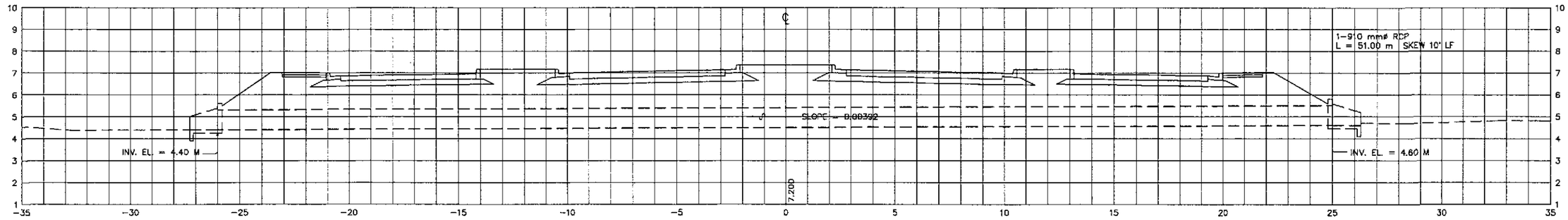
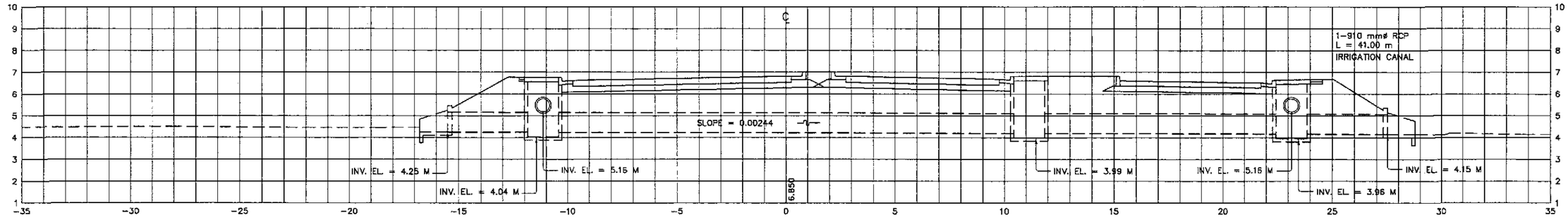
34+555



34+450



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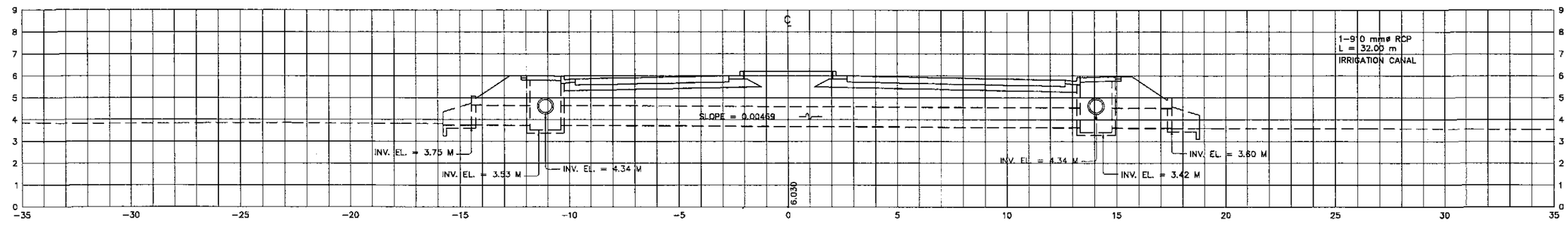
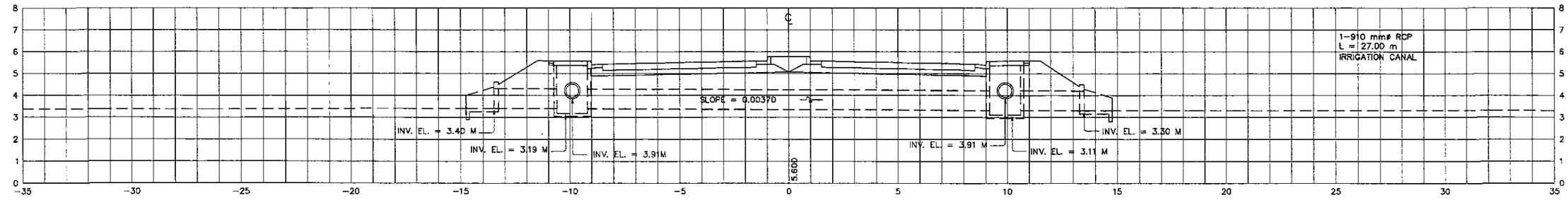


34+200



JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	9/19/02	C. STEC MARIA
CHECKED	9/24/02	A. HAKIM
SUBMITTED	9/25/02	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)

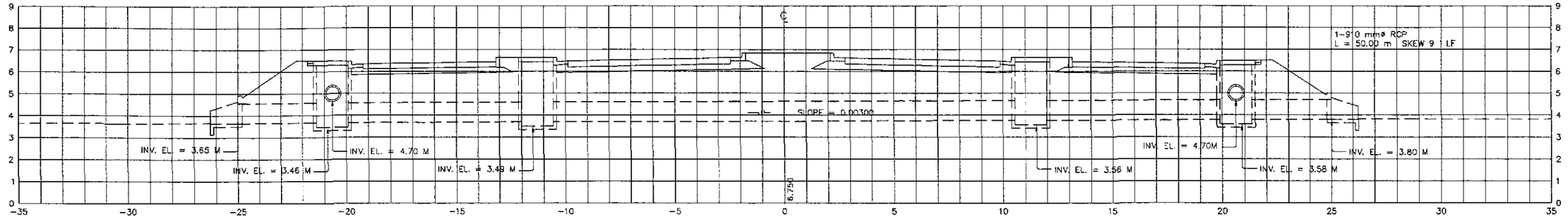
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE : 1:100 FULL SIZE A1

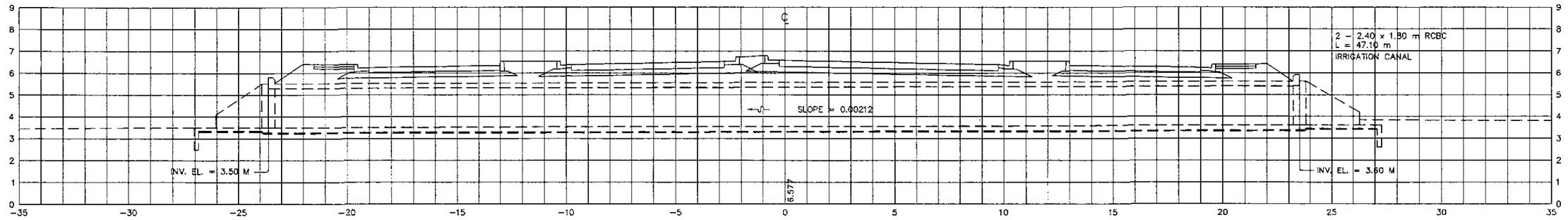
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 34+200 - STA. 34+555

SHEET NO. : **DC-01**

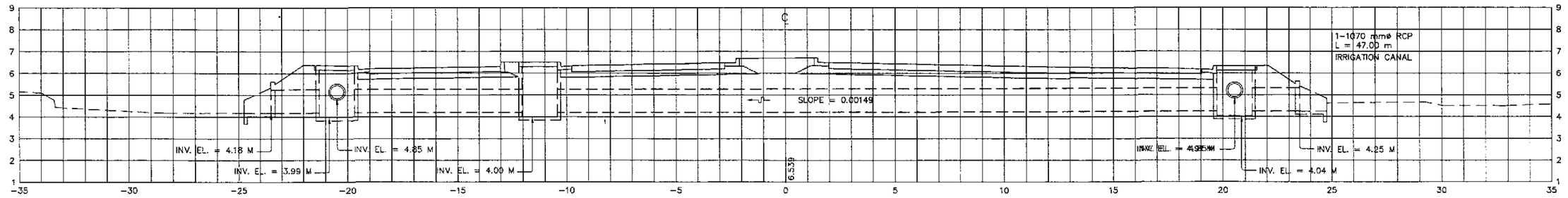
34+900



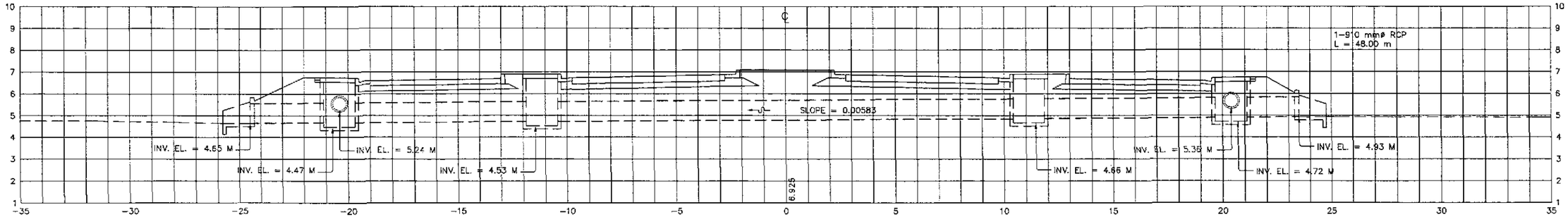
34+775



34+715



34+635



JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE *
DESIGNED	9/19/02	T. SAN MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	K. KIKUCHI 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 I

SCALE :

1:100

FULL SIZE A1

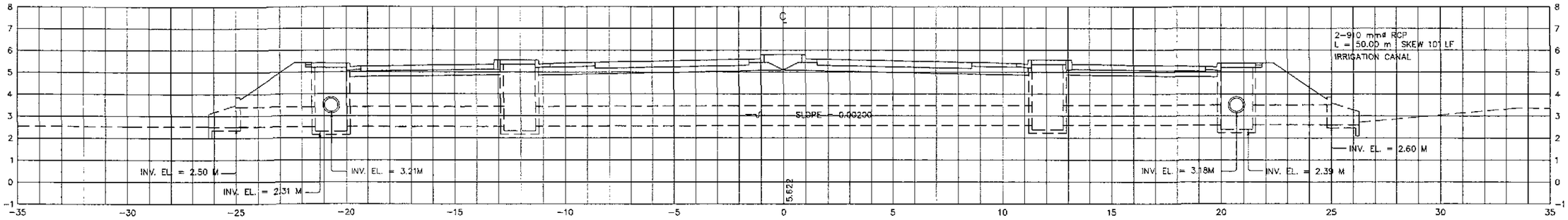
SHEET CONTENTS :

DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 34+635 - STA. 34+900

SHEET NO. :

DC-02

35+670



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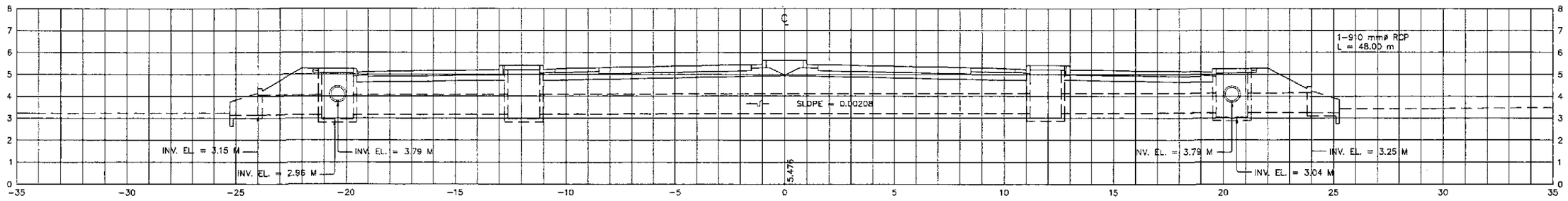

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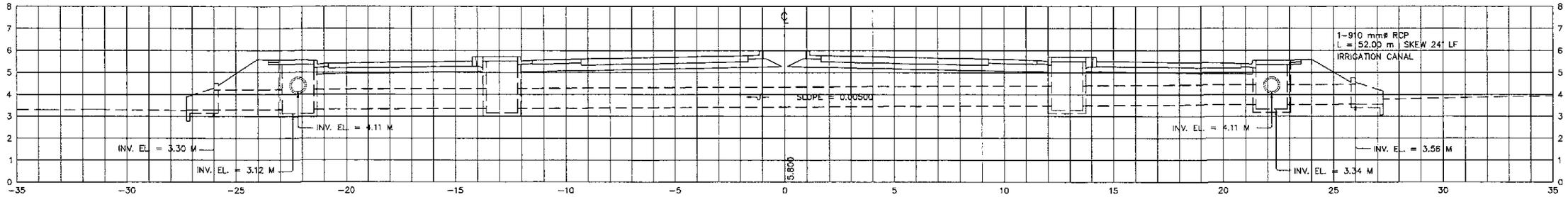
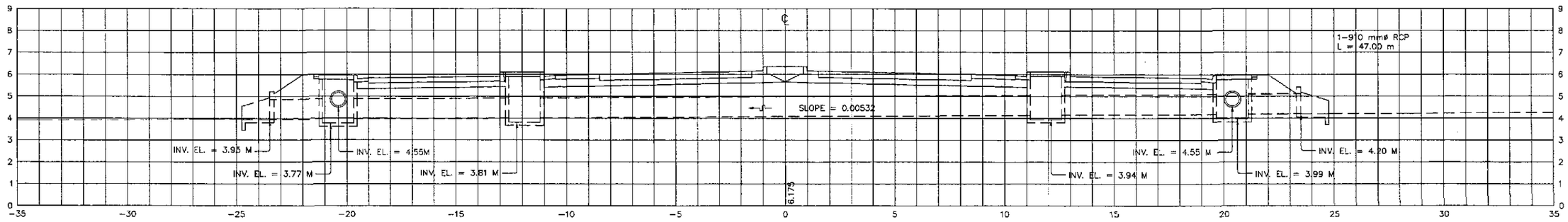


35+135



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE *
DESIGNED	9/19/02	F. SISON MARIA
CHECKED	9/24/02	A. HAKIM
SUBMITTED	9/25/02	K. ASUKA 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 :
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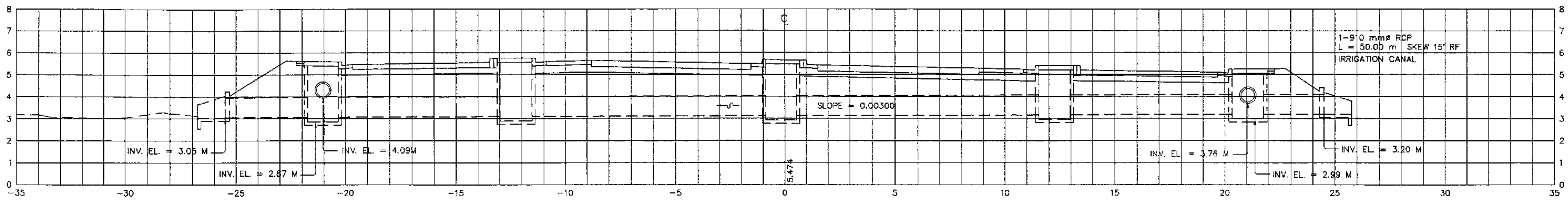
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE : 1:100 FULL SIZE A1

SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 35+135 - STA. 35+670

SHEET NO. : DC-03

36+075



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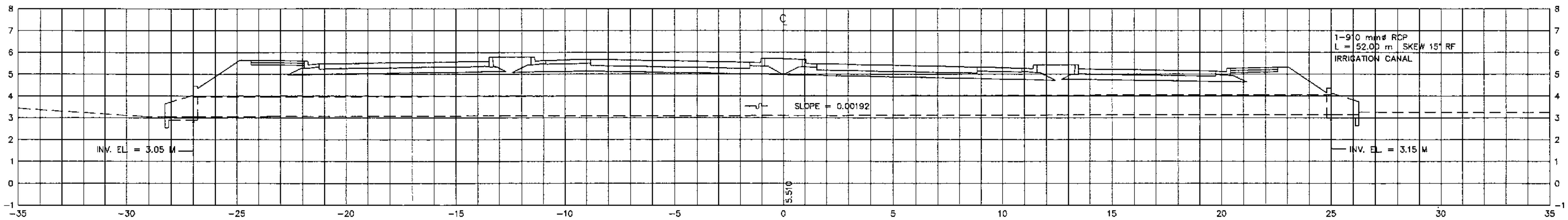
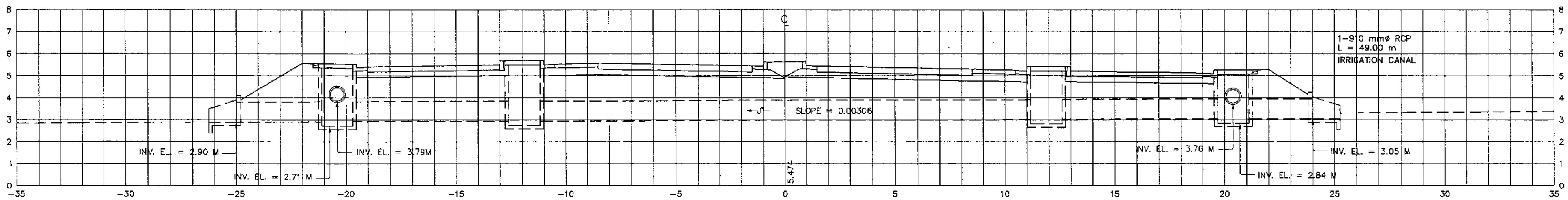
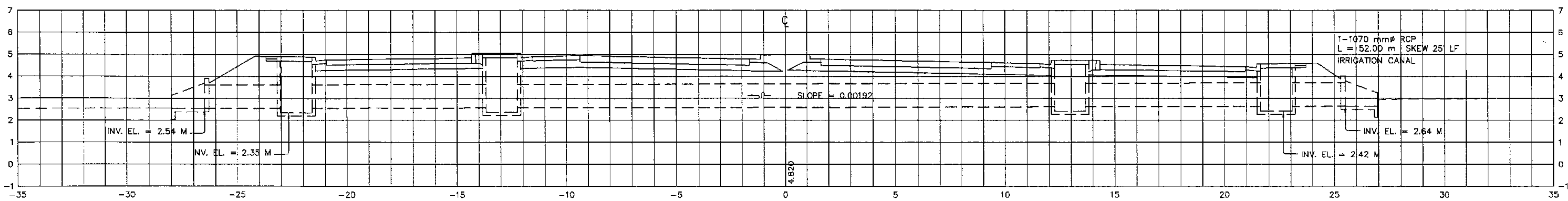


35+965



35+825



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

	DATE	SIGNATURE
DESIGNED	9/19/02	S. STA. MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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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 :
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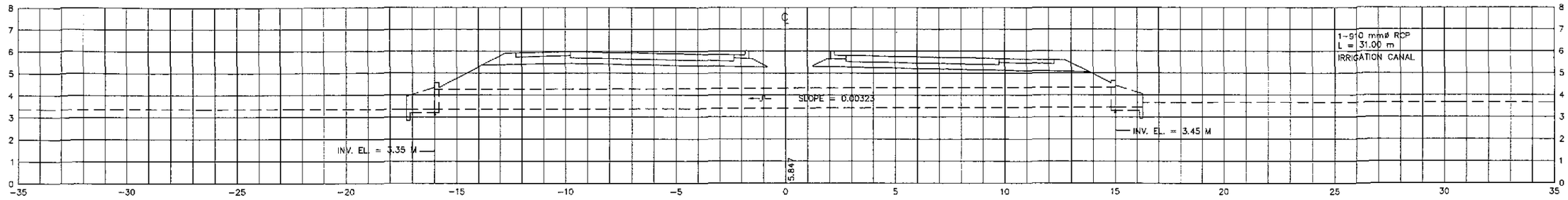
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE : 1:100
FULL SIZE A1

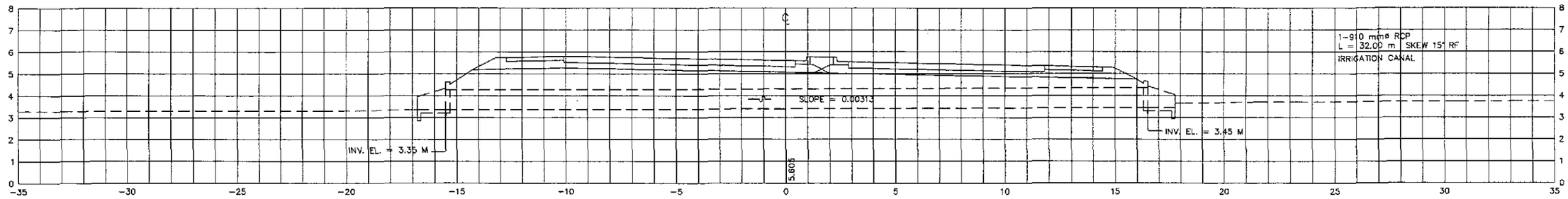
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 35+825 - STA. 36+075

SHEET NO. : DC-04

36+365



36+285



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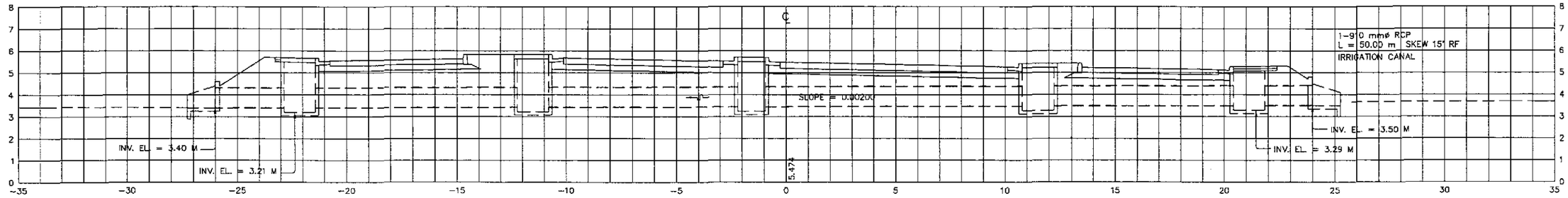
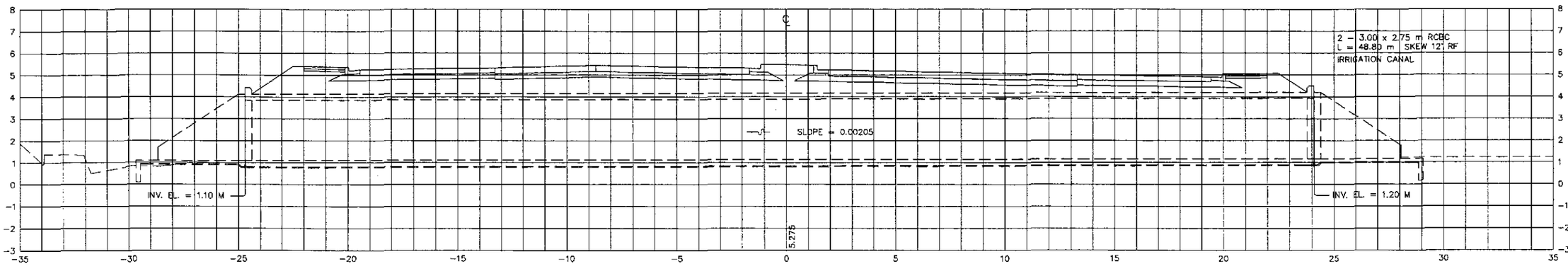


36+125



JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	9/19/02	F. SIA MARIA
CHECKED	9/21/02	A. HASKINS
SUBMITTED	9/22/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
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DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director V	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 I

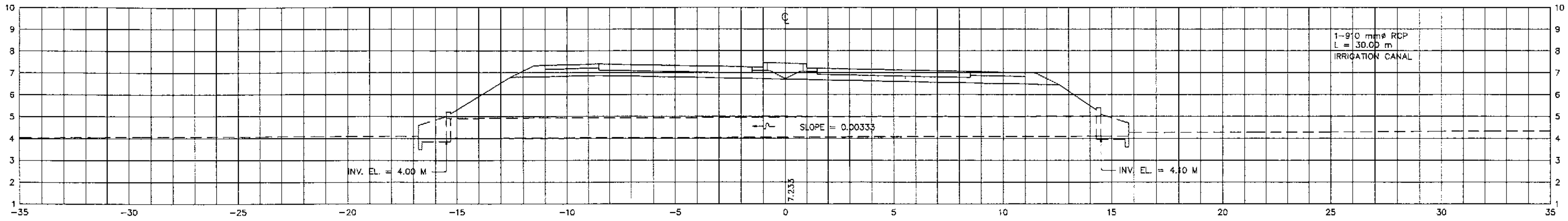
SCALE : 1:100 FULL SIZE A1

SHEET CONTENTS :

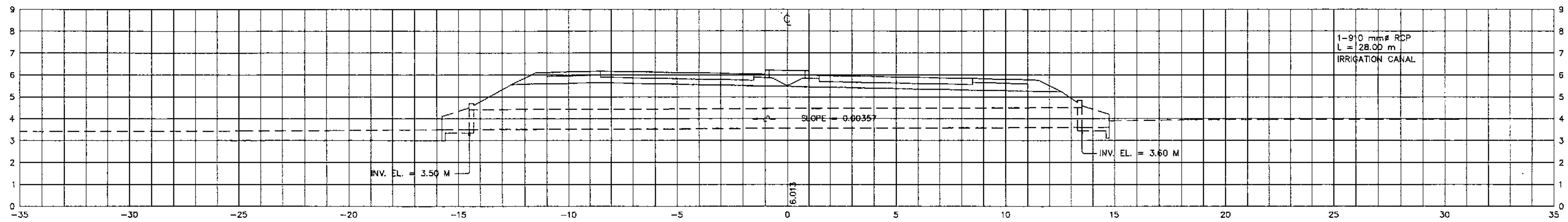
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 36+125 - STA. 36+365

SHEET NO. : **DC-05**

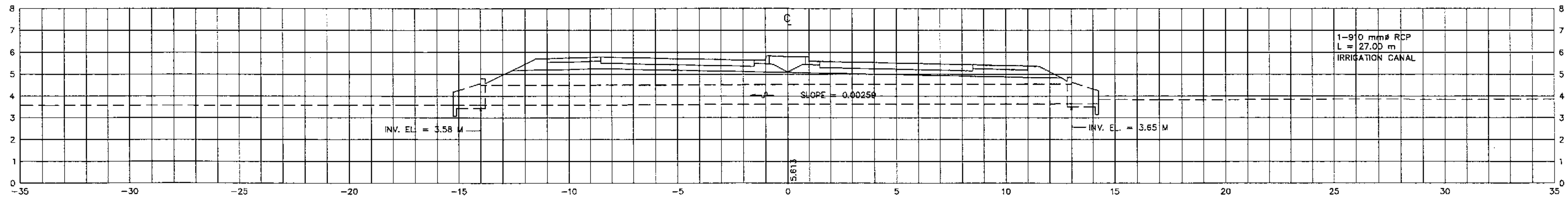
36+660



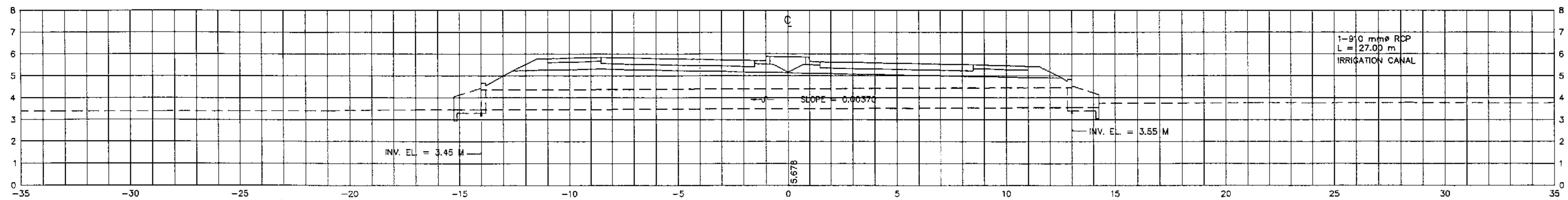
36+565



36+525



36+445



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

	DATE	SIGNATURE
DESIGNED	9/19/02	V. STA. MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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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 :
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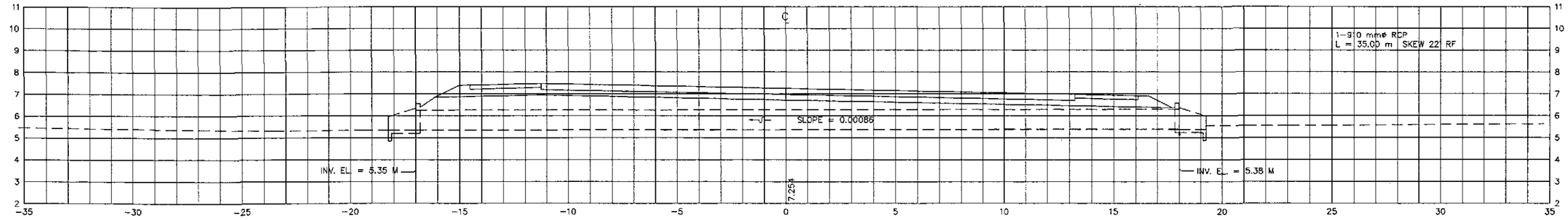
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE : 1:100
FULL SIZE A1

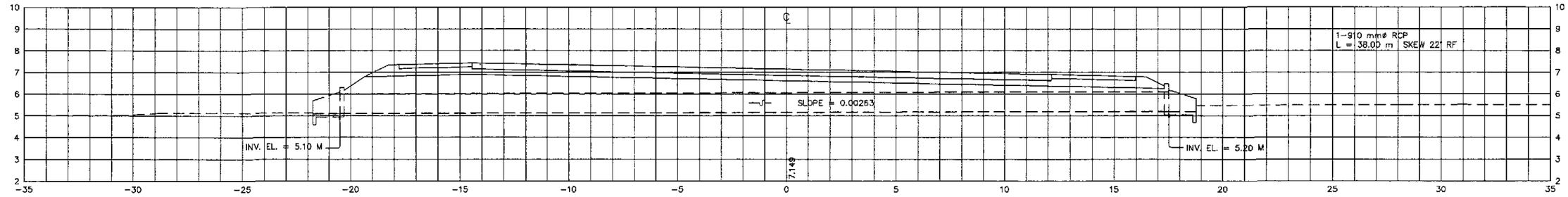
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 36+445 - STA. 36+660

SHEET NO. : **DC-06**

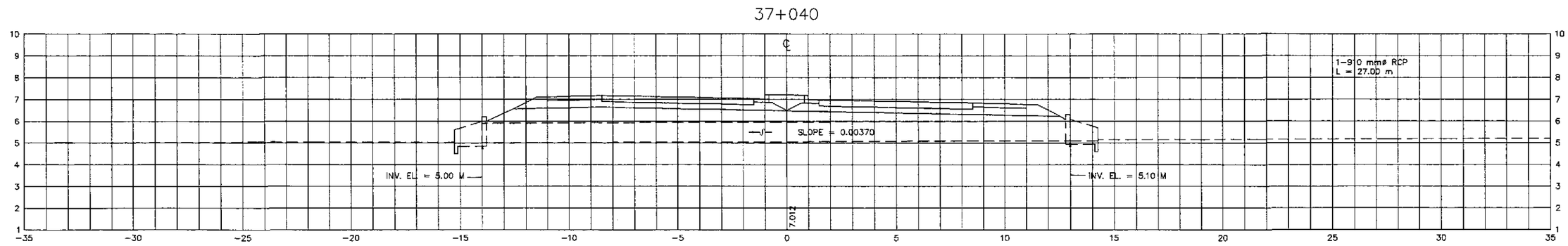
37+244



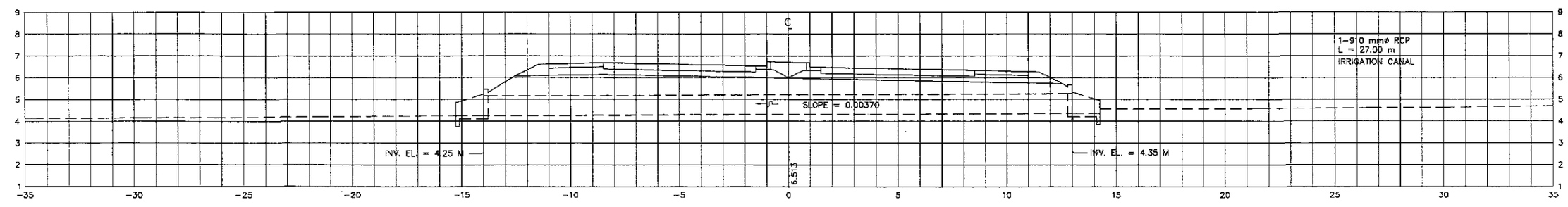
37+223



37+040



36+890



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/02	A. HAKIM
CHECKED	9/20/02	
SUBMITTED	9/23/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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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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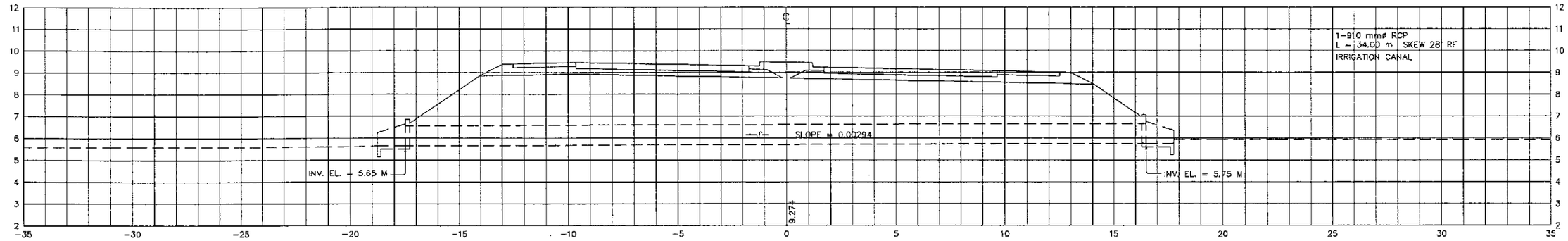
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE :
1:100
FULL SIZE A1

SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 36+890 - STA. 37+244

SHEET NO. :
DC-07

37+728



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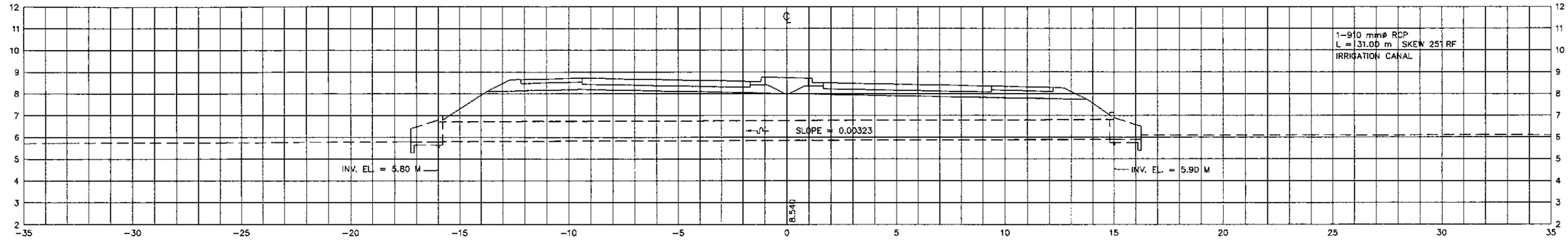
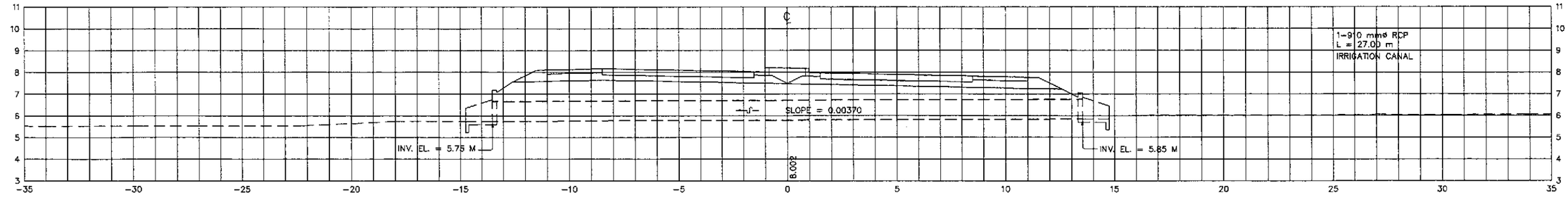


37+465



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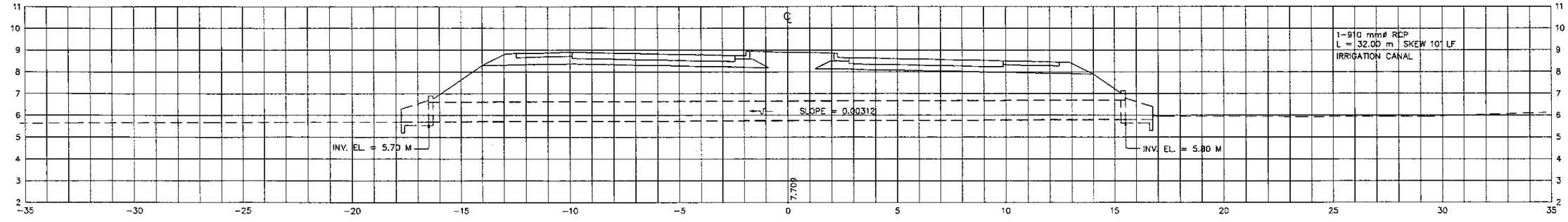

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	9/19/02	T. SUGIYAMA
CHECKED	9/21/02	K. HAKIM
SUBMITTED	9/23/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	DIC, Director IV	Undersecretary	Secretary

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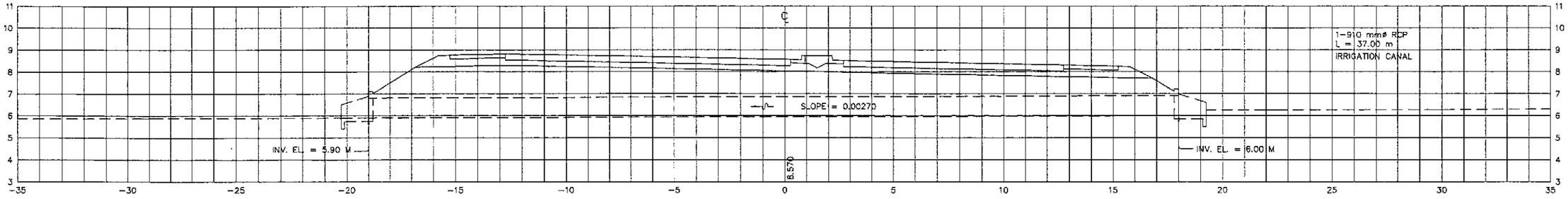
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE : 1:100 FULL SIZE A1

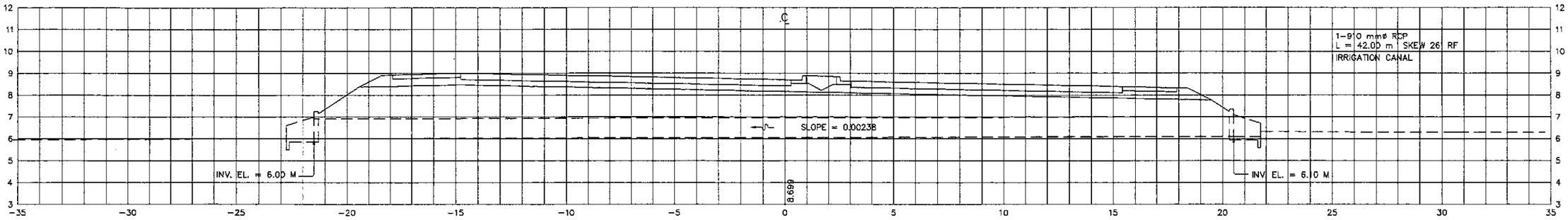
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 37+335 - STA. 37+728

SHEET NO. : **DC-08**

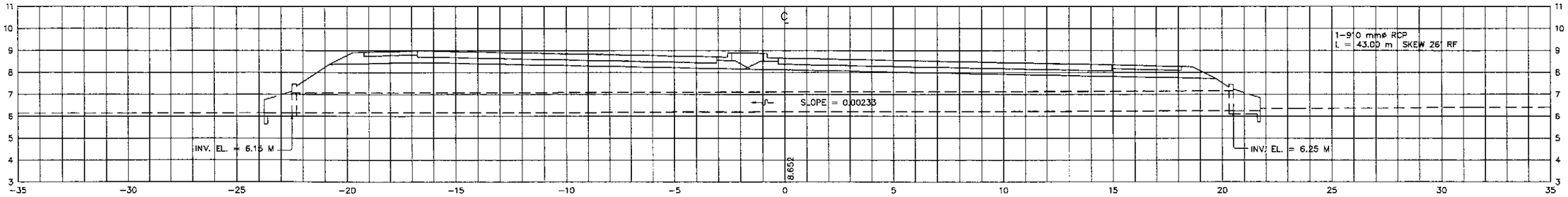
38+195



38+140



38+090



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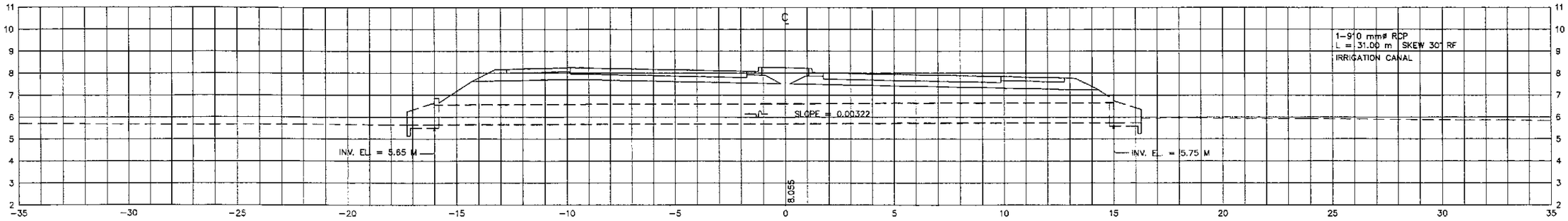

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KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

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CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	TEAM LEADER

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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. BONCAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

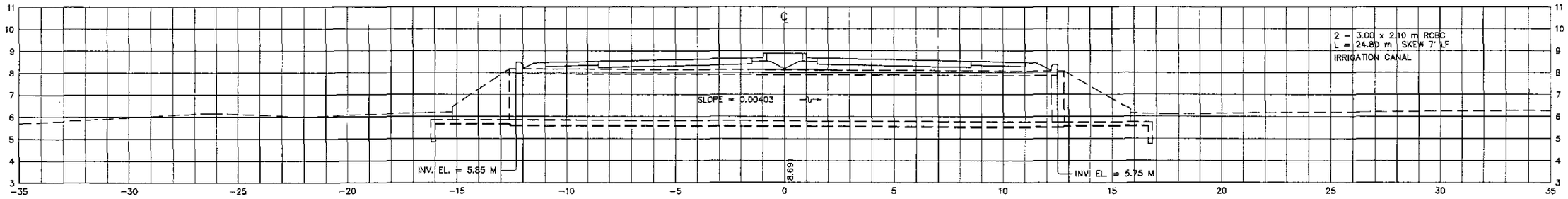
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE : 1:100 FULL SIZE A1

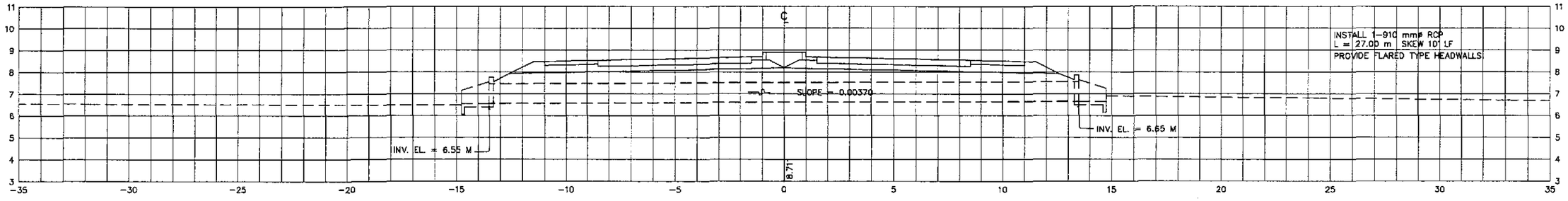
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 37+852 - STA. 38+195

SHEET NO. :
DC-09

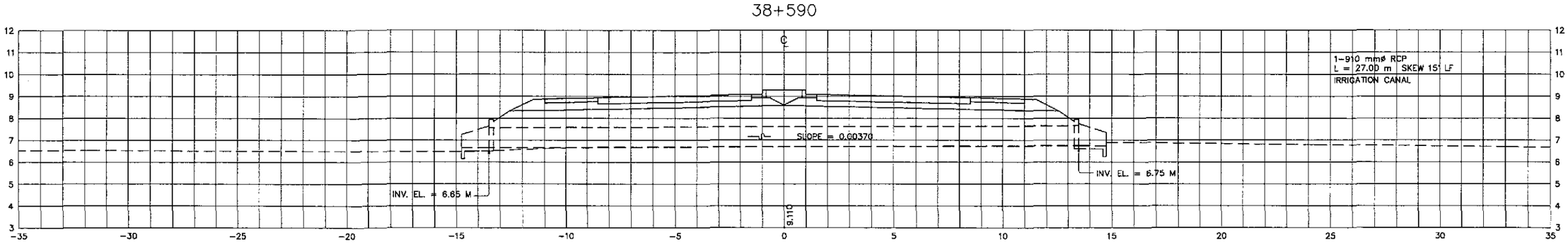
38+720



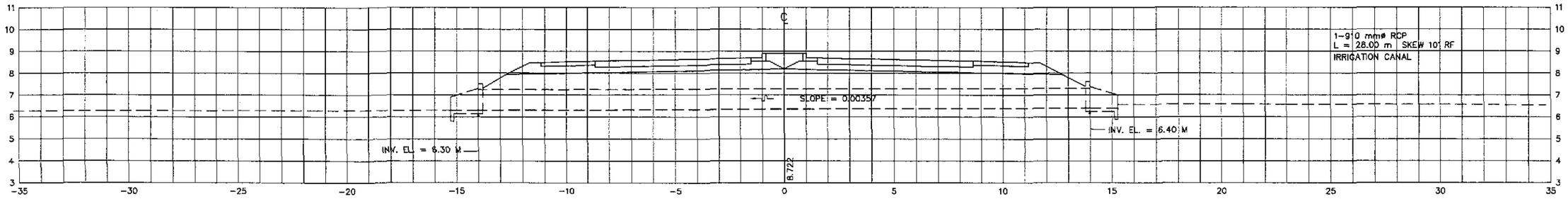
38+690



38+590



38+414



JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	9/19/02	F. SIA MAGAR
CHECKED	9/21/02	A. HARIM
SUBMITTED	9/25/02	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)	Aprroved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONCAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

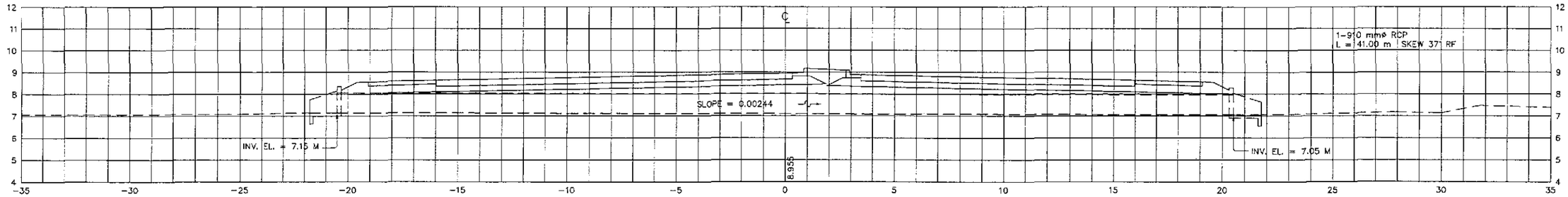
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE : 1:100 FULL SIZE A1

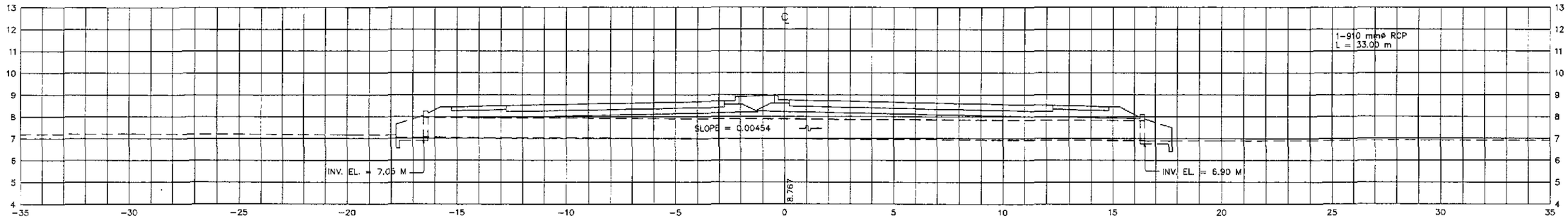
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 38+414 - STA. 38+720

SHEET NO. : **DC-10**

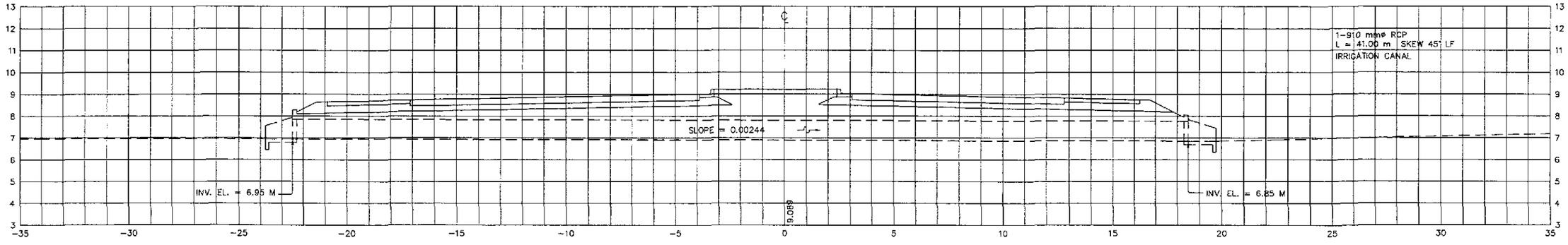
39+190



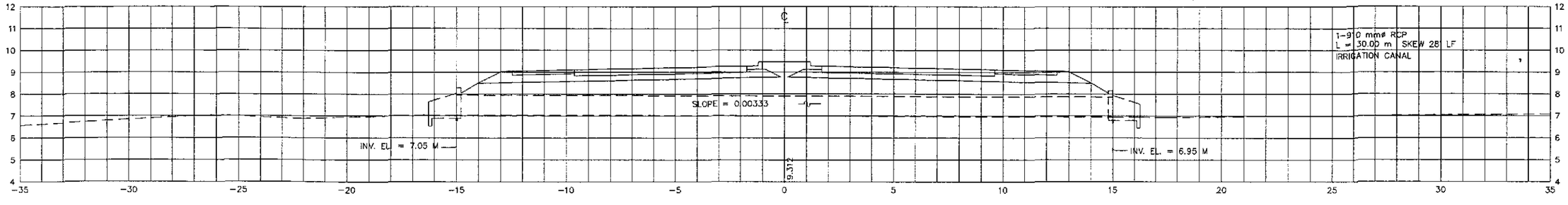
39+045



38+988

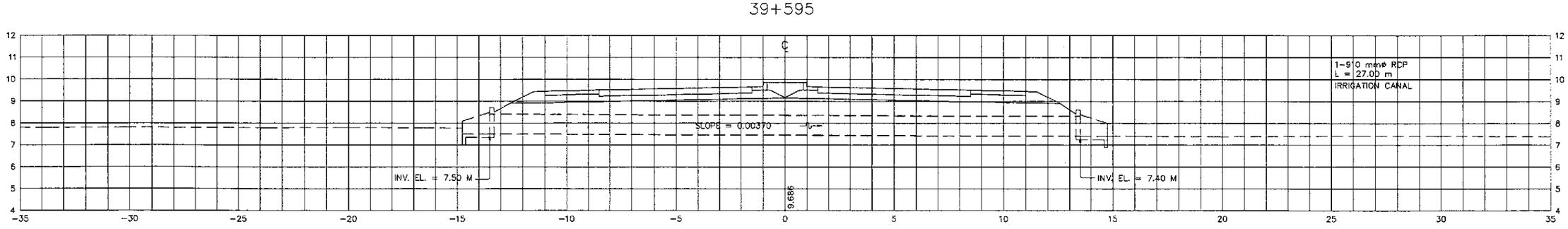


38+862

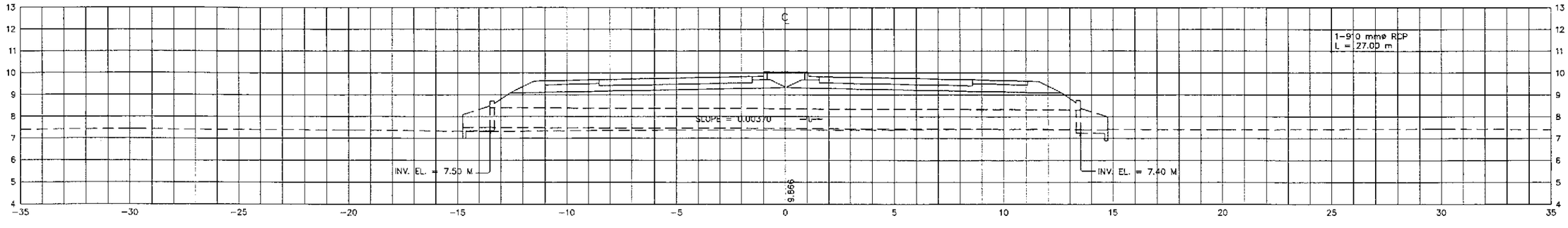


JICA JAPAN INTERNATIONAL COOPERATION AGENCY KEI KATAHIRA & ENGINEERS INTERNATIONAL YEC YACHIYO ENGINEERING CO., LTD.		DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	9/19/02	F. STA. MARIA	PJHL – 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)	1:100	DRAINAGE CROSS-SECTION ALONG BYPASS (ULTIMATE STAGE) STA. 38+862 - STA. 39+190	DC-11
	CHECKED	9/24/02	A. HAKIM	Submitted By:	Reviewed By:	Recommended By: (See cover sheet for Signature) / Approved By: (See cover sheet for Signature/Approval)				
	SUBMITTED	9/25/02	K. IKUTA 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 I	FULL SIZE A1		

39+595



39+365



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE & NAME
DESIGNED	9/19/02	A. HAKIM
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	M. KUSUHARA, TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL - PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
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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

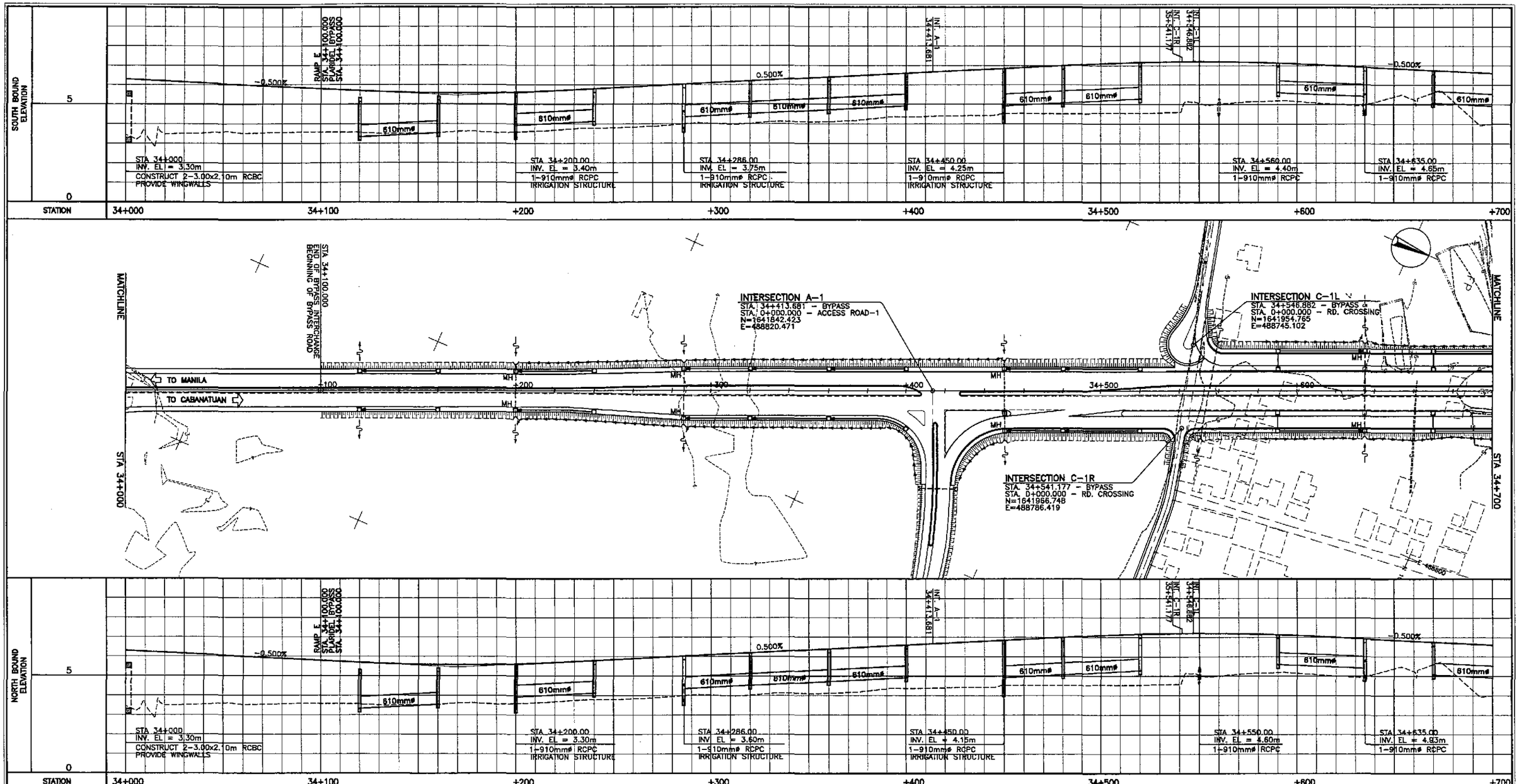
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)

PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE :
1:100
FULL SIZE A1

SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (ULTIMATE STAGE)
STA. 39+365 - STA. 39+595

SHEET NO. :
DC-12



STATION	34+000	34+100	+200	+300	+400	34+500	+600	+700
FINISHED GRADE	6.300 6.200 6.100 6.000 5.900 5.800 5.700 5.620 5.580 5.580 5.620 5.700 5.800 5.900 6.000 6.100 6.200 6.300 6.400 6.500 6.600 6.700 6.800 6.900 7.000 7.096 7.162 7.196 7.196 7.162 7.096 7.000 6.900 6.800 6.700							
TOP LEVEL OF CIM (MC)	6.94 6.94	7.102 7.102	7.068 7.069	6.690 6.690				
INVERT LEVEL OF CROSS PIPE (MC)	5.324 5.324	5.486 5.486	5.653 5.653	5.274 5.274				
TOP LEVEL OF CIM (FR)	5.290 5.230	5.370 5.310	5.565 5.505	5.765 5.705	5.995 5.935	6.165 6.105	6.365 6.305	6.565 6.505	6.63 6.63	6.78 6.78	6.942 6.942	6.705 6.705	6.909 6.909	6.530 6.530				
INVERT LEVEL OF CROSS PIPE (FR)	5.286 5.286	5.448 5.448	5.615 5.615	5.236 5.236				
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	3.604	3.684	4.079	4.079	4.489	4.659 4.669	4.889 4.879	5.079	4.926	5.076 5.086	5.286	5.368	5.603	5.074				
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	2.544	3.624	4.019	4.019	4.429	4.599 4.609	4.809 4.819	5.019	4.928	5.076 5.086	5.286	5.368	5.603	5.074				

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	9/19/02	T.S. LA MORIA
CHECKED	9/24/02	A. HAKIM
SUBMITTED	9/23/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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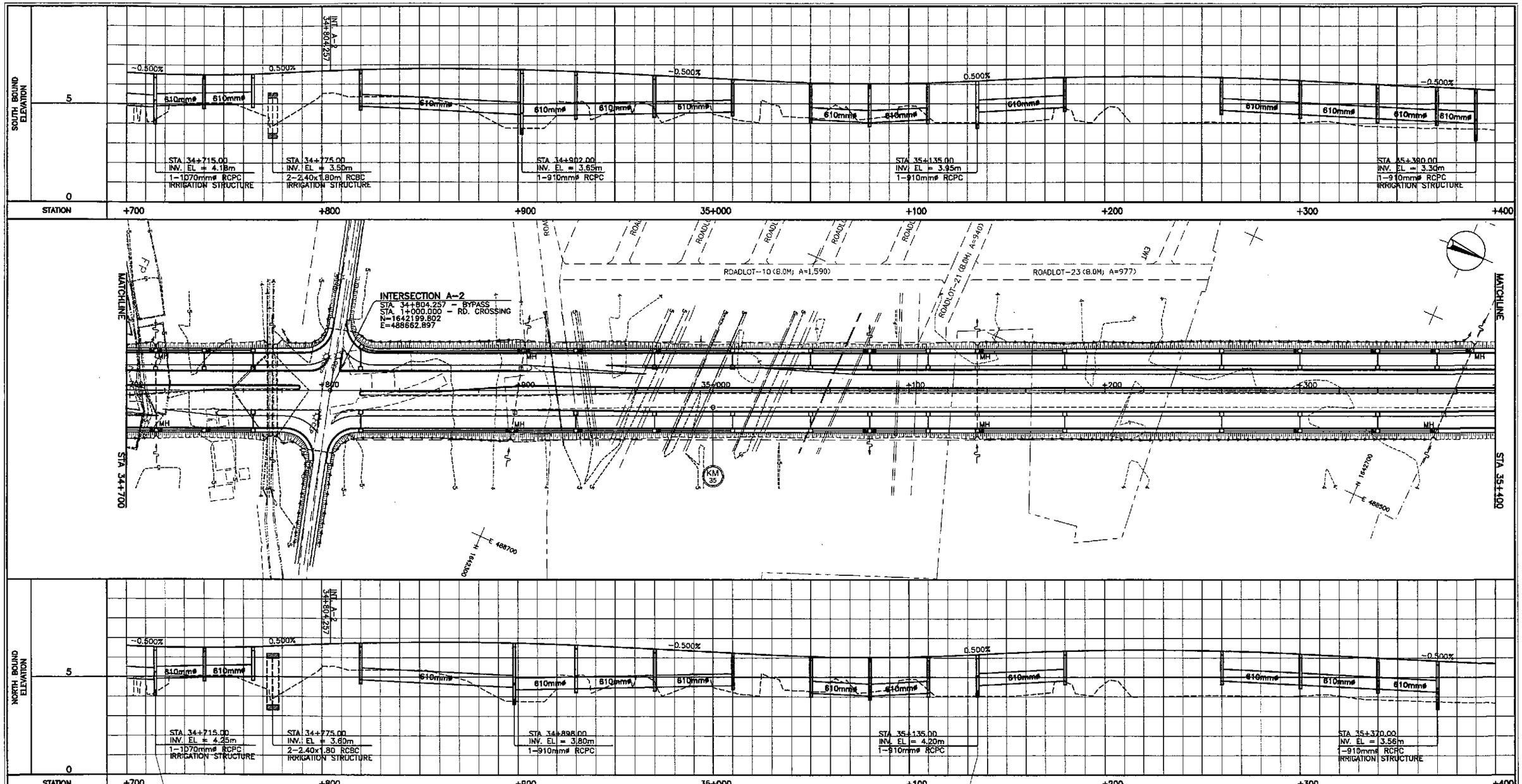
Project Director	Chief, Highways Division	DIC, Director IV	Undersecretary	Secretary

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 I

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

SHEET CONTENTS :
SURFACE DRAINAGE PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 34+000 - STA. 34+700

SHEET NO. :
DP-01



STATION	+700								+800				
FINISHED GRADE	6.600			6.525		6.500	6.525	6.600	6.887	6.750	6.787	6.800	6.787
TOP LEVEL OF CIM (MC)					6.440	6.440	6.483						
INVERT LEVEL OF CROSS PIPE (MC)					5.024	5.024	5.067						
TOP LEVEL OF CIM (FR)		6.323	6.323		6.280	6.280	6.323						
INVERT LEVEL OF CROSS PIPE (FR)					4.986	4.986	5.029						
INVERT LEVEL OF LONGITUDINAL PIPE (SB)		4.839	4.907		4.957	4.967	5.017						
INVERT LEVEL OF LONGITUDINAL PIPE (NB)		4.839	4.907		4.957	4.967	5.017						

STATION		+900										35+000										+100				
FINISHED GRADE		6.750	6.687			6.600	6.500			6.400	6.300			6.200	6.105			6.045		6.025	6.045			6.105		
TOP LEVEL OF CIM (MC)				6.583	6.583			6.390	6.390			6.190	6.190			6.015	6.015		5.965	5.965		6.015	6.015			
INVERT LEVEL OF CROSS PIPE (MC)				4.967	4.967			4.774	4.774			4.774	4.774			4.399	4.399		4.349	4.349		4.399	4.399			
TOP LEVEL OF CIM (FR)	6.530	6.530		6.423	6.423			6.230	6.230			6.030	6.030			5.855	5.855		5.805	5.805		5.855	5.855		5.956	5.956
INVERT LEVEL OF CROSS PIPE (FR)				4.929	4.929			4.736	4.736			4.738	4.736			4.361	4.361		4.311	4.311		4.361	4.361			
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	4.464	4.700		4.764	4.774			4.484	4.494			4.574					4.199		4.049	4.049		4.199				4.589
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	4.464	4.700		4.764	4.774			4.484	4.494			4.574					4.199		4.049	4.049		4.199				4.589

STATION				+200							+300							+400
FINISHED GRADE	6.287		6.350	6.387	6.400	6.387		6.350	6.287		6.200	6.100		6.000	5.900		5.800	
TOP LEVEL OF CIM (MC)		6.290	6.290				6.290	6.290		6.140	6.140		5.940	5.940		5.790	5.69	
INVERT LEVEL OF CROSS PIPE (MC)		4.874	4.874				4.874	4.874		4.724	4.724		4.524	4.524		4.374	4.074	
TOP LEVEL OF CIM (FR)		6.130	6.130				6.130	6.130		5.980	5.980		5.780	5.780		5.630	5.53	
INVERT LEVEL OF CROSS PIPE (FR)		4.836	4.836				4.836	4.836		4.686	4.686		4.486	4.486		4.336	4.036	
INVERT LEVEL OF LONGITUDINAL PIPE (SB)		4.824					4.824			4.624	4.614		4.414	4.404		4.254	3.794	
INVERT LEVEL OF LONGITUDINAL PIPE (NB)		4.824					4.824			4.624	4.614		4.414	4.404		4.254		

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

	DATE	SIGNATURE
DESIGNED	9/19/02	F.S. STA. MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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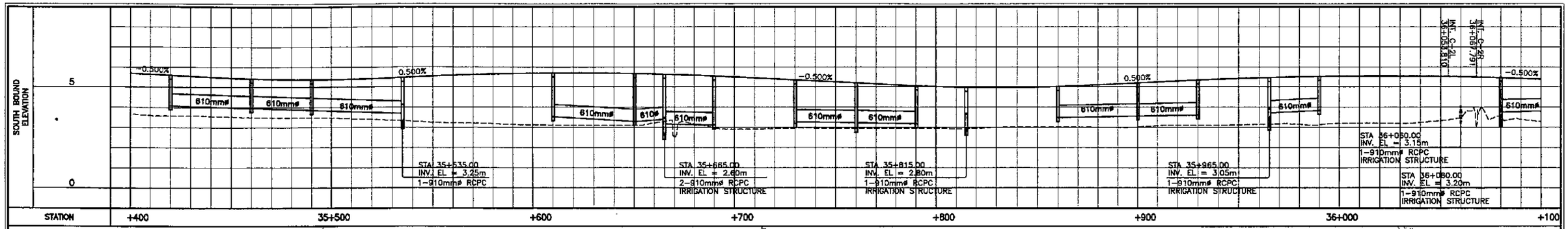
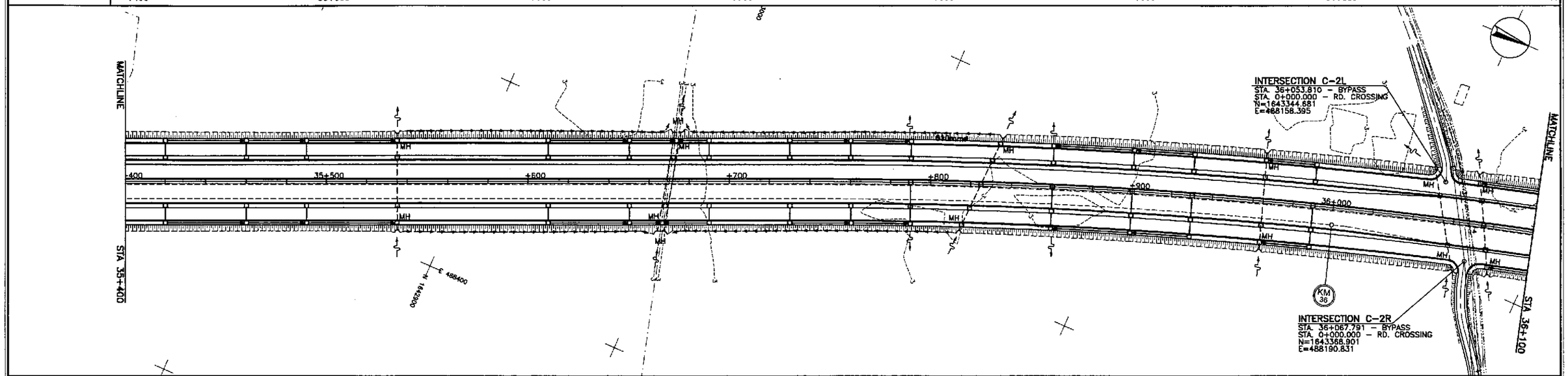
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE I

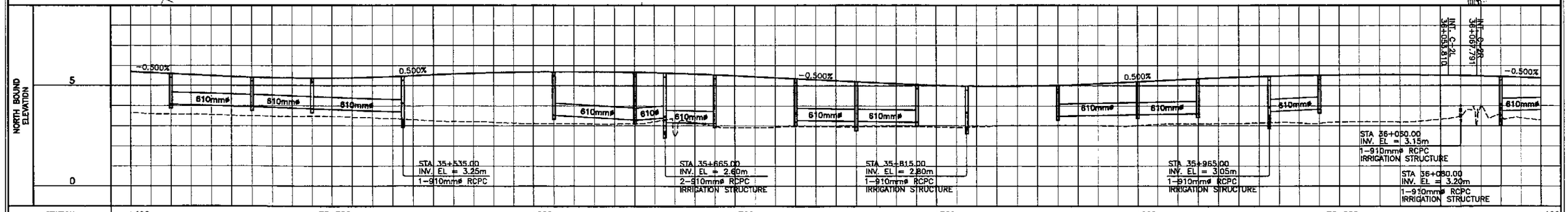
SCALE :
HORIZONTAL
1:1000
VERTICAL
1:100
FULL SIZE A1

SHEET CONTENTS :
SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 34+700 - STA. 35+400

SHEET NO. :
DP-02







STATION	+400						35+500						+600
FINISHED GRADE	5.700	5.600	5.500	5.406	5.356		5.356	5.406		5.493	5.538	5.527	5.462
TOP LEVEL OF CIM (MC)		5.540 5.540		5.346 5.346		5.295 5.295			5.411				
INVERT LEVEL OF CROSS PIPE (MC)		4.124 4.124		4.030 4.030		3.979 3.979			3.995				
TOP LEVEL OF CIM (FR)		5.380 5.380		5.186 5.186		5.135 5.135			5.251				
INVERT LEVEL OF CROSS PIPE (FR)		4.086 4.086		3.992 3.992		3.941 3.941			3.957				
INVERT LEVEL OF LONGITUDINAL PIPE (SB)		4.068		3.988 3.978		3.918 3.908			3.818				
INVERT LEVEL OF LONGITUDINAL PIPE (NB)		4.068		3.988 3.978		3.918 3.908			3.818				

STATION										+700		
FINISHED GRADE		5.347	5.226		5.105			4.984		4.863	4.748	
TOP LEVEL OF CIM (MC)	5.344 5.344			5.105 5.105					4.863 4.863			4.649 4.649
INVERT LEVEL OF CROSS PIPE (MC)	3.728 3.728			3.489 3.489					3.247 3.247			3.233 3.233
TOP LEVEL OF CIM (FR)	5.184 5.184			4.945 4.945					4.703 4.703			4.489 4.489
INVERT LEVEL OF CROSS PIPE (FR)	3.690 3.690			3.451 3.451					3.209 3.209			3.195 3.195
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	3.528			3.289 3.279			3.154 3.208		3.238 3.103			3.183
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	3.528			3.289 3.279		3.204 3.180			3.238 3.103			3.183

STATION					+800							+900
FINISHED GRADE	4.671	4.638	4.650		4.706		4.800		4.900	5.000	5.100	5.200
TOP LEVEL OF CIM (MC)		4.578 4.578		4.896 4.618		4.716		5.105		5.280 4.940		5.480 5.140
INVERT LEVEL OF CROSS PIPE (MC)		2.962 2.962		3.687 3.002		3.124		3.489		3.664 3.324		4.064 4.064
TOP LEVEL OF CIM (FR)		4.418 4.418		4.826 4.458		4.556		4.995		5.120 4.780		5.320 4.980
INVERT LEVEL OF CROSS PIPE (FR)		2.924 2.924		3.632 2.964		3.063		3.501		3.626 3.286		4.026 4.026
INVERT LEVEL OF LONGITUDINAL PIPE (SB)		3.033 3.023		2.873				3.876		3.649		3.849 3.859
INVERT LEVEL OF LONGITUDINAL PIPE (NB)		3.033 3.023		2.873						3.309		3.509 3.519

STATION								36+000						+100
FINISHED GRADE	5.300		5.390	5.460		5.510		5.540	5.550	5.540	5.510		5.460	
TOP LEVEL OF CIM (MC)		5.525 5.285			5.752 5.412		5.805 5.465					5.765	5.400	
INVERT LEVEL OF CROSS PIPE (MC)		4.209 3.869			4.136 4.196		4.189 4.049					4.149	3.784	
TOP LEVEL OF CIM (FR)		5.465 5.125			5.592 5.252		5.645 5.305					5.605	5.240	
INVERT LEVEL OF CROSS PIPE (FR)		4.071 3.831			4.098 3.958		4.151 4.011					4.111	3.746	
INVERT LEVEL OF LONGITUDINAL PIPE (SB)		4.009			3.788		4.189						4.099	
INVERT LEVEL OF LONGITUDINAL PIPE (NB)		3.669			3.788		3.849						3.759	

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

	DATE	SIGNATURE
DESIGNED	9/19/02	F.S. STA. MARIA
CHECKED	9/21/02	Hakim A. HAKIM
SUBMITTED	9/23/02	M. Kiuchi M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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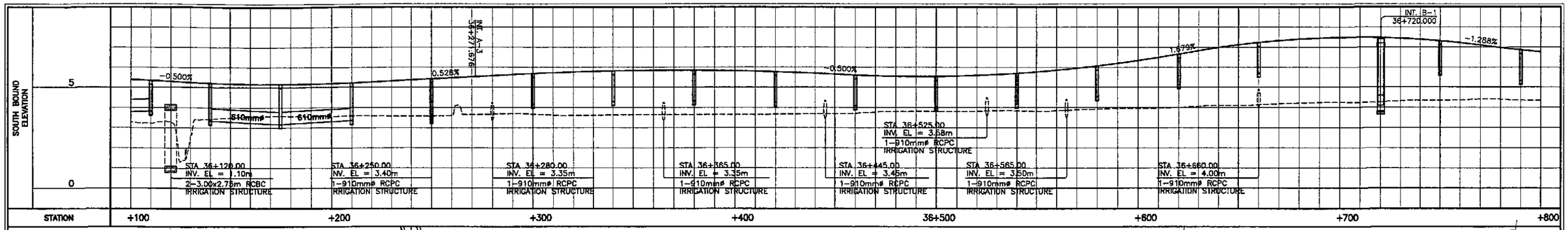
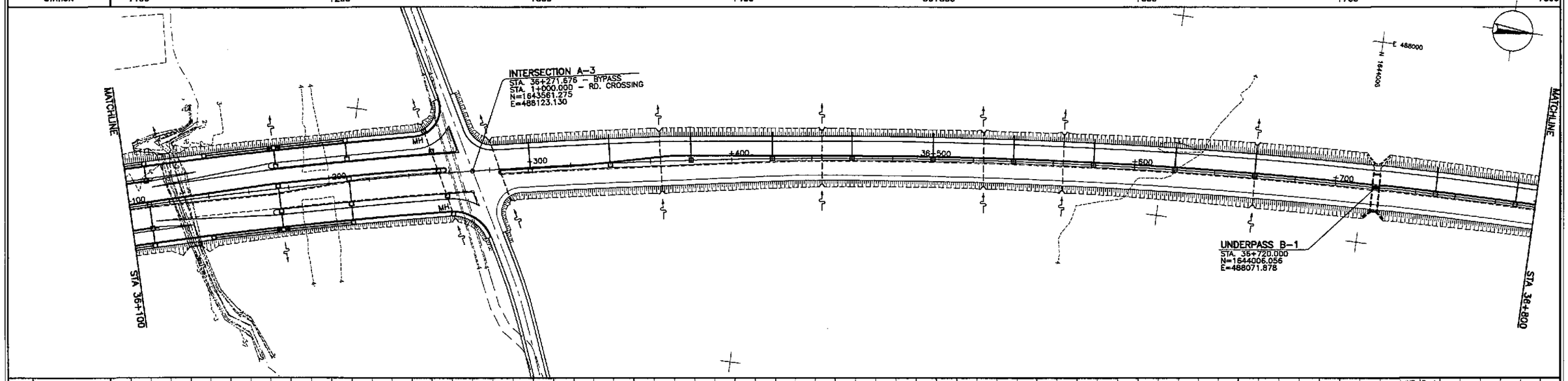
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE I

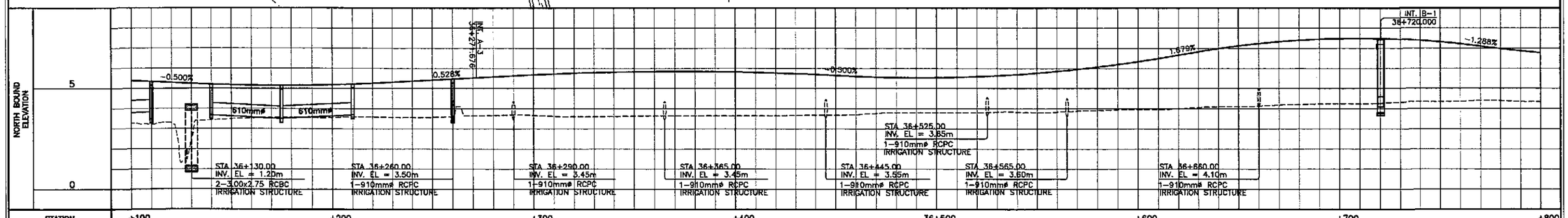
SCALE :
HORIZONTAL
1:1000
VERTICAL
1:100
FULL SIZE A1

SHEET CONTENTS :
SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 35+400 - STA. 36+100

SHEET NO. :
DP-03







STATION	+100										+200			
FINISHED GRADE	5.390		5.300		5.212		5.163		5.155		5.189		5.264	
TOP LEVEL OF CIM (MC)	5.625	5.285		5.492	5.152			5.437 5.097			5.506	5.166		
INVERT LEVEL OF CROSS PIPE (MC)	4.209	3.869		3.876	3.536			3.821 3.481			3.890	3.550		
TOP LEVEL OF CIM (FR)	5.465	5.125		5.332	4.992			5.277 4.937			5.346	5.006		
INVERT LEVEL OF CROSS PIPE (FR)	4.071	3.831		3.838	3.498			3.783 3.443			3.852	3.512		
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	4.159				3.676			3.501 3.515			3.690			
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	3.819				3.336			3.161 3.175			3.350			

STATION							+300							
FINISHED GRADE	5.368		5.474		5.579		5.681		5.761		5.815		5.844	
TOP LEVEL OF CIM (MC)										5.975				6.007
INVERT LEVEL OF CROSS PIPE (MC)										4.691				4.723
TOP LEVEL OF CIM (FR)		5.567	5.227											
INVERT LEVEL OF CROSS PIPE (FR)										4.626				4.658
INVERT LEVEL OF LONGITUDINAL PIPE (SB)		3.860												
INVERT LEVEL OF LONGITUDINAL PIPE (NB)		3.520												

STATION			+400										36+500	
FINISHED GRADE	5.847		5.824		5.775		5.701		5.606		5.547		5.542	
TOP LEVEL OF CIM (MC)				5.935				5.766				5.702		
INVERT LEVEL OF CROSS PIPE (MC)				4.651				4.482				4.418		
TOP LEVEL OF CIM (FR)														
INVERT LEVEL OF CROSS PIPE (FR)				4.586				4.417				4.353		
INVERT LEVEL OF LONGITUDINAL PIPE (SB)														
INVERT LEVEL OF LONGITUDINAL PIPE (NB)														

STATION									+600					
FINISHED GRADE	5.592		5.696		5.855		6.068		6.336		6.656		6.982	
TOP LEVEL OF CIM (MC)		5.856				6.228				6.816				7.393
INVERT LEVEL OF CROSS PIPE (MC)		4.572				4.944				5.532				6.109
TOP LEVEL OF CIM (FR)														
INVERT LEVEL OF CROSS PIPE (FR)		4.507				4.879				5.467				6.044
INVERT LEVEL OF LONGITUDINAL PIPE (SB)														
INVERT LEVEL OF LONGITUDINAL PIPE (NB)														

STATION					+700										+800
FINISHED GRADE	7.233		7.399		7.481		7.478		7.390		7.217		6.976		
TOP LEVEL OF CIM (MC)									7.463				7.034		
INVERT LEVEL OF CROSS PIPE (MC)									6.179				5.750		
TOP LEVEL OF CIM (FR)															
INVERT LEVEL OF CROSS PIPE (FR)									6.114				5.685		
INVERT LEVEL OF LONGITUDINAL PIPE (SB)															
INVERT LEVEL OF LONGITUDINAL PIPE (NB)															

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

	DATE	SIGNATURE
DESIGNED	9/19/02	F.S. STA. MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

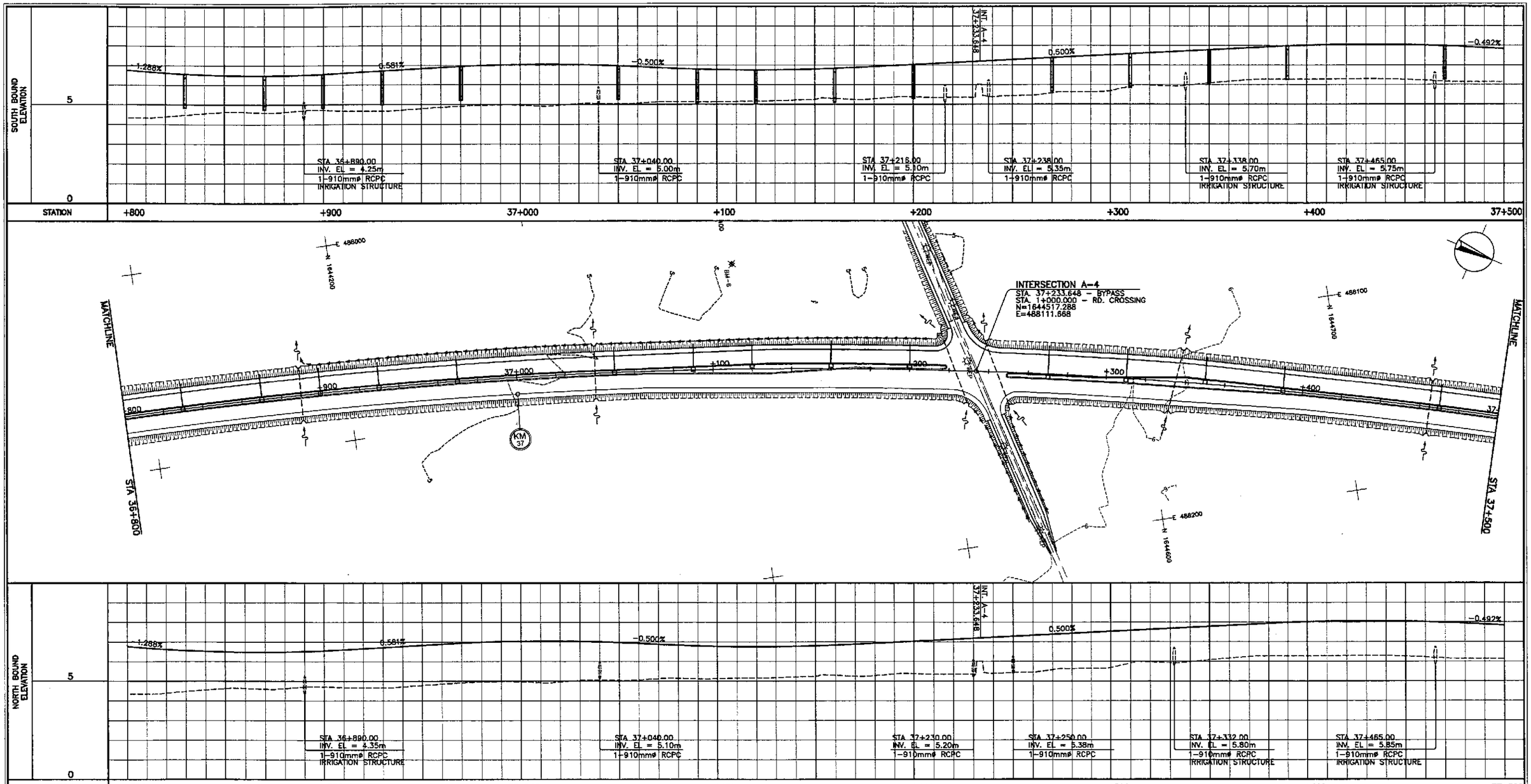
PJHL - PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC,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

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

SHEET CONTENTS :
SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 36+100 - STA. 36+800

SHEET NO. :
DP-04



STATION		+800									
FINISHED GRADE		6.772		6.621		6.524		6.480		6.489	
TOP LEVEL OF CIM (MC)				6.732				6.644			6.712
INVERT LEVEL OF CROSS PIPE (MC)				5.448				5.360			5.428
TOP LEVEL OF CIM (FR)											
INVERT LEVEL OF CROSS PIPE (FR)				5.383				5.295			5.363
INVERT LEVEL OF LONGITUDINAL PIPE (SB)											
INVERT LEVEL OF LONGITUDINAL PIPE (NB)											

STATION	+900									
FINISHED GRADE	6.552		6.662		6.778		6.894		6.988	
TOP LEVEL OF CIM (MC)			6.880				7.101			
INVERT LEVEL OF CROSS PIPE (MC)			5.596				5.817			
TOP LEVEL OF CIM (FR)										
INVERT LEVEL OF CROSS PIPE (FR)			5.531				5.752			
INVERT LEVEL OF LONGITUDINAL PIPE (SB)										
INVERT LEVEL OF LONGITUDINAL PIPE (NB)										

STATION	37+000									
FINISHED GRADE	7.040		7.048		7.012		6.934		6.839	
TOP LEVEL OF CIM (MC)					7.133				6.969	
INVERT LEVEL OF CROSS PIPE (MC)					5.849				5.685	
TOP LEVEL OF CIM (FR)										
INVERT LEVEL OF CROSS PIPE (FR)					5.784				5.620	
INVERT LEVEL OF LONGITUDINAL PIPE (SB)										
INVERT LEVEL OF LONGITUDINAL PIPE (NB)										

STATION	+100									
FINISHED GRADE	6.779		6.759		6.779		6.839		6.934	
TOP LEVEL OF CIM (MC)		6.919				6.999				7.194
INVERT LEVEL OF CROSS PIPE (MC)		5.635				5.715				5.910
TOP LEVEL OF CIM (FR)										
INVERT LEVEL OF CROSS PIPE (FR)		5.570				5.650				5.845
INVERT LEVEL OF LONGITUDINAL PIPE (SB)										
INVERT LEVEL OF LONGITUDINAL PIPE (NB)										

STATION	+200									
FINISHED GRADE	7.034		7.134		7.234		7.335		7.435	
TOP LEVEL OF CIM (MC)							7.545			
INVERT LEVEL OF CROSS PIPE (MC)							6.261			
TOP LEVEL OF CIM (FR)										
INVERT LEVEL OF CROSS PIPE (FR)							6.196			
INVERT LEVEL OF LONGITUDINAL PIPE (SB)										
INVERT LEVEL OF LONGITUDINAL PIPE (NB)										

STATION	+300									
FINISHED GRADE	7.535		7.635		7.735		7.835		7.935	
TOP LEVEL OF CIM (MC)	7.745				7.945				8.135	
INVERT LEVEL OF CROSS PIPE (MC)	6.461				6.661				6.851	
TOP LEVEL OF CIM (FR)										
INVERT LEVEL OF CROSS PIPE (FR)	6.396				6.598				6.786	
INVERT LEVEL OF LONGITUDINAL PIPE (SB)										
INVERT LEVEL OF LONGITUDINAL PIPE (NB)										

STATION	+400										37+500
FINISHED GRADE	8.015		8.056		8.057		8.018		7.939		
TOP LEVEL OF CIM (MC)							8.138				
INVERT LEVEL OF CROSS PIPE (MC)							6.854				
TOP LEVEL OF CIM (FR)											
INVERT LEVEL OF CROSS PIPE (FR)							6.789				
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	9/19/02	P.S. STA. MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	M. 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	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)

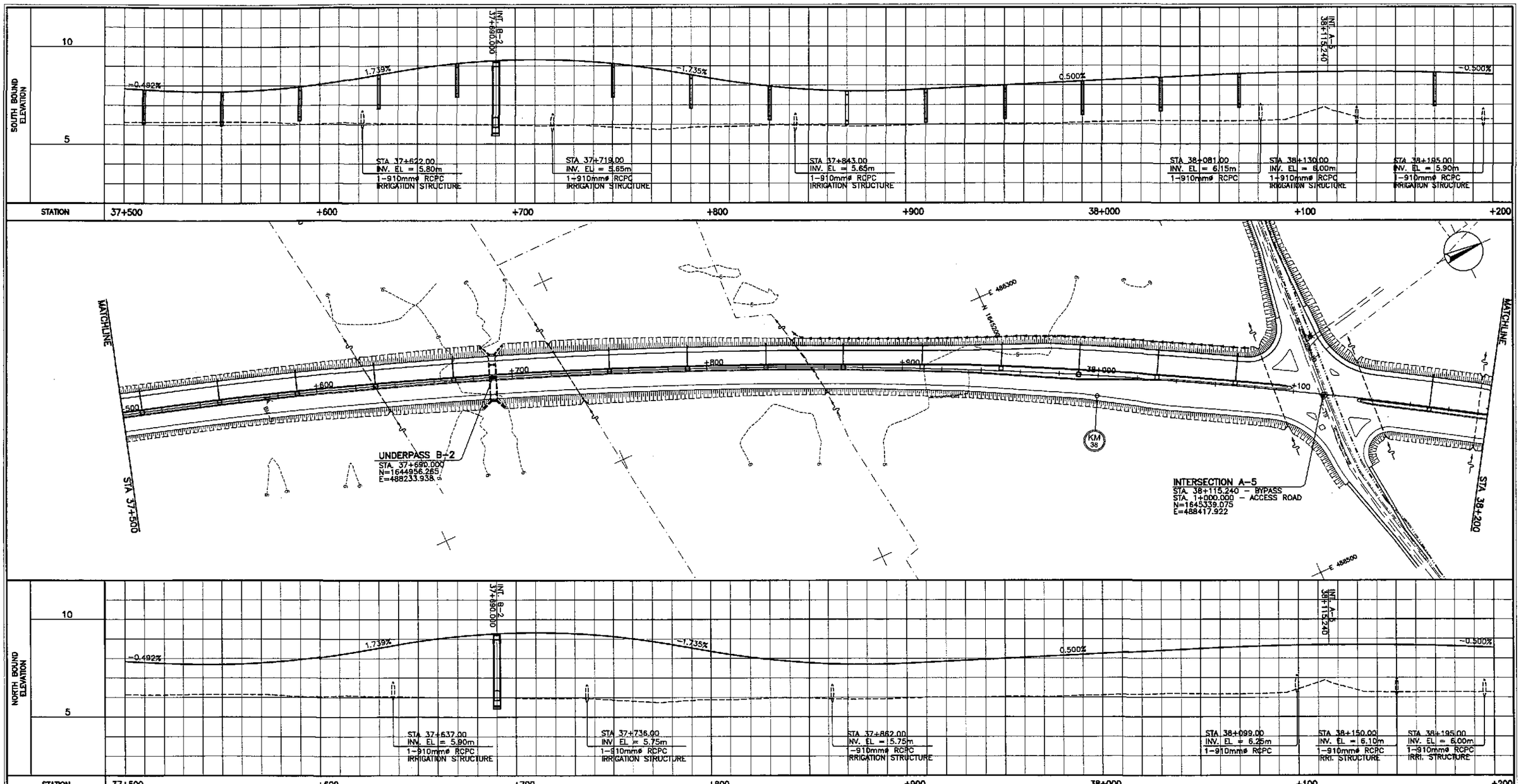
PLARIDEL BYPASS - CONTRACT PACKAGE I

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

SHEET CONTENTS :

SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 36+800 - STA. 37+500

SHEET NO. :
DP-05



STATION	37+500					+600					+700					+800					+900					38+000					+100				+200

STATION	37+500					+600					+700					+800					+900					38+000					+100				+200
FINISHED GRADE	7.841	7.742	7.689	7.724	7.849	8.063	8.366	8.714	9.012	9.211	9.311	9.311	9.212	9.014	8.717	8.370	8.067	7.854	7.731	7.697	7.752	7.852	7.952	8.052	8.152	8.252	8.352	8.452	8.549	8.624	8.674	8.699	8.699	8.674	8.624
TOP LEVEL OF CIM (MC)	7.851		7.866		8.116		8.700		9.271				9.273		8.703		8.120		7.874		7.962		8.162		8.362		8.562		8.746					8.809	
INVERT LEVEL OF CROSS PIPE (MC)	6.667		6.582		6.832		7.416		7.987				7.989		7.419		6.836		6.590		6.678		6.878		7.078		7.278		7.462					7.525	
TOP LEVEL OF CIM (FR)																																			
INVERT LEVEL OF CROSS PIPE (FR)	6.602		6.517		6.767		7.351		7.922				7.924		7.354		6.771		6.525		6.613		6.813		7.013		7.213		7.397					7.460	
INVERT LEVEL OF LONGITUDINAL PIPE (SB)																																			
INVERT LEVEL OF LONGITUDINAL PIPE (NB)																																			

JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/02	[illegible]
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/25/02	M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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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 I

SCALE :

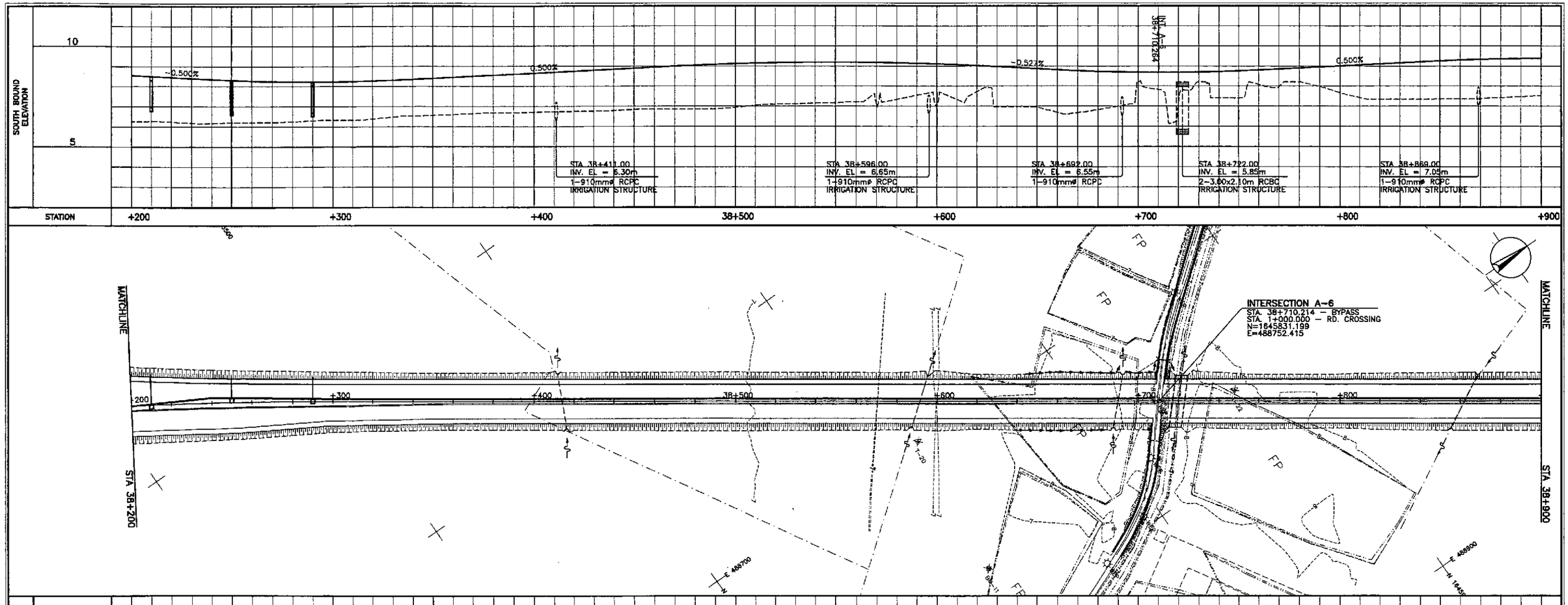
HORIZONTAL
1:1000
VERTICAL
1:100
FULL SIZE A1

SHEET CONTENTS :

SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (INITIAL STAGE)
STA. 37+500 - STA. 38+200

SHEET NO. :

DP-06



FINISHED GRADE	8.549	8.452	8.352	8.272	8.232	8.232	8.272	8.352	8.452	8.552	8.652	8.752	8.852	8.952	9.049	9.123	9.172	9.195	9.192	9.164	9.110	9.030	8.928	8.822	8.738	8.694	8.691	8.730	8.809	8.909	9.009	9.109	9.209	9.304	9.363
TOP LEVEL OF CIM (MC)	8.680		8.472		8.392																														
INVERT LEVEL OF CROSS PIPE (MC)	7.376		7.188		7.108																														
TOP LEVEL OF CIM (FR)																																			
INVERT LEVEL OF CROSS PIPE (FR)	7.311		7.123		7.043																														
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	9/19/02	S. STA. MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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PROJECT AND LOCATION :

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UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)

PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE :

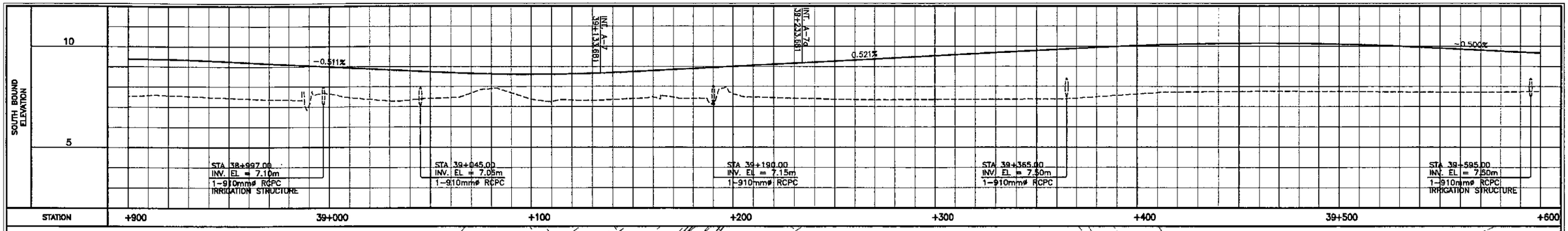
HORIZONTAL
1:1000
VERTICAL
1:100
FULL SIZE A1

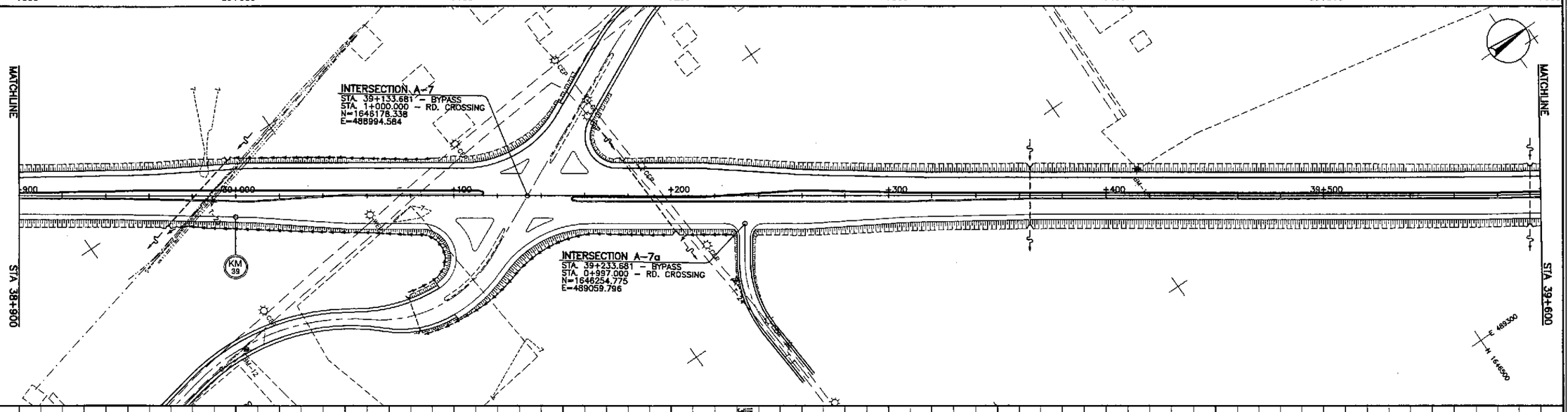
SHEET CONTENTS :

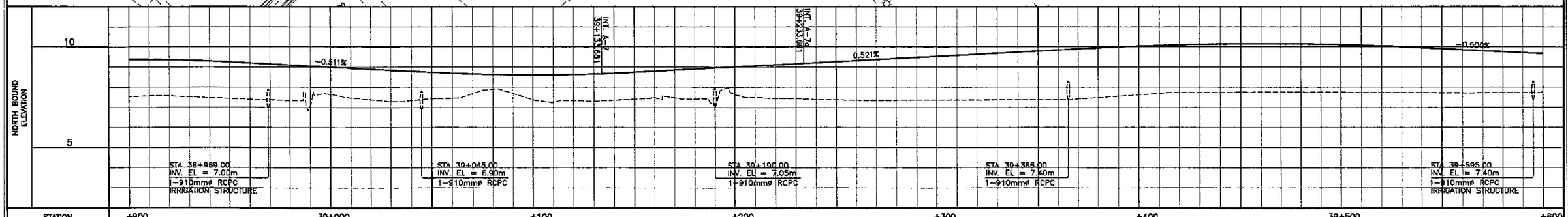
SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 38+200 - STA. 38+900

SHEET NO. :

DP-07







STATION +900 39+000 +100 +200 +300 +400 39+500 +600

FINISHED GRADE	9.383	9.361	9.299	9.202	9.100	8.998	8.895	8.793	8.696	8.635	8.615	8.637	8.700	8.799	8.903	9.007	9.111	9.215	9.319	9.424	9.528	9.632	9.736	9.840	9.944	10.036	10.102	10.142	10.157	10.146	10.110	10.048	9.961	9.861	9.761
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
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/02	F.S. STA. MARIA
CHECKED	9/21/02	Hakim A. HAKIM
SUBMITTED	9/25/02	M. Kiuchi M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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PROJECT AND LOCATION :
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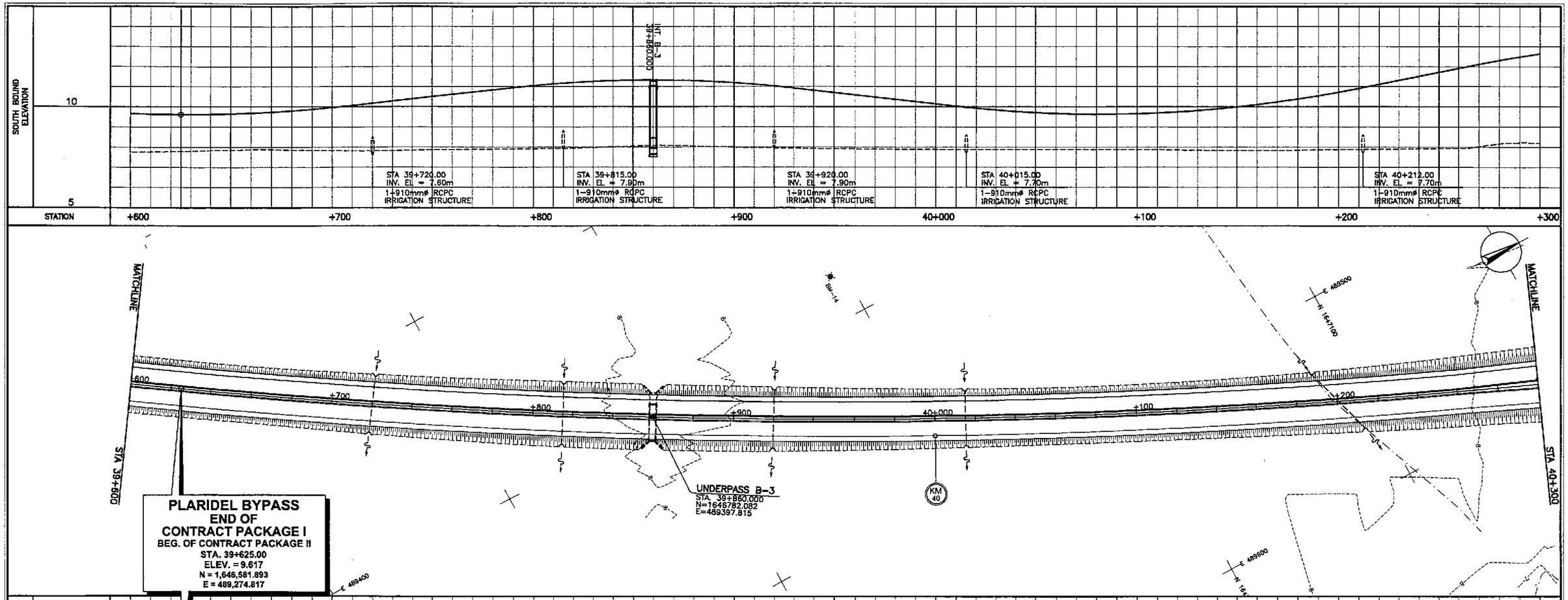
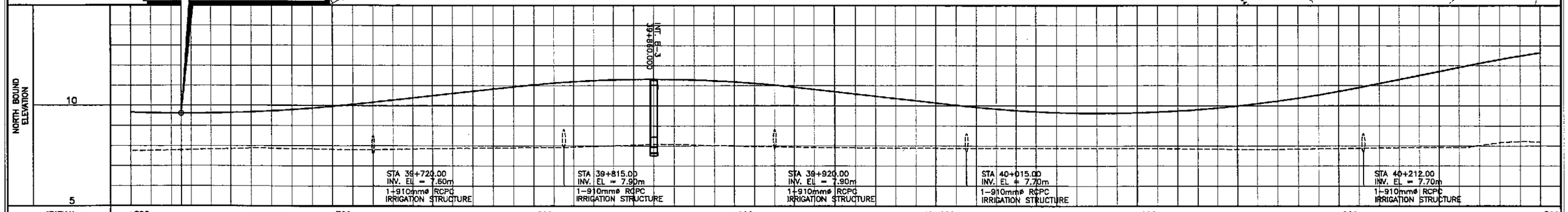
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
PLARIDEL BYPASS - CONTRACT PACKAGE I

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

SHEET CONTENTS :
SURFACE DRAINAGE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 38+900 - STA. 39+600

SHEET NO. :
DP-08





FINISHED GRADE	9.668	9.621	9.627	9.686	9.799	9.965	10.177	10.396	10.615	10.833	11.044	11.200	11.292	11.321	11.287	11.190	11.029	10.814	10.590	10.366	10.142	9.926	9.765	9.666	9.629	9.655	9.743	9.894	10.107	10.382	10.720	11.112	11.513	11.913	12.308
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
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/17/02	F.S. STA. MARIA
CHECKED	9/19/02	A. HAKIM
SUBMITTED	9/23/02	M. KIUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
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ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)

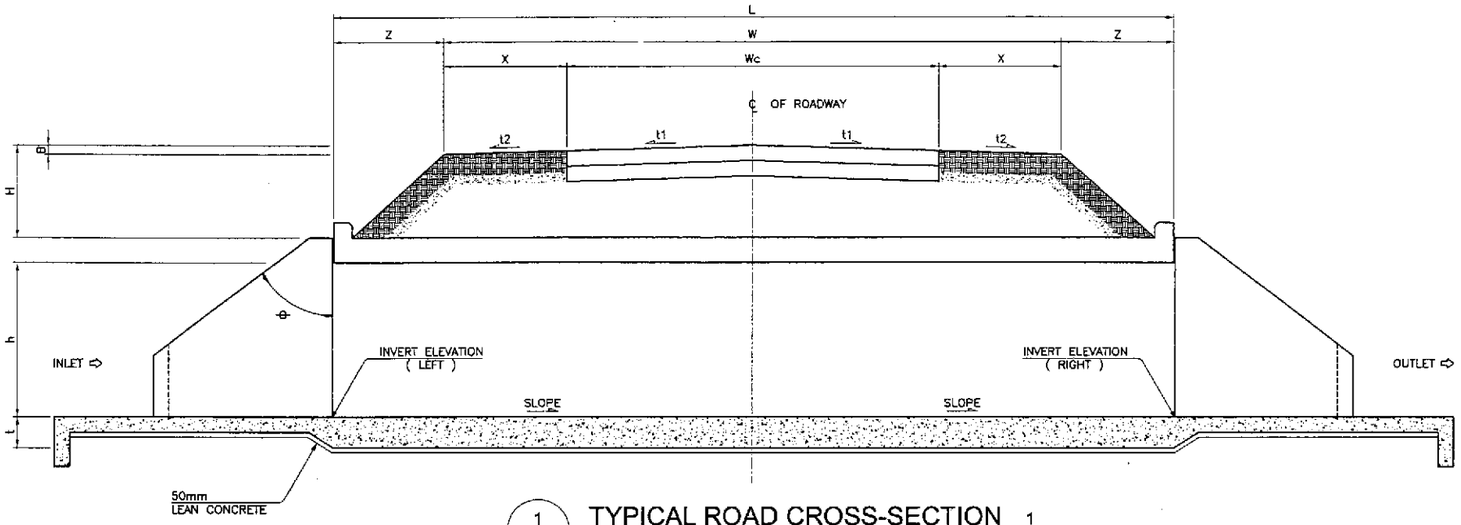
PLARIDEL BYPASS - CONTRACT PACKAGE I

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

SHEET CONTENTS :

DRAINAGE SURFACE
PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 39+600 - STA. 39+625

SHEET NO. :
DP-09



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

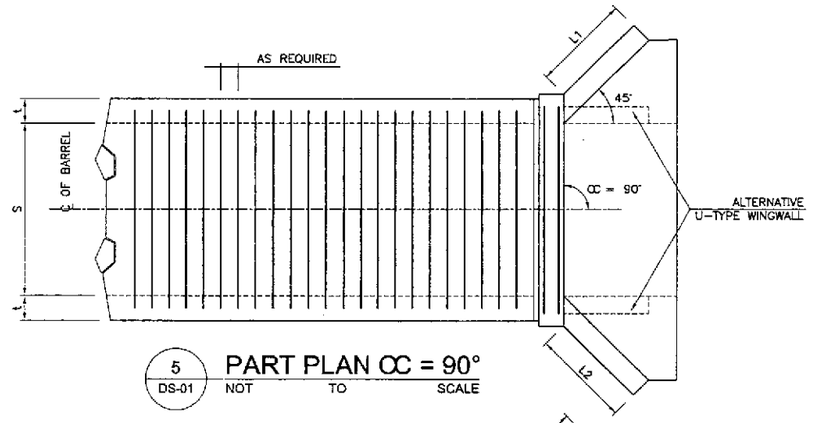
LEGEND :

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

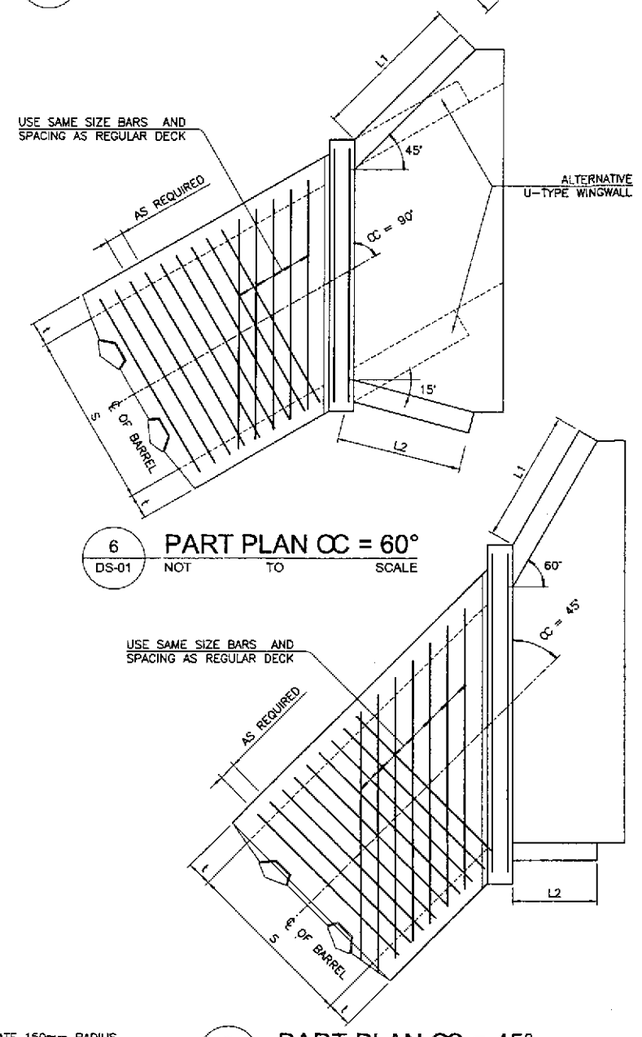
HORIZONTAL SKEW ANGLE CC	L (mm)
90°	W+2tan θ [(H+t) – (B+200)]
60°	1.1547 (W+2tan θ [(H+t)–(B+200)])
45°	1.4142 (W+2tan θ [(H+t)–(B+200)])

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.

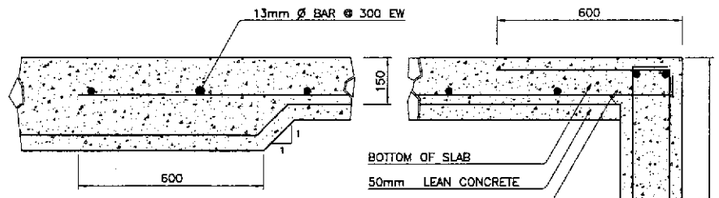


5 DS-01 **PART PLAN CC = 90°** — NOT TO SCALE

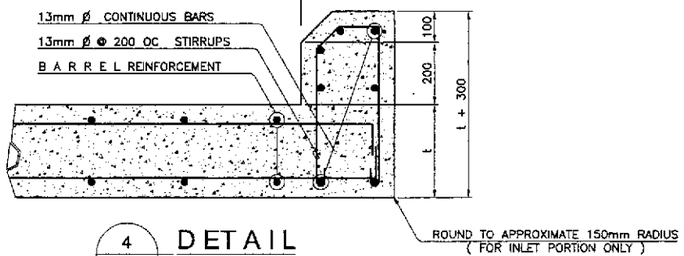


6 DS-01 **PART PLAN CC = 60°** — NOT TO SCALE

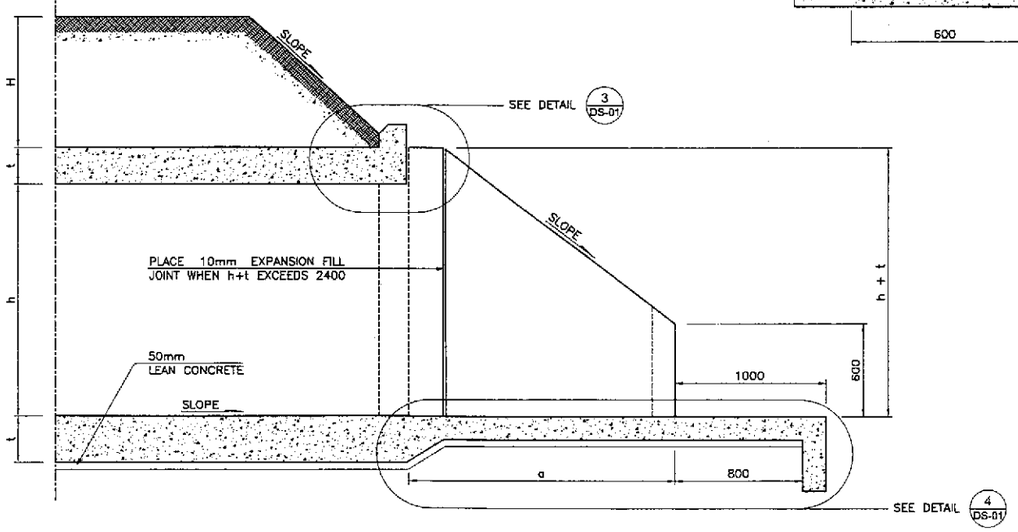
7 DS-01 **PART PLAN CC = 45°** — NOT TO SCALE



3 DS-01 **DETAIL** — NOT TO SCALE



4 DS-01 **DETAIL** — NOT TO SCALE



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

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

JAPAN INTERNATIONAL COOPERATION AGENCY

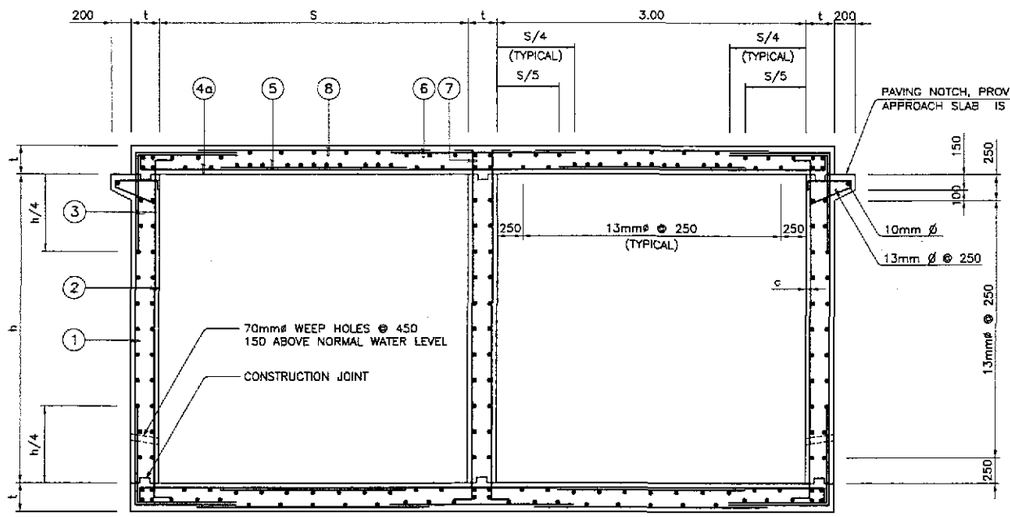
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/02	E. STA. MARIA
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	M. KUNCHI, TEAM LEADER

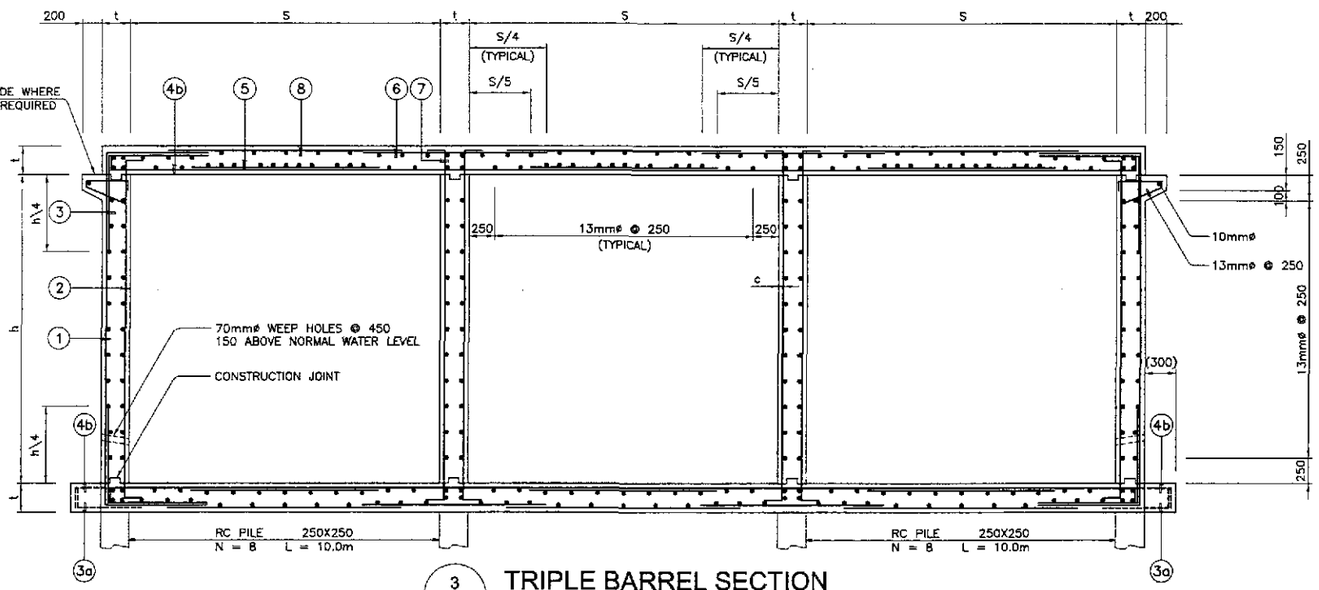
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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. BONDAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

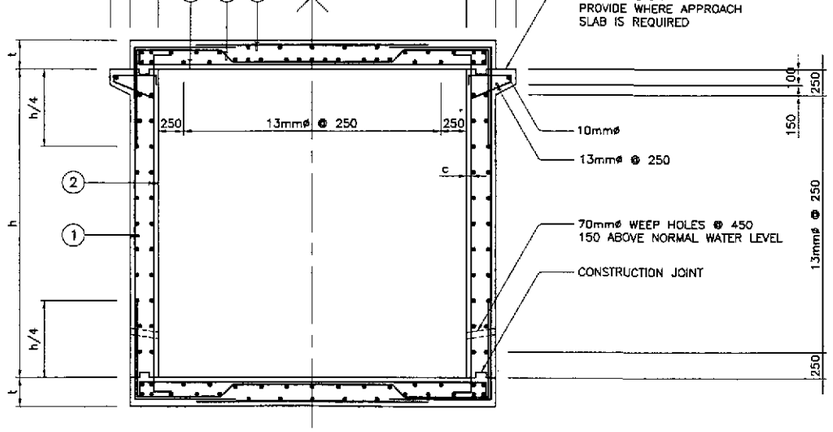
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE I	NOT TO SCALE FULL SIZE A1	STANDARD DETAILS OF REINFORCED CONCRETE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



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

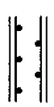


3 / DS-02 TRIPLE BARREL SECTION
SCALE 1:30



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

NOTE:



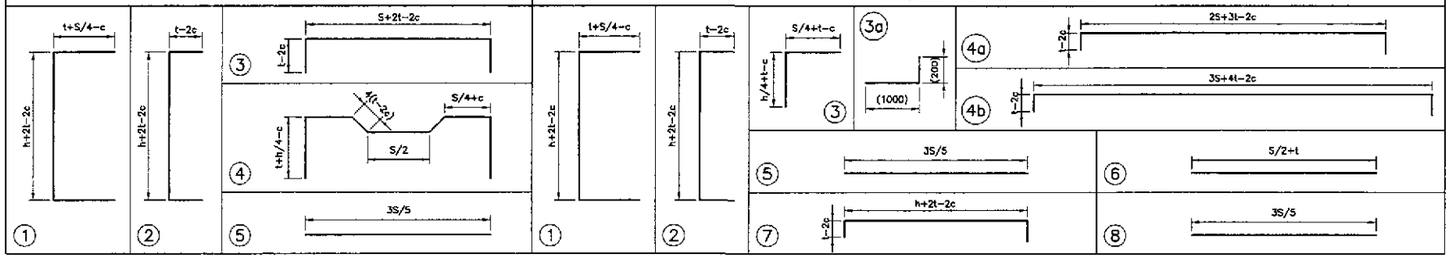
FOR WALL THICKNESS LESS THAN 240, STAGGER HORIZONTAL REINFORCEMENT AS SHOWN.

LEGEND:

c = CONCRETE CLEAR COVER (50mm)

o—— ADDITIONAL REBARS IF FILL IS LESS THAN 600mm

BAR BENDING DIAGRAM



CLEAR SPAN S	CLEAR HEIGHT h	SINGLE BARREL BOX CULVERT t	BAR 1 Ø	BAR 1 SPACING	BAR 2 Ø	BAR 2 SPACING	BAR 3 Ø	BAR 3 SPACING	BAR 4 Ø	BAR 4 SPACING	BAR 5 Ø	BAR 5 SPACING	DOUBLE AND TRIPLE BARREL BOX CULVERT t	BAR 1 Ø	BAR 1 SPACING	BAR 2 Ø	BAR 2 SPACING	BAR 3 Ø	BAR 3 SPACING	BAR 4 Ø	BAR 4 SPACING	BAR 5 Ø	BAR 5 SPACING	BAR 6 Ø	BAR 6 SPACING	BAR 7 Ø	BAR 7 SPACING	BAR 8 Ø	BAR 8 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

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

	DATE	SIGNATURE
DESIGNED	9/19/02	TEAM LEADER
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/23/02	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 I

SCALE : 1:30 FULL SIZE A1

SHEET CONTENTS : STANDARD DETAILS OF RCBC BARRELS

SHEET NO. : DS-02

QUANTITIES FOR STANDARD BOX CULVERTS

CLEAR		QUANTITY PER METER OF BARREL					
		SINGLE		DOUBLE		TRIPLE	
SPAN S	HEIGHT h	CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	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	478.60	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		DOUBLE		TRIPLE	
			CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	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, 16th 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 :

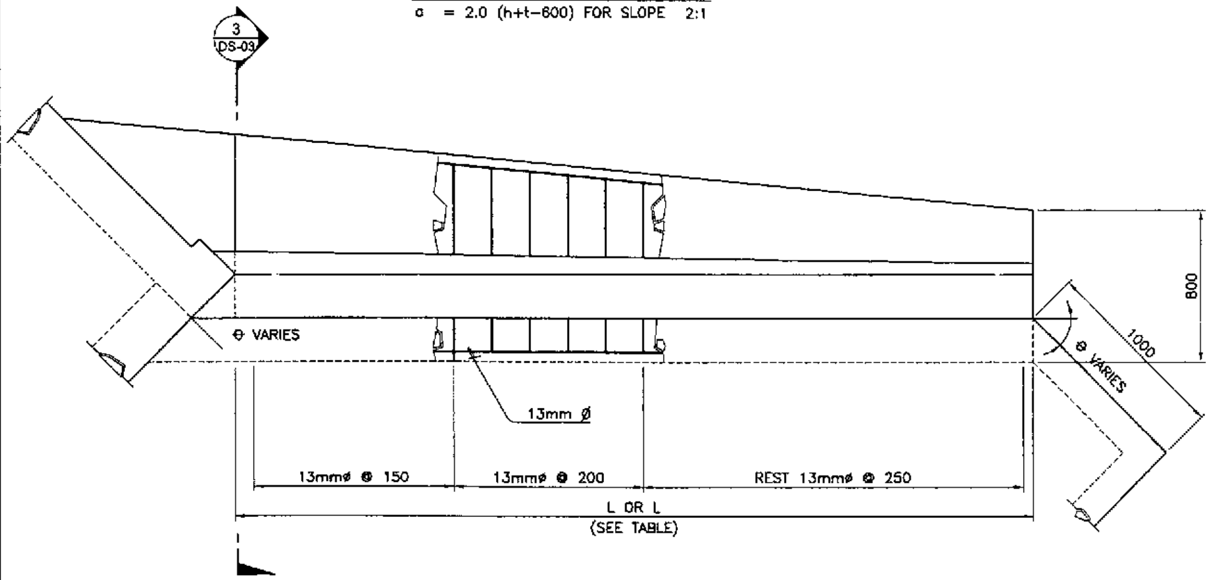
MAXIMUM HEIGHT OF FILL IS 3000mm ABOVE TOP SLAB, FOR HEIGHT OF FILL GREATER THAN 3000mm SPECIAL DESIGN OF BOX CULVERT SHOULD BE DONE.

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

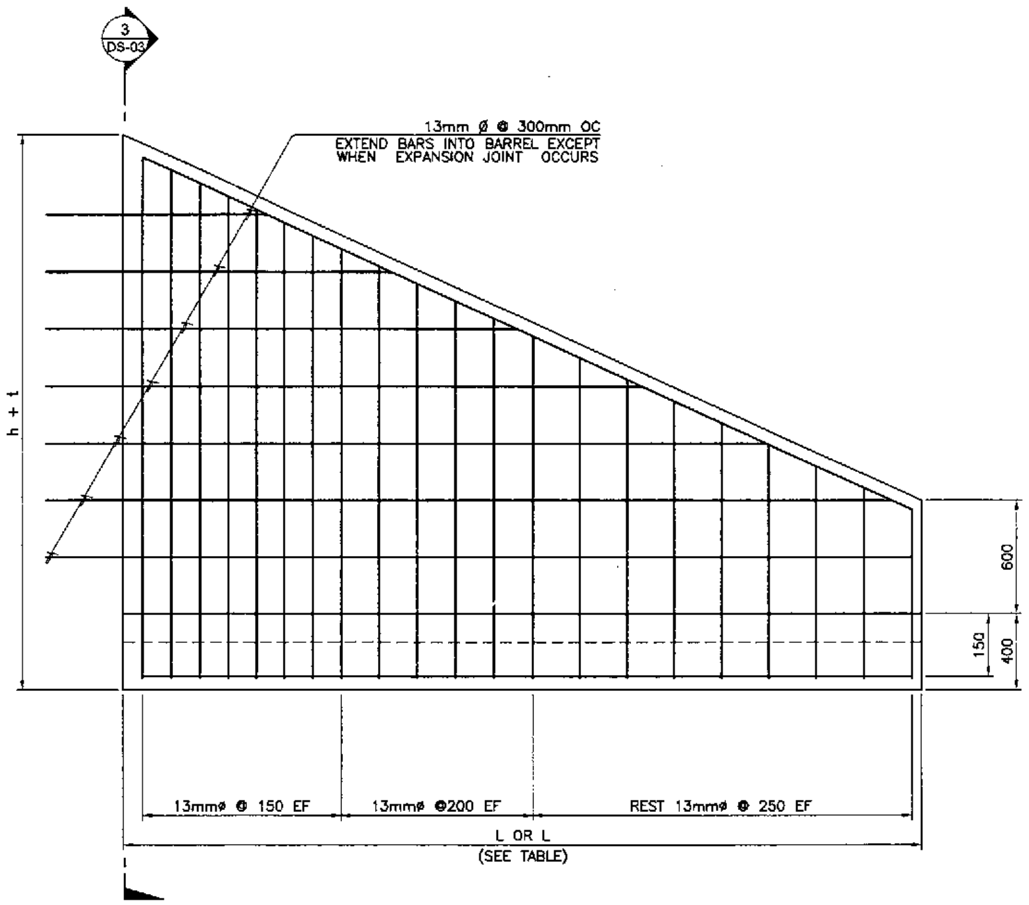
WHERE :

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

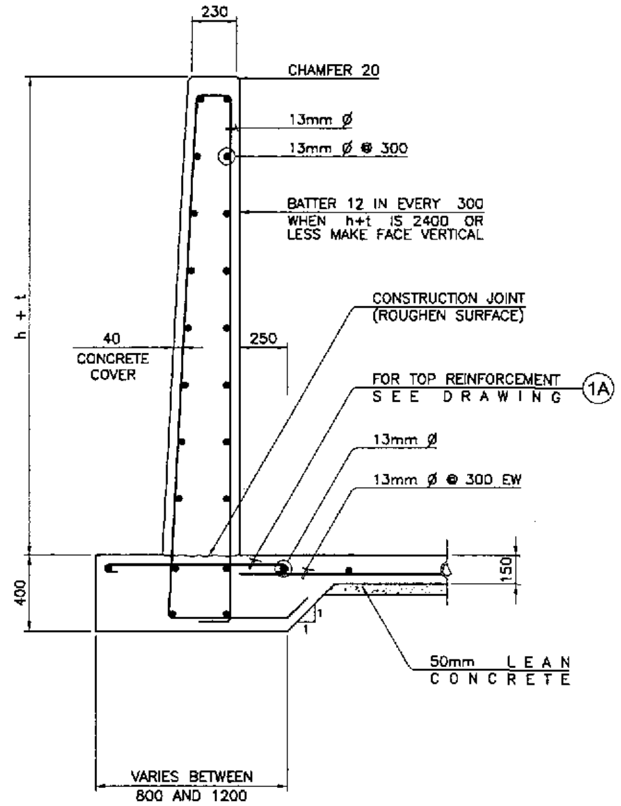
a = 2.0 (h+t-600) FOR SLOPE 2:1



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
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/02	F. STA. MARIA
CHECKED	9/21/02	H. AKASHI
SUBMITTED	9/23/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

PROJECT AND LOCATION :
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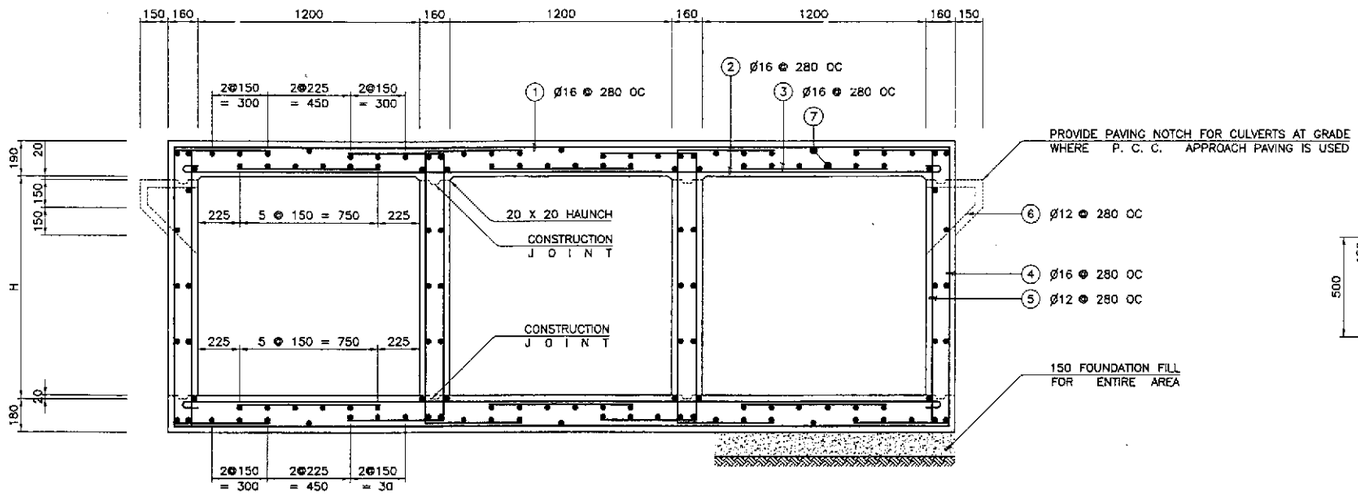
PLARIDEL BYPASS - CONTRACT PACKAGE I

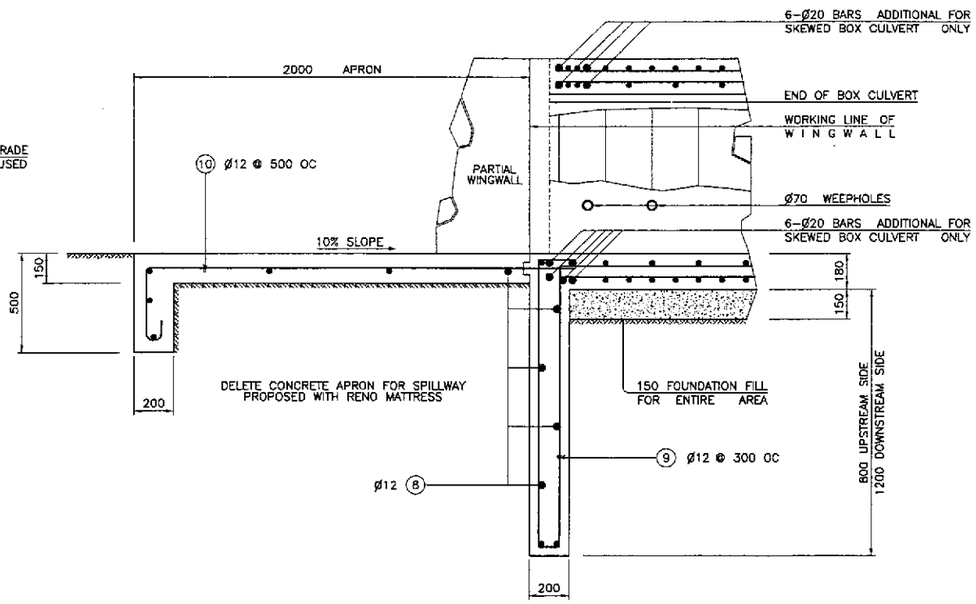
SCALE : 1:40 FULL SIZE A1

SHEET CONTENTS : STANDARD DETAILS OF RCBC WINGWALLS

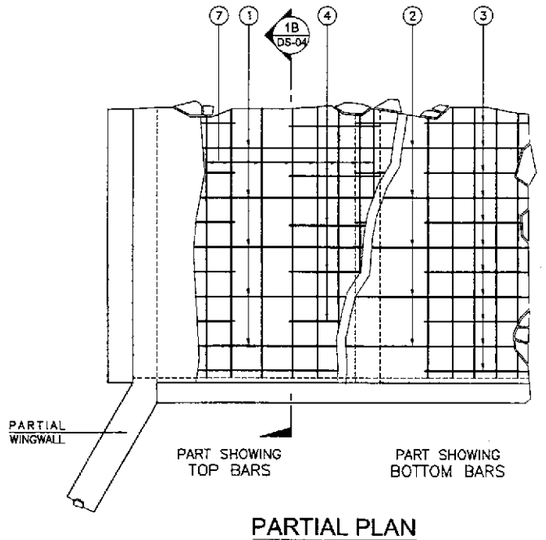
SHEET NO. : DS-03



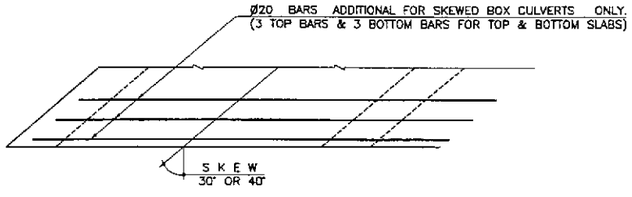
1A DS-04 SECTION ALONG ℄ OF ROADWAY
NOT TO SCALE



1B DS-04 PARTIAL SECTION A
NOT TO SCALE

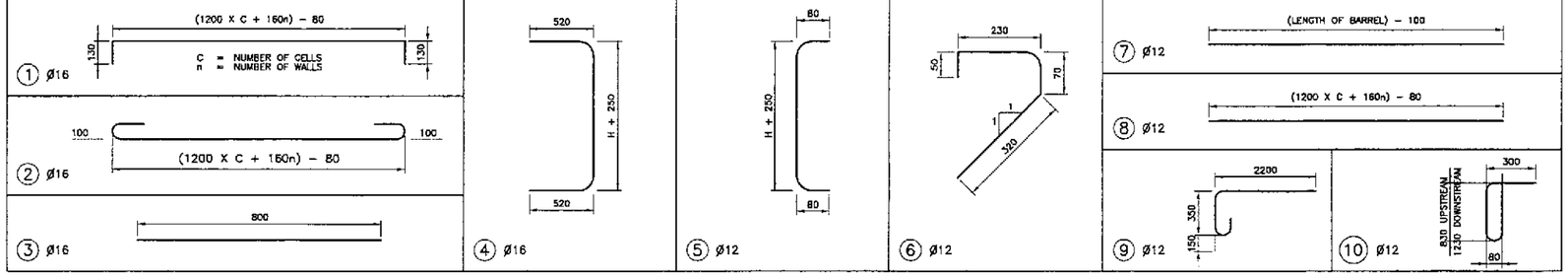


PARTIAL PLAN
NOT TO SCALE



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)

HEIGHT OF CELL "H" (METER)	SINGLE BARREL				DOUBLE BARREL				TRIPLE BARREL			
	CONCRETE CLASS "A" (m3)	REINFORCING STEEL (kg)	EXCAVATION (m3)	FOUNDATION F I L L (m3)	CONCRETE CLASS "A" (m3)	REINFORCING STEEL (kg)	EXCAVATION (m3)	FOUNDATION F I L L (m3)	CONCRETE CLASS "A" (m3)	REINFORCING STEEL (kg)	EXCAVATION (m3)	FOUNDATION F I L L (m3)
1.20	0.95	132.59	0.67	0.27	1.64	217.00	1.12	0.48	2.34	299.62	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

COMMON TO ALL HEIGHT OF CELL	SINGLE BARREL			DOUBLE BARREL			TRIPLE BARREL		
	CONCRETE CLASS "A" (m3)	REINFORCING STEEL (kg)	EXCAVATION (m3)	CONCRETE CLASS "A" (m3)	REINFORCING STEEL (kg)	EXCAVATION (m3)	CONCRETE CLASS "A" (m3)	REINFORCING STEEL (kg)	EXCAVATION (m3)
	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	9/19/02	P. STO. ROMAN
CHECKED	9/21/02	A. HAKIM
SUBMITTED	9/22/02	M. KINOSHITA TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

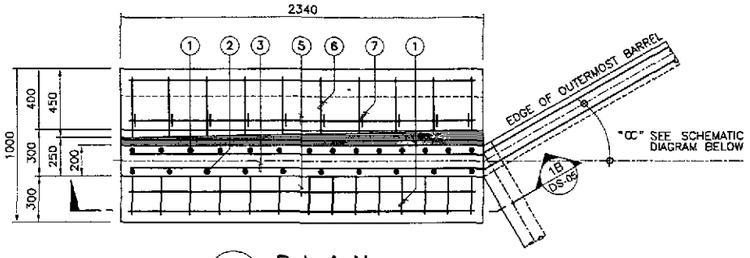
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC,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

SCALE : NOT TO SCALE FULL SIZE A1

SHEET CONTENTS : STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)

SHEET NO. : DS-04



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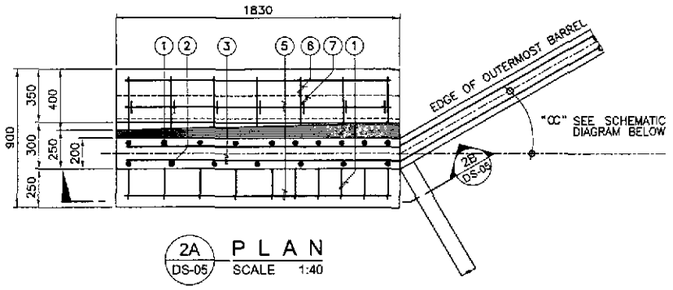

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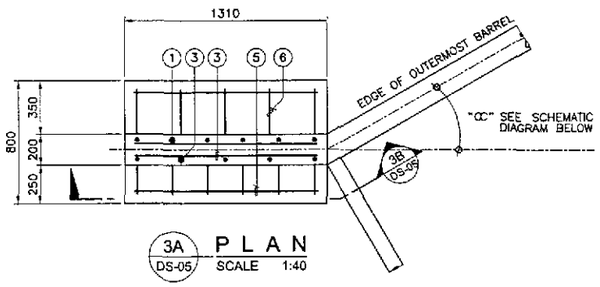

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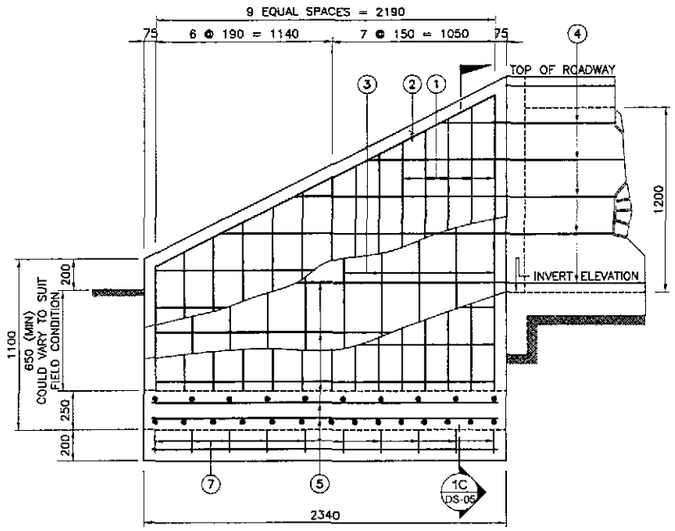

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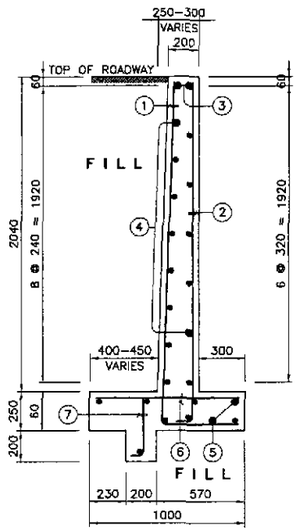
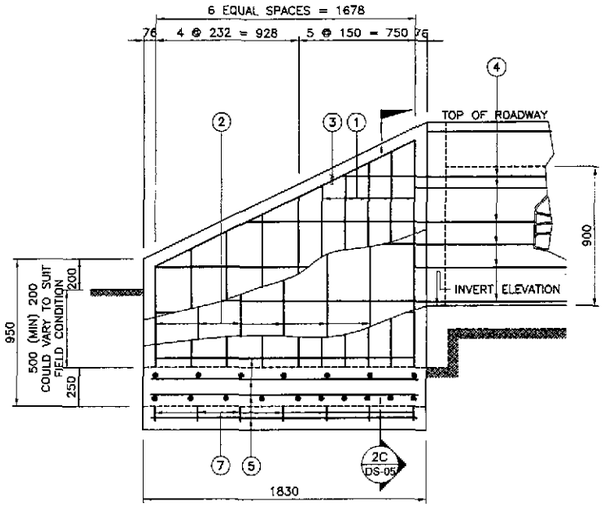


1C DS-05 SECTION SCALE 1:40



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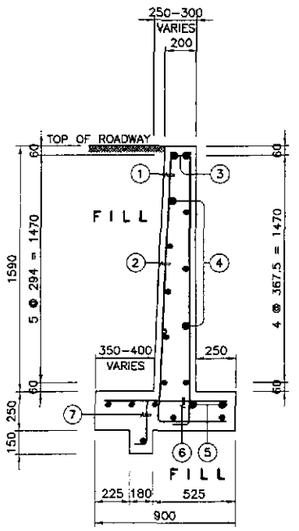

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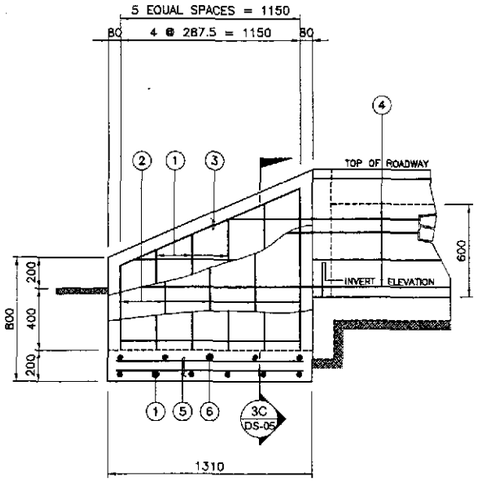


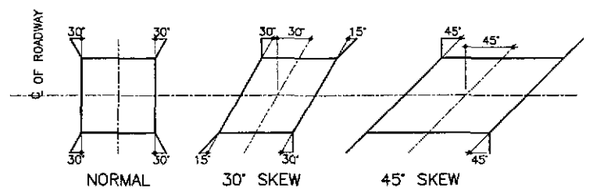
3B DS-05 ELEVATION SCALE 1:40

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

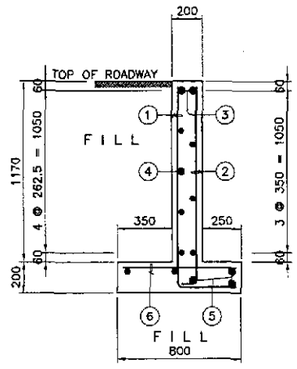
BAR BENDING DIAGRAM H=900		
① 10–12mmø	② 7–12mmø	③ 2–12mmø
④ 6–12mmø	⑤ 10–12mmø	⑥ 7–12mmø / ⑦ 7–12mmø

BAR BENDING DIAGRAM H=600		
① 6–12mmø	② 5–12mmø	③ 2–12mmø
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

JAPAN INTERNATIONAL COOPERATION AGENCY

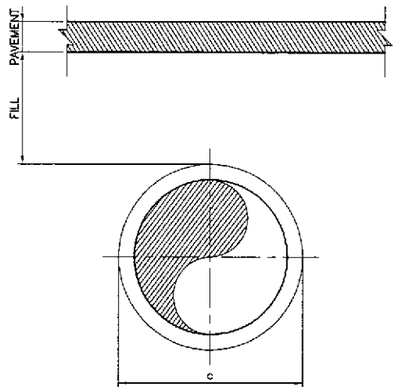
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/02	STA. MARIA
CHECKED	9/12/02	A. TAKATA
SUBMITTED	9/22/02	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 I	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 THICK-NESS (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 6.98	1 LINE 6.98

CONCRETE 317 kg/cm² (4,500 lb/in²)

WALL THICK-NESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ⊛	
t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT
51	495	514	502	521	44	1 LINE 1.69	
51	495	514	502	521	44	1 LINE 2.33	
51	495	514	502	521	44	1 LINE 2.96	
64	660	680	667	686	44	1 LINE 4.23	1 LINE 3.60
76	825	845	832	851	51	1 LINE 5.92	1 LINE 4.44
86	988	1007	994	1013	64	2 LINES EACH 4.66	1 LINE 4.66
95	1150	1165	1156	1175	64	2 LINES EACH 5.29	1 LINE 5.29
108	1315	1334	1321	1340	64	2 LINES EACH 6.56	1 LINE 6.56
127	1639	1658	1645	1664	64	2 LINES EACH 8.68	1 LINE 8.68

STRENGTH TEST REQUIREMENTS kg/m OF PIPE

THREE-EDGE-BEARING METHOD ✳	
0.00025mCRACK LOAD	ULTIMATE LOAD
3.355	5.218
3.914	6.060
4.473	6.709
4.473	7.454
5.032	8.573
6.038	9.840
7.045	10.958
8.051	11.927
8.945	14.909

EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS

CONCRETE 317 kg/cm² (4,500 lb/in²)

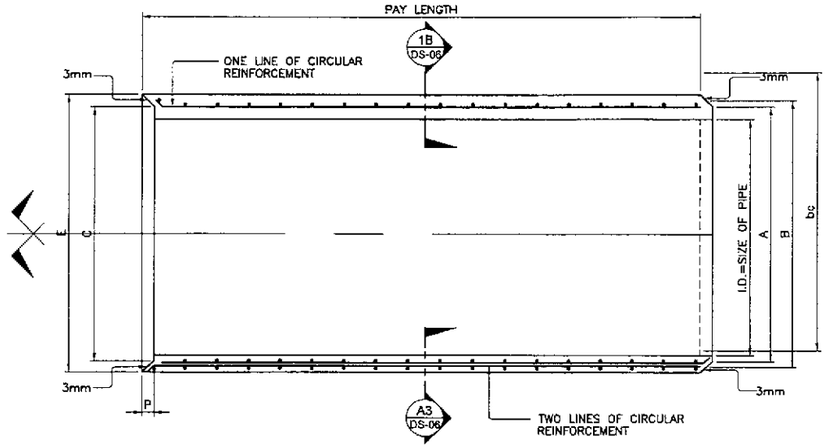
WALL THICK-NESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ○	
t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT
—	—	—	—	—			
—	—	—	—	—			
—	—	—	—	—			
76	673	692	680	699	44	1 LINE 5.50	1 LINE 4.23
89	838	857	845	864	51	1 LINE 6.56	1 LINE 5.08
102	1003	1022	1010	1029	64	2 LINES EACH 5.92	1 LINE 5.92
114	1168	1187	1175	1194	64	2 LINES EACH 6.98	1 LINE 6.98
127	1334	1353	1340	1359	64	2 LINES EACH 8.04	1 LINE 8.04
152	1664	1683	1670	1690	64	2 LINES EACH 10.56	1 LINE 10.58

STRENGTH TEST REQUIREMENTS kg/m OF PIPE

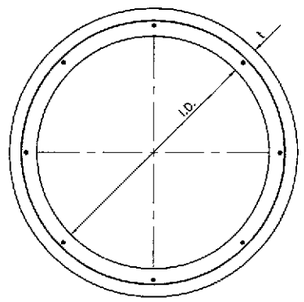
THREE-EDGE-BEARING METHOD	
0.00025mCRACK LOAD	LOAD ULTIMATE
5.964	8.945
7.454	11.182
8.945	13.418
10.436	15.655
11.927	17.891
13.418	22.364

⊛ 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.

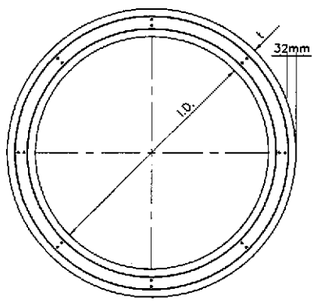


1A DS-06 LONGITUDINAL SECTION NOT TO SCALE



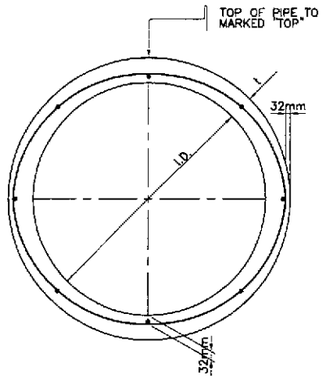
ONE LINE OF CIRCULAR REINFORCEMENT

1B DS-06 SECTION

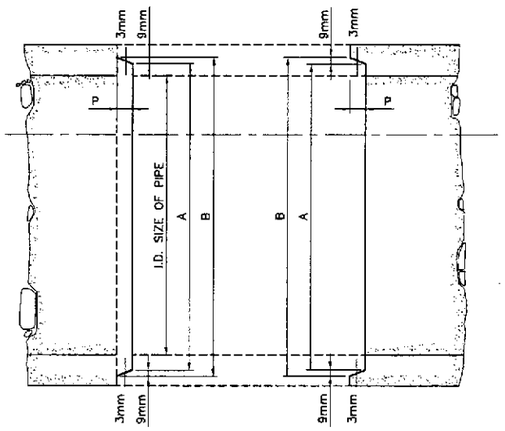


TWO LINES OF CIRCULAR REINFORCEMENT

1C DS-06 SECTION



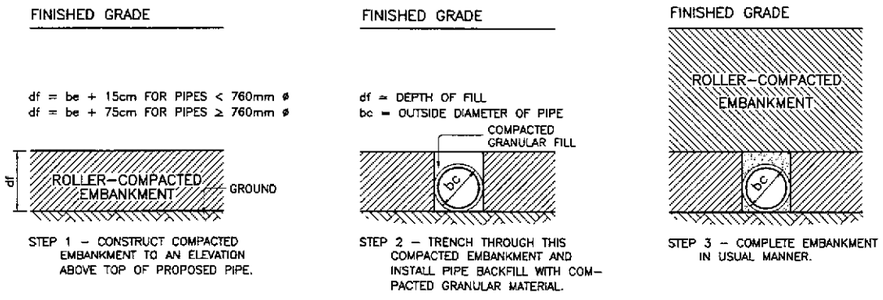
ONE LINE OF ELLIPTICAL REINFORCEMENT



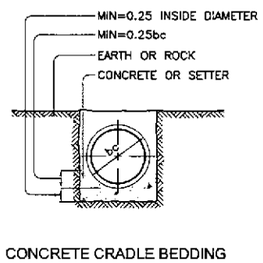
TONGUE END GROOVE END

1D DS-06 SECTION

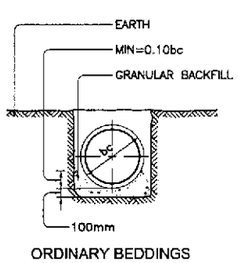
1 DS-06 STANDARD REINFORCED CONCRETE PIPE CULVERTS SCALE AS SHOWN



2 DS-06 METHODS OF PIPE INSTALLATION NOT TO SCALE

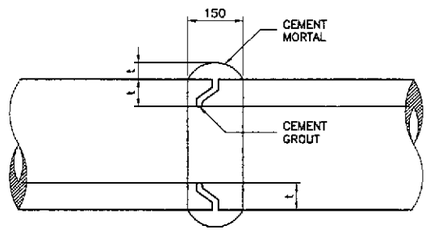


CONCRETE CRADLE BEDDING



ORDINARY BEDDINGS

3 DS-06 TYPICAL BEDDING FOR CONDUITS NOT TO SCALE



4 DS-06 DETAIL OF PIPE COLLAR NOT TO SCALE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	9/19/02	
CHECKED	9/21/02	
SUBMITTED	9/22/02	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. :
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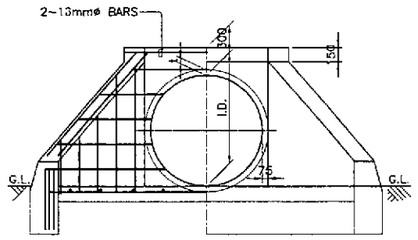
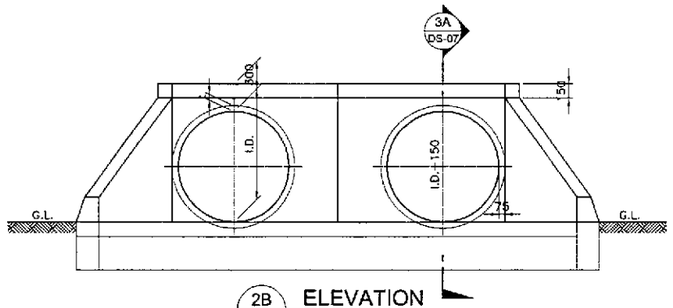


1B DS-07 ELEVATION NOT TO SCALE



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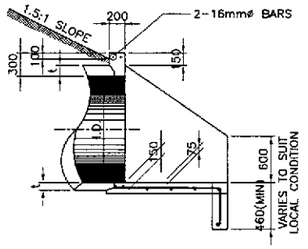
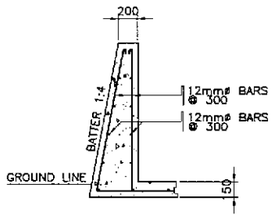
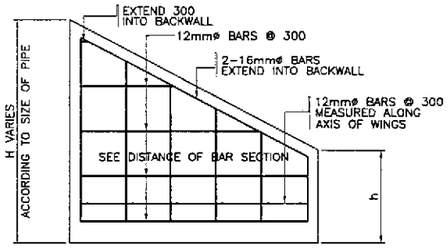


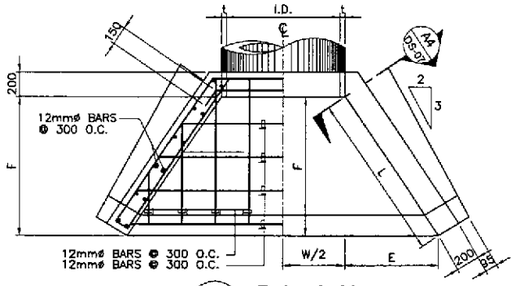
3A DS-07 SECTION NOT TO SCALE



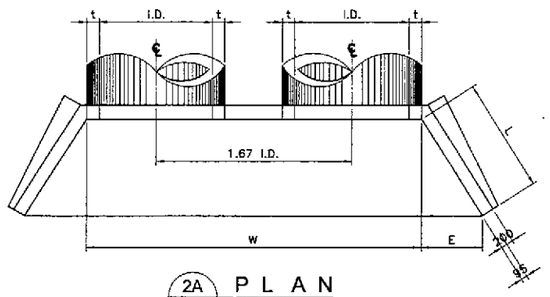
3B DS-07 SECTION NOT TO SCALE



3C DS-07 SECTION NOT TO SCALE



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

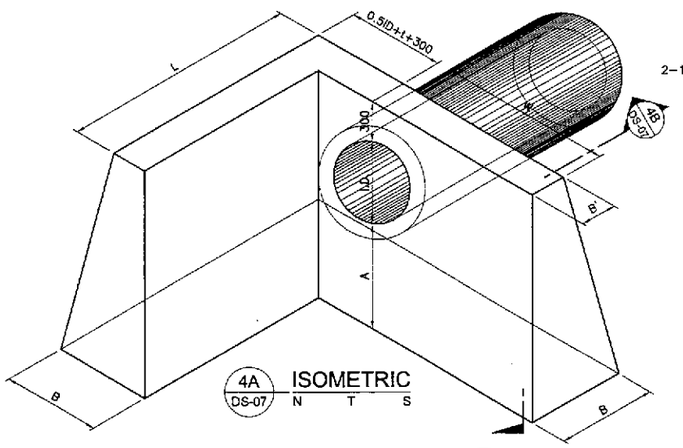
2 DS-07 FLARED TYPE HEADWALL (DOUBLE PIPE) SCALE AS SHOWN

TABLE A (ONE FLARED TYPE HEADWALL 1.5:1)

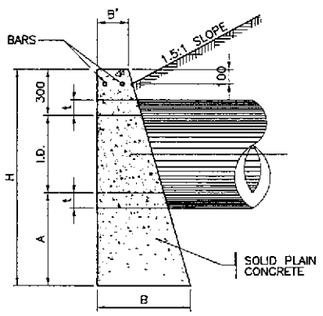
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)				SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THICKNESS SHELL (t)	L	E	F	h	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. 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	6
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	–	–



4A DS-07 ISOMETRIC N T S

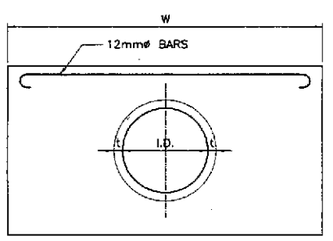


4B DS-07 SECTION NOT TO SCALE

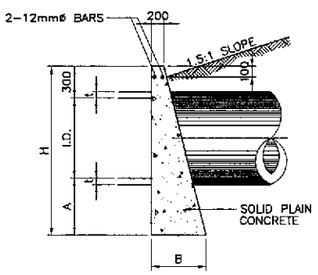
4 DS-07 L-TYPE HEADWALL NOT AS SHOWN

TABLE C (ONE STRAIGHT TYPE HEADWALL)

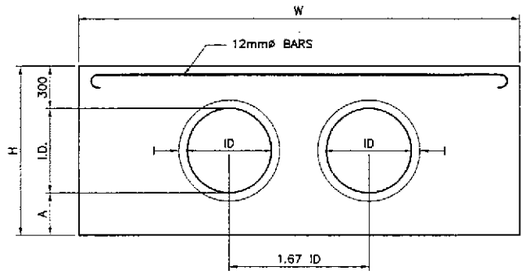
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)			SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.
460	51	310	350	1070	1500	0.15	0.46	3.48	2600	0.33	0.63	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



5A DS-07 SINGLE PIPE NOT TO SCALE



5B DS-07 SECTION NOT TO SCALE



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

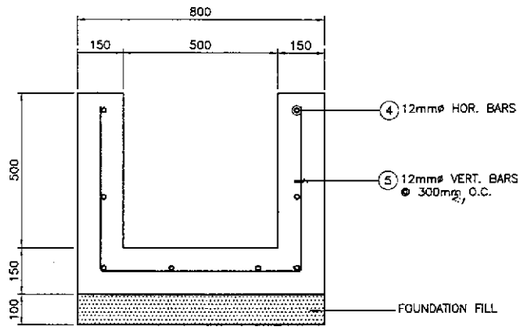
KEI KATAHIRA & ENGINEERS INTERNATIONAL — YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	01/19/02	
CHECKED	9/21/02	
SUBMITTED	9/23/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

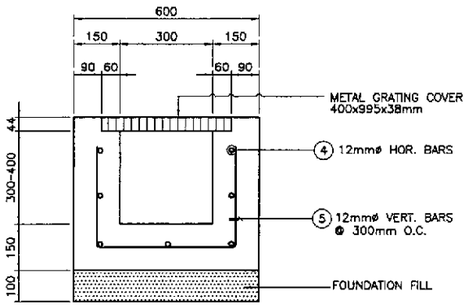
PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO, Project Director	JOSEFINA M. ALAGAR, Chief, Highways Division	GILBERTO S. REYES, OIC, Director IV	MANUEL M. BONGAN, 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 REINFORCED CONCRETE HEADWALL FOR RCPC	DS-07
PLARIDEL BYPASS - CONTRACT PACKAGE I	FULL SIZE A1		

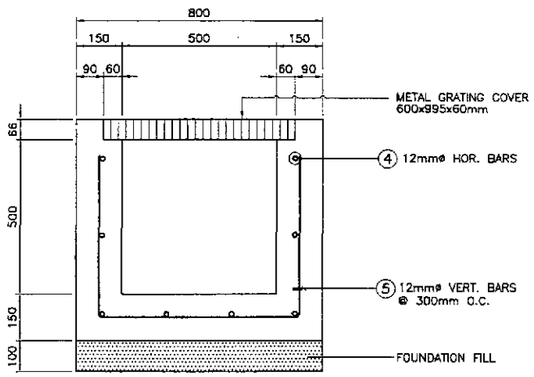


REINFORCED CONCRETE DITCH

2 DS-08 TYPE U SCALE: 1:10

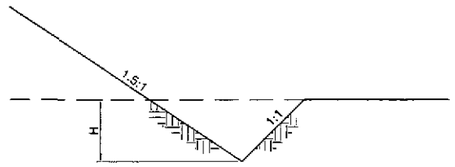


REINFORCED CONCRETE DITCH W/ COVER



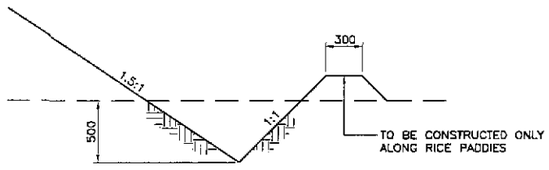
REINFORCED CONCRETE DITCH W/ COVER

1 DS-08 TYPE LU SCALE: 1:10



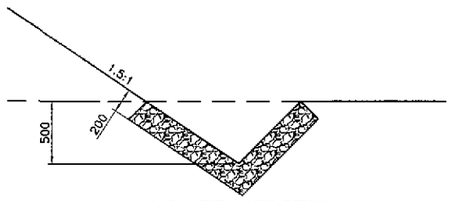
V-SHAPED UNLINED DITCH

TYPE E-4



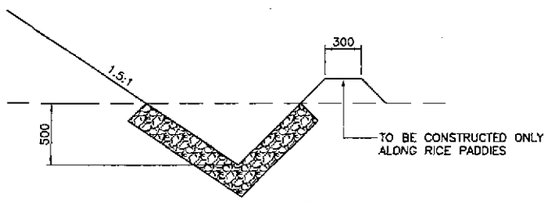
V-SHAPED UNLINED DITCH

TYPE E-3



V-SHAPED LINED DITCH

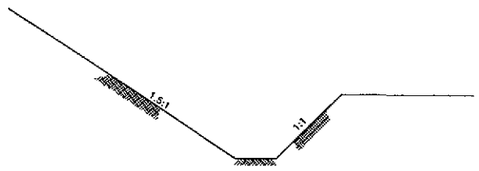
TYPE E-2



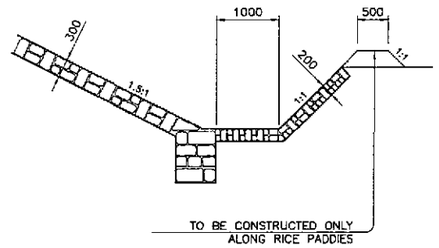
V-SHAPED UNLINED DITCH

TYPE E-1

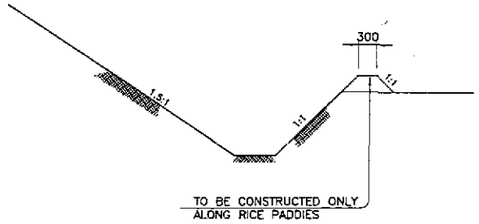
4 DS-08 TYPE E SCALE: 1:25



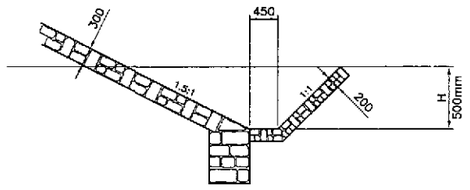
TYPE C-7



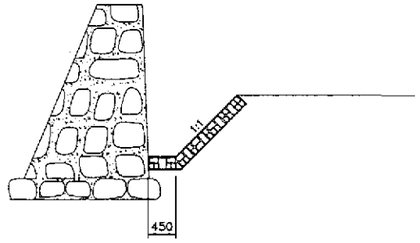
TYPE C-3



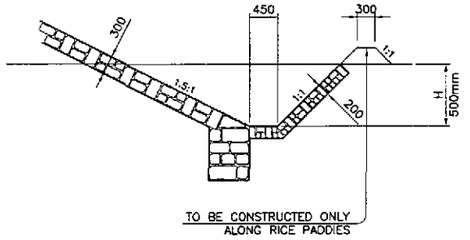
TYPE C-6



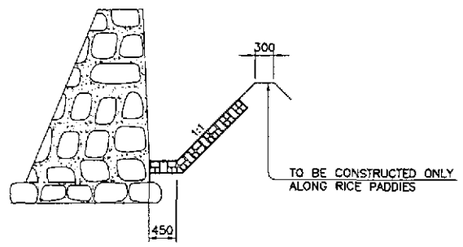
TYPE C-2



TYPE C-5



TYPE C-1



TYPE C-4

5 DS-08 TYPE C NOT TO SCALE

STANDARD DRAINAGE DITCHES

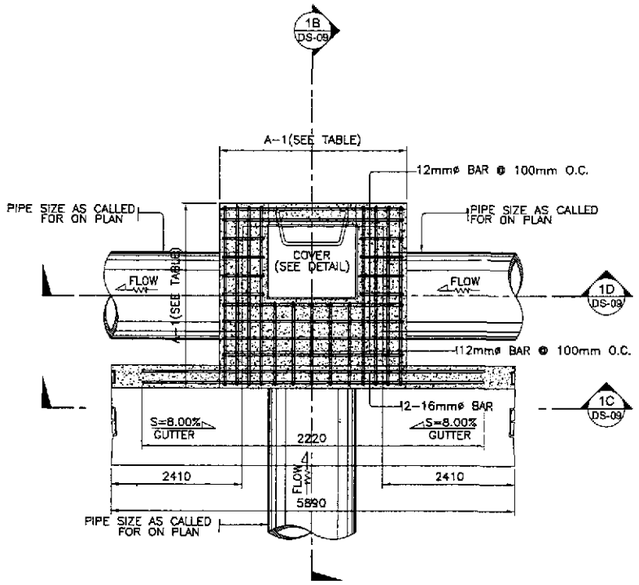
JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

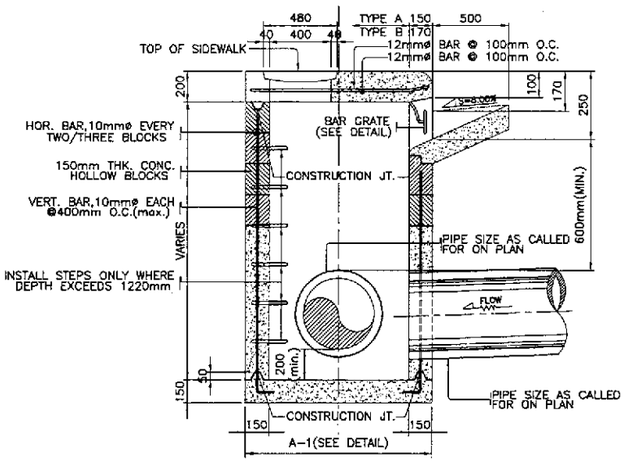
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	9/19/02		Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	9/21/02	H. HAKIM	DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONGAN	SIMEON A. DATUMANONG
SUBMITTED	9/23/02	M. KITAGAWA TEAM LEADER	Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

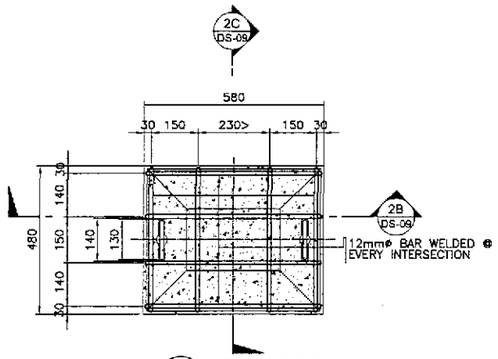
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD DRAINAGE DITCHES	DS-08
PLARIDEL BYPASS - CONTRACT PACKAGE I	FULL SIZE A1		



1A DS-09 PLAN



1B DS-09 SECTION



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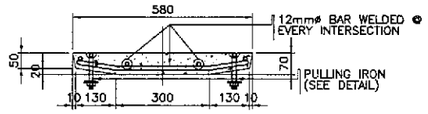

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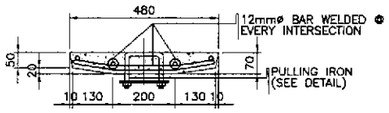
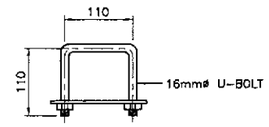
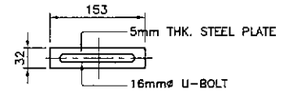


2C DS-09 SECTION

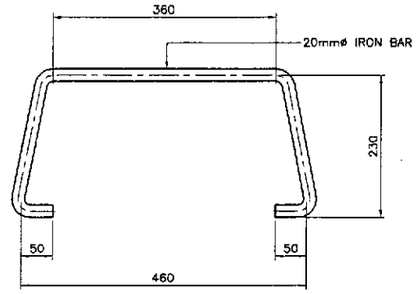


3A DS-09 PLAN

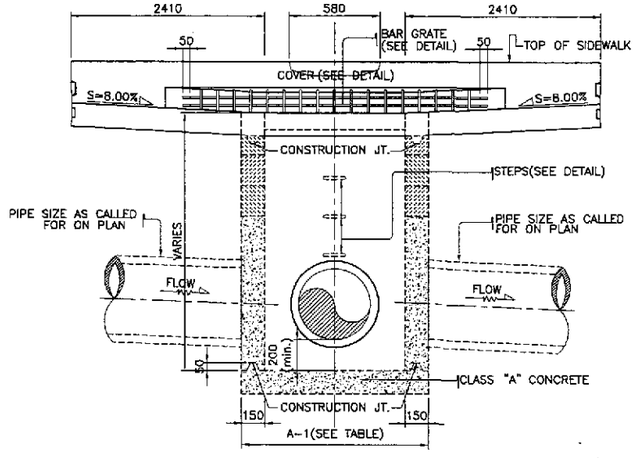


3B DS-09 ELEVATION

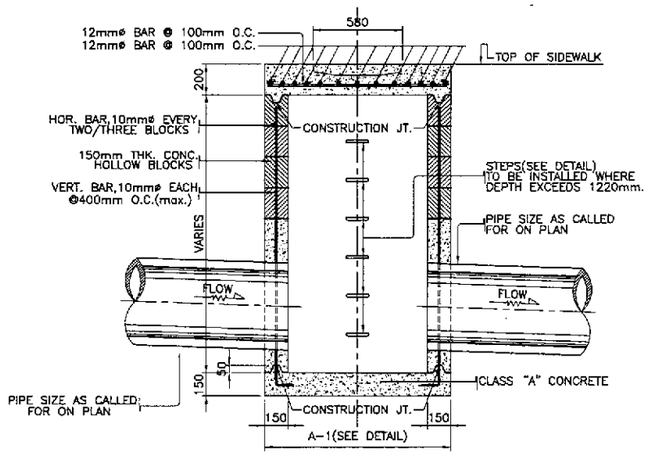
3 DS-09 PULLING IRON DETAIL
SCALE 1:5



4 DS-09 STEP
SCALE 1:5



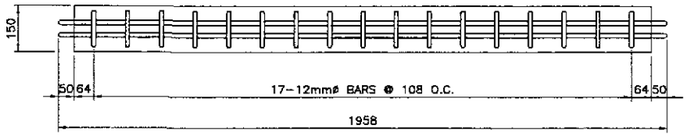
1C DS-09 SECTION
1:20



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	9/19/02	F. STA. MARIA
CHECKED	9/21/02	A. HARIKI
SUBMITTED	9/23/02	M. KUSUDA TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

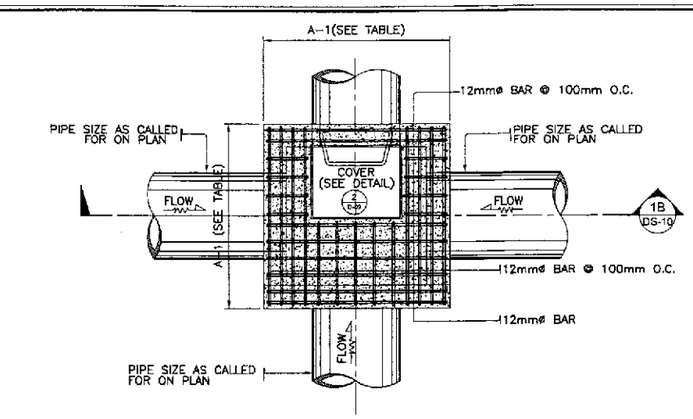
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

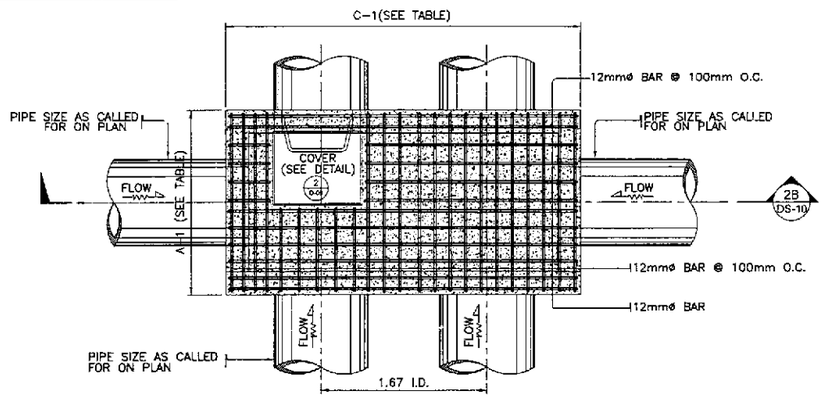
SCALE : AS SHOWN FULL SIZE A1

SHEET CONTENTS : STANDARD COMBINATION CURB INLET MANHOLE

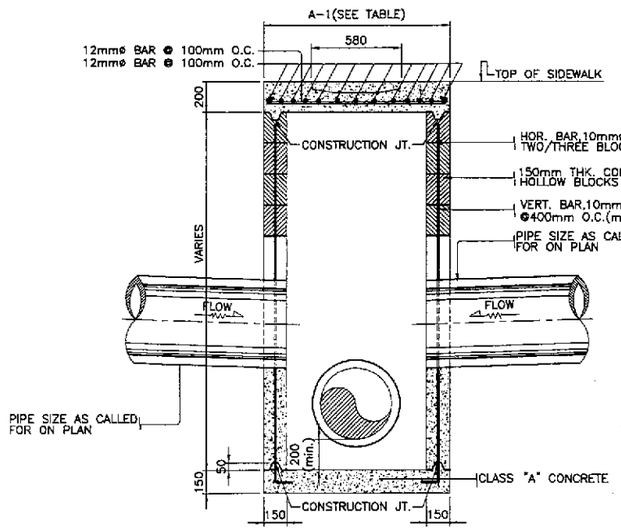
SHEET NO. : DS-09



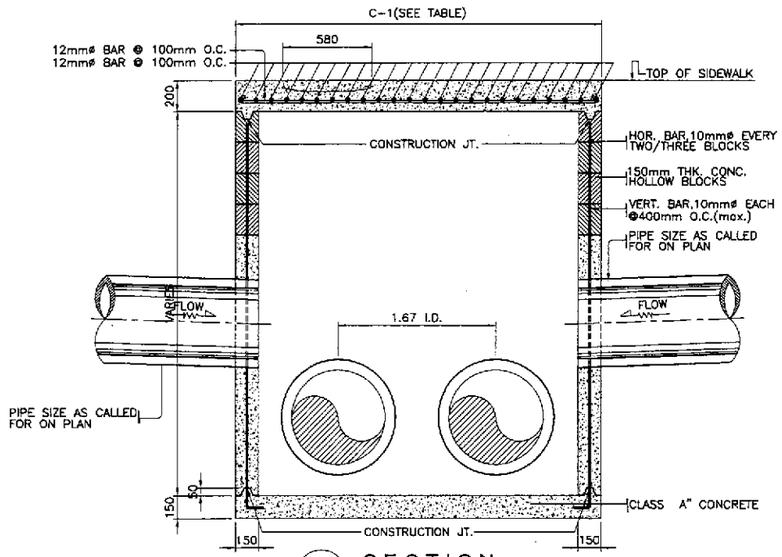
1A DS-10 PLAN BOX-TYPE MANHOLE (SINGLE PIPE)



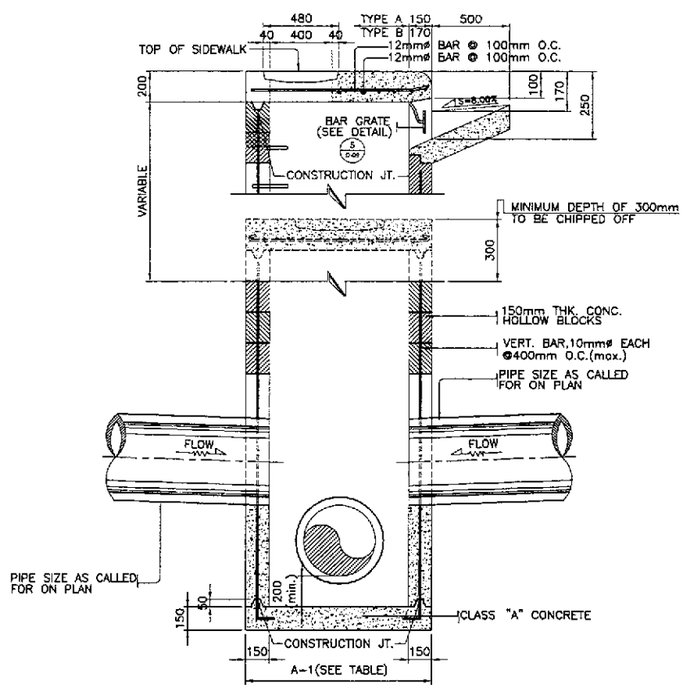
2A DS-10 PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)



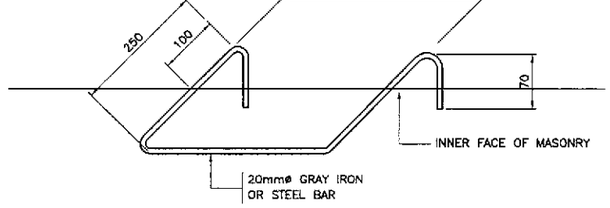
1B DS-10 SECTION



2B DS-10 SECTION



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



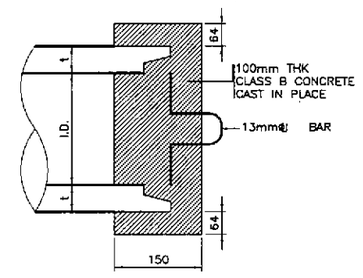
4 DS-10 STD. STEP OR RUNG

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

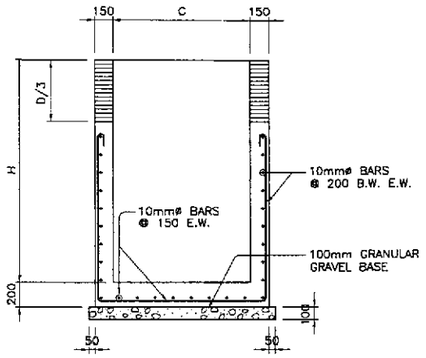
JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

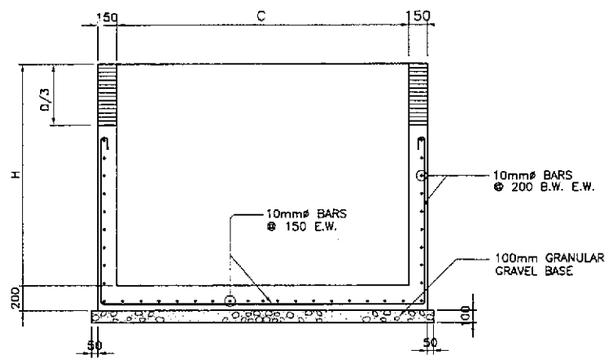
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PJHL – PMO Submitted By:	BUREAU OF DESIGN Reviewed By:	BUREAU OF DESIGN Recommended By:	OFFICE OF THE SECRETARY Recommended By: (See cover sheet for Signature)	OFFICE OF THE SECRETARY Approved By: (See cover sheet for Signature/Approval)
DESIGNED	9/19/02						
CHECKED	9/21/02	A. RAKIM					
SUBMITTED	9/23/02	M. KIUCHI 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)	AS SHOWN	SPECIAL JUNCTION BOX MANHOLE	DS-10
PLARIDEL BYPASS - CONTRACT PACKAGE I	FULL SIZE A1		



1C DS-11 SECTION



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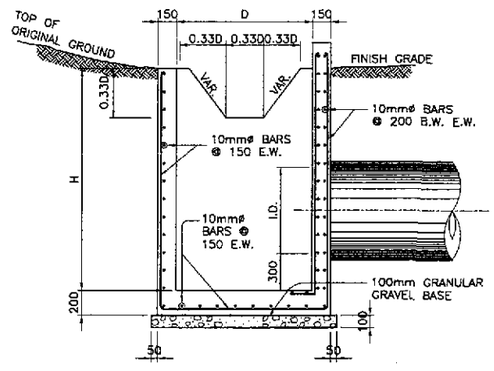

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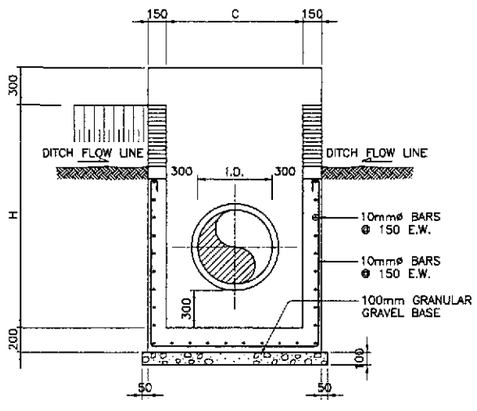

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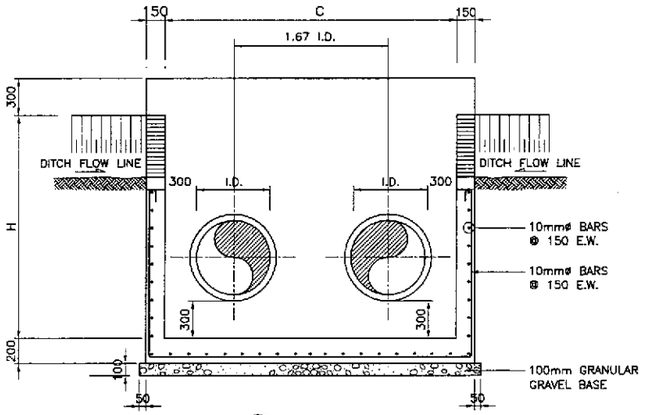

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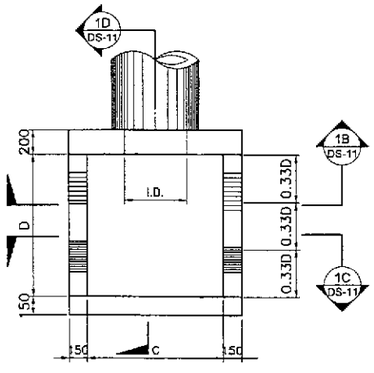
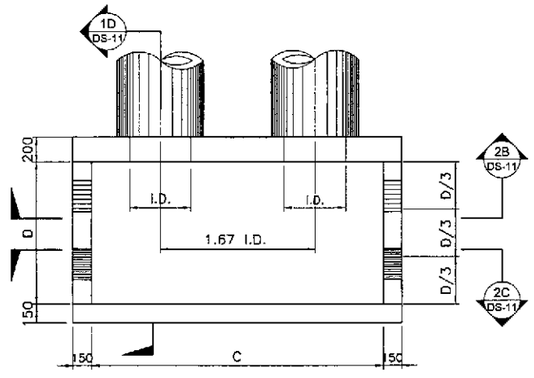


1A D-11 PLAN



2A DS-11 PLAN

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

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

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

DETAILS OF REINFORCED CONCRETE CATCH BASIN FOR RCPC

JAPAN INTERNATIONAL COOPERATION AGENCY

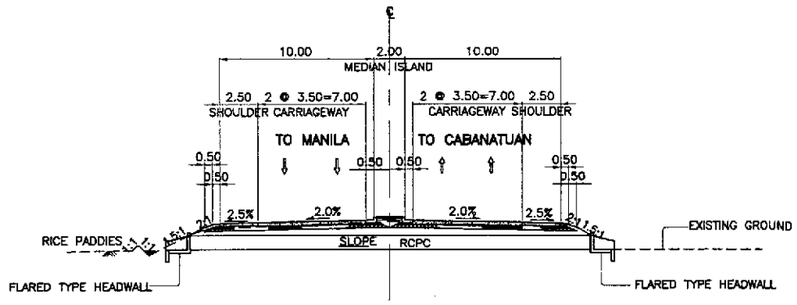
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/02	
CHECKED	9/19/02	
SUBMITTED	9/23/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

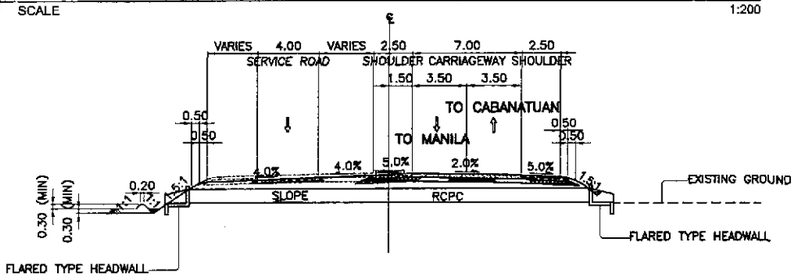
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	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)	1:25	STANDARD REINFORCED CONCRETE CATCH BASIN FOR RCPC	DS-11
PLARIDEL BYPASS - CONTRACT PACKAGE I	FULL SIZE A1		



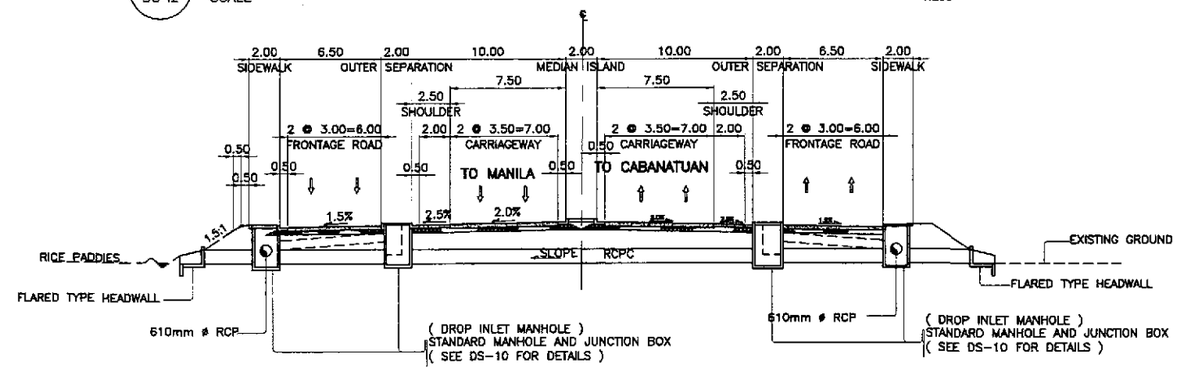
1 DS-12 SCALE 1:200

TYPICAL DRAINAGE SECTION (ULTIMATE STAGE)



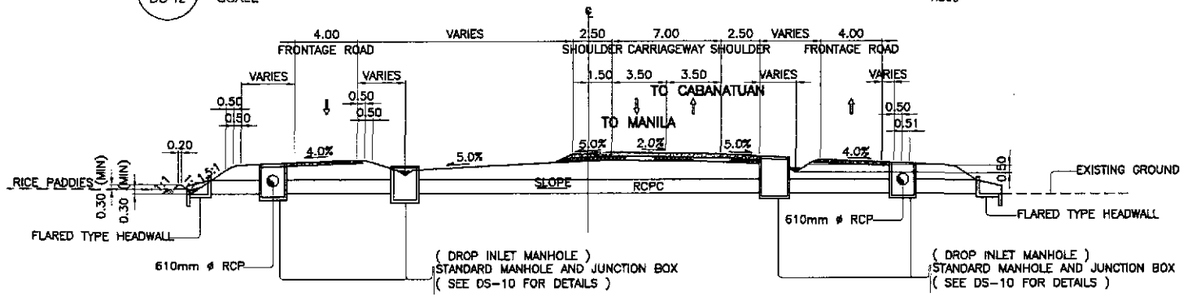
2 DS-12 SCALE 1:200

TYPICAL DRAINAGE SECTION (INITIAL STAGE)



TYPICAL DRAINAGE SECTION WITH CURB INLET MANHOLE (ULTIMATE STAGE)

3 DS-12 SCALE 1:200



TYPICAL DRAINAGE SECTION WITH DROP INLET MANHOLE (INITIAL STAGE)

4 DS-12 SCALE 1:200

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	9/19/07	S. SAKAI
CHECKED	9/19/07	H. HAKIM
SUBMITTED	9/19/07	M. MOMMA TEAM LEADER

REPUBLIC OF THE PHILIPPINES
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PLARIDEL BYPASS - CONTRACT PACKAGE I

SCALE :
NOT TO SCALE
FULL SIZE A1

SHEET CONTENTS :
TYPICAL DRAINAGE SECTIONS WITH MANHOLE
(INITIAL and ULTIMATE STAGE)

SHEET NO. :
DS-12