DRAINAGE

SURFACE DRAINAGE / DRAINAGE STRUCTURES SCHEDULE

LEFT SIDE					RIGHT SIDE				
STATION		LOCATION	LENGTH	TYPE OF STRUCTURE	STATION		LOCATION	LENGTH	TYPE OF STRUCTURE
FROM	TO		(m)		FROM	TO		(m)	
CIM	CIM				CIM	CIM			
49+500		O & S		CIM	49+500		O & S		CIM
49+500		O TO S	6.5	460 mm ø RCPC	49+500		O TO S	6.5	460 mm ø RCPC
49+500	49+540	S	40	610 mm ø RCPC	49+500	49+540	S	40	610 mm ø RCPC
49+540		O & S		CIM	49+540		O & S		CIM
49+540		O TO S	6.5	460 mm ø RCPC	49+540		O TO S	6.5	460 mm ø RCPC
49+540	49+580	S	40	610 mm ø RCPC	49+540	49+580	S	40	610 mm ø RCPC
49+580		O & S		CIM	49+580		O & S		CIM
49+580		O TO S	6.5	460 mm ø RCPC	49+580		O TO S	6.5	460 mm ø RCPC
49+580	49+610	S	30	610 mm ø RCPC	49+580	49+610	S	30	610 mm ø RCPC
49+610		O & S		CIM	49+610		O & S		CIM
49+610		O TO S	6.5	460 mm ø RCPC	49+610		O TO S	6.5	460 mm ø RCPC
49+610	49+625	S	15	610 mm ø RCPC	49+610	49+625	S	15	610 mm ø RCPC

WATERSHED		STATION	SKEW	FINISHED GRADE ELEV.	CULVERT CHARACTERISTICS							STRUCTURES		CULVERT FLOW CAPACITY	REMARKS	RECOMMENDATION
					INVERT ELEVATION (m)			SLOPE	RCPC	RCBC (SxH)	LENGTH (m)					
NO.	Q (cms)	(kms)		(m)	LEFT	CENTER	RIGHT		(mm dia.)	(mxm)	LEFT	RIGHT	TOTAL	LEFT	RIGHT	(cms)		
		41+415		13.85	8.56	8.46	8.35	0.00538	1-910		19.50	19.50	39.00	F		1.67	EXISTING IRRIGATION STRUCTURE, LENGTH=28m	EXTEND EXTG. 1-910mm ø RCPC BY 12.0m LEFTSIDE. PROVIDE FLARED HEADWALL ● LEFTSIDE.
		41+565		13.88	8.84	8.77	8.70	0.00368	1-910		19.00	19.00	38.00	F		1.47	EXISTING IRRIGATION STRUCTURE, LENGTH=27m	EXTEND EXTG. 1-910mm ø RCPC BY 12.0m LEFTSIDE. PROVIDE FLARED HEADWALL ● LEFTSIDE.
		41+740		13.96	9.14	9.21	9.00	0.00578	1-910		18.50	18.50	37.00	F		1.16	EXISTING STORM WATER DRAINAGE LENGTH=26m	EXTEND EXTG. 1-910mm ø RCPC BY 12.0m LEFTSIDE. PROVIDE FLARED HEADWALL ● LEFTSIDE.
		41+860		13.46	9.50	9.43	9.35	0.00429	1-910		17.50	17.50	35.00	F		1.23	EXISTING STORM WATER DRAINAGE LENGTH=23m	EXTEND EXTG. 1-910mm ø RCPC BY 13.0m LEFTSIDE. PROVIDE FLARED HEADWALL ● LEFTSIDE.
		42+180		12.38	9.86	9.78	9.70	0.00571	1-910		14.00	14.00	28.00	F		1.39	EXISTING IRRIGATION STRUCTURE, LENGTH=18m	EXTEND EXTG. 1-910mm ø RCPC BY 11.0m LEFTSIDE. PROVIDE FLARED HEADWALL ● LEFTSIDE.
		45+262	30° LF	18.84	11.65	11.57	11.50	0.00352		2-3.0m x 2.40m	21.40	21.20	42.60	W		48.76	EXISTING IRRIGATION STRUCTURE, LENGTH = 28.50m	EXTEND EXTG. 2-3.0m x 2.40m RCBC BY 14.60m LEFTSIDE. PROVIDE WING-WALLS ● LEFTSIDE.
		45+635	60° LF	16.14	13.30	13.32	13.45	0.00517	1-1070		24.50	24.50	49.00	F		2.07	EXISTING IRRIGATION STRUCTURE, LENGTH=21m	EXTEND EXTG. 1-1070mm ø RCPC BY 21.0m LEFTSIDE. PROVIDE FLARED HEADWALL ● LEFTSIDE.
		49+475		19.56	16.73	16.81	16.90	0.00345	1-910		24.50	25.50	50.00	F		1.09	EXISTING STORM WATER DRAINAGE LENGTH=29m	EXTEND EXTG. 1-910mm ø RCPC BY 22.0m LEFTSIDE. PROVIDE FLARED HEADWALL ● LEFTSIDE.

LEGEND:

M – Center Median; S – Sidewalk; CIM – Catch Inlet Manhole; F – Flared Type Headwall; CB – Catch Basin
O – Outer Separator; RCPC – Reinforced Concrete Pipe Culvert; MH – Manhole; W – Wingwall

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE &
DESIGNED	9/25/08	F. STA. MARIA
CHECKED	9/27/08	HARU
SUBMITTED	9/30/08	M. KUSUMI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	FULL SIZE A1	SURFACE DRAINAGE / DRAINAGE STRUCTURES SCHEDULE	DG-01
PLARIDEL BYPASS - CONTRACT PACKAGE III			

SURFACE DRAINAGE SCHEDULE

LEFT SIDE					RIGHT SIDE				
STATION		LOCATION	LENGTH	TYPE OF STRUCTURE	STATION		LOCATION	LENGTH	TYPE OF STRUCTURE
FROM CIM	TO CIM		(m)		FROM CIM	TO CIM		(m)	
42+890		EXISTING 1-910mmø RCPC x 29.00m			42+890		EXISTING 1-910mmø RCPC x 29.00m		
42+955		EXISTING 1-910mmø RCPC x 31.00m			42+955		EXISTING 1-910mmø RCPC x 31.00m		
43+000		EXISTING 1-1520mmø RCPC x 40.00m			43+000		EXISTING 1-1520mmø RCPC x 40.00m		
43+055		EXISTING 1-1070mmø RCPC x 31.00m			43+055		EXISTING 1-1070mmø RCPC x 31.00m		
43+140		EXISTING 1-910mmø RCPC x 29.00m			43+140		EXISTING 1-910mmø RCPC x 29.00m		
43+255		EXISTING 1-1070mmø RCPC x 26.00m			43+255		EXISTING 1-1070mmø RCPC x 26.00m		
43+500		EXISTING 1-1520mmø RCPC x 29.00m			43+500		EXISTING 1-1520mmø RCPC x 29.00m		
43+678		EXISTING 2-3.00 x 2.75 RCBC x 26.80m			43+678		EXISTING 2-3.00 x 2.75 RCBC x 26.80m		
43+774		EXISTING 1-1070mmø RCPC x 28.00m			43+774		EXISTING 1-1070mmø RCPC x 28.00m		
44+015		EXISTING 1-1220mmø RCPC x 28.00m			44+015		EXISTING 1-1220mmø RCPC x 28.00m		
44+240		EXISTING 1-1.20 x 0.60 RCBC x 34.55m			44+240		EXISTING 1-1.20 x 0.60 RCBC x 34.55m		
44+265		EXISTING 1-1.20 x 0.60 RCBC x 28.65m			44+265		EXISTING 1-1.20 x 0.60 RCBC x 28.65m		
44+380		EXISTING 1-910mmø RCPC x 28.00m			44+380		EXISTING 1-910mmø RCPC x 28.00m		
44+470		EXISTING 1-1220mmø RCPC x 29.00m			44+470		EXISTING 1-1220mmø RCPC x 29.00m		
44+537		EXISTING 1-1220mmø RCPC x 39.00m			44+537		EXISTING 1-1220mmø RCPC x 39.00m		
44+660		EXISTING 1-2.40 x 1.80 RCBC x 33.00m			44+660		EXISTING 1-2.40 x 1.80 RCBC x 33.00m		
45+110		EXISTING 1-910mmø RCPC x 28.00m			45+110		EXISTING 1-910mmø RCPC x 28.00m		
45+262		EXISTING 2-3.00 x 2.40 RCBC x 28.50m			45+262		EXISTING 2-3.00 x 2.40 RCBC x 28.50m		
45+635		EXISTING 1-1070mmø RCPC x 29.00m			45+635		EXISTING 1-1070mmø RCPC x 29.00m		
45+914		EXISTING 1-910mmø RCPC x 33.00m			45+914		EXISTING 1-910mmø RCPC x 33.00m		
46+000		EXISTING 1-910mmø RCPC x 27.00m			46+000		EXISTING 1-910mmø RCPC x 27.00m		
46+120		EXISTING 1-910mmø RCPC x 32.00m			46+120		EXISTING 1-910mmø RCPC x 32.00m		
46+250		EXISTING 1-910mmø RCPC x 54.00m			46+250		EXISTING 1-910mmø RCPC x 54.00m		
46+300		EXISTING 1-910mmø RCPC x 29.00m			46+300		EXISTING 1-910mmø RCPC x 29.00m		
46+640		EXISTING 1-910mmø RCPC x 34.00m			46+640		EXISTING 1-910mmø RCPC x 34.00m		
46+794		EXISTING 1-910mmø RCPC x 37.00m			46+794		EXISTING 1-910mmø RCPC x 37.00m		
46+940		EXISTING 1-910mmø RCPC x 27.00m			46+940		EXISTING 1-910mmø RCPC x 27.00m		
47+080		EXISTING 1-910mmø RCPC x 35.00m			47+080		EXISTING 1-910mmø RCPC x 35.00m		
47+448		EXISTING 3-2.40 x 2.40 RCBC x 34.90m			47+448		EXISTING 3-2.40 x 2.40 RCBC x 34.90m		
47+515		EXISTING 3-3.00 x 2.10 RCBC x 32.00m			47+515		EXISTING 3-3.00 x 2.10 RCBC x 32.00m		
47+635		EXISTING 3-1.80 x 1.50 RCBC x 30.00m			47+635		EXISTING 3-1.80 x 1.50 RCBC x 30.00m		
47+950		EXISTING 3-1.50 x 1.50 RCBC x 27.00m			47+950		EXISTING 3-1.50 x 1.50 RCBC x 27.00m		
49+475		EXISTING 1-910mmø RCPC x 29.00m			49+475		EXISTING 1-910mmø RCPC x 29.00m		
49+500		O & S		CIM	49+500		O & S		CIM
49+500		O TO S	6.5	460 mm ø RCPC	49+500		O TO S	6.5	460 mm ø RCPC
49+500	49+540	S	40	610 mm ø RCPC	49+500	49+540	S	40	610 mm ø RCPC
49+540		O & S		CIM	49+540		O & S		CIM
49+540		O TO S	6.5	460 mm ø RCPC	49+540		O TO S	6.5	460 mm ø RCPC
49+540	49+580	S	40	610 mm ø RCPC	49+540	49+580	S	40	610 mm ø RCPC
49+580		O & S		CIM	49+580		O & S		CIM
49+580		O TO S	6.5	460 mm ø RCPC	49+580		O TO S	6.5	460 mm ø RCPC
49+580	49+610	S	30	610 mm ø RCPC	49+580	49+610	S	30	610 mm ø RCPC
49+610		O & S		CIM	49+610		O & S		CIM
49+610		O TO S	6.5	460 mm ø RCPC	49+610		O TO S	6.5	460 mm ø RCPC

LEFT SIDE					RIGHT SIDE				
STATION		LOCATION	LENGTH	TYPE OF STRUCTURE	STATION		LOCATION	LENGTH	TYPE OF STRUCTURE
FROM CIM	TO CIM		(m)		FROM CIM	TO CIM		(m)	

LEGEND:

M – Center Median S – Sidewalk CIM – Catch Inlet Manhole
O – Outer Separator RCPC ~ 6.5 Reinforced Concrete Pipe Culvert MH – Manhole

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

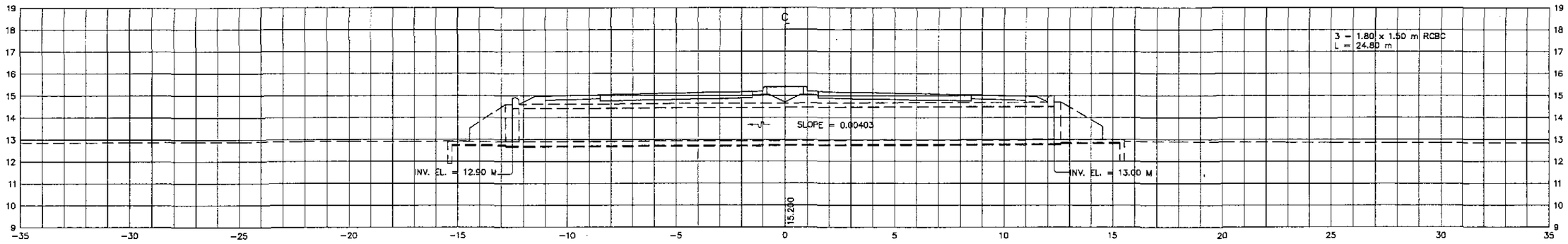
	DATE	SIGNATURE
DESIGNED	9/25/08	F. STA. MARIA
CHECKED	9/27/08	A. HAKIM
SUBMITTED	9/30/08	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE III	FULL SIZE A1	SCHEDULE OF SURFACE DRAINAGE	DG-02

47+635



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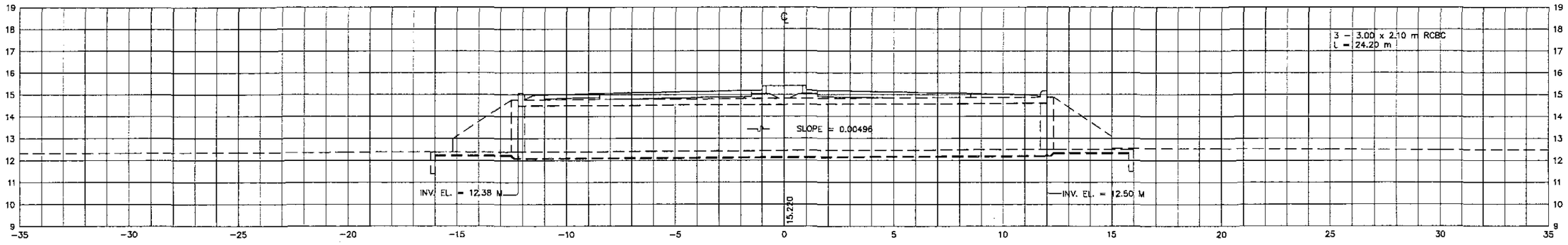

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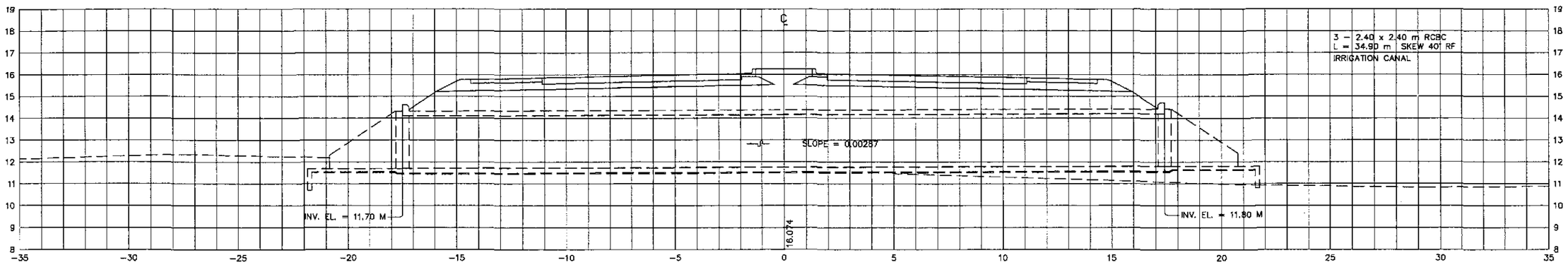


JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/27/02	P. STA. MARIA
CHECKED	9/27/02	A. HAYOM
SUBMITTED	9/30/02	K. SUGIMOTO TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Aprroved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

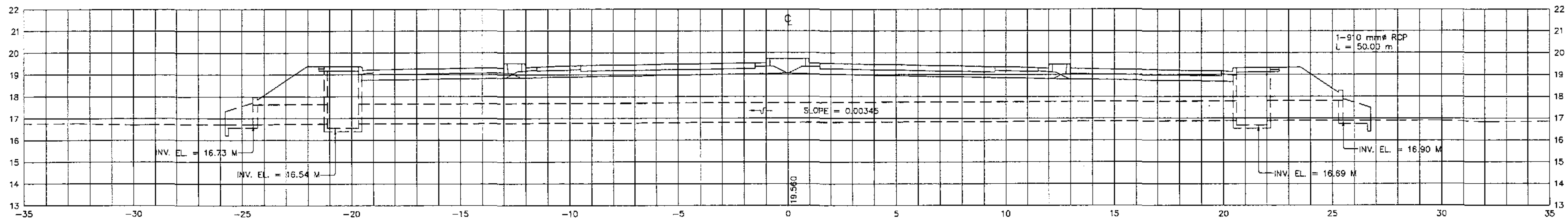
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE III

SCALE : 1:100 FULL SIZE A1

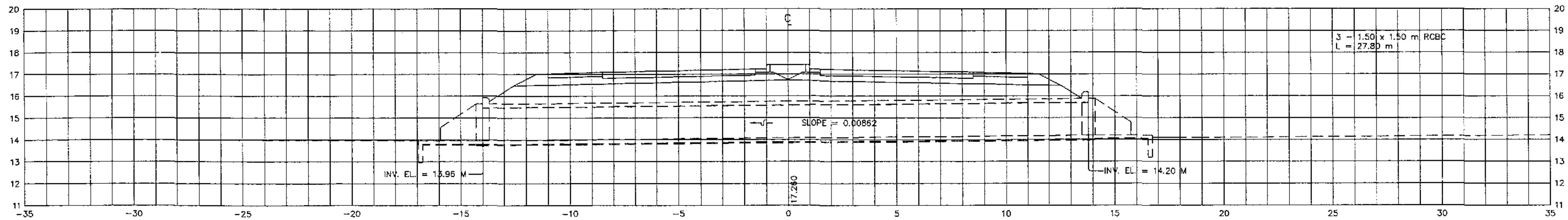
SHEET CONTENTS :
DRAINAGE CROSS-SECTIONS
ALONG BYPASS (ULTIMATE STAGE)
STA 47+448 - STA. 47+635

SHEET NO. : DC-01

49+475



47+950



JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	R. STA. MARIA
CHECKED	9/27/02	A. HAKIM
SUBMITTED	9/30/02	K. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL - PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary

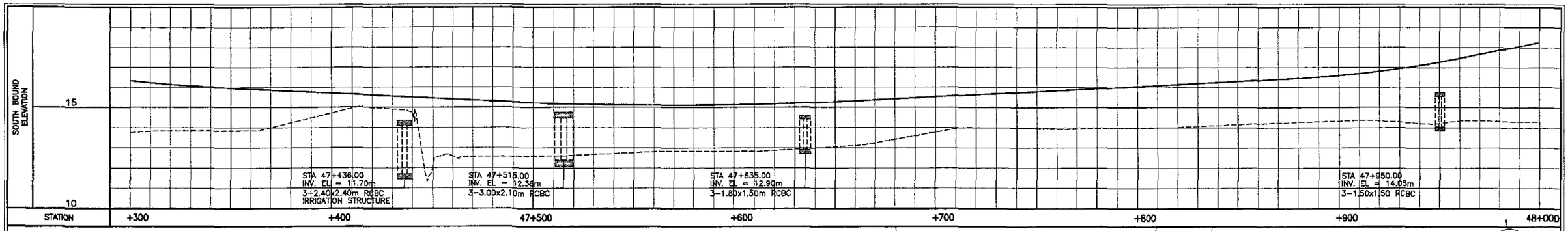
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)

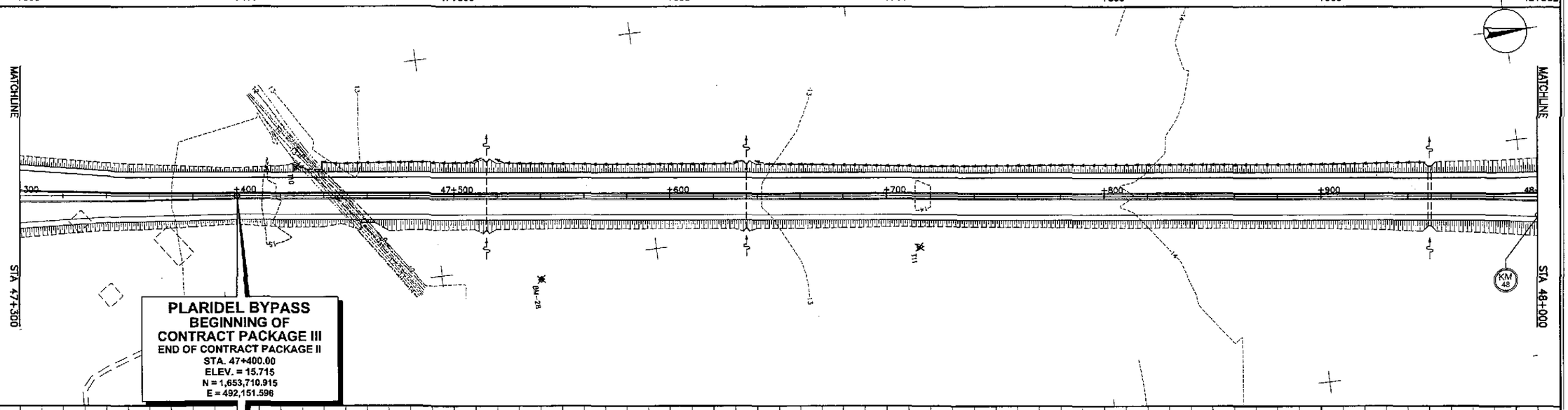
PLARIDEL BYPASS - CONTRACT PACKAGE III

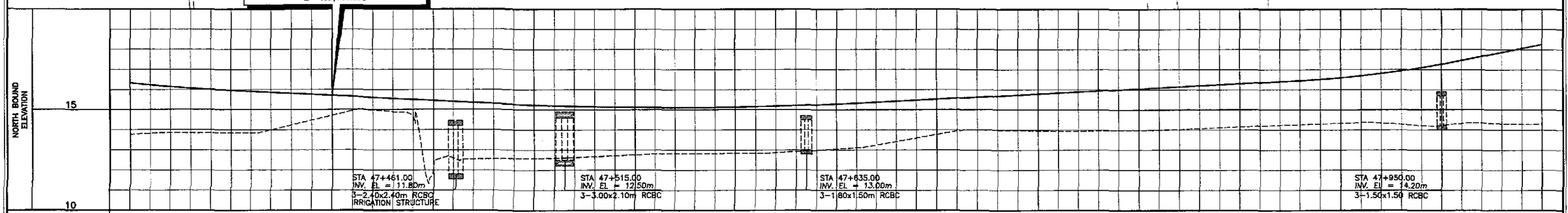
SCALE : 1:100
FULL SIZE A1

SHEET CONTENTS :
DRAINAGE CROSS-SECTIONS
ALONG BYPASS (ULTIMATE STAGE)
STA 47+950 - STA. 49+475

SHEET NO. : **DC-02**







FINISHED GRADE	16.338	16.147	16.016	15.916	15.815	15.715	15.614	15.514	15.413	15.315	15.235	15.175	15.136	15.117	15.118	15.140	15.182	15.244	15.327	15.427	15.530	15.633	15.736	15.839	15.942	16.045	16.148	16.251	16.354	16.457	16.597	16.811	17.098	17.460	17.858
TOP LEVEL OF CIM (MC)																																			
INVERT LEVEL OF CROSS PIPE (MC)																																			
TOP LEVEL OF CIM (FR)																																			
INVERT LEVEL OF CROSS PIPE (FR)																																			
INVERT LEVEL OF LONGITUDINAL PIPE (SB)																																			
INVERT LEVEL OF LONGITUDINAL PIPE (NB)																																			

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

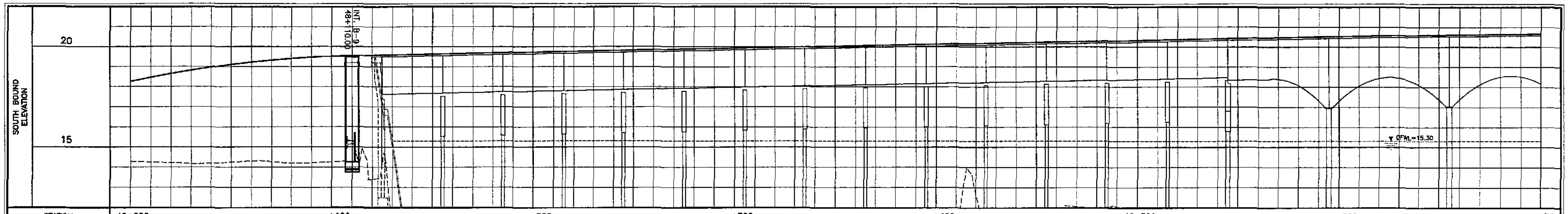
KEI KATAHIRA & ENGINEERS INTERNATIONAL
YEC YACHIYO ENGINEERING CO., LTD.

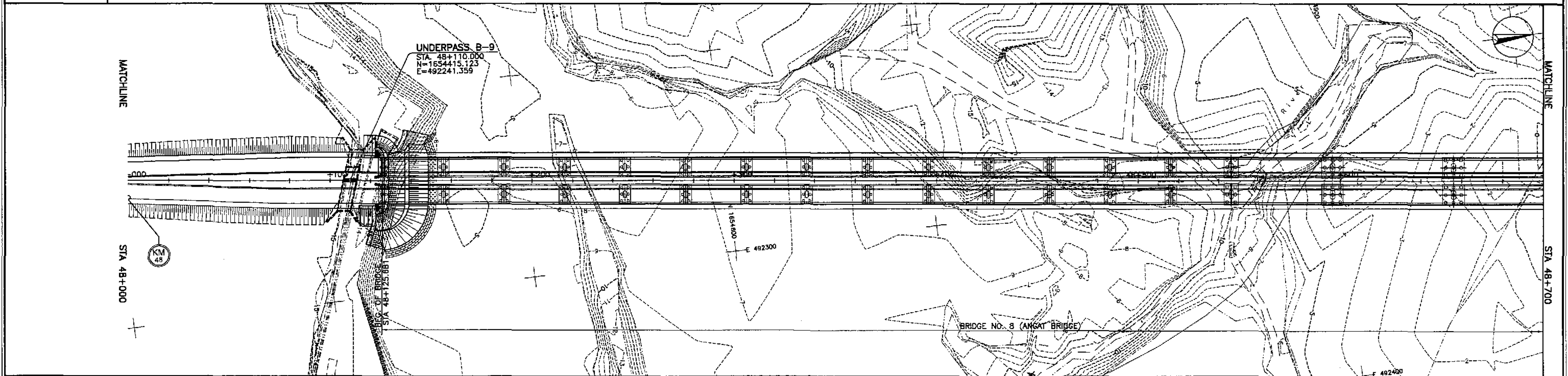
	DATE	SIGNATURE
DESIGNED	9/25/02	
CHECKED	9/27/02	
SUBMITTED	9/30/02	

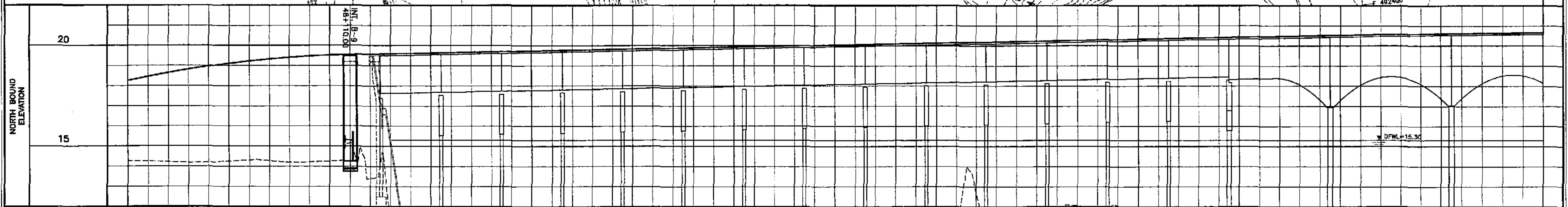
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON *UPGRADING* INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE III	HORIZONTAL 1:1000 VERTICAL 1:100 FULL SIZE A1	***SURFACE DRAINAGE*** **PLAN AND PROFILE** ALONG BYPASS (ULTIMATE STAGE) STA. 47+300 - STA. 48+000	**DP-01**







STATION	48+000					+100					+200					+300					+400					48+500					+600				+700
FINISHED GRADE	18.256	18.645	18.972	19.227	19.410	19.522	19.571	19.611	19.651	19.691	19.731	19.771	19.811	19.851	19.891	19.931	19.971	20.011	20.051	20.091	20.131	20.171	20.211	20.251	20.291	20.331	20.371	20.411	20.451	20.491	20.531	20.567	20.598	20.623	20.643
TOP LEVEL OF CIM (MC)																																			
INVERT LEVEL OF CROSS PIPE (MC)																																			
TOP LEVEL OF CIM (FR)																																			
INVERT LEVEL OF CROSS PIPE (FR)																																			
INVERT LEVEL OF LONGITUDINAL PIPE (SB)																																			
INVERT LEVEL OF LONGITUDINAL PIPE (NB)																																			

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY
KEI KATAHIRA & ENGINEERS INTERNATIONAL
yec YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	R.S. S[illegible]
CHECKED	9/27/02	X. HAKIM
SUBMITTED	9/30/02	M. K[illegible] TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

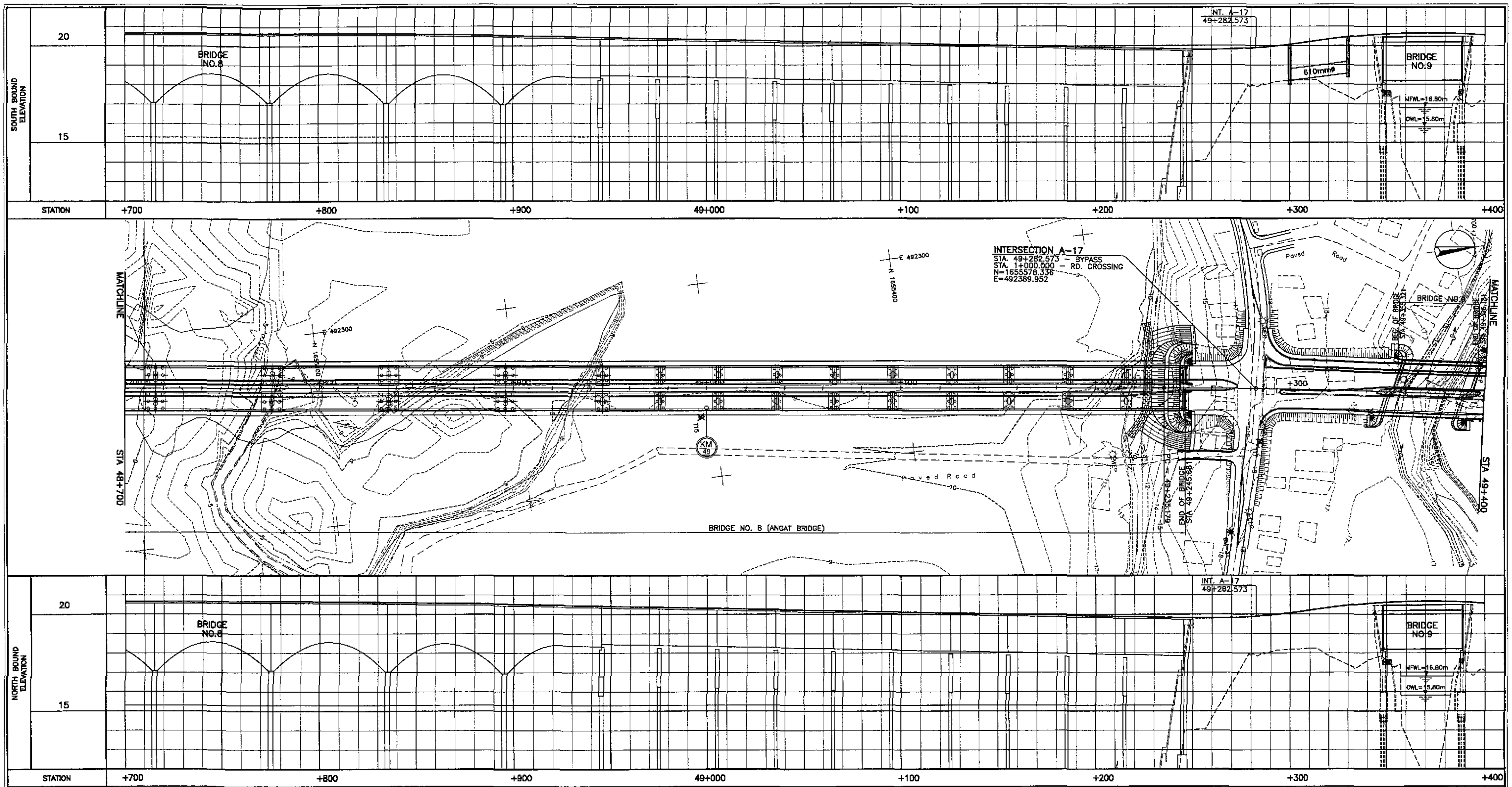
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO, Project Director	JOSEFINA M. ALAGAR, Chief, Highways Division	GILBERTO S. REYES, OIC, Director IV	MANUEL M. BONOAN, Undersecretary	SIMEON A. DATUMANONG, Secretary

PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE III

SCALE :
HORIZONTAL 1:1000
VERTICAL 1:100
FULL SIZE A1

SHEET CONTENTS :
SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 48+000 - STA. 48+700

SHEET NO. :
DP-02



STATION	+700										+800										+900										49+000				
FINISHED GRADE	20.658	20.667	20.671	20.670	20.663	20.651	20.634	20.611	20.583	20.550	20.511	20.471	20.431	20.391	20.351	20.311	20.271	20.231	20.191	20.151	20.111	20.071	20.031	19.991	19.951	19.911	19.871	19.831	19.805	19.878	20.065	20.341	20.547	20.652	20.658
TOP LEVEL OF CIM (MC)																																			
INVERT LEVEL OF CROSS PIPE (MC)																																			
TOP LEVEL OF CIM (FR)																																			
INVERT LEVEL OF CROSS PIPE (FR)																																			
INVERT LEVEL OF LONGITUDINAL PIPE (SB)																																			
INVERT LEVEL OF LONGITUDINAL PIPE (NB)																																			

(Station markers along the grade row: +700, +800, +900, 49+000, +100, +200, +300, +400.)

JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	
CHECKED	9/27/02	A. HAKIM
SUBMITTED	9/30/02	M. TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO, Project Director	JOSEFINA M. ALAGAR, Chief, Highways Division	GILBERTO S. REYES, OIC, Director IV	MANUEL M. BONOAN, Undersecretary	SIMEON A. DATUMANONG, Secretary

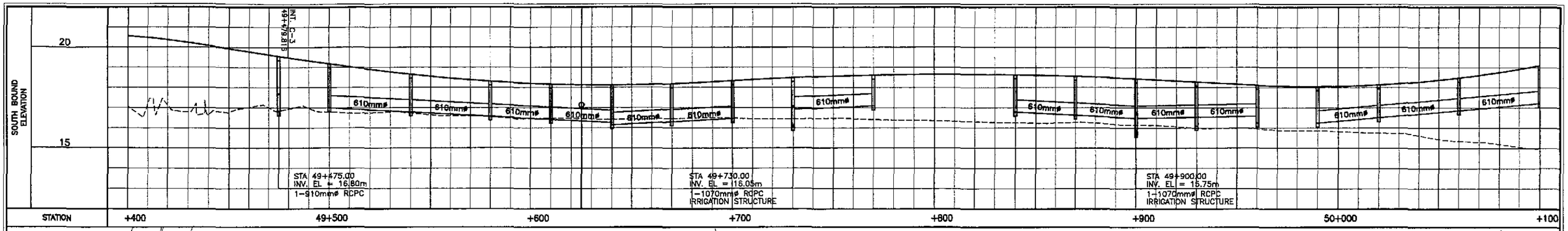
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING *INTER-URBAN HIGHWAY SYSTEM* ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)

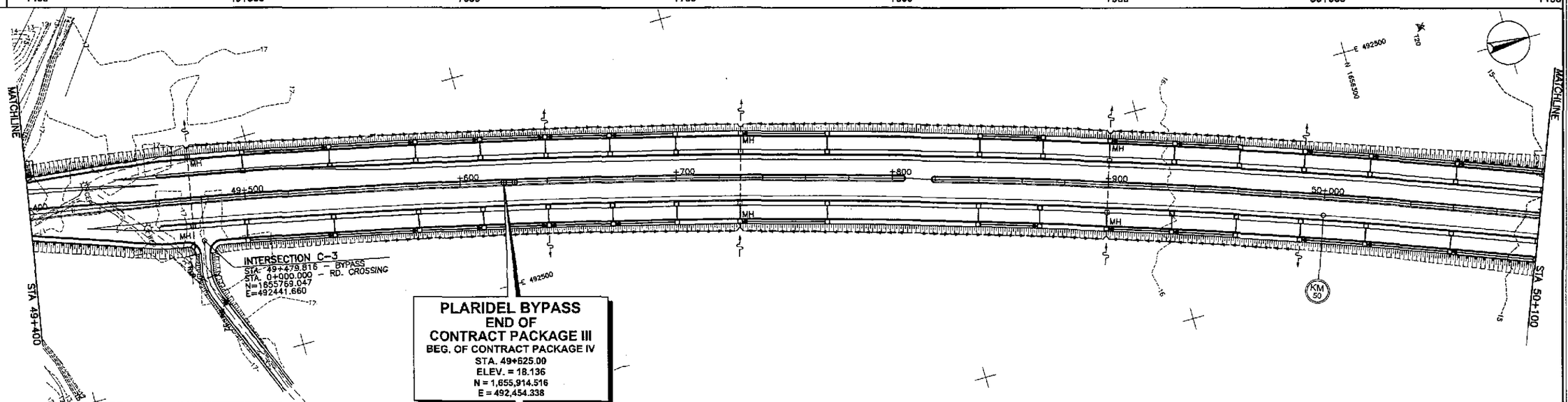
PLARIDEL BYPASS - CONTRACT PACKAGE III

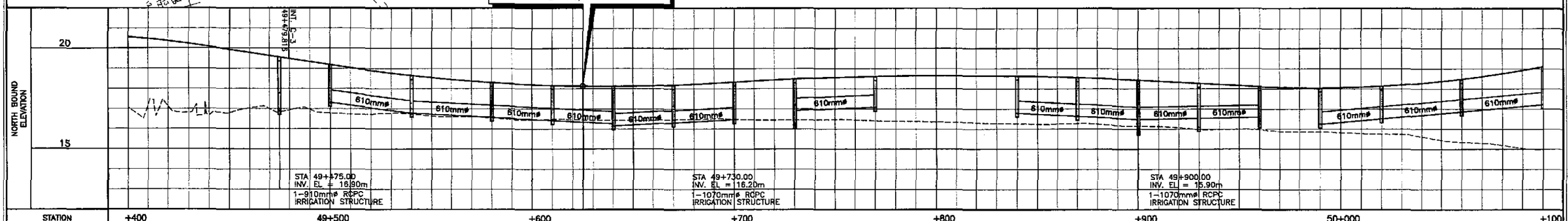
SCALE : HORIZONTAL 1:1000; VERTICAL 1:100; FULL SIZE A1

SHEET CONTENTS :
SURFACE DRAINAGE PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 48+700 - STA. 49+400

SHEET NO. : DP-03







STATION	+400				49+500						+600						+700						+800						+900						50+000						+100
FINISHED GRADE	20.564	20.369	20.055	19.785	19.485	19.185	18.898	18.654	18.457	18.304	18.197	18.136	18.119	18.149	18.223	18.331	18.437	18.524	18.589	18.632	18.654	18.654	18.632	18.588	18.522	18.435	18.328	18.219	18.112	18.053	18.061	18.135	18.277	18.485	18.761					
TOP LEVEL OF CIM (MC)						19.125		18.594		18.244	18.106		18.059	18.126		18.271	18.420		18.550			18.572		18.495		18.375	18.213		18.052		17.997		18.075		18.425	19.043					
INVERT LEVEL OF CROSS PIPE (MC)						17.509		16.978		16.628	18.490		16.443	16.510		16.655	17.004		17.134			16.956		16.879		16.959	16.797		15.636		15.381		16.459		16.809	17.427					
TOP LEVEL OF CIM (FR)						18.965		18.434		18.084	17.948		17.899	17.966		18.111	18.260		18.390			18.412		18.335		18.215	18.053		17.892		17.837		17.915		18.265	18.883					
INVERT LEVEL OF CROSS PIPE (FR)						17.471		16.940		16.590	16.452		16.405	16.472		15.617	15.966		17.096			16.918		16.841		16.921	16.759		16.598		16.343		16.421		16.771	17.389					
INVERT LEVEL OF LONGITUDINAL PIPE (SB)						17.309		16.788		16.578	16.418		16.258	16.295		16.455	16.884		17.084			16.756		16.606		16.474	16.516		16.586		16.239		16.389		16.599	17.217					
INVERT LEVEL OF LONGITUDINAL PIPE (NB)						17.309		16.788		16.578	16.418		16.258	16.295		16.455	16.884		17.084			16.756		16.606		16.474	16.516		16.586		16.239		16.389		16.599	17.217					

FINISHED GRADE	20.564	20.369	20.055	19.785	19.485	19.185	18.898	18.654	18.457	18.304	18.197	18.136	18.119	18.149	18.223	18.331	18.437	18.524	18.589	18.632	18.654	18.654	18.632	18.588	18.522	18.435	18.328	18.219	18.112	18.053	18.061	18.135	18.277	18.485	18.761					
TOP LEVEL OF CIM (MC)						19.125		18.594		18.244	18.106		18.059	18.126		18.271	18.420		18.550			18.572		18.495		18.375	18.213		18.052		17.997		18.075		18.425	19.043					
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INVERT LEVEL OF LONGITUDINAL PIPE (NB)						17.309		16.788		16.578	16.418		16.258	16.295		16.455	16.884		17.084			16.756		16.606		16.474	16.516		16.586		16.239		16.389		16.599	17.217					

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KEI KATAHIRA & ENGINEERS INTERNATIONAL
YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/26/02	A. HAKIM
CHECKED	9/27/02	A. HAKIM
SUBMITTED	9/30/02	M. KUSUNOKI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

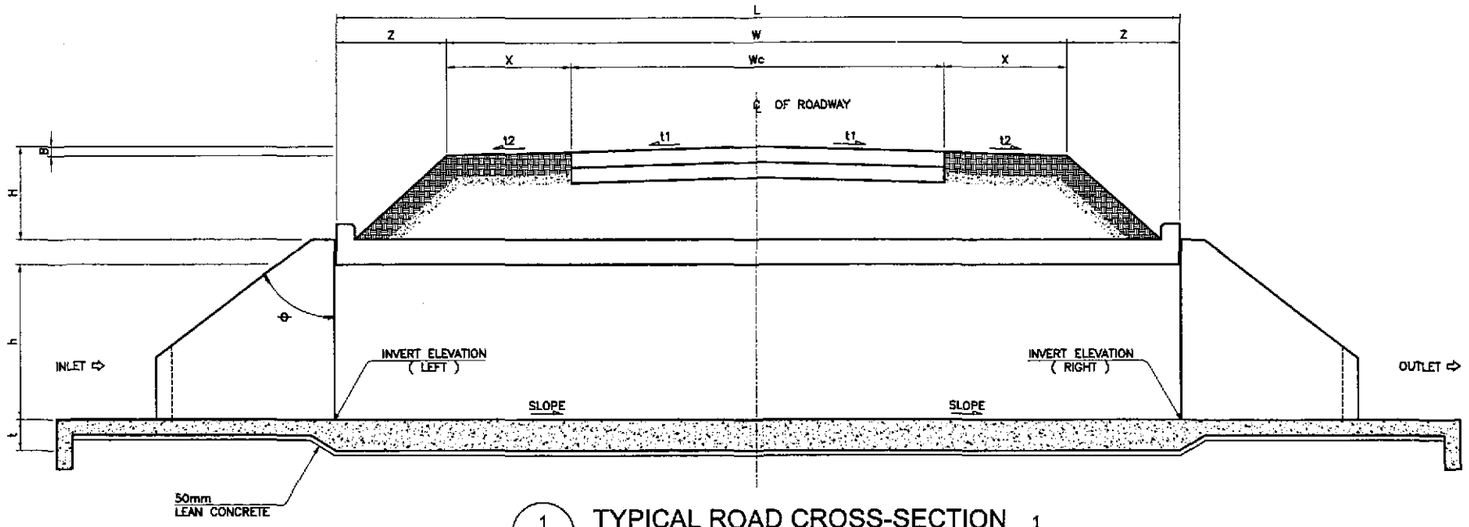
PJHL - PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary

PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE III

SCALE :
HORIZONTAL 1:1000
VERTICAL 1:100
FULL SIZE A1

SHEET CONTENTS :
SURFACE DRAINAGE PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 49+400 - STA. 49+625

SHEET NO. :
DP-04



1 DS-01 **TYPICAL ROAD CROSS-SECTION** 1 — NOT TO SCALE

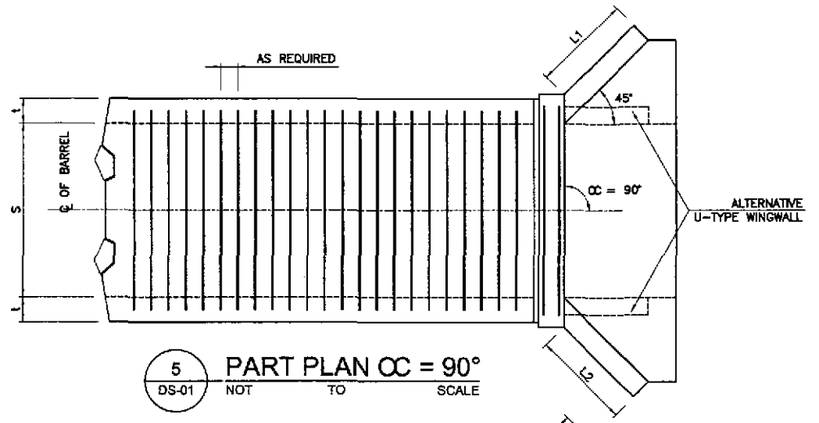
LEGEND :

W	—	WIDTH OF ROADWAY FORMATION
X	—	WIDTH OF SHOULDER
Wc	—	WIDTH OF CARRIAGEWAY
H	—	COVER ABOVE THE CULVERT
L	—	TOTAL LENGTH OF BARREL
t1	—	SLOPE OF CARRIAGEWAY
t2	—	SLOPE OF SHOULDER
Z	—	[(H+t) – (B+200)] tan θ
B	—	$xt_2+0.5t_1$ Wc
h	—	HEIGHT OF CULVERT OPENING
t	—	THICKNESS OF CULVERT WALL OR SLAB
θ	—	SLOPE OF EMBANKMENT
CC	—	ANGLE OF SKEW

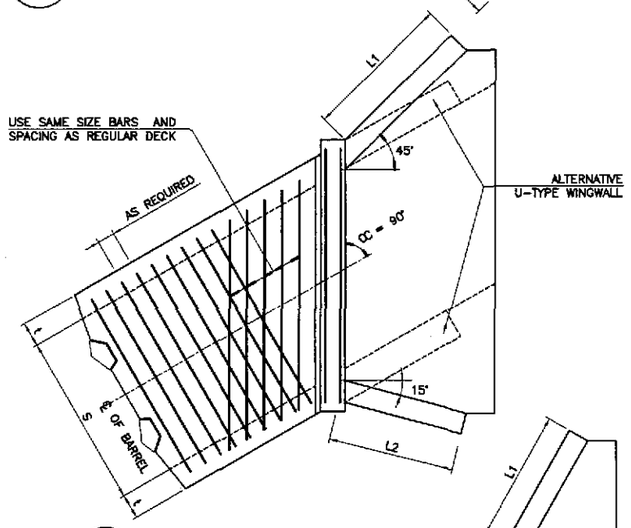
HORIZONTAL SKEW ANGLE CC	L (mm)
90°	W+2tan θ [(H+t) – (B+200)]
60°	1.1547 (W+2tan θ [(H+t)–(B+200)])
45°	1.4142 (W+2tan θ [(H+t)–(B+200)])

NOTES:

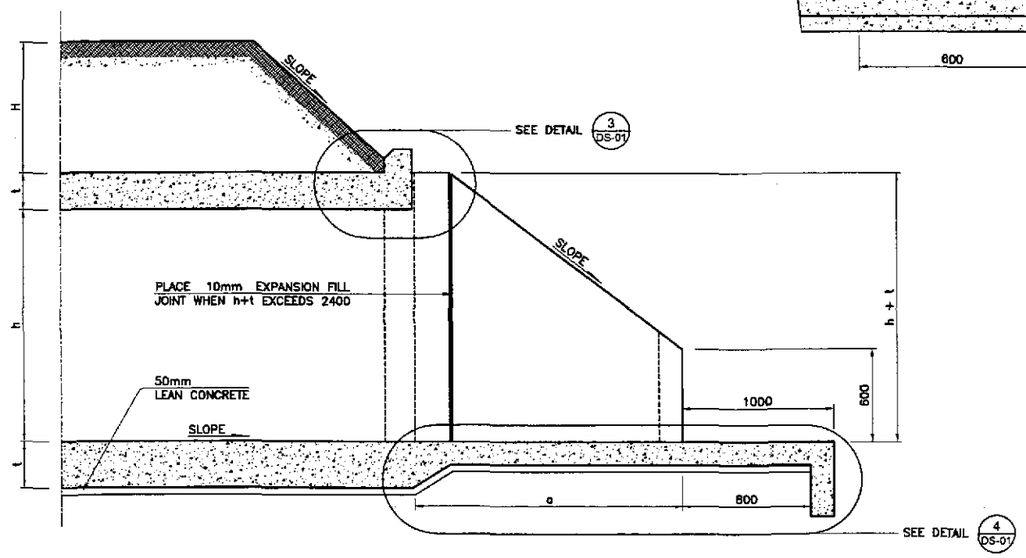
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. MINIMUM CONCRETE COVER SHALL BE 40 CLEAR. WHEN HEIGHT OF FILL H=0 INCREASE COVER BY 30.



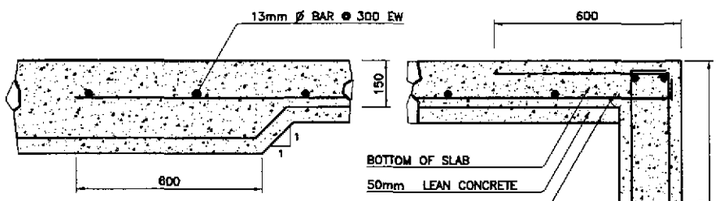
5 DS-01 **PART PLAN CC = 90°** — NOT TO SCALE



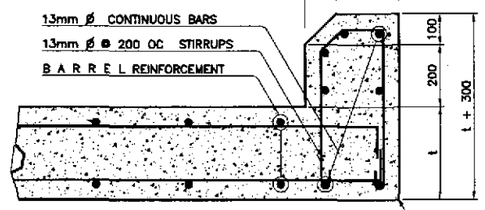
6 DS-01 **PART PLAN CC = 60°** — NOT TO SCALE



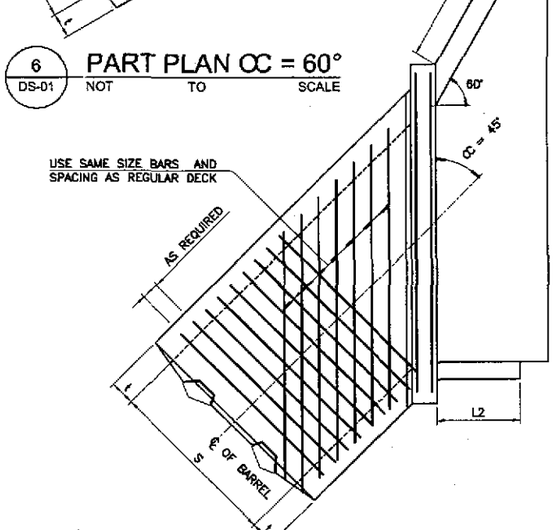
2 DS-01 **PART SECTION ALONG ℄ OF CULVERT** — NOT TO SCALE



3 DS-01 **DETAIL** — NOT TO SCALE



4 DS-01 **DETAIL** — NOT TO SCALE



7 DS-01 **PART PLAN CC = 45°** — NOT TO SCALE

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

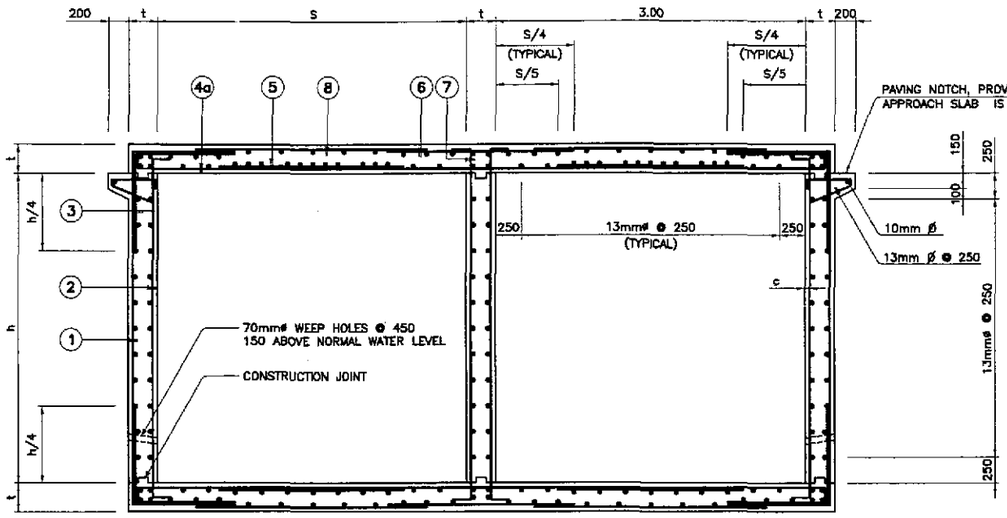
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	STA. MARIA
CHECKED	9/27/02	HAKIM
SUBMITTED	9/20/02	TEAM LEADER

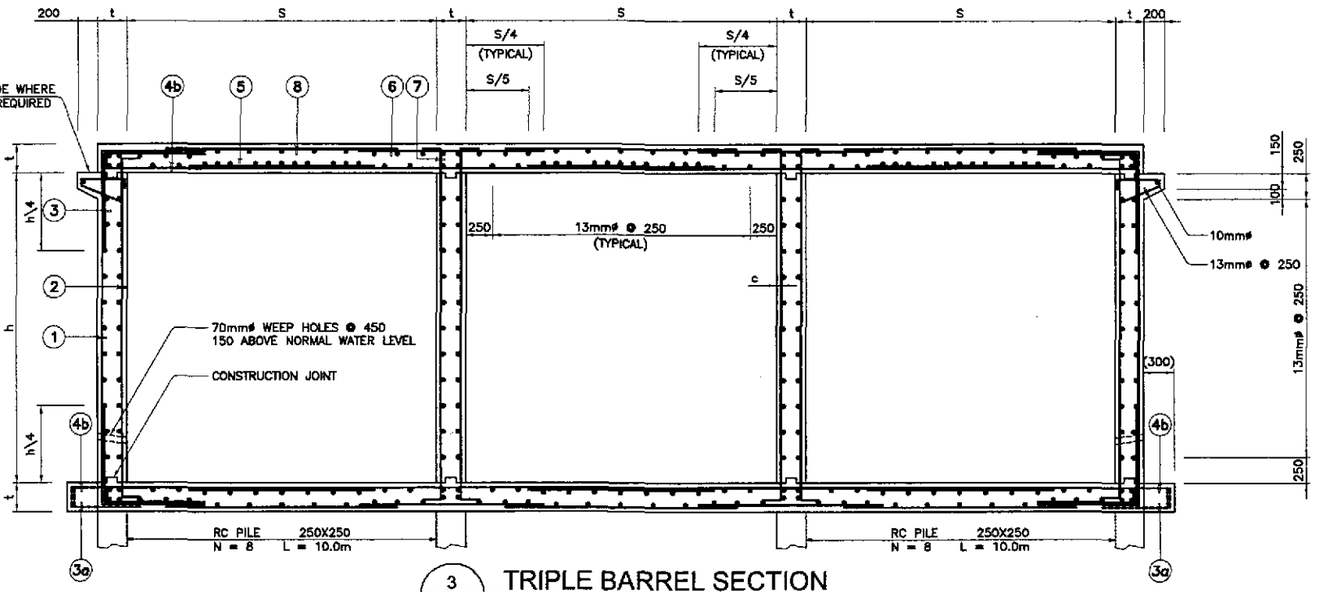
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

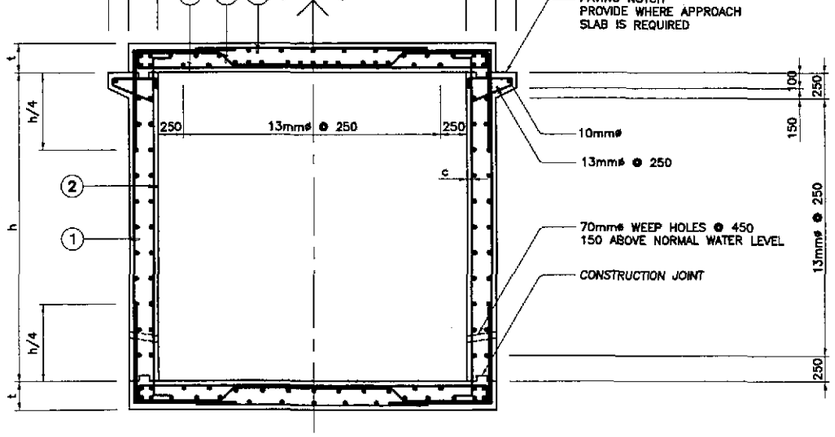
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON *UPGRADING INTER-URBAN HIGHWAY SYSTEM* ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)	DS-01
PLARIDEL BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		



2 DS-02 **DOUBLE BARREL SECTION**
SCALE 1:30



3 DS-02 **TRIPLE BARREL SECTION**
SCALE 1:30



1 DS-02 **SINGLE BARREL SECTION**
SCALE 1:30

NOTE:

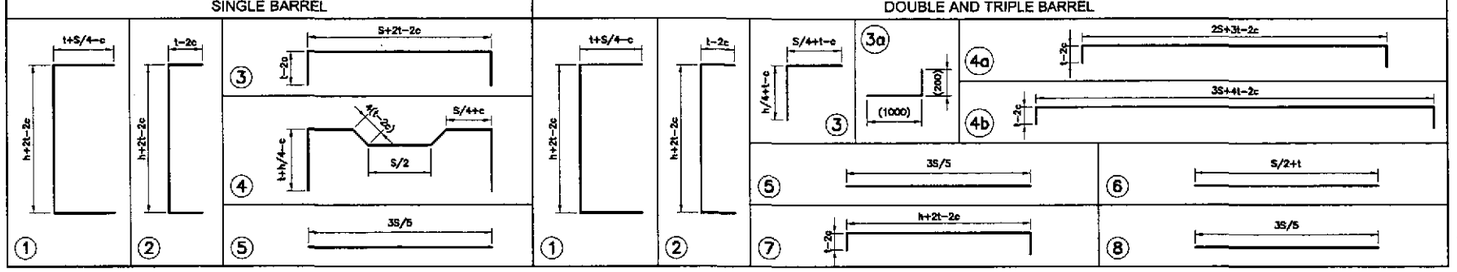
FOR WALL THICKNESS LESS THAN 240, STAGGER HORIZONTAL REINFORCEMENT AS SHOWN.

LEGEND:

c = CONCRETE CLEAR COVER (50mm)

ADDITIONAL REBARS IF FILL IS LESS THAN 600mm

BAR BENDING DIAGRAM



CLEAR		SINGLE BARREL BOX CULVERT											DOUBLE AND TRIPLE BARREL BOX CULVERT															
SPAN S	HEIGHT h	t	BAR 1		BAR 2		BAR 3		BAR 4		BAR 5		t	BAR 1		BAR 2		BAR 3		BAR 4		BAR 5		BAR 6		BAR 7		BAR 8	
			ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING		ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING
1250	1000	180	13	300	13	300	13	300	13	300	13	300	180	13	300	13	300	13	300	13	300	13	300	20	200	13	300	13	300
	1250	180	13	300	13	300	13	300	13	300	13	300	180	13	300	16	300	13	300	13	300	13	300	20	200	13	300	13	300
	1500	180	13	300	13	280	13	300	13	300	13	300	180	13	300	16	280	13	300	13	300	13	300	20	200	13	300	13	300
	1800	180	13	300	13	260	13	300	13	300	13	300	180	13	300	16	260	13	300	13	300	13	300	20	200	13	300	13	300
1500	1000	180	16	240	16	300	16	240	16	240	13	300	200	16	300	16	300	16	300	16	300	16	300	20	200	13	300	13	280
	1250	180	16	240	16	300	16	240	16	240	13	300	200	16	300	16	300	16	300	16	300	16	300	20	200	13	300	13	280
	1500	180	16	240	16	280	16	240	16	240	13	300	200	16	300	16	280	16	300	16	300	16	300	20	200	13	300	13	280
	1800	180	16	240	16	280	16	240	16	240	13	300	200	16	300	16	260	16	300	16	300	16	300	20	200	13	300	13	280
1800	1250	200	16	260	16	300	16	260	16	260	13	280	250	16	300	16	300	16	300	16	300	16	300	20	190	13	300	13	220
	1500	200	16	260	16	300	16	260	16	260	13	280	250	16	300	16	280	16	300	16	300	16	300	20	190	13	300	13	220
	1800	200	16	260	16	280	16	260	16	260	13	280	250	16	300	16	280	16	300	16	300	16	300	20	190	13	300	13	220
	2100	200	16	260	16	260	16	260	16	260	13	280	250	16	300	16	260	16	300	16	300	16	300	20	190	13	300	13	220
2400	1800	220	16	220	16	280	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2100	220	16	220	16	260	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2400	220	16	220	16	200	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2750	220	16	200	16	180	16	200	16	200	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
3000	2100	280	16	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200
	2400	280	16	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200
	2750	280	16	200	16	240	16	220	16	200	13	200	300	20	300	16	200	20	300	20	300	20	300	25	170	16	300	13	200
	3000	280	16	200	16	220	16	200	16	200	13	200	300	20	300	16	200	20	300	20	300	20	300	25	170	16	300	13	200

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC) BARRELS

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

KEI KATAHIRA & ENGINEERS INTERNATIONAL — YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/26/02	F. STA. ROMANA
CHECKED	9/27/02	R. HAKIM
SUBMITTED	9/30/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONDAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	1:30	STANDARD DETAILS OF RCBC BARRELS	DS-02
PLARIDEL BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		

QUANTITIES FOR STANDARD BOX CULVERTS

CLEAR SPAN S	CLEAR HEIGHT h	QUANTITY PER METER OF BARREL – SINGLE CONCRETE (m3)	SINGLE REINFORCEMENT (kg)	DOUBLE CONCRETE (m3)	DOUBLE REINFORCEMENT (kg)	TRIPLE CONCRETE (m3)	TRIPLE REINFORCEMENT (kg)
1250	1000	0.94	113.32	1.63	209.22	2.33	296.18
	1250	1.03	121.63	1.77	216.22	2.51	312.39
	1500	1.12	130.98	1.90	232.07	2.69	330.39
	1800	1.23	141.71	2.07	249.50	2.91	352.09
1500	1000	1.03	165.90	2.04	253.90	2.92	354.80
	1250	1.12	177.10	2.19	256.00	3.12	370.20
	1500	1.21	189.60	2.34	279.60	3.32	387.10
	1800	1.32	202.50	2.52	296.20	3.56	407.10
1800	1250	1.38	189.20	3.11	312.30	4.45	437.00
	1500	1.48	199.90	3.30	326.10	4.70	454.00
	1800	1.60	214.80	3.53	342.80	5.00	475.20
	2100	1.72	239.60	3.75	357.50	5.30	494.40
2400	1800	2.04	272.70	5.04	431.80	7.20	619.10
	2100	2.17	288.50	5.31	447.30	7.56	637.10
	2400	2.31	314.10	5.58	461.80	7.92	656.40
	2750	2.46	356.70	5.90	478.50	8.34	677.70
3000	2100	3.17	308.70	6.03	635.70	8.64	899.70
	2400	3.34	321.30	6.30	652.00	9.00	919.60
	2750	3.53	374.40	6.62	705.60	9.42	895.00
	3000	3.67	413.50	6.84	721.60	9.72	1015.40

QUANTITIES FOR STANDARD WINGWALLS

m (meter)	h+t (meter)	L (meter)	QUANTITY PER WINGWALL AND APRON SLAB – SINGLE CONCRETE (m3)	SINGLE REINFORCEMENT (kg)	DOUBLE CONCRETE (m3)	DOUBLE REINFORCEMENT (kg)	TRIPLE CONCRETE (m3)	TRIPLE REINFORCEMENT (kg)
1.37	1.18	1.23	2.41	150	2.94	180	3.48	220
1.75	1.43	1.76	3.48	220	4.08	265	4.72	300
2.12	1.68	2.29	4.66	300	5.36	350	6.06	395
2.57	1.98	2.93	6.22	405	7.01	450	7.80	500
1.37	1.18	1.23	2.50	140	3.26	180	3.88	220
1.75	1.43	1.76	3.69	210	4.42	250	5.16	290
2.12	1.68	2.29	4.78	270	5.73	320	6.56	360
2.57	1.98	2.93	6.35	350	7.42	410	8.37	460
1.78	1.45	1.80	3.81	210	4.98	280	5.90	330
2.15	1.70	2.33	5.03	280	6.33	350	7.36	400
2.60	2.00	2.97	6.48	360	8.09	450	9.26	510
3.05	2.30	3.61	8.37	460	10.00	550	11.31	620
2.63	2.02	3.01	7.08	390	9.14	500	10.71	590
3.08	2.32	3.65	9.28	510	11.61	640	13.37	740
3.53	2.62	4.28	11.42	630	13.98	770	15.92	880
4.06	2.97	5.03	14.17	780	17.90	990	19.15	1050
3.17	2.38	3.78	10.08	560	12.38	680	14.53	800
3.62	2.68	4.41	12.30	680	14.83	820	17.19	940
4.15	3.03	5.15	15.15	840	17.94	990	20.57	1130
4.52	3.28	5.68	17.34	960	20.33	1120	23.15	1270

GENERAL NOTES :

SPECIFICATION :

AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES, 15th EDITION 1996.

DESIGN LOAD :

LIVE LOAD MS-18 (HS 20-44)

CONCRETE :

ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSION STRENGTH IN 28 DAYS OF f'c = 20.7 MPa (3000psi). ALL EXPOSED CORNERS TO BE CHAMFERED 20 MINIMUM. NO CONSTRUCTION JOINT ARE TO BE MADE EXCEPT WHERE SHOWN. WHEN BOTTOM SLAB IS SUBJECT TO ABRASION ADD 25mm TO BOTTOM SLAB TO INCREASE COVERAGE ON STEEL.

STEEL REINFORCEMENT :

ALL REINFORCING STEEL TO BE INTERMEDIATE (GRADE 40) ASTM A-615 WITH DEFORMATIONS CONFORMING TO ASTM A-305.

GENERAL :

IN STATING CULVERT SIZE, GIVE SPAN BY HEIGHT (SPAN FIRST) WHEN HEIGHT OF FILL, H=0 THE TOP OF SURFACE OF THE UPPER SLAB SHALL FOLLOW THE CROWN OF THE FINISHED ROADWAY. THE BOX CULVERT SHALL BE CONSTRUCTED ON A LAYER OF LEAN CONCRETE 50mm MINIMUM THICKNESS.

LIVE LOAD DISTRIBUTION REINFORCEMENT :

WHEN THERE IS LESS THAN 600mm OF FILL ABOVE TOP SLAB OF CULVERT ADDITIONAL REINFORCEMENT TRANSVERSE TO THE MAIN REINFORCEMENT IS ADDED TO THE BOTTOM OF THE TOP SLAB IN ACCORDANCE WITH AASHTO 1.3.2.E.

HEIGHT OF FILL :

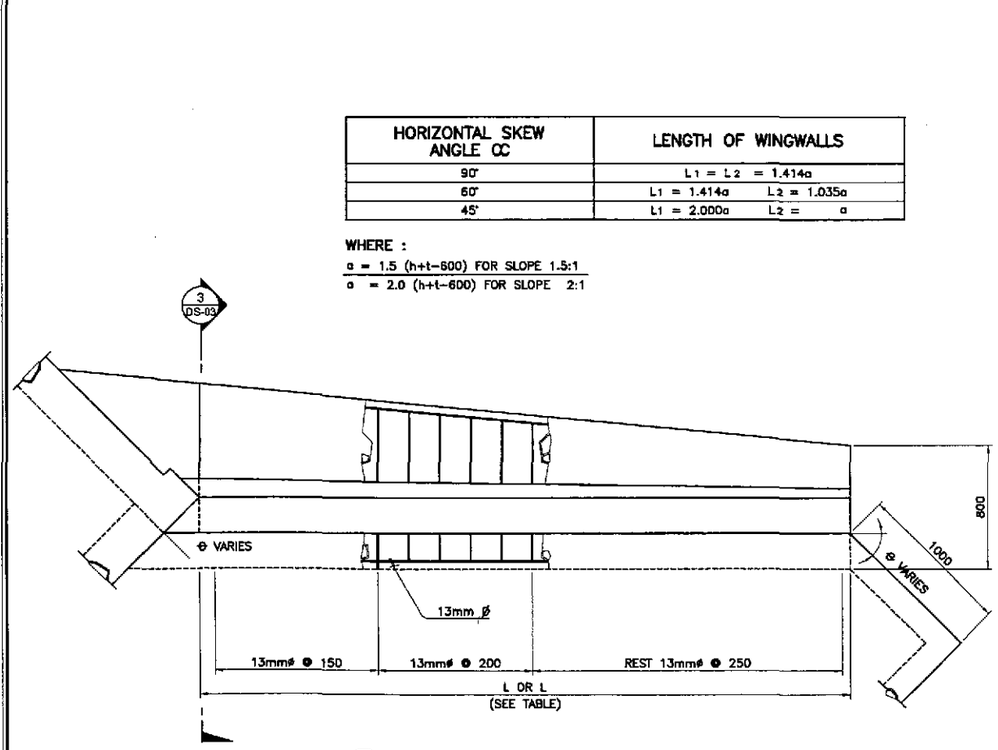
MAXIMUM HEIGHT OF FILL IS 3000mm ABOVE TOP SLAB, FOR HEIGHT OF FILL GREATER THAN 3000mm SPECIAL DESIGN OF BOX CULVERT SHOULD BE DONE.

HORIZONTAL SKEW ANGLE CC	LENGTH OF WINGWALLS
90°	L1 = L2 = 1.414a
60°	L1 = 1.414a L2 = 1.035a
45°	L1 = 2.000a L2 = a

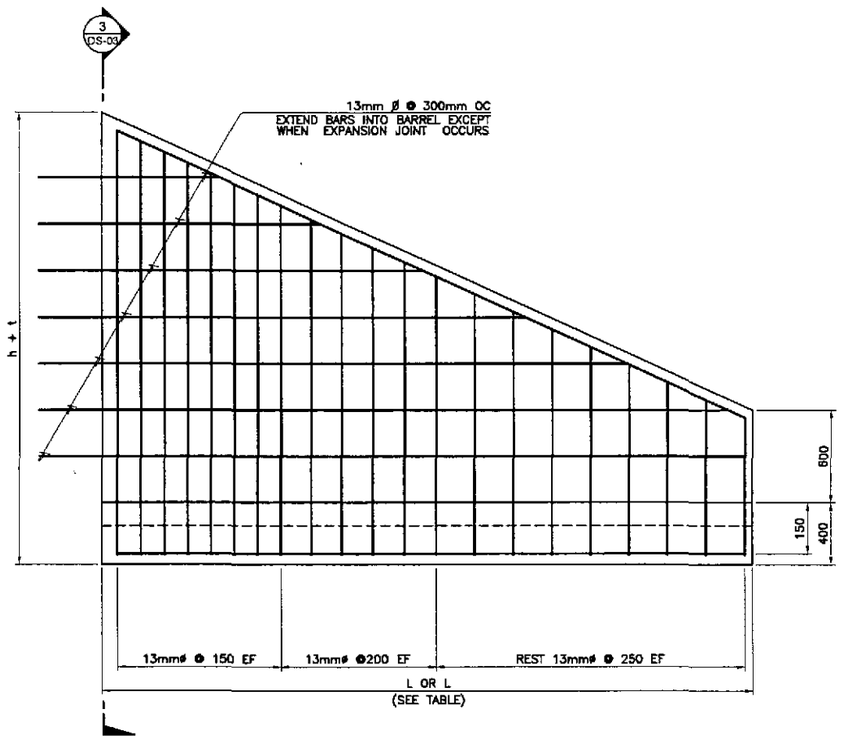
WHERE :

a = 1.5 (h+t-600) FOR SLOPE 1.5:1

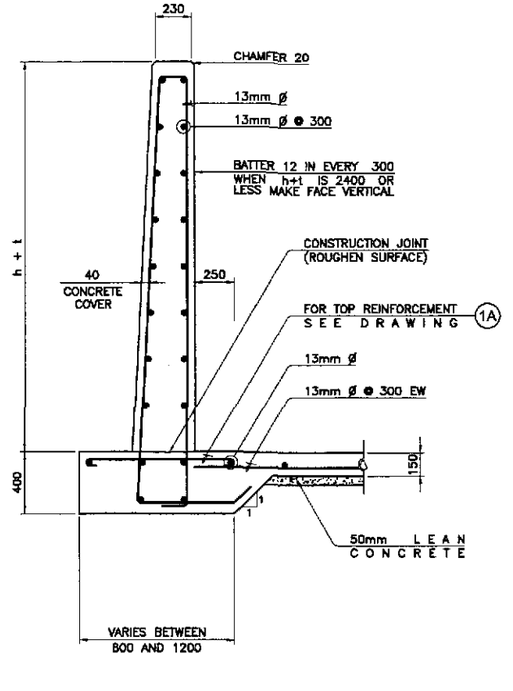
a = 2.0 (h+t-600) FOR SLOPE 2:1



1 DS-03 WINGWALL PLAN SCALE 1:40



2 DS-03 WINGWALL ELEVATION SCALE 1:40



3 DS-03 SECTION SCALE 1:40

RCBC WINGWALL DETAILS

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

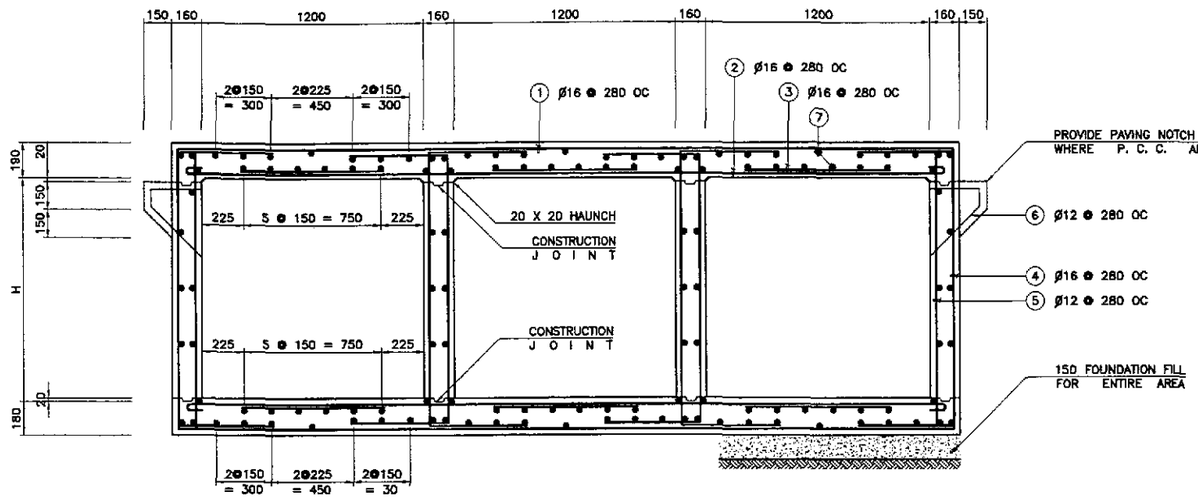
KEI KATAHIRA & ENGINEERS INTERNATIONAL — YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/04	F. STA. MARIA
CHECKED	9/27/04	MAKIN
SUBMITTED	9/30/04	TEAM LEADER

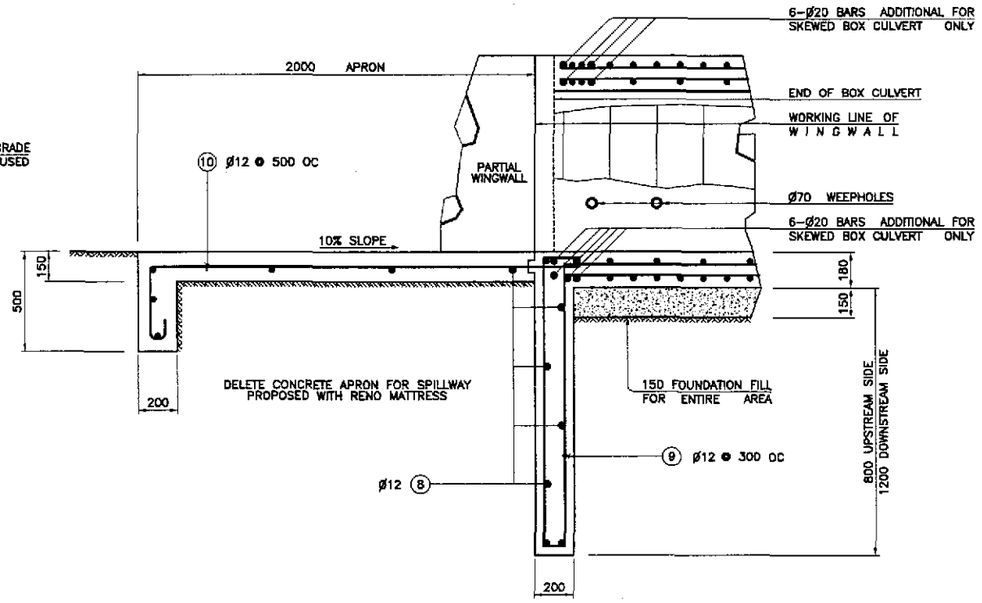
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO, Project Director	JOSEFINA M. ALADAR, Chief, Highways Division	GILBERTO S. REYES, OIC, Director IV	MANUEL M. BONOAN, Undersecretary	SIMEON A. DATUMANONG, Secretary

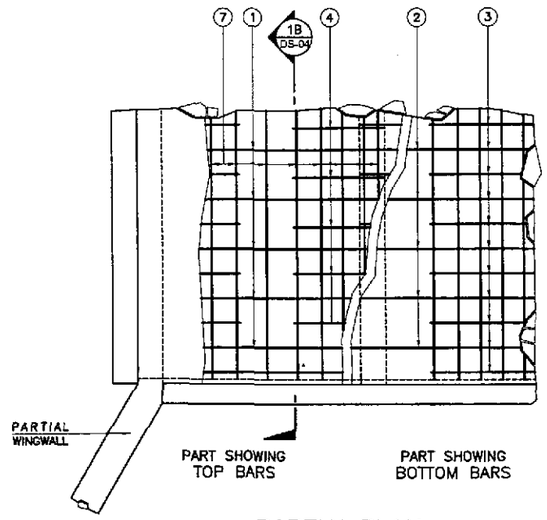
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	1:40	STANDARD DETAILS OF RCBC WINGWALLS	DS-03
PLARIDEL BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		



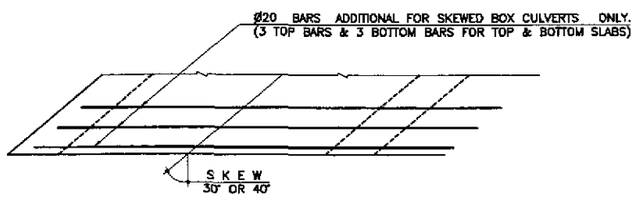
1A / DS-04 SECTION ALONG ℄ OF ROADWAY
NOT TO SCALE



1B / DS-04 PARTIAL SECTION A
NOT TO SCALE

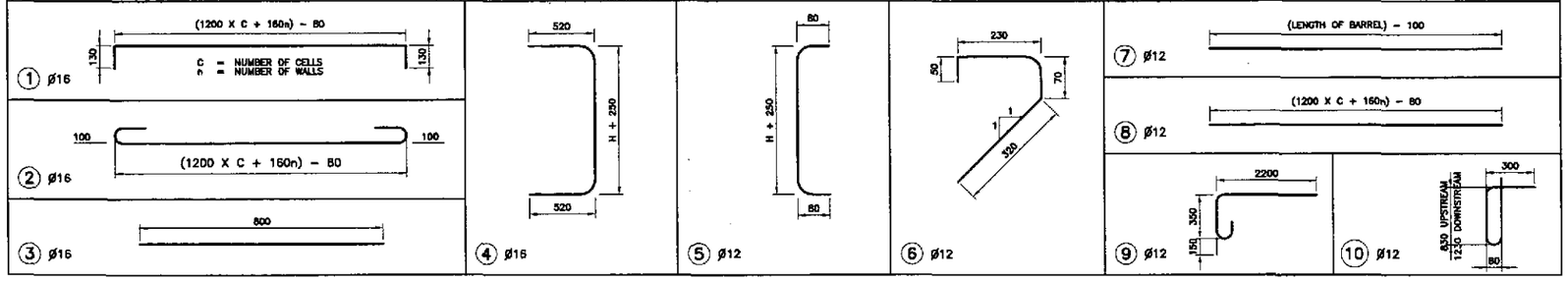


PARTIAL PLAN
NOT TO SCALE



NOTE:
ALL OTHER REINFORCING BARS SHALL BE PERPENDICULAR OR PARALLEL, AS THE CASE MAYBE, TO BOX AXIS.

BAR BENDING DIAGRAM



ESTIMATE OF QUANTITIES (PER LINEAR METER OF LENGTH)

	SINGLE BARREL				DOUBLE BARREL				TRIPLE BARREL			
HEIGHT OF CELL "H" (METER)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	FOUNDATION F I L L (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	FOUNDATION F I L L (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	FOUNDATION F I L L (m^3)
1.20	0.95	132.59	0.67	0.27	1.64	217.00	1.12	0.48	2.34	299.82	1.56	0.68
0.90	0.85	127.30	0.67	0.27	1.50	209.08	1.12	0.48	2.14	289.04	1.56	0.68
0.60	0.75	122.01	0.67	0.27	1.35	201.15	1.12	0.48	1.95	278.48	1.56	0.68

ADDITIONAL WEIGHT OF REINFORCEMENT PER END OF BOX CULVERT
30° SKEW = 98.5 kgs. 30° SKEW = 46.5 kgs.
45° SKEW = 120.5 kgs. 45° SKEW = 57.0 kgs.

APRON AND END TOE FOR BOTH ENDS

	SINGLE BARREL			DOUBLE BARREL			TRIPLE BARREL		
COMMON TO ALL HEIGHT OF CELL	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)
	1.73	57.94	3.64	3.28	111.34	6.08	4.83	164.70	8.53

1 / DS-04 LOW DEPTH TYPE BOX CULVERT
NOT TO SCALE

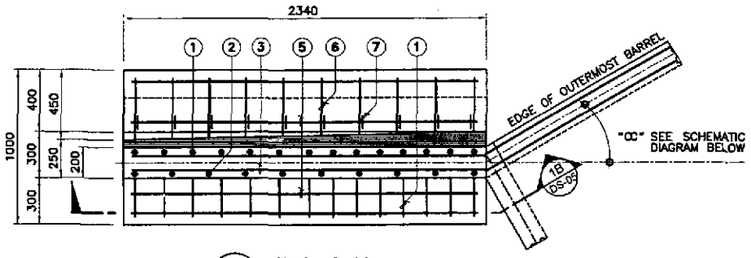
JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	
CHECKED	9/27/02	
SUBMITTED	9/30/02	TEAM LEADER

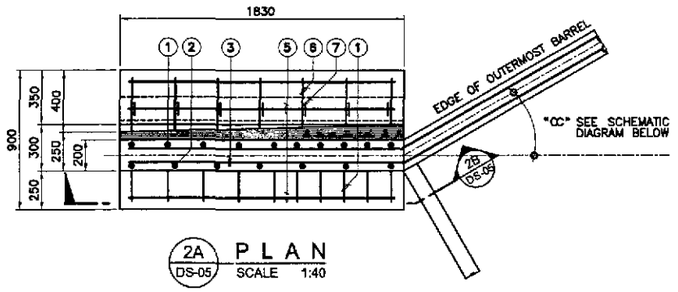
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE III	NOT TO SCALE FULL SIZE A1	STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)	DS-04



1A DS-05 PLAN SCALE 1:40



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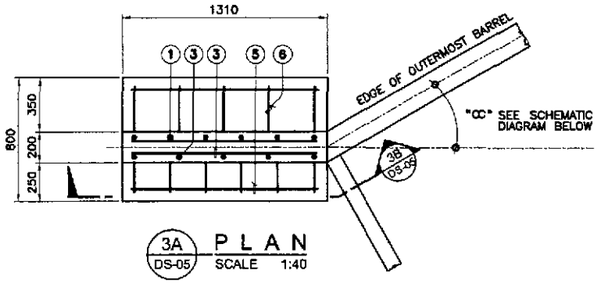
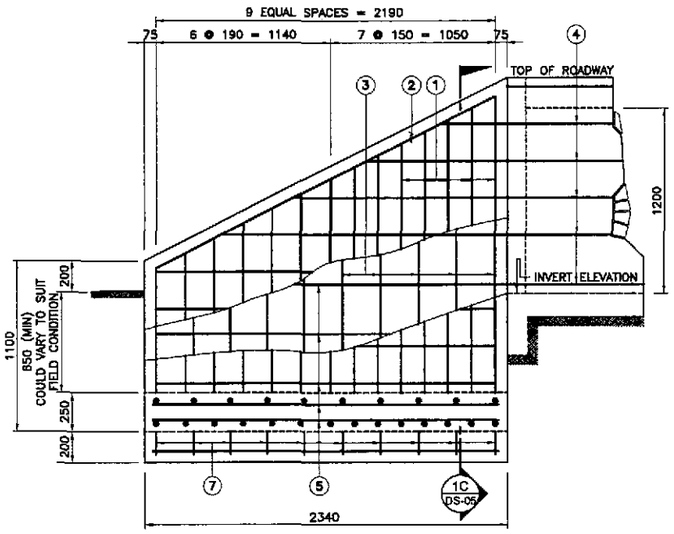
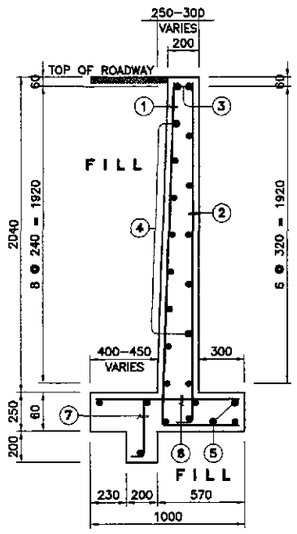


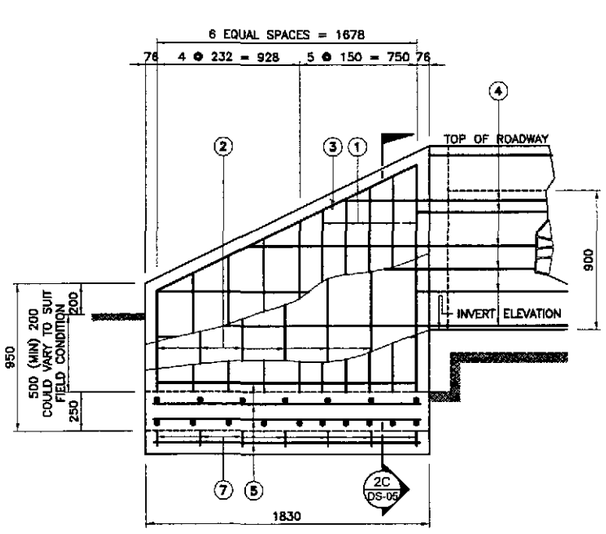
3A DS-05 PLAN SCALE 1:40



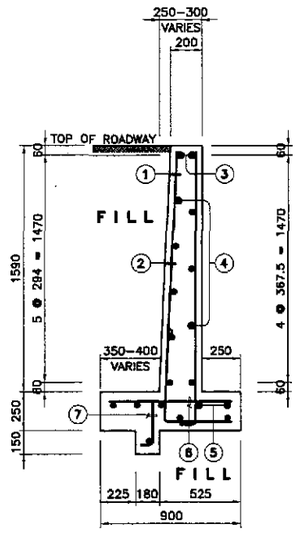
1A DS-05 ELEVATION SCALE 1:40



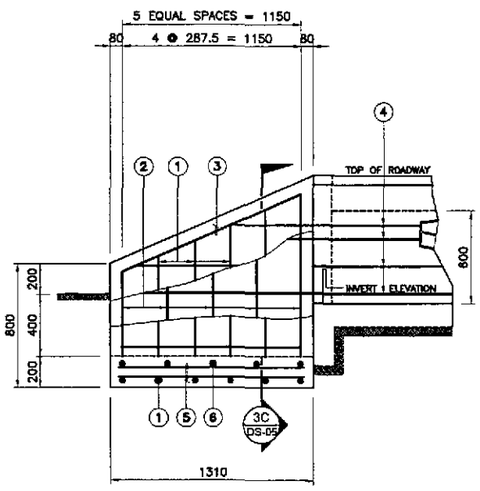
1C DS-05 SECTION SCALE 1:40



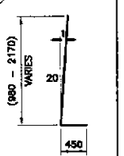
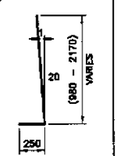
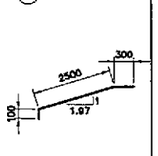
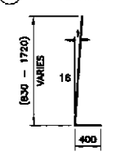
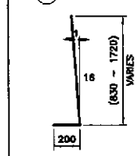
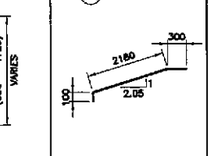
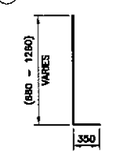
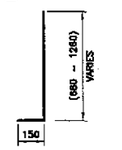
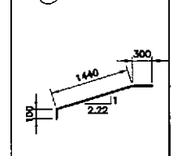
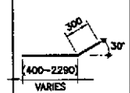
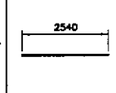
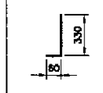
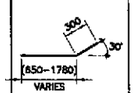
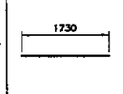
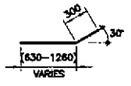
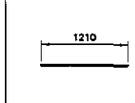
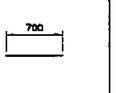
2B DS-05 ELEVATION SCALE 1:40



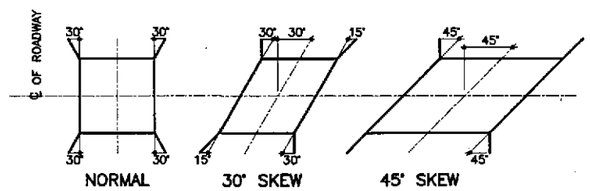
2C DS-05 SECTION SCALE 1:40



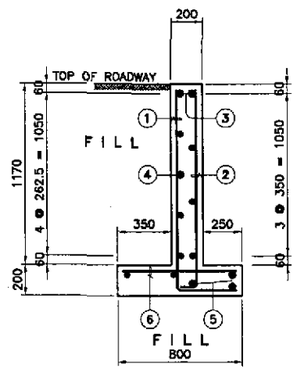
3B DS-05 ELEVATION SCALE 1:40

BAR BENDING DIAGRAM H=1200							BAR BENDING DIAGRAM H=900							BAR BENDING DIAGRAM H=600						
① 14–12mmø	② 10–12mmø	③ 2–12mmø					① 10–12mmø	② 7–12mmø	③ 2–12mmø					① 8–12mmø	② 5–12mmø	③ 2–12mmø				
																					
④ 9–12mmø	⑤ 9–12mmø	⑥ 10–12mmø	⑦ 10–12mmø				④ 6–12mmø	⑤ 10–12mmø	⑥ 7–12mmø	⑦ 7–12mmø				④ 5–12mmø	⑤ 7–12mmø	⑥ 5–12mmø				
																				

ESTIMATE OF QUANTITIES PER WINGWALL				
HEIGHT (m)	CONCRETE CLASS "A" (m^3)	REINFORCEMENT (kg)	EXCAVATION (m^3)	FOUNDATION FILL (m^3)
1.20	2.96	102.89	5.78	0.30
0.90	1.90	57.68	3.53	0.22
0.60	0.88	31.43	1.97	0.15



4 DS-05 SCHEMATIC DIAGRAM SHOWING FLARE OF WINGWALL NOT TO SCALE



3C DS-05 SECTION SCALE 1:40

LOW DEPTH TYPE BOX CULVERT

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

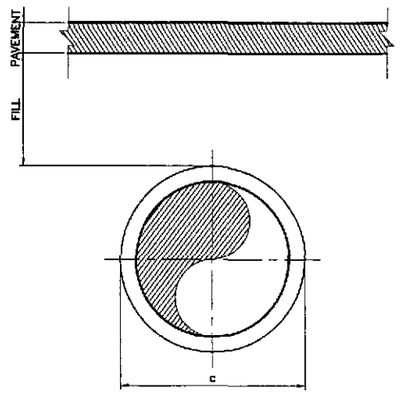
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	A. HAKIM
CHECKED	9/27/02	M. KUCHI
SUBMITTED	9/27/02	M. KUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE III	AS SHOWN FULL SIZE A1	STANDARD LOW DEPTH TYPE BOX CULVERT (2 of 2)	DS-05



STANDARD STRENGTH PIPES:
FILL 1/2 E.D. FOR FLEXIBLE PAVEMENT OR MIN. OF 0.60 m
0.30 m FOR RIGID PAVEMENT
EXTRA STRENGTH PIPES:
FILL: 0.30 m FOR RIGID AND FLEXIBLE PAVEMENTS

MINIMUM PIPE COVERING

DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT

STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS

CONCRETE 247 kg/cm² (3,500 lb/in²)

SIZE OF PIPE (mm)	WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE	
I.D.	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT
300	57	344	363	351	370	44	1 LINE 1.48	
380	57	344	363	351	370	44	1 LINE 1.90	
460	64	508	527	514	534	44	1 LINE 2.54	1 LINE 2.12
610	76	673	692	680	699	44	1 LINE 3.60	1 LINE 2.75
760	89	858	857	845	864	51	1 LINE 4.66	1 LINE 3.60
910	102	1003	1022	1010	1029	64	2 LINES EACH 3.81	1 LINE 3.81
1070	114	1168	1187	1175	1194	64	2 LINES EACH 4.44	1 LINE 4.44
1220	127	1334	1353	1340	1359	64	2 LINES EACH 5.29	1 LINE 5.29
1520	152	1664	1683	1670	1690	64	2 LINES EACH 5.98	1 LINE 6.98

CONCRETE 317 kg/cm² (4,500 lb/in²)

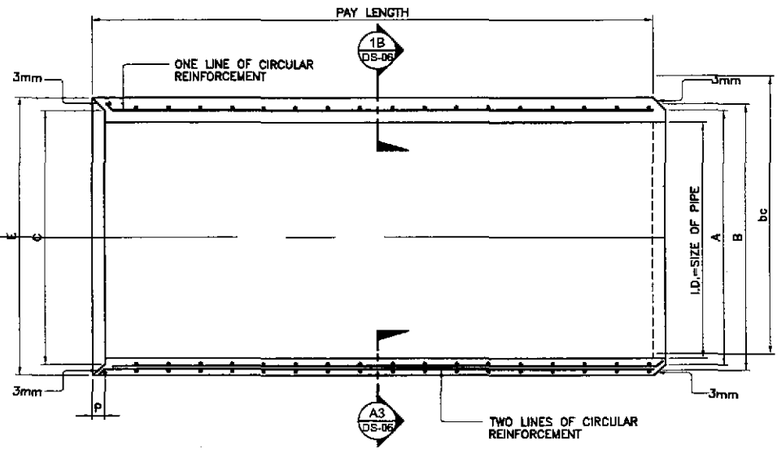
WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ❀		STRENGTH TEST REQUIREMENTS kg/m OF PIPE	
t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	THREE-EDGE-BEARING METHOD ✳	
								0.00025mCRACK LOAD	ULTIMATE LOAD
51	495	514	502	521	44	1 LINE 1.69		3.355	5.218
51	495	514	502	521	44	1 LINE 2.33		3.914	6.060
51	495	514	502	521	44	1 LINE 2.96		4.473	6.709
64	660	680	667	686	44	1 LINE 4.23	1 LINE 3.60	4.473	7.454
76	825	845	832	851	51	1 LINE 5.92	1 LINE 4.44	5.032	8.573
86	988	1007	994	1013	64	2 LINES EACH 4.66	1 LINE 4.66	6.038	9.840
95	1150	1165	1156	1175	64	2 LINES EACH 5.29	1 LINE 5.29	7.045	10.958
108	1315	1334	1321	1340	64	2 LINES EACH 6.56	1 LINE 6.56	8.051	11.927
127	1639	1658	1645	1664	64	2 LINES EACH 8.68	1 LINE 8.68	8.945	14.909

EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS

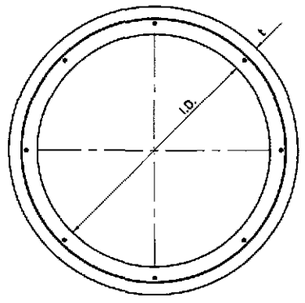
CONCRETE 317 kg/cm² (4,500 lb/in²)

WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ○		STRENGTH TEST REQUIREMENTS kg/m OF PIPE	
t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	THREE-EDGE-BEARING METHOD	
								0.00025mCRACK LOAD	LOAD ULTIMATE
—	—	—	—	—					
—	—	—	—	—					
—	—	—	—	—					
76	673	692	680	699	44	1 LINE 5.50	1 LINE 4.23	5.964	8.945
89	838	857	845	864	51	1 LINE 6.56	1 LINE 5.08	7.454	11.182
102	1003	1022	1010	1029	64	2 LINES EACH 5.92	1 LINE 5.92	8.945	13.418
114	1168	1187	1175	1194	64	2 LINES EACH 6.98	1 LINE 6.98	10.436	15.655
127	1334	1353	1340	1359	64	2 LINES EACH 8.04	1 LINE 8.04	11.927	17.891
152	1664	1683	1670	1690	64	2 LINES EACH 10.58	1 LINE 10.58	13.418	22.364

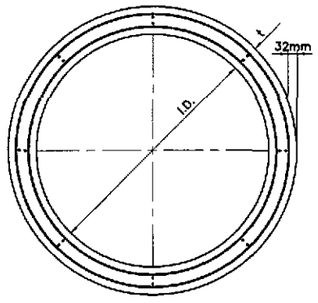
❀ THE DISTANCE FROM CENTERLINE OF THE REINFORCEMENT TO THE NEAREST SURFACE OF THE CONCRETE HAS BEEN ASSUMED AS 32mm FOR PIPES WITH A SHELL THICKNESS OF 64mm OR MORE.
✳ TEST LOADS FOR SAND-BEARING TEST SHALL BE ONE AND ONE – HALF TIMES THOSE SPECIFIED IN THIS TABLE FOR THE THREE – EDGE BEARING TEST.



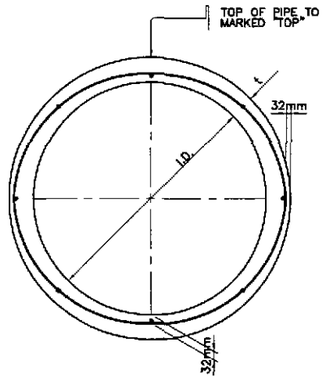
1A DS-06 LONGITUDINAL SECTION NOT TO SCALE



ONE LINE OF CIRCULAR REINFORCEMENT

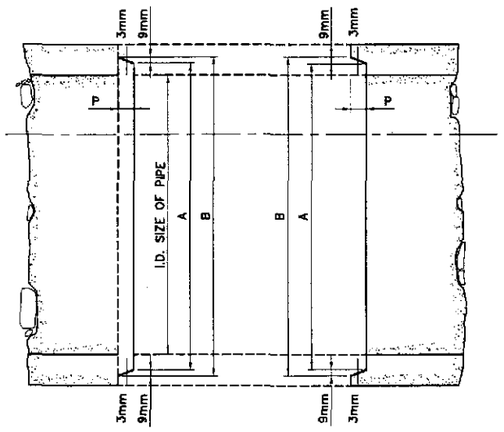


TWO LINES OF CIRCULAR REINFORCEMENT



ONE LINE OF ELLIPTICAL REINFORCEMENT

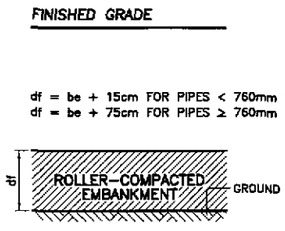
1B DS-06 SECTION
1C DS-06 SECTION



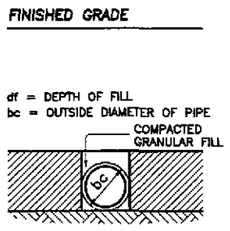
TONGUE END GROOVE END

1D DS-06 SECTION

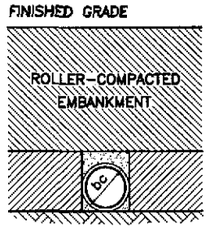
1 DS-06 STANDARD REINFORCED CONCRETE PIPE CULVERTS SCALE AS SHOWN



STEP 1 – CONSTRUCT COMPACTED EMBANKMENT TO AN ELEVATION ABOVE TOP OF PROPOSED PIPE.

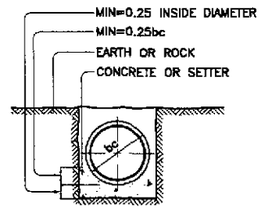


STEP 2 – TRENCH THROUGH THIS COMPACTED EMBANKMENT AND INSTALL PIPE BACKFILL WITH COMPACTED GRANULAR MATERIAL.

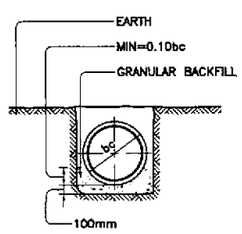


STEP 3 – COMPLETE EMBANKMENT IN USUAL MANNER.

2 DS-06 METHODS OF PIPE INSTALLATION NOT TO SCALE

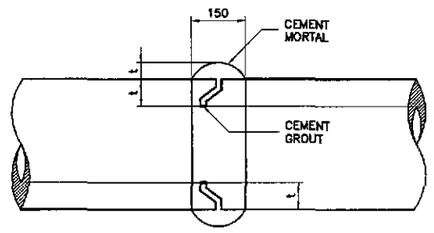


CONCRETE CRADLE BEDDING



ORDINARY BEDDINGS

3 DS-06 TYPICAL BEDDING FOR CONDUITS NOT TO SCALE



4 DS-06 DETAIL OF PIPE COLLAR NOT TO SCALE

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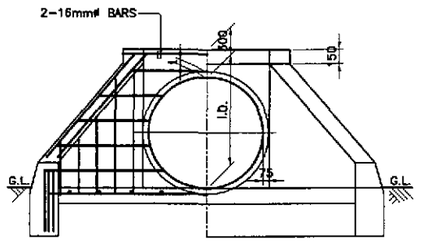
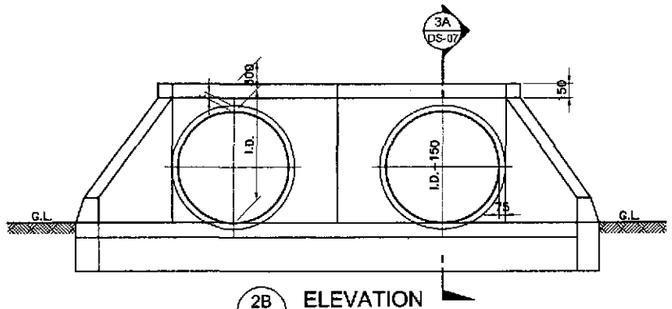


1B DS-07 ELEVATION NOT TO SCALE



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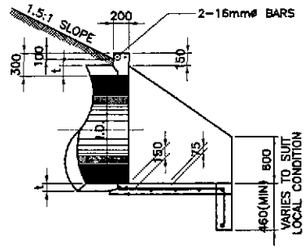

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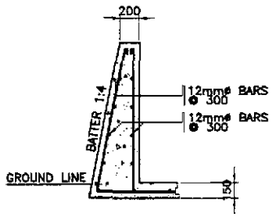

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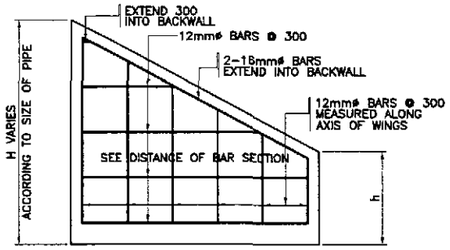

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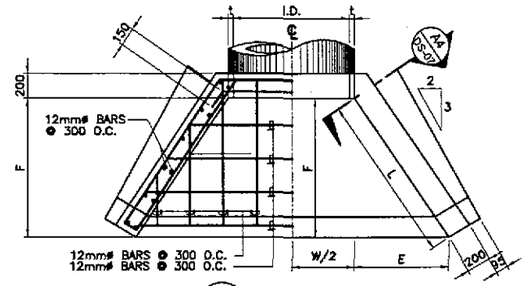
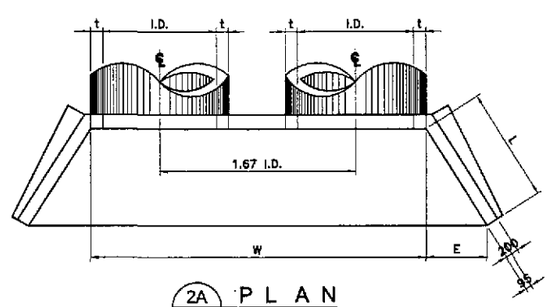


1A DS-07 PLAN N T S



2A DS-07 PLAN N T S

1 DS-07 FLARED TYPE HEADWALL (SINGLE PIPE) SCALE AS SHOWN

2 DS-07 FLARED TYPE HEADWALL (DOUBLE PIPE) SCALE AS SHOWN

TABLE A (ONE FLARED TYPE HEADWALL 1.5:1)

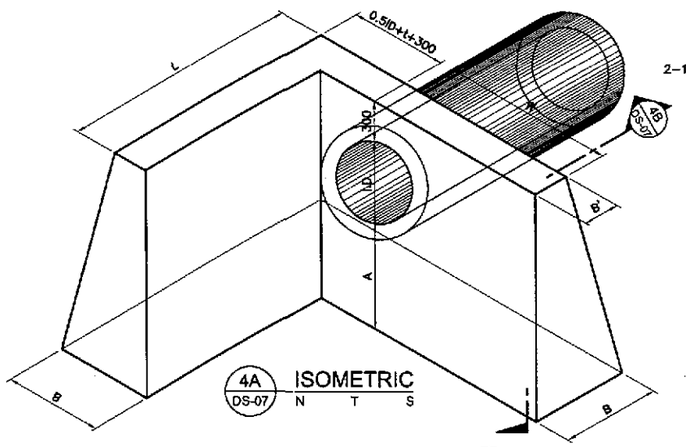
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)				SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THICKNESS SHELL (t)	L	E	F	h	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.
460	51	710	390	590	0	0.17	610	0.57	25.65	0.32	1380	0.83	37.35	0.51	2150	1.27	57.15
610	64	960	530	800	0	0.29	760	0.82	36.46	0.58	1780	1.16	48.39	0.87	2800	1.75	78.75
910	86	1510	840	1260	600	0.65	1070	1.55	68.92	1.30	2590	2.22	92.61	1.95	4100	3.36	150.98
1070	95	1770	980	1470	600	0.90	1230	2.38	107.10	1.80	3020	3.05	137.25	2.70	4800	3.96	178.20
1220	108	2040	1130	1690	600	1.17	1370	2.66	110.27	2.34	3400	3.71	154.77	3.51	5360	5.36	241.34
1520	127	2540	1410	2110	600	1.81	1680	3.93	174.74	3.63	4229	5.47	228.18	5.43	6760	6.76	304.20

TABLE C (ONE L-TYPE HEADWALL)

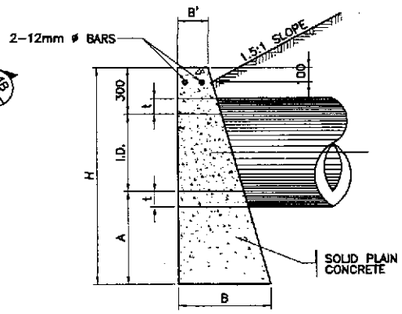
DIA. & THICKNESS (mm)		DIMENSIONS (mm)						SINGLE PIPE	
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	B'	H	W	L	CONCRETE m^3 mm	REINF. STEEL kg.
460	51	310	350	200	1070	1070	1070	0.66	5
610	64	410	430	200	1320	1220	1220	1.06	8
910	86	610	610	200	1820	1820	1820	2.76	11
1070	95	710	780	300	2080	1970	VARIES	–	–
1220	108	810	870	300	2330	2120	VARIES	–	–
1520	127	1010	980	300	3030	2420	VARIES	–	–

TABLE C (ONE STRAIGHT TYPE HEADWALL)

DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)			SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.
460	51	310	350	1070	1500	0.15	0.46	3.48	2600	0.33	0.83	4.90	3400	0.45	0.80	5.97
610	64	410	430	1320	2400	0.29	0.87	4.55	3500	0.58	1.20	6.50	4600	0.87	1.51	8.45
910	86	610	600	1820	3800	0.65	2.28	6.68	5200	1.30	3.16	9.52	6800	1.95	3.85	12.36
1070	95	710	780	2080	4300	0.90	3.84	7.57	6050	1.80	5.09	10.67	7900	2.70	6.43	13.96
1220	108	810	870	2330	4800	1.17	4.43	8.81	6900	2.34	6.70	12.54	9000	3.51	7.97	16.14
1520	127	1010	980	2830	6000	1.81	8.80	10.94	8600	3.63	11.93	15.56	11200	5.43	15.05	19.82

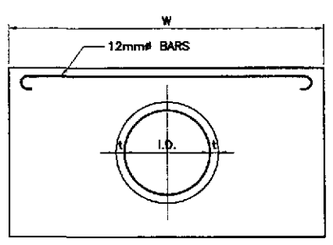


4A DS-07 ISOMETRIC N T S

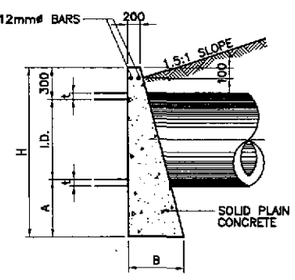


4B DS-07 SECTION NOT TO SCALE

4 DS-07 L-TYPE HEADWALL NOT AS SHOWN



5A DS-07 SINGLE PIPE NOT TO SCALE



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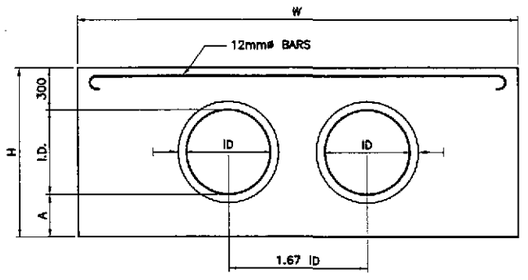

5C DS-07 DOUBLE PIPE NOT TO SCALE
1-2/3 I.D.

5 DS-07 STRAIGHT TYPE HEADWALL NOT AS SHOWN

STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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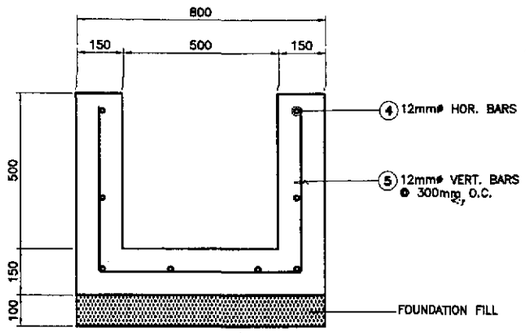
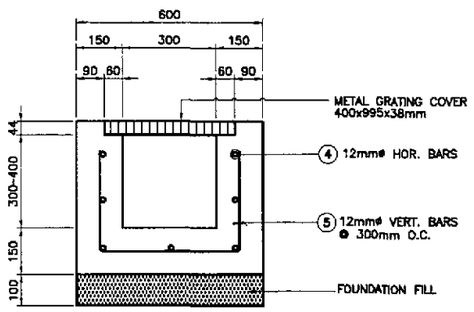
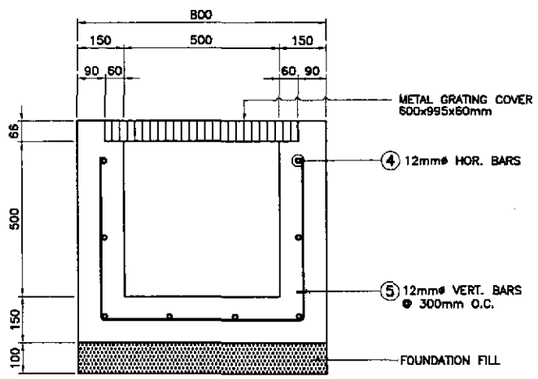


REINFORCED CONCRETE DITCH

2 / DS-08 — TYPE U — SCALE: 1:10

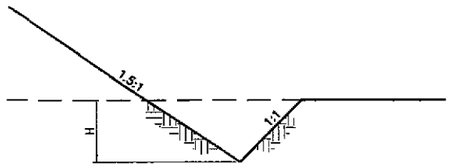


REINFORCED CONCRETE DITCH W/ COVER



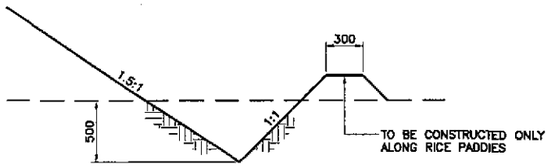
REINFORCED CONCRETE DITCH W/ COVER

1 / DS-08 — TYPE LU — SCALE: 1:10



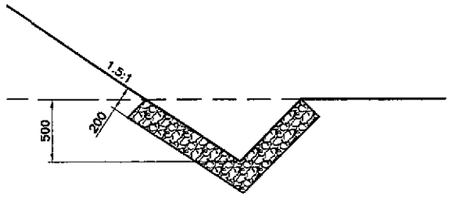
V-SHAPED UNLINED DITCH

TYPE E-4



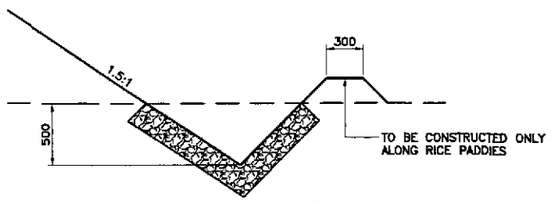
V-SHAPED UNLINED DITCH

TYPE E-3



V-SHAPED LINED DITCH

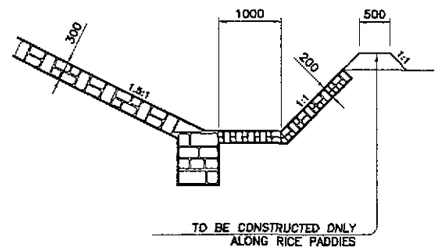
TYPE E-2



V-SHAPED UNLINED DITCH

TYPE E-1

4 / DS-08 — TYPE E — SCALE: 1:25



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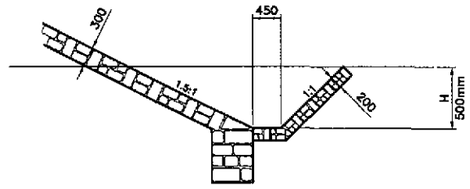

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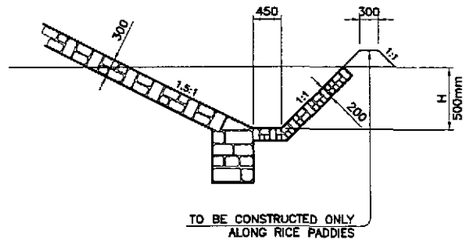
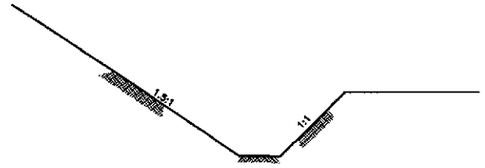
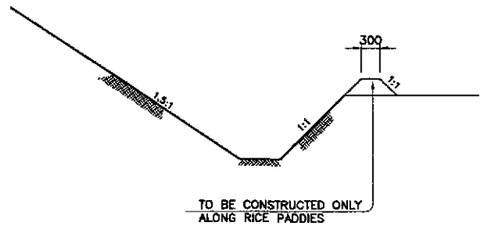


TYPE C-1

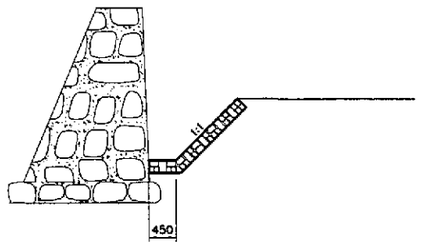
5 / DS-08 — TYPE C — NOT TO SCALE



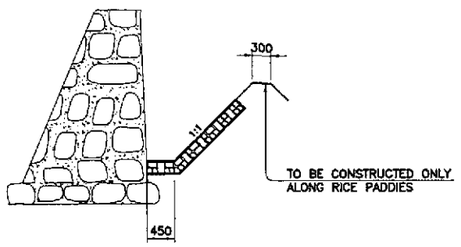
TYPE C-7



TYPE C-6



TYPE C-5



TYPE C-4

STANDARD DRAINAGE DITCHES

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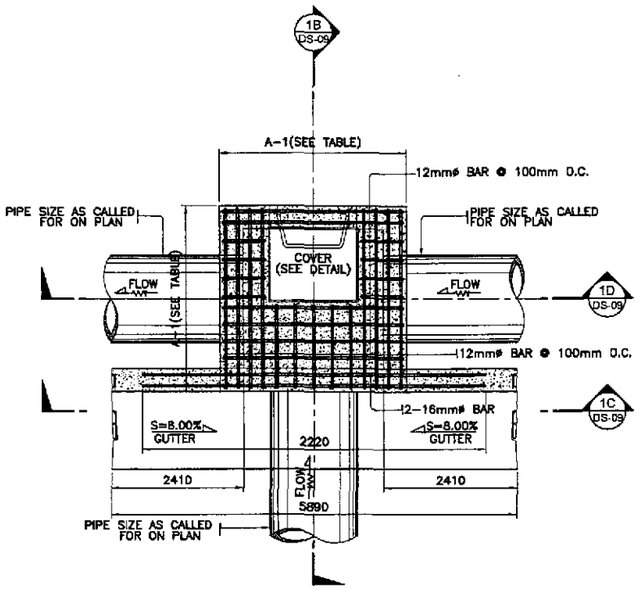
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

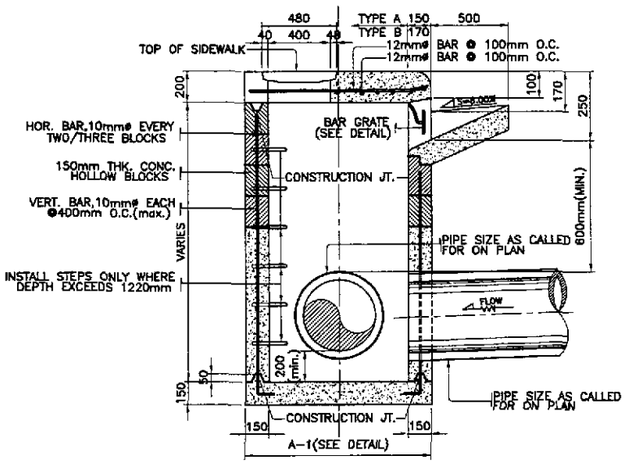
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	9/25/02	P. STA. MARIA	Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	9/27/02	A. HAKIM					
SUBMITTED	9/30/02	M. KIKUCHI TEAM LEADER	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary

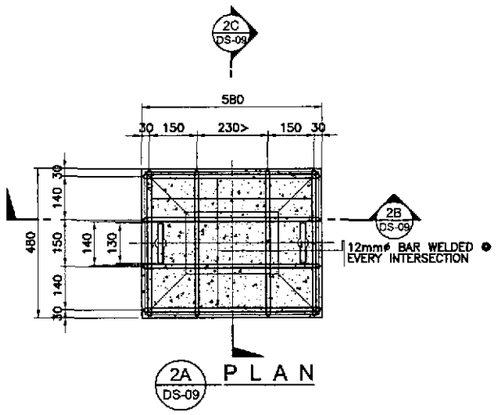
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD DRAINAGE DITCHES	DS-08
PLARIDEL BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		



1A DS-09 PLAN



1B DS-09 SECTION



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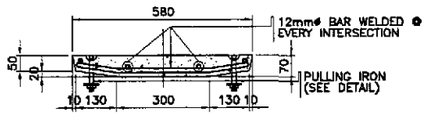

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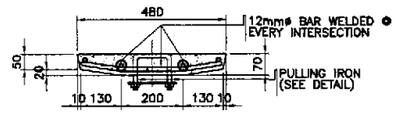
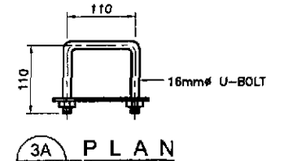


2C DS-09 SECTION



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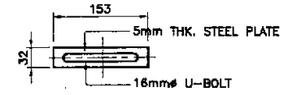
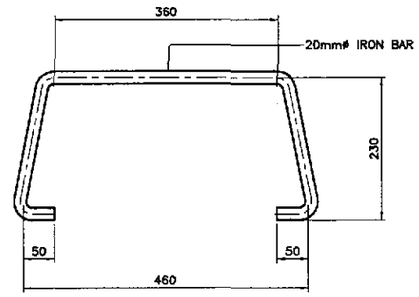
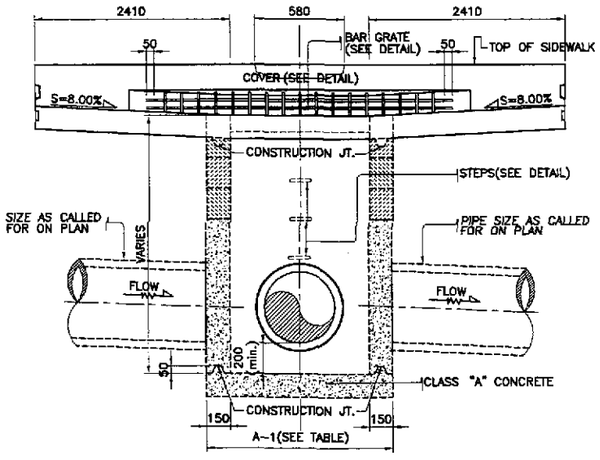


3B DS-09 ELEVATION

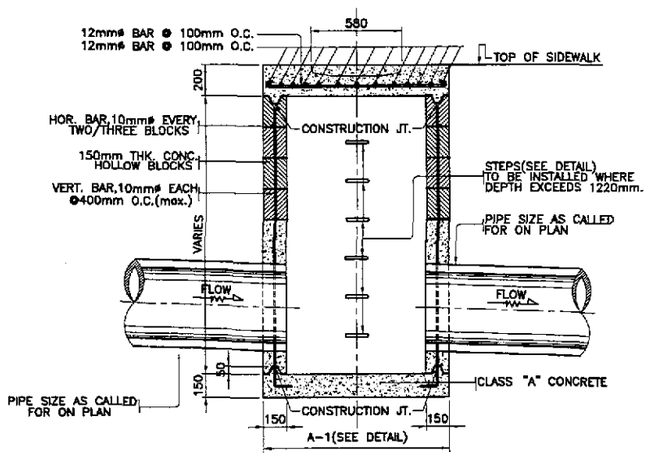
3 DS-09 PULLING IRON DETAIL
SCALE 1:5



4 DS-09 S T E P
SCALE 1:5



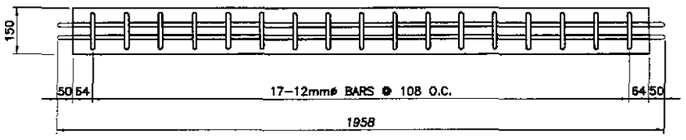
1C DS-09 SECTION
1:20



1D DS-09 SECTION

1 DS-09 CURB INLET MANHOLE
SCALE 1:20

2 DS-09 CONCRETE COVER DETAIL
SCALE 1:10



5 DS-09 DETAIL OF BAR GRATE FOR OPENING OF CURB INLET
SCALE 1:20

TABLE OF DIMENSION		
TYPE OF CIM	SIZE OF PIPE (mm)	A-1
T-1	300	1.12 M.
T-2	460	1.19 M.
T-3	610	1.37 M.
T-4	760	1.54 M.
T-5	910	1.73 M.
T-6	1070	1.90 M.
T-7	1220	2.08 M.
T-8	1520	2.43 M.

NOTES:
1. ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
2. PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
3. CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
4. CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS SHALL HAVE AN AVERAGE COMPRESSIVE STRENGTH OF 6.865MPa.
5. IN CONCRETE HOLLOW BLOCKS STRUCTURE, ALL HOLES SHALL BE FILLED WITH CEMENT MORTAR.
6. WHERE CONCRETE HOLLOW BLOCKS STRUCTURES ATTAIN A HEIGHT OF 1.20 METER, IT SHALL BE REINFORCED STEEL BARS SPACE AT NOT MORE THAN 0.60 M. O.C. BOTHWAYS.
7. INSTALL STEPS ONLY WHERE DEPTH EXCEEDS 1.22 METERS.

DETAILS OF COMBINATION CURB INLET MANHOLE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY
KEI KATAHIRA & ENGINEERS INTERNATIONAL
YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/22/08	T. STO. MARIA
CHECKED	9/22/08	A. MAKIM
SUBMITTED	9/22/08	M. ENDOH, TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

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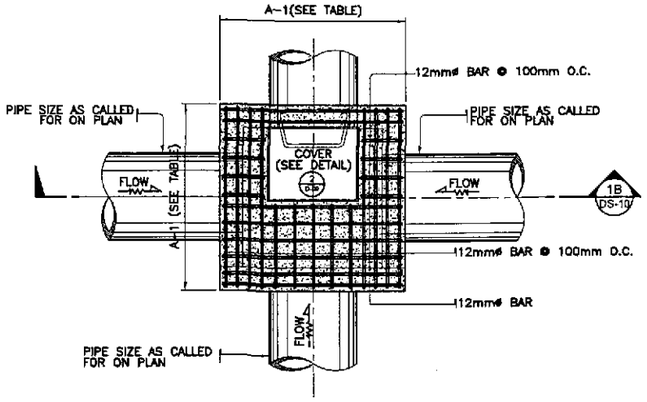
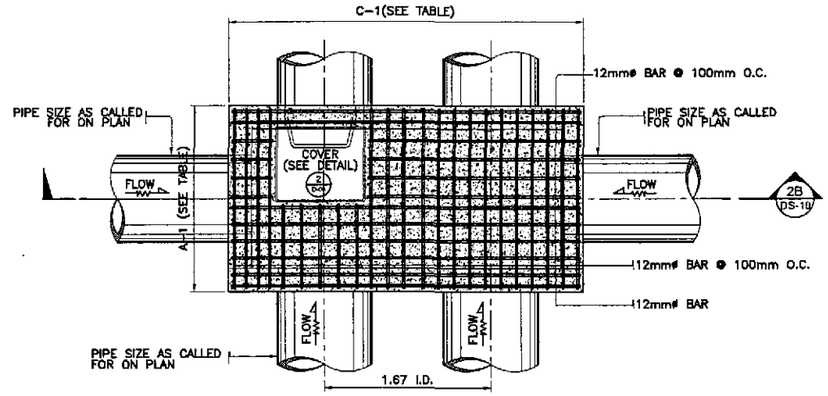
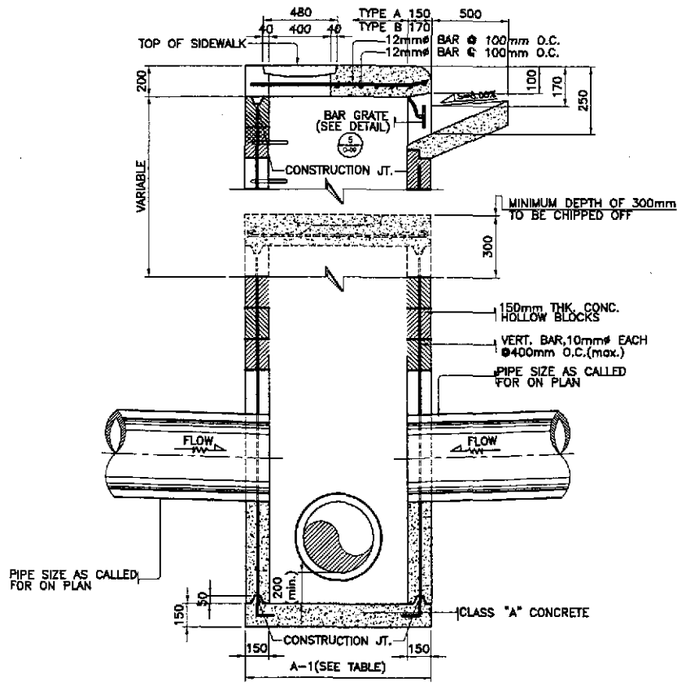
PLARIDEL BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		



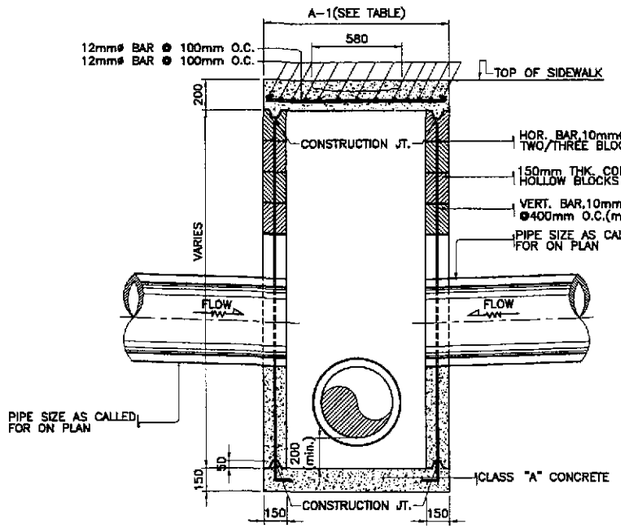
1A DS-10 PLAN BOX-TYPE MANHOLE (SINGLE PIPE)



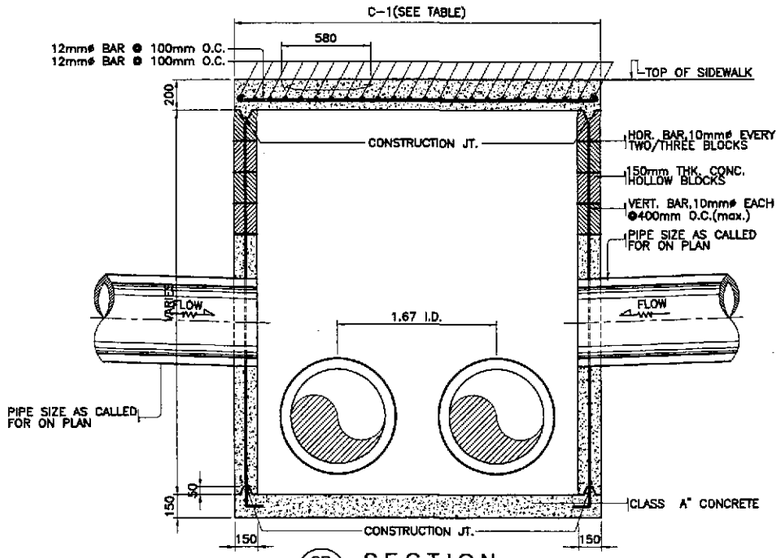
2A DS-10 PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)



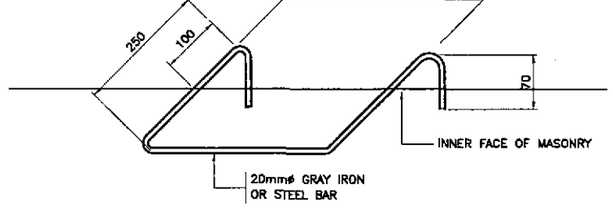
3 DS-10 BOX-TYPE CONVERTED TO CURB INLET MANHOLE



1B DS-10 SECTION



2B DS-10 SECTION



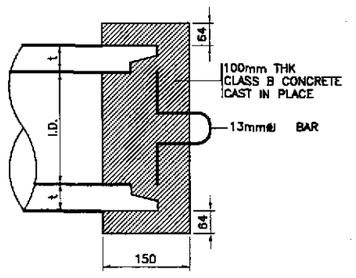
4 DS-10 STD. STEP OR RUNG

TABLE OF MANHOLE					
(H) HEIGHT mm.	(T) THICKNESS OF WALL (mm)	VERTICAL BARS			HORIZONTAL BARS
		INSIDE EDGE	CENTER	OUTSIDE EDGE	
1000	150mm CHB	–	10mmø @ 200	–	10mmø @ 400
2000	150mm CHB	–	12mmø @ 200	–	10mmø @ 400
3000	180mm CONC.	20mmø @ 300	–	32mmø @ 300	10mmø @ 400
4000	230mm CONC.	20mmø @ 250	–	32mmø @ 250	10mmø @ 400
5000	280mm CONC.	20mmø @ 225	–	32mmø @ 225	10mmø @ 400
6000	330mm CONC.	20mmø @ 200	–	32mmø @ 200	10mmø @ 400
7000	380mm CONC.	20mmø @ 175	–	32mmø @ 175	10mmø @ 400
8000	410mm CONC.	20mmø @ 150	–	32mmø @ 150	10mmø @ 400

TABLE OF DIMENSION			
TYPE OF CIM	SIZE OF PIPE (mm)	A-1 (m)	C-1 (m)
T-1	300	1.12	1.92
T-2	460	1.19	2.26
T-3	610	1.37	2.69
T-4	760	1.54	3.11
T-5	910	1.73	3.55
T-6	1070	1.90	3.98
T-7	1220	2.08	4.42
T-8	1520	2.43	5.27

NOTES:

1. ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
2. PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
3. CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
4. CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS SHALL HAVE AN AVERAGE COMPRESSIVE STRENGTH OF 6.865MPa.
5. IN CONCRETE HOLLOW BLOCKS STRUCTURE, ALL HOLES SHALL BE FILLED WITH CEMENT MORTAR.
6. WHERE CONCRETE HOLLOW BLOCKS STRUCTURES ATTAIN A HEIGHT OF 1.20 METER, IT SHALL BE REINFORCED STEEL BARS SPACE AT NOT MORE THAN 0.60 M. O.C. BOTHWAYS.
7. INSTALL STEPS ONLY WHERE DEPTH EXCEEDS 1.22 METERS.
8. 150 mm BOTTOM SLAB THICKNESS FOR HEIGHT OF 1000 TO 4000mm. AND 200mm. FOR 5000 TO 8000mm IN HIEGHT.
9. FROM THE HEIGHT OF 3000 TO 8000mm. THE FIRST 2000mm, FROM THE TOP IS CHB WITH DETAILS FOR 2000mm HEIGHT.
10. REINFORCEMENT FOR BOTTOM SLAB ARE ALL 10mmø @ 400 B.W.
11. VERTICAL BARS ARE CUT AT HALF POINT FOR EVERY OTHER BAR AT SOLID WALL.
12. INSIDE SURFACES AND OUTSIDE SURFACES OF ALL MASONRY SHALL HAVE A PLASTER COAT 1/2" THICK.
13. BOX TYPE MANHOLE SHAL NOT BE CONSTRUCTED WITHIN THE RIDING SURFACE.



5 DS-10 CONCRETE BLOCK PLUG @ SUBSURFACE PIPE

SPECIAL JUNCTION BOX MANHOLE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

KEI KATAHIRA & ENGINEERS INTERNATIONAL — YEC YACHIYO ENGINEERING CO., LTD.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	9/25/02		Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	9/27/02		DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
SUBMITTED	9/30/02	M. UNOKI TEAM LEADER	Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
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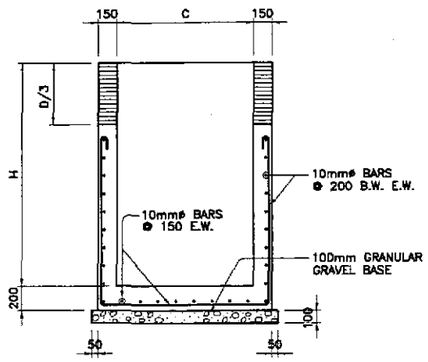
PLARIDEL BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		



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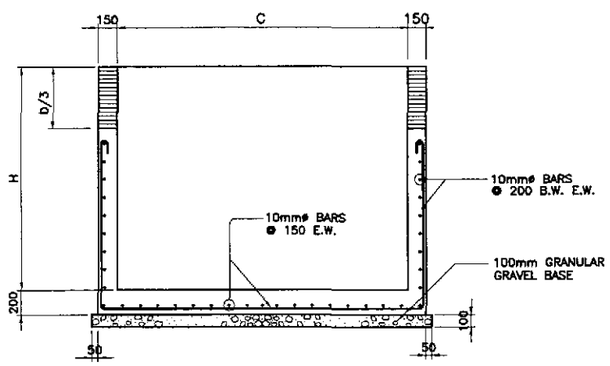
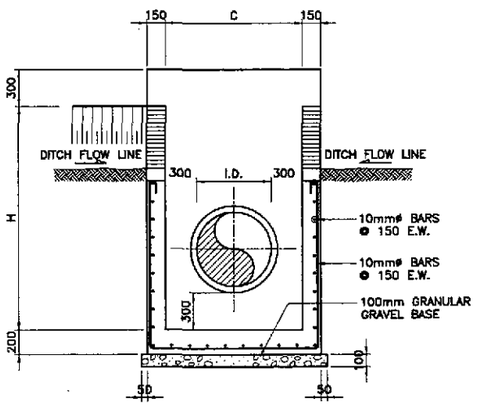


2C DS-11 SECTION



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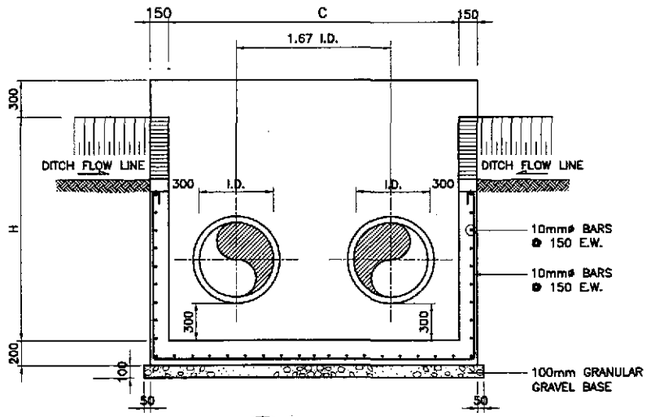

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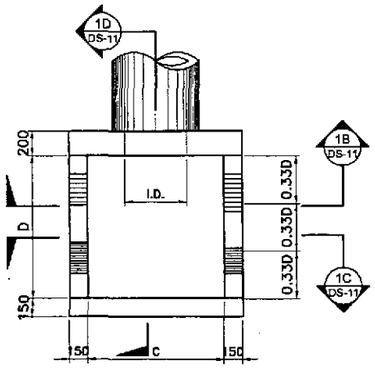
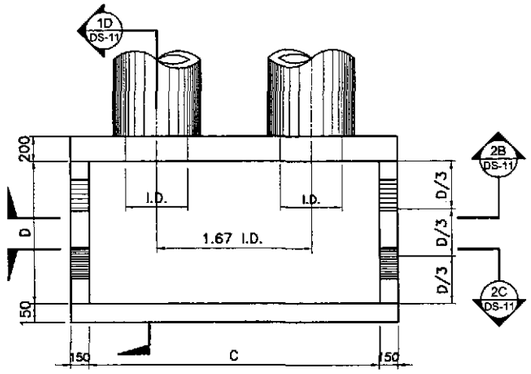


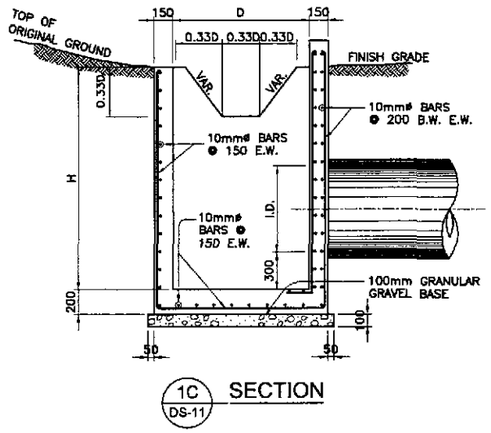
1A D-11 PLAN



2A DS-11 PLAN

1 DS-11 CONCRETE CATCH BASIN (SINGLE PIPE)
SCALE 1:25

2 DS-11 CONCRETE CATCH BASIN (DOUBLE PIPE)
SCALE 1:25



1C DS-11 SECTION

REINFORCED CONCRETE CATCH BASIN DIMENSION FOR RCPC

PIPE DIAMETER (mm)		610	910	1070	1220	1520
COMMON TO ALL NUMBER OF BARRELS	H	1.910	2.210	2.370	2.520	2.820
	D	1.200	1.500	1.650	1.800	2.100
SINGLE	C	1.210	1.510	1.670	1.820	2.120
DOUBLE	C	2.230	3.030	3.460	3.860	4.660
TRIPLE	C	3.250	4.550	5.240	5.890	7.120

DETAILS OF REINFORCED CONCRETE CATCH BASIN FOR RCPC

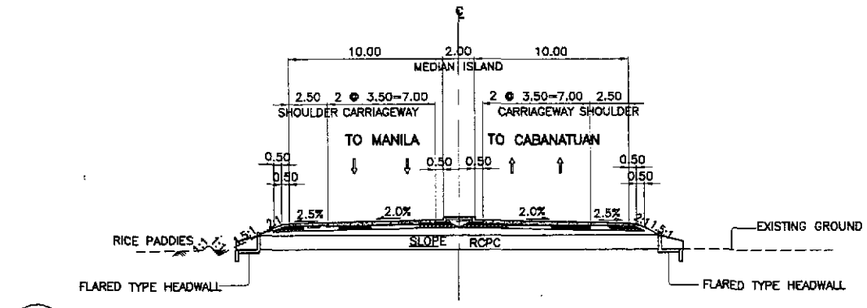
JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/27/02	F. SIA, JR.
CHECKED	9/27/02	
SUBMITTED	9/30/02	M. ROSAL TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

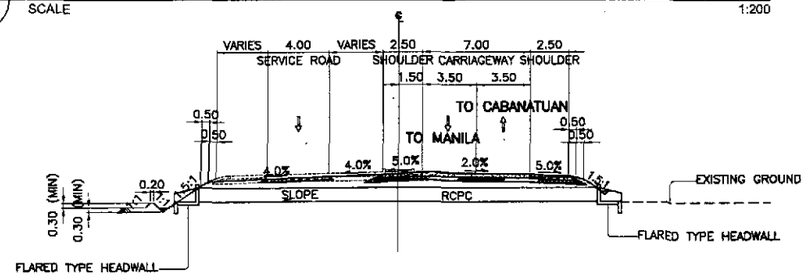
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE III	1:25 FULL SIZE A1	STANDARD REINFORCED CONCRETE CATCH BASIN FOR RCPC	DS-11



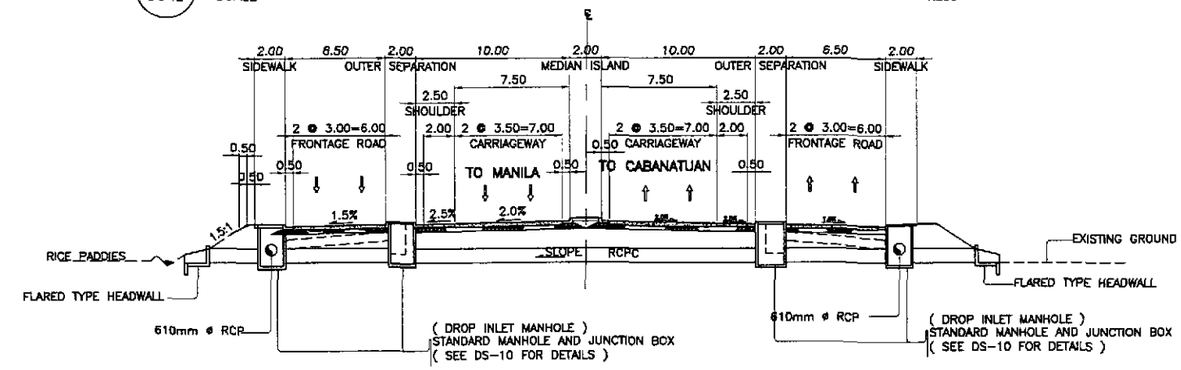
1 DS-12 TYPICAL DRAINAGE SECTION (ULTIMATE STAGE)

SCALE 1:200



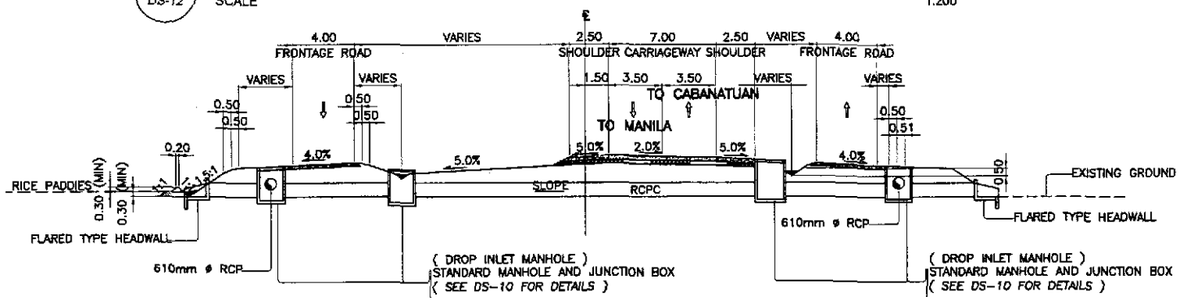
2 DS-12 TYPICAL DRAINAGE SECTION (INITIAL STAGE)

SCALE 1:200



3 DS-12 TYPICAL DRAINAGE SECTION WITH CURB INLET MANHOLE (ULTIMATE STAGE)

SCALE 1:200

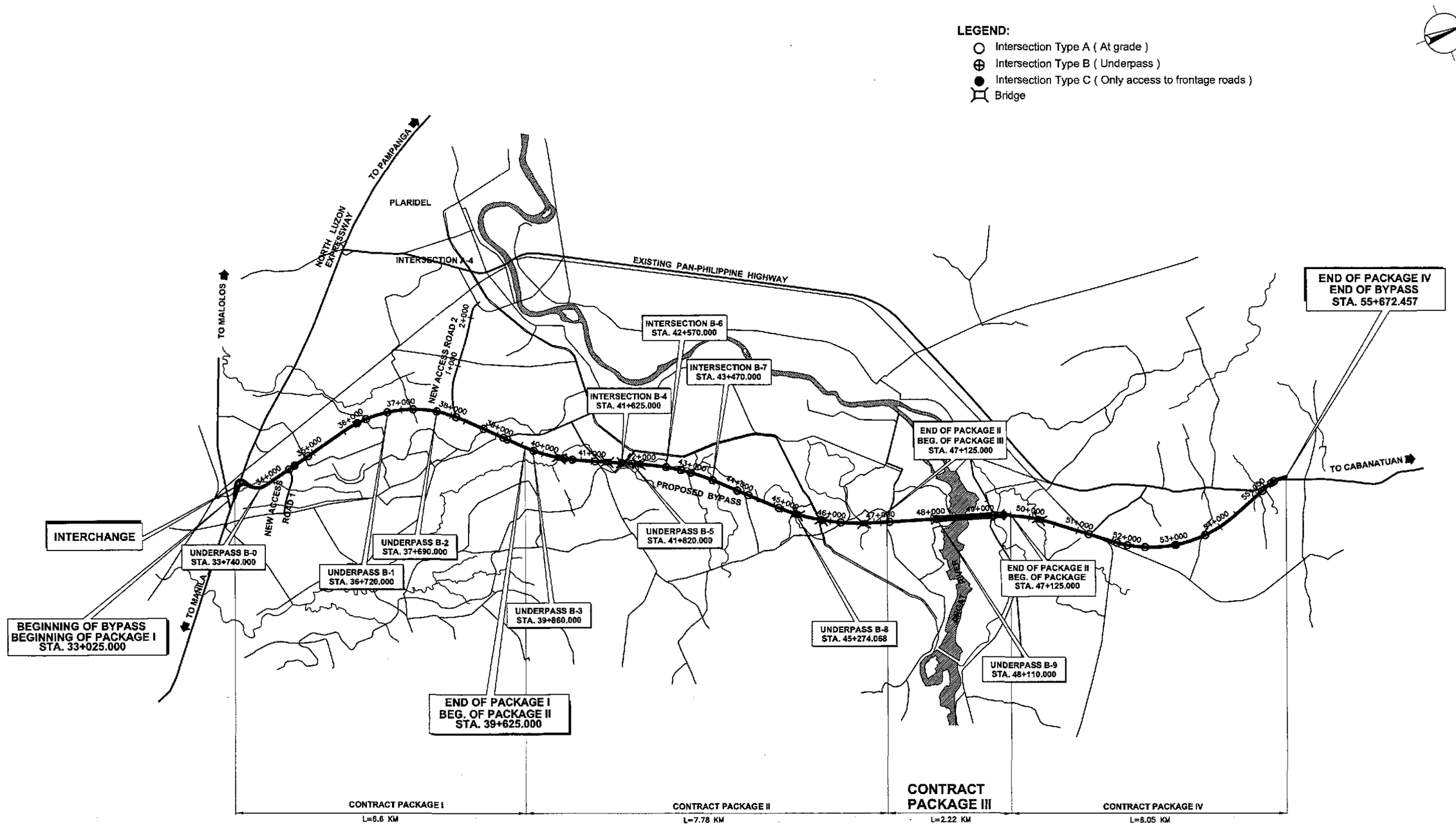


4 DS-12 TYPICAL DRAINAGE SECTION WITH DROP INLET MANHOLE (INITIAL STAGE)

SCALE 1:200

JICA JAPAN INTERNATIONAL COOPERATION AGENCY KEI KATAHIRA & ENGINEERS INTERNATIONAL YEC YACHIYO ENGINEERING CO., LTD.		DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	9/26/06	F. STA. MARIA	PJHL – PMO	BUREAU OF DESIGN	OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE FULL SIZE A1	TYPICAL DRAINAGE SECTIONS WITH MANHOLE (INITIAL and ULTIMATE STAGE)	DS-12
	CHECKED	9/27/06	H. YASUI	Submitted By:	Reviewed By: / Recommended By:	Recommended By: (See cover sheet for Signature) / Approved By: (See cover sheet for Signature/Approval)				
	SUBMITTED	9/20/06	M. KOMATSU TEAM LEADER	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division / GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary / SIMEON A. DATUMANONG Secretary	PLARIDEL BYPASS - CONTRACT PACKAGE III			

UNDERPASS CROSSING (BOX CULVERT)



A / UP-01 SITE DEVELOPMENT PLAN - UNDERPASSES ALONG BYPASS

SCALE 1:40,000

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KEI KATAHIRA & ENGINEERS INTERNATIONAL
YEC YACHIYO ENGINEERING CO., LTD.

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DESIGNED	9/26/02	
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SUBMITTED	9/30/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
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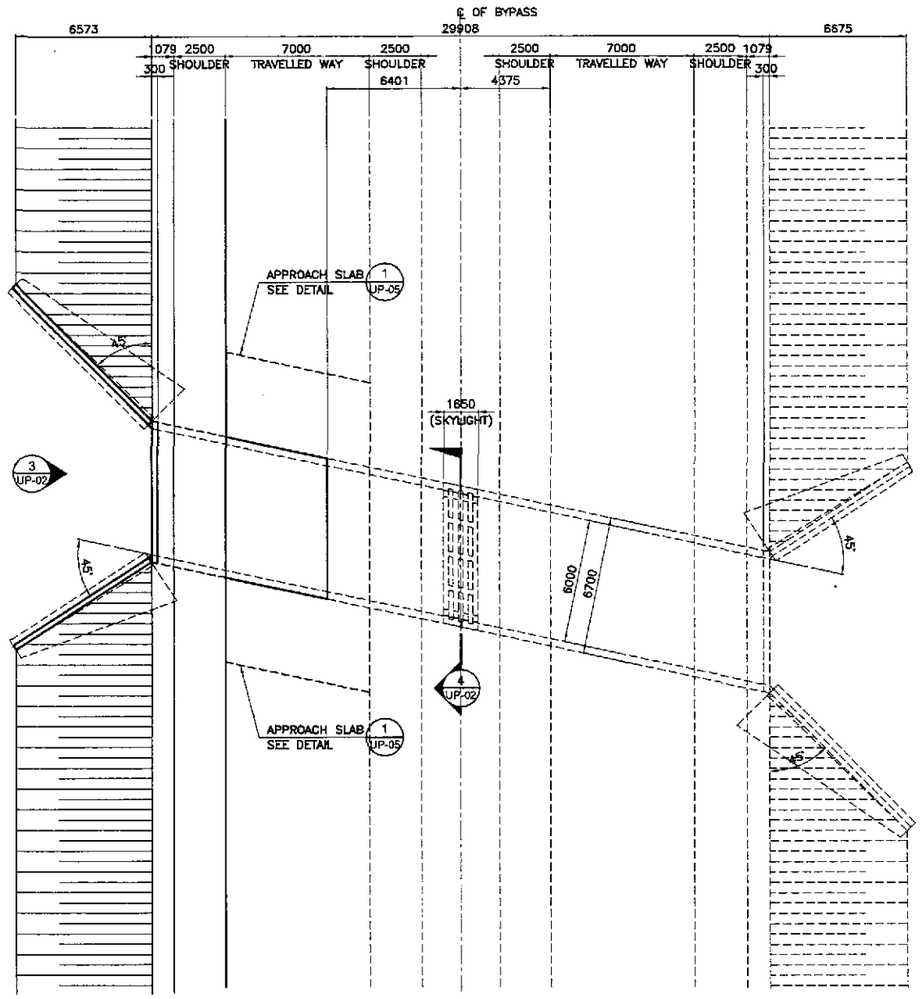
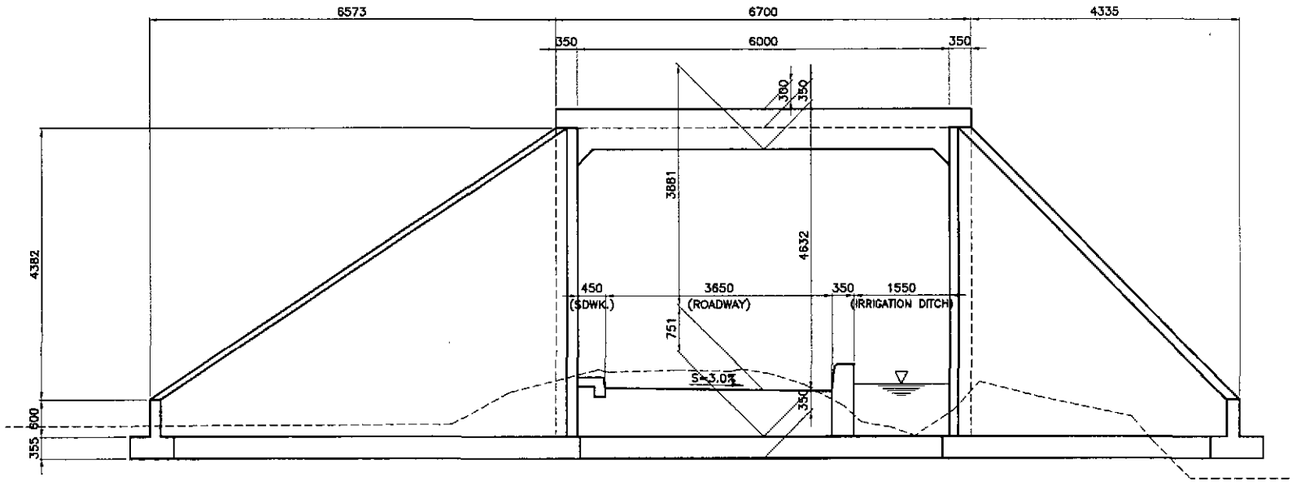
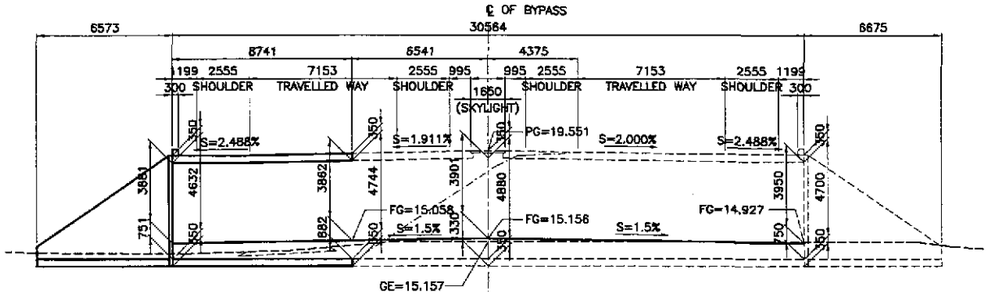


1 UP-02 GENERAL PLAN
SCALE 1:150

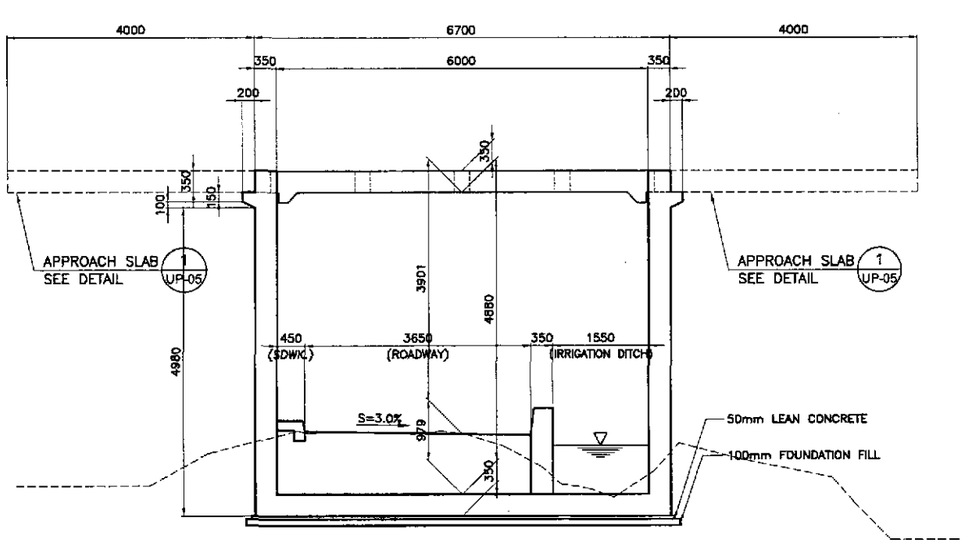


3 UP-02 ELEVATION
SCALE 1:50



NOTE:
THE HORIZONTAL DIMENSIONS INDICATED IN THIS ELEVATION ARE SKEWED LENGTH

2 UP-02 GENERAL ELEVATION
SCALE 1:150



4 UP-02 SECTION
SCALE 1:50

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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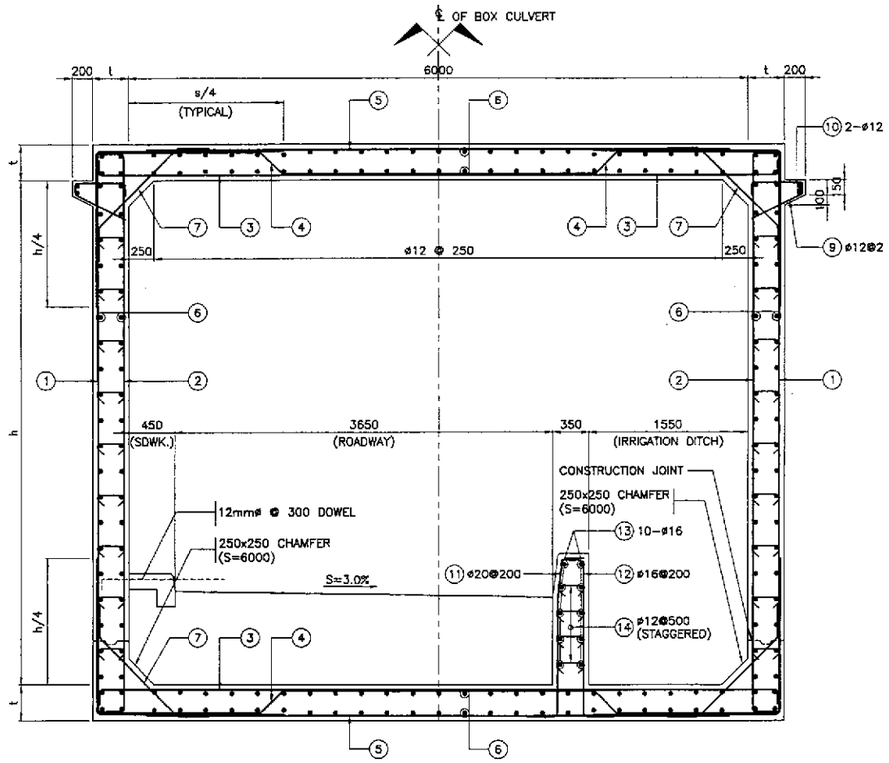
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE III

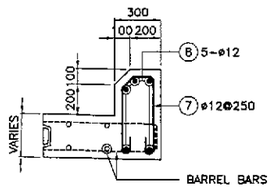
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(ULTIMATE STAGE)
B-9 (STA. 48+110.00)

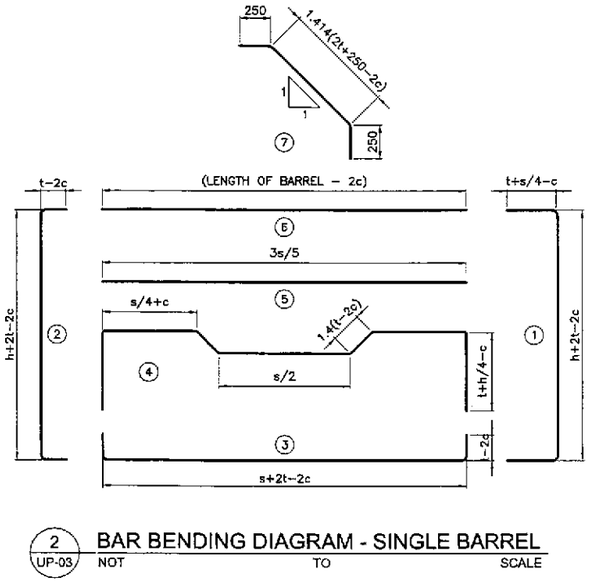
SHEET NO. :
UP-02



1 UP-03 SECTION - SINGLE BARREL
NOT TO SCALE



3 UP-03 PARAPET DETAIL
SCALE 1:20



2 UP-03 BAR BENDING DIAGRAM - SINGLE BARREL
NOT TO SCALE

DESIGN NOTES :

SPECIFICATIONS:
DESIGN:
BRIDGE DESIGN SPECIFICATION (1992 AASHTO SPECIFICATIONS)

LOAD FACTORS:
1.5 D 1.5 E + 2.5 (L + I)
1.3 (D + 1.67 LL + 1.00 E)
1.3 (D + 1.67 LL + 0.50 E)

WHERE:
D – DEAD LOAD
E – EARTH LOAD
L – LIVE LOAD
I – IMPACT
CAPACITY REDUCTION FACTOR IS INCLUDED.

LOADING:
LIVE LOAD:
HS20-44 TRUCK
APPLY IMPACT ONLY TO THE ROOF SLAB.

EARTH COVER (mm)	IMPACT (%)
Up to 300	30
301 to 600	20
601 to 900	10
Over 900	0

NO SURCHARGE ON WALL DUE TO LIVE LOAD.

EARTH LOAD:
EARTH PRESSURE FOR CONDITIONS:
18.8 KPa/m VERTICAL
9.4 KPa/M HORIZONTAL

UNIT STRESSES:
f'c = 28 MPa
fy = 276 MPa

DISTRIBUTION "d" BARS:
UP TO AND INCLUDING 3.0M COVER EXPRESSED AS A PERC OF MAIN POSITIVE REINFOCEMENT REQUIRED:
$\frac{55}{\sqrt{S}}$, MAX. 50%

OVER 3.0 COVER
ø12 @ 450 mm MAXIMUM.

SHEAR:
MAXIMUM ALLOWABLE SHEAR, $v = 0.291\sqrt{f'c}$ MPa

EXCLUSIONS:
COMPRESSIVE REINFORCEMENT AND NEGATIVE-MOMENT REDUCTION (FOR CONTINUITY) DO NOT APPLY.
AXIAL LOADING ON MEMBERS HAS NOT BEEN CONSIDERED.

BAR SCHEDULE SINGLE BARREL BOX CULVERT

NAME	S	h	t	BAR 1		BAR 2		BAR 3		BAR 4		BAR 5		BAR 6		BAR 7		REMARKS
	SPAN	HEIGHT	THICKNESS	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	
B-9	6000	4900	350	20	200	20	200	20	200	20	200	12	200	12	250	16	200	FLUSHED TO ROADWAY (SKEW 12°LF)

SCHEDULE OF REINFORCEMENTS (B9 – STA. 48+110.000)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=9.040m.	1	20	94	200	A	1800	5373	1800	–	–	–	8973	843.46	2.466	2080	76.31
	2	20	92	200	A	250	5373	250	–	–	–	5873	540.32	2.466	1333	
	3	20	94	200	A	250	6600	250	–	–	–	7100	667.4	2.466	1646	
	4	20	92	200	B	1493	1550	354	3000	–	–	9794	901.01	2.466	2222	
	5	12	94	200	C	4000	–	–	–	–	–	4000	376	0.888	334	
	6	12	196	250	C	9142	–	–	–	–	–	9142	1791.82	0.888	1592	
	7	16	180	200	D	560	1202	560	–	–	–	2322	417.94	1.579	660	
	8	12	56	250	E	114	450	71	150	550	114	999	55.93	0.888	50	
	9	12	10	AS DWG	D	6598	–	–	–	–	–	6598	65.98	0.888	59	
	10	12	58	250	H	500	70	707	–	–	–	1277	74.07	0.888	66	
	11	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
DITCH WALL	12	20	46	200	J	209	371	1147	317	–	–	2044	94.02	2.466	232	4.05
	13	16	46	200	K	209	1527	317	–	–	–	2053	94.44	1.579	150	
	14	12	10	AS DWG	D	8940	–	–	–	–	–	8940	89.4	0.888	80	
	15	12	93	400	G	114	274	114	–	–	–	502	46.69	0.888	42	
WINGWALL (h+t)=5.123m. L=9.596m.	W1	12	2	AS DWG	D	600	11533	–	–	–	–	12133	24.27	0.888	22	18.82
	W2	12	17	300	D	5381 (mm)	–	–	–	–	–	5381	91.47	0.888	82	
	W3a	32	16	200	I	1755	4599 (mm)	150	–	–	–	6504	104.07	6.313	657	
	W3b	25	15	200	I	1265	3092 (mm)	150	–	–	–	4506	67.6	3.854	261	
	W3c	16	8	350	I	805	1584 (mm)	150	–	–	–	2539	20.31	1.579	33	
	W4	12	33	300	I	203	3092 (mm)	150	–	–	–	3444	113.67	0.888	101	
	W5a	25	15	200	D	2251 (mm)	–	–	–	–	–	2251	33.76	3.854	131	
	W5b	25	7	400	D	1799 (mm)	–	–	–	–	–	1799	12.59	3.854	49	
	W5c	16	8	350	D	1138 (mm)	–	–	–	–	–	1138	9.1	1.579	15	
	W6	12	7	AS DWG	D	9846	–	–	–	–	–	9846	68.92	0.888	62	
WINGWALL (h+t)=5.123m. L=8.137m.	W1	12	2	AS DWG	D	600	9779	–	–	–	–	10379	20.76	0.888	19	16
	W2	12	17	300	D	4554 (mm)	–	–	–	–	–	4554	77.42	0.888	69	
	W3a	32	14	200	I	1755	4599 (mm)	150	–	–	–	6504	91.06	6.313	575	
	W3b	25	13	200	I	1265	3092 (mm)	150	–	–	–	4506	58.58	3.854	226	
	W3c	16	7	350	I	805	1584 (mm)	150	–	–	–	2539	17.77	1.579	29	
	W4	12	28	300	I	203	3092 (mm)	150	–	–	–	3444	96.45	0.888	86	
	W5a	25	13	200	D	2251 (mm)	–	–	–	–	–	2251	29.26	3.854	113	
	W5b	25	6	400	D	1799 (mm)	–	–	–	–	–	1799	10.79	3.854	42	
	W5c	16	7	350	D	1138 (mm)	–	–	–	–	–	1138	7.96	1.579	13	
	W6	12	7	AS DWG	D	8387	–	–	–	–	–	8387	58.71	0.888	53	
													GRAND TOTAL =		13209 KG	115.2

JAPAN INTERNATIONAL COOPERATION AGENCY
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	M. CHAN
CHECKED	9/27/02	A. ABACIM
SUBMITTED	9/30/02	M. RUSSEL TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :
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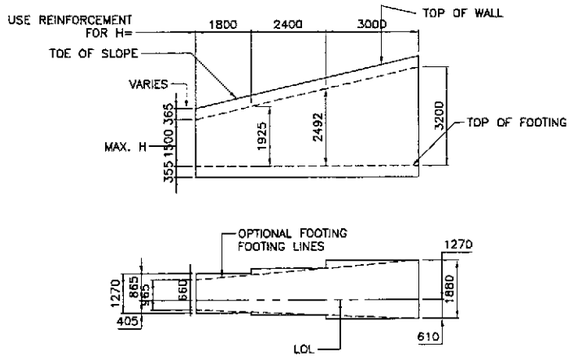
PLARIDEL BYPASS - CONTRACT PACKAGE III

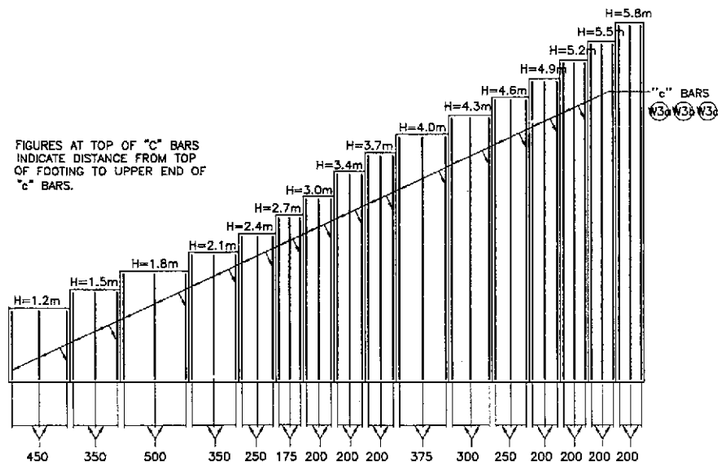
SCALE : AS SHOWN (FULL SIZE A1)

SHEET CONTENTS : BOX CULVERT BARREL DETAILS (ULTIMATE STAGE)

SHEET NO. : UP-03



1 / UP-04 TYPICAL LAYOUT EXAMPLE
SCALE 1:100



REINFORCED CONCRETE WINGWALLS																
H	1200	1500	1800	2100	2400	2700	3000	3400	3700	4000	4300	4600	4900	5200	5500	5800
W	965	1120	1270	1420	1575	1730	1880	2030	2185	2335	2490	2640	2795	2945	3050	3150
C	305	355	405	455	510	560	610	660	710	760	815	865	915	965	1015	1065
B	660	765	865	965	1065	1170	1270	1370	1475	1575	1675	1775	1880	1980	2035	2085
F	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355
Batter	None	None	None	None	None	None	None	None	None	1:25	1:25	1:25	1:25	1:25	1:26	1:27
S	305	305	305	305	305	305	305	305	305	465	475	490	500	500	500	500
"c" Bars	12@450	12@350	12@275	16@350	16@250	16@175	20@200	25@200	25@200	32@375	32@300	32@250	32@200	32@175	32@200	32@200
"d" Bars	12@450	12@350	12@275	16@350	16@250	20@350	25@400	25@400	25@400	25@375	25@300	25@250	25@200	25@175	28@200	28@200

NOTES

UNIT STRESSES: f_s =165 MPa, f_c =9 MPa, n=10

MAXIMUM TOE PRESSURE = 180 kPa

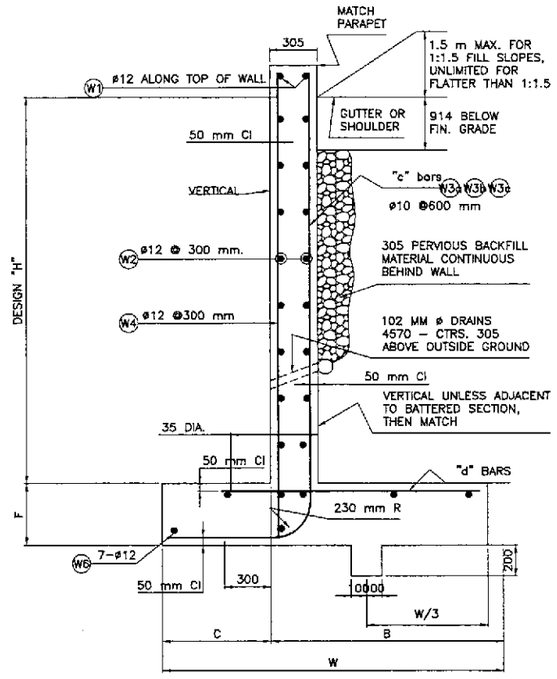
ELEVATIONS, LENGTH AND ANGLE OF FLARE OF WINGS MAY BE VARIED BY THE ENGINEER TO SUIT CONDITIONS ENCOUNTERED IN THE FIELD. WALLS DESIGNED FOR 600 mm LIVELOAD SURCHARGE, 1 : 1.5 SLOPING SURCHARGE NOT TO EXCEED 1.5 m IN ELEVATION PLUS 600 mm LIVELOAD SURCHARGE. OR UNLIMITED 1:2 SURCHARGE

DIMENSIONS "H", "L","M","N", ELEVATION "a" AND "ANGLE OF FLARES" (AS APPLY) ARE SHOWN ON THE PLANS

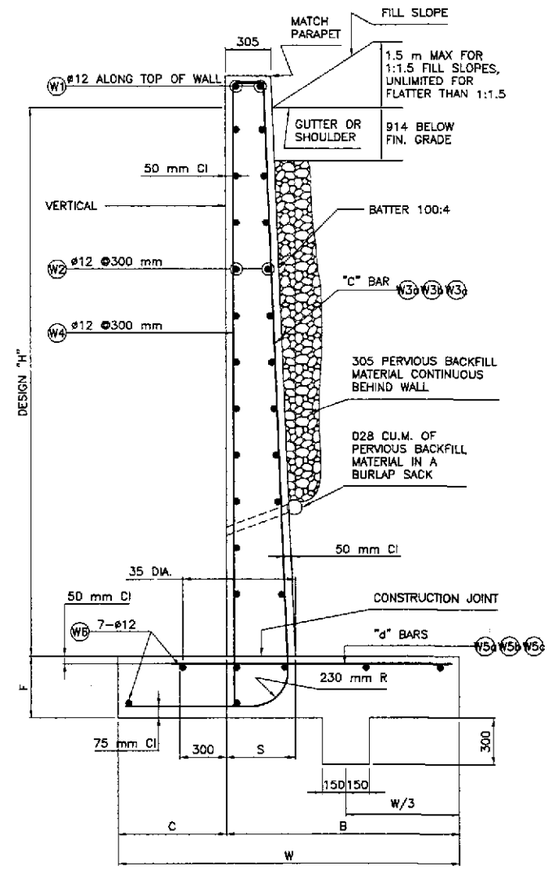
WALL HEIGHT MAY BE EXCEEDED BY 150 mm BEFORE GOING TO NEXT GREATER "H".

ELIMINATE CUTOFF WALL IF ADJACENT CHANNEL IS PAVED AND SKEW IS 20°MAXIMUM

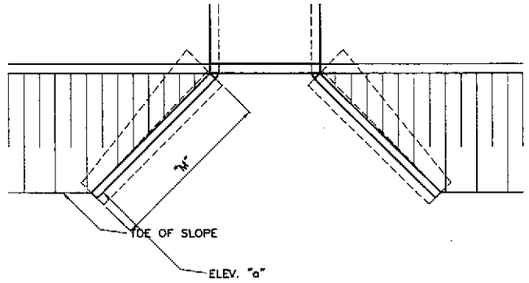
FOR WALL OFFSET VALUES, SEE STANDARD PLAN B3-8



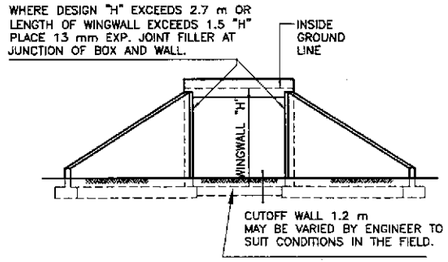
2 / UP-04 TYPICAL SECTION
H=1.2 m THRU 3.7 m
SCALE 1:20



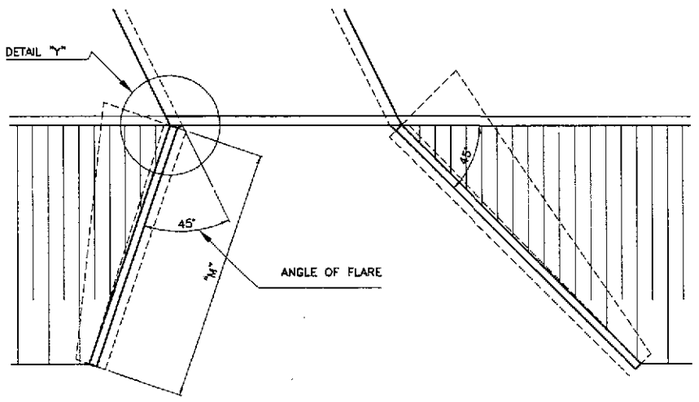
3 / UP-04 TYPICAL SECTION
H=4.0 m THRU 4.9 m
SCALE 1:20



4 / UP-04 PLAN
SCALE 1:100



5 / UP-04 END ELEVATION
SCALE 1:100



6 / UP-04 PLAN
SCALE 1:100

JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/25/02	
CHECKED	9/27/02	A. HAKIM
SUBMITTED	9/30/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

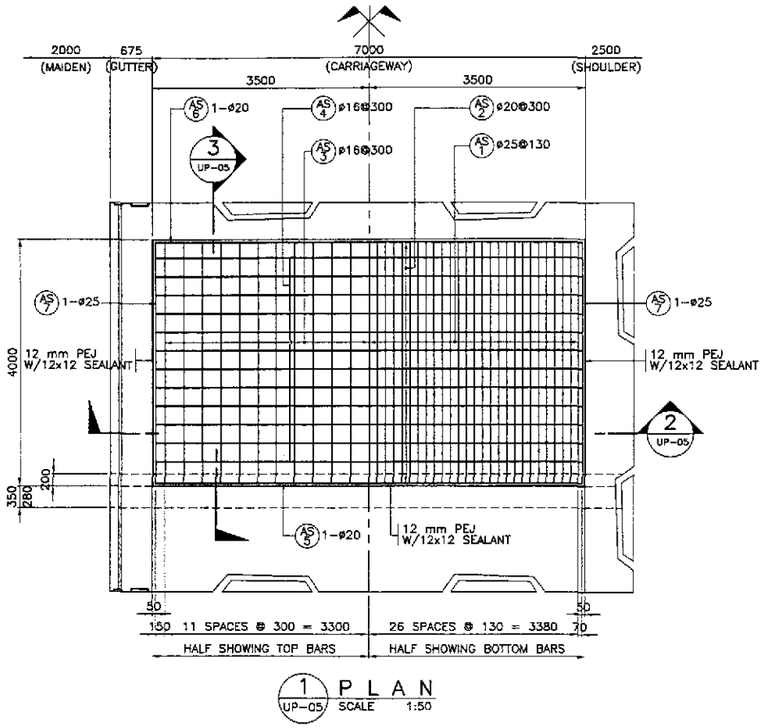
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE III

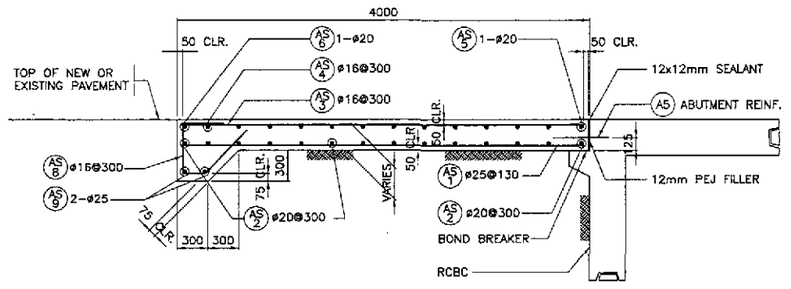
SCALE : AS SHOWN — FULL SIZE A1

SHEET CONTENTS : BOX CULVERT WINGWALL DETAIL (ULTIMATE STAGE)

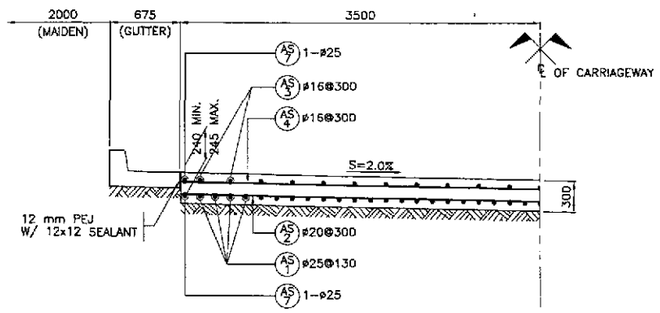
SHEET NO. : UP-04



1 UP-05 PLAN SCALE 1:50



3 UP-05 SECTION SCALE 1:30



2 UP-05 SECTION SCALE 1:30

REINFORCEMENT SCHEDULE & ESTIMATED QUANTITIES FOR TWO LANES APPROACH SLABS

BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF REBARS)	REINFORCEMENT											CONCRETE VOLUME (m^3)	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	69	130	B	3900	150	–	4050	226.80	3.853	874		1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB
	AS 2	20	14	300	A	7900	–	–	7900	55.30	2.466	136		
a (B) b	AS 3	16	25	300	B	3900	150	–	4050	101.25	1.578	160		
	AS 4	16	12	300	A	7900	–	–	7900	47.40	1.578	75		
	AS 5	20	1	AS SHOWN	A	7200	–	–	7200	7.20	2.466	18		
	AS 6	20	1	AS SHOWN	A	7900	–	–	4050	53.20	1.578	84	9.58	
400 a c b (C)	AS 7	25	4	AS SHOWN	A	1965	1965	–	3930	15.72	3.853	61		
	AS 8	16	27	300	C	415 MIN. 475 MAX.	250	650	1745	47.11	1.578	74		
	AS 9	25	2	AS SHOWN	A	7900	–	–	7900	15.80	3.853	61		
											GRAND TOTAL =	1543	9.58	

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

KEI KATAHIRA & ENGINEERS INTERNATIONAL — YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/20/02	
CHECKED	9/27/02	R. HAKIM
SUBMITTED	9/20/02	TEAM LEADER

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SHEET CONTENTS : BOX CULVERT — APPROACH SLAB DETAIL (ULTIMATE STAGE)

SHEET NO. : UP-05