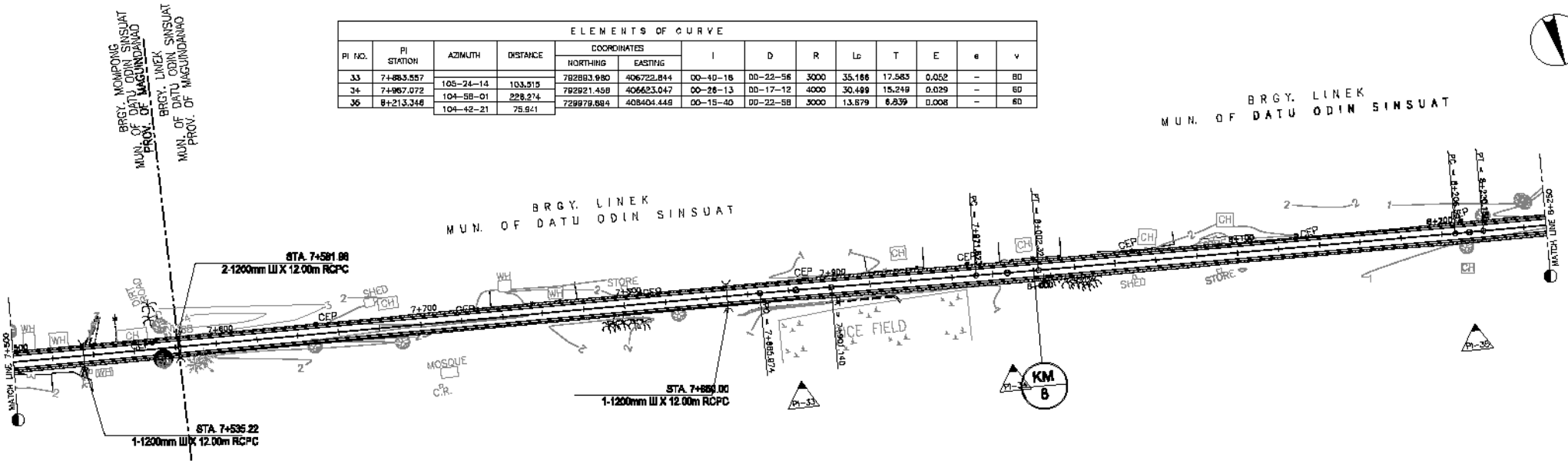
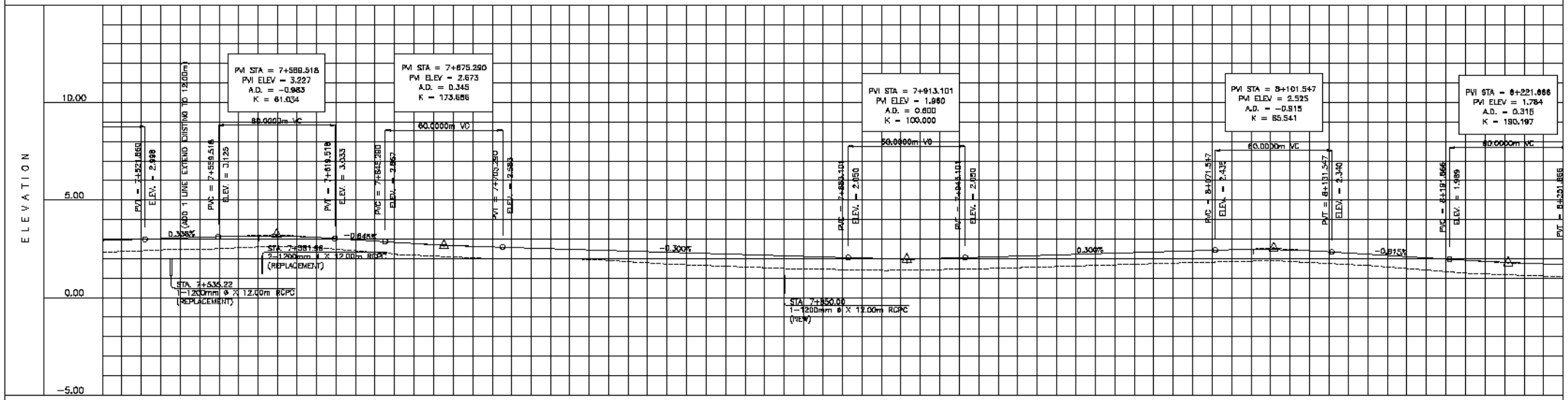
ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
33	7+883.557	105-24-14	103.515	782883.980	406722.844	00-40-18	00-22-56	3000	35.166	17.583	0.052	–	60
34	7+987.072	104-58-01	228.274	782921.458	406623.047	00-26-13	00-17-12	4000	30.499	15.249	0.029	–	60
35	8+213.348	104-42-21	75.941	729979.684	408404.449	00-15-40	00-22-58	3000	13.879	6.939	0.008	–	60





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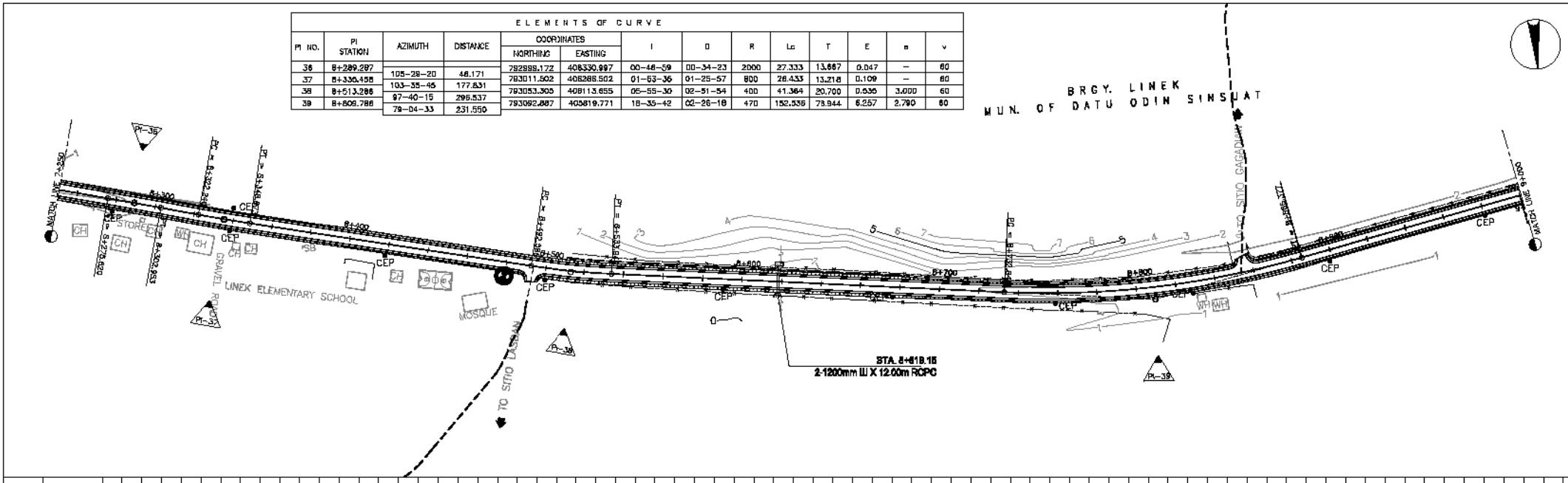
PROJECT & LOCATION :
THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES
PROVINCE OF MAGUINDANAO

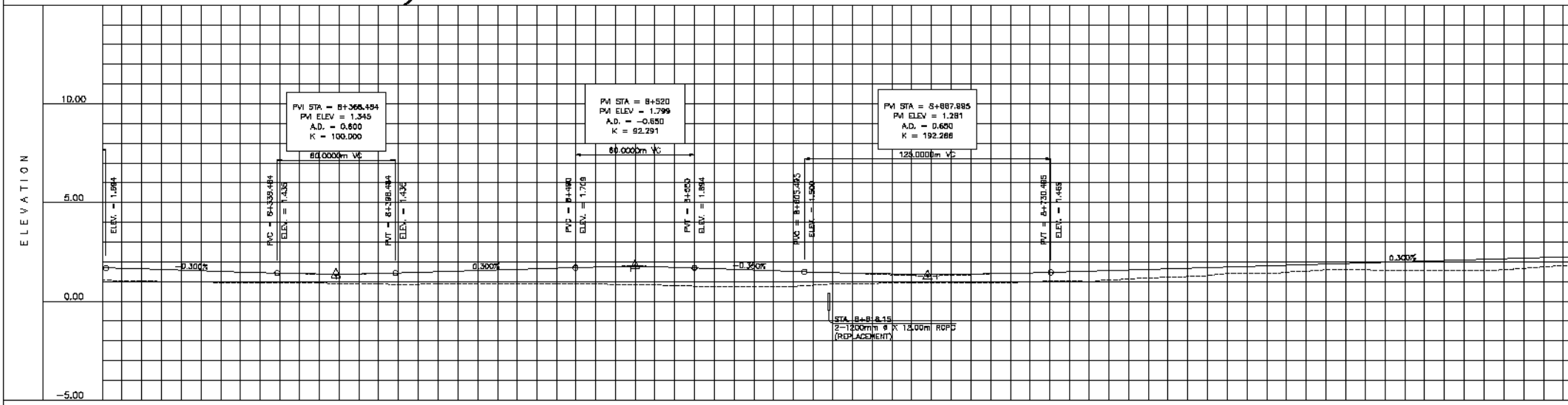
SHEET CONTENTS :
TAMONTAKA-TAPIAN
PLAN AND PROFILE
STA. 7+500 TO STA. 8+250

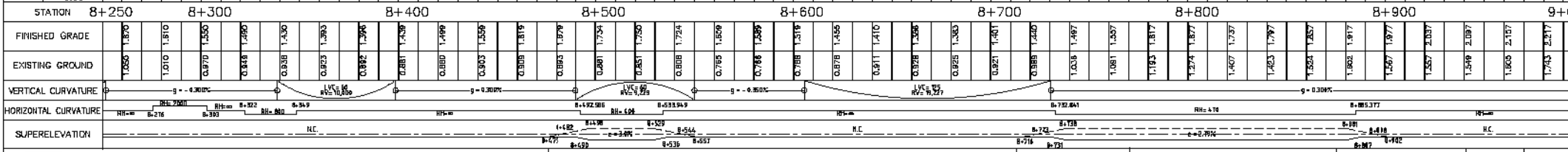
SET NO.

SHEET NO.
TT-13

ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES		I	D	R	Lc	T	E	e	v
				NORTHING	EASTING								
36	8+289.297			782999.172	408330.997	00-48-59	00-34-23	2000	27.333	13.667	0.047	–	60
		105-28-20	48.171										
37	8+336.456			783011.502	408288.502	01-53-36	01-25-57	800	26.433	13.216	0.109	–	60
		103-35-45	177.831										
38	8+513.286			783053.305	408113.655	05-55-30	02-51-54	400	41.364	20.700	0.535	3.000	60
		97-40-15	295.537										
39	8+809.788			783092.887	407819.771	18-35-42	02-26-18	470	152.535	78.944	6.257	2.790	60
		79-04-33	231.550										







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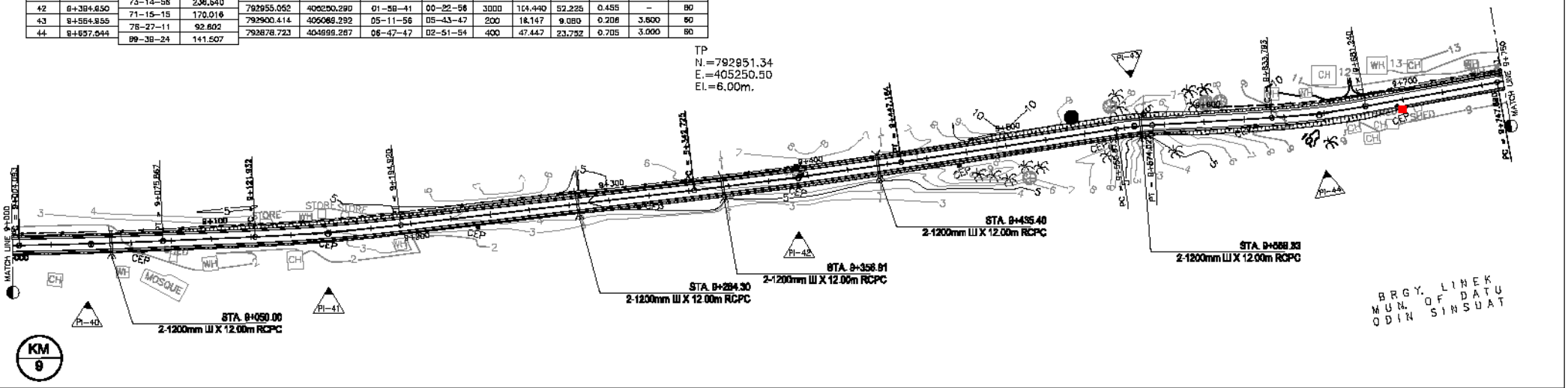
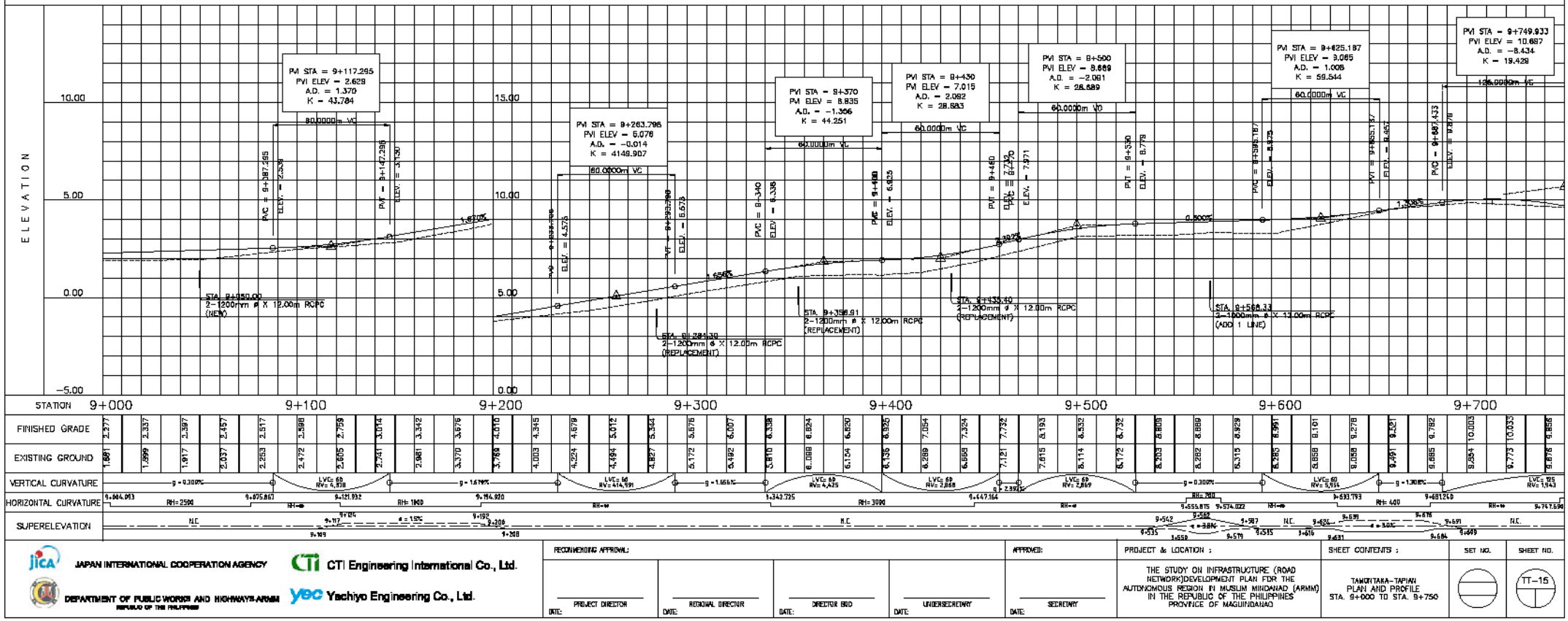
PROJECT DIRECTOR DATE:	REGIONAL DIRECTOR DATE:	DIRECTOR BOD DATE:	UNDERSECRETARY DATE:	SECRETARY DATE:	THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES PROVINCE OF MAGUINDANAO	TAMONTAKA-TAPIAN PLAN AND PROFILE STA. 8+250 TO STA. 9+000		TT-14

ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
40	9+039.983			793049.006	405582.418	01-38-42	00-27-31	2500	71.773	35.889	0.258	–	60
		77-25-51	118.465										
41	9+158.442			793023.226	405476.792	04-10-55	01-06-48	1000	72.959	36.510	0.666	1.500	60
		73-14-56	236.540										
42	9+394.850			792955.052	406250.290	01-58-41	00-22-56	3000	104.440	52.225	0.455	–	80
		71-15-15	170.016										
43	9+564.855			792900.414	405089.392	05-11-56	05-43-47	200	18.147	9.080	0.206	3.500	50
		76-27-11	92.602										
44	9+657.644			792878.723	404999.267	06-47-47	02-51-54	400	47.447	23.752	0.705	3.000	50
		89-38-24	141.507										





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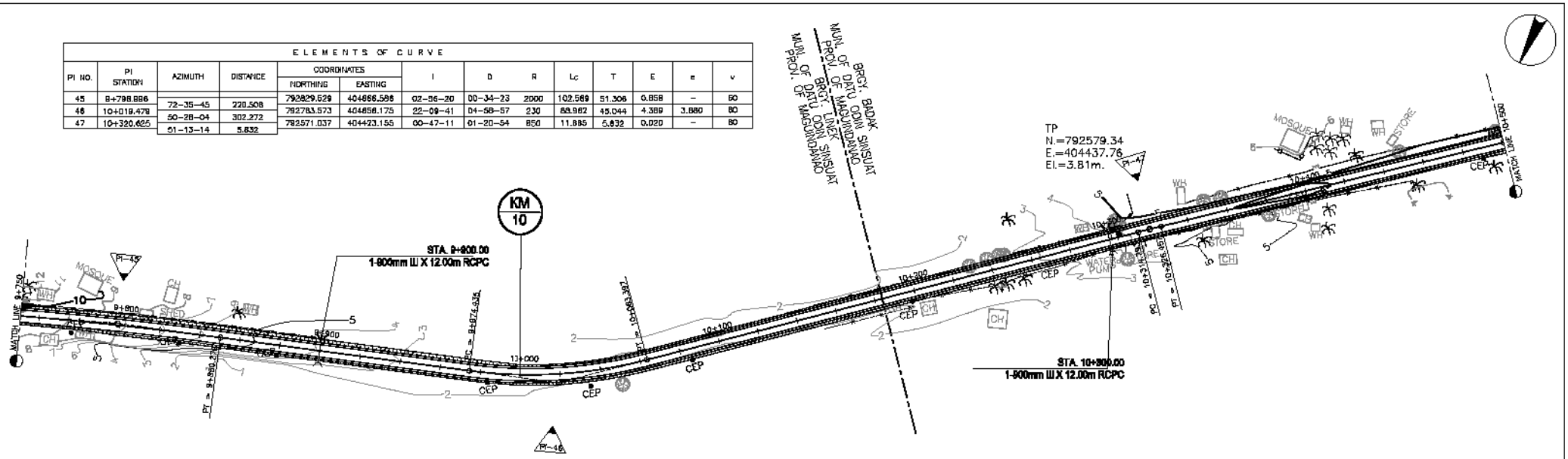
PROVINCE OF MAGUINDANAO

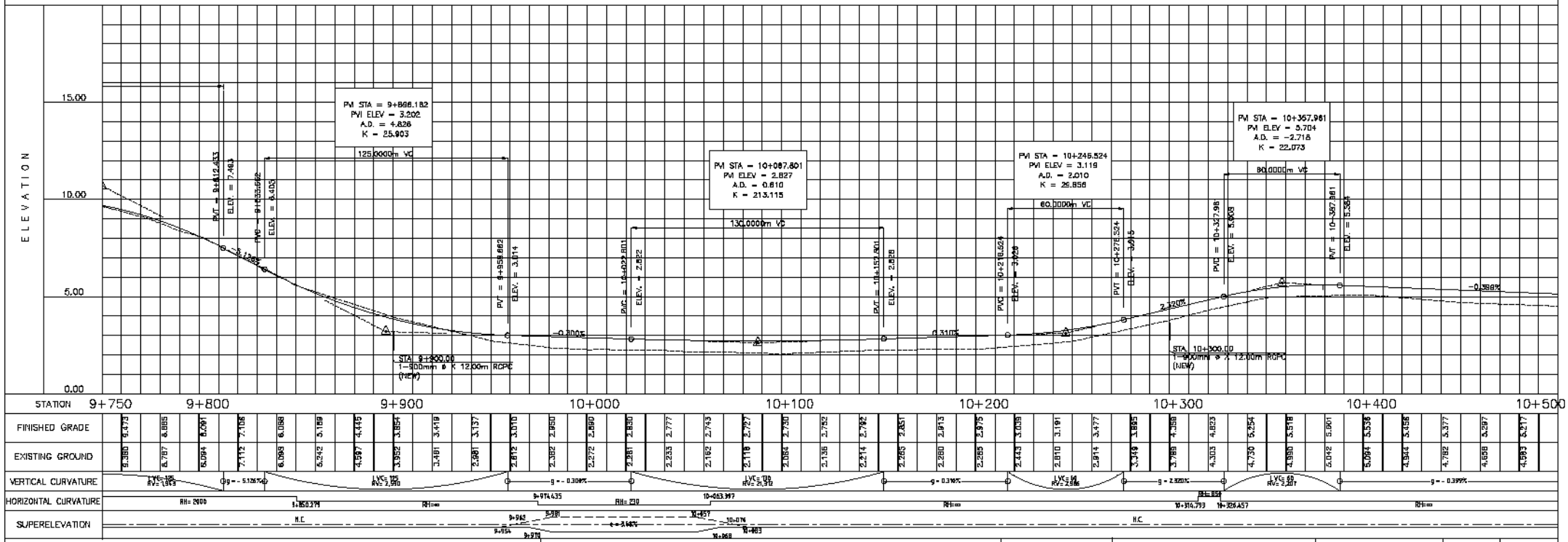
SHEET CONTENTS :
TAMONTAKA-TAPIAN
PLAN AND PROFILE
STA. 9+000 TO STA. 9+750

SET NO.

SHEET NO.
TT-15

ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES		I	D	R	Lc	T	E	e	v
				NORTHING	EASTING								
45	9+798.886			792829.529	404866.586	02-36-20	00-34-23	2000	102.589	51.306	0.658	–	50
		72-35-45	220.508										
46	10+019.479			792783.573	404656.175	22-09-41	04-58-57	230	88.962	45.044	4.389	3.880	80
		50-28-04	302.272										
47	10+320.625			792571.037	404423.155	00-47-11	01-20-54	850	11.885	5.932	0.020	–	80
		51-13-14	5.832										





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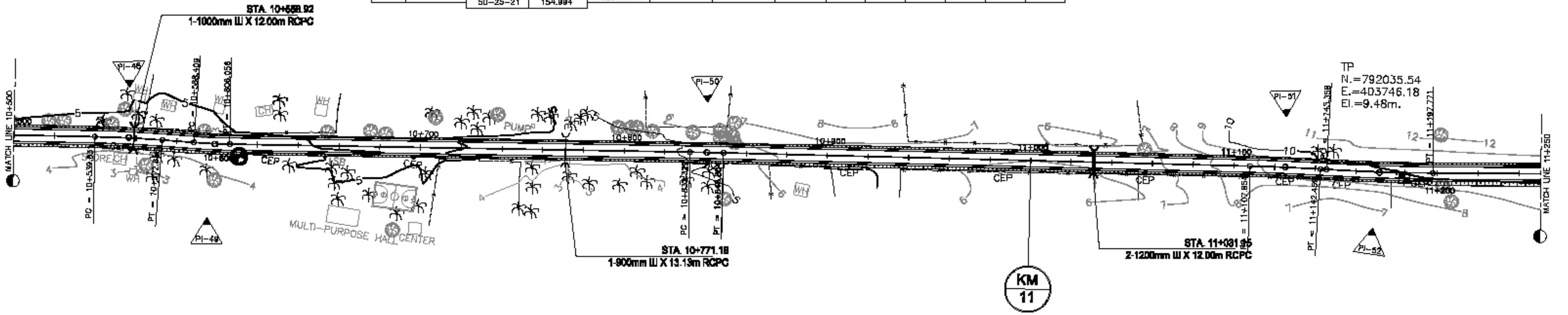
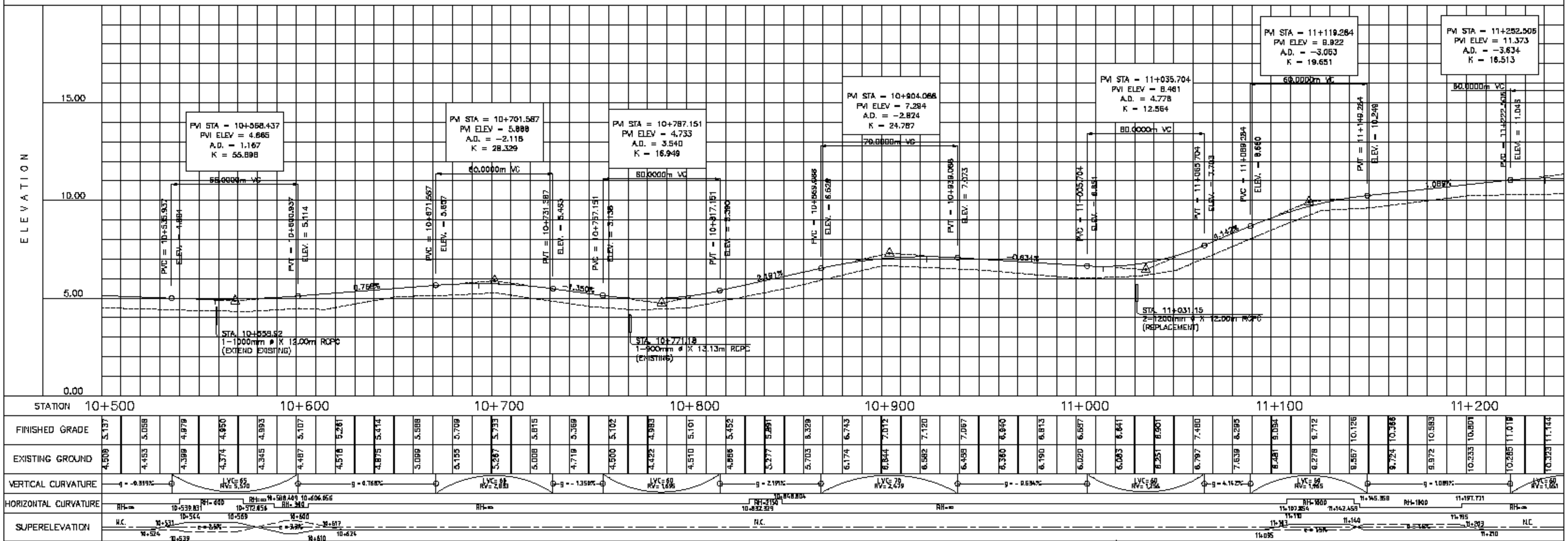
MUN. OF DATU ODIN SINSUAT

BRGY. BADAK

PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES		I	D	R	Lc	T	E	e	v
				NORTHING	EASTING								
48	10+556.349	54-22-27	40.895	792423.398	404239.394	03-09-13	01-54-36	600	33.025	16.517	0.227	2.500	60
49	10+597.235	51-00-14	243.337	792389.577	404206.153	03-22-13	03-49-11	300	17.647	8.828	0.130	3.300	60
50	10+840.567	51-26-34	8.237	792248.453	404017.034	00-26-21	00-31-59	2150	16.475	8.237	0.016	–	60
51	11+125.158	53-25-32	46.416	792069.069	403794.488	01-58-58	01-08-46	1000	34.605	17.304	0.150	1.500	50
52	11+171.571	50-25-21	154.994	792041.411	403757.212	03-00-11	01-08-46	1000	52.412	26.212	0.343	1.500	60





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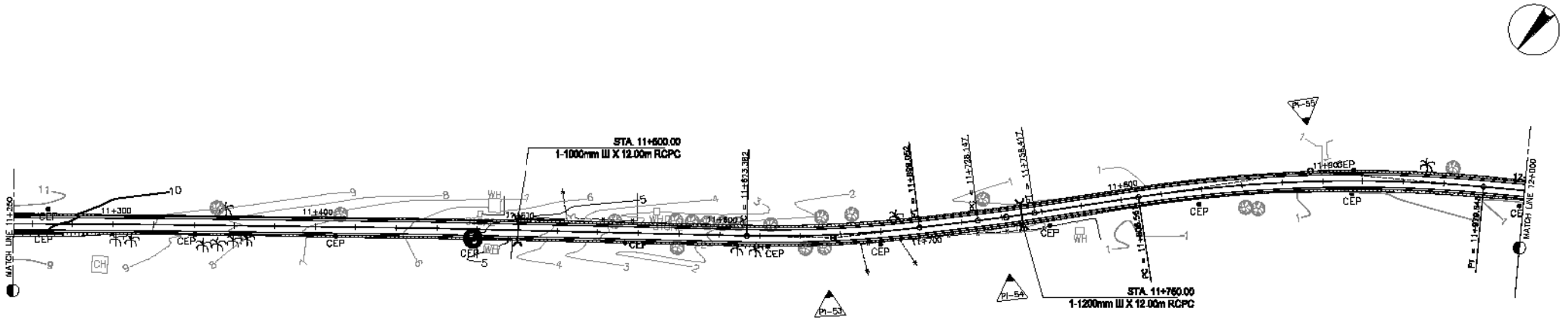
SHEET CONTENTS :
TAMONTAKA-TAPIAN PLAN AND PROFILE STA. 10+500 TO STA. 11+250

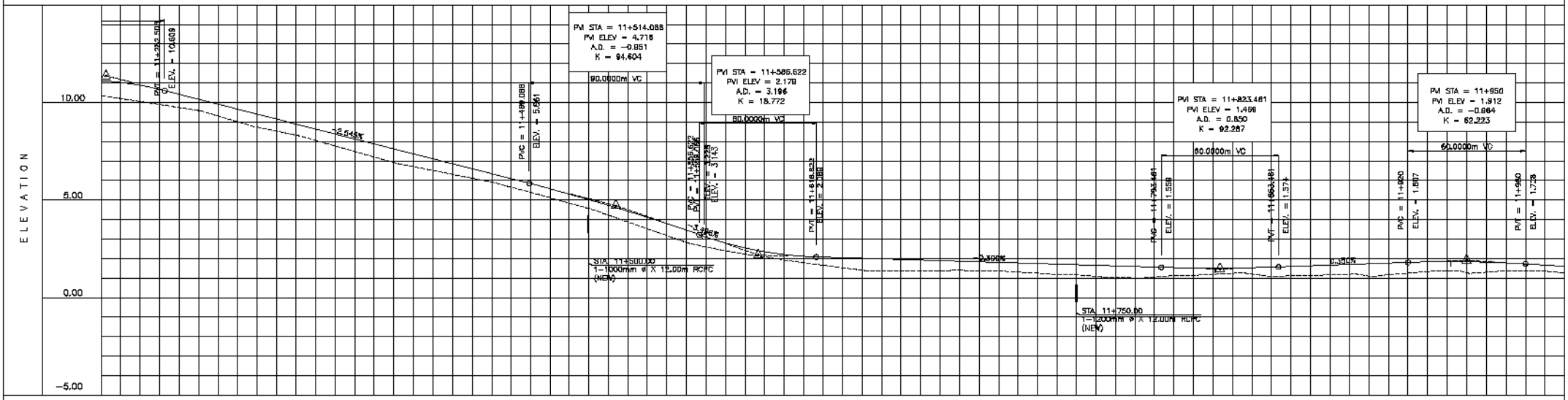
SET NO.

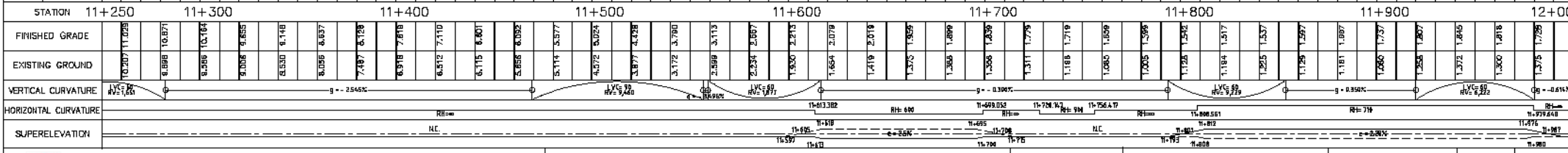
SHEET NO. TT-17



BRGY. BADAK
MUN. OF DATU ODIN SINSUAT

ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
53	11+555.290	43-11-23	26.139	781735.714	403381.045	08-10-51	01-54-26	600	85.559	42.908	1.532	2.500	60
54	11+742.263	41-23-24	152.240	781672.910	403322.090	01-47-59	01-16-24	900	28.270	14.136	0.111	–	80
55	11+884.521	55-11-47	224.170	781556.595	403221.432	13-48-23	01-36-51	710	171.087	85.960	5.185	2.250	60





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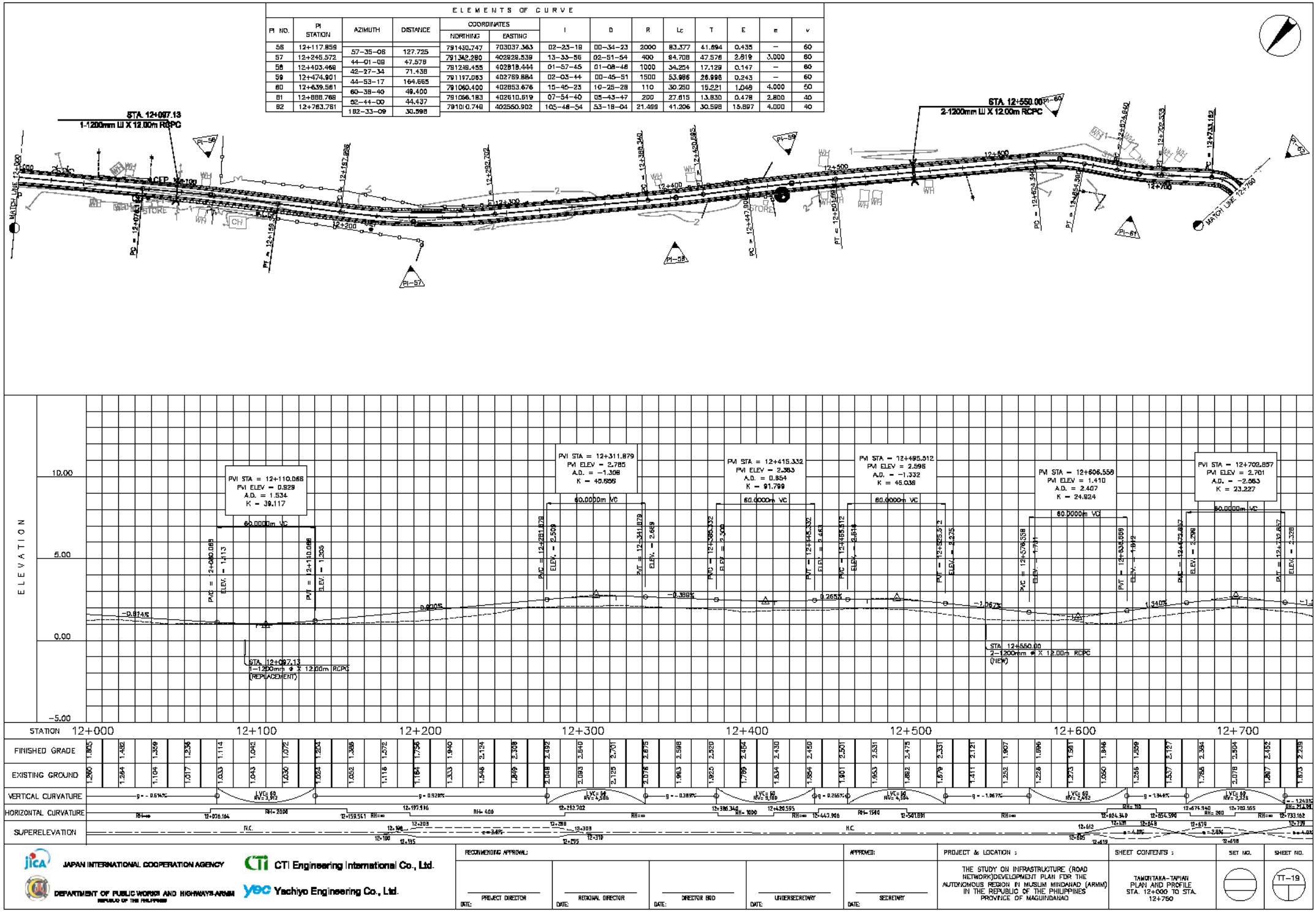
PROVINCE OF MAGUINDANAO

SHEET CONTENTS :
TAMONTAKA-TAPIAN
PLAN AND PROFILE
STA. 11+250 TO STA. 12+000

SET NO.

SHEET NO.
TT-18



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PROVINCE OF MAGUINDANAO

SHEET CONTENTS :

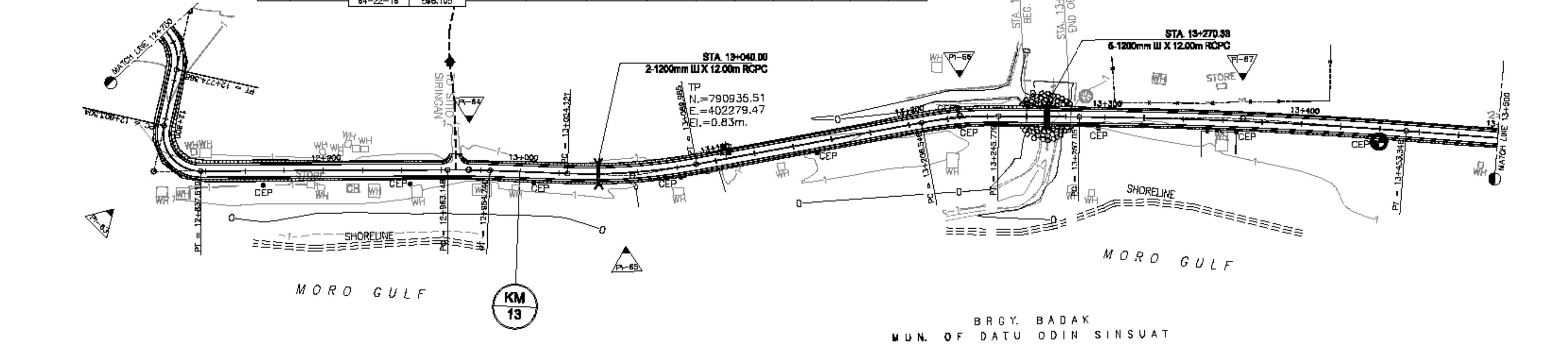
TAMONTAKA-TAPIAN
PLAN AND PROFILE
STA. 12+000 TO STA. 12+750

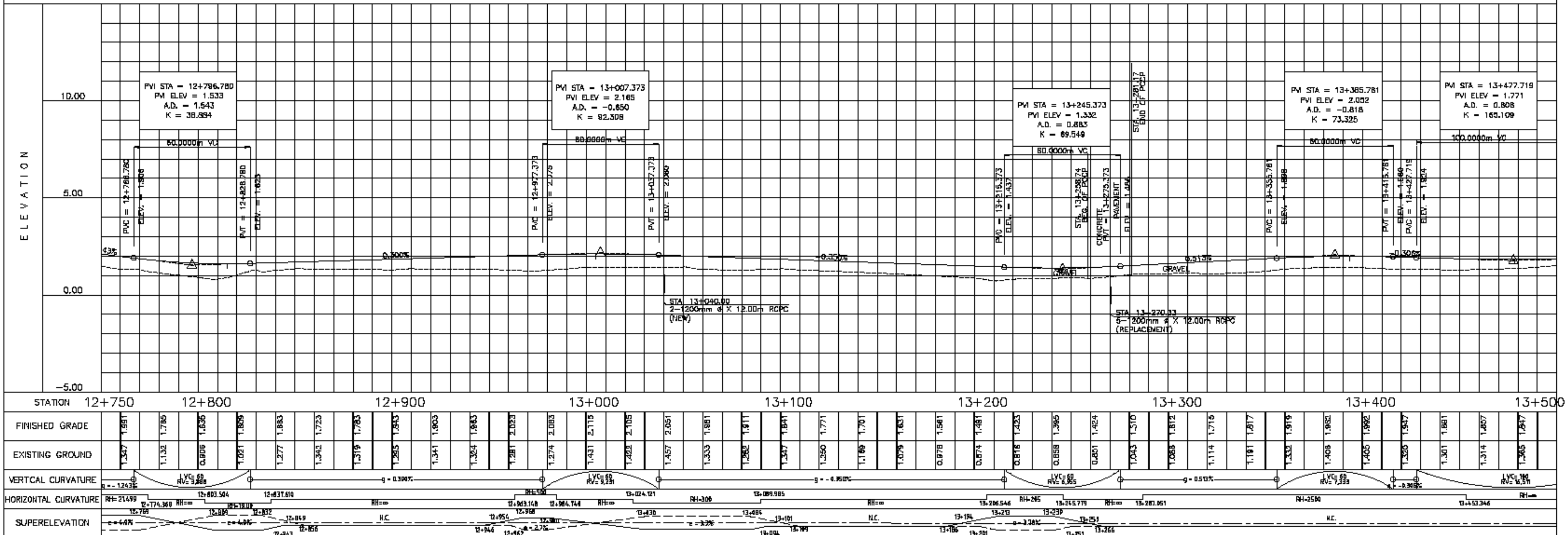
SET NO.

SHEET NO.

TT-19

ELEMENTS OF CURVE													
PI NO.	PI STATION	AZINUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
63	12+827.326			791080.460	402525.846	102-50-58	06-18-41	19	34.106	23.822	11.471	4.000	40
		59-41-58	160.157										
64	12+973.945			791009.655	402387.568	02-28-27	02-17-31	500	21.592	10.798	0.117	2.700	60
		82-10-28	83.244										
65	13+057.188			790970.798	402313.960	12-34-44	03-49-11	300	65.884	33.065	1.817	3.300	60
		49-35-41	168.303										
66	13+226.223			780861.058	402185.029	10-57-54	05-35-24	205	39.232	19.676	0.942	3.780	60
		60-33-35	144.127										
67	13+370.230			790790.217	402059.513	03-48-40	00-27-31	2500	166.295	83.178	1.363	–	60
		64-22-16	596.105										





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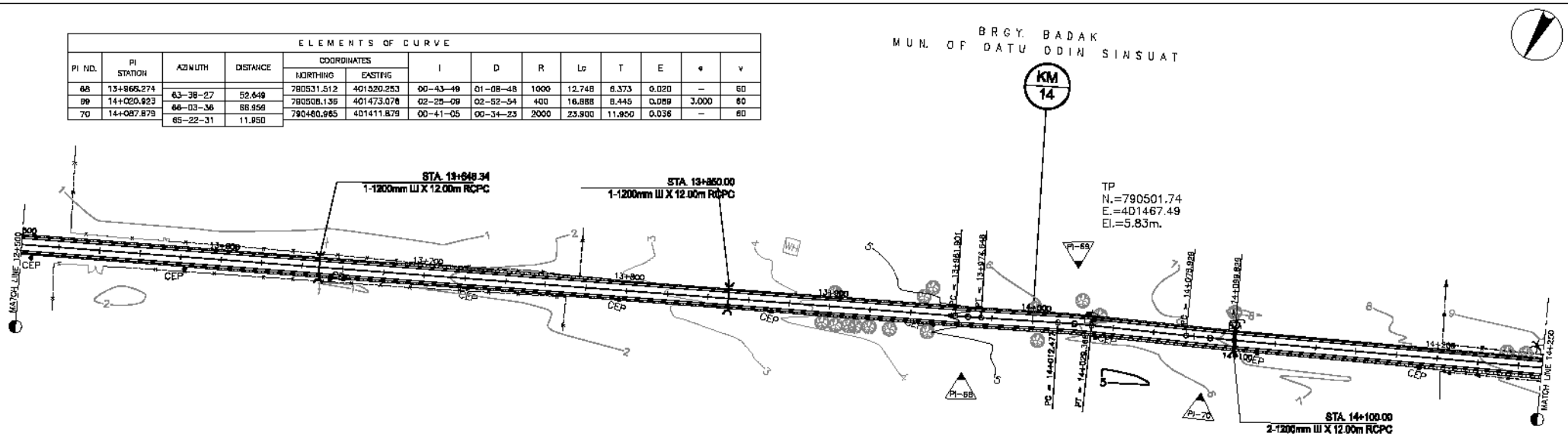
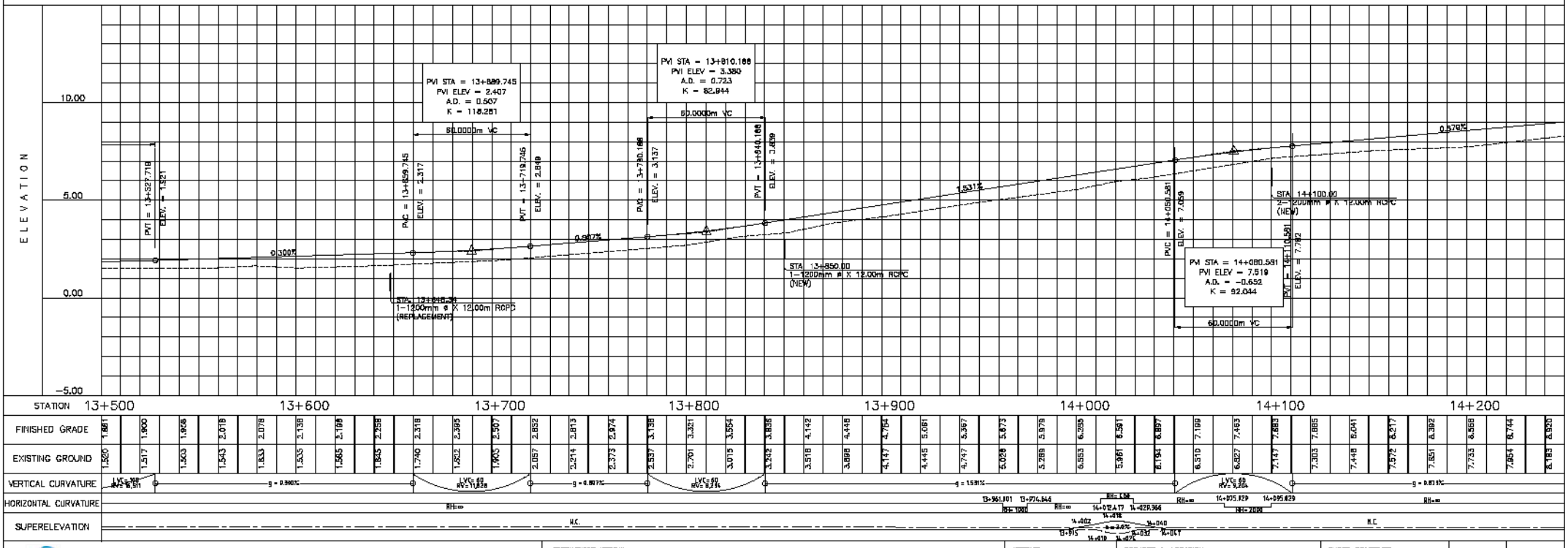
ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES		I	D	R	Lc	T	E	e	v
				NORTHING	EASTING								
68	13+865.274			790531.512	401520.253	00-43-49	01-08-48	1000	12.748	6.373	0.020	–	60
		63-38-27	52.649										
69	14+020.923			790508.136	401473.076	02-25-09	02-52-54	400	16.888	8.445	0.089	3.000	60
		66-03-36	66.956										
70	14+087.879			790480.965	401411.879	00-41-05	00-34-23	2000	23.900	11.950	0.036	–	60
		65-22-31	11.950										





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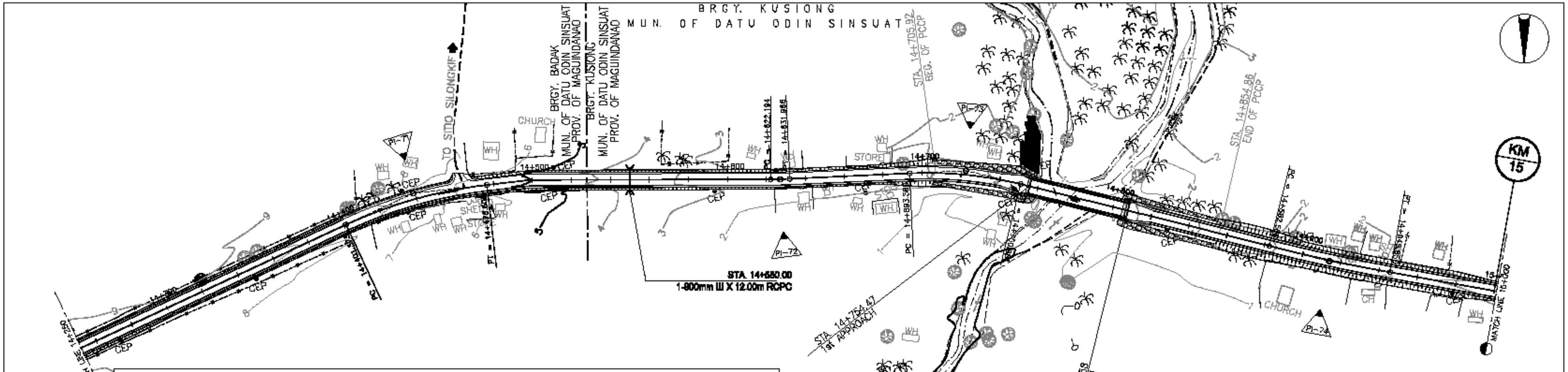
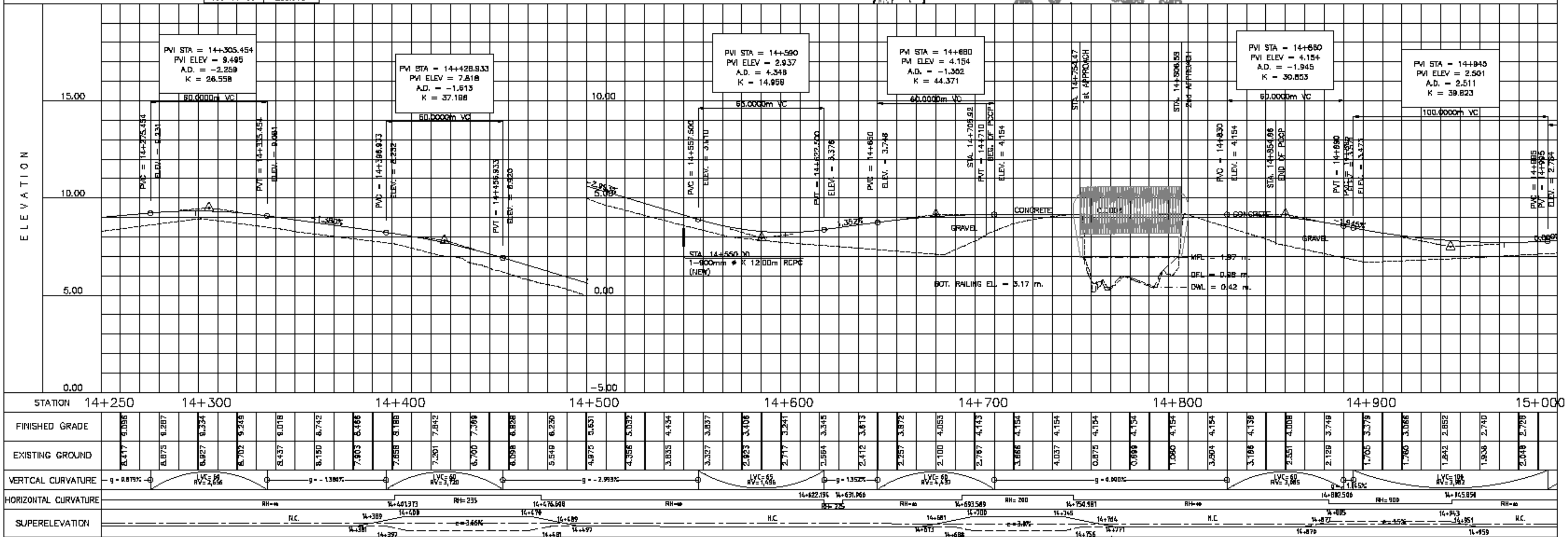


ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
71	14+439.315			790332.981	401093.128	18-20-35	04-52-35	235	75.235	37.942	3.043	3.660	60
		83-25-36	60.072										
72	14+827.081			790325.731	400906.109	02-29-19	05-05-35	225	9.772	4.887	0.053	–	60
		87-21-15	85.404										
73	14+722.483			790321.327	400809.807	16-26-29	05-43-47	200	57.392	28.894	2.076	3.800	60
		103-47-44	106.593										
74	14+914.191			790328.217	400623.397	04-01-57	01-16-24	900	63.344	31.885	0.558	1.500	60
		100-11-55	200.316										



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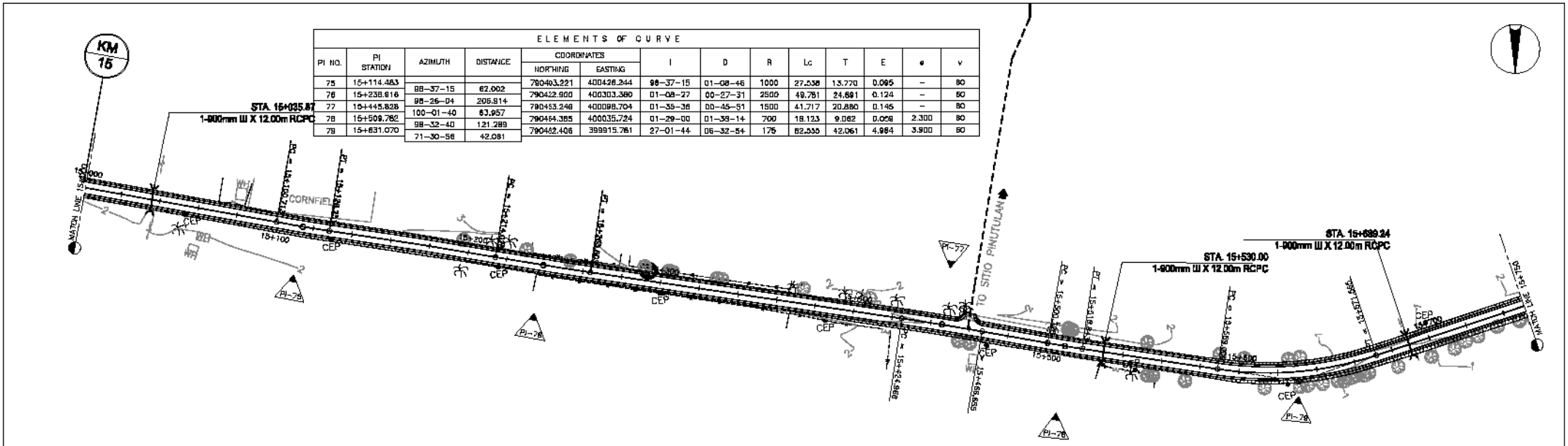
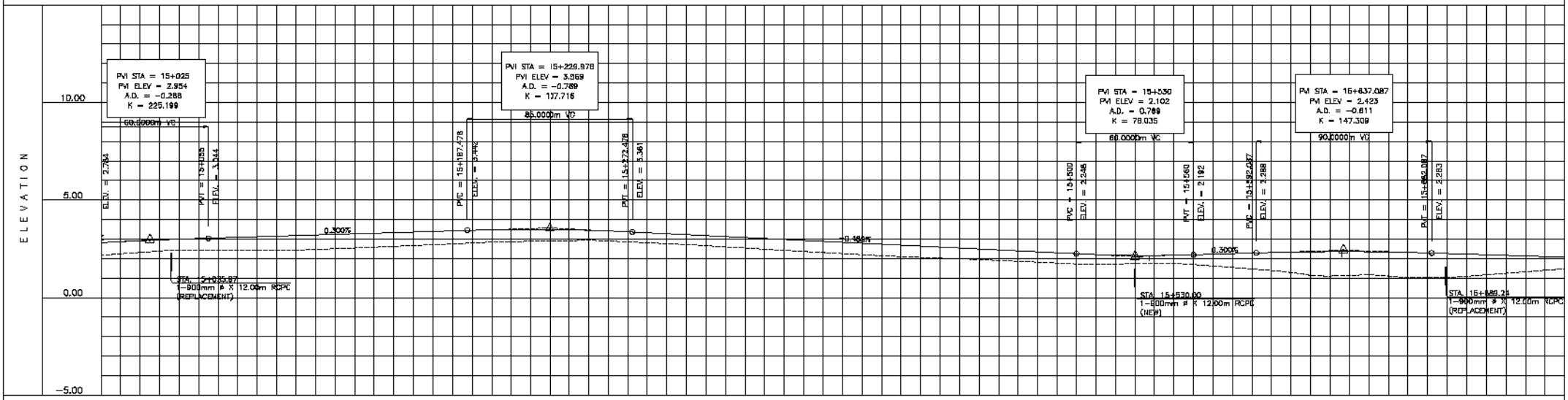
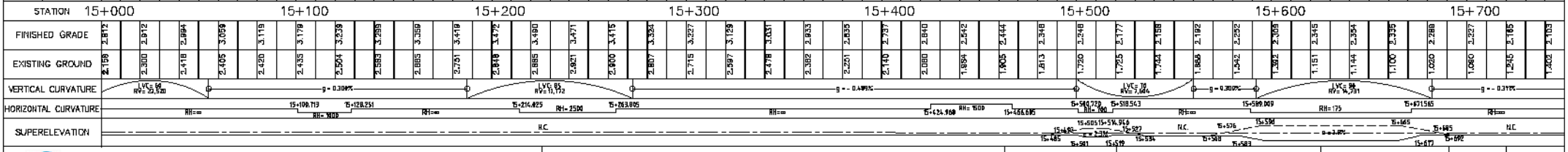


ELEMENTS OF CURVE

PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
75	15+114.483			790403.221	400426.244	98-37-15	01-08-46	1000	27.538	13.770	0.095	–	60
		98-37-15	62.002										
76	15+238.816			790422.900	400303.380	01-08-27	00-27-31	2500	49.781	24.891	0.124	–	60
		98-26-04	205.814										
77	15+445.828			790453.248	400098.704	01-35-36	00-45-51	1500	41.717	20.880	0.145	–	60
		100-01-40	63.957										
78	15+509.782			790464.365	400035.724	01-29-00	01-39-14	700	18.123	9.062	0.059	2.300	60
		98-32-40	121.289										
79	15+631.070			790482.406	399915.761	27-01-44	06-32-54	175	82.555	42.061	4.984	3.900	60
		71-30-56	42.081										





JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS-ARMM
REPUBLIC OF THE PHILIPPINES
CTI Engineering International Co., Ltd.
Yachiyo Engineering Co., Ltd.

RECOMMENDING APPROVAL:
PROJECT DIRECTOR — DATE:
REGIONAL DIRECTOR — DATE:
DIRECTOR BOD — DATE:
UNDERSECRETARY — DATE:
APPROVED:
SECRETARY — DATE:

PROJECT & LOCATION :
THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES
PROVINCE OF MAGUINDANAO

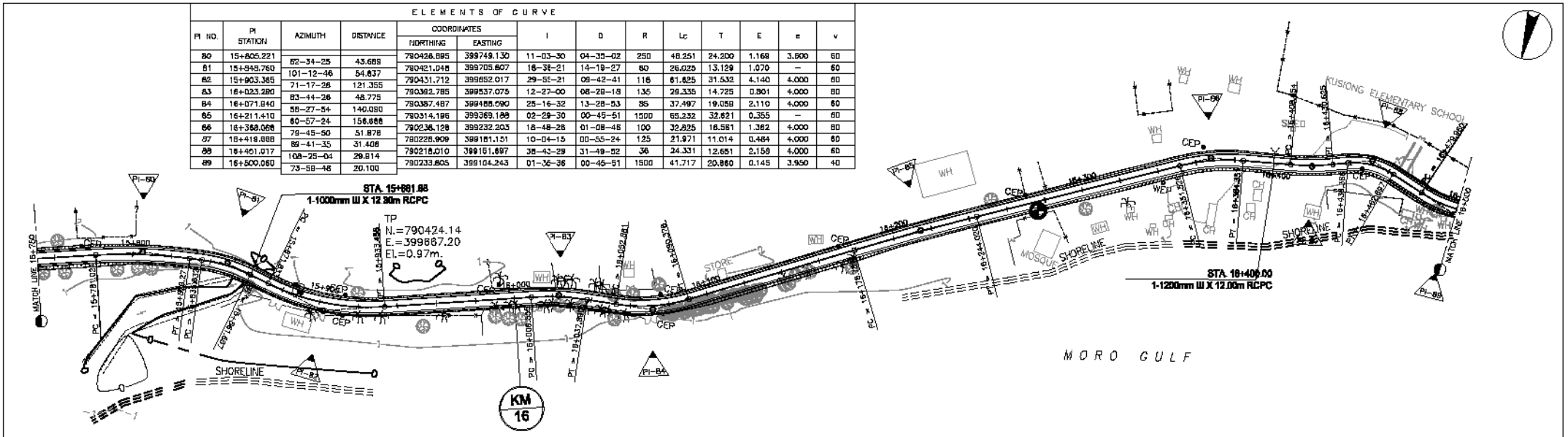
SHEET CONTENTS :
TAMONTAKA-TAPIAN
PLAN AND PROFILE
STA. 15+000 TO STA. 15+750

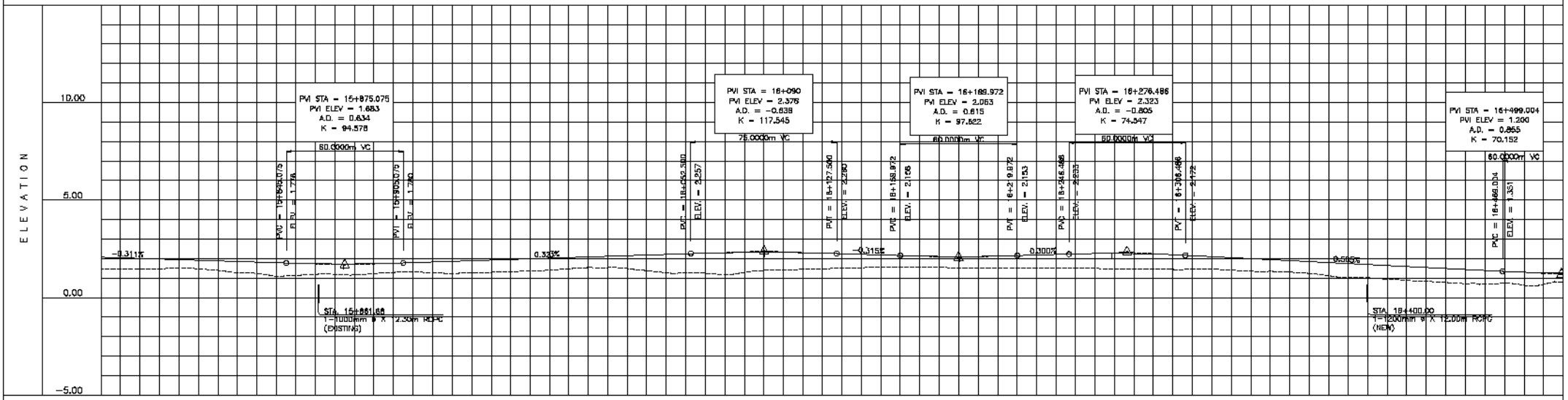
SET NO.

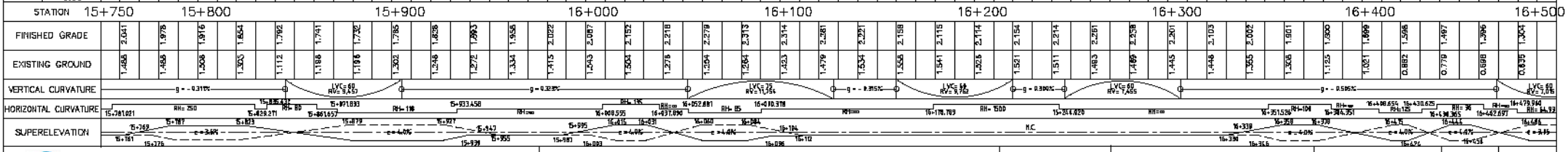
SHEET NO.
TT-23

ELEMENTS OF CURVE

PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
80	15+805.221												
		62-34-25	43.669	790426.895	399749.130	11-03-30	04-35-02	250	48.251	24.200	1.168	3.500	60
81	15+848.760												
		101-12-46	54.837	790421.048	399705.807	16-38-21	14-19-27	80	26.025	13.129	1.070	–	60
82	15+903.365												
		71-17-26	121.355	790431.712	399652.017	29-55-21	09-42-41	116	61.625	31.532	4.140	4.000	60
83	16+023.280												
		83-44-26	48.775	790392.785	399537.075	12-27-00	08-28-18	135	29.335	14.725	0.801	4.000	60
84	16+071.840												
		58-27-54	140.080	790387.487	399488.590	25-16-32	13-28-53	85	37.497	19.059	2.110	4.000	60
85	16+211.410												
		60-57-24	156.668	790314.186	399369.188	02-29-30	00-45-51	1500	65.232	32.621	0.355	–	60
86	16+368.068												
		79-45-50	51.878	790236.128	399232.203	18-48-28	01-08-46	100	32.825	16.581	1.362	4.000	80
87	16+419.888												
		89-41-35	31.406	790228.909	399181.151	10-04-15	00-55-24	125	21.971	11.014	0.484	4.000	60
88	16+451.017												
		108-25-04	29.814	790218.010	399151.697	38-43-29	31-49-52	36	24.331	12.651	2.159	4.000	60
89	16+500.060												
		73-58-48	20.100	790233.805	399104.243	01-36-36	00-45-51	1500	41.717	20.860	0.145	3.950	40







JICA JAPAN INTERNATIONAL COOPERATION AGENCY
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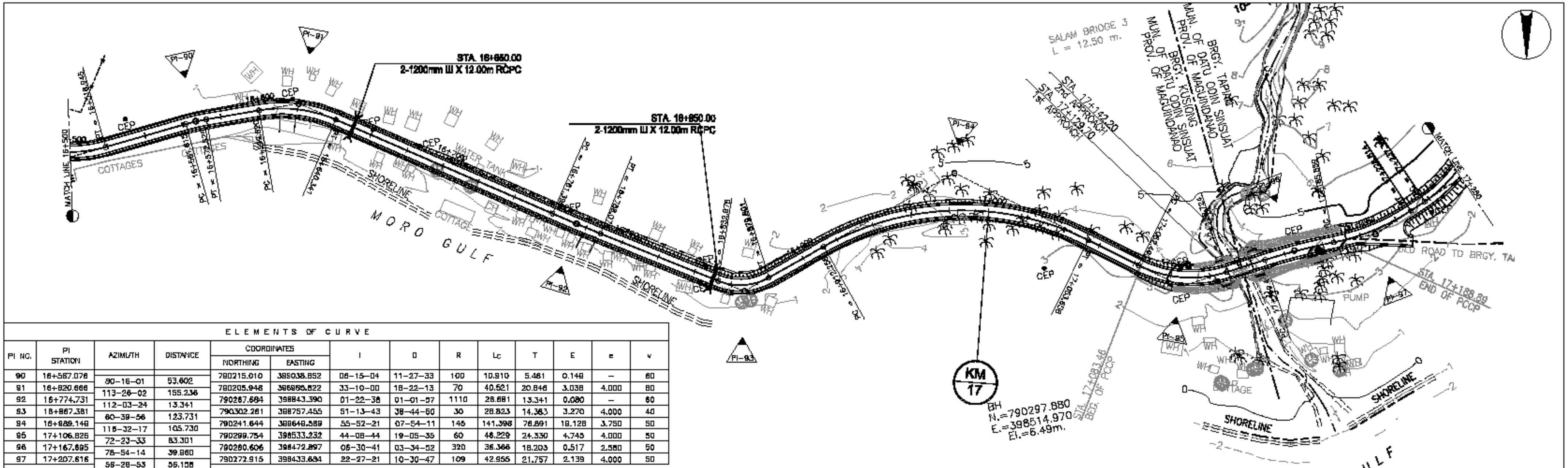
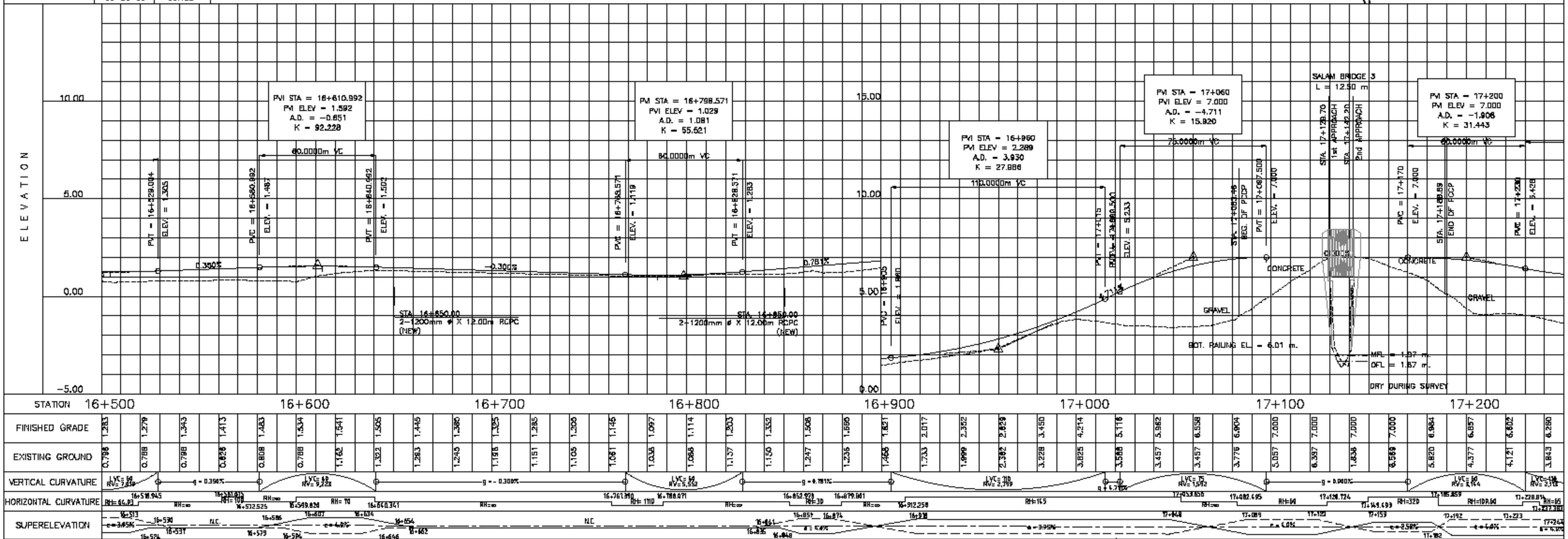
REPUBLIC OF THE PHILIPPINES
CTI CTI Engineering International Co., Ltd.
yec Yachiyo Engineering Co., Ltd.

RECOMMENDING APPROVAL:				APPROVED:	PROJECT & LOCATION :	SHEET CONTENTS :	SET NO.	SHEET NO.
PROJECT DIRECTOR DATE:	REGIONAL DIRECTOR DATE:	DIRECTOR BOD DATE:	UNDERSECRETARY DATE:	SECRETARY DATE:	THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES PROVINCE OF MAGUINDANAO	TAMONTAKA-TAPIAN PLAN AND PROFILE STA. 15+750 TO STA. 16+500		TT-24



E L E M E N T S O F C U R V E													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES		I	D	R	Lc	T	E	e	v
				NORTHING	EASTING								
90	16+567.076	80-16-01	53.602	790215.010	399038.852	06-15-04	11-27-33	100	10.910	5.461	0.148	–	60
91	16+620.666	113-26-02	155.236	790205.948	398985.822	33-10-00	18-22-13	70	40.521	20.846	3.038	4.000	60
92	16+774.731	112-03-24	13.341	790267.684	398843.390	01-22-38	01-01-57	1110	26.681	13.341	0.080	–	60
93	16+867.381	60-39-56	123.731	790302.261	398757.455	51-13-43	38-44-60	30	26.823	14.363	3.270	4.000	40
94	16+989.148	116-32-17	105.730	790241.644	398648.569	55-52-21	07-54-11	145	141.398	76.891	18.128	3.750	50
95	17+106.826	72-23-33	83.301	790299.754	398533.232	44-08-44	19-05-35	60	46.229	24.330	4.745	4.000	50
96	17+167.695	78-54-14	39.860	790280.606	398472.897	06-30-41	03-34-52	320	36.366	18.203	0.517	2.560	50
97	17+207.616	56-28-53	56.158	790272.915	398433.684	22-27-21	10-30-47	109	42.955	21.757	2.139	4.000	50



JAPAN INTERNATIONAL COOPERATION AGENCY

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS-ARMM
REPUBLIC OF THE PHILIPPINES

CTI Engineering International Co., Ltd.

Yachiyo Engineering Co., Ltd.

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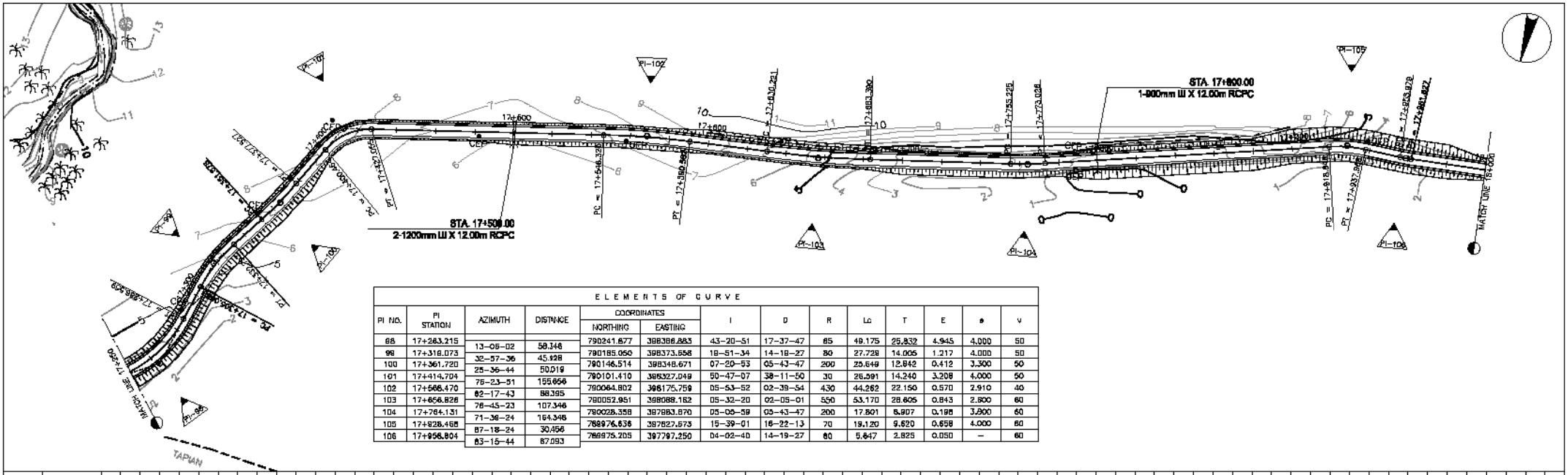
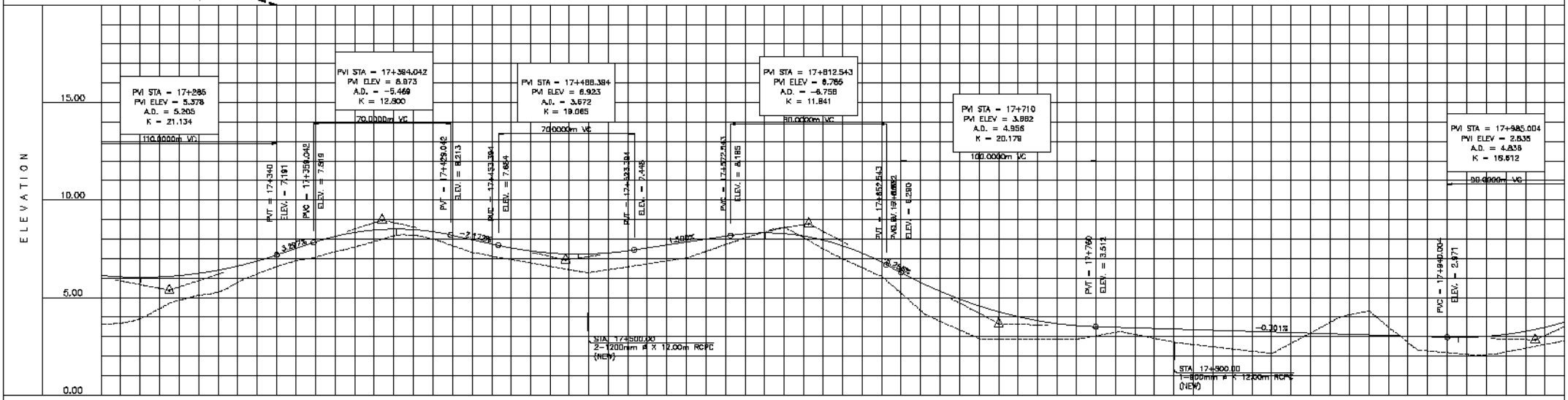
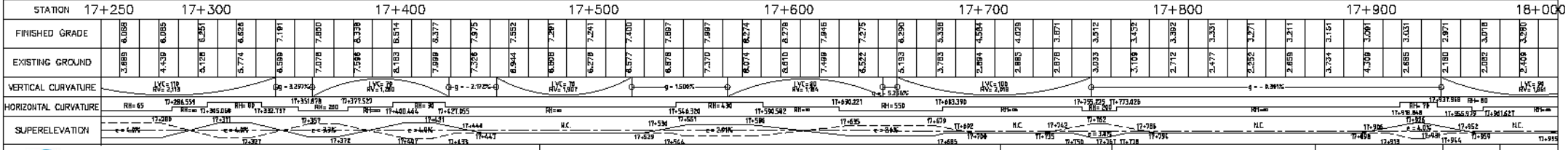


ELEMENTS OF CURVE

PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
98	17+283.215			790241.677	398386.883	43–20–51	17–37–47	65	49.175	25.832	4.945	4.000	50
		13–05–02	58.346										
99	17+316.073			790185.050	398373.658	18–51–34	14–18–27	80	27.728	14.005	1.217	4.000	50
		32–57–36	45.928										
100	17+361.720			790146.514	398348.671	07–20–53	05–43–47	200	25.649	12.842	0.412	3.300	50
		25–36–44	50.019										
101	17+414.704			790101.410	398327.049	50–47–07	38–11–50	30	26.591	14.240	3.208	4.000	50
		76–23–51	155.656										
102	17+566.470			790064.802	398175.759	05–53–52	02–39–54	430	44.262	22.150	0.570	2.910	40
		82–17–43	88.395										
103	17+656.826			790052.951	398088.182	05–32–20	02–05–01	550	53.170	26.605	0.843	2.800	60
		76–45–23	107.346										
104	17+764.131			790028.358	397983.870	05–05–59	05–43–47	200	17.801	8.907	0.198	3.800	60
		71–38–24	164.348										
105	17+828.468			789976.636	397827.673	15–39–01	16–22–13	70	19.120	9.620	0.658	4.000	60
		87–18–24	30.456										
106	17+956.804			789975.205	397797.250	04–02–40	14–19–27	80	5.647	2.825	0.050	–	60
		83–15–44	87.093										





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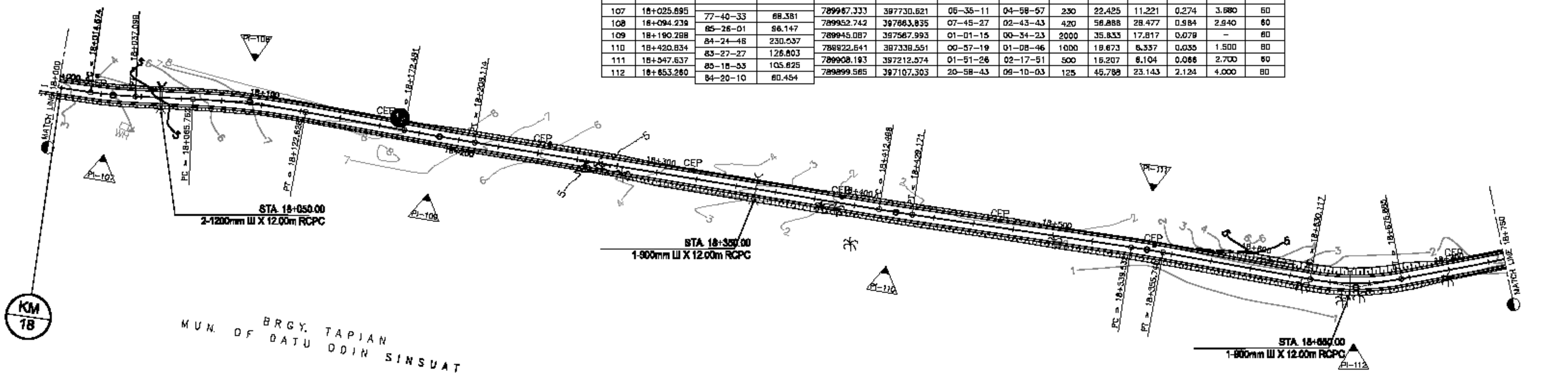
PROVINCE OF MAGUINDANAO

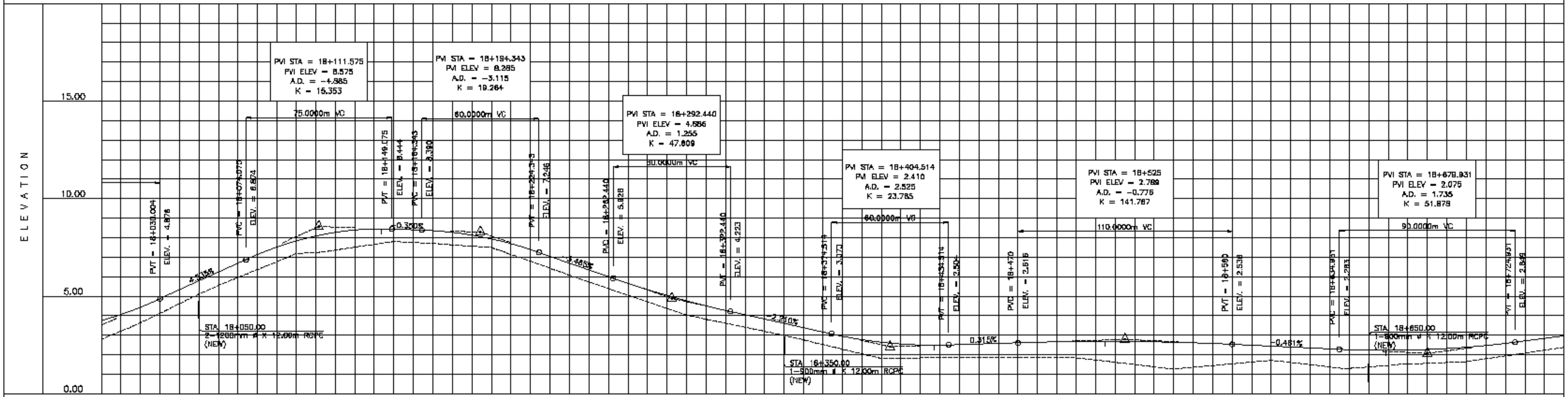
SHEET CONTENTS :
TAMONTAKA–TAPIAN
PLAN AND PROFILE
STA. 17+250 TO STA. 18+000

SET NO.

SHEET NO.
TT–26

ELEMENTS OF CURVE														
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
107	18+025.895			789967.333	397730.621	05-35-11	04-58-57	230	22.425	11.221	0.274	3.680	60
		77-40-33	68.381										
108	18+094.239			789952.742	397663.835	07-45-27	02-43-43	420	56.888	28.477	0.964	2.940	60
		85-26-01	96.147										
109	18+190.288			789945.087	397567.993	01-01-15	00-34-23	2000	35.633	17.817	0.079	–	60
		84-24-46	230.537										
110	18+420.834			788922.641	397338.551	00-57-19	01-08-46	1000	16.673	8.337	0.035	1.500	60
		83-27-27	126.803										
111	18+547.637			789908.193	397212.574	01-51-26	02-17-51	500	16.207	8.104	0.066	2.700	60
		85-16-53	105.625										
112	18+653.260			789899.565	397107.303	20-58-43	09-10-03	125	45.769	23.143	2.124	4.000	60
		84-20-10	60.454										





STATION	FINISHED GRADE	EXISTING GROUND
18+000	3.757	2.799
	4.449	3.635
	5.329	4.615
	6.236	5.547
	7.132	6.398
18+100	7.831	7.192
	8.270	7.365
	8.449	7.660
	8.405	7.754
	8.272	7.643
18+200	7.935	7.496
	7.391	6.786
	6.703	6.077
	6.010	5.382
	5.350	4.703
18+300	4.772	4.028
	4.276	3.614
	3.835	3.201
	3.393	2.758
	2.958	2.284
18+400	2.646	1.610
	2.503	1.842
	2.522	1.671
	2.585	1.878
	2.644	1.861
18+500	2.679	1.842
	2.685	1.612
	2.664	1.382
	2.614	1.360
	2.536	1.536
18+600	2.444	1.713
	2.352	1.480
	2.262	1.319
	2.228	1.459
	2.271	1.564
18+700	2.391	1.651
	2.588	1.945
	2.840	2.236

VERTICAL CURVATURE: LVC= 90 RV= 4,681; g = 4.535%; LVC= 75 RV= 1,535; g = - 0.350%; LVC= 60 RV= 1,926; g = - 3.465%; LVC= 60 RV= 4,781; g = - 2.210%; LVC= 60 RV= 2,377; g = 0.315%; LVC= 110 RV= 14,177; g = - 0.461%; LVC= 90 RV= 5,188; g = 1.274%

HORIZONTAL CURVATURE: 18+014.674 RH= 230 18+037.099; RH=∞; 18+065.762 RH= 420 18+122.628; RH=∞; 18+172.481 RH= 2000 18+208.114; RH=∞; 18+412.498 RH= 1000 18+429.171; RH=∞; 18+539.532 RH= 500 18+555.749; RH=∞; 18+630.117 RH= 125 18+675.885; RH=∞

SUPERELEVATION: 18+002, 18+010, 18+021, 18+031, e = 3.68%, 18+071, e = 2.94%, 18+119, 18+125, 18+133, 18+144, N.C., 18+523, 18+530, 18+538, 18+544, e = 2.70%, 18+551, 18+557, 18+565, 18+573, N.C., 18+617, 18+624, 18+637, e = 4.0%, 18+669, 18+682, 18+689, 18+697, N.C.

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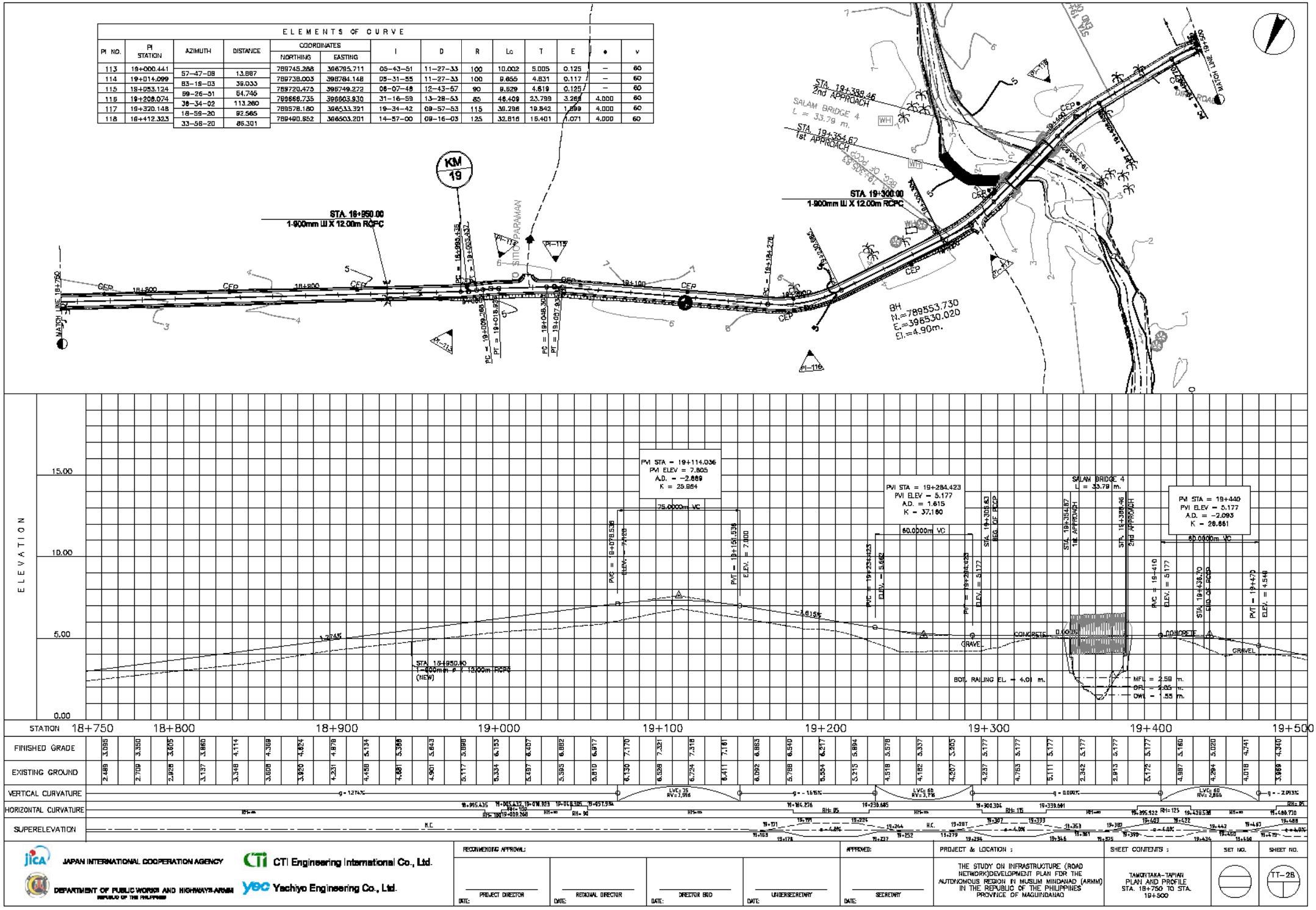
PROVINCE OF MAGUINDANAO

SHEET CONTENTS :
TAMONTAKA-TAPIAN
PLAN AND PROFILE
STA. 18+000 TO STA. 18+750

SET NO.

SHEET NO.
TT-27


ELEMENTS OF CURVE
PI NO. | PI STATION | AZIMUTH | DISTANCE | COORDINATES NORTHING | COORDINATES EASTING | I | D | R | Lc | T | E | e | v
113 | 19+000.441 | 57-47-08 | 13.887 | 789745.288 | 398795.711 | 05-43-51 | 11-27-33 | 100 | 10.002 | 5.005 | 0.125 | – | 60
114 | 19+014.099 | 83-18-03 | 39.033 | 789738.003 | 398784.148 | 05-31-55 | 11-27-33 | 100 | 9.855 | 4.931 | 0.117 | – | 60
115 | 19+053.124 | 59-26-51 | 54.745 | 789720.475 | 398749.272 | 06-07-48 | 12-43-57 | 90 | 9.529 | 4.819 | 0.125 | – | 60
116 | 19+208.074 | 38-34-02 | 113.280 | 789656.735 | 398603.930 | 31-16-59 | 13-28-53 | 85 | 46.409 | 23.799 | 3.268 | 4.000 | 60
117 | 19+320.148 | 18-59-20 | 82.565 | 789578.180 | 398533.321 | 19-34-42 | 09-57-53 | 115 | 39.298 | 19.842 | 1.899 | 4.000 | 60
118 | 19+412.323 | 33-58-20 | 85.301 | 789490.652 | 398503.201 | 14-57-00 | 09-16-03 | 125 | 32.816 | 16.401 | 1.071 | 4.000 | 60
KM 19
STA. 18+950.00
1-900mm Ø X 12.00m RCPC
STA. 19+300.00
1-900mm Ø X 12.00m RCPC
SITIO PARAMAN
MATCH LINE 19+750
STA. 19+399.46
2nd APPROACH
SALAM BRIDGE 4
L = 33.79 m.
STA. 19+354.67
1st APPROACH
BH
N.=789553.730
E.=398530.020
El.=4.90m.
PI-115
PI-116
PI-117
PI-118
ELEVATION
15.00
10.00
5.00
0.00
PVI STA = 19+114.036
PVI ELEV = 7.805
A.D. = -2.889
K = 25.864
75.0000m VC
PVC = 19+078.536
ELEV. = 7.420
PVT = 19+151.536
ELEV. = 7.000
PVI STA = 19+284.423
PVI ELEV = 5.177
A.D. = 1.615
K = 37.160
60.0000m VC
PVC = 19+254.423
ELEV. = 5.682
PVT = 19+314.423
ELEV. = 5.177
STA. 19+305.63
BEG. OF RCPC
STA. 19+354.67
1st APPROACH
STA. 19+399.46
2nd APPROACH
PVI STA = 19+440
PVI ELEV = 5.177
A.D. = -2.093
K = 28.661
60.0000m VC
PVC = 19+410
ELEV. = 5.177
STA. 19+438.70
END OF RCPC
PVT = 19+470
ELEV. = 4.540
-1.274%
1.274%
-4.915%
CONCRETE
GRAVEL
0.400m
STA. 18+950.00
1-900mm Ø RCPC
(NEW)
BOT. RAILING EL. = 4.01 m.
MFL = 2.58 m.
OFL = 2.05 m.
OWL = .55 m.
STATION 18+750 18+800 18+900 19+000 19+100 19+200 19+300 19+400 19+500
FINISHED GRADE 3.095 3.350 3.605 3.860 4.114 4.369 4.624 4.878 5.134 5.388 5.643 5.898 6.153 6.407 6.662 6.917 7.170 7.321 7.318 7.161 6.883 6.540 6.217 5.894 5.578 5.337 5.305 5.177 5.177 5.177 5.177 5.177 5.177 5.177 5.160 5.020 4.741 4.340
EXISTING GROUND 2.489 2.709 2.928 3.137 3.348 3.608 3.825 4.231 4.458 4.881 4.901 5.117 5.334 5.497 5.595 5.810 6.130 6.328 6.724 6.411 6.092 5.788 5.554 5.413 4.518 4.182 4.207 4.237 4.763 5.111 2.342 2.913 5.172 4.887 4.284 4.018 3.869
VERTICAL CURVATURE
HORIZONTAL CURVATURE
SUPERELEVATION
LVC= 25 RV= 7.996
LVC= 60 RV= 3.716
LVC= 60 RV= 2.866
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STA. 18+750 TO STA. 19+500
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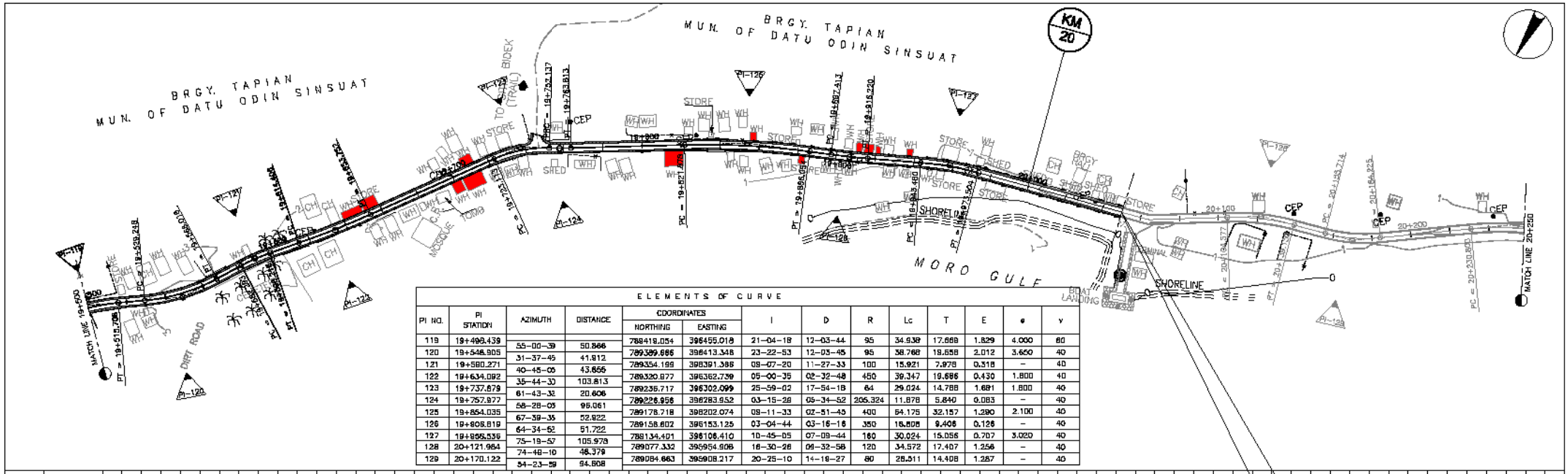
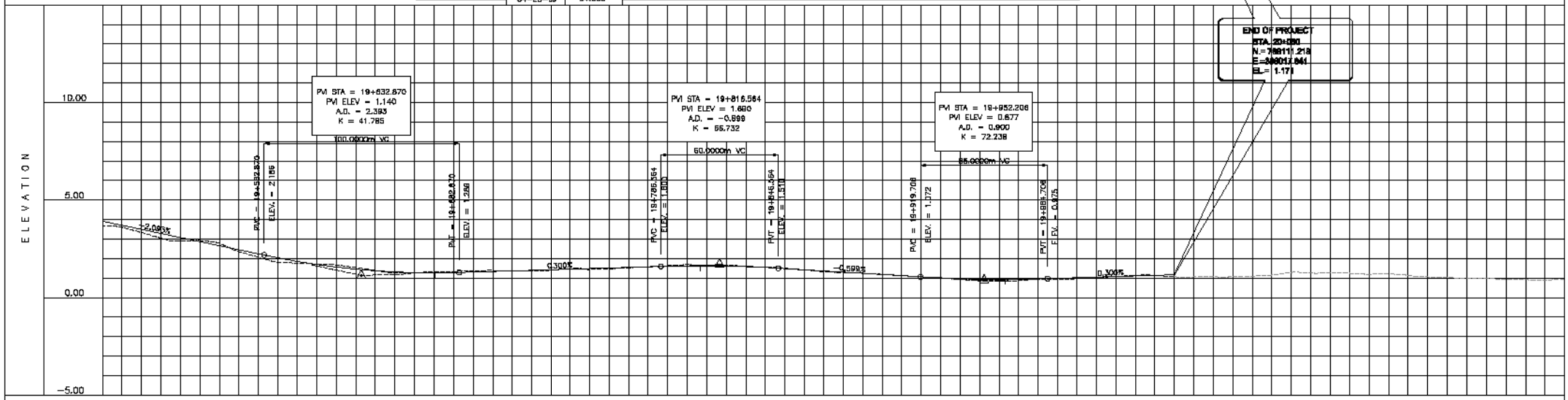
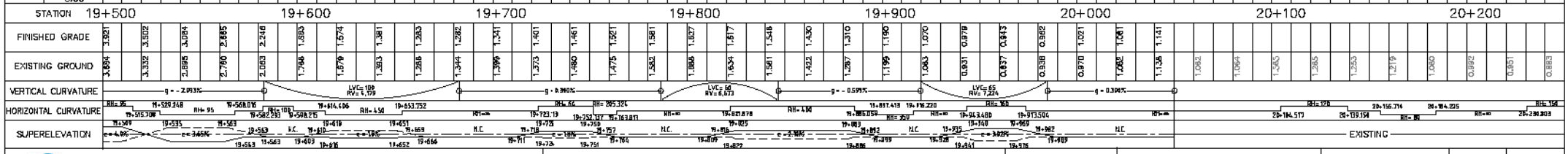
TT-28



ELEMENTS OF CURVE

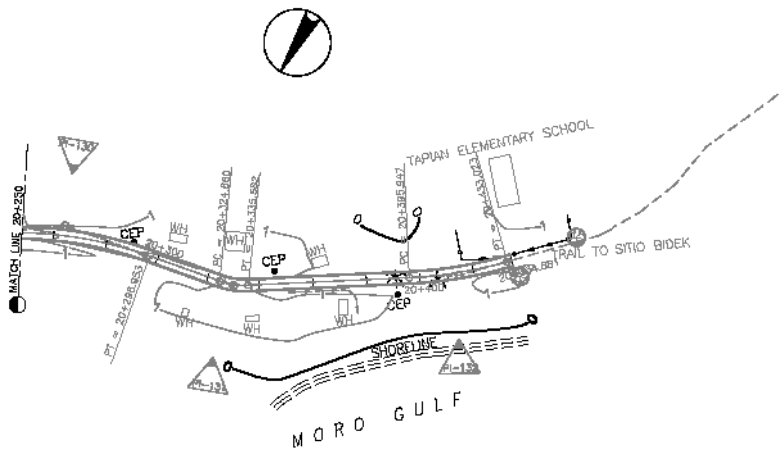
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES NORTHING	COORDINATES EASTING	I	D	R	Lc	T	E	e	v
119	19+490.439												
		55-00-39	50.866	789418.054	396455.018	21-04-18	12-03-44	95	34.938	17.668	1.829	4.000	60
120	19+548.905	31-37-45	41.912	789389.686	396413.348	23-22-53	12-03-45	95	38.768	19.658	2.012	3.650	40
121	19+580.271	40-45-05	43.655	789354.199	396391.386	09-07-20	11-27-33	100	15.921	7.978	0.318	–	40
122	19+634.092	35-44-30	103.813	789320.977	396362.739	05-00-35	02-32-48	450	39.347	19.686	0.430	1.800	40
123	19+737.879	61-43-32	20.606	789236.717	396302.099	25-59-02	17-54-18	64	29.024	14.788	1.681	1.800	40
124	19+757.977	58-28-03	96.061	789226.956	396283.952	03-15-28	05-34-52	205.324	11.878	5.940	0.083	–	40
125	19+854.035	67-39-35	52.922	789178.718	396202.074	09-11-33	02-51-45	400	64.175	32.157	1.290	2.100	40
126	19+906.819	64-34-52	51.722	789158.602	396153.125	03-04-44	03-16-16	350	18.808	9.408	0.126	–	40
127	19+955.535	75-19-57	105.978	789134.401	396106.410	10-45-05	07-09-44	160	30.024	15.056	0.707	3.020	40
128	20+121.964	74-48-10	46.379	789077.332	395954.906	18-30-26	09-32-58	120	34.572	17.407	1.256	–	40
129	20+170.122	54-23-59	94.808	789084.663	395908.217	20-25-10	14-18-27	80	28.511	14.408	1.257	–	40



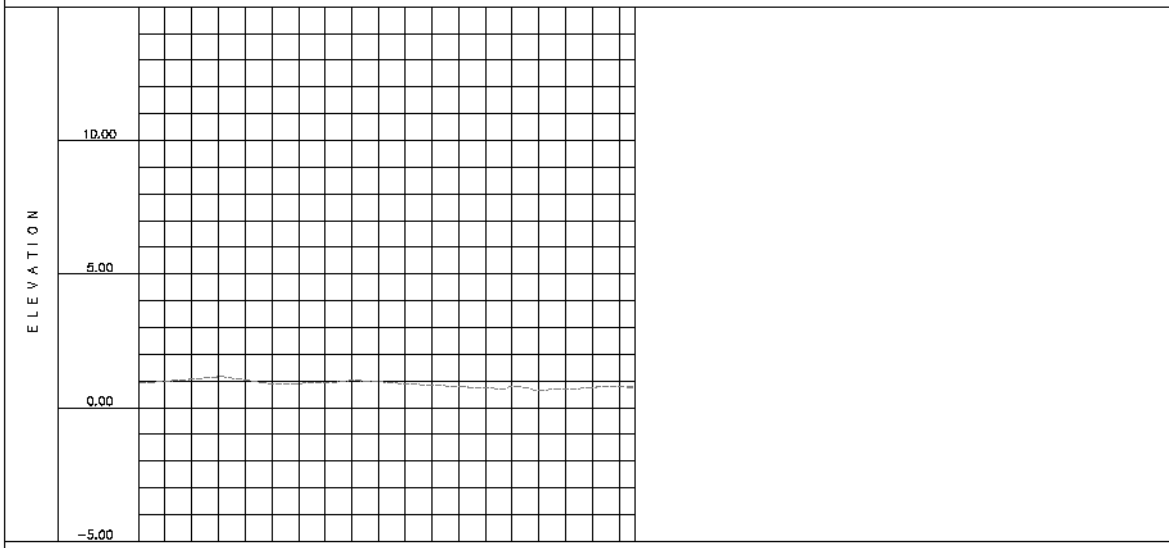


JICA JAPAN INTERNATIONAL COOPERATION AGENCY
CTI CTI Engineering International Co., Ltd.
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS-ARMM REPUBLIC OF THE PHILIPPINES
yec Yachiyo Engineering Co., Ltd.

RECOMMENDING APPROVAL:				APPROVED:	PROJECT & LOCATION :	SHEET CONTENTS :	SET NO.	SHEET NO.
PROJECT DIRECTOR DATE:	REGIONAL DIRECTOR DATE:	DIRECTOR BOD DATE:	UNDERSECRETARY DATE:	SECRETARY DATE:	THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES PROVINCE OF MAGUINDANAO	TAMONTAKA-TAPIAN PLAN AND PROFILE STA. 19+500 TO STA. 20+250		TT-29



ELEMENTS OF CURVE													
PI NO.	PI STATION	AZIMUTH	DISTANCE	COORDINATES		I	D	R	Lc	T	E	e	v
				NORTHING	EASTING								
130	20+284.424			789009.589	395831.291	25-16-03	07-38-22	150	66.150	33.622	3.722		
		78-40-03	66.660										
131	20+330.191			788997.597	395765.515	22-21-03	40-55-33	28	10.823	5.532	0.541		
		57-19-06	84.516										
132(END)	20+414.588			788851.958	395894.378	13-16-36	07-08-44	180	37.075	18.621	1.080		
		44-02-24	20.460										



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REPUBLIC OF THE PHILIPPINES
Yachiyo Engineering Co., Ltd.

RECOMMENDING APPROVAL:

PROJECT DIRECTOR	REGIONAL DIRECTOR	DIRECTOR BOD	UNDERSECRETARY
DATE:	DATE:	DATE:	DATE:

APPROVED:

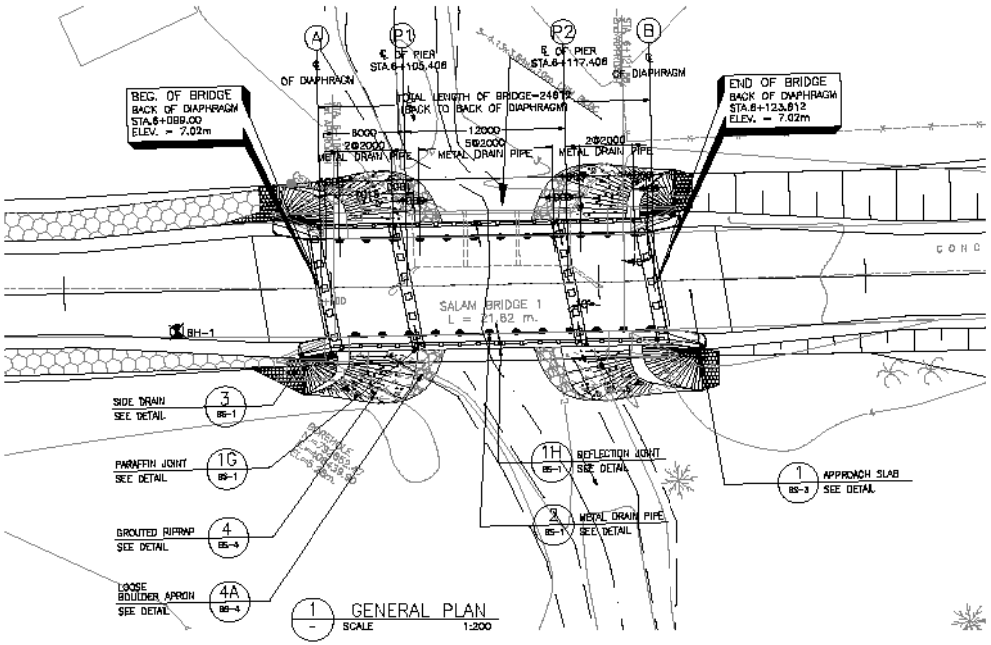
SECRETARY
DATE:

PROJECT & LOCATION :
THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES
PROVINCE OF MAGUINDANAO

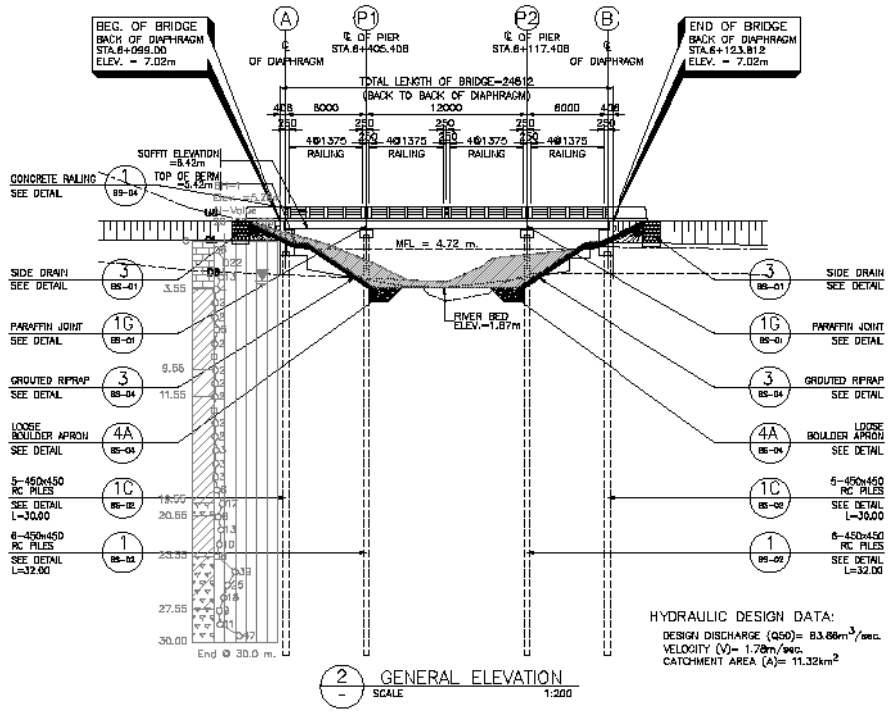
SHEET CONTENTS :
TANONTAKA-TAPIAN
PLAN AND PROFILE
STA. 20+250 TO STA. 20+435.788

SET NO.

SHEET NO.
TT-30



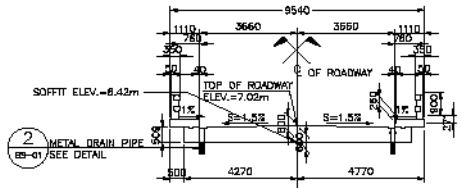
1 - GENERAL PLAN
SCALE 1:200



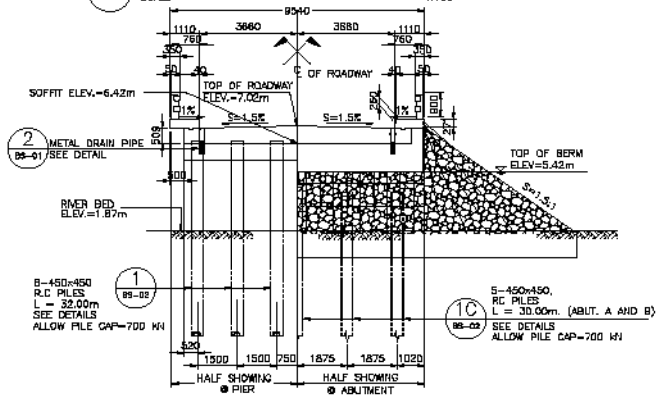
2 - GENERAL ELEVATION
SCALE 1:200

HYDRAULIC DESIGN DATA:

DESIGN DISCHARGE (Q50)= 83.86m^3/sec.
VELOCITY (V)= 1.78m/sec.
CATCHMENT AREA (A)= 11.32km^2



3 - TYPICAL SECTION SUPERSTRUCTURE
SCALE 1:100



4 - TYPICAL SECTION AT ABUTMENT AND PIER
SCALE 1:100

SUMMARY OF QUANTITIES

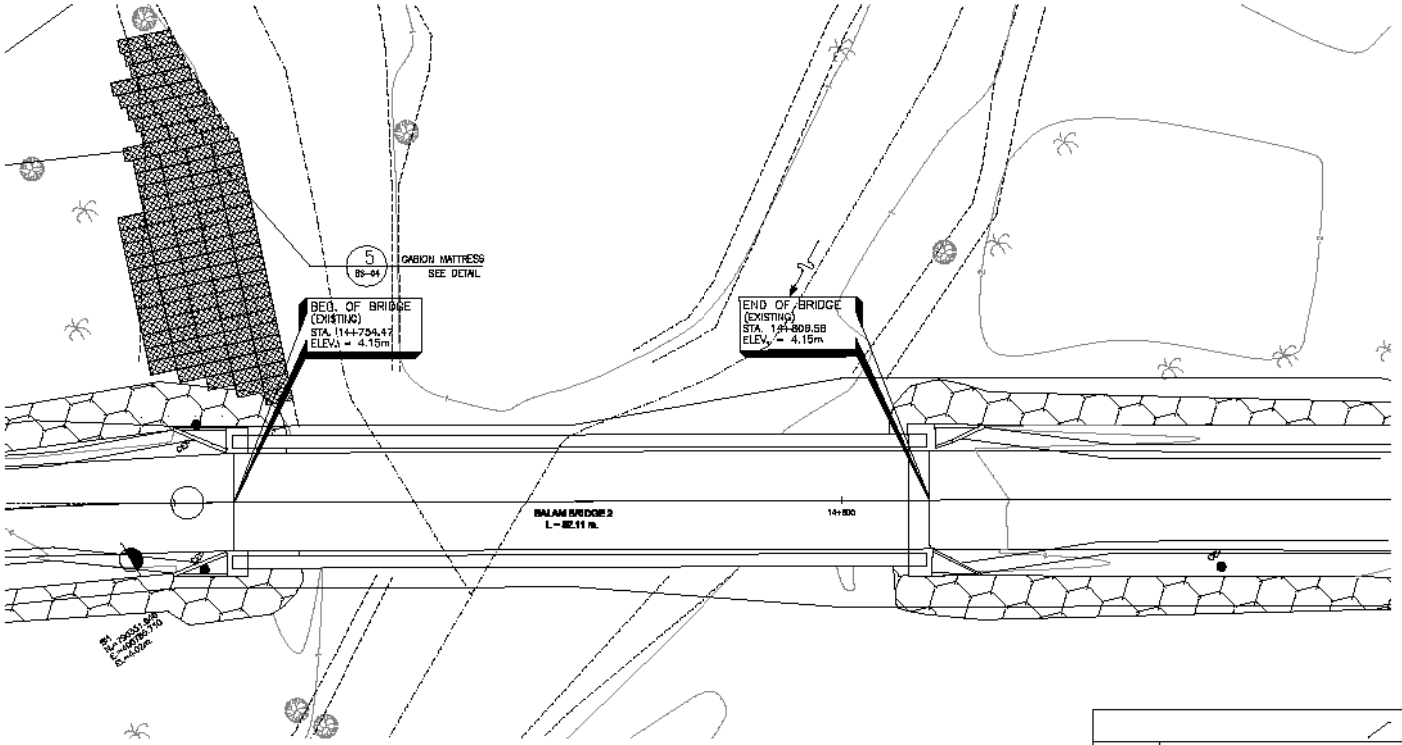
ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER		SUPERSTRUCTURE	TOTAL
			"A"	"B"	"1"	"2"		
101(1)25	REMOVAL OF EXISTING BRIDGE (L=24.73m)	L.S.	–	–	–	–	1.00	1
103(2)a	BRIDGE EXCAVATION COMMON, ABOVE, O.W.L.	CU.M.	5.58	11.25	–	–	–	17
103(2)b	BRIDGE EXCAVATION COMMON, BELOW, O.W.L.	CU.M.	50.95	88.35	–	–	–	118
103(7)a	STRUCTURE BACKFILL	CU.M.	40.97	14.78	–	–	–	56
104(1)b	EMBANKMENT FROM BORROW MATERIALS	CU.M.	–	–	–	–	–	–
400(4)b	PRECAST CONC. PILES (450X450), FURNISHED	L.M.	150.00	150.00	180.00	180.00	–	660
400(13)b	PRECAST CONC. PILES (450X450), DRIVEN	L.M.	150.00	150.00	180.00	180.00	–	660
400(15)b	TEST PILES, RC 450X450, FURNISHED & DRIVEN	L.M.	180.00	180.00	192.00	192.00	–	704
401(a)	CONCRETE RAILING	L.M.	–	–	–	–	49.82	50
404(1)a	REINFORCING STEEL BAR, GRADE 40 (SUBSTRUCTURE)	KGS.	–	–	–	–	–	–
404(1)b	REINFORCING STEEL BAR, GRADE 40 (SUPERSTRUCTURE)	KGS.	–	–	–	–	–	–
405(1)a	STRUCTURAL CONCRETE CLASS "A" (SUBSTRUCTURE)	CU.M.	22.47	22.47	5.83	5.83	–	57
405(1)b	STRUCTURAL CONCRETE CLASS "A" (SUPERSTRUCTURE)	CU.M.	–	–	–	–	181.00	181
406(8)	LEAN CONCRETE	CU.M.	0.58	0.58	–	–	–	2
407(1)b	PREFORMED EXPANSION JT. FILLER W/SEALANT, 12mm THK	SQ.M.	6.41	8.80	–	–	–	14
407(1)c	PREFORMED EXPANSION JT. FILLER W/SEALANT, 25mm THK	SQ.M.	–	–	–	–	–	–
604(5)	GROUTED RIPRAP (SLOPE PROTECTION)	CU.M.	53.14	53.14	–	–	–	107
608	HAND LAID ROCK EMBANKMENT (LOOSE BOULDER APRON)	CU.M.	60.43	60.43	–	–	–	121
SPL421(314)	CONSTRUCTION, MAINTENANCE AND REMOVAL OF DETOUR ROAD AND BRIDGE	L.S.	–	–	–	–	1.00	1
SPL412(1)c	METAL DRAIN (150#x750mm C.I. PIPE)	POS.	–	–	–	–	22.00	22

NOTES:

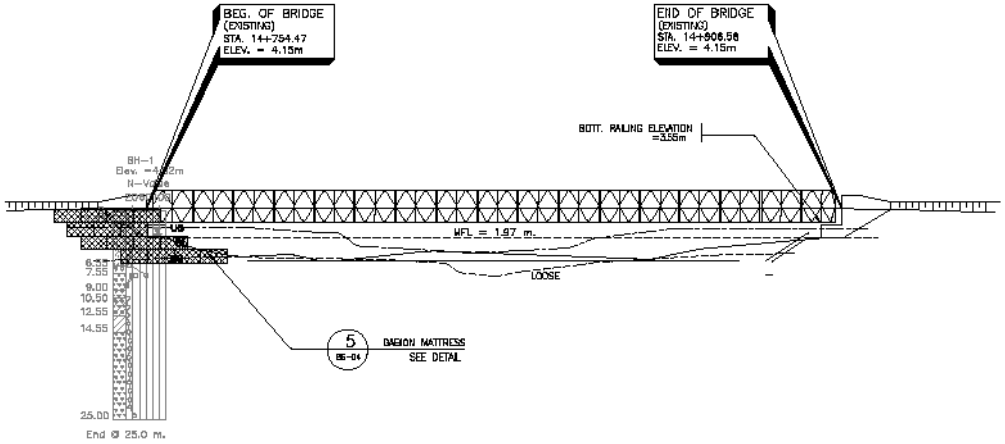
1. ALL ELEVATIONS AND STATIONINGS SHALL BE VERIFIED BEFORE CONSTRUCTION.
2. ESTIMATES OF QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.
3. STEEL REINFORCEMENT DOES NOT INCLUDE ALLOWANCES FOR SPLICING.
4. ACTUAL CASTING LENGTH OF REINFORCED CONCRETE PILE SHALL BE DETERMINED FROM THE RESULT OF DRIVING TEST PILES.
5. ACTUAL LENGTH OF STEEL PILE SHALL BE DETERMINED FROM THE RESULT OF DRIVING THE FIRST PILE AT EACH PILE GROUP AT THE LOCATION DESIGNATED BY THE ENGINEER.

JICA JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS-ARMM
REPUBLIC OF THE PHILIPPINES
CTI CTI Engineering International Co., Ltd.
yec Yachiyo Engineering Co., Ltd.

RECOMMENDING APPROVAL:				APPROVED:	PROJECT & LOCATION :	SHEET CONTENTS :	SET NO.	SHEET NO.
PROJECT DIRECTOR DATE:	REGIONAL DIRECTOR DATE:	DIRECTOR BOD DATE:	UNDERSECRETARY DATE:	SECRETARY DATE:	THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES PROVINCE OF MAGUINDANAO	TANONTAKA-TAPIAN SALAM BRIDGE 1 PLAN AND PROFILE STA. 6+099.00 TO STA. 6+123.812		TT-31



1 GENERAL PLAN
SCALE 1:200



2 GENERAL ELEVATION
SCALE 1:200

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER		SUPERSTRUCTURE	TOTAL
			"A"	"B"	"1"	"2"		
101(1)2B	REMOVAL OF EXISTING BRIDGE (L=24.73m)	L.S.	–	–	–	–	1.00	1
103(2)a	BRIDGE EXCAVATION COMMON, ABOVE, O.W.L.	CU.M.	598.12	0.00	–	–	–	597
103(2)b	BRIDGE EXCAVATION COMMON, BELOW, O.W.L.	CU.M.	526.13	0.00	–	–	–	527
103(7)a	STRUCTURE BACKFILL	CU.M.	0.00	0.00	–	–	–	–
104(1)b	EMBANKMENT FROM BORROW MATERIALS	CU.M.	–	–	–	–	–	–
400(4)b	PRECAST CONC. PILES (450X450), FURNISHED	L.M.	–	–	–	–	–	–
400(13)b	PRECAST CONC. PILES (450X450), DRIVEN	L.M.	–	–	–	–	–	–
400(15)b	TEST PILES, RC 450X450, FURNISHED & DRIVEN	L.M.	–	–	–	–	–	–
401(a)	CONCRETE RAILING	L.M.	–	–	–	–	–	–
404(1)a	REINFORCING STEEL BAR, GRADE 40 (SUBSTRUCTURE)	KGS.	–	–	–	–	–	–
404(1)b	REINFORCING STEEL BAR, GRADE 40 (SUPERSTRUCTURE)	KGS.	–	–	–	–	–	–
405(1)a	STRUCTURAL CONCRETE CLASS "A" (SUBSTRUCTURE)	CU.M.	–	–	–	–	–	–
405(1)b	STRUCTURAL CONCRETE CLASS "A" (SUPERSTRUCTURE)	CU.M.	–	–	–	–	–	–
405(6)	LEAN CONCRETE	CU.M.	–	–	–	–	–	–
407(1)b	PREFORMED EXPANSION JT. FILLER W/SEALANT, 12mm THK	SQ.M.	–	–	–	–	–	–
407(1)c	PREFORMED EXPANSION JT. FILLER W/SEALANT, 25mm THK	SQ.M.	–	–	–	–	–	–
504(5)	GROUTED RIPRAP (SLOPE PROTECTION)	CU.M.	0.00	0.00	–	–	–	–
505	HAND LAID ROCK EMBANKMENT (LOOSE BOULDER APRON)	CU.M.	0.00	0.00	–	–	–	–
SPL421(314)	CONSTRUCTION, MAINTENANCE AND REMOVAL OF DETOUR ROAD AND BRIDGE	L.S.	–	–	–	–	–	–
SPL417(1)c	METAL DRAIN (1504x750mm G.I. PIPE)	PCS.	–	–	–	–	–	–
511	MATRESS GABION	CU.M.	857.13	–	–	–	–	334

NOTES:

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2. ESTIMATES OF QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.
3. STEEL REINFORCEMENT DOES NOT INCLUDE ALLOWANCES FOR SPLICING.
4. ACTUAL CASTING LENGTH OF REINFORCED CONCRETE PILE SHALL BE DETERMINED FROM THE RESULT OF DRIVING TEST PILES.
5. ACTUAL LENGTH OF STEEL PILE SHALL BE DETERMINED FROM THE RESULT OF DRIVING THE FIRST PILE AT EACH PILE GROUP AT THE LOCATION DESIGNATED BY THE ENGINEER.

JAPAN INTERNATIONAL COOPERATION AGENCY
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REPUBLIC OF THE PHILIPPINES
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Yachiyo Engineering Co., Ltd.

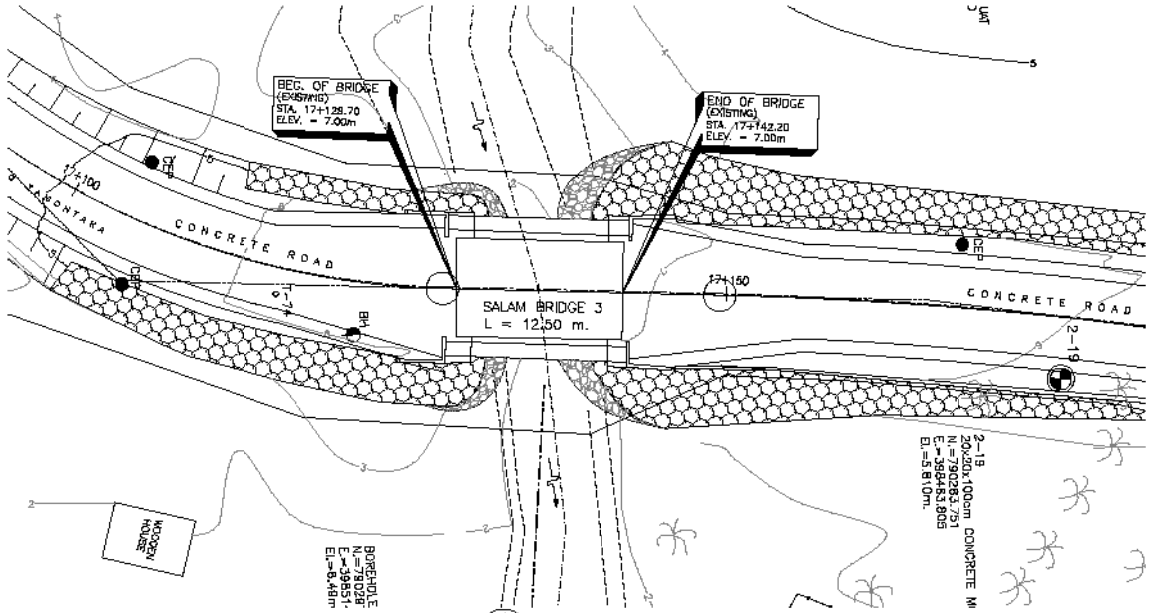
RECOMMENDING APPROVAL:
PROJECT DIRECTOR DATE:
REGIONAL DIRECTOR DATE:
DIRECTOR BRD DATE:
UNDERSECRETARY DATE:
APPROVED:
SECRETARY DATE:

PROJECT & LOCATION :
THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES
PROVINCE OF MAGUINDANAO

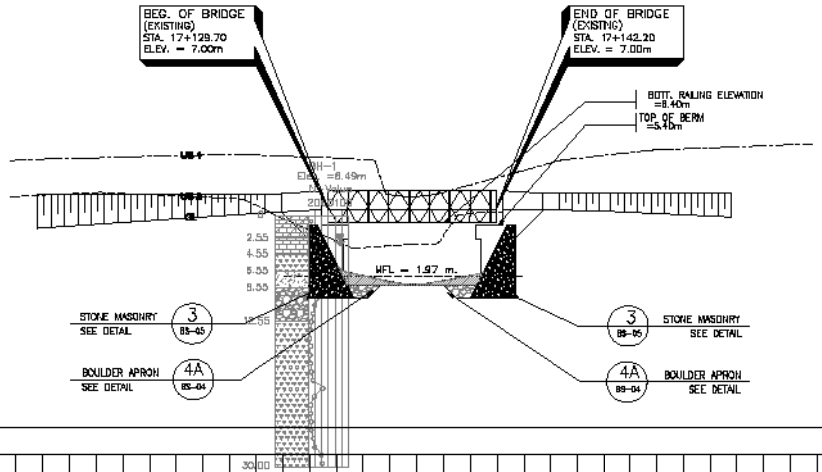
SHEET CONTENTS :
TANONTAKA-TAPIAN SALAM BRIDGE 2 PLAN AND PROFILE STA. 14+754.47 TO STA. 14+806.56

SET NO.

SHEET NO.
TT-32



1 GENERAL PLAN
SCALE 1:200



2 GENERAL ELEVATION
SCALE 1:200

ELEVATION

STATION

FINISHED GRADE

EXISTING GROUND

VERTICAL CURVATURE

HORIZONTAL CURVATURE

SUPERELEVATION

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER		SUPERSTRUCTURE	TOTAL
			"A"	"B"	"1"	"2"		
101(1)2b	REMOVAL OF EXISTING BRIDGE (L=24.73m)	L.S.	–	–	–	–	–	–
103(2)a	BRIDGE EXCAVATION COMMON, ABOVE, O.W.L.	CU.M.	129.85	131.13	–	–	–	261
103(2)b	BRIDGE EXCAVATION COMMON, BELOW, O.W.L.	CU.M.	117.90	115.07	–	–	–	233
103(7)a	STRUCTURE BACKFILL	CU.M.	0.00	0.00	–	–	–	–
104(1)b	EMBANKMENT FROM BORROW MATERIALS	CU.M.	–	–	–	–	–	–
400(4)b	PRECAST CONC. PILES (450X450), FURNISHED	L.M.	–	–	–	–	–	–
400(13)b	PRECAST CONC. PILES (450X450), DRIVEN	L.M.	–	–	–	–	–	–
400(15)b	TEST PILES, RC 450X450, FURNISHED & DRIVEN	L.M.	–	–	–	–	–	–
401(a)	CONCRETE RAILING	L.M.	–	–	–	–	–	–
404(1)a	REINFORCING STEEL BAR, GRADE 40 (SUBSTRUCTURE)	KGS.	–	–	–	–	–	–
404(1)b	REINFORCING STEEL BAR, GRADE 40 (SUPERSTRUCTURE)	KGS.	–	–	–	–	–	–
405(1)a	STRUCTURAL CONCRETE CLASS "A" (SUBSTRUCTURE)	CU.M.	–	–	–	–	–	–
405(1)b	STRUCTURAL CONCRETE CLASS "A" (SUPERSTRUCTURE)	CU.M.	–	–	–	–	–	–
405(6)	LEAN CONCRETE	CU.M.	–	–	–	–	–	–
407(1)b	PREFORMED EXPANSION JT. FILLER W/SEALANT, 12mm THK	SQ.M.	–	–	–	–	–	–
407(1)c	PREFORMED EXPANSION JT. FILLER W/SEALANT, 25mm THK	SQ.M.	–	–	–	–	–	–
506	STONE MASONRY	CU.M.	43.02	43.02	–	–	–	87
508	HAND LAID ROCK EMBANKMENT (LOOSE BOULDER APRON)	CU.M.	38.53	38.53	–	–	–	78
SPL421(3)4	CONSTRUCTION, MAINTENANCE AND REMOVAL OF DETOUR ROAD AND BRIDGE	L.S.	–	–	–	–	–	–
SPL421(1)c	METAL DRUM (150mmx750mm C.I. PIPE)	PCS.	–	–	–	–	–	–

NOTES.
1. ALL ELEVATIONS AND STATIONINGS SHALL BE VERIFIED BEFORE CONSTRUCTION.
2. ESTIMATES OF QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.
3. STEEL REINFORCEMENT DOES NOT INCLUDE ALLOWANCES FOR SPLICING.
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PROJECT DIRECTOR DATE:
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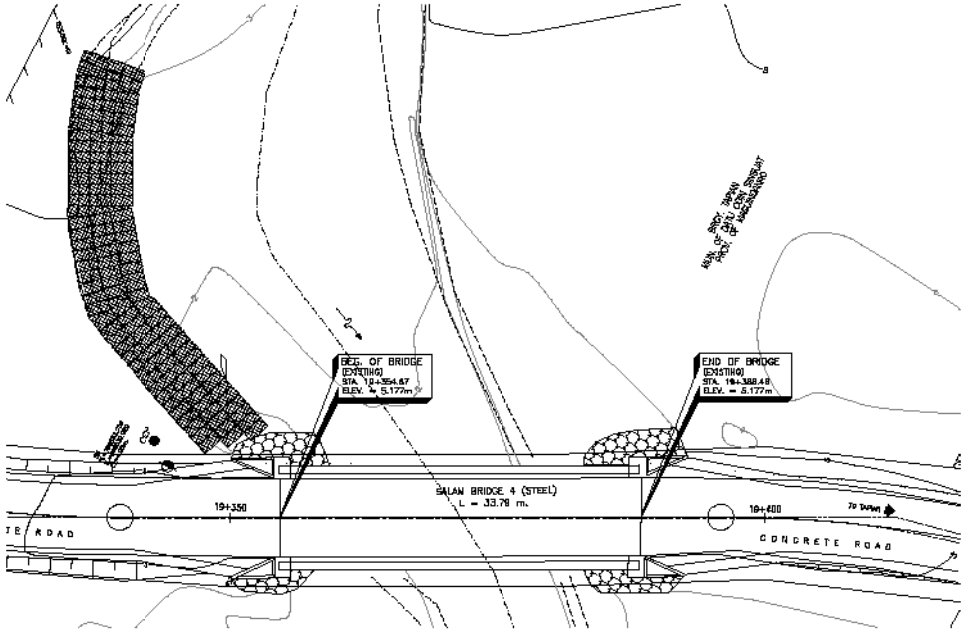
PROJECT & LOCATION :
THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES
PROVINCE OF MAGUINDANAO

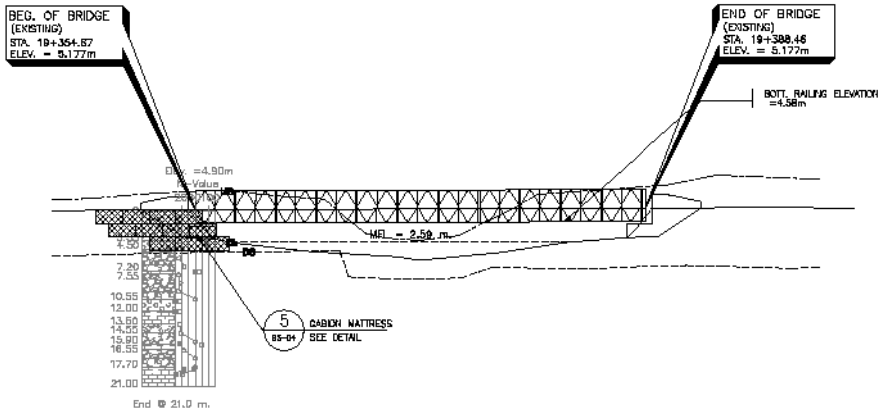
SHEET CONTENTS :
TANONTAKA-TAPIAN
SALAM BRIDGE 3
PLAN AND PROFILE
STA. 17+129.70 TO
STA. 17+142.20

SET NO.

SHEET NO.
TT-33



1 GENERAL PLAN
SCALE 1:200



2 GENERAL ELEVATION
SCALE 1:200

SUMMARY OF QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER		SUPERSTRUCTURE	TOTAL
			"A"	"B"	"1"	"2"		
101(1)26	REMOVAL OF EXISTING BRIDGE (L=24.73m)	L.S.	–	–	–	–	–	–
103(2)a	BRIDGE EXCAVATION COMMON, ABOVE, O.W.L.	CU.M.	892.78	0.00	–	–	–	893
103(2)b	BRIDGE EXCAVATION COMMON, BELOW, O.W.L.	CU.M.	226.81	0.00	–	–	–	227
103(7)a	STRUCTURE BACKFILL	CU.M.	0.00	0.00	–	–	–	–
104(1)b	EMBANKMENT FROM BORROW MATERIALS	CU.M.	–	–	–	–	–	–
400(4)b	PRECAST CONC. PILES (450X450), FURNISHED	L.M.	–	–	–	–	–	–
400(13)b	PRECAST CONC. PILES (450X450), DRIVEN	L.M.	–	–	–	–	–	–
400(15)b	TEST PILES, RC 450X450, FURNISHED & DRIVEN	L.M.	–	–	–	–	–	–
401(a)	CONCRETE RAILING	L.M.	–	–	–	–	–	–
404(1)a	REINFORCING STEEL BAR, GRADE 40 (SUBSTRUCTURE)	KGS.	–	–	–	–	–	–
404(1)b	REINFORCING STEEL BAR, GRADE 40 (SUPERSTRUCTURE)	KGS.	–	–	–	–	–	–
405(1)a	STRUCTURAL CONCRETE CLASS "A" (SUBSTRUCTURE)	CU.M.	–	–	–	–	–	–
405(1)b	STRUCTURAL CONCRETE CLASS "A" (SUPERSTRUCTURE)	CU.M.	–	–	–	–	–	–
405(8)	LEAN CONCRETE	CU.M.	–	–	–	–	–	–
407(1)b	PREFORMED EXPANSION JT. FILLER W/SEALANT, 12mm THK	SQ.M.	–	–	–	–	–	–
407(1)c	PREFORMED EXPANSION JT. FILLER W/SEALANT, 25mm THK	SQ.M.	–	–	–	–	–	–
504(5)	GROUTED RIPRAP (SLOPE PROTECTION)	CU.M.	0.00	0.00	–	–	–	–
508	HAND LAID ROCK EMBANKMENT (LOOSE BOULDER APRON)	CU.M.	0.00	0.00	–	–	–	–
SPL421(314)	CONSTRUCTION, MAINTENANCE AND REMOVAL OF DETOUR ROAD AND BRIDGE	L.S.	–	–	–	–	–	–
SPL417(1)c	METAL DRAIN (1508x750mm G.I. PIPE)	POS.	–	–	–	–	–	–
511	MATRESS GABION	CU.M.	878.79	–	–	–	–	880

NOTES:

1. ALL ELEVATIONS AND STATIONINGS SHALL BE VERIFIED BEFORE CONSTRUCTION.
2. ESTIMATES OF QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.
3. STEEL REINFORCEMENT DOES NOT INCLUDE ALLOWANCES FOR SPLICING.
4. ACTUAL CASTING LENGTH OF REINFORCED CONCRETE PILE SHALL BE DETERMINED FROM THE RESULT OF DRIVING TEST PILES.
5. ACTUAL LENGTH OF STEEL PILE SHALL BE DETERMINED FROM THE RESULT OF DRIVING THE FIRST PILE AT EACH PILE GROUP AT THE LOCATION DESIGNATED BY THE ENGINEER.

JAPAN INTERNATIONAL COOPERATION AGENCY
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REPUBLIC OF THE PHILIPPINES
CTI Engineering International Co., Ltd.
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RECOMMENDING APPROVAL:

PROJECT DIRECTOR	REGIONAL DIRECTOR	DIRECTOR BRD	UNDERSECRETARY	SECRETARY
DATE:	DATE:	DATE:	DATE:	DATE:

APPROVED:

PROJECT & LOCATION :
THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES
PROVINCE OF MAGUINDANAO

SHEET CONTENTS :
TAMONTAKA–TAPIAN
SALAM BRIDGE 4
PLAN AND PROFILE
STA. 19+354.67 TO
STA. 19+388.46

SET NO.

SHEET NO.
TT–34

BASIN NUMBER	DISCHARGE	STATION	RCPC	LENGTH	INVERT ELEVATION	SLOPE	HEADWALL/ WING WALL		FLOW CAPACITY	FLOW DIRECTION	REMARKS	RECOMMENDATION
	m3/sec	(km)	DIA mm F	(m)	(m)	%	LEFT	RIGHT	m3/sec	LEFT/RIGHT		
1	35.77	0 + 512.02	Bridge	–	–	–			–		EXISTING RCDG BRIDGE 1	
		0 + 922.23	1 –1000	11.8	5.310	5.37	F	F	6.02	→	EXISTING RCPC	
2	6.08	1 + 355.91	1 –1000	11.3	4.120	1.66	F	F	3.07	→	EXISTING RCPC	
		1 + 489.29	3 –1000	8.3	4.850	1.09	F	F	7.47	→	EXISTING RCPC	
3	3.07	1 + 712.38	1 –600	13.4	3.180	3.44	F	F	1.13	→	EXISTING RCPC	
		2 + 228.43	1 –600	11.9	2.500	1.93	F	F	2.50	→	EXISTING RCPC	
4	1.30	2 + 363.68	1 –600	12.3	3.060	2.27	F	F	2.71	→	EXISTING RCPC	
5	278.07	3 + 655.05	Bridge	–	–	–			–		EXISTING RCDG BRIDGE 2	
6	0.85	4 + 152.83	1 –600	11.8	1.400	0.00	F	F	0.00		EXISTING RCPC	
		4 + 400.00	1 –600	12.0	0.880	0.50	F	F	1.27	→		REPLACE EXISTING RCPC
7	1.05	4 + 651.48	1 –600	12.0	5.805	0.50		F	1.27	→		
8	4.99	4 + 850.00	1 –600	12.0	14.122	0.50		F	1.27	→		EXTEND EXISTING RCPC
		5 + 083.48	1 –1000	12.0	18.140	8.21	F	F	6.84	→		
		5 + 261.48	1 –1000	12.0	14.230	8.28		F	6.87	→	EXISTING RCPC	
		5 + 423.10	1 –1000	12.0	10.950	2.12	F	F	3.47	→		EXTEND EXISTING RCPC
9	4.34	5 + 773.95	2 –1200	12.0	10.097	0.50	F	F	5.49	←		REPLACE EXISTING RCPC
10	85.58	6 + 100.26	Bridge	–	–	–			–		EXISTING SALAM BRIDGE 1	
11	19.09	6 + 466.57	2 –1200	12.0	0.745	0.70	F	F	6.50	→		REPLACE EXISTING RCPC
		6 + 499.74	2 –1200	12.0	0.755	0.70	F	F	6.50	→		REPLACE EXISTING RCPC
		6 + 600.00	2 –1200	12.0	1.740	0.70	F	F	6.50	→		
12	18.38	7 + 000.00	2 –1200	12.0	2.348	1.50		F	9.51	→		
		7 + 214.12	2 –1200	12.0	0.507	1.50	F	F	9.51	←		REPLACE EXISTING RCPC
13	15.58	7 + 425.88	1 –1200	12.0	1.297	1.10	F	F	4.07	→		REPLACE EXISTING RCPC
		7 + 535.22	1 –1200	12.0	1.118	2.72	F	F	6.40	→		REPLACE EXISTING RCPC
14		7 + 581.98	2 1200	12.0	1.233	0.50	F	F	5.49	→		REPLACE EXISTING RCPC
	8.38	7 + 650.00	1 –1200	12.0	0.222	0.50	F	F	2.75	→		
15		8 + 618.15	2 –1200	12.0	–0.467	0.50	F	F	5.49	→		REPLACE EXISTING RCPC
	9.43	9 + 020.00	2 –1200	12.0	0.900	0.50		F	5.49	→		
16		9 + 284.30	2 –1200	12.0	3.489	0.50		F	5.49	→		REPLACE EXISTING RCPC
	13.61	9 + 356.91	2 –1200	12.0	4.659	0.50		F	5.49	→		REPLACE EXISTING RCPC
		9 + 435.40	2 –1200	12.0	5.322	0.50	F	F	5.49	→		REPLACE EXISTING RCPC
17		9 + 568.33	2 –1000	12.0	4.530	12.73	F	F	17.03	→		ADD 1 LINE TO EXISTING
	7.35	9 + 900.00	1 –600	12.0	2.251	0.50		F	1.27	→		
		10 + 300.00	1 –600	12.0	2.757	0.50		F	1.27	→		
		10 + 558.92	1 –1000	12.0	3.230	3.90	F	CB	4.71	→		EXTEND EXISTING
18		10 + 771.18	1 –600	12.0	2.880	5.86		F	4.36	→	EXISTING RCPC	
19	12.30	11 + 031.15	2 –1200	12.0	4.820	2.60	F	F	12.52	→		REPLACE EXISTING RCPC
	6.22	11 + 500.00	1 –1000	12.0	3.310	0.50		F	1.56	→		
		11 + 750.00	1 –1200	12.0	–0.238	0.50	F	F	2.75	←		
20		12 + 097.13	1 –1200	12.0	–0.661	0.50	F	F	2.75	←		REPLACE EXISTING RCPC
21	5.92	12 + 250.00	2 –1200	12.0	0.087	0.60	F	F	5.02	←		
	91.80	13 + 040.00	2 –1200	12.0	0.124	8.50	F	F	22.64	←		
22		13 + 270.33	5 –1200	12.0	–0.466	13.00	F	F	70.00	→		REPLACE EXISTING RCPC
	10.12	13 + 648.34	1 –1200	12.0	0.356	5.00	F	F	8.68	→		REPLACE EXISTING RCPC
		13 + 850.00	1 –1200	12.0	2.062	0.50	F	F	2.75	→		
23		14 + 100.00	2 –1200	12.0	5.758	0.50	F	F	5.49	→		
	108.99	14 + 550.00	1 –900	12.0	2.532	0.50	F	CB	1.27	→		
24		14 + 754.47	Bridge	–	–	–			–		EXISTING SALAM BRIDGE 2	
	4.74	15 + 035.67	1 –900	12.0	1.377	0.50	F	F	1.27	→		REPLACE EXISTING RCPC
		15 + 530.00	1 –900	12.0	0.559	0.50	F	F	1.27	→		
		15 + 656.24	1 –900	12.0	0.659	0.50	F	F	1.27	→		REPLACE EXISTING RCPC
25		15 + 661.58	1 –1000	12.0	–0.250	0.81	F	F	2.15	→	EXISTING RCPC	
	12.00	16 + 400.00	1 –1200	12.0	–0.228	0.50	F	F	2.75	→		
		16 + 550.00	2 –1200	12.0	–0.446	0.50		F	5.49	→		
26		16 + 650.00	2 –1200	12.0	–0.497	0.50		F	5.49	→		
27	24.73	17 + 129.70	Bridge	–	–	–			–		EXISTING SALAM BRIDGE 3	
28	3.56	17 + 500.00	2 –1200	12.0	5.314	0.50	F	F	5.49	→		
29	0.68	17 + 800.00	1 –900	12.0	1.780	0.50	F	F	1.27	→		
30	5.39	18 + 050.00	2 –1200	12.0	3.856	0.70		F	6.50	→		
	3.78	18 + 350.00	1 –900	12.0	2.013	0.50	F		1.27	→		
		18 + 650.00	1 –900	12.0	0.633	0.50	F	F	1.27	→		
		18 + 950.00	1 –900	12.0	3.814	0.50		F	1.27	→		
31		19 + 300.00	1 –900	12.0	–1.602	0.50	F		1.27	→		
	65.56	19 + 354.67	Bridge	–	–	–			–		EXISTING SALAM BRIDGE 4	

LEGEND :

- EXISTING RCPC
- PROPOSED RCPC
- F FLARED WINGWALL
- CB CATCH BASIN
- L TYPE HEADWALL

1 SCHEDULE OF CULVERTS

D–01 D–01

JAPAN INTERNATIONAL COOPERATION AGENCY

DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS-ARMM

CTI Engineering International Co., Ltd.

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RECOMMENDING APPROVAL:

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PROVINCE OF MAGUINDANAO

SHEET CONTENTS :

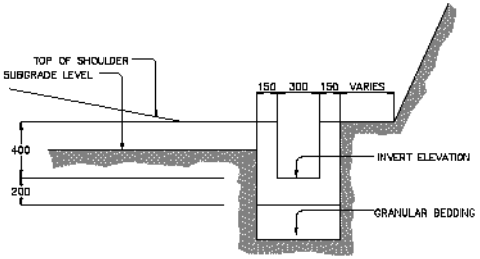
TAMONTAKA–TAPIAN
SCHEDULE OF PIPE CULVERTS

SET NO.

SHEET NO.

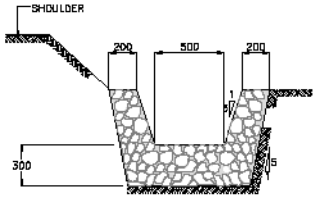
11–35

DISCHARGE	STATION		LENGTH	LOCATION	SLOPE	VELOCITY	TYPE OF DITCH
m^3/sec	BEGINNING	END	(m)		%	(m/s)	
0.3589	4 + 575	4 + 800	225	LEFT	4.413	2.89	Gr – T
0.0751	4 + 800	4 + 850	50	LEFT	3.749	0.83	Gr – T
0.1678	4 + 875	5 + 000	125	RIGHT	3.749	2.09	Gr – T
0.2254	4 + 850	5 + 000	150	LEFT	3.749	2.50	Gr – T
0.2254	5 + 100	5 + 250	150	LEFT	1.337	2.50	Gr – T
0.1678	5 + 250	5 + 375	125	LEFT	1.337	2.09	Cs
0.1202	5 + 420	5 + 500	80	LEFT	1.778	1.34	UD – C
0.0883	5 + 500	5 + 600	100	LEFT	0.599	0.98	UD – C
0.0221	5 + 600	5 + 625	25	RIGHT	0.599	0.25	Gr – T
0.0442	5 + 875	5 + 725	50	RIGHT	1.249	0.49	Gr – T
0.0663	5 + 800	5 + 875	75	RIGHT	0.300	0.74	Gr – T
0.0663	5 + 900	5 + 975	75	LEFT	4.560	0.74	Gr – T
0.2291	6 + 900	7 + 060	160	LEFT	1.663	2.55	Cs
0.0931	7 + 050	7 + 125	65	LEFT	0.338	1.03	Cs
0.0971	8 + 500	8 + 550	50	LEFT	0.300	1.02	Gr – T
0.1289	8 + 550	8 + 620	70	LEFT	0.350	1.43	Gr – T
0.2393	8 + 820	8 + 750	130	LEFT	0.438	2.66	Gr – T
0.0837	8 + 750	8 + 800	50	LEFT	0.438	0.93	Gr – T
0.4185	8 + 850	9 + 100	250	LEFT	0.438	4.65	Cs
0.0419	9 + 100	9 + 125	25	LEFT	1.249	0.47	UD – C
0.1758	9 + 125	9 + 230	105	LEFT	1.249	1.95	Cs
0.2846	9 + 230	9 + 400	170	LEFT	1.656	3.16	Cs
0.0419	9 + 475	9 + 500	25	LEFT	2.392	0.47	UD – C
0.1220	9 + 800	9 + 675	75	LEFT	2.037	1.38	UD – C
0.0407	9 + 675	9 + 700	25	LEFT	2.037	0.45	Cs
0.4116	9 + 700	9 + 900	200	LEFT	5.126	4.57	UD – C
0.0431	10 + 900	10 + 925	25	RIGHT	0.834	0.48	Gr – T
0.3562	16 + 700	16 + 900	200	LEFT	0.300	3.95	UD – C
0.2148	17 + 800	17 + 700	100	LEFT	5.256	2.38	Gr – T
0.4282	17 + 700	17 + 900	200	LEFT	0.300	4.77	Gr – T
0.1028	18 + 575	18 + 625	50	LEFT	0.481	1.14	Cs
0.0240	19 + 550	19 + 575	25	LEFT	2.083	0.27	UD – C
0.0495	19 + 700	19 + 725	25	LEFT	0.300	0.55	UD – C
0.0888	19 + 800	19 + 850	50	LEFT	0.300	1.10	UD – C
0.0888	19 + 800	19 + 850	50	RIGHT	0.300	1.10	UD – C
0.2288	19 + 850	19 + 970	120	LEFT	0.599	2.54	UD – C
0.1907	19 + 850	19 + 950	100	RIGHT	0.599	2.12	UD – C
0.1525	19 + 970	20 + 050	80	LEFT	0.456	1.69	UD – C
0.1430	19 + 950	20 + 025	75	RIGHT	0.300	1.59	UD – C
0.0477	20 + 025	20 + 050	25	RIGHT	0.300	0.53	UD – C



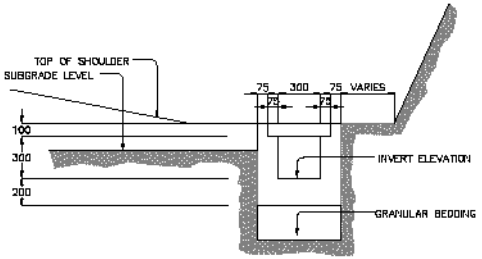
CONCRETE LINED U-DITCH (TYPE Cs)

1 D-08 D-09 SCALE 1:10



TRAPEZOIDAL GROUTED RIPRAP DITCH (TYPE Gr – T)

2 D-08 D-09 SCALE 1:10



DITCH WITH COVER (TYPE UD-C)

3 D-08 D-09 SCALE 1:10

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED.
2. CEMENT MORTAR FOR MASONRY LINING & GROUTED RIP-RAP SHALL BE ONE PART PORTLAND CEMENT AND TWO PARTS FINE AGGREGATE.
3. LOCATIONS OF DITCH THROUGH ROCK SHALL BE DETERMINED BY THE ENGINEER IN THE FIELD TO SUIT ACTUAL FIELD CONDITION.
4. FOR TYPE II OR TYPE II LINED DITCH AND TYPE III LINED DITCH.
   - TYPE IIA BASE = 500mm.
   - TYPE IIB BASE = 1000mm.
   - TYPE IIB BASE = 500mm.
   - TYPE IIC BASE = 1000mm.

1 SCHEDULE AND DETAILS OF SIDE DITCHES

D-08 D-09 SCALE NTS

JAPAN INTERNATIONAL COOPERATION AGENCY
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS-ARMM REPUBLIC OF THE PHILIPPINES
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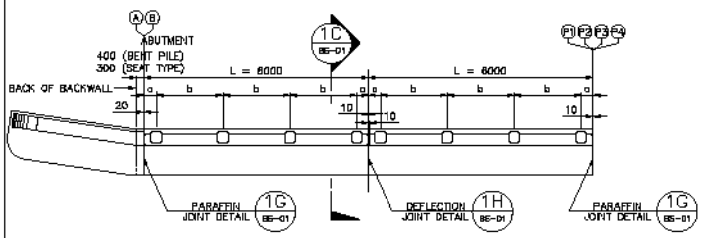
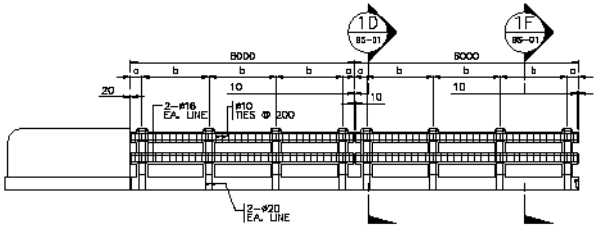
RECOMMENDING APPROVAL:				APPROVED:	PROJECT & LOCATION :	SHEET CONTENTS :	SET NO.	SHEET NO.
PROJECT DIRECTOR DATE:	REGIONAL DIRECTOR DATE:	DIRECTOR BID DATE:	UNDERSECRETARY DATE:	SECRETARY DATE:	THE STUDY ON INFRASTRUCTURE (ROAD NETWORK)DEVELOPMENT PLAN FOR THE AUTONOMOUS REGION IN MUSLIM MINDANAO (ARMM) IN THE REPUBLIC OF THE PHILIPPINES PROVINCE OF MAGUINDANAO	TAMONTAKA–TAPIAN SCHEDULE AND DETAILS OF SIDE DITCHES		TT-36

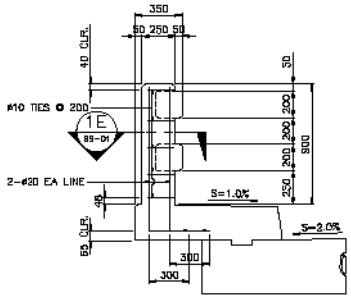


1A BS-01 PLAN SCALE 1:100

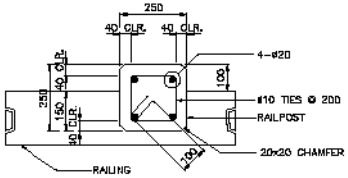


1B BS-01 ELEVATION SCALE 1:100

NOTE:
SIDEWALK SHALL BE PLACED AFTER THE SHORING UNDER THE SUPERSTRUCTURE HAS BEEN RELEASED SUFFICIENTLY TO PERMIT THE SPANS TO ATTAIN FULL DEAD LOAD DEFLECTION.



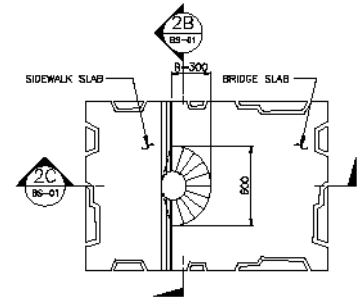
1D BS-01 SECTION SCALE 1:20



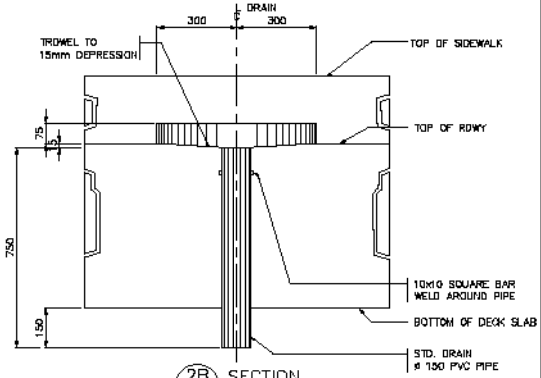
1E BS-01 SECTION SCALE 1:10

ESTIMATED QUANTITIES OF POST & RAILINGS			
SPAN LENGTH (m)	STRUCTURE COMPONENT	REINFORCEMENT KG./m	VOLUME OF CONCRETE (m³/m)
6.00	POST	11.266	0.038
	RAILING	36.628	0.132
6.50	POST	12.899	0.043
	RAILING	38.987	0.128
7.00	POST	12.071	0.040
	RAILING	37.037	0.131
8.00	POST	12.874	0.042
	RAILING	37.117	0.129
8.50	POST	11.628	0.040
	RAILING	37.151	0.131
9.00	POST	11.266	0.034
	RAILING	37.180	0.133
10.00	POST	13.519	0.045
	RAILING	36.552	0.127
11.00	POST	12.290	0.041
	RAILING	38.655	0.130
12.00	POST	11.266	0.038
	RAILING	38.740	0.133
13.00	POST	15.599	0.052
	RAILING	36.291	0.122

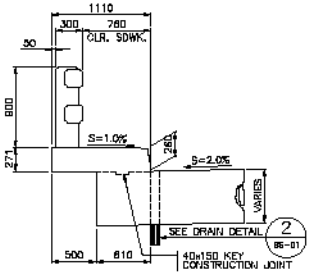
RALING FOR RCSL BRIDGES					
SPAN LENGTH (m)	TOTAL NO. OF JOINT INSIDE SPAN		TOTAL NO. OF RAILPOST PER SPAN	a (mm)	b (mm)
	DEFLECTION	PARAFFIN			
6.00	0	4	8	250	1833
6.50	0	4	10	250	1500
7.00	0	4	10	250	1625
8.00	0	4	12	250	1500
8.50	0	4	12	250	1600
9.00	0	4	12	250	1700
10.00	2	4	18	250	1500
11.00	2	4	16	250	1667
12.00	2	4	18	250	1833
13.00	4	4	24	250	1278



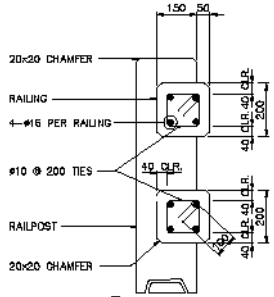
2A BS-01 PLAN SCALE 1:20



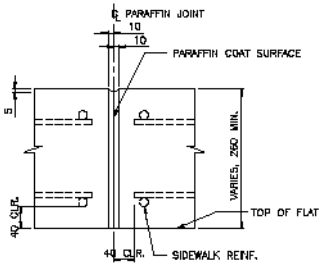
2B BS-01 SECTION SCALE 1:10



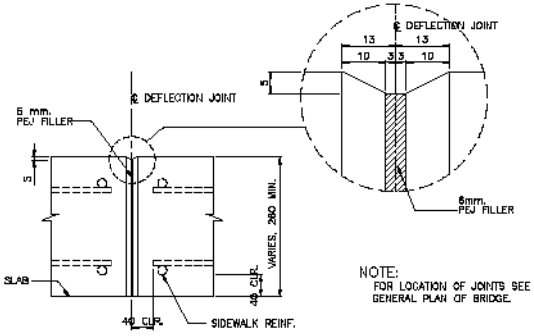
1C BS-01 SIDEWALK DETAIL SCALE 1:30



1F BS-01 SECTION SCALE 1:10

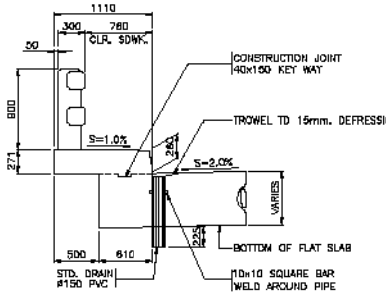


1G BS-01 PARAFFIN JOINT SCALE 1:5



1H BS-01 DEFLECTION JOINT SCALE 1:5

NOTE:
FOR LOCATION OF JOINTS SEE GENERAL PLAN OF BRIDGE.



2C BS-01 SECTION SCALE 1:20

THE DESIGN CONSULTANT SHALL BE HELD FULLY RESPONSIBLE FOR THE FAILURE OF THE FACILITY DUE TO FAULTY DESIGN EXCEPT FOR THE CHANGES MADE WITHOUT THE CONFORMITY OF THE CONSULTANTS

1 BS-01 TYPICAL RAILING AND SIDEWALK DETAILS SCALE AS SHOWN

THE DESIGN CONSULTANT SHALL BE HELD FULLY RESPONSIBLE FOR THE FAILURE OF THE FACILITY DUE TO FAULTY DESIGN EXCEPT FOR THE CHANGES MADE WITHOUT THE CONFORMITY OF THE CONSULTANTS

2 BS-01 TYPICAL DRAIN PIPE DETAIL SCALE AS SHOWN

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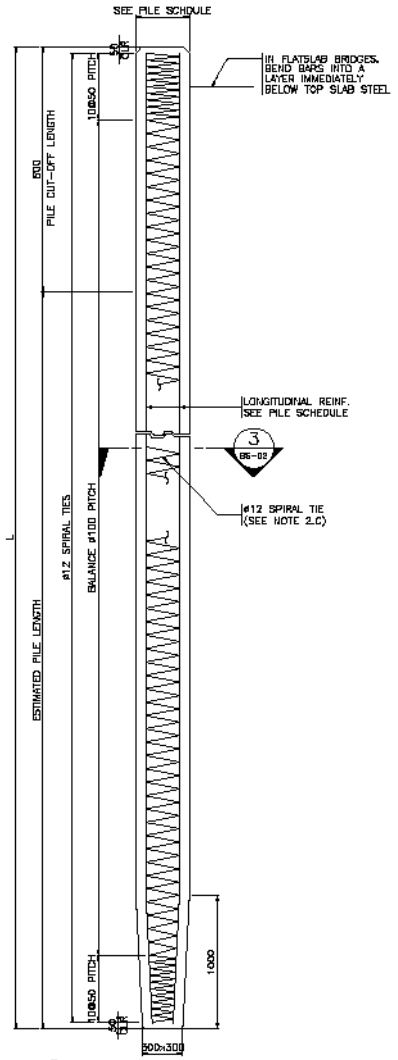
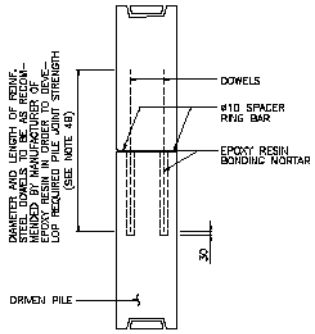
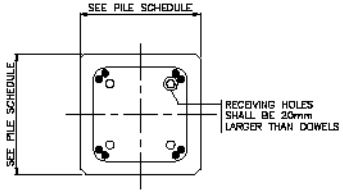


1 BS-02 PILE ELEVATION
SCALE 1:20

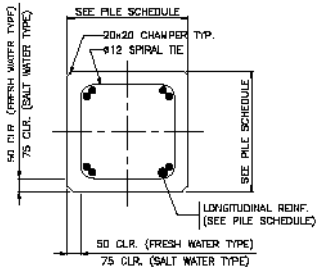


2A BS-02 ELEVATION
SCALE 1:20

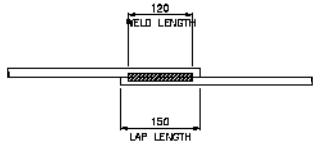


2B BS-02 SECTION
SCALE 1:10

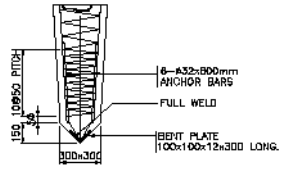
2 BS-02 TYPICAL PILE SPLICE DETAIL
SCALE AS SHOWN



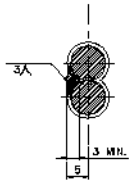
3 BS-02 SECTION
SCALE 1:10



5A BS-02 ELEVATION
SCALE 1:5



4 BS-02 PILE TIP FOR HARD DRIVING
SCALE 1:20



5B BS-02 SECTION
N. T. S.

5 BS-02 WELDED SPIRAL TIE SPLICE DETAIL
SCALE AS SHOWN

PILE SCHEDULE					
TYPE	SIZE (mm)	LONGITUDINAL REINF		MAX CASTING LENGTH (m)	
		QUANTITY	BAR SIZE	1-PT PICK-UP	2-PT PICK-UP
A	400 x 400	8	25	24	34
B	400 x 400	8	28	28	37
C	450 x 450	8	28	28	37
D	450 x 450	8	32	29	41
E	450 x 450	8	36	31	44

NOTES:

1. CONCRETE :

   CONCRETE SHALL CONFORM TO THE REQUIREMENT OF CLASS AA CONCRETE WITH 27.6 MPa CYLINDER STRENGTH AND 20mm MAXIMUM AGGREGATE SIZE.

2. REINFORCEMENT :

   A. ALL REINFORCING STEEL SHALL BE DEFORMED BARS CONFORMING TO AASHTO M31 (ASTM A615) GRADE 40.
   B. SPLICES OF ADJACENT LONGITUDINAL STEEL SHALL BE STAGGERRED 100 BAR DIAMETERS APART. LENGTH OF SPLICES SHALL BE 1000mm FOR ø25, 1300mm FOR ø28, 1700m FOR ø32 AND 2100mm FOR ø36.
   C. SPIRAL-TIES SHALL BE WELDED AT SPLICES ACCORDING TO DETAIL 5 BS-02

3. DRIVING :

   A. PILE HEADS SHALL BE PROTECTED FROM DIRECT IMPACT OF THE HAMMER BY CUSHION BLOCKS CONSISTING OF SEVERAL BLOCKS OF WOOD OR OF OTHER APPROVED MATERIALS.
   B. PILES SHALL BE DRIVEN TO A DEPTH THAT WILL PRODUCE THE REQUIRED ALLOWABLE BEARING CAPACITY.
   C. THE ESTIMATED PILE LENGTH AND ESTIMATED PILE TIP ELEVATION ARE SHOWN ON GENERAL PLAN AND ELEVATION OF EACH BRIDGES.

4. PILE SPLICE :

   A. PILES MAY BE SPLICED ONLY IF STRICTLY NECESSARY AND APPROVED BY THE ENGINEER. PILE SPLICES SHALL BE LOCATED AT LEAST 10m BELOW THE EXISTING GROUND LEVEL
   B. PILE SPLICE SHALL DEVELOP 100% AXIAL AND 50% BENDING OF THE CAPACITY OF THE PILE SECTION WHERE THE SPLICE IS LOCATED.

5. ALLOWABLE PILE BEARING CAPACITY : 500 kN PER PILE (FOR 400 x 400 PILES)
   700 kN PER PILE (FOR 450 x 450 PILES)

6. MINIMUM HAMMER ENERGY RATING = 55 kN-m

7. BASIS FOR COMPUTING ALLOWABLE PILE BEARING CAPACITY:

$$Pall = \left(\frac{1.67\ eh\ Eh}{S + 2.54}\right)\left(\frac{Wr + 0.16\ Wp}{Wr + Wp}\right)$$

   WHERE:

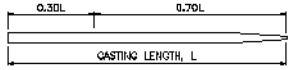
   Pall = ALLOWABLE PILE BEARING CAPACITY (kN)
   eh = HAMMER EFFICIENCY
   Eh = HAMMER ENERGY RATING (kN-m)
   Wr = WEIGHT OF RAM (kN)
   Wp = WEIGHT OF PILE AND OTHER DRIVEN WEIGHTS (Kn)
   S = AVERAGE PENETRATION PER BLOW FOR THE LAST 150mm OF DRIVING (mm)

8. TEST PILES :

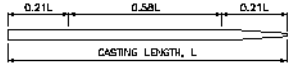
   A. TEST PILES SHALL BE DRIVEN WITH THE SAME HAMMER USED FOR DRIVING REGULAR PILES AND MAY BE PART OF FOUNDATION IF APPROVED BY THE ENGINEER.
   B. THE TEST PILE LENGTH SHALL BE 2 METERS LONGER THAN SPECIFIED ESTIMATED LENGTHS, UNLESS INDICATED OTHERWISE IN BRIDGE DETAILS.

9. PICK-UP POINTS :

   PICK-UP POINTS SHALL BE MARKED ON ALL PILES AND ALL LIFTING SHALL BE DONE AT THESE POINTS.



1 – POINT PICK-UP



2 – POINT PICK-UP

THE USE OF SPECIAL EMBEDDED OR ATTACHED LIFTING DEVICES SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

THE REVIEW AND APPROVAL OF THESE PLANS BY DPWH DO NOT RELIEVE THE DESIGNER/CONSULTANT(S) FROM RESPONSIBILITY FOR THE SAFETY AND STABILITY OF THE COMPLETED FACILITY/STRUCTURE(S), AS WELL AS FOR THE FAILURE OF THE SAME DUE TO FAULTY DESIGN.

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CTI CTI Engineering International Co., Ltd.
yec Yachiyo Engineering Co., Ltd.

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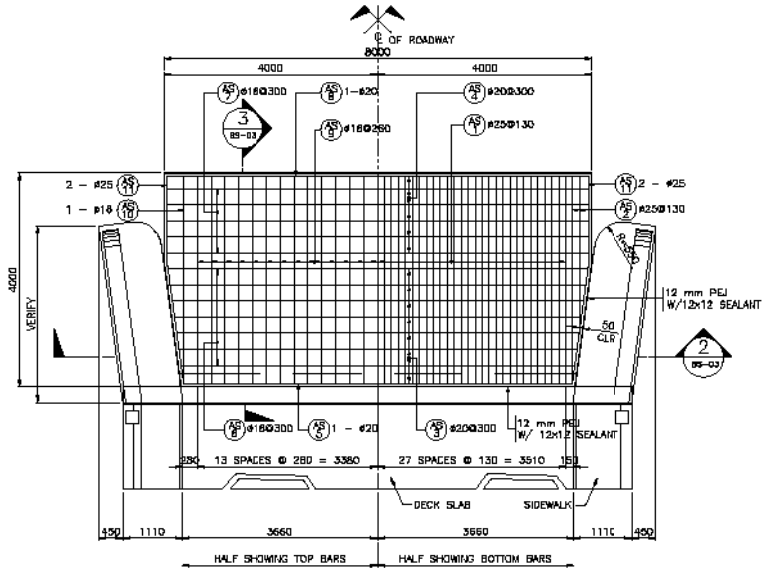
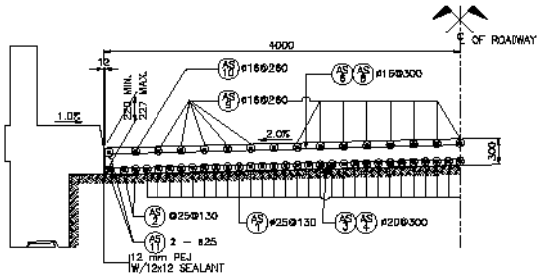
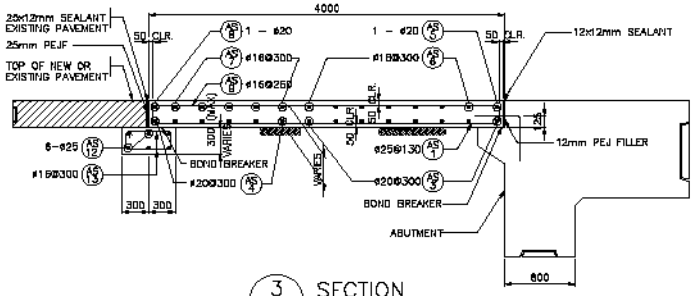


1 / BS–03 PLAN
SCALE 1:50



2 / BS–03 SECTION
SCALE 1:30



3 / BS–03 SECTION
SCALE 1:30

REINFORCEMENT SCHEDULE & ESTIMATED QUANTITIES FOR TWO LANE APPROACH SLABS

BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF REBARS)	REINFORCEMENT											CONCRETE VOLUME (m³)	REMARKS
	MARK	SIZE (mm)	QUANTITY	SPACING (mm)	SHAPE	BAR DIMENSIONS (mm) a	b	c	LENGTH PER BAR (mm)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)		
a / A	AS 1	25	55	130	B	3800	200	–	4100	225.50	3.854	870		1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB
	AS 2	25	4	130	B	2800 MIN 3700 MAX	200	–	3450	13.80	3.854	54		
	AS 3	20	8	300	A	7220 MIN 7900 MAX	–	–	7560	60.48	2.466	150		
	AS 4	20	6	300	A	7900	–	–	7900	47.40	2.466	117		
a / B / b	AS 5	20	1	AS SHOWN	A	7200	–	–	7200	7.20	2.466	18		
	AS 6	16	7	300	A	7300 MIN 7900 MAX	–	–	7600	53.20	1.579	85		
	AS 7	16	5	300	A	7900	–	–	7900	39.50	1.579	63	10.80	
a / C / b	AS 8	20	1	AS SHOWN	A	7900	–	–	7900	7.90	2.466	20		
	AS 9	16	28	250	B	3900	200	–	4100	114.80	1.579	182		
	AS 10	16	2	AS SHOWN	B	3750	200	–	3950	7.90	1.579	13		
	AS 11	25	4	AS SHOWN	C	1750	2150	–	3900	15.60	3.854	61		
a / b / c / a / b / D	AS 12	25	6	AS SHOWN	A	7900	–	–	7900	47.40	3.854	183		
	AS 13	16	28	300	D	200	500	150	1700	47.60	1.579	76		
											GRAND TOTAL =	1892	10.80	

ITEM NO.	DESCRIPTION	UNIT	TOTAL
404	REINFORCING STEEL GRADE 40	kgs.	1892
405 (1)	STRUCTURAL CONCRETE CLASS "A"	cu.m.	10.80

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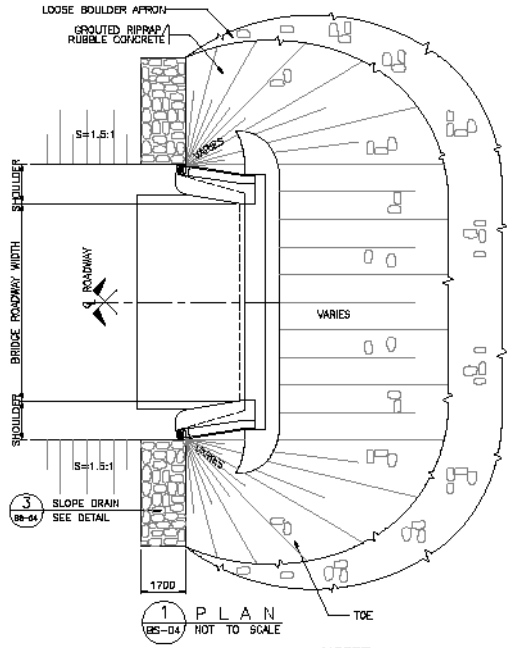
SHEET CONTENTS :
APPROACH SLAB DETAILS (NORMAL 2 LANES)

SET NO.

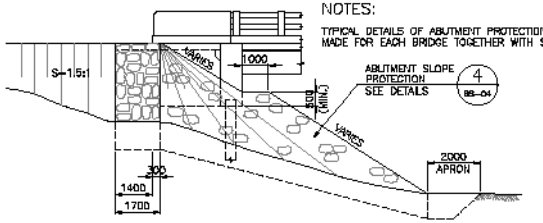
SHEET NO.
CM–03



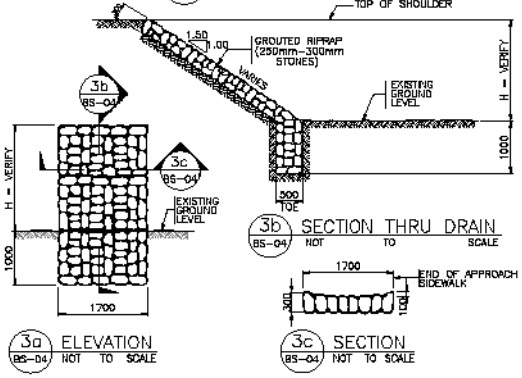
1 BS-04 PLAN NOT TO SCALE

NOTES:

TYPICAL DETAILS OF ABUTMENT PROTECTION SHOULD BE MADE FOR EACH BRIDGE TOGETHER WITH SPECIFICATION.



2 BS-04 ELEVATION NOT TO SCALE

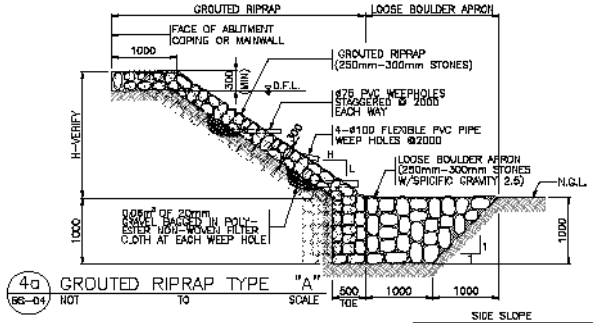


3b BS-04 SECTION THRU DRAIN NOT TO SCALE

3a BS-04 ELEVATION NOT TO SCALE

3c BS-04 SECTION NOT TO SCALE

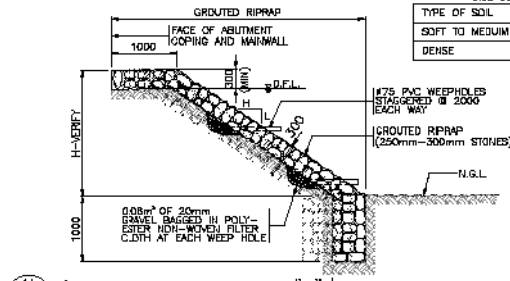
3 BS-04 SIDE DRAIN DETAILS NOT TO SCALE



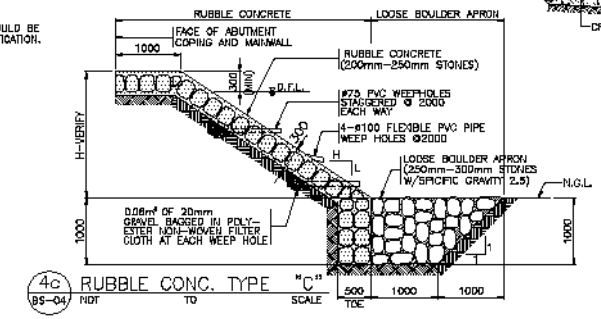
4a BS-04 GROUTED RIPRAP TYPE "A" NOT TO SCALE

SIDE SLOPE

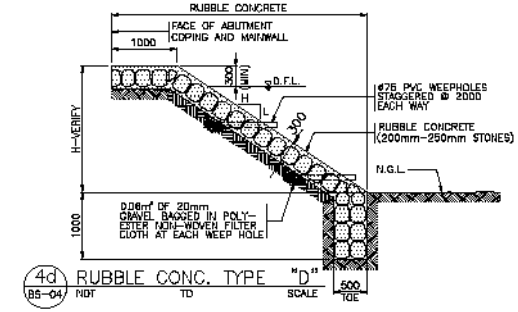
TYPE OF SOIL	H	L
SOFT TO MEDIUM	1.5	1.00
DENSE	1.00	1.00



4b BS-04 GROUTED RIPRAP TYPE "B" NOT TO SCALE

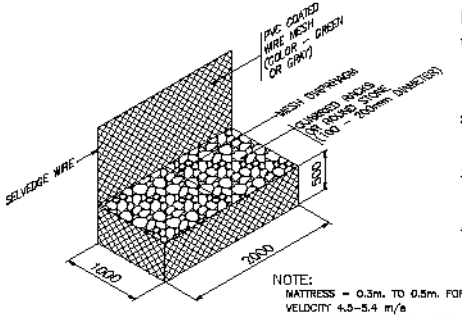


4c BS-04 RUBBLE CONC. TYPE "C" NOT TO SCALE



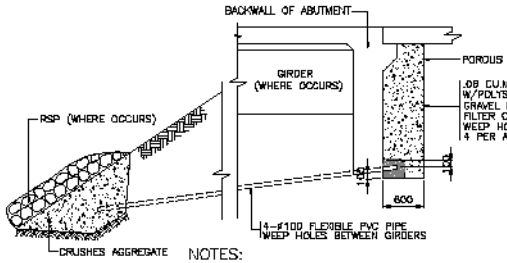
4d BS-04 RUBBLE CONC. TYPE "D" NOT TO SCALE

4 BS-04 RUBBLE CONCRETE/ GROUTED RIPRAP DETAILS NOT TO SCALE



NOTE:
MATTRESS = 0.3m. TO 0.5m. FOR
VELOCITY 4.5-5.4 m/s
MIN. MATTRESS THICKNESS = 0.3m.

5 BS-04 GABIONS/MATTRESS NOT TO SCALE



NOTES:

1. ABUTMENT DRAINAGE SHALL BE PROVIDED BEHIND ABUTMENT, POROUS BACKFILL SHALL EXTEND LATERALLY THE FULL LENGTH OF THE BACKWALL.

6 BS-04 DIAPHRAGM ABUTMENT DRAINAGE NOT TO SCALE

NOTES:

1. STONES SHALL BE CLEAN, HARD, AND DURABLE AND SHALL BE SUBJECT TO THE ENGINEER'S APPROVAL. ADOBE STONES SHALL NOT BE USED UNLESS OTHERWISE SPECIFIED. THE MIN. SIZE OF STONES TO BE USED SHALL BE 0.005m³ IN VOLUME AND NOT LESS THAN 75 PERCENT OF THE TOTAL VOLUME OF ROCK EMBANKMENT SHALL CONSISTS OF STONES 0.01m³ VOLUME. STONES OBTAINED FROM EXCAVATION PERFORMED UNDER THIS CONTRACT MAY BE USED IF QUALIFIED.

2. CONCRETE SHALL BE CLASS "B" IN ACCORDANCE WITH ITEM 405-STRUCTURAL CONCRETE OF THE SPECIAL PROVISIONS.

3. THE FOUNDATION BED SHALL BE EXCAVATED TO THE LINES AND GRADES AS SHOWN IN THE PLANS AS DIRECTED BY THE ENGINEER, AND SHALL BE THOROUGHLY COMPACTED.

4. FALSEWORK/FORMWORK IF USED SHALL BE CONSTRUCTED SO AS TO WITHSTAND THE STRESSES IMPOSED. FORMWORK USED SHALL BE CONSTRUCTED WITH SUFFICIENT STRENGTH, RIGIDITY AND SHAPE AS TO LEAVE THE FINISHED WORKS TRUE TO THE DIMENSIONS SHOWN ON THE PLANS AND WITH THE SURFACE FINISHED AS SPECIFIED.

5. CONSTRUCTION:

   ONE LAYER OF CONCRETE CLASS "B" SHALL BE PLACED AT THE PREPARED BED PRIOR TO PLACING OF STONES. CLEARANCE BETWEEN STONES SHALL NOT BE MORE THAN 65mm OR THE MAXIMUM SIZE OF CONCRETE AGGREGATE FOR CLASS "B".

   CONCRETE CLASS "B" SHALL BE PLACED AFTER EACH LAYER OF STONE AND SHALL BE THOROUGHLY CONSOLIDATED BY MEANS OF A VIBRATOR INSERTED IN EACH LAYER OF CONCRETE. IN NO CASE SHALL THE VIBRATOR BE OPERATED LONGER THAN 10 SECONDS IN ANY LOCATION.

   AFTER REMOVAL OF FORMS, ANY CAVITIES, VOIDS AND HONEYCOMB SPOTS SHALL BE FILLED UP WITH MORTAR COMPOSED OF ONE PART CEMENT AND TWO PARTS SAND.

   ALL DEBRIS AND REFUSE RESULTING FROM WORK SHALL BE REMOVED AND THE SITE LEFT IN A NEAT AND PRESENTABLE CONDITION.

6. PROVIDE 1.0m BERM WHEN H>4.0m.

RUBBLE CONCRETE:

1. RUBBLE CONCRETE SHALL BE CLASS B (1:2.5:5) MIX CONCRETE WITH BOULDERS EMBEDDED THEREIN. BOULDERS 200-250mm ø SHALL BE CAREFULLY HAND-LAID WITHIN THE CONCRETE SECTION. THE BOULDERS SHALL BE THOROUGHLY INCORPORATED INTO THE CONCRETE MASS WITH A COVER OF 30mm AND NOT LESS THAN 30mm APART.

2. FOR THE LOOSE BOULDER APRON, BOULDERS 250-300mm ø SHALL BE HAND-LAID, CLOSE TOGETHER AND SHALL BE FIRMLY BEDDED. ALL VOIDS BETWEEN BOULDERS SHALL BE FILLED WITH GRAVEL AND THE JOINTS FILLED WITH TIGHTLY DRIVEN SPALLS.

3. CURTAIN WALLS SHALL BE USED AT BOTH ENDS OF THE LOOSE BOULDER APRON BANK PROTECTION WORKS. BOULDERS SHALL BE CAREFULLY HAND-LAID AND EMBEDDED INTO THE CONCRETE SECTION.

4. NO CONCRETING UNDER WATER SHALL BE PERMITTED.

TYPICAL PHYSICAL PROPERTIES GEOTEXTILES

WEIGHT	ASTM D3776	g/m²	300
THICKNESS (2 kN/m²)	ASTM D1777	mm	3.8
TENSILE STRENGTH	ASTM D4595	kN/m MD	28.7
		CD	28.1
GRAB STRENGTH	ASTM D4632	N MD	1600
		CD	1450
ELONGATION	ASTM D4632	% MD	70
		CD	70
TEAR STRENGTH	ASTM D4533	N MD	510
		CD	550
PUNCTURE STRENGTH	ASTM D4833	N	560
BURST STRENGTH	ASTM D3786	kPa	>1362
WATER PERMEABILITY	ASTM D4491	cm/sec	1x10⁻¹
PORE SIZE	ASTM D4751	mm	<0.075

GROUTED RIPRAP:

250-300mm ø SHALL BE USED FOR THE FACING AND/SHALL BE HANDLAID WITH THE LONGEST DIMENSIONS PERPENDICULAR TO THE SLOPE AND FIRMLY BEDDED INTO THE SLOPE AND AGAINST THE ADJOINING BOULDER SPACES BETWEEN THE BOULDERS SHALL BE COMPLETELY FILLED WITH 1:3 MORTAR. THE OUTSIDE SURFACE OF THE BOULDERS SHALL BE LEFT EXPOSED AND THE SURFACE OF THE MORTAR SHALL BE SWEPT WITH A STIFF BROOM.

FOR GABIONS:

1. BODY WIRE DIAMETER – 3.00mm/4.00mm.
2. SELVEDGE WIRE DIAMETER – 3.90mm/4.90mm.
3. TENSILE STRENGTH – 400 MPA TO 600 MPA.
4. WEIGHT OF ZINC COATING – 244 G/SQ.M. (MIN.) OF COATED WIRE SURFACE.
5. ELONGATION; 200mm GAGE-LENGTH – 12% (MIN.)
6. TYING & CONNECTING WIRE DIAMETER – 2.20mm (MIN.)
7. ROCK FILL – 100 TO 200mm DIAM.
8. DENSITY OF FILLED GABIONS – 1400 KG/CU.M. (MIN.)
9. WIRE SHOULD BE TRIPPLE TWISTED
10. MESH SIZE – 8 X 10 cm.

FOR MATTRESES:

1. BODY WIRE DIAMETER – 2.00 TO 2.20 MIN.
2. SELVEDGE WIRE DIAMETER – 3.00 TO 3.20 MIN.
3. 4. & 5. – SAME AS NOS. 3,4&5 ABOVE IN THE SPECIFICATION FOR GABIONS
5. TYING & CONNECTING WIRE DIAMETER – 2.00 TO 2.20 MIN.

METHOD OF FILLING:

1. FILLING IS DONE BY HAND OR MACHINE, MAKING SURE THAT THE STONE IS TIGHTLY PACK, WITH A MINIMUM OF VOIDS.
2. EACH GABION IS FILLED ONLY ONE-THIRD FULL TO START WITH, AFTER WHICH TWO HORIZONTAL BRACING WERE ARE FIXED ACROSS EACH COMPARTMENT FROM FRONT TO BACK, JUST ABOVE THE LEVEL OF THE STONE.
3. THE GABIONS IS NEXT FILLED TO TWO-THIRDS, AND THE HORIZONTAL BRACING REPEATED AT THAT LEVEL. FINALLY IT IS FILLED TO THE TOP-SLIGHTLY OVER-FULL TO ALLOW FOR SETTLEMENT.

NOTE: LOOSE BOULDER APRON:
IF THE VELOCITY IS LESS THAN 3.0m/SEC 250mm-300mm STONE & IF THE VELOCITY IS GREATER THAN 3.0m/SEC USE 350mm-500mm.

THE DESIGN CONSULTANT SHALL BE HELD FULLY RESPONSIBLE FOR THE FAILURE OF THE FACILITY DUE TO FAULTY DESIGN EXCEPT FOR THE CHANGES MADE WITHOUT THE CONFORMITY OF THE CONSULTANTS

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yec Yachiyo Engineering Co., Ltd.

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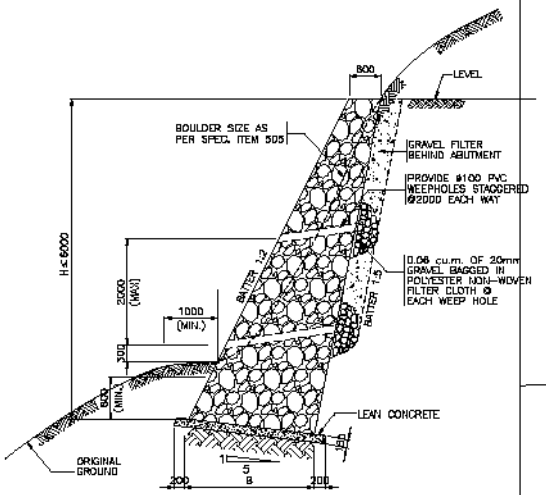
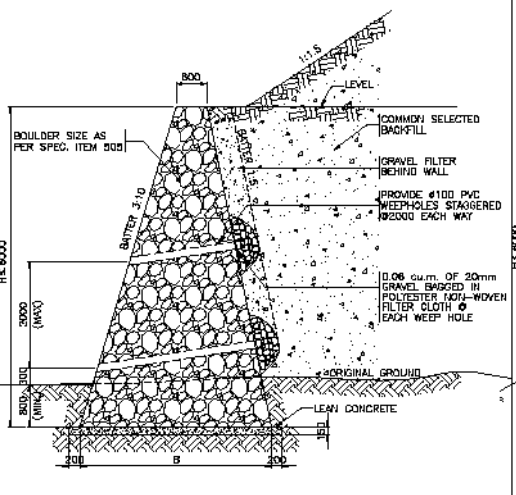


APPLICATION:

IDEAL WHERE IS RESTRICTED CUT/EXCAVATION IS AVAILABLE BEHIND RETAINING WALL, EITHER SLOPED OR LEVEL HOWEVER, IT IS APPLICABLE ONLY FOR STABLE GROUND (MORE THAN SOFT GROUND)

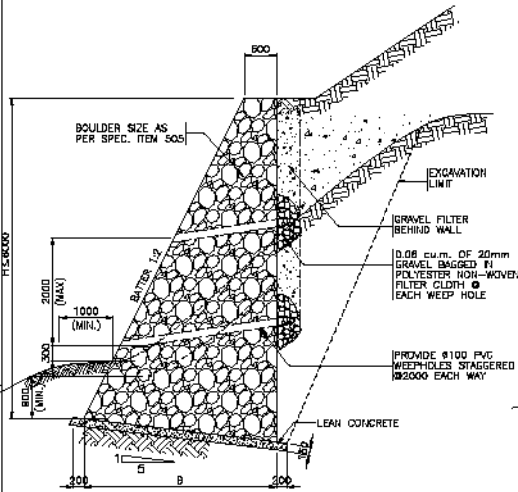
1 BS-05 TYPE I (CUT SECTION) N. T. S.



APPLICATION:

IDEAL FOR RETAINING EMBANKMENTS EITHER SLOPED OR LEVEL

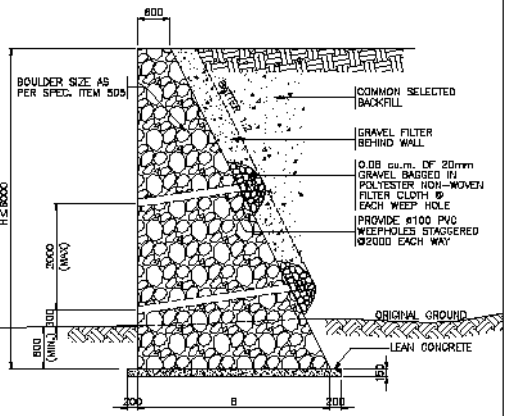
2 BS-05 TYPE II (EMBANKMENT SECTION) N. T. S.



APPLICATION:

APPLICABLE WHERE CUT OR EMBANKMENT BEHIND THE RETAINING WALL IS RESTRICTED.

3 BS-05 TYPE III (EMBANKMENT / CUT SECTION) N. T. S.



APPLICATION:

IDEAL FOR RETAINING EMBANKMENTS EITHER SLOPED OR LEVEL

4 BS-05 TYPE IV (EMBANKMENT / CUT SECTION) N. T. S.

TYPE I (CUT SECTION)				
OVERALL HEIGHT (mm)	TOP WIDTH (mm)	BOTTOM WIDTH,(B) (mm)	VOLUME PER METER (cu.m.)	MAX. SOIL REACTION (kPa)
1000	600	900	0.75	40
2000	600	1200	1.80	75
3000	600	1500	3.15	105
4000	600	1800	4.80	130
5000	600	2100	6.75	155
6000	600	2400	9.00	175

NOTES:

1. FOOTING TO BE LOCATED ON STRATUM WITH PERMISSIBLE BEARING PRESSURE NOT LESS THAN THE GIVEN MAXIMUM SOIL PRESSURE.
2. SOFT SPOTS UNDER FOOTING SHALL BE REMOVED AND REPLACED WITH LEAN CONCRETE CLASS "B"
3. STONE MASONRY SHALL COMPLY WITH SPECIFICATION ITEM NO. 505.
4. ANY VOIDS BETWEEN THE CUT FACE AND STONE MASONRY SHALL BE FILLED WITH ROCK FILL BY HAND AND PLACED IN LAYERS.

TYPE II (EMBANKMENT SECTION)				
OVERALL HEIGHT (mm)	TOP WIDTH (mm)	BOTTOM WIDTH,(B) (mm)	VOLUME PER METER (cu.m.)	MAX. SOIL REACTION (kPa)
1000	600	1100	0.85	40
2000	600	1600	2.20	80
3000	600	2100	4.05	120
4000	600	2600	6.40	155
5000	600	3100	9.25	190
6000	600	3600	12.60	220

NOTES:

1. FOOTING TO BE LOCATED ON STRATUM WITH PERMISSIBLE BEARING PRESSURE NOT LESS THAN THE GIVEN MAXIMUM SOIL PRESSURE.
2. SOFT SPOTS UNDER FOOTING SHALL BE REMOVED AND REPLACED WITH LEAN CONCRETE CLASS "B"
3. STONE MASONRY SHALL COMPLY WITH SPECIFICATION ITEM NO. 505.

TYPE III (EMBANKMENT/CUT SECTION)				
OVERALL HEIGHT (mm)	TOP WIDTH (mm)	BOTTOM WIDTH,(B) (mm)	VOLUME PER METER (cu.m.)	MAX. SOIL REACTION (kPa)
1000	600	1100	0.85	35
2000	600	1600	2.20	60
3000	600	2100	4.05	85
4000	600	2600	6.40	105
5000	600	3100	9.25	130
6000	600	3600	12.90	150

NOTES:

1. FOOTING TO BE LOCATED ON STRATUM WITH PERMISSIBLE BEARING PRESSURE NOT LESS THAN THE GIVEN MAXIMUM SOIL PRESSURE.
2. SOFT SPOTS UNDER FOOTING SHALL BE REMOVED AND REPLACED WITH LEAN CONCRETE CLASS "B"
3. STONE MASONRY SHALL COMPLY WITH SPECIFICATION ITEM NO. 505.

TYPE IV (EMBANKMENT SECTION)					
BRIDGE NAME (mm)	OVERALL HEIGHT (mm)	TOP WIDTH (mm)	BOTTOM WIDTH,(B) (mm)	VOLUME PER METER (cu.m.)	MAX. SOIL REACTION (kPa)
NAMUNGA 2	5000	600	2500	7.75	227.20
NAGUILUYAN	5000	600	2500	7.75	227.20
MASCARINA 1	4000	600	2000	5.20	180.11
MALINAO	3500	600	1700	4.11	147.25
BULBUGAN	3370	600	1690	3.95	147.93
MARAUL 1	3000	600	1500	3.15	132.83

NOTES:

1. FOOTING TO BE LOCATED ON STRATUM WITH PERMISSIBLE BEARING PRESSURE NOT LESS THAN THE GIVEN MAXIMUM SOIL PRESSURE.
2. SOFT SPOTS UNDER FOOTING SHALL BE REMOVED AND REPLACED WITH LEAN CONCRETE CLASS "B"
3. STONE MASONRY SHALL COMPLY WITH SPECIFICATION ITEM NO. 505.

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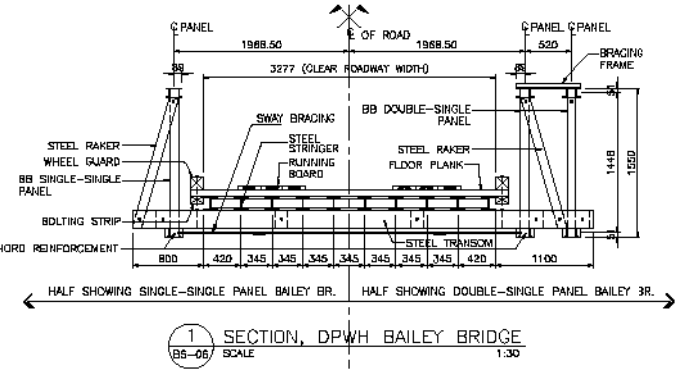
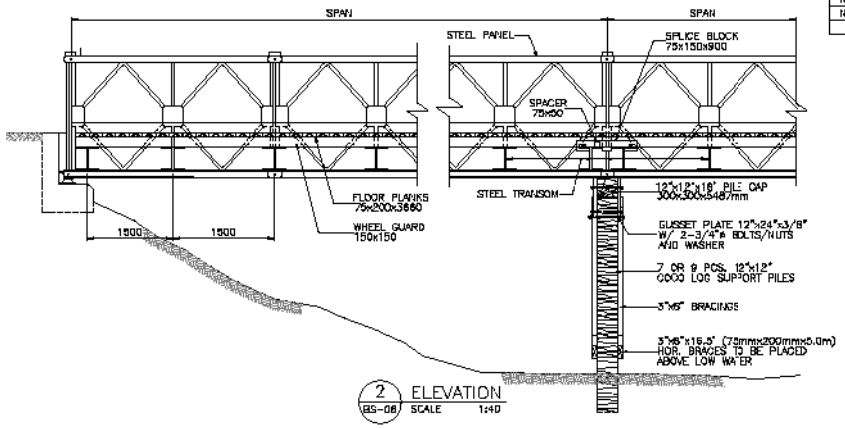
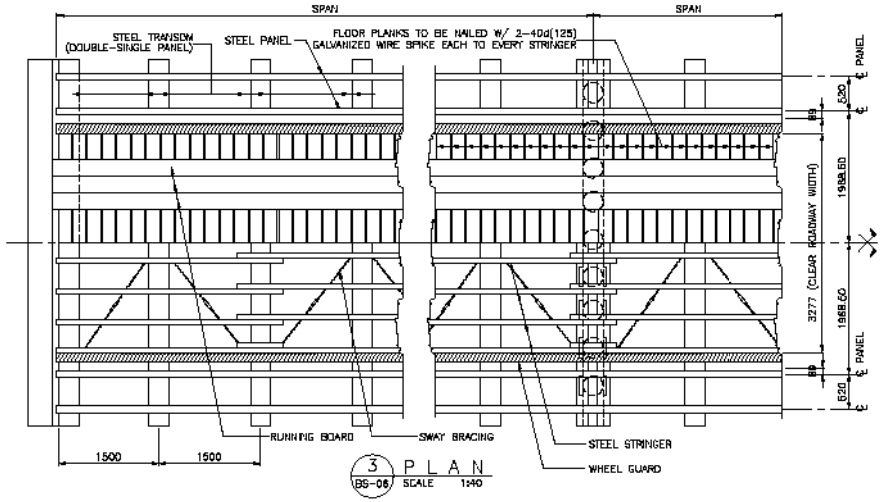


1 SECTION, DPWH BAILEY BRIDGE
BS-06 SCALE 1:30



2 ELEVATION
BS-06 SCALE 1:40



3 PLAN
BS-06 SCALE 1:40

BILL OF MATERIALS (PER PANEL) FOR SUPERSTRUCTURE

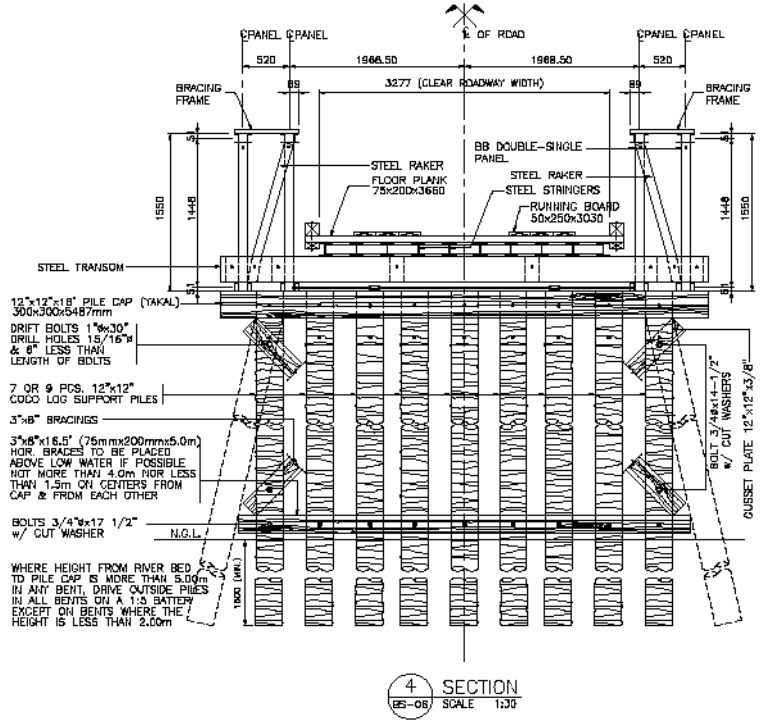
DESCRIPTION	SINGLE-SINGLE PANELS (L=15.00m.)				DOUBLE-SINGLE PANELS (L=15.00m.)			
	NO.	UNIT	QUANTITY	REMARKS	NO.	UNIT	QUANTITY	REMARKS
BAILEY PANEL	10	kgs.	2730.00	DPWH STANDARD	20	kgs.	5440.00	DPWH STANDARD
CHORD REINF.	10	kgs.	845.50	DPWH STANDARD	20	kgs.	1891.00	DPWH STANDARD
BEARING PLATES	4	kgs.	141.80	DPWH STANDARD	8	kgs.	283.60	DPWH STANDARD
RAKERS	12	kgs.	141.84	DPWH STANDARD	12	kgs.	141.84	DPWH STANDARD
PANEL PINS	24	kgs.	76.80	DPWH STANDARD	48	kgs.	153.60	DPWH STANDARD
SAFETY PINS	24	kgs.	0.60	DPWH STANDARD	48	kgs.	1.20	DPWH STANDARD
STEEL TRANSOMS	11	kgs.	2214.96	DPWH STANDARD	11	kgs.	2214.96	DPWH STANDARD
TRANSOM CLAMPS	20	kgs.	57.00	DPWH STANDARD	40	kgs.	114.00	DPWH STANDARD
PLAIN STRINGERS	15	kgs.	1772.70	DPWH STANDARD	15	kgs.	1772.70	DPWH STANDARD
BUTTOM STRINGERS	10	kgs.	1227.30	DPWH STANDARD	10	kgs.	1227.30	DPWH STANDARD
BRACING BOLTS	24	kgs.	10.80	DPWH STANDARD	64	kgs.	28.80	DPWH STANDARD
SWAY BRACES	10	kgs.	291.50	DPWH STANDARD	10	kgs.	291.50	DPWH STANDARD
END POST, FEMALE	2	kgs.	112.00	DPWH STANDARD	4	kgs.	224.00	DPWH STANDARD
END POST, MALE	2	kgs.	109.50	DPWH STANDARD	4	kgs.	219.00	DPWH STANDARD
BRACING FRAME	–	–	–	–	10	kgs.	70.00	DPWH STANDARD
FLOOR PLANKS	77	bd.ft.	1848.00	3"x 6"x12'	77	bd.ft.	1848.00	3"x 6"x12'
RUNNING BOARD	42	bd.ft.	700.00	2"x10"x10'	42	bd.ft.	700.00	2"x10"x10'
WHEEL GUARD	10	bd.ft.	660.00	6"x 8"x10'	22	bd.ft.	600.00	6"x 8"x10'
BOLTING STRIPS	54	bd.ft.	150.00	3"x 6"x10'	10	bd.ft.	150.00	3"x 6"x10'
BOLTS (WHEEL GUARD)	–	kgs.	18.85	13øx330	54	kgs.	18.85	13øx330
BOLTS (ANCHOR BOLTS)	6	kgs.	3.95	20øx400	8	kgs.	5.93	20øx400
NAILS	–	kgs.	10.00	100mm CW	–	kgs.	10.00	100mm CW
NAILS	–	kgs.	50.00	125mm CW	–	kgs.	50.00	125mm CW
NAILS	–	kgs.	60.00	150mm CW	–	kgs.	80.00	150mm CW

BILL OF MATERIALS (FOR COCO SUPPORT PILE)

NUMBER		SIZE	LENGTH	DESCRIPTIONS	QUANTITY	
3 SPAN	2 SPAN				3 SPAN	2 SPAN
2	1	12" x 12"	18'-0"	PILE CAP	432 Bd. Ft.	216 Bd. Ft.
0	4	3" x 8"	18'-0"	CROSS BRACINGS	288 Bd. Ft.	144 Bd. Ft.
0	2	3" x 8"	16.5'-0"	HORIZONTAL BRACINGS	132 Bd. Ft.	66 Bd. Ft.
T O T A L					852 Bd. Ft.	426 Bd. Ft.

3 SPAN	2 SPAN	SIZE	LENGTH	DESCRIPTIONS	3 SPAN	2 SPAN
18	9	1"ø	30"	DRIFT BOLTS	60 KG	30 KG
16	8	3/4"ø	17-1/2"	BOLTS w/ SQ. HDS. & NUTS	12 KG	6 KG
8	4	3/4"ø	14-1/2"	BOLTS w/ SQ. HDS. & NUTS	8 KG	4 KG
48	24	FOR 3/2" BOLTS		CUT WASHERS	4 KG	2 KG
		50d	5-1/2"	GALVANIZED WIRE NAILS	4 KG	2 KG
T O T A L					88 KG	44 KG

18	9	(AS SPECIFIED)	TIMBER PILES COCO LOG	
			CARBOLINEUM OR HOT TAR	4 GAL. 2 GAL.



4 SECTION
BS-06 SCALE 1:30

THE DESIGN CONSULTANT SHALL BE HELD FULLY RESPONSIBLE FOR THE FAILURE OF THE FACILITY DUE TO FAULTY DESIGN EXCEPT FOR THE CHANGES MADE WITHOUT THE CONFORMITY OF THE CONSULTANTS

GENERAL NOTES:

SPECIFICATIONS:
- DESIGN-1992 AASHTO STANDARD SPECIFICATIONS
- CONSTRUCTION-DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS & BRIDGES, REVISED 1998
- LIVE LOAD – M-18 LOADING
- MIN. SAFE BEARING CAPACITY – 8.5 TONS/PILE (COCO LOG)
- ALL DIMENSION ARE IN MILLIMETERS UNLESS OTHERWISE INDICATED

LUMBER:
- ALL PILES ARE COCO LOG PILES AND SHALL BE MATURED AND FREE FROM DEFECTS.
- ALL FLOOR PLANKS AND RUNNING BOARDS SHALL BE SAWN LUMBER FROM TREES, PREFERABLY APITONG OR TANGUILI. WHEEL GUARDS AND RAILING TO BE OF GUIJO OR EQUAL.
- ALL LUMBER SHALL BE SEASONED, SOUND AND FREE FROM ANY DEFECTS THAT WOULD AFFECT THEIR STRENGTH AND DURABILITY.

ERECTION:
- BOLT HOLES IN WOOD SHALL BE BORED 1/16" SMALLER THAN BOLT DIAMETER TO GIVE A DRIVING FIT.
- TOP OF PILE CAPS, BOTTOM AND SIDES OF FLOOR PLANKS AND ALL CONTACT SURFACES OF WOOD TO WOOD SHALL BE COATED WITH PAINT. AFTER STRINGERS AND BEFORE FLOOR PLANKS ARE LAID, PAINT THE ENTIRE STRUCTURE WITH TWO COATS OF CARBOLINEUM OR HOT TAR.
- CRACKS IN TIMBER AND ALL SPACES LIKELY TO RETAIN MOISTURE TO BE SEALED WITH PITCH.
- PILE DRIVING RESISTANCE TIMBER PILES 4-5 BLOWS/25MM

NOTES:
1. THE DETOUR BRIDGE SHALL BE DESIGNED, FURNISHED, INSTALLED AND MAINTAINED BY THE CONTRACTOR.
2. THE CONTRACTOR SHALL SUBMIT WORKING DRAWINGS AND DESIGN CALCULATIONS FOR THE DETOUR BRIDGE THAT WILL SATISFY ALL THE REQUIREMENTS GIVEN HEREIN (IN ALL CONTRACT DRAWINGS) AND IN THE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS. CONSTRUCTION OF THE DETOUR BRIDGE SHALL BE STARTED ONLY AFTER APPROVAL OF WORKING DRAWINGS.
3. THE DETOUR BRIDGE SHALL BE A STANDARD BAILEY BRIDGE APPROVED BY THE DPWH. THE STANDARD BAILEY BRIDGE (ILLUSTRATED IN SECTION 3/ –) IS A PREENGINEERED BRIDGE IN WHICH ALL COMPONENTS ARE DESIGNED AND DETAILED BY THE MANUFACTURER. THE OTHER COMPONENTS ARE CONTRACTOR-DESIGNED TIMBER MEMBERS SUCH AS RUNNING BOARDS, WHEEL GUARDS, AND FLOOR PLANKS.
4. THE CONTRACTOR SHALL DEMONSTRATE BY CALCULATIONS THAT ALL COMPONENTS AND CONNECTIONS OF THE CHOSEN BRIDGE INCLUDING ABUTMENTS AND PIERS ARE STABLE AND CAN ADEQUATELY RESIST ALL FORCES INDUCED BY THE SAME LOADS AND LOADING COMBINATIONS FOR THE MAIN BRIDGE AS SPECIFIED IN DRAWING No . – , EXCEPT THE "PERMIT LOAD".
5. LOAD FACTORS, CAPACITY REDUCTION FACTORS AND ALLOWABLE STRESSES SHALL BE AS RECOMMENDED BY THE CONTRACTOR. THE CONTRACTOR, HOWEVER, SHALL TAKE FULL RESPONSIBILITY OF THE DETOUR BRIDGE'S PERFORMANCE. ANY REPAIRS AND/OR REPLACEMENT NEEDED FOR THE SMOOTH PERFORMANCE OF THE DETOUR BRIDGE SHALL BE DONE BY THE CONTRACTOR WITHOUT ADDITIONAL COST TO THE GOVERNMENT.

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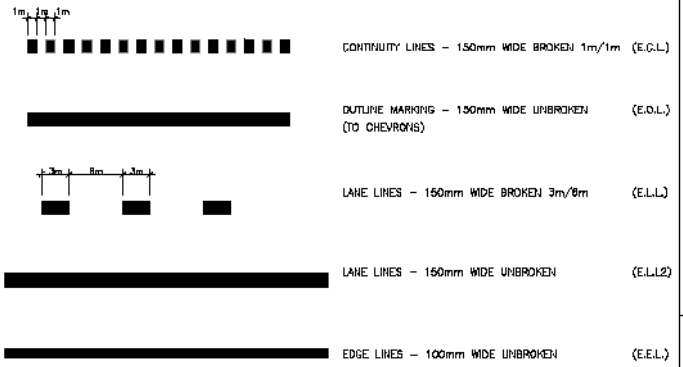
EXPRESSWAY MAIN LINE



CONTINUITY LINES – 150mm WIDE BROKEN 1m/1m (E.C.L.)

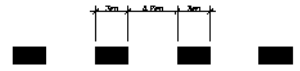
OUTLINE MARKING – 150mm WIDE UNBROKEN (E.O.L.)
(TO CHEVRONS)

LANE LINES – 150mm WIDE BROKEN 3m/8m (E.L.L.)

LANE LINES – 150mm WIDE UNBROKEN (E.L.L2)

EDGE LINES – 100mm WIDE UNBROKEN (E.E.L.)

RAMPS



LANE LINES – 100mm WIDE BROKEN 3m/4.5m (R.L.L.)

LANE LINES – 100mm WIDE UNBROKEN (R.L.L2)

EDGE LINES – 100mm WIDE UNBROKEN (R.E.L.)

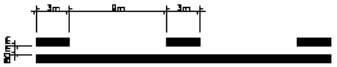
OUTLINE MARKING – 100mm WIDE UNBROKEN (R.O.L.)
(TO CHEVRONS)

OTHER ROADS

LANE LINES – 100mm WIDE BROKEN 3m/4.5m (L.L.)

LANE LINES – 100mm WIDE UNBROKEN (L.L2)

EDGE LINES – 100mm WIDE UNBROKEN (E.L.)



BARRIER LINES – 100mm WIDE (ONE DIRECTION) (B.L1)

BARRIER LINES – 100mm WIDE (BOTH DIRECTIONS) (B.L2)

BARRIER LINES – 100mm WIDE (BOTH DIRECTIONS) (B.L3)
(BI-DIRECTIONAL WHITE RAISED PAVEMENT
MARKERS AT 2m CRS)

CONTINUITY LINES – 100mm WIDE BROKEN 1m/3m (C.L.)

OUTLINE MARKING – 100mm WIDE UNBROKEN (O.L.)
(TO CHEVRONS)

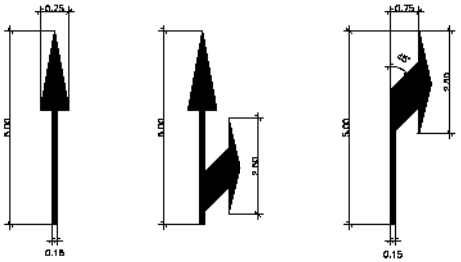
TURN LINES – 150mm WIDE BROKEN 600mm/600mm (T.L.)

GIVE WAY LINES – 2 x 200mm WIDE BROKEN
600mm/600mm (G.W.L.)

STOP LINES – 300 mm WIDE UNBROKEN (S.L.)

NOTES:

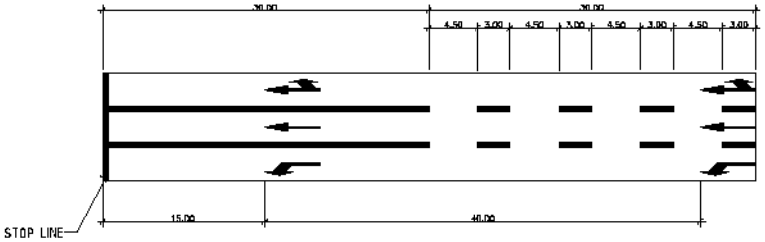
1. PROVIDE YELLOW, SINGLE FACE PAVEMENT STUDS (100mm x 100mm) ON BOTH SIDE OF CHEVRON @ 3m O.C.
2. KERBS OF THE TOLL BOOTH ISLANDS, RAISED DIVIDERS AND ROADSIDE KERBS IN THE VICINITY OF TOLL PLAZAS ARE PAINTED WITH APPROVED PAINTS IN ALTERNATE BLACK AND WHITE SEGMENTS OF 500mm IN LENGTH ON THE EXPOSED SURFACE.
3. MATERIALS, DIMENSIONS AND COLOR OF STANDARD PAVEMENT ARROWS CONFORMED IN ACCORDANCE WITH THE SPECIFICATION DEFINED IN THE DPWH MANUAL OF PAVEMENT MARKINGS, 1980 EDITION.



FOR RAMPS AND OTHER ROADS OR AT ROADS WITH
SPEED LIMIT OF 60 KPH OR LESS

STANDARD PAVEMENT ARROWS

	RAMPS & OTHER ROADS (60 KPH OR LESS)	EXPRESSWAY MAINLINE (GREATER THAN 60 KPH)
W	100 mm	150 mm
D	500 mm	1000 mm
A	1.5 m	3.0 m
B	2.0 m	4.0 m
C	4.0 m	8.0 m



PAVEMENT MARKINGS AT UNSIGNALISED INTERSECTION

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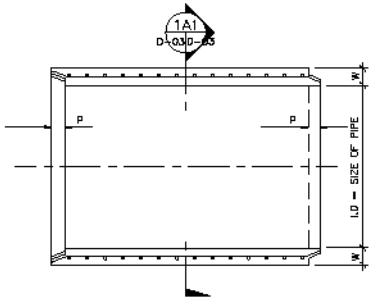
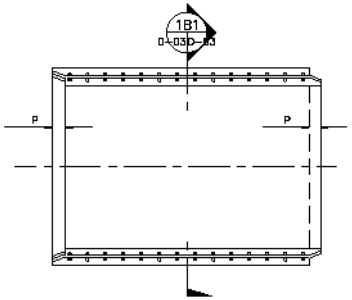
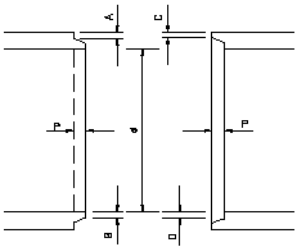


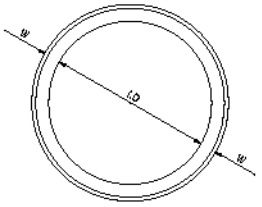
1A D-03 D-03 ONE LINE OF CIRCULAR OR ELLIPTICAL REINFORCEMENT



1B D-03 D-03 TWO LINES OF CIRCULAR REINFORCEMENT

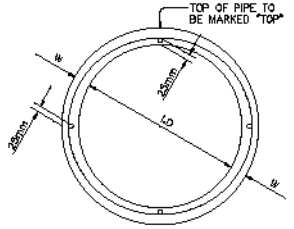


1C D-03 D-03 TONGUE AND GROOVE DIMENSIONS



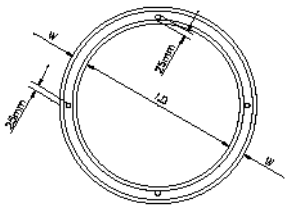
ONE LINE OF CIRCULAR REINFORCEMENT

N O T E S:
1. FOR 63mm OR LESS, WALL THICKNESS PROTECTIVE COVERING, SHALL BE 19mm
2. FOR 63mm OR GREATER, WALL THICKNESS CIRCULAR REINFORCEMENT SHALL BE PLACED 35 TO 50% OF WALL THICKNESS FROM THE INNER SURFACE.



ONE LINE OF ELLIPTICAL REINFORCEMENT

3. FOR WELDED CONNECTION, THE MINIMUM LAP REQUIREMENT SHALL BE 51mm.
4. FOR TIE WIRE CONNECTION, THE MINIMUM LAP REQUIREMENT SHALL BE 20 x DIAMETER (Deformed bar) 40 X DIAMETER (Plain bar)



TWO LINES OF CIRCULAR REINFORCEMENT

N O T E S:
1. THE SPACING CENTER TO CENTER OF ADJACENT RINGS OF CIRCUMFERENTIAL REINFORCEMENT IN A CAGE SHALL NOT EXCEED 101mm.
2. 910mm OR MORE WALL THICKNESS—THE BELL OR THE SPIGOT OF THE JOINT SHALL CONTAIN AT LEAST ONE CIRCUMFERENTIAL REINFORCEMENT.

1 LONGITUDINAL SECTION (TONGUE AND GROOVE TYPE)

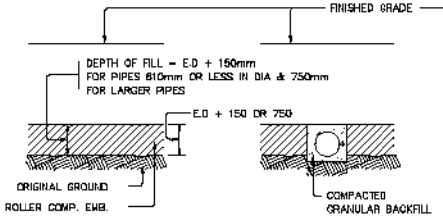
1 D-03 D-03 NOT TO SCALE

PERMISSIBLE VARIATION

1. INTERNAL DIAMETER (I.D.) OF 305 TO 810 MILLIMETER PIPE SHALL VARY NOT MORE THAN ± 1.5% FROM THE DESIGN DIAMETER. THE I.D. OF 888 TO 2743mm. PIPE SHALL VARY NO MORE THAN ±1 % OR 9.5mm, WHICH EVER IS GREATER, FROM THE DESIGN DIAMETER.
2. WALL THICKNESS (W)—THE WALL THICKNESS SHALL NOT BE LESS THAN THAT SHOWN IN THE DESIGN BY MORE THAN 5% OR 4.8mm WHICHEVER IS GREATER.
3. LENGTH OF TWO OPPOSITE SIDES—VARIATIONS IN LAYING LENGTHS OF TWO OPPOSITE SIDES OF PIPE SHALL NOT BE MORE THAN 10.4mm/m OF DIAMETER, WITH A MAXIMUM OF 18mm IN ANY LENGTH OF PIPE
4. LENGTH OF PIPE — THE UNDERRUN IN LENGTH OF A SECTION OF PIPE SHALL NOT BE MORE THAN 10.4mm/m WITH A MAXIMUM OF 13mm IN ANY LENGHT OF PIPE

ALL DIMENSIONS ARE IN MILLIMETERS	TONGUE		GROOVE	
P	A	B	C	D
45/51	23	20	20	23
63	33	30	30	33

1A1 D-03 D-03 SECTION



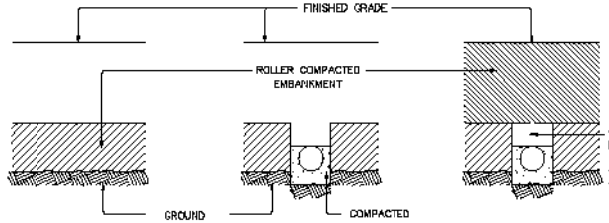
STEP 1— CONSTRUCT/COMPACT EMBANKMENT TO AN ELEVATION 150mm ABOVE TOP OF PROPOSED PIPE.

STEP 2— TRENCH THROUGH THIS COMPACTED EMBANKMENT AND INSTALL PIPE, BACKFILL WITH COMPACTED GRANULAR MATERIAL.

STEP 3— COMPLETE EMBANKMENT IN USUAL MANNER

2A D-03 D-03 CALIFORNIA METHOD A

1B1 D-03 D-03 SECTION



STEP 1 — CONSTRUCT COMPACT EMBANKMENT TO A TOTAL DEPTH EQUAL TO TWICE THE OUTSIDE DIAMETER OF THE PIPE.

STEP 2 — TRENCH THROUGH THIS COMPACTED EMBANKMENT AND INSTALL PIPE, BACKFILL WITH COMPACTED GRANULAR MATERIAL TO TOP OF PIPE.

STEP 3 — FILL REMAINDER OF TRENCH WITH BACKFILL PLACED IN LOOSEST POSSIBLE CONDITION

STEP 4 — COMPLETE EMBANKMENT IN NORMAL MANNER.

2B D-03 D-03 CALIFORNIA METHOD B

2 METHODS OF PIPE INSTALLATION

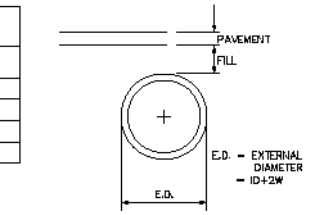
2 D-03 D-03 NOT TO SCALE

* MAXIMUM SAFE FILLS FOR STANDARD RCP

INSIDE DIAMETER (mm)	SPECIFIED CRACKING DEAD LOAD, KG. PER LINEAR METER PER MILLIMETER OF PIPE	SAFE HEIGHTS OF PIPE COVER IN METERS (H)	
		CLASS IV STRENGTH RCP	
	CLASS IV	METHOD A	METHOD B
900 (36)	9.77	10.3	NO LIMIT
1000 (42)	9.77	10.4	NO LIMIT
1200 (48)	9.77	10.5	NO LIMIT

* NOTE: IN PRACTICAL APPLICATION OF THE ABOVE TABLES THE OVERFILL VALUES ARE NOT TO BE CONSIDERED CLOSER THAN THE NEAREST 500mm.; DECIMALS OF A METER ARE SHOWN TO FACILITATE PLOTTING OF DESIGN CURVES, IF DESIRED.

MINIMUM FILL FOR REINFORCED CONCRETE PIPES

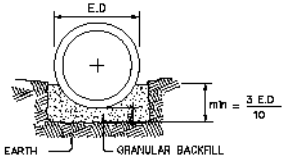


STANDARD STRENGTH PIPES

FILL: 1/2 E.D. FOR FLEXIBLE PAVEMENT
0.30 FOR RIGID PAVEMENT

EXTRA STRENGTH PIPES

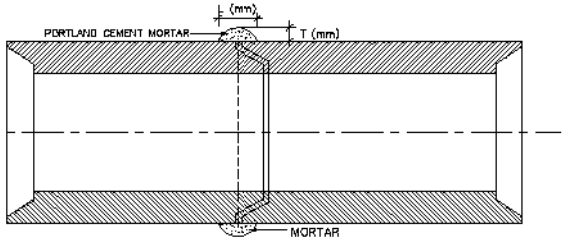
FILL: 0.30m FOR RIGID AND FLEXIBLE PAVEMENT



GRANULAR MATERIAL BEDDING

DIAMETER	d
460 – 760	100
> 760	150

INTERNAL DIAMETER OF PIPE (I.D)	CLASS IV REINFORCED CONCRETE PIPE						
	WALL THICKNESS B (CONCRETE STRENGTH 280 kg/cm (4000psi))					STRENGTH TEST REQUIREMENT kg PER LINEAR METER OF PIPE	
	WALL THICKNESS (W) mm.	CIRCULAR REINFORCEMENT cm²/m		ELLIPTICAL REINFORCEMENT cm²/m	DEPTH (Y) mm.	THREE-EDGE-BEARING METHOD	
		INNER CAGE	OUTER CAGE			LOAD TO PROVIDE 0.25mm CRACK	ULTIMATE LOAD
900 (36)	101	3.3	4.7	7.0	53	8900	13400
1000 (42)	114	7.4	5.5	8.3	53	10300	15700
1200 (48)	127	8.9	6.8	9.9	53	12000	17900



2C D-03 D-03 JOINTING PIPE

PORTLAND CEMENT MORTAR BEAD		
INTERNAL DIAMETER OF PIPE (I.D)	L (mm)	T (mm)
900	65	30
1000	90	36
1200	100	40

NOTE :
1. ALL JOINTS, UNLESS OTHERWISE SPECIFIED SHALL BE FILLED WITH STIFF MORTAR COMPOSE OF ONE PART PORTLAND CEMENT AND TWO PARTS SAND.
2. MORTAR SHALL BE PLACED INSIDE AND OUTSIDE TO FORM A DURABLE,WATERTIGHT JOINT.
3. ADDITINOAL MORTAR SHALL BE USED TO FORM A BEAD AROUND THE OUTSIDE OF THE JOINT.
4. MATERIALS TO BE USED SHALL SATISFY ITEM 500 REINFORCED CONCRETE PIPE CULVERT OF DPWH TECHNICAL SPECIFICATIONS.

3 TYP. BEDDING DETAILS

3 D-03 D-03 NOT TO SCALE

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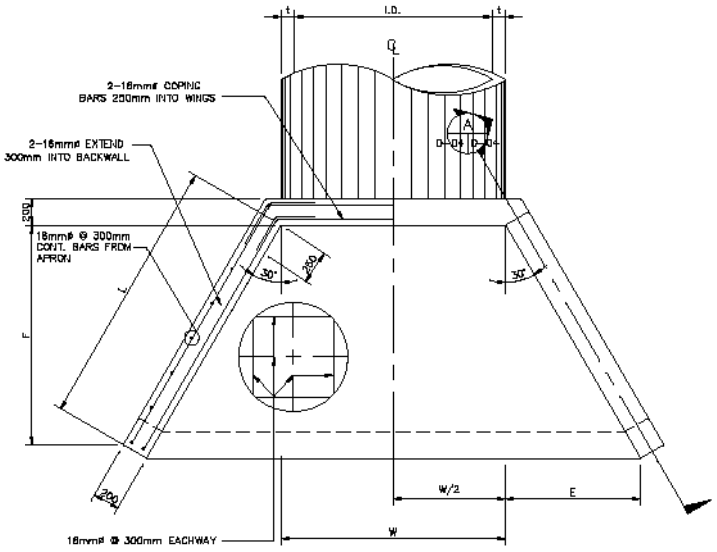
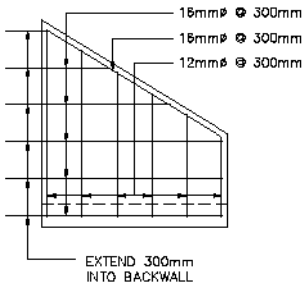
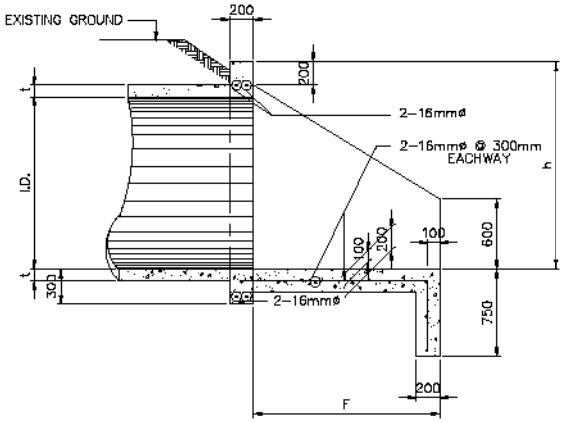


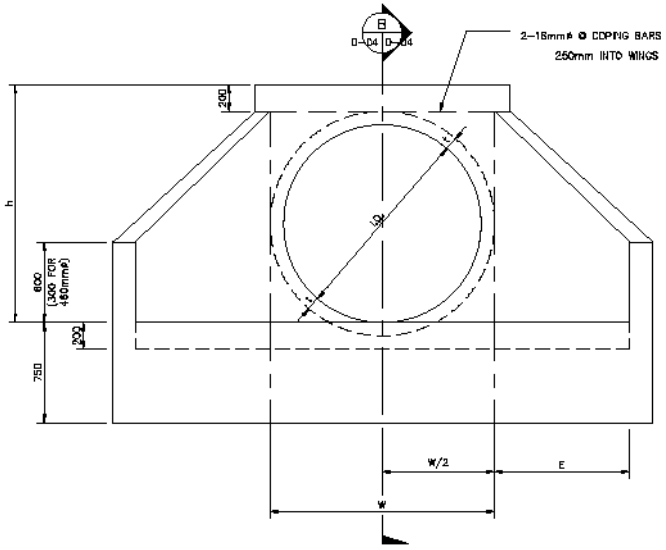
1 PLAN
D–04 D–04 SCALE 1:20



3 SECTION A
D–04 D–04 SCALE 1:30



4 SECTION B
D–04 D–04 SCALE 1:30



2 ELEVATION
D–04 D–04 SCALE 1:20

TABLE 1 –FLARED TYPE HEADWALLS FOR 0.46m. TO 0.91m PIPES (4:1 FILL SLOPES)

DIA. & THK. OF PIPE(mm)		DIMENSIONS (mm)				SINGLE PIPE		
INT. DIA. I.D.	THK. 't'	L	E	F	h	W (mm)	CONCRETE (cu.m)	STEEL (kg)
900	101	1830	1020	1520	1215	1112	1.8397	171.48

TABLE 2 –TYPE A FLARED HEADWALLS FOR 1.07m. TO 1.52m PIPES (2:1 FILL SLOPES)

DIA. & THK. OF PIPE(mm)		DIMENSIONS (mm)					SINGLE PIPE		
INT. DIA. I.D.	THK. 't'	L	E	F	h	AREA OF WATERWAY	W (mm)	CONCRETE (cu.m)	STEEL (kg)
1000	114	2100	1150	1800	1385	0.70	1298	2.3238	218.80
1200	127	2400	1300	2000	1550	0.91	1474	2.8330	264.06

NOTE: CONTRACTOR SHALL CUT FLUSH TO HEADWALL THE PROTRUDING PART OF THE SKEWED PIPE.

GENERAL NOTES

SPECIFICATIONS:

DPWH STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 2004

DESIGN DATA:

CONCRETE:

ALL CONCRETE TO BE CLASS "A"
ALL EXPOSED CORNERS TO BE CHAMPERED 20mm.

EXPOSED SURFACES TO HAVE ORDINARY FINISH.

REINFORCING STEEL:

ALL REINFORCING STEEL TO BE DEFORMED BARS OF STRUCTURAL OR INTERMEDIATE GRADE.

MULTIPLE PIPES TO BE SET WITH LONGITUDINAL CENTERLINES 1.67 DIAMETERS OF PIPE APART.

SKEWED PIPES:

DIMENSIONS "W" TO BE INCREASED TO TAKE CARE OF INCREASED WIDTH OR LENGTH DUE TO SKEW OR MULTIPLE PIPES.

TOPS OF HEADWALLS, ON GRADES CULVERTS SHALL BE PLACED PARALLEL TO PROFILE GRADE WHEN THE GRADES ARE 30% OR MORE.

QUANTITIES SHOWN IN TABLES ARE FOR ONE HEADWALL

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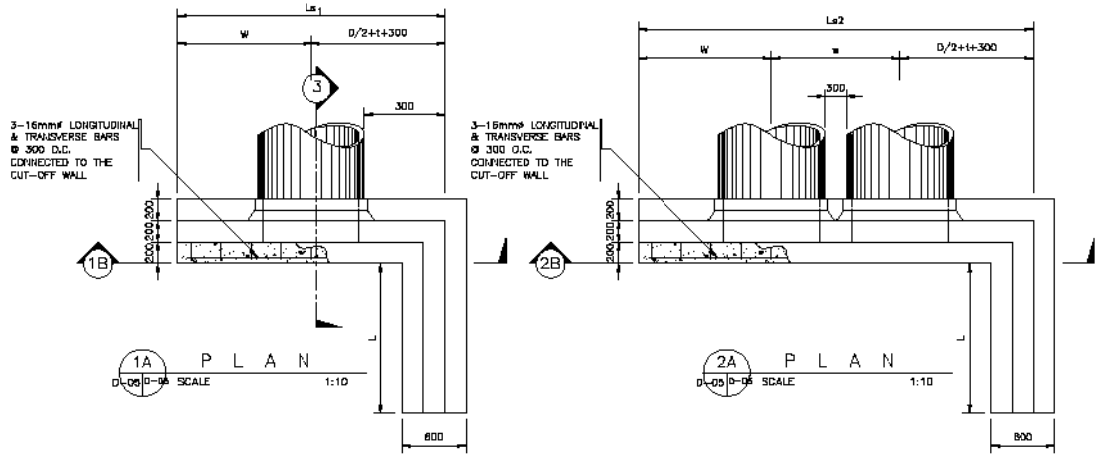
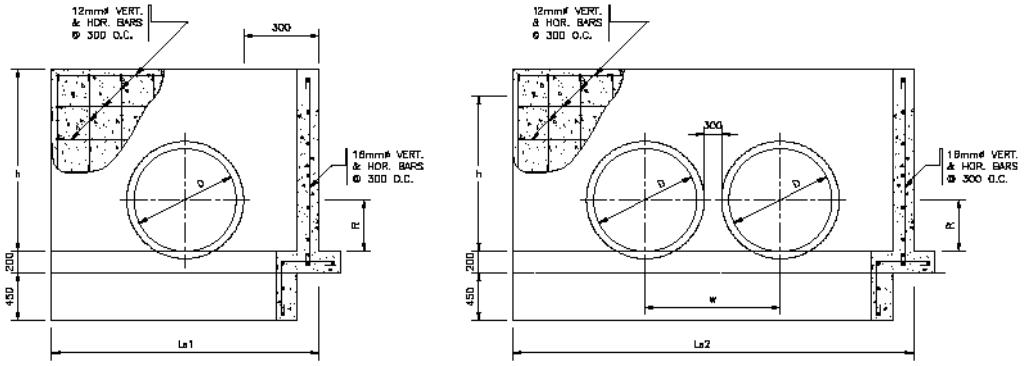


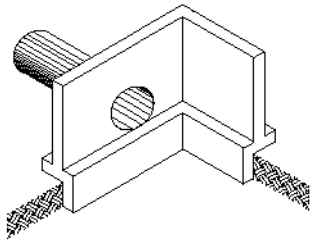
QUANTITIES				
PIPE DIAMETER (mm)	SINGLE BARREL		DOUBLE BARREL	
	CONCRETE	STEEL	CONCRETE	STEEL
900	1.556	80.98	2.237	117.22
1000	1.842	89.60	2.693	132.19
1200	2.141	102.56	3.176	154.56



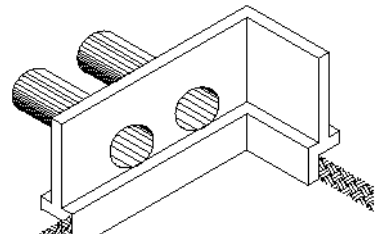
1B L-TYPE SINGLE BARREL (SECTION)
D-05 D-05 SCALE 1:10

2B L-TYPE DOUBLE BARREL (SECTION)
D-05 D-05 SCALE 1:10

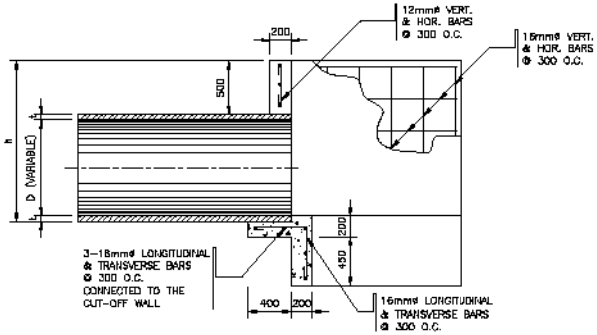
L-TYPE CONCRETE HEADWALL (NORMAL)								
PIPE DIAMETER (D)	WALL THICKNESS (t)	h	W	w	SINGLE BARREL		DOUBLE BARREL	
					L	Ls1	L	Ls2
		2*t+D+.5	.8+D/2+t	D+2t+.3	.8*Ls1	W+D/2+T+.3	.8*Ls3	Ls1+w
800	0.102	1.61	1.36	1.31	1.77	2.21	2.82	3.53
1000	0.144	1.80	1.45	1.48	1.92	2.40	3.11	3.88
1200	0.127	1.97	1.54	1.65	2.06	2.57	3.38	4.22



1C L-TYPE SINGLE BARREL (ISOMETRIC VIEW)
D-05 D-05 NOT TO SCALE



2C L-TYPE DOUBLE BARREL (ISOMETRIC VIEW)
D-05 D-05 NOT TO SCALE



1 HEADWALL L-TYPE SINGLE BARREL
D-05 D-05 NOT TO SCALE

2 HEADWALL L-TYPE DOUBLE BARREL
D-05 D-05 NOT TO SCALE

3 TYPICAL SECTION DETAILS
D-05 D-05 NOT TO SCALE

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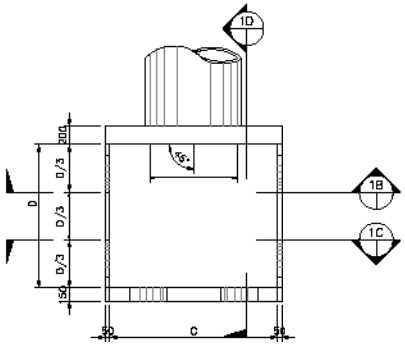
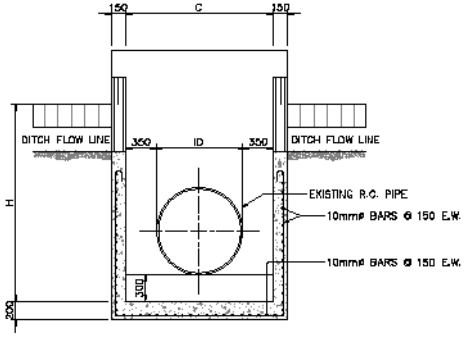
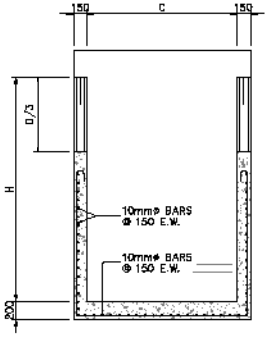


1A PLAN
D-06 D-06 SCALE 1:20



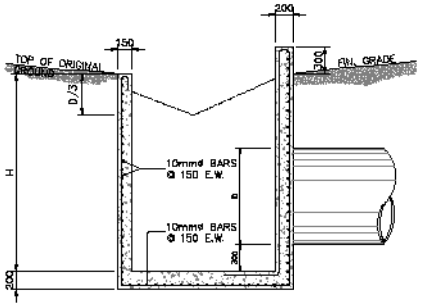
1B SECTION
D-06 D-06 SCALE 1:20



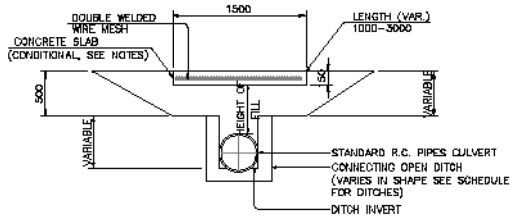
1C SECTION
D-06 D-06 SCALE 1:20

CATCH BASIN DIMENSIONS FOR SINGLE and MULTI BARREL RCP

PIPE DIAMETER (mm)		900	1000	1200
COMMON TO ALL NUMBER OF BARREL (cm)	H	221	240	258
	A	113	119	125
	B	97	102	106
	D	150	165	180
SINGLE	C	150	165	180
DOUBLE	C	332	379	424



1D SECTION "C"
D-06 D-06 SCALE 1:20



1E PRIVATE ENTRANCE
D-06 D-06 SCALE 1:20

NOTES: (PRIVATE ENTRANCE)

1. THE INVERT SLOPE AND ALIGNMENT OF RC PIPE CULVERT SHALL BE IN CONJUCTION WITH THE CONNECTING OPEN DITCH.
2. SEAL WITH GROUTED RIPRAP (300 mm THICK) SPACES BETWEEN THE RC PIPE CULVERTS AND OPEN DITCH LOCATED IN BOTH SIDES.
3. THE LENGTH OF PRIVATE ENTRANCE SHALL VARY BETWEEN 1000 TO 3000 mm AS DIRECTED BY THE ENGINEER.
4. CONCRETE SLAB & OVER THE RC PIPE CULVERT SHALL BE PROVIDED ONLY WHEN THE HEIGHT OF FILL IS LESS THAN 600 mm AND MOTOR VEHICLES WILL PASS THROUGH THE PRIVATE ENTRANCE.

1 STANDARD CONCRETE CATCH BASIN

D-06 D-06 SCALE 1:20

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