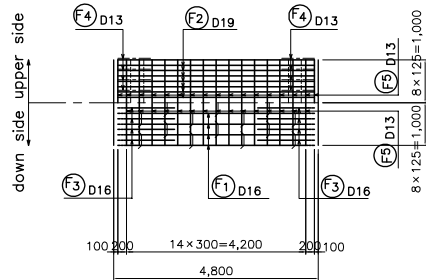
Cross Section



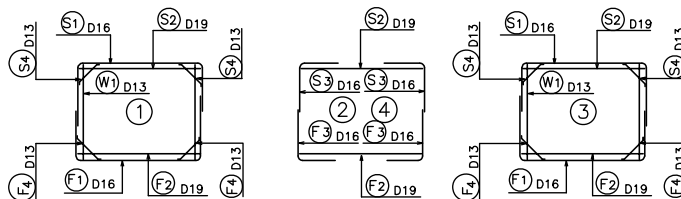
Side wall



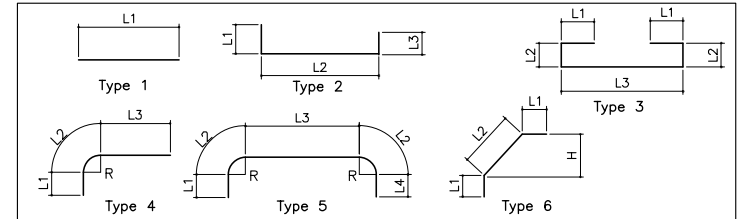
Floor Slab



Main Bar Arrangement



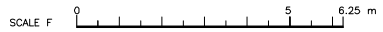
Bar Arrangement List



Class	Type	D	Q'ty	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	L6 (mm)	H (mm)	R (mm)
S1	5	D16	4	8,620	2,190	267	4,260	1,630				170
S2	1	D19	8	4,600	4,600							
S3	4	D16	8	3,190	1,653	267	1,264					170
S4	6	D13	8	1,280	100	1,073	100				759	
S5	1	D13	32	1,000	1,000							
S6	3	D13	14	950	100	231	282					
W1	1	D13	8	3,650	3,650							
W2	1	D13	40	1,000	1,000							
W3	2	D13	20	430	100	228	100					
F1	5	D16	4	8,720	1,680	267	4,260	2,240				170
F2	1	D19	8	4,600	4,600							
F3	4	D16	8	3,160	1,730	267	1,155					170
F4	6	D13	8	1,350	100	1,144					809	
F5	1	D13	32	1,000	1,000							
F6	3	D13	14	1,050	100	281	282					

Reinforced Bar Weight List

Class	D	L (mm)	Q'ty	Unit Weight (kg/m)	Weight (kg/bar)	Total Weight (kg)	Remark
S1	D16	8,620	4	1.56	13.447	53.788	—
S2	D19	4,600	8	2.25	10.350	82.800	—
S3	D16	3,190	8	1.56	4.976	39.808	—
S4	D13	1,280	8	1.56	1.274	10.192	—
S5	D13	1,000	32	0.995	0.995	31.840	—
S6	D13	950	14	0.995	0.945	13.230	—
W1	D13	3,650	8	0.995	3.632	29.056	—
W2	D13	1,000	40	0.995	0.995	39.800	—
W3	D13	430	20	0.995	0.428	8.560	—
F1	D16	8,720	4	1.56	13.603	54.412	—
F2	D19	4,600	8	2.25	10.350	82.800	—
F3	D16	3,160	8	1.56	4.930	39.440	—
F4	D13	1,350	8	0.995	1.343	10.744	—
F5	D13	1,000	32	0.995	0.995	31.840	—
F6	D13	1,050	14	0.995	1.045	14.630	—



Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for Upgrading the Improvement of  
Masasi-Mangaka Road

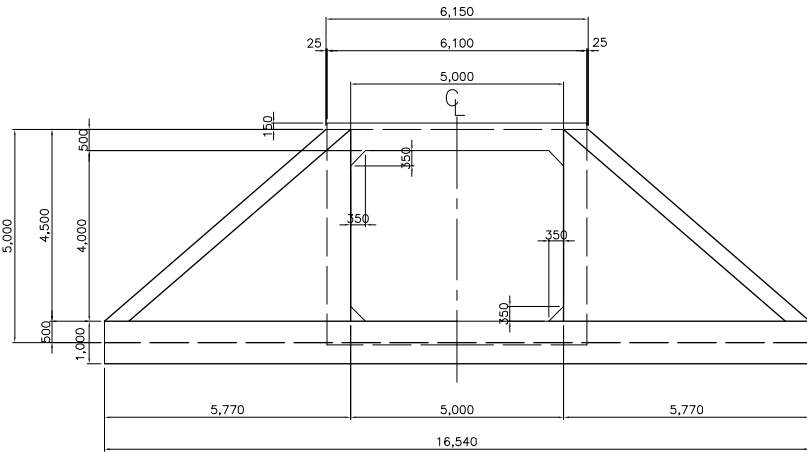
DRAWING TITLE:  
BOX CULVERT 4.0x3.0x1  
MAIN BODY BAR ARRANGEMENT

Date: Aug. 2009  
Prepared by:  
Checked by:

DRAWING No.:  
MR 03 F-5

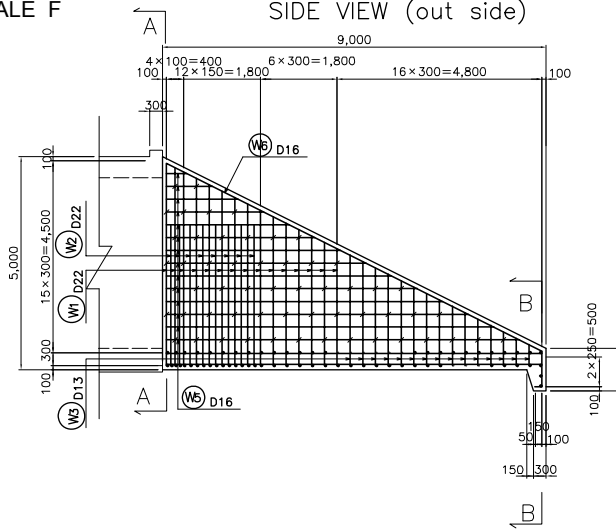
# INLET/OUTLET ( 5.0×4.0×1 )

FRONT VIEW

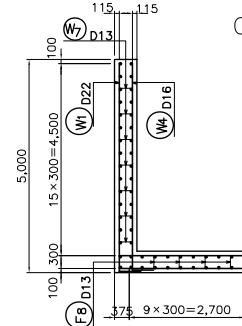


SCALE F

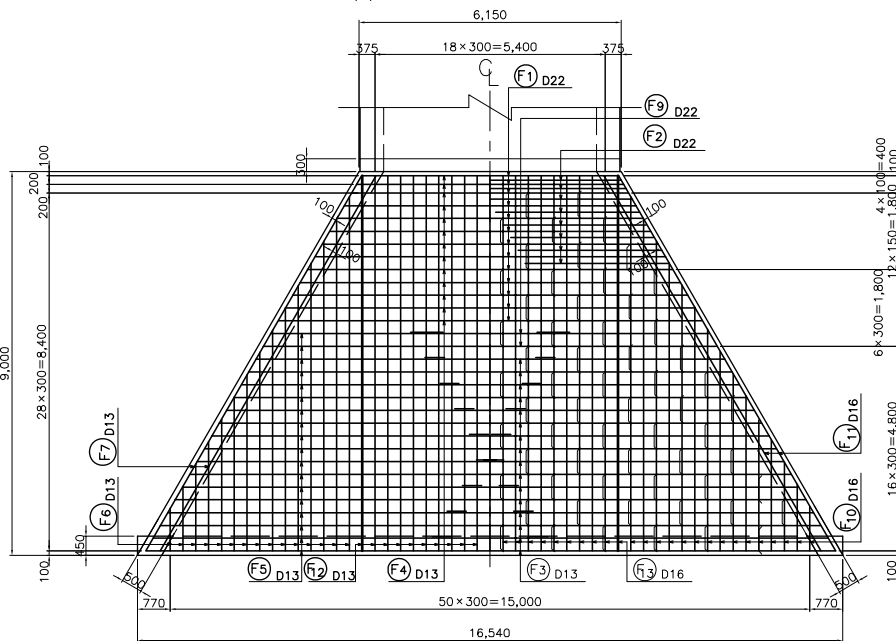
SIDE VIEW (out side)



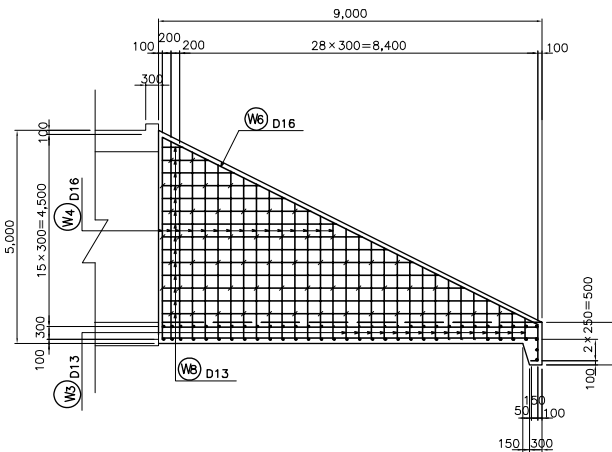
A-A SECTION



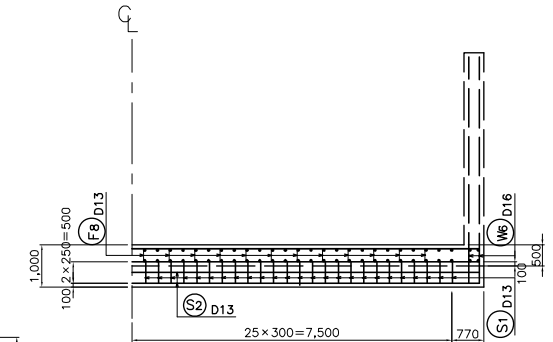
PLAN  
upper side      down side



SIDE VIEW (in side)



B-B SECTION



SCALE F 0 5 m 6.25m

Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the improvement of  
Masasi-Mangaka Road

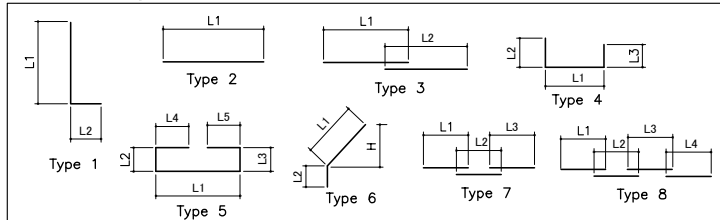
DRAWING TITLE:  
BOX CULVERT 5.0×4.0×1  
INLET/OUTLET BAR ARRANGMENT (1/2)

Date: Aug. 2009  
Prepared by:  
Checked by:

DRAWING No.:  
MR 03 F-6

## INLET/OUTLET ( 5.0×4.0×1 )

Bar Arrangement List



Class	Type	D	Q'ty	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	H (mm)	(mm)
W1	1	D22	30	4,140	3,770	370					L1=2,740-4,800
W2	1	D22	16	3,670	3,300	370					
W3	1	D13	60	1,640	1,540	100					L1=490-2,590
W4	1	D16	30	3,870	3,770	100					L1=2,740-4,800
W5	2	D16	28	4,380	4,380						L1=480-8,280
W6	6	D16	4	10,680	9,840	840				4,400	
W7-1	4	D13	84	350	147	100	100				
W7-2	4	D13	28	350	143	100	100				
W8	2	D13	28	4,380	4,380						L1=480-8,280
F1	2	D22	13	7,980	7,980						L1=6,040-9,920
F2	2	D22	16	3,300	3,300						
F3	3	D13	16	14,050	10,000	4,045					L2=1,455-6,635
F4	2	D13	13	7,980	7,980						L1=6,040-9,920
F5	3	D13	18	13,690	10,000	3,685					L2=735-6,635
F6	2	D13	30	4,660	4,660						L1=1,010-8,310
F7	3	D13	4	10,620	10,000	620					
F8-1	5	D13	76	1,500	635	331	331	100	100		
F8-2	5	D13	84	1,480	626	326	326	100	100		
F9	3	D22	2	10,910	10,000	905					L2=735-1,075
F10	2	D16	30	4,660	4,660						L1=1,010-8,310
F11	3	D16	4	10,620	10,000	615					
F12	2	D13	21	8,800	8,800						
F13	2	D16	21	8,800	8,800						
S1	1	D13	51	650	500	150					
S2	3	D13	2	16,640	10,000	6,635					

Reinforced Bar Weight List

Class	D	L (mm)	Q'ty	Unit Weight (kg/m)	Weight (kg/bar)	Total Weight (kg)	Remark
W1	D22	4,140	30	3.04	12.586	377.580	L
W2	D22	3,670	16	3.04	11.157	178.512	L
W3	D13	1,640	60	0.995	1.632	97.920	L
W4	D16	3,870	30	1.56	6.037	181.110	L
W5	D16	4,380	28	1.56	6.833	191.324	—
W6	D16	10,680	4	1.56	16.661	66.644	—
W7-1	D13	350	84	0.995	0.348	29.232	L
W7-2	D13	350	28	0.995	0.348	9.744	L
W8	D13	4,380	28	0.995	4.358	122.024	—
F1	D22	7,980	13	3.04	24.259	315.367	—
F2	D22	3,300	16	3.04	10.032	160.512	—
F3	D13	14,050	16	0.995	13.980	223.680	—
F4	D13	7,980	13	0.995	7.940	103.220	—
F5	D13	13,690	18	0.995	13.622	245.196	—
F6	D13	4,660	30	0.995	4.637	139.110	—
F7	D13	10,620	4	0.995	10.567	42.268	—
F8-1	D13	1,500	76	0.995	1.493	113.468	L
F8-2	D13	1,480	84	0.995	1.473	123.732	L
F9	D22	10,910	2	3.04	33.166	66.332	—
F10	D16	4,660	30	1.56	7.270	218.100	—
F11	D16	10,620	4	1.56	16.567	66.268	—
F12	D13	8,800	21	0.995	8.756	183.876	—
F13	D16	8,800	21	1.56	13.728	288.288	—
S1	D13	650	51	0.995	0.647	32.997	L
S2	D13	16,640	2	0.995	16.557	33.114	—

Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BOX CULVERT 5.0×4.0×1  
INLET/OUTLET BAR ARRANGMENT(2/2)

Date: Aug. 2009

Prepared by:

Checked by:

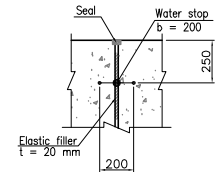
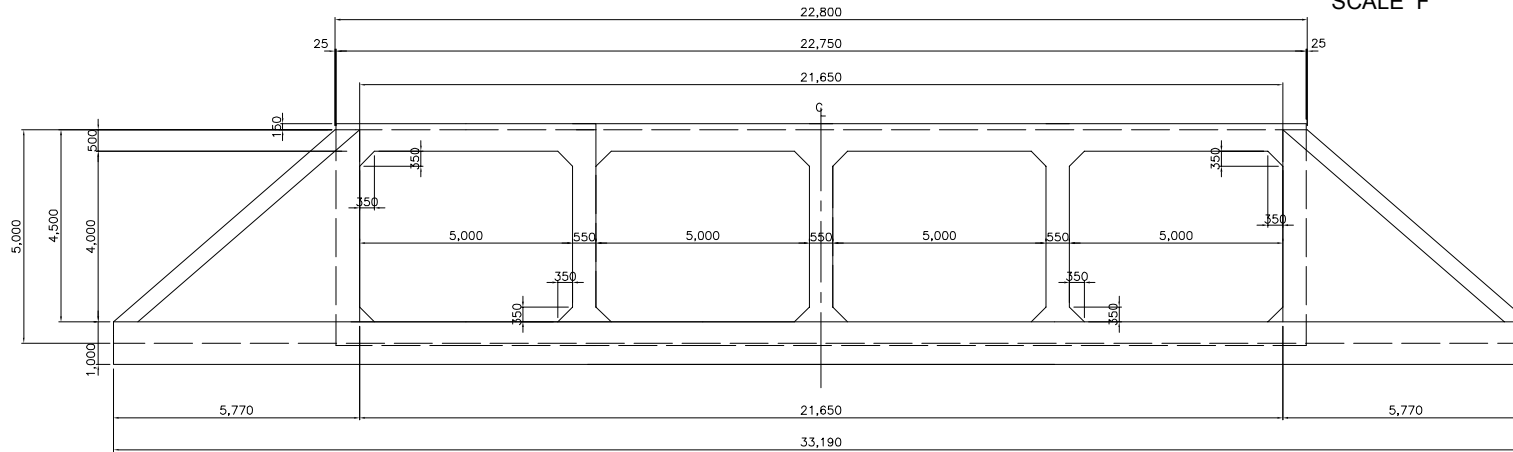
DRAWING No.:

MR 03 F-7

FRONT VIEW

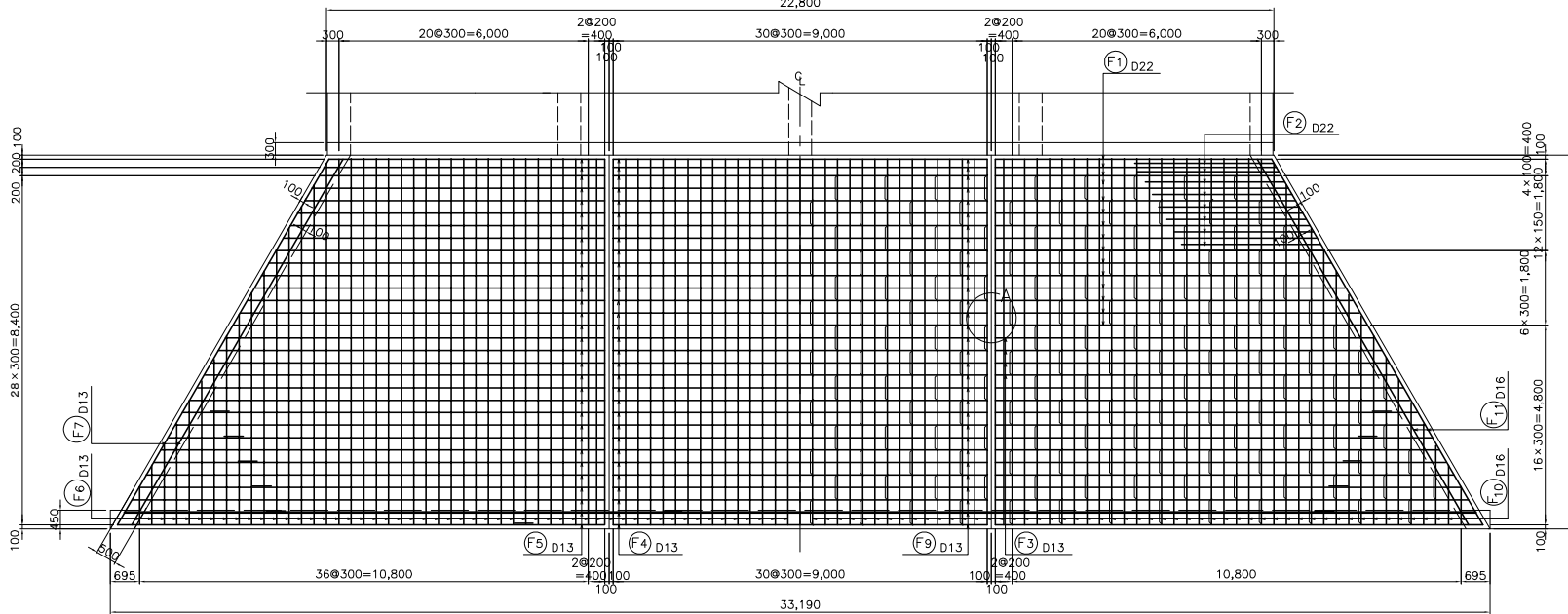
INLET/OUTLET TypeB3 ( 5.0x4.0-4 )

SCALE F



DETAIL "A" OF CONTRACTION JOINT  
SCALE G

PLAN  
upper side      down side



SCALE F 0 5 m

Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the Improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BOX CULVERT 5.0x4.0x4  
INLET/OUTLET BAR ARRANGEMENT (1/2)

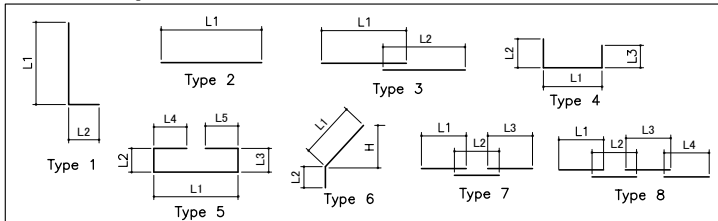
Date: Aug. 2009  
Prepared by:  
Checked by:

DRAWING No.:  
MR 03 F-8



# INLET/OUTLET ( 5.0×4.0×4 )

Bar Arrangement List



Class	Type	D	Q'ty	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	H (mm)	(mm)
W1	1	D22	30	4,140	3,770	370					L1=2,740-4,800
W2	1	D22	16	3,670	3,300	370					
W3	1	D13	60	1,640	1,540	100					L1=490-2,590
W4	1	D16	30	3,870	3,770	100					L1=2,740-4,800
W5	2	D16	28	4,380	4,380						L1=480-8,280
W6	6	D16	4	10,680	9,840	840				4,400	
W7-1	4	D13	84	350	147	100	100				
W7-2	4	D13	28	350	143	100	100				
W8	2	D13	28	4,380	4,380						L1=480-8,280
F1	7	D22	15	26,530	10,000	10,000	6,530				L3=4,230-8,830
F2	2	D22	16	3,300	3,300						
F3	7	D13	5	29,250	10,000	10,000	9,250				L3=8,570-9,930
F4	2	D13	20	6,770	6,765						L1=3,600-9,930
F5	8	D13	11	32,490	10,000	10,000	10,000	2,485			L4=740-4,230
F6	2	D13	32	4,800	4,795						L1=900-8,690
F7	3	D13	4	10,620	10,000	620					
F8-1	5	D13	122	1,500	635	331	331	100	100		
F8-2	5	D13	196	1,480	626	326	326	100	100		
F9	8	D22	11	32,490	10,000	10,000	10,000	2,485			L4=740-4,230
F10	2	D16	32	4,800	4,795						L1=900-8,690
F11	3	D16	4	10,620	10,000	615					
F12	2	D13	75	8,800	8,800						
F13	2	D16	75	8,800	8,800						
S1	1	D13	107	650	500	150					
S2	8	D13	2	34,230	10,000	10,000	10,000	4,230			

Reinforced Bar Weight List

Class	D	L (mm)	Q'ty	Unit Weight (kg/m)	Weight (kg/bar)	Total Weight (kg)	Remark
W1	D22	4,140	30	3.04	12.586	377.580	L
W2	D22	3,670	16	3.04	11.157	178.512	L
W3	D13	1,640	60	0.995	1.632	97.920	L
W4	D16	3,870	30	1.56	6.037	181.110	L
W5	D16	4,380	28	1.56	6.833	191.324	—
W6	D16	10,680	4	1.56	16.661	66.644	—
W7-1	D13	350	84	0.995	0.348	29.232	L
W7-2	D13	350	28	0.995	0.348	9.744	L
W8	D13	4,380	28	0.995	4.358	122.024	—
F1	D22	26,530	15	3.04	80.651	1209.765	—
F2	D22	3,300	16	3.04	10.032	160.512	—
F3	D13	29,250	5	0.995	29.104	145.520	—
F4	D13	6,770	20	0.995	6.736	134.720	—
F5	D13	32,490	11	0.995	32.328	355.608	—
F6	D13	4,800	32	0.995	4.776	152.832	—
F7	D13	10,620	4	0.995	10.567	42.268	—
F8-1	D13	1,500	122	0.995	1.493	182.146	L
F8-2	D13	1,480	196	0.995	1.473	288.708	L
F9	D22	32,490	11	3.04	98.770	1086.470	—
F10	D16	4,800	32	1.56	7.488	239.616	—
F11	D16	10,620	4	1.56	16.567	66.268	—
F12	D13	8,800	75	0.995	8.756	656.700	—
F13	D16	8,800	75	1.56	13.728	1029.600	—
S1	D13	650	107	0.995	0.647	69.229	L
S2	D13	34,230	2	0.995	34.059	68.118	—

Tanzania National Roads Agency (TANROADS)  
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CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the improvement of  
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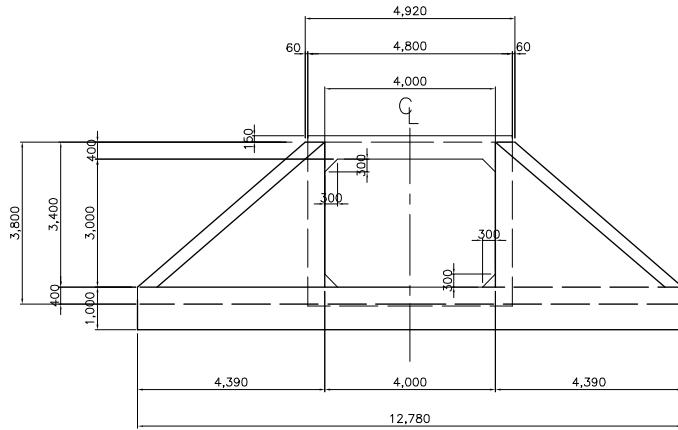
DRAWING TITLE:  
BOX CULVERT 5.0×4.0×4  
INLET/OUTLET BAR ARRANGEMENT (2/2)

Date: Aug. 2009  
Prepared by:  
Checked by:

DRAWING No.:  
MR 03 F-9

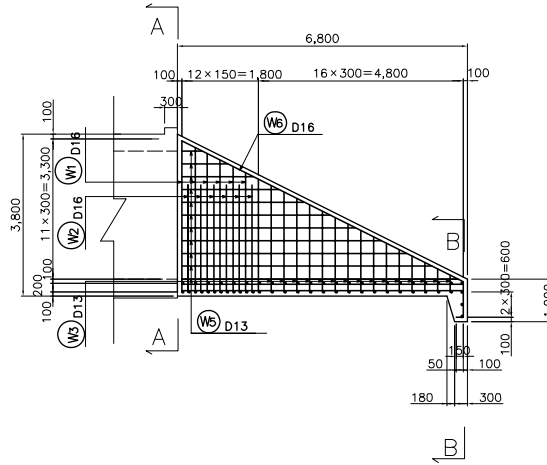
# INLET/OUTLET (4.0×3.0)

FRONT VIEW

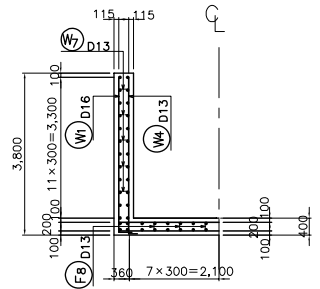


SCALE F

SIDE VIEW (out side)

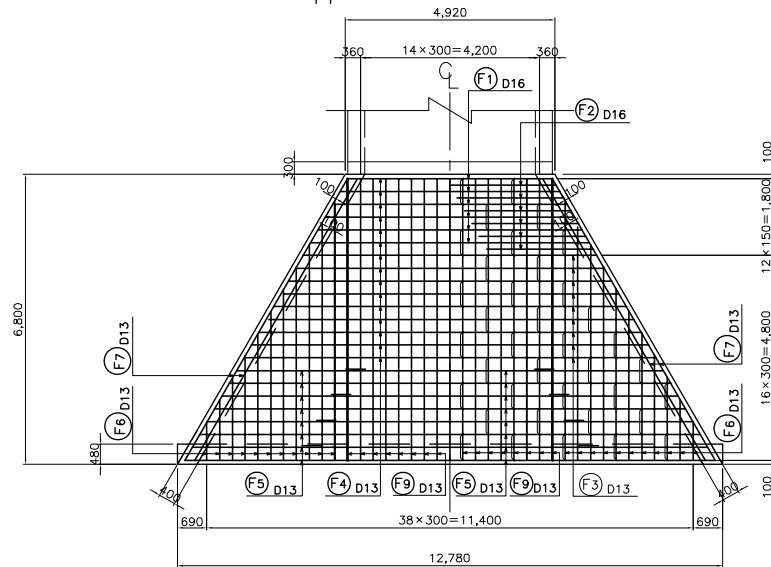


A-A SECTION

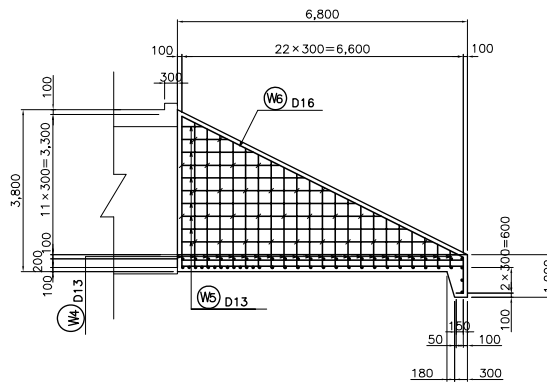


PLAN

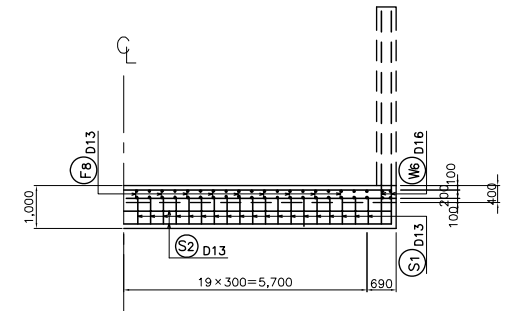
upper side down side



SIDE VIEW (in side)



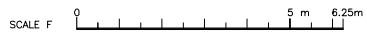
B-B SECTION



## MATERIAL LIST

(by 1 structure)

Type	Concrete (m <sup>3</sup> )	Form (m <sup>2</sup> )	Reinforcement bar (t)	Base (m <sup>3</sup> )	Lean Concrete (m <sup>3</sup> )	Lean Concrete Form (m <sup>2</sup> )	Gabion (m <sup>3</sup> )
4.0×3.0	37.74	59.68	1.54	12.17	5.48	1.46	4.43



Tanzania National Roads Agency (TANROADS)  
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DRAWING TITLE:  
BOX CULVERT 4.0×3.0×1  
INLET/OUTLET BAR ARRANGMENT(1/2)

Date: Aug. 2009

Prepared by:

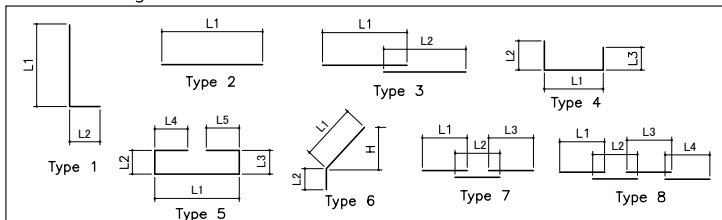
Checked by:

DRAWING No.:

MR 03 F-10

# INLET/OUTLET ( 4.0×3.0×1 )

Bar Arrangement List



Class	Type	D	Q'ty	L (mm)	L1 (mm)	L2 (mm)	L3 (mm)	L4 (mm)	L5 (mm)	H (mm)	(mm)
W1	1	D16	12	3,460	3,195	260					L1=2,790-3,600
W2	1	D16	12	2,760	2,500	260					
W3	1	D13	32	1,670	1,515	155	1,625				L1=390-2,640
W4	1	D13	44	2,100	1,995	100	100				L1=390-3,600
W5	2	D13	44	3,480	3,480						L1=480-6,480
W6	6	D16	4	8,220	7,380	840				3,300	
W7-1	4	D13	28	350	143	100	100				
W7-2	4	D13	32	350	141	100	100				
F1	2	D16	6	5,690	5,685						L1=4,810-6,560
F2	2	D16	12	2,500	2,500						
F3	2	D13	9	8,280	8,280						L1=6,890-9,670
F4	2	D13	15	7,240	7,240						L1=4,810-9,670
F5	6	D13	16	11,680	10,000	1,678					L2=465-2,890
F6	2	D13	44	3,500	3,500						L1=900-6,100
F7	2	D13	8	7,630	7,630						
F8-1	5	D13	14	1,290	629	228	228	100	100		
F8-2	5	D13	60	1,280	626	226	226	100	100		
F9	2	D13	34	6,600	6,600						
S1	1	D13	39	750	600	150					
S2	3	D13	2	12,910	10,000	2,905					

Reinforced Bar Weight List

Class	D	L (mm)	Q'ty	Unit Weight (kg/m)	Weight (kg/bar)	Total Weight (kg)	Remark
W1	D16	3,460	12	1.56	5.398	64.776	L
W2	D16	2,760	12	1.56	4.306	51.672	L
W3	D13	1,670	32	0.995	1.662	53.184	L
W4	D13	2,100	44	0.995	2.090	91.960	L
W5	D13	3,480	44	0.995	3.463	152.372	—
W6	D16	8,220	4	1.56	12.823	51.292	—
W7-1	D13	350	28	0.995	0.348	9.744	L
W7-2	D13	350	32	0.995	0.348	11.136	L
F1	D16	5,690	6	1.56	8.876	53.256	—
F2	D16	2,500	12	1.56	3.900	46.800	—
F3	D13	8,280	9	0.995	8.239	74.151	—
F4	D13	7,240	15	0.995	7.204	108.060	—
F5	D13	11,680	16	0.995	11.622	185.952	—
F6	D13	3,500	44	0.995	3.483	153.252	—
F7	D13	7,630	8	0.995	7.592	60.736	—
F8-1	D13	1,290	14	0.995	1.284	17.976	L
F8-2	D13	1,280	60	0.995	1.274	76.440	L
F9	D13	6,600	34	0.995	6.567	223.278	—
S1	D13	750	39	0.995	0.746	29.094	L
S2	D13	12,910	2	0.995	12.845	25.690	—

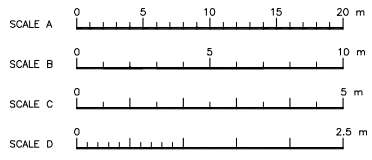
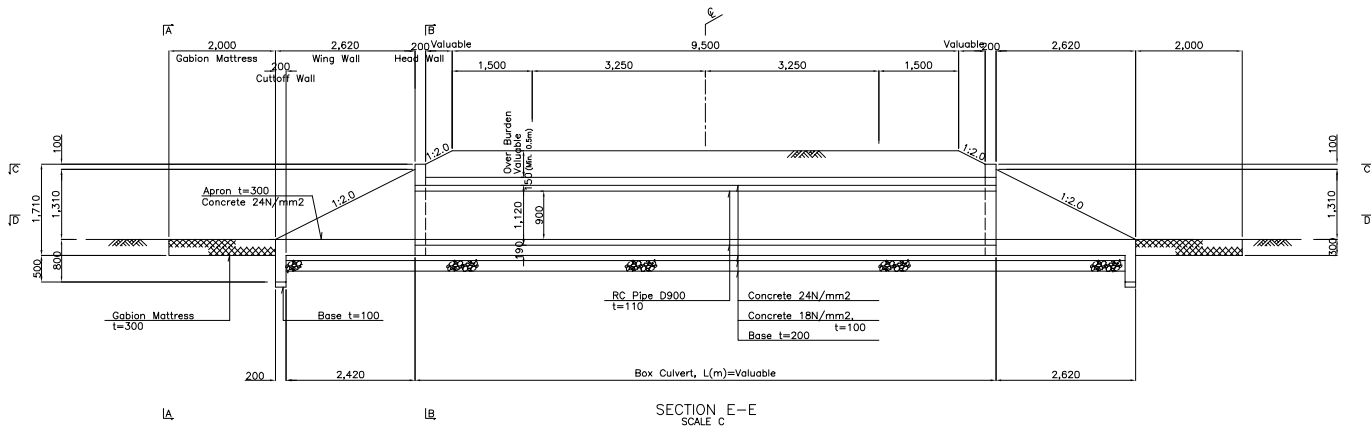
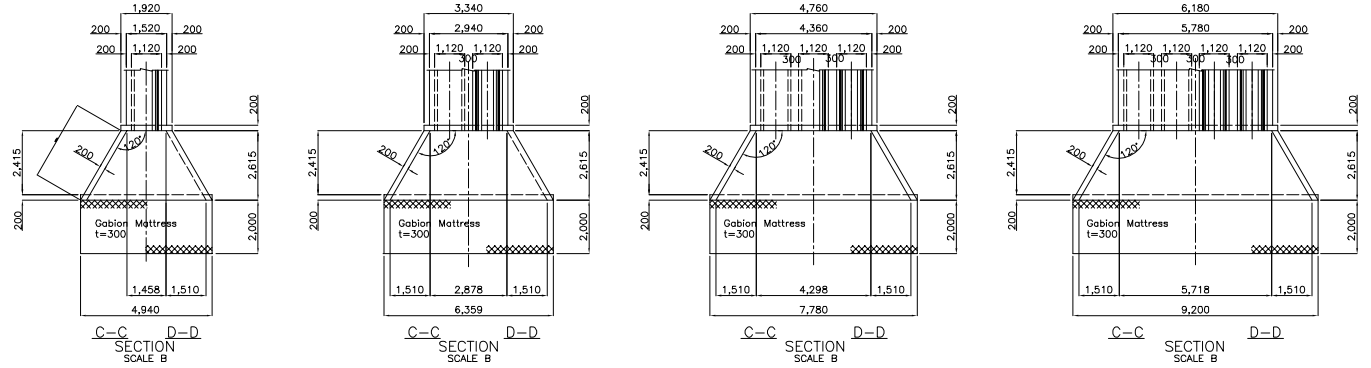
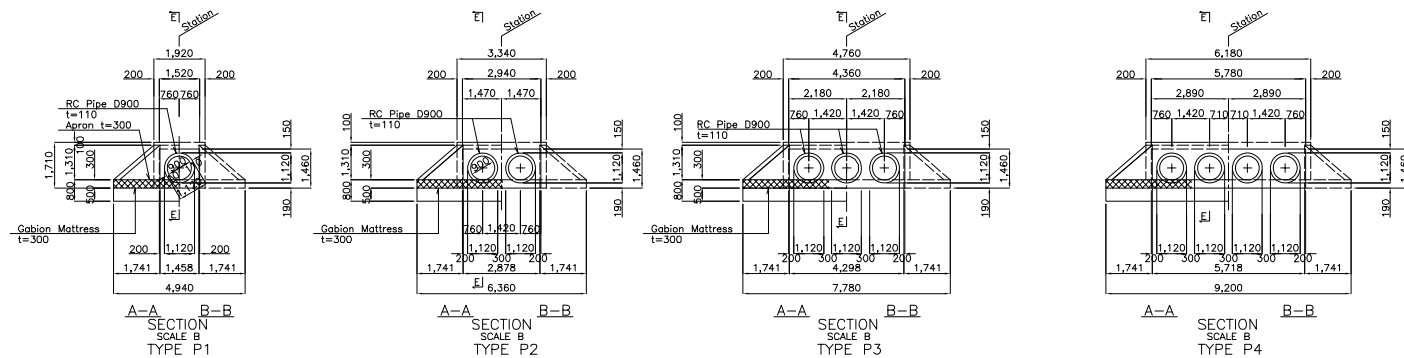
Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BOX CULVERT 4.0×3.0×1  
INLET/OUTLET BAR ARRANGMENT

Date: Aug. 2009  
Prepared by:  
Checked by:  
DRAWING No.:  
MR 03 F-11

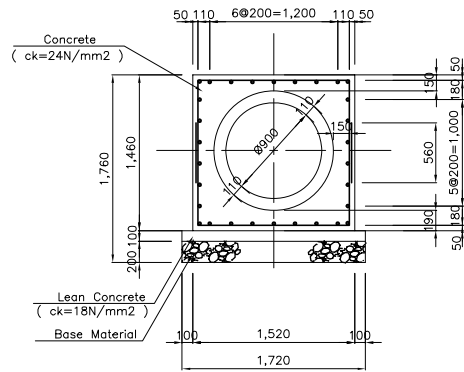


Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:  MR 03 F-12
	INGEROSEC CORPORATION, JAPAN	The Project for the improvement of Masasi-Mangaka Road	LOCATION AND DIMENSION OF PIPE CULVERT	Prepared by:	
				Checked by:	

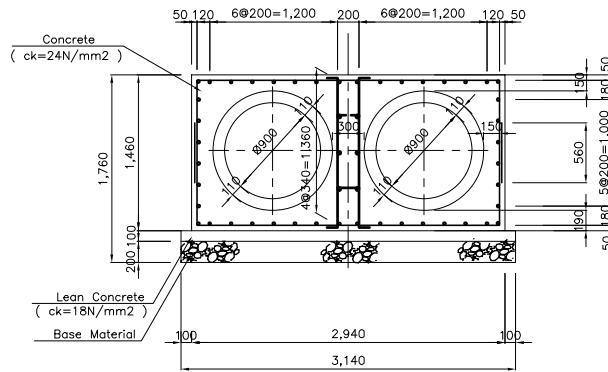
# PIPE CULVERT 360°ENCASEMENT

SCALE D

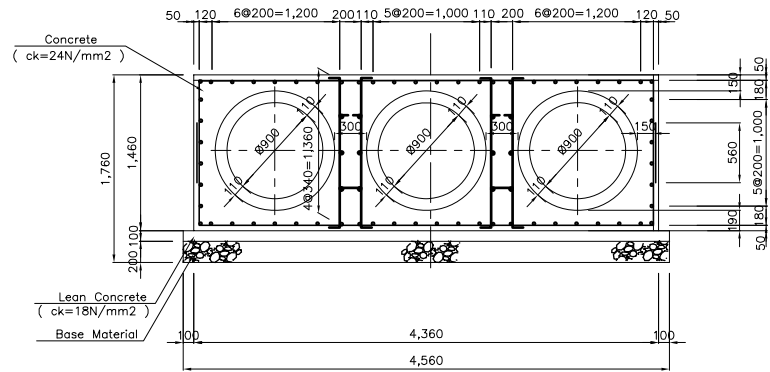
TYPE P1



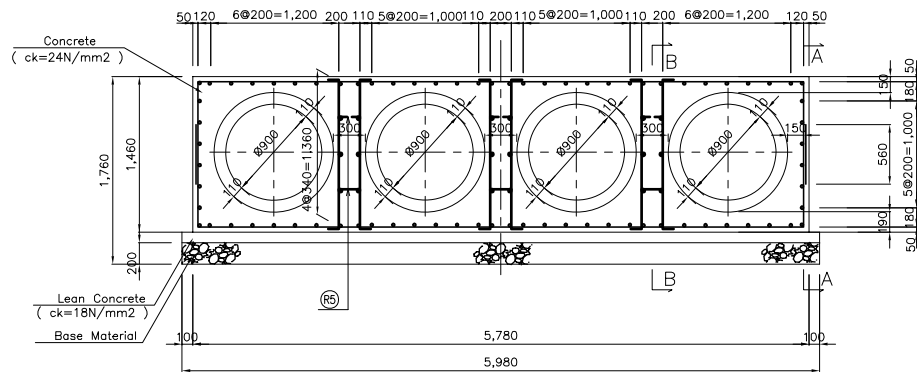
TYPE P2



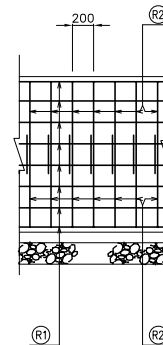
TYPE P3



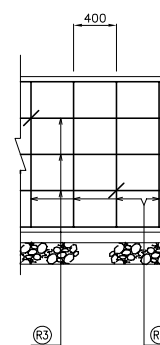
TYPE P4



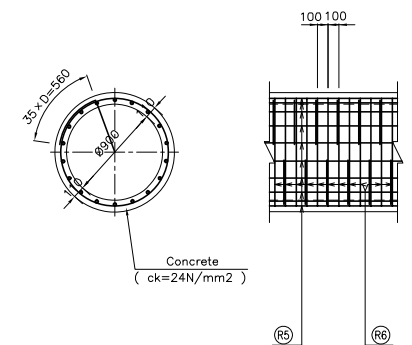
A - A



B - B



REINFORCED CONCREAT PIPE



Material List

(by 10m)

Type	Concrete (m3)	Form (m2)	Reinforcement bar (kg)	Base (m3)	Lean Concrete (m3)	Lean Concrete Form (m2)
P 1	12.340	29.200	989.04	3.440	1.720	2.000
P 2	23.220	29.200	1661.21	6.280	3.140	2.000
P 3	34.100	29.200	2364.57	9.120	4.560	2.000
P 4	44.980	29.200	3067.94	11.960	5.980	2.000

Reinforced Bar List

(by 1m)

Type	D	Q'ty	Unit Length (mm)	Unit Weight (kg/m)	Weight (kg)	Type
P1	(R1)	D16	30	1,000	1.56	46.800
	(R2)	D16	10	3,340	1.56	52.104
P2	(R1)	D16	44	1,000	1.56	68.640
	(R2)	D16	10	4,760	1.56	74.256
P3	(R1)	D16	60	1,000	1.56	93.600
	(R2)	D16	10	6,180	1.56	96.408
P4	(R1)	D16	76	1,000	1.56	118.560
	(R2)	D16	10	7,600	1.56	118.560

Reinforced Bar List

(by 1m)

Type	D	Q'ty	Unit Length (mm)	Unit Weight (kg/m)	Weight (kg)	Type
P2	(R3)	D16	6	1,000	1.56	9.360
	(R4)	D16	5	1,560	1.56	12.168
P3	(R3)	D16	12	1,000	1.56	18.720
	(R4)	D16	10	1,560	1.56	24.336
P4	(R3)	D16	18	1,000	1.56	28.080
	(R4)	D16	15	1,560	1.56	36.504
	(R5)	D16	7.5	435	1.56	5.090

RC Pipe Material List

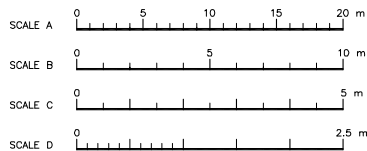
(by 10m)

Type	Concrete (m3)	Form (m2)	Reinforced Bar (kg)
D900	3.490	63.460	987.4

Reinforced Bar List

(by 1m)

Type	D	Q'ty	Unit Length (mm)	Unit Weight (kg/m)	Weight (kg)	Type
(R5)	D19	18	1,000	2.25	40.500	—
(R6)	D16	10	3,733	1.56	58.235	○



Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
PIPE CULVERT 360°ENCASEMENT  
( BAR ARRANGMENT )

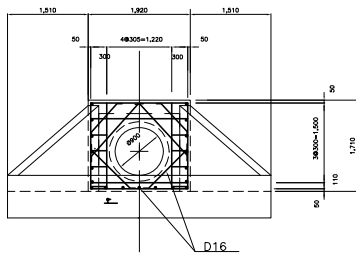
Date: Aug. 2009  
Prepared by:  
Checked by:

DRAWING No.:  
MR 03 F-13

# TRANSVERSE PIPE CULVERT INLET/OUTLET

TYPE P1  
SCALE C

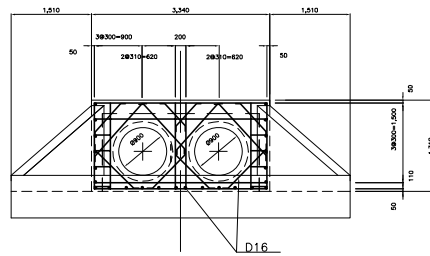
FRONT VIEW



PLAN

TYPE P2  
SCALE C

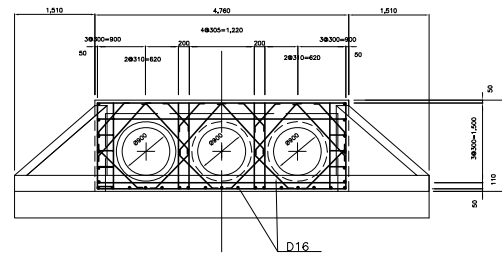
FRONT VIEW



PLAN

TYPE P3  
SCALE C

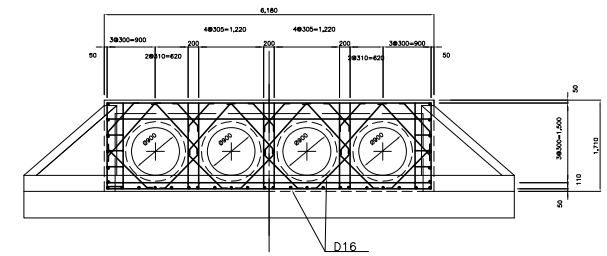
FRONT VIEW



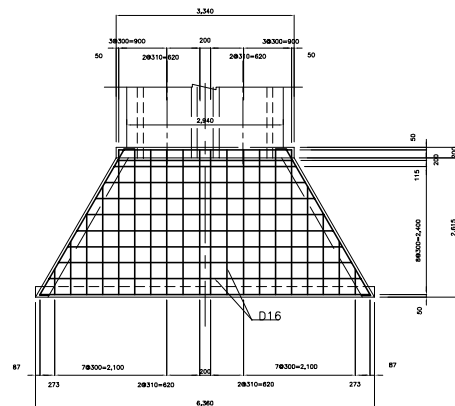
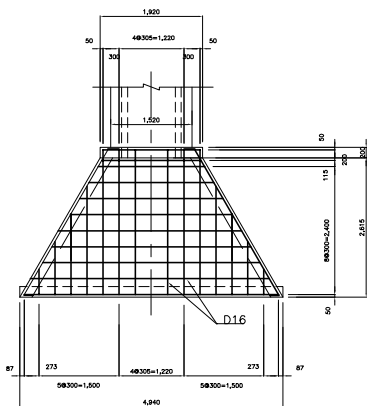
PLAN

TYPE P4  
SCALE C

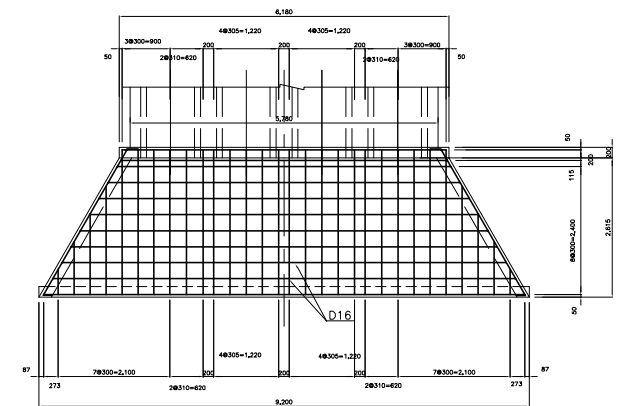
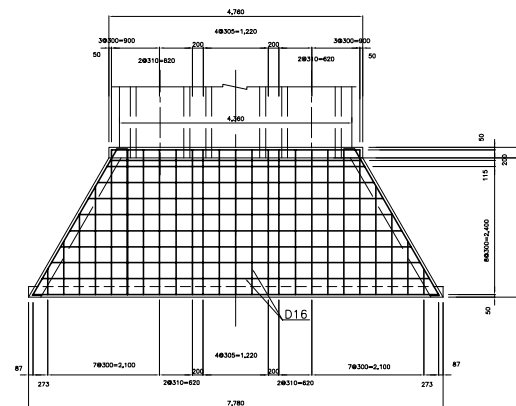
FRONT VIEW



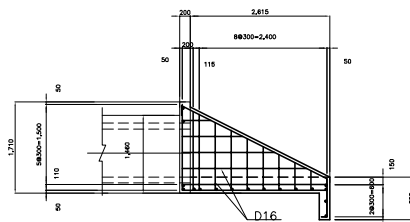
PLAN



PROFILE



SCALE C 5 m



SCALE C

Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

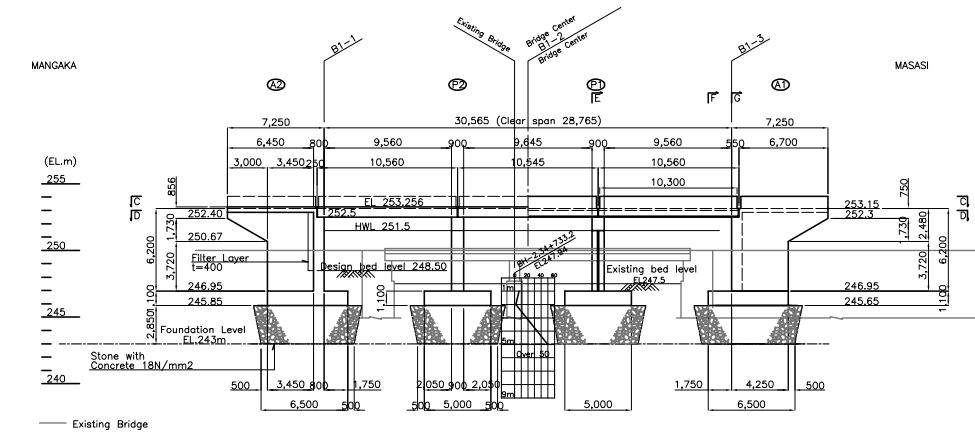
CONSULTANTS:  
**INGEROSEC CORPORATION, JAPAN**

PROJECT NAME:  
**The Project for the improvement of  
Masasi-Mangaka Road**

DRAWING TITLE:  
**TRANSVERSE PIPE CULVERT INLET/OUTLET  
( BAR ARRANGEMENT )**

Date: Aug. 2009  
Prepared by:  
Checked by:

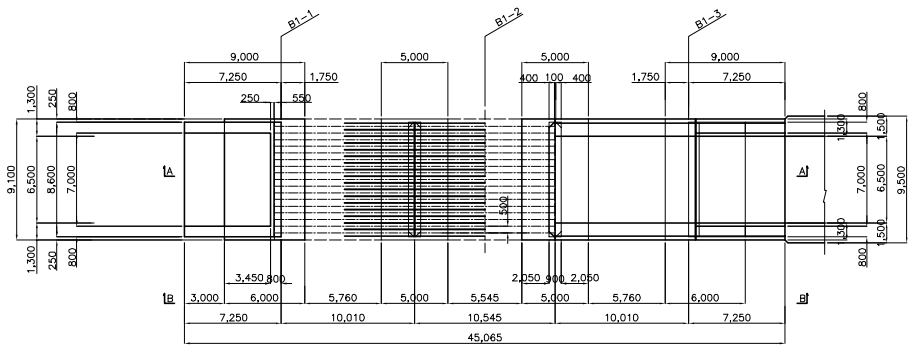
DRAWING No.:  
**MR 03 F-14**



Position	Station
B1	34+683.5

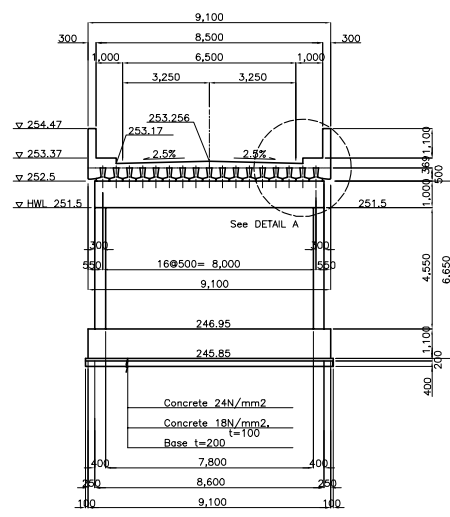
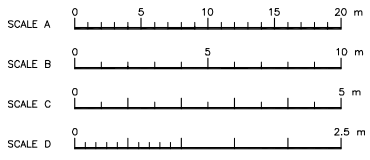
SECTION A-A  
SCALE A

SECTION B-B  
SCALE A

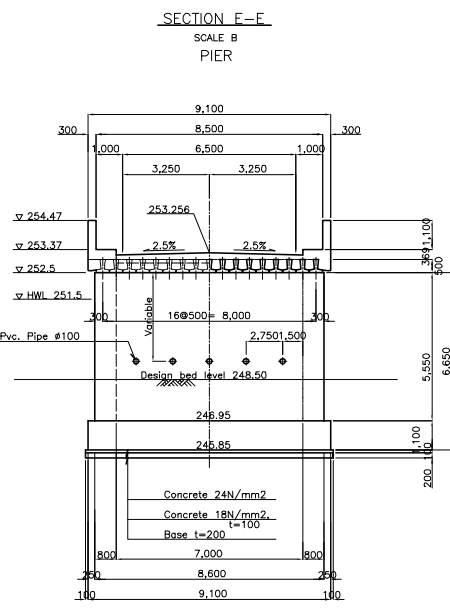


SECTION C-C  
SCALE A

SECTION D-D  
SCALE A

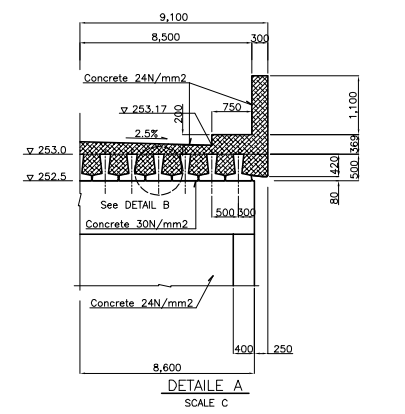


SECTION E-E  
SCALE B

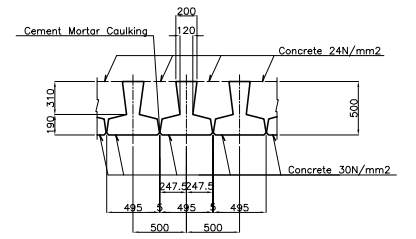


SECTION F-F  
SCALE B

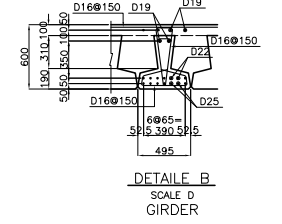
SECTION G-G  
SCALE B



DETAIL A  
SCALE C



DETAIL B  
SCALE D



DETAIL C  
SCALE D

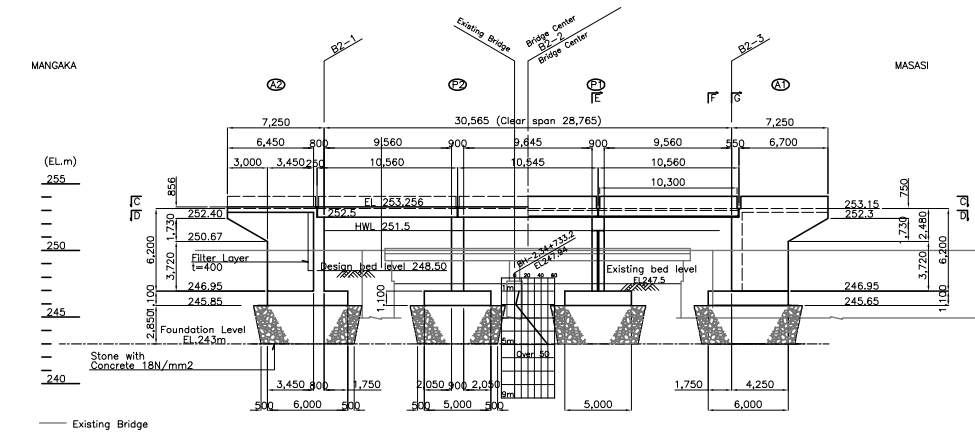
Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the Improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BRIDGE No.1(KM.34+683.8)

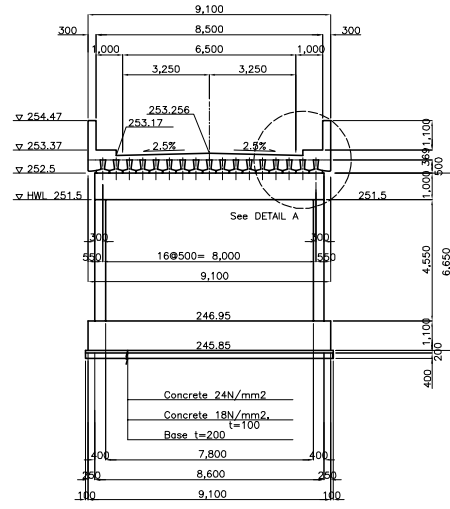
Date: Aug. 2009  
Prepared by:  
Checked by:  
DRAWING No.:  
MR 03 F-15



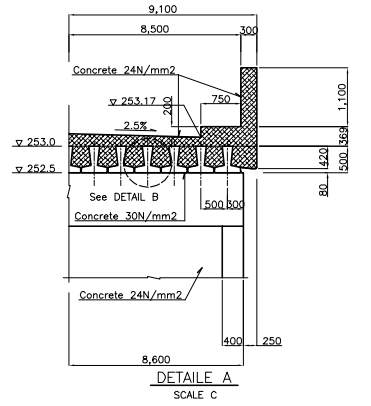
Bridge 2	
Position	Station
B2	34+869.2

SECTION A-A  
SCALE A

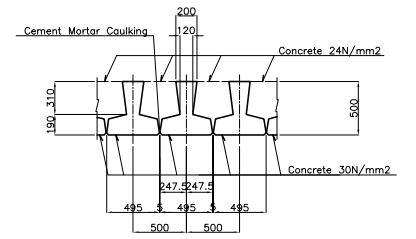
SECTION B-B  
SCALE A



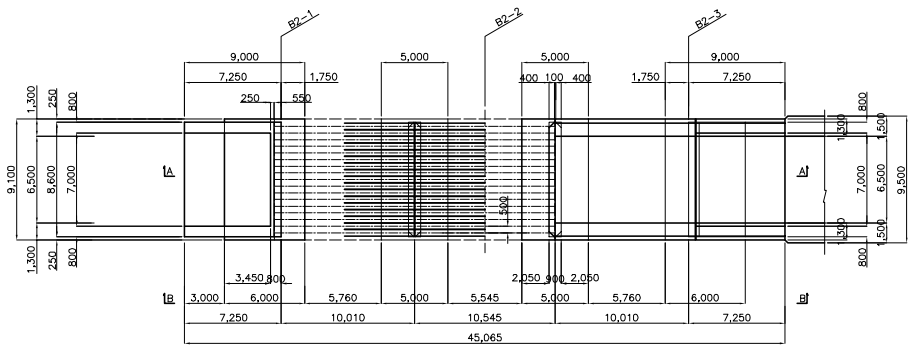
SECTION E-E  
SCALE B



DETAIL A  
SCALE C

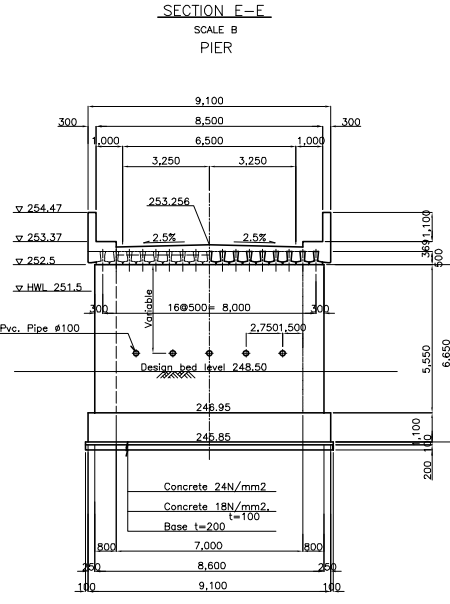


DETAIL B  
SCALE D



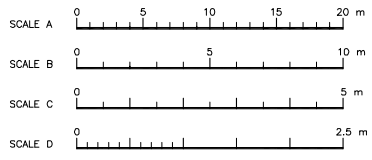
SECTION C-C  
SCALE A

SECTION D-D  
SCALE A



SECTION F-F SECTION G-G  
SCALE B SCALE B

ABUTMENT



Tanzania National Roads Agency (TANROADS)  
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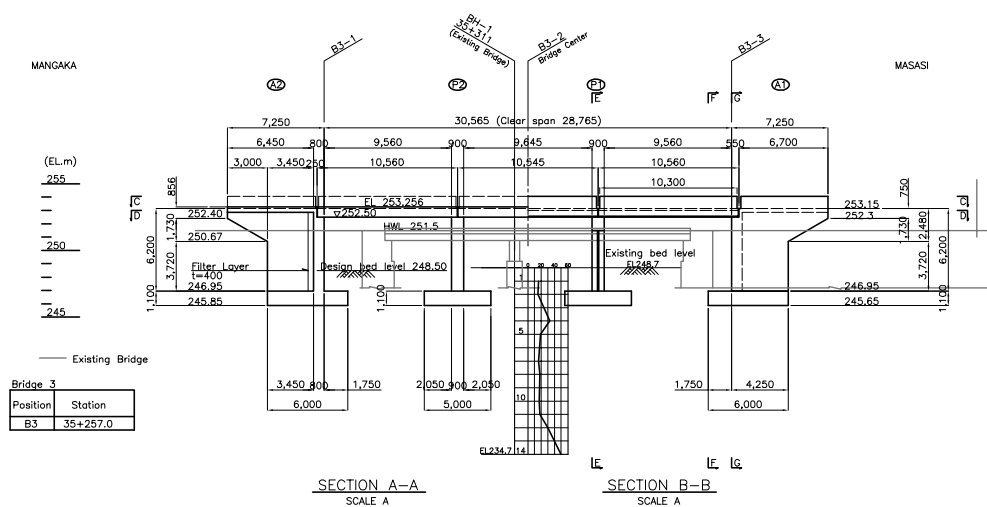
CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

PROJECT NAME:  
The Project for the Improvement of  
Masasi-Mangaka Road

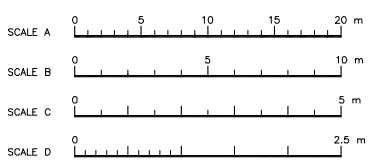
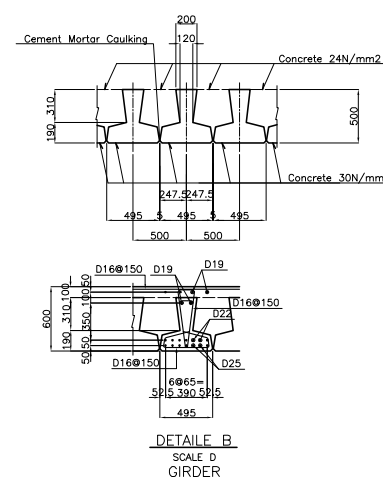
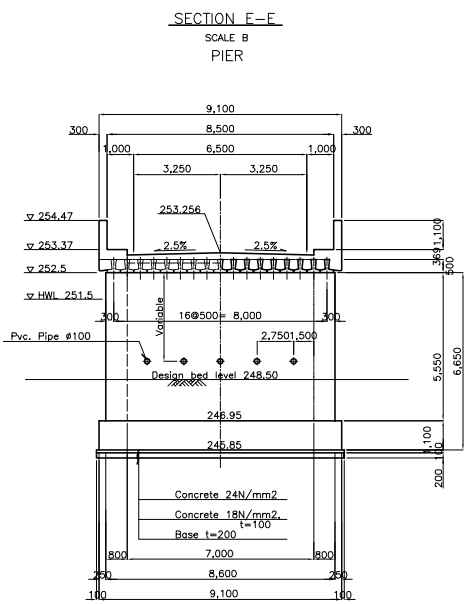
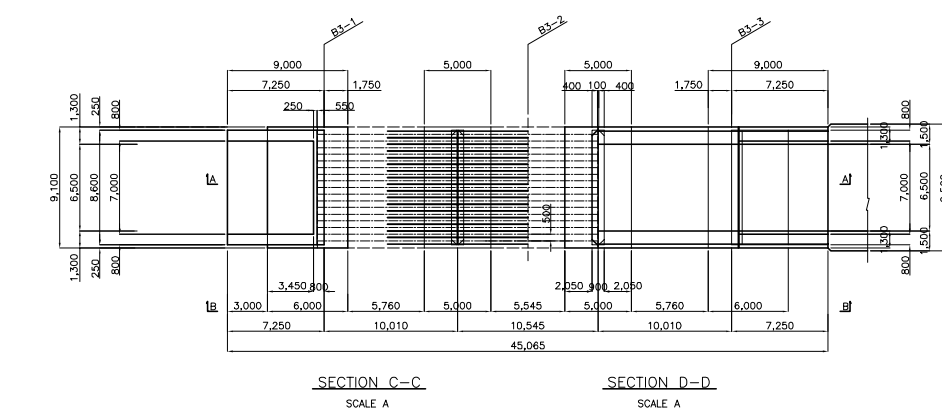
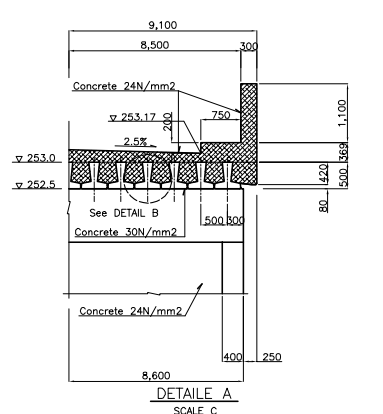
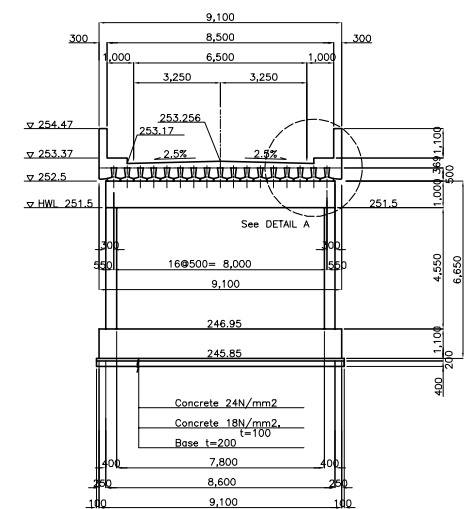
DRAWING TITLE:  
BRIDGE No.2(KM.34+869.2)

Date: Aug. 2009  
Prepared by:  
Checked by:  
DRAWING No.:  
MR 03 F-16





Bridge 3	Station
B3	35+257.0



Tanzania National Roads Agency (TANROADS)  
of The United Republic of Tanzania

CONSULTANTS:  
INGEROSEC CORPORATION, JAPAN

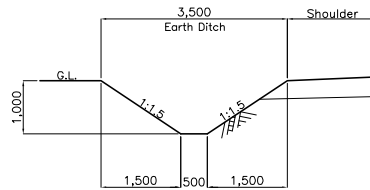
PROJECT NAME:  
The Project for the Improvement of  
Masasi-Mangaka Road

DRAWING TITLE:  
BRIDGE NO.3 (KM.35+257.0)

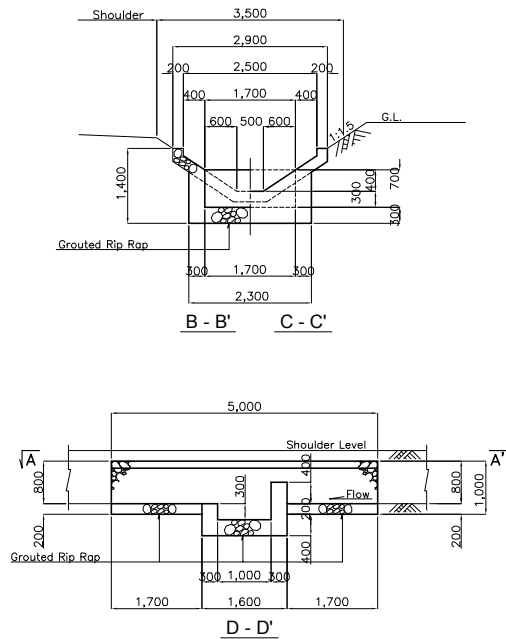
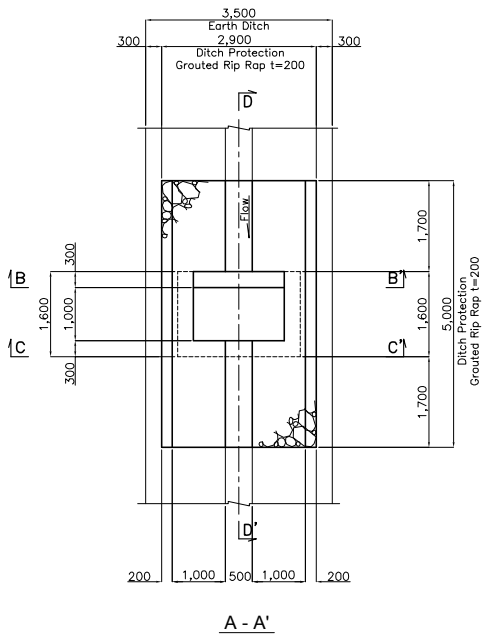
Date: Aug. 2009  
Prepared by:  
Checked by:  
DRAWING No.:  
MR 03 F-17

## DITCH

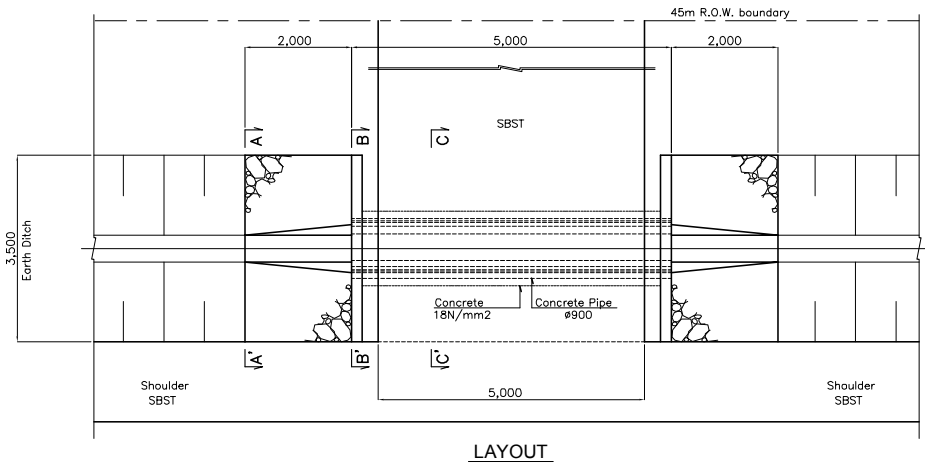
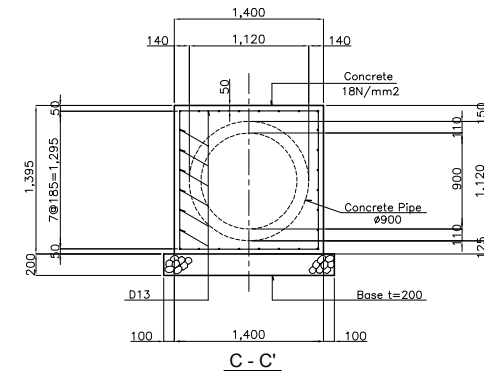
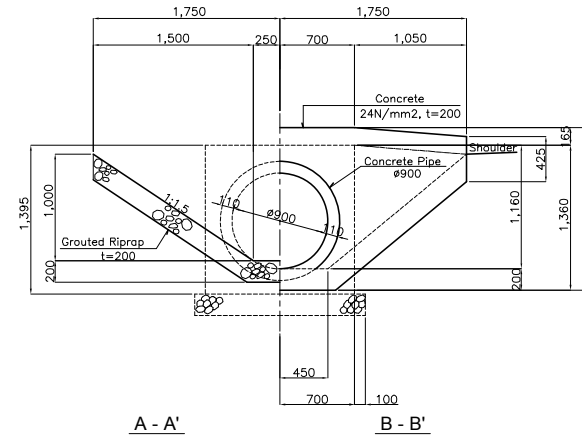
Ditch A (Earth Ditch)  
Scale 1:100



Ditch Protection (Velocity Type)  
Scale 1:100



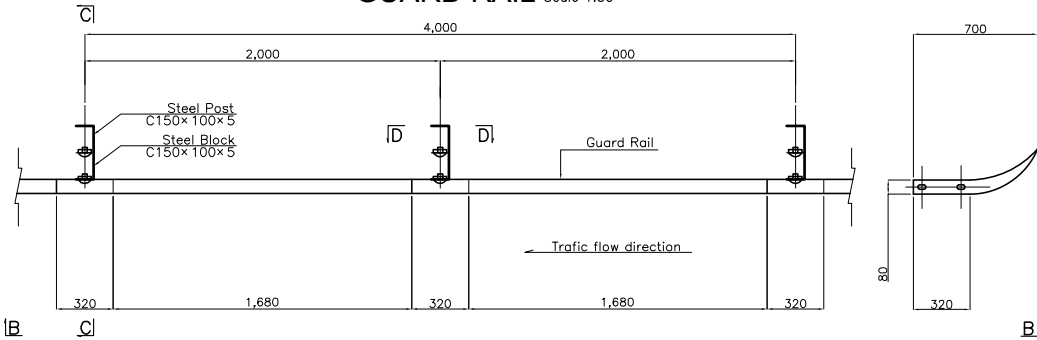
## ENTRANCE CULVERT



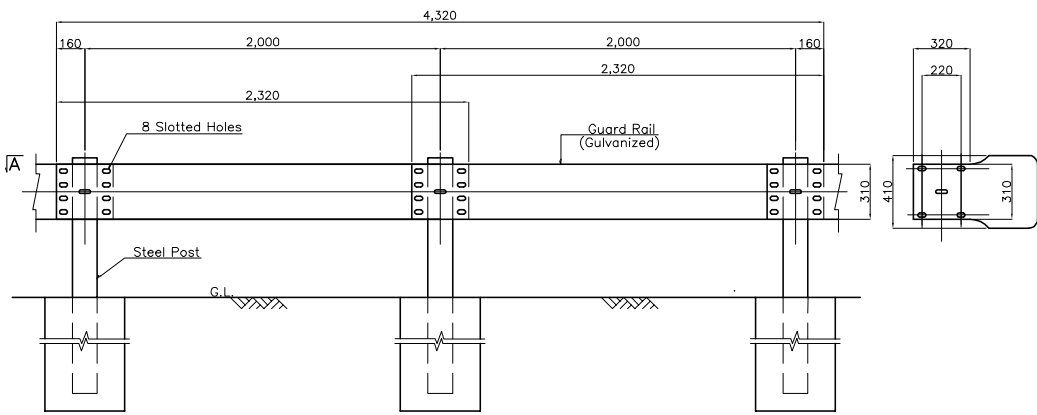
Note: All dimensions are in millimeters, unless otherwise noted.

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	INCIDENTAL WORKS-1 DITCH AND ENTRANCE CULVERT SCALE 1:50, 1:100, 1:200	Prepared by:	MR 03 G-1
				Checked by:	

# GUARD RAIL Scale 1:30

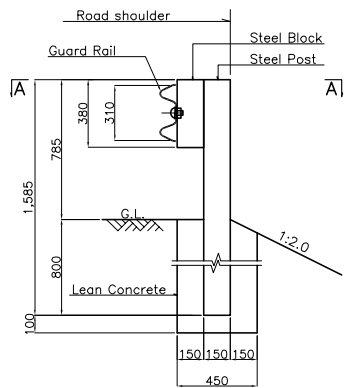


SECTION A - A

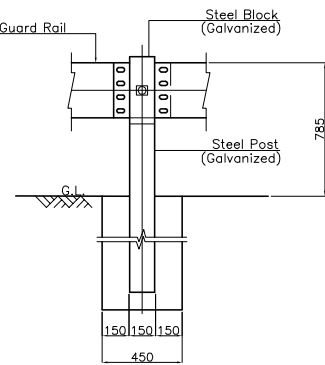


SECTION B - B

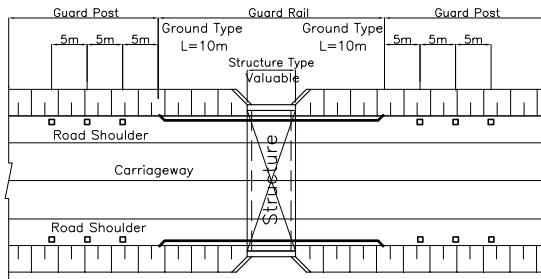
## GUARD RAIL:GROUND TYPE



SECTION C - C



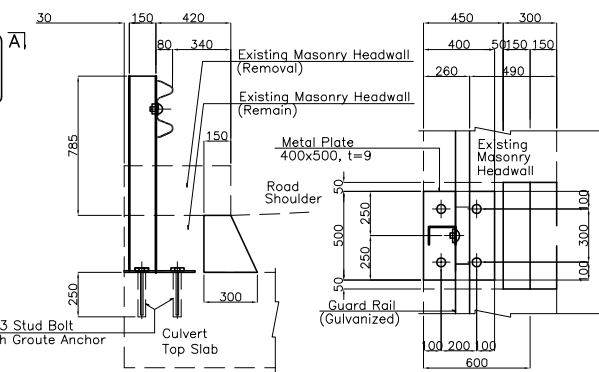
SECTION D - D



LAYOUT OF GUARD RAIL AND GUARD POST FOR STRUCTURE SECTION

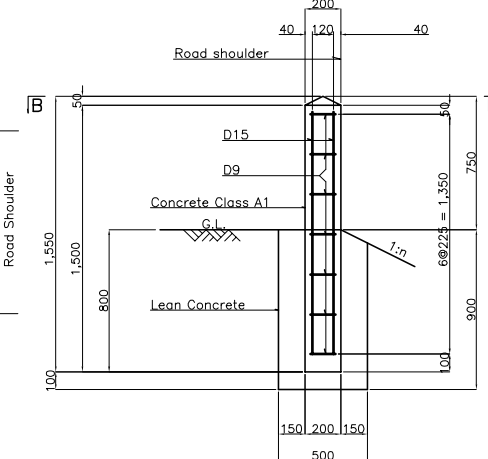
NON-SCALE

## GUARD RAIL:STRUCTURE TYPE

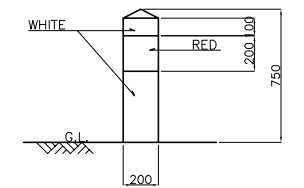


Note: This structure shall be applied for the existing headwall portions where the shoulder width is insufficient.

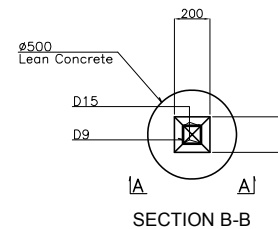
## GUARD POST Scale 1:30



## SECTION A-A



Installation:  
- Culvert/Bridge Approach Section



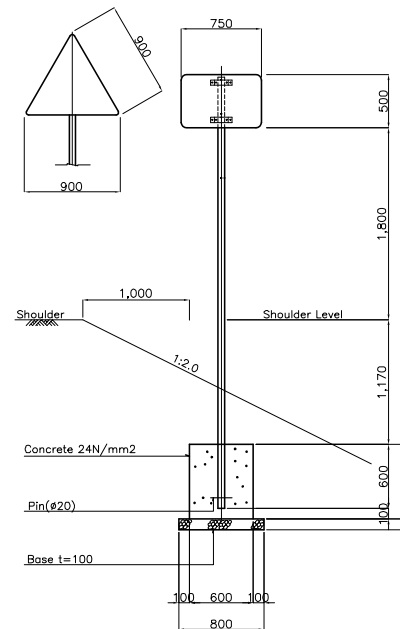
SECTION B-B

Note: All dimensions are in millimeters, unless otherwise noted.

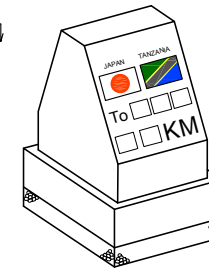
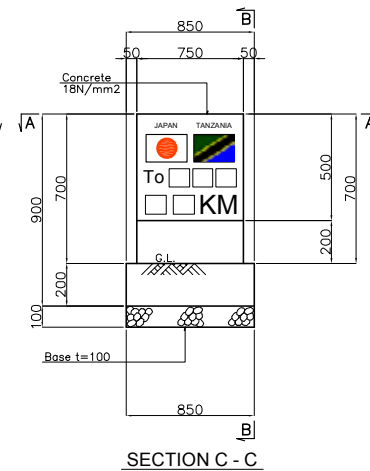
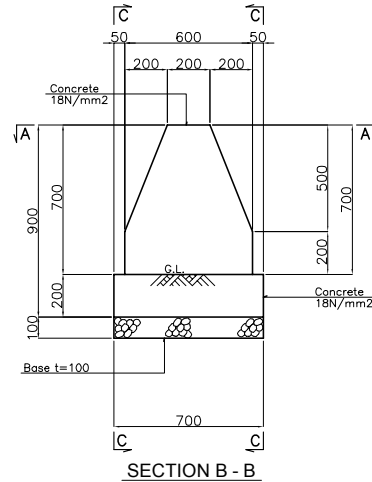
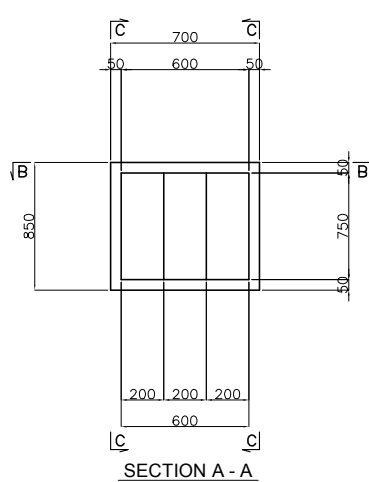
Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	INCIDENTAL WORKS-2 GUARD RAIL AND GUARD POST SCALE 1:30	Prepared by:	MR 03 G-2
				Checked by:	

# TRAFFIC SIGNS

**SIGN POST**  
Scale 1:50



**KILOMETER POST** Scale 1:25



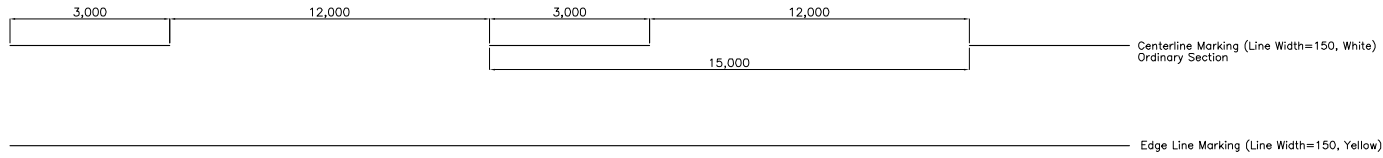
Note: Installation of kilopost shall be set alternately in each 1km

Note: All dimensions are in millimeters, unless otherwise noted.

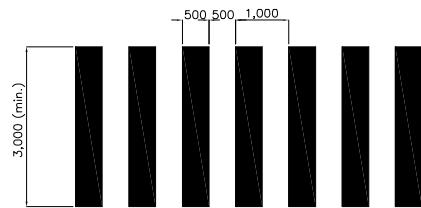
Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	INCIDENTAL WORKS-3 TRAFFIC SIGNS AND KILOMETER POST SCALE 1:25, 1:50	Prepared by:	MR 03 G-3
				Checked by:	

# PAVEMENT MARKINGS

## LINE MARKINGS



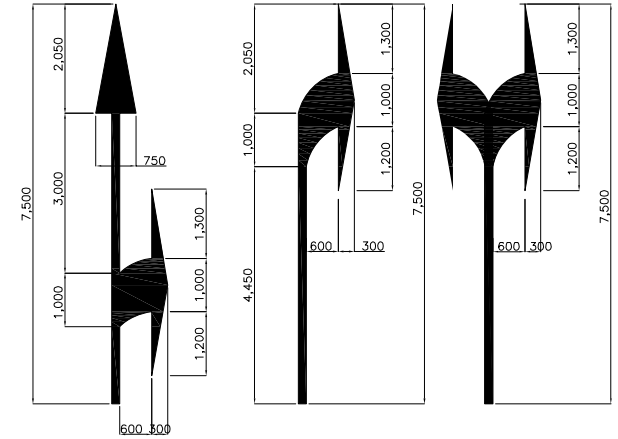
## PEDESTRIAN CROSSING



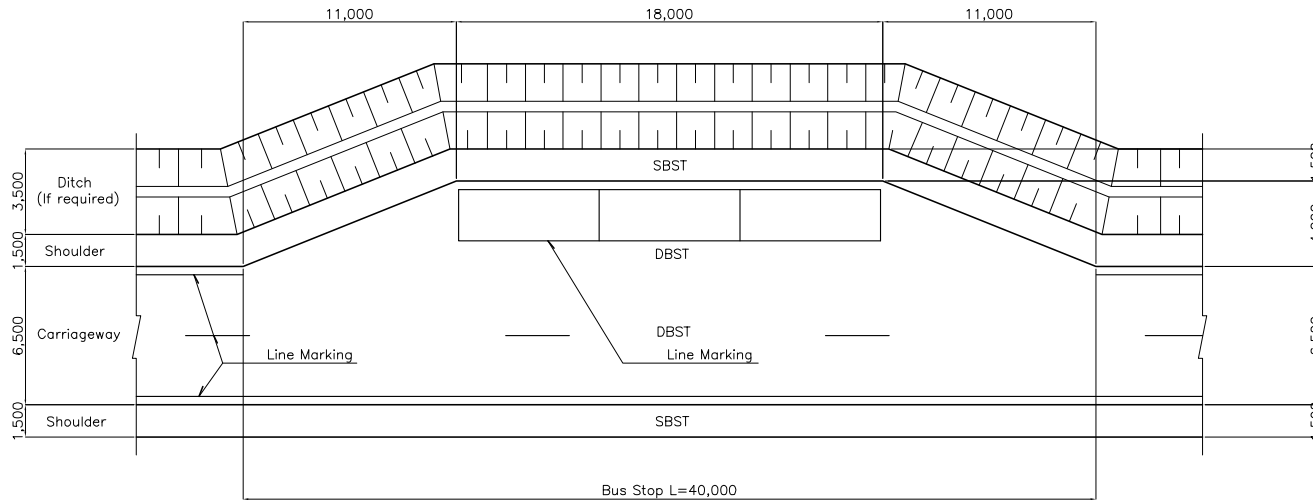
### PEDESTRIAN CROSSING INSTALLATION

NO.	Location
1	17+975.0
2	21+850.0
3	24+430.0
4	26+012.0
5	30+318.0
6	32+395.0

## ARROWS

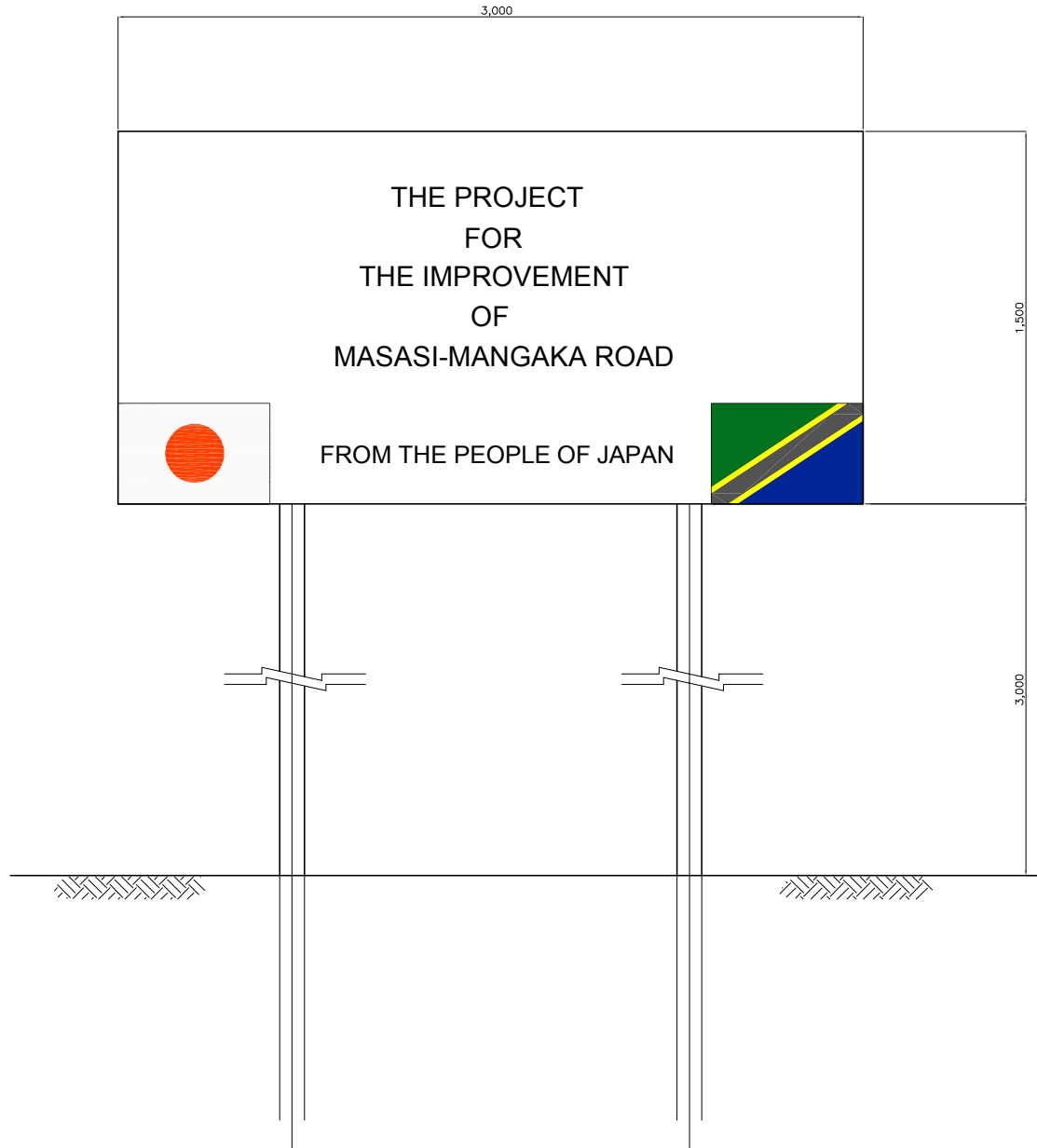


## BUS STOP



### PLAN

Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	INCIDENTAL WORKS-4 PAVEMENT MARKINGS AND BUS STOP NON-SCALE	Prepared by:	MR 03 G-4
				Checked by:	



Tanzania National Roads Agency (TANROADS) of The United Republic of Tanzania	CONSULTANTS:	PROJECT NAME:	DRAWING TITLE:	Date: Aug. 2009	DRAWING No.:
	INGEROSEC CORPORATION, JAPAN	The Project for the Improvement of Masasi-Mangaka Road	INCIDENTAL WORKS-5 PROJECT INFORMATION BOARD SCALE 1:50	Prepared by:	MR 03 G-5
				Checked by:	