

# **DRAINAGE**



# SCHEDULE OF DRAINAGE STRUCTURES

WATERSHED NO.	Q (cms)	STATION (kms)	SKEW	FINISHED GRADE ELEV. (m)	CULVERT CHARACTERISTICS							STRUCTURES		CULVERT FLOW CAPACITY (cms)	REMARKS	RECOMMENDATION			
					INVERT ELEVATION (m)			SLOPE	RCPC (mm dia.)	RCBC (SxH) (mm)	LENGTH (m)						INLET	OUTLET	
					LEFT	CENTER	RIGHT				LEFT	RIGHT	TOTAL						
<b>ACCESS ROAD</b>																			
<b>STA. 111 + 100.000 INTERSECTION A-14 (MAJOR)</b>																			
				28.60	26.85	26.88	26.90	0.00357	1-910			7.00	7.00	14.00	F	F	1.11	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				27.49	25.65	25.68	25.70	0.00357	1-910			7.00	7.00	14.00	F	F	1.11	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				28.50	26.25	26.28	26.30	0.00333	1-910			7.50	7.50	15.00	F	F	1.08	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
			40° LF	28.44	26.25	26.30	26.35	0.00556	1-910			9.00	9.00	18.00	F	F	1.39	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
			40° LF	28.35	26.30	26.35	26.40	0.00556	1-910			9.00	9.00	18.00	F	F	1.39	IRRIGATION STRUCTURE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				27.38	25.45	25.48	25.50	0.00357	1-910			7.00	7.00	14.00	F	F	1.11	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				28.30	25.80	25.85	25.90	0.00625	1-910			8.00	8.00	16.00	F	F	1.47	IRRIGATION STRUCTURE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
			30° LF	27.40	25.65	25.70	25.75	0.00667	1-910			7.50	7.50	15.00	F	F	1.52	IRRIGATION STRUCTURE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				28.40	26.40	26.45	26.50	0.00667	1-910			7.50	7.50	15.00	F	F	1.52	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				28.30	26.00	25.93	25.85	0.00937	1-910			8.00	8.00	16.00	F	F	1.81	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				28.25	26.10	26.03	25.95	0.01000	1-910			7.50	7.50	15.00	F	F	1.86	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
<b>STA. 111 + 961.357 INTERSECTION A-15 (MAJOR)</b>																			
				31.21	29.46	29.35	29.26	0.01357	1-1070			6.50	8.50	15.00	F	F	2.90	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				31.32	29.60	29.50	29.40	0.01053	1-910			9.50	9.50	19.00	F	F	1.66	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
<b>STA. 112 + 873.408 INTERSECTION A-16</b>																			
				32.00	30.40	30.35	30.30	0.00909	1-910			5.50	5.50	11.00	F	F	1.54	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
<b>STA. 118 + 010.000 INTERSECTION A-19</b>																			
				34.84	32.90	32.85	32.80	0.00909	1-1070			5.50	5.50	11.00	F	F	2.37	IRRIGATION STRUCTURE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
<b>STA. 118 + 795.000 INTERSECTION A-20</b>																			
				36.14	33.55	33.53	33.50	0.00357	1-910			7.00	7.00	14.00	F	F	0.97	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
				34.96	33.30	33.32	33.35	0.00454	1-910			5.50	5.50	11.00	F	F	1.26	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.

LEGEND:  
 S - STRAIGHT      W - WINGWALL  
 F - FLARED

## QUANTITIES FOR RCBC

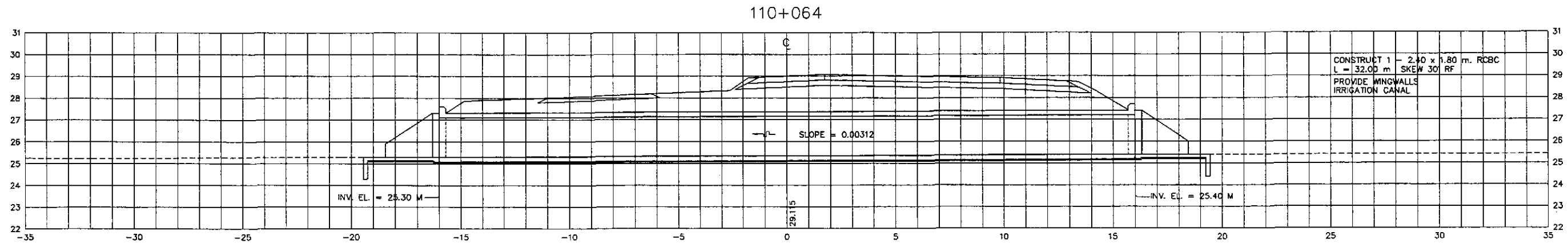
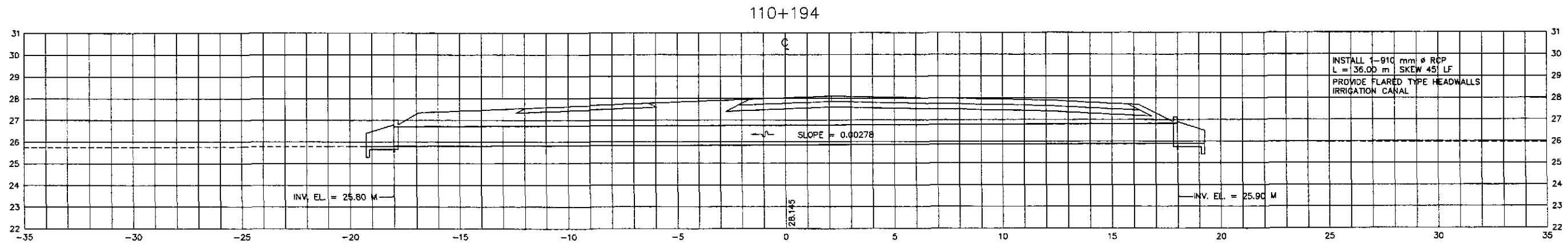
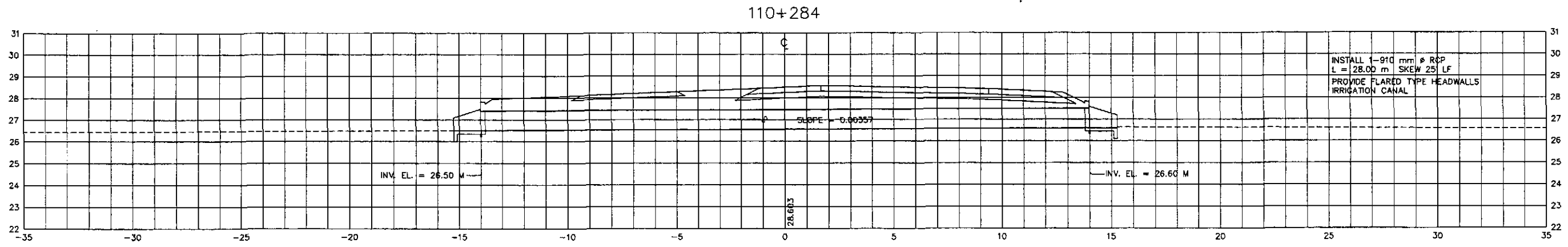
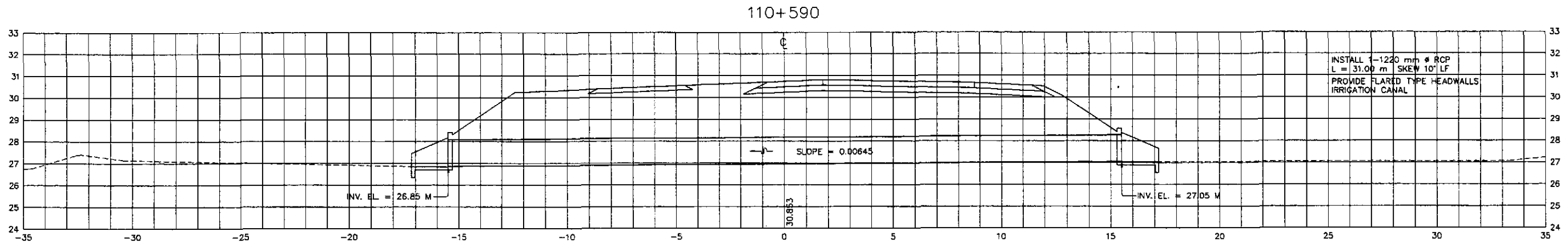
STATION	SIZE	ITEM 103 (1) STRUCTURAL EXCAVATION (m <sup>3</sup> )	ITEM 103 (3) a GRAVEL FONDATION FILL (m <sup>3</sup> )		ITEM 404 (1) REINFORCING BAR (GRADE 40) (kg)		ITEM 405 (1) a STRUCTURAL CONCRETE CLASS "A" (m <sup>3</sup> )		ITEM 405 (6) LEAN CONCRETE (m <sup>3</sup> )	
		RCBC & WW	RCBC	WW	RCBC	WW	RCBC	WW	RCBC	WW
<b>MAIN BYPASS</b>										
<b>STA. 109 + 920.000 - STA. 119 + 000.000</b>										
110+064	1-2.40x1.80	138.56	9.60	3.56	8,726.40	780.00	65.28	14.16	4.80	1.78
116+834	2-1.25x1.00	231.20	23.12	1.82	14,226.96	360.00	110.64	5.88	11.56	0.91
<b>TOTAL</b>		369.76	32.72	5.38	22,953.36	1,140.00	176.12	20.04	16.36	2.69

<b>JAPAN INTERNATIONAL COOPERATION AGENCY</b> KATAHIRA & ENGINEERS INTERNATIONAL YACHIYO ENGINEERING CO., LTD.	DESIGNED	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN	PROJECT AND LOCATION :					SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/16/02	<i>[Signature]</i>		Submitted By:	Reviewed By:	Recommended By:	Approved By:	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) <b>CABANATUAN BYPASS - CONTRACT PACKAGE II</b>	NOT TO SCALE	SCHEDULE OF DRAINAGE STRUCTURES / QUANTITIES FOR RCBC	DG-02
	SUBMITTED	10/18/02	<i>[Signature]</i>		DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary				

# SCHEDULE OF SIDE DITCH AND OUTER SEPARATOR DITCHES

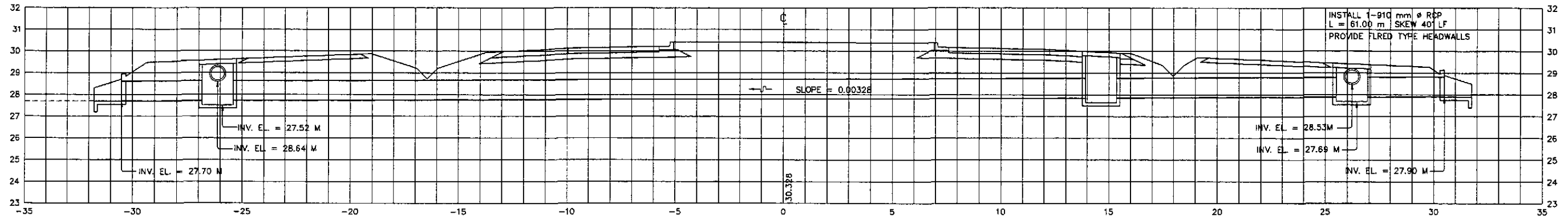
STATION		LENGTH (m)	TYPE	LOCATION	REMARKS	STATION		LENGTH (m)	TYPE	LOCATION	REMARKS	STATION		LENGTH (m)	TYPE	LOCATION	REMARKS
FROM	TO					FROM	TO					FROM	TO				
<b>SIDE DITCH (MAIN BYPASS)</b>						<b>SIDE DITCH (ACCESS ROAD)</b>						<b>OUTER SEPARATOR DITCH (CONTINUATION)</b>					
122+060	122+340	280.00	E-3	LEFT SIDE	UNLINED	<b>ROAD INTERSECTION A-15</b>						113+220	113+450	230.00	E-2a	LEFT SIDE	LINED
110+060	110+160	100.00	E-3	LEFT SIDE	UNLINED	0+855.00	0+940.00	85.00	U	LEFT SIDE	LINED	113+220	113+460	240.00	E-2a	RIGHT SIDE	LINED
110+160	110+200	40.00	E-3	LEFT SIDE	UNLINED	0+855.00	0+940.00	85.00	U	RIGHT SIDE	LINED	113+470	113+660	190.00	U	LEFT SIDE	LINED
110+280	110+480	200.00	C-1	LEFT SIDE	LINED	1+040.00	1+160.00	120.00	U	LEFT SIDE	LINED	113+480	113+660	180.00	U	RIGHT SIDE	LINED
110+480	110+590	110.00	E-3	LEFT SIDE	UNLINED	1+040.00	1+160.00	120.00	U	RIGHT SIDE	LINED	113+660	113+920	260.00	E-2a	LEFT SIDE	LINED
110+920	111+086	166.00	E-3	LEFT SIDE	UNLINED	<b>ROAD INTERSECTION B-8</b>						113+660	113+920	260.00	E-2a	RIGHT SIDE	LINED
111+086	111+140	54.00	E-3	LEFT SIDE	UNLINED	0+880.00	0+970.00	90.00	E-4	LEFT SIDE	UNLINED	113+940	114+080	140.00	E-2a	LEFT SIDE	LINED
111+320	111+450	130.00	E-3	LEFT SIDE	UNLINED	0+880.00	0+970.00	90.00	E-4	RIGHT SIDE	UNLINED	113+940	114+060	120.00	E-2a	RIGHT SIDE	LINED
111+450	111+510	60.00	E-3	LEFT SIDE	UNLINED	<b>ROAD INTERSECTION A-18</b>						114+100	114+280	180.00	U	LEFT SIDE	LINED
111+510	111+860	350.00	C-1	LEFT SIDE	LINED	0+890.00	0+910.00	20.00	E-4	LEFT SIDE	UNLINED	114+120	114+260	140.00	E-2a	RIGHT SIDE	LINED
112+280	112+560	280.00	C-1	LEFT SIDE	LINED	0+890.00	0+920.00	30.00	E-4	RIGHT SIDE	UNLINED	114+300	114+609	309.00	E-2a	LEFT SIDE	LINED
112+735	112+780	45.00	E-3	LEFT SIDE	UNLINED	0+890.00	0+920.00	30.00	E-4	RIGHT SIDE	UNLINED	114+280	114+465	185.00	U	RIGHT SIDE	LINED
112+780	112+865	85.00	E-3	LEFT SIDE	UNLINED	1+090.00	1+110.00	20.00	E-4	LEFT SIDE	UNLINED	114+465	114+609	144.00	E-2a	RIGHT SIDE	LINED
112+890	113+030	140.00	E-3	LEFT SIDE	UNLINED	1+090.00	1+110.00	20.00	E-4	RIGHT SIDE	UNLINED	114+625	114+675	50.00	E-2a	LEFT SIDE	LINED
113+380	113+460	80.00	E-3	LEFT SIDE	UNLINED	<b>ROAD INTERSECTION A-20</b>						114+625	114+645	20.00	E-2a	RIGHT SIDE	LINED
113+460	113+660	200.00	C-1	LEFT SIDE	LINED	0+900.00	0+960.00	60.00	E-4	LEFT SIDE	UNLINED	114+675	114+940	265.00	U	LEFT SIDE	LINED
113+660	113+780	120.00	E-3	LEFT SIDE	UNLINED	<b>OUTER SEPARATOR DITCH</b>						114+645	114+940	295.00	U	RIGHT SIDE	LINED
113+780	113+880	100.00	E-3	LEFT SIDE	UNLINED	111+110	111+320	210.00	E-2a	LEFT SIDE	LINED	114+940	115+280	340.00	E-2a	RIGHT SIDE	LINED
114+120	114+270	150.00	C-1	LEFT SIDE	LINED	111+110	111+290	180.00	E-2a	RIGHT SIDE	LINED	115+360	115+790	430.00	E-2a	LEFT SIDE	LINED
114+270	114+460	190.00	C-1	LEFT SIDE	LINED	111+320	111+885	565.00	U	LEFT SIDE	LINED	115+360	115+760	400.00	E-2a	RIGHT SIDE	LINED
114+460	114+609	149.00	E-3	LEFT SIDE	UNLINED	111+290	111+910	620.00	U	RIGHT SIDE	LINED	115+820	115+890	70.00	E-2a	LEFT SIDE	LINED
114+680	114+930	250.00	C-1	LEFT SIDE	LINED	111+885	111+960	75.00	E-2a	LEFT SIDE	LINED	115+840	115+880	40.00	E-2a	RIGHT SIDE	LINED
114+930	115+100	170.00	U	LEFT SIDE	LINED	111+910	111+940	30.00	E-2a	RIGHT SIDE	LINED	115+900	115+965	65.00	E-2a	LEFT SIDE	LINED
114+930	115+100	170.00	U	RIGHT SIDE	LINED	111+990	112+170	180.00	U	LEFT SIDE	LINED	115+900	115+960	60.00	E-2a	RIGHT SIDE	LINED
115+160	115+280	120.00	U	LEFT SIDE	LINED	111+970	112+190	220.00	U	RIGHT SIDE	LINED	115+995	116+050	55.00	E-2a	LEFT SIDE	LINED
115+160	115+280	120.00	U	RIGHT SIDE	LINED	112+200	112+275	75.00	E-2a	LEFT SIDE	LINED	115+995	116+050	55.00	E-2a	RIGHT SIDE	LINED
115+490	115+640	150.00	E-3	LEFT SIDE	UNLINED	112+220	112+245	25.00	E-2a	RIGHT SIDE	LINED	116+050	116+340	290.00	U	LEFT SIDE	LINED
115+640	115+780	120.00	E-3	LEFT SIDE	UNLINED	112+275	112+560	285.00	U	LEFT SIDE	LINED	116+050	116+340	290.00	U	RIGHT SIDE	LINED
115+995	116+340	345.00	C-1	LEFT SIDE	LINED	112+245	112+560	315.00	U	RIGHT SIDE	LINED	116+340	116+460	120.00	E-2a	LEFT SIDE	LINED
116+550	116+820	270.00	C-1	LEFT SIDE	LINED	112+560	112+850	290.00	E-2a	LEFT SIDE	LINED	116+340	116+420	80.00	E-2a	RIGHT SIDE	LINED
116+860	116+955	95.00	E-3	LEFT SIDE	UNLINED	112+890	113+020	130.00	E-2a	LEFT SIDE	LINED	116+480	116+640	160.00	E-2a	LEFT SIDE	LINED
116+995	117+080	85.00	E-3	LEFT SIDE	UNLINED	112+580	112+850	290.00	E-2a	RIGHT SIDE	LINED	116+520	116+620	100.00	E-2a	RIGHT SIDE	LINED
117+230	117+370	140.00	E-3	LEFT SIDE	UNLINED	112+890	113+020	130.00	E-2a	LEFT SIDE	LINED	116+680	116+820	160.00	E-2a	LEFT SIDE	LINED
117+370	117+450	80.00	E-3	LEFT SIDE	UNLINED	112+890	113+020	130.00	E-2a	RIGHT SIDE	LINED	116+680	116+800	140.00	E-2a	RIGHT SIDE	LINED
117+450	117+710	260.00	C-1	LEFT SIDE	LINED	113+040	113+190	150.00	U	LEFT SIDE	LINED	116+840	117+450	610.00	E-2a	LEFT SIDE	LINED
117+710	117+930	220.00	C-1	LEFT SIDE	LINED	113+040	113+160	120.00	U	RIGHT SIDE	LINED	116+840	117+455	635.00	E-2a	RIGHT SIDE	LINED
118+220	118+400	180.00	E-3	LEFT SIDE	UNLINED							117+450	118+000	550.00	U	LEFT SIDE	LINED
												117+455	117+990	535.00	U	RIGHT SIDE	LINED

<b>JICA</b> JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION :				SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/16/02	<i>[Signature]</i>		THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Palarid, Cabanatuan and San Jose Bypasses)				FULL SIZE A1	SCHEDULE OF SIDE DITCH AND OUTER SEPARATOR DITCH	DG-03
	SUBMITTED	10/21/02	<i>[Signature]</i>		Submitted By:	Reviewed By:	Recommended By:	Approved By:			
			DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary				

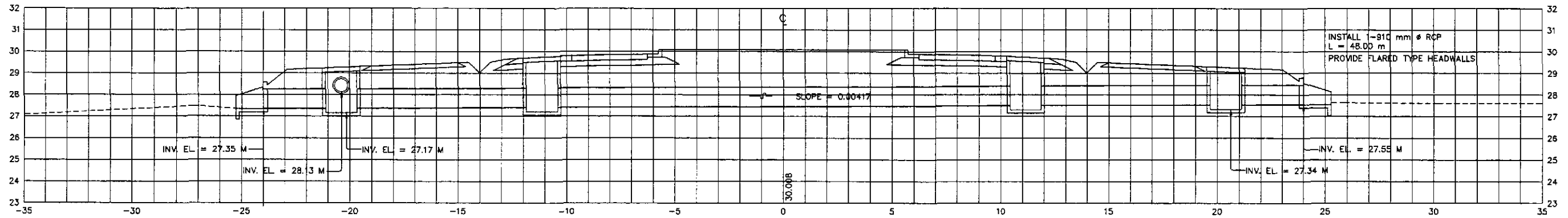


		DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/10/02			BUREAU OF DESIGN	OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)			1:100	DRAINAGE CROSS-SECTION ALONG BYPASS ( INITIAL STAGE ) STA. 110+064 - STA. 110+590	DC-01
	CHECKED	10/10/02			Submitted By:	Reviewed By:	Recommended By:	Approved By:	CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1		
SUBMITTED	10/10/02		DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES DC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary					

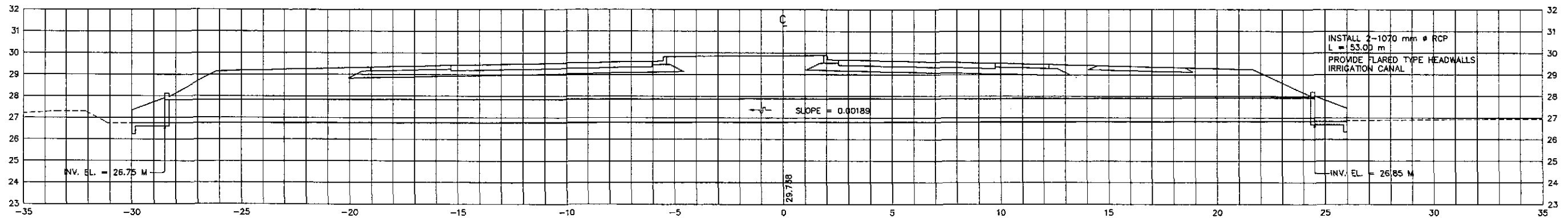
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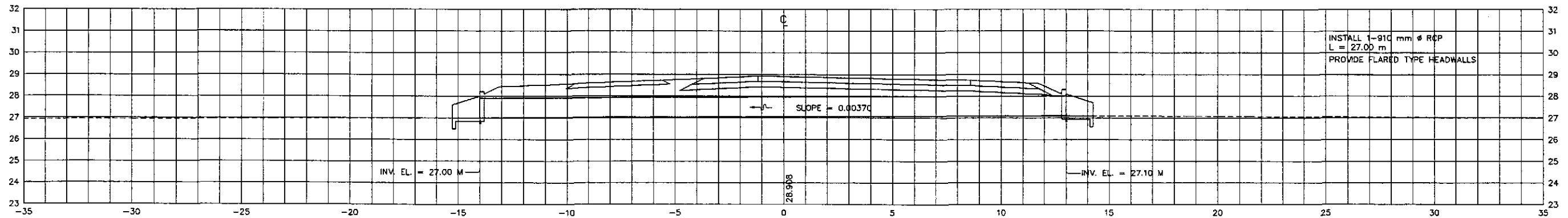
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111+086

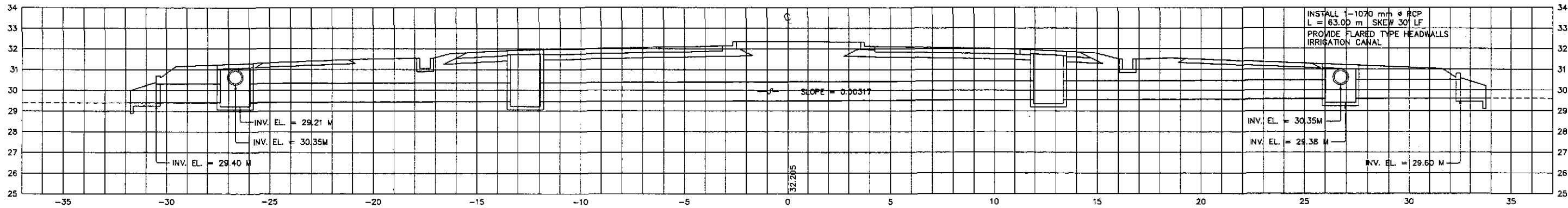


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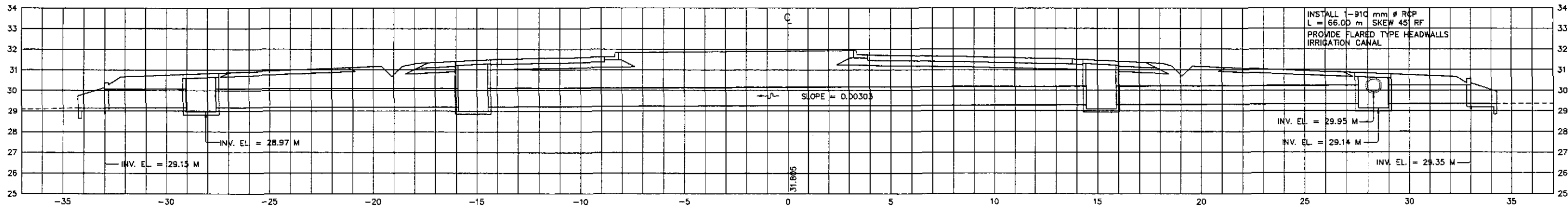


	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	PROJECT AND LOCATION :			SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	10/10/02	<i>[Signature]</i>		BUREAU OF DESIGN	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)			1:100	DRAINAGE CROSS-SECTION ALONG BYPASS ( INITIAL STAGE ) STA. 110+920 - STA. 111+204	DC-02
	SUBMITTED	10/28/02	<i>[Signature]</i>		OFFICE OF THE SECRETARY	CABANATUAN BYPASS - CONTRACT PACKAGE II			FULL SIZE A1		
	Submitted By:		PUHL - PMO	Reviewed By:	Recommended By:	Recommended By:					
			DANILO C. TRAJANO Project Director		JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary				
							SIMON A. DATUMANONG Secretary				

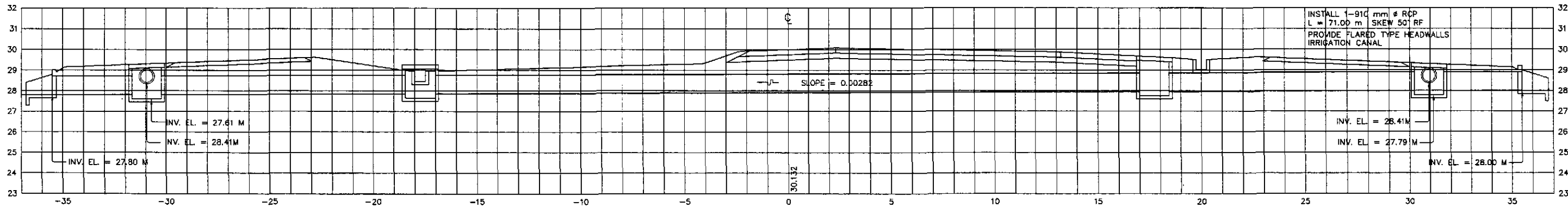
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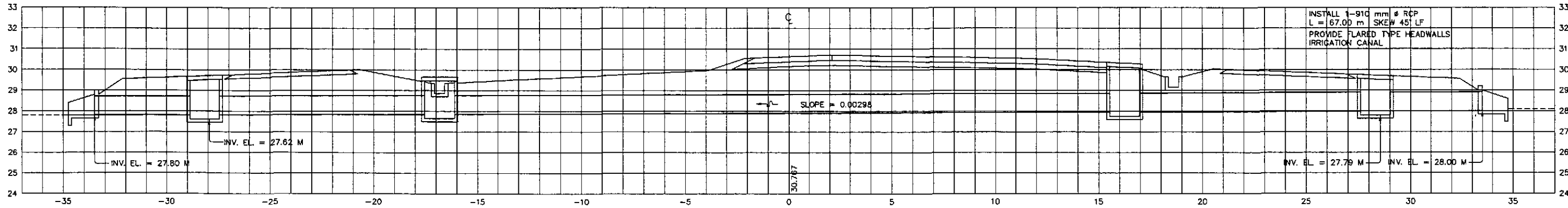
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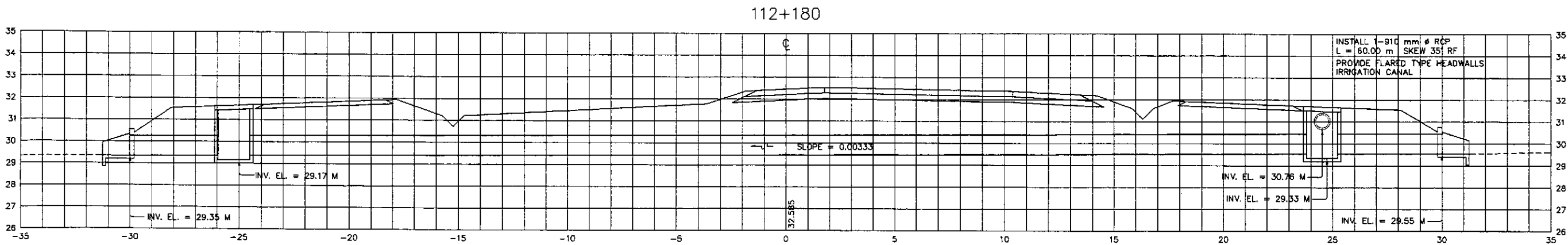
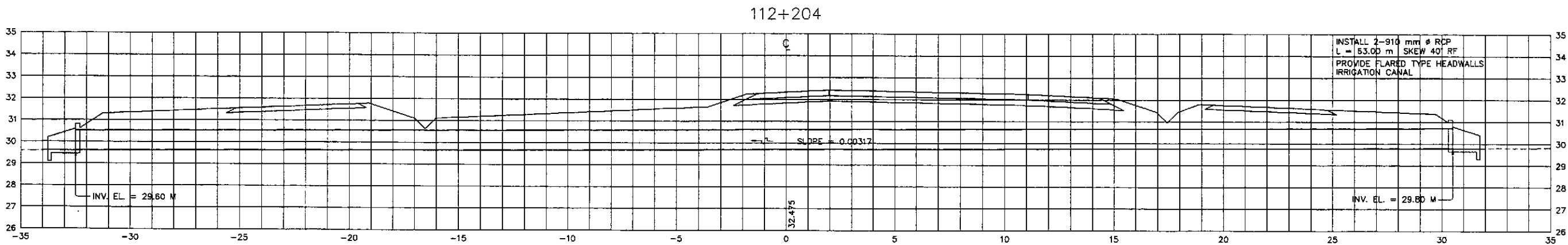
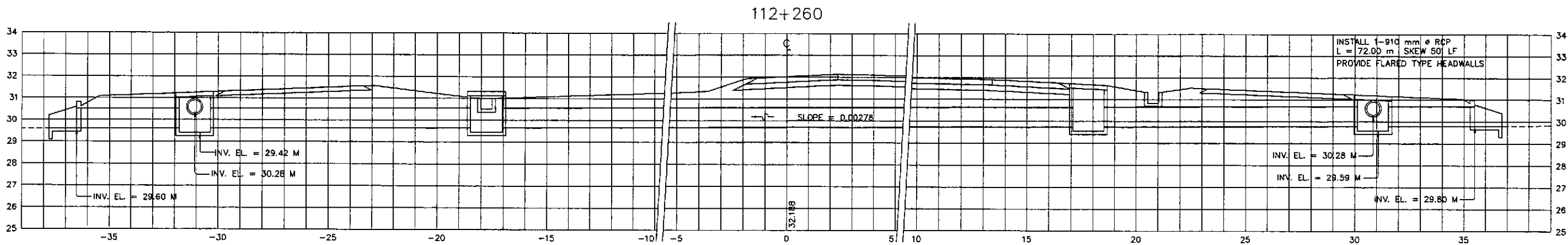
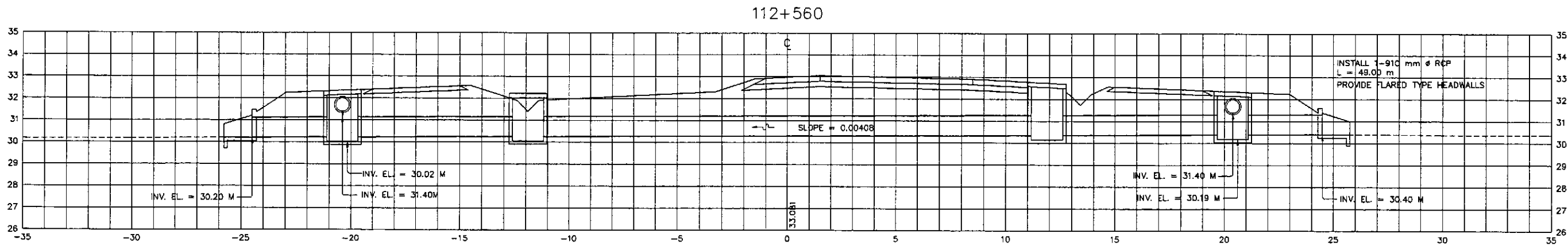
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111+304

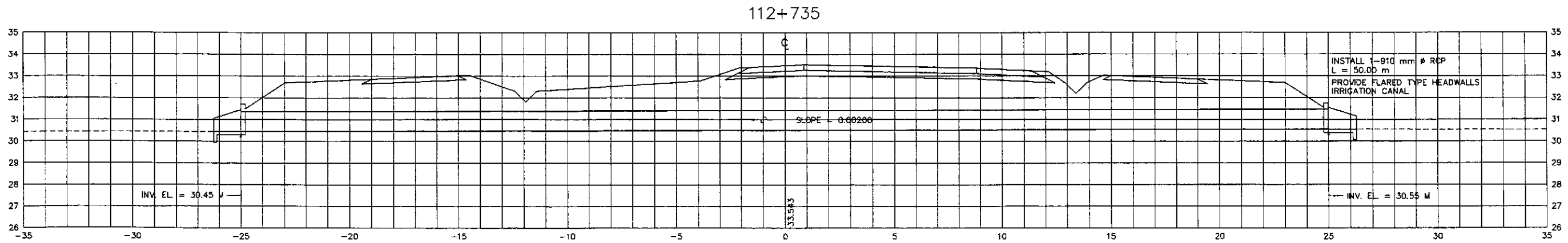
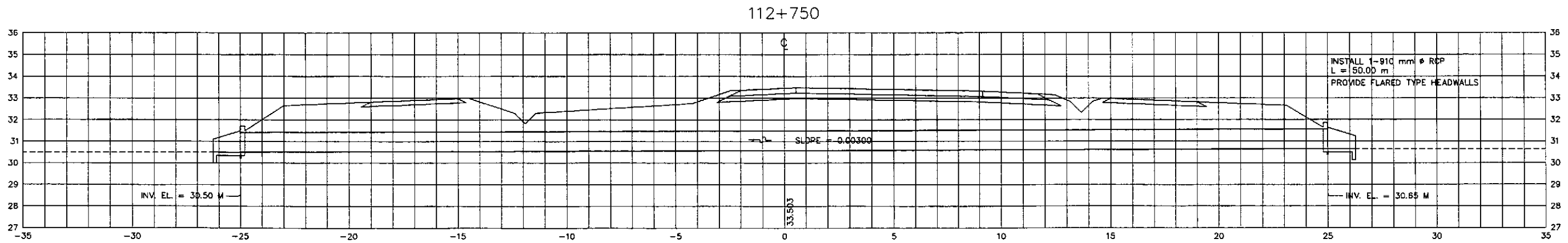
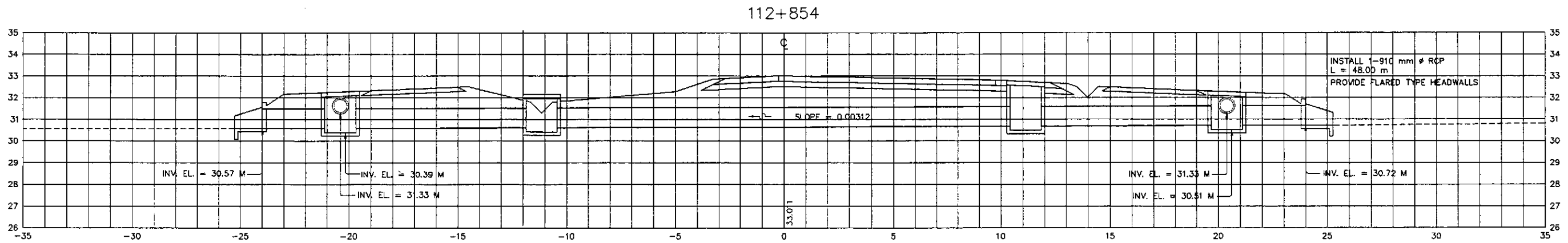
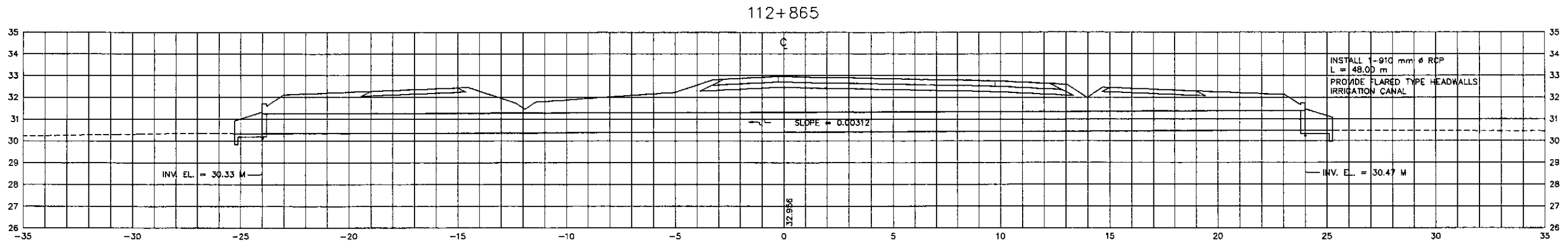


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	DESIGNED	<i>[Signature]</i>	DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS							THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Paridel, Cabanatuan and San Jose Bypasses)	1:100	DRAINAGE CROSS-SECTION ALONG BYPASS ( INITIAL STAGE ) STA. 111+304 - STA. 111+980	DC-03
	CHECKED	<i>[Signature]</i>	BUREAU OF DESIGN										
SUBMITTED	<i>[Signature]</i>	Submitted By: DANILO C. TRAJANO Project Director	Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OIC, Director IV	Recommended By: MANUEL M. BONDAN Undersecretary	Approved By: SIMFON A. DATUMANONG Secretary							

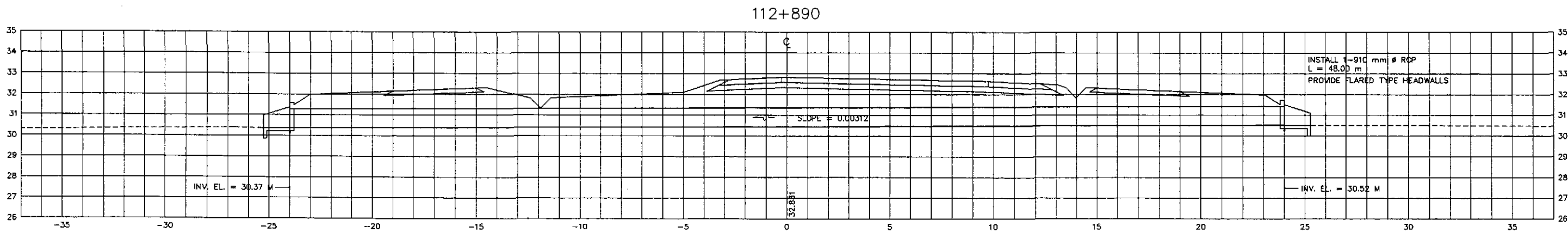
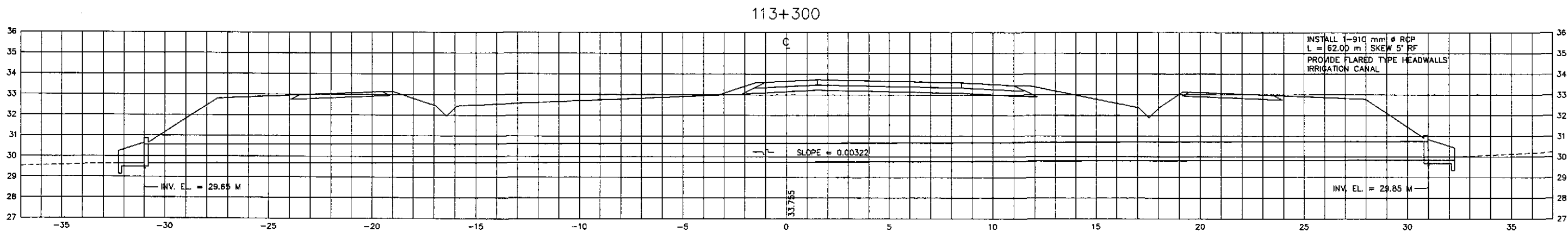
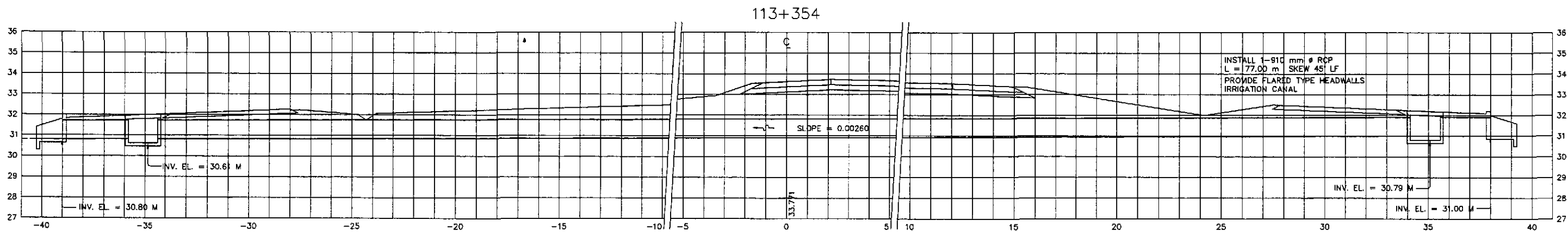
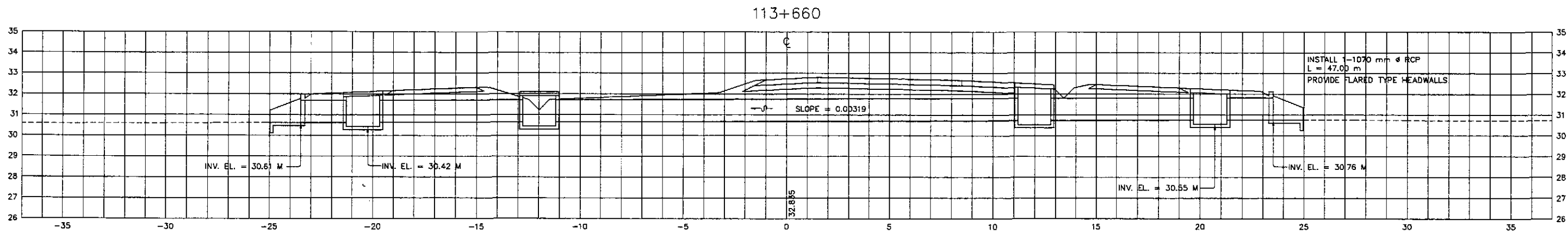


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	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS											PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Piaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE II	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTION ALONG BYPASS ( INITIAL STAGE ) STA. 112+180 - STA. 112+560	SHEET NO. : DC-04
	JICA JAPAN INTERNATIONAL COOPERATION AGENCY KAI KATAHIRA & ENGINEERS INTERNATIONAL YEO YACHIYO ENGINEERING CO., LTD.											PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Piaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE II	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTION ALONG BYPASS ( INITIAL STAGE ) STA. 112+180 - STA. 112+560	SHEET NO. : DC-04



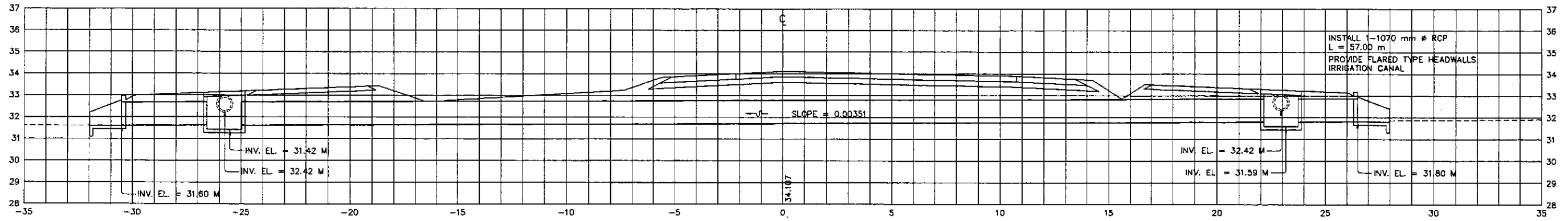


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			DANILLO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary

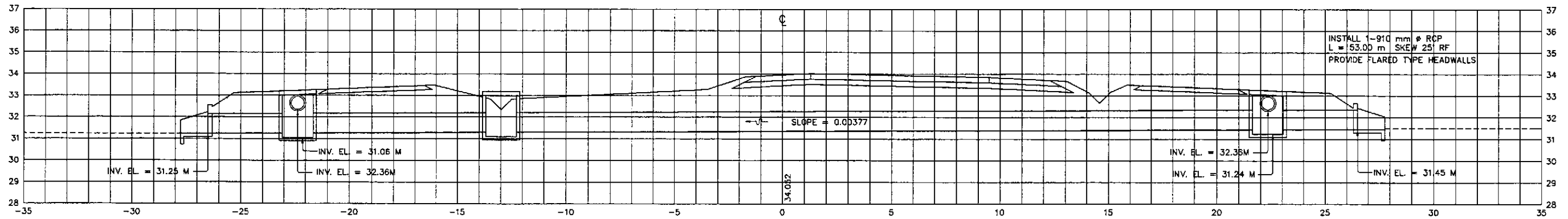


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	DESIGNED: <i>[Signature]</i> CHECKED: <i>[Signature]</i> SUBMITTED: <i>[Signature]</i>	Submitted By: <b>DANILO C. TRAJANO</b> Project Director	Reviewed By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division	Recommended By: <b>GILBERTO S. REYES</b> OIC, Director IV	Recommended By: <b>MANUEL M. BONGAON</b> Undersecretary	Approved By: <b>SIMEON A. DATUMANONG</b> Secretary	
	BUREAU OF DESIGN    OFFICE OF THE SECRETARY (See cover sheet for Signatures)    (See cover sheet for Signatures/Approvals)						

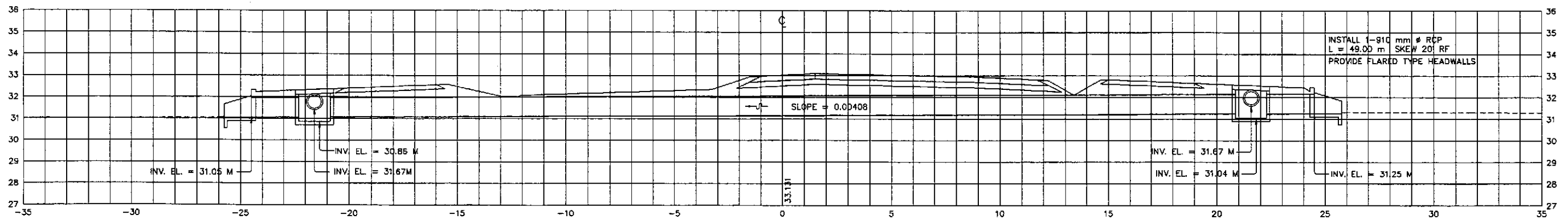
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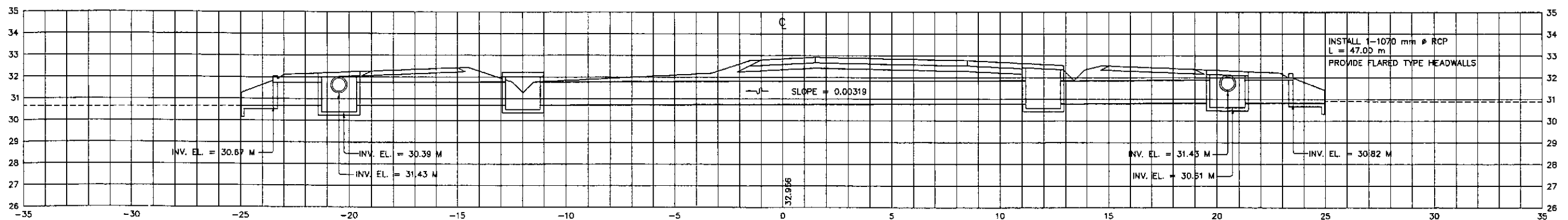
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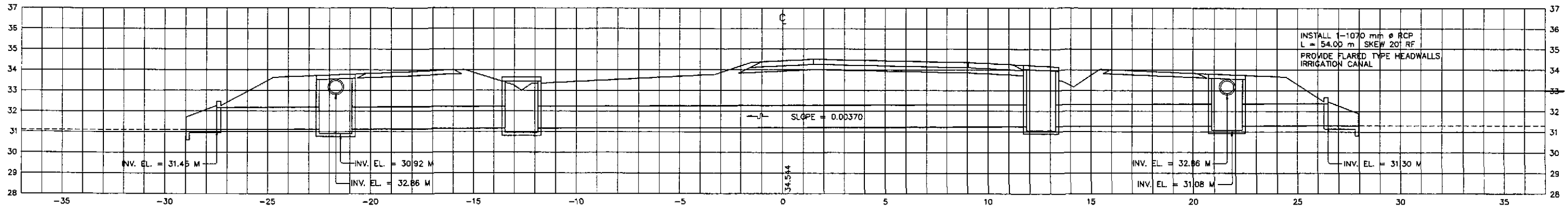


113+880

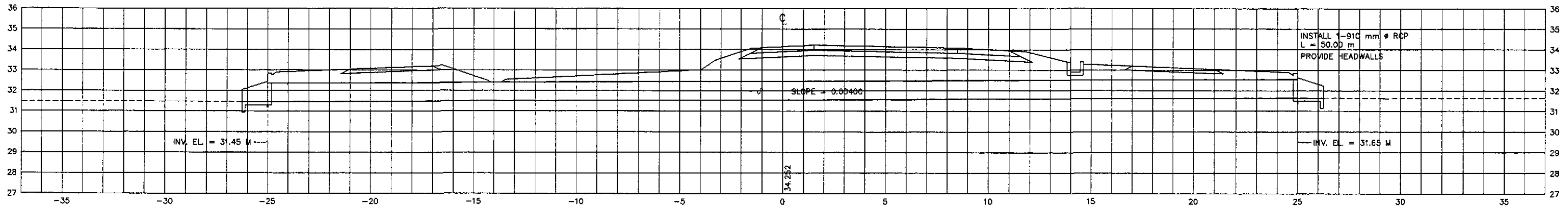


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	CHECKED	<i>[Signature]</i>	Submitted By:	Reviewed By:	Recommended By:				
SUBMITTED	<i>[Signature]</i>	<i>[Signature]</i>	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary		

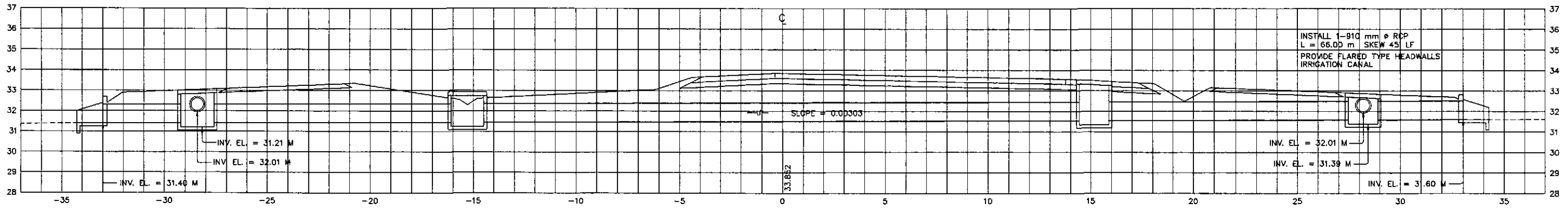
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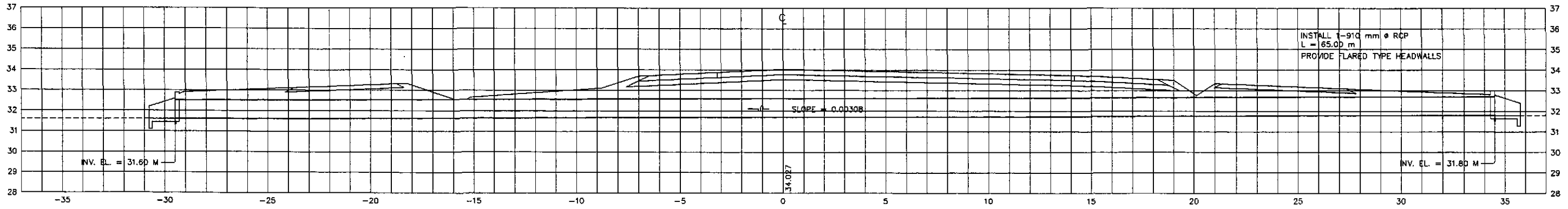
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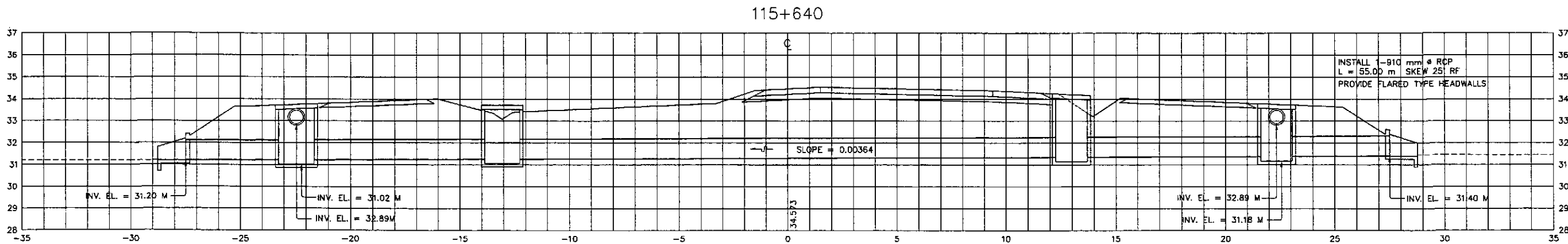
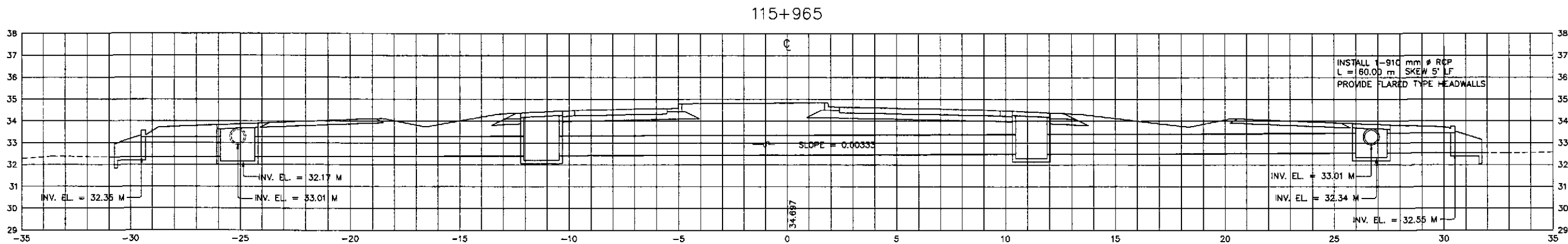
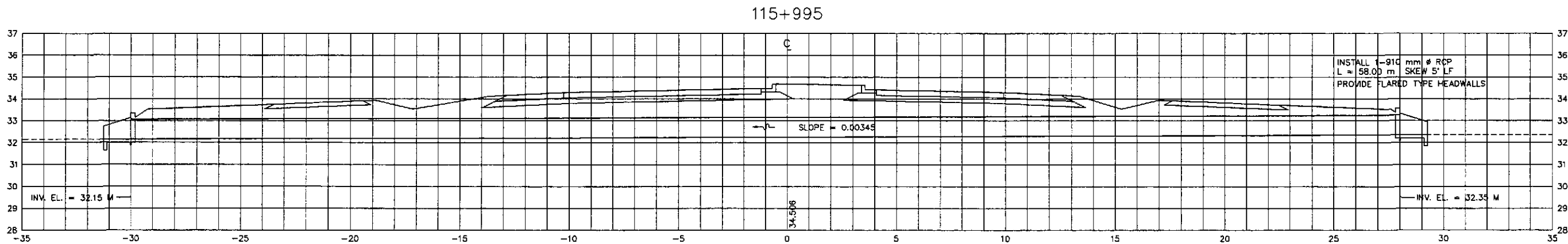
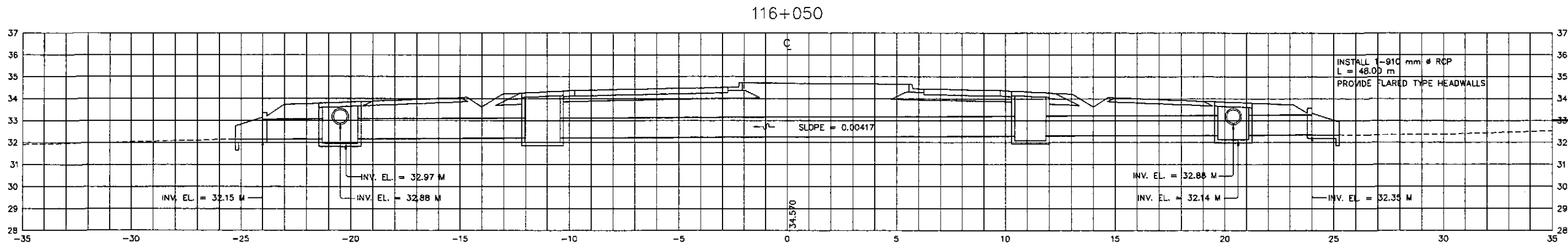
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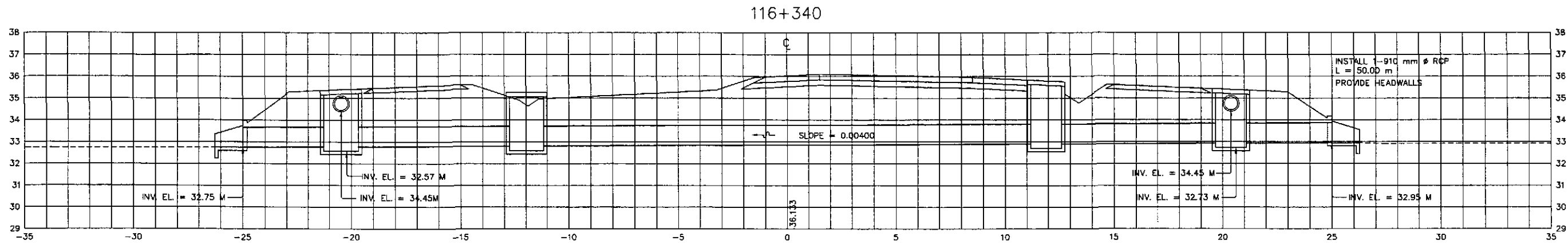
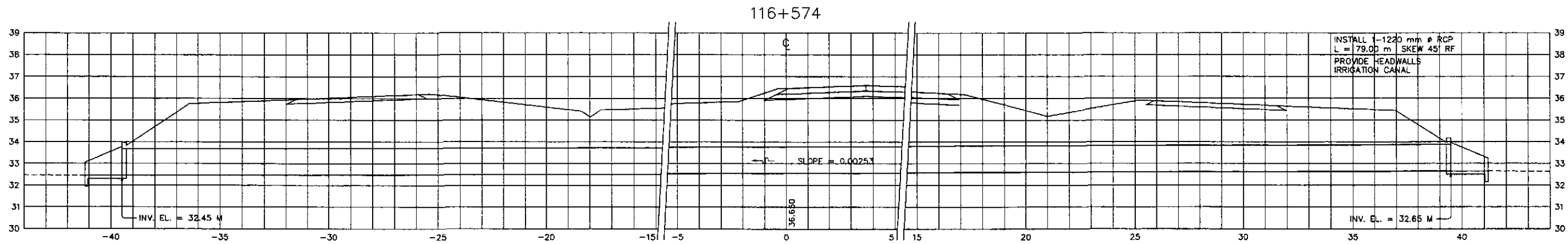
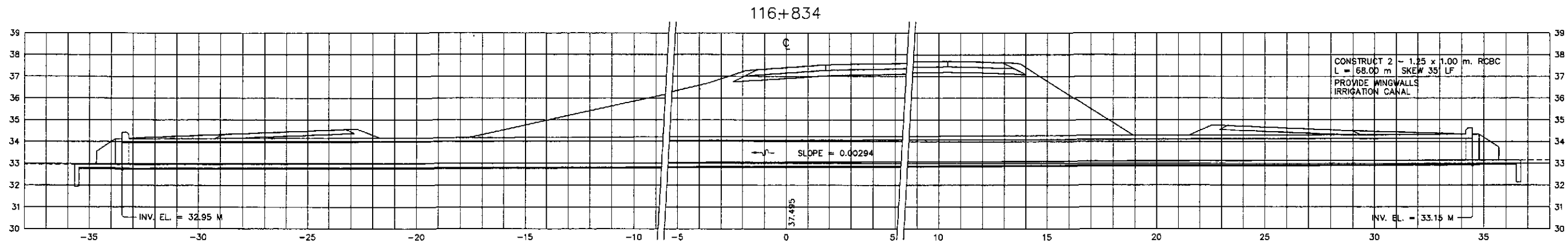
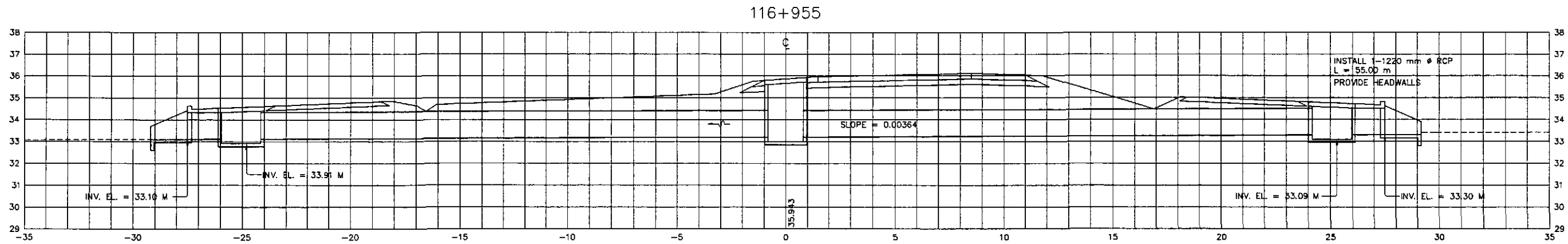
114+625



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	DATE	SIGNATURE																																
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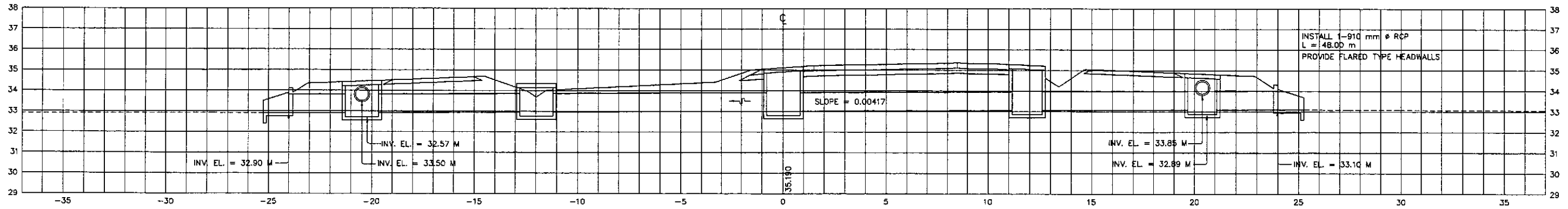


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	DESIGNED: 10/11/01 CHECKED: 10/16/01 SUBMITTED: 10/18/01	SIGNATURE # 	P.J.H. - PWD Submitted By: DANILLO C. TRAJANO Project Director	BUREAU OF DESIGN Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES OIC, Director IV Recommended By: MANUEL M. BONDAN Undersecretary Approved By: SIMEON A. DATUMANONG Secretary		
	CABANATUAN BYPASS - CONTRACT PACKAGE II						

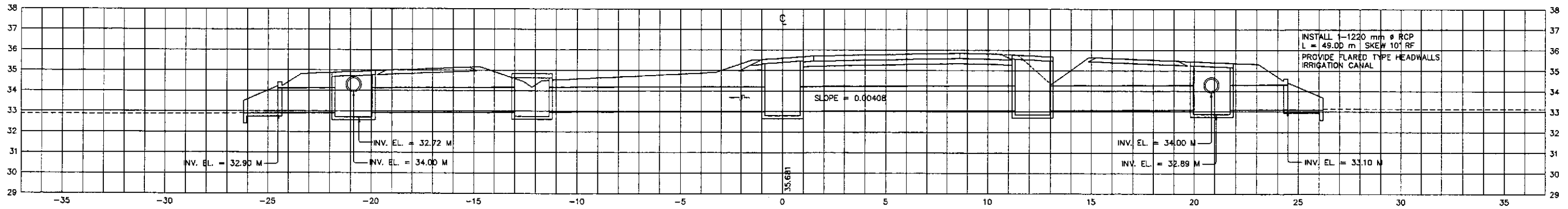


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	DESIGNED: <i>[Signature]</i> CHECKED: <i>[Signature]</i> SUBMITTED: <i>[Signature]</i>	Submitted By: <b>DANILO C. TRAJANO</b> Project Director	Reviewed By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division	Recommended By: <b>GILBERTO S. REYES</b> OIC, Director IV	Recommended By: <b>MANUEL M. BONDAN</b> Undersecretary	Approved By: <b>SIMEON A. DATUMANONG</b> Secretary	
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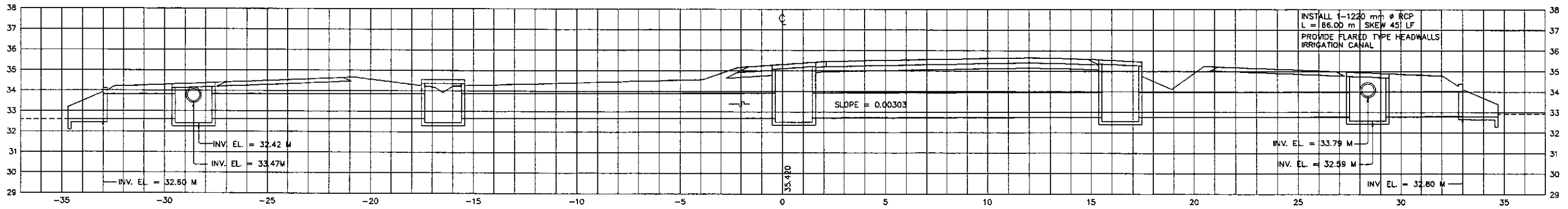
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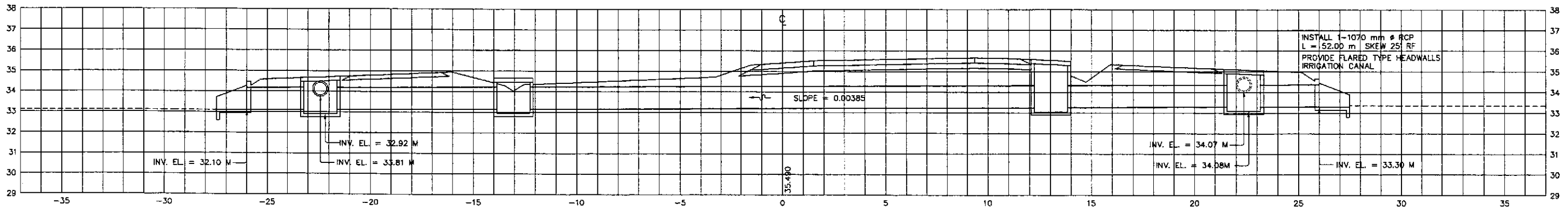
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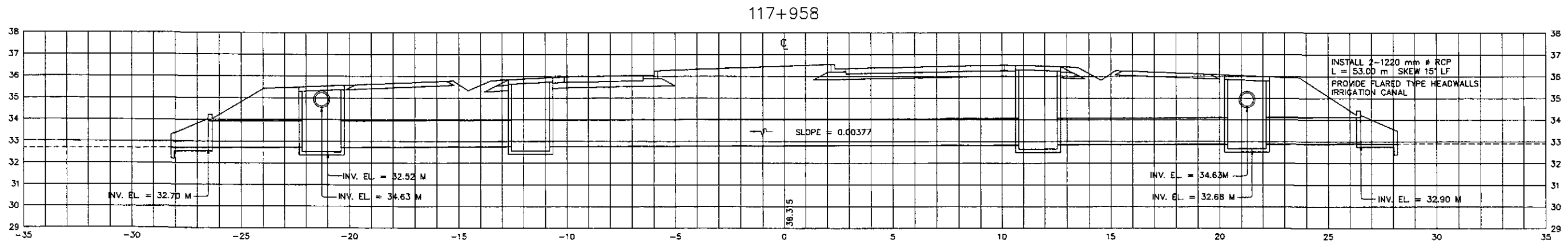
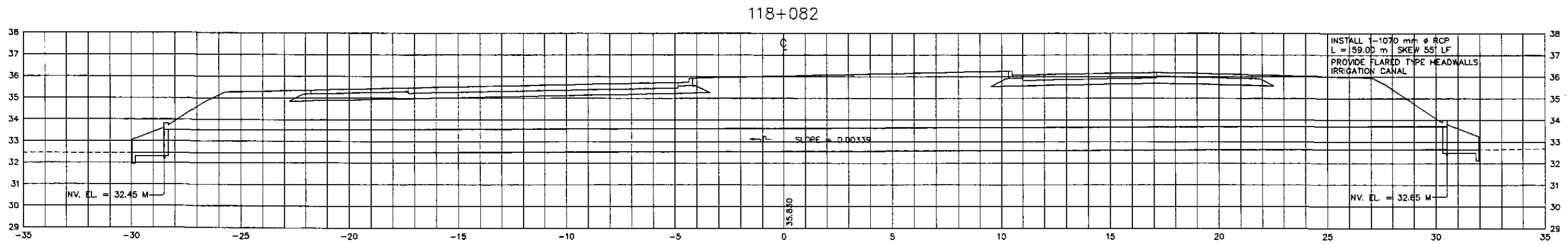
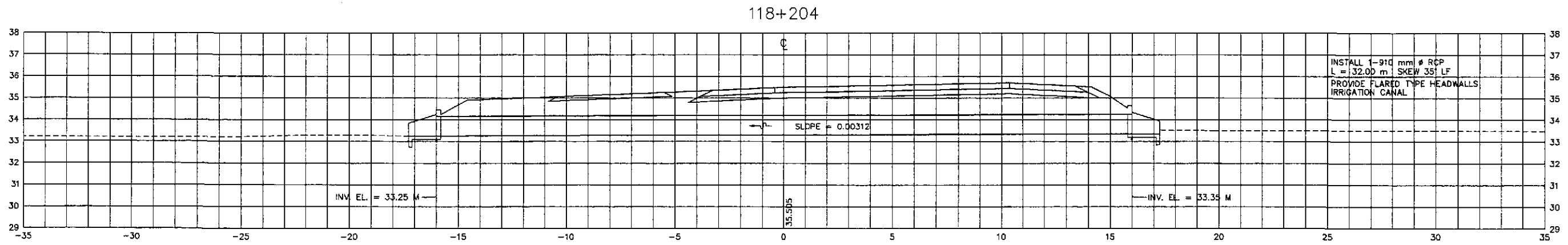
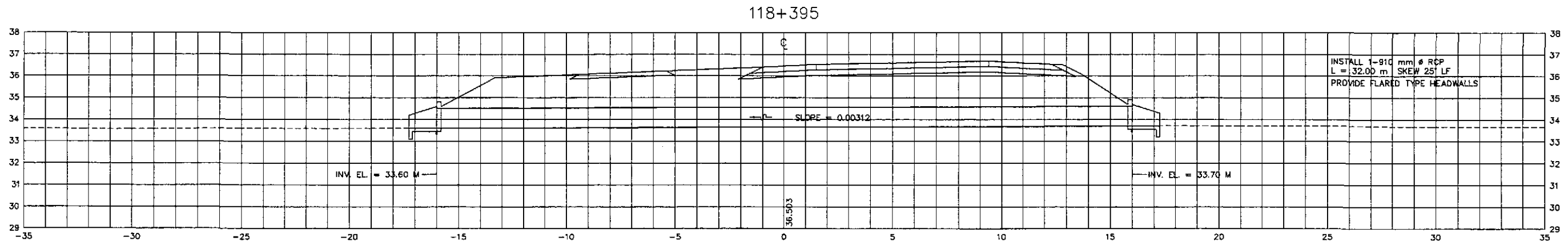
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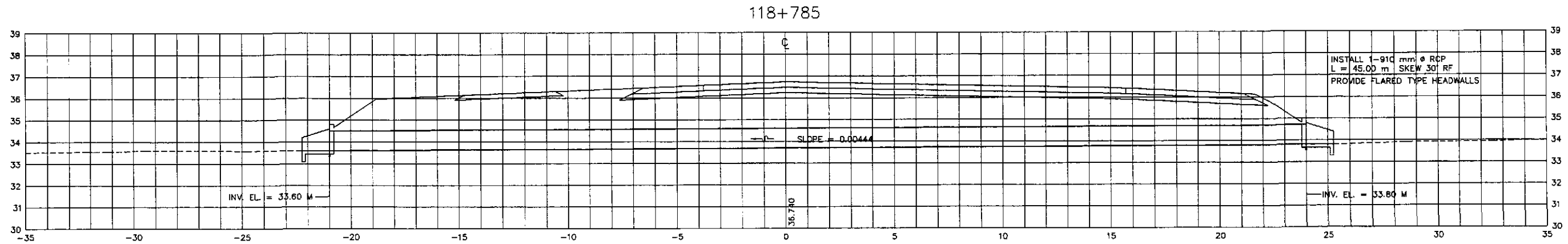
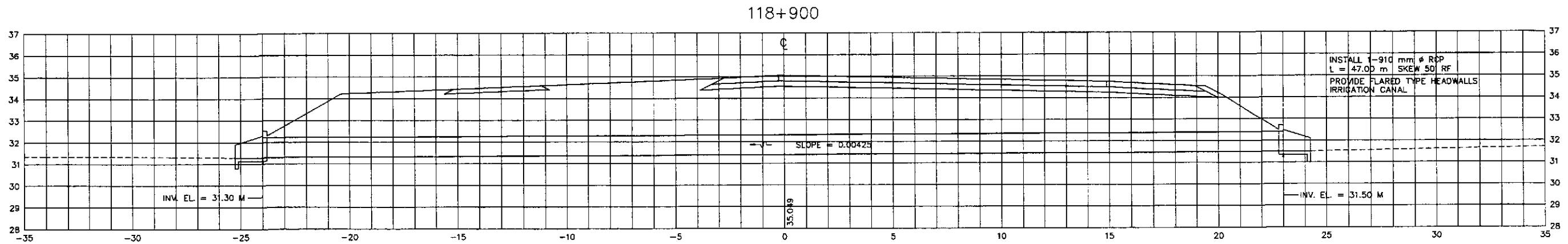


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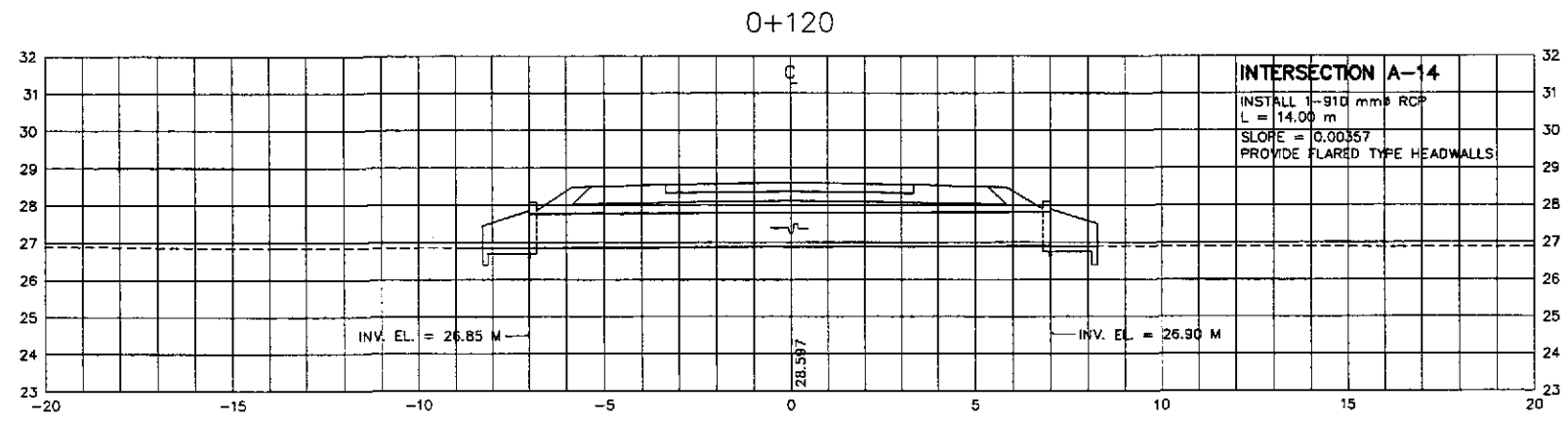
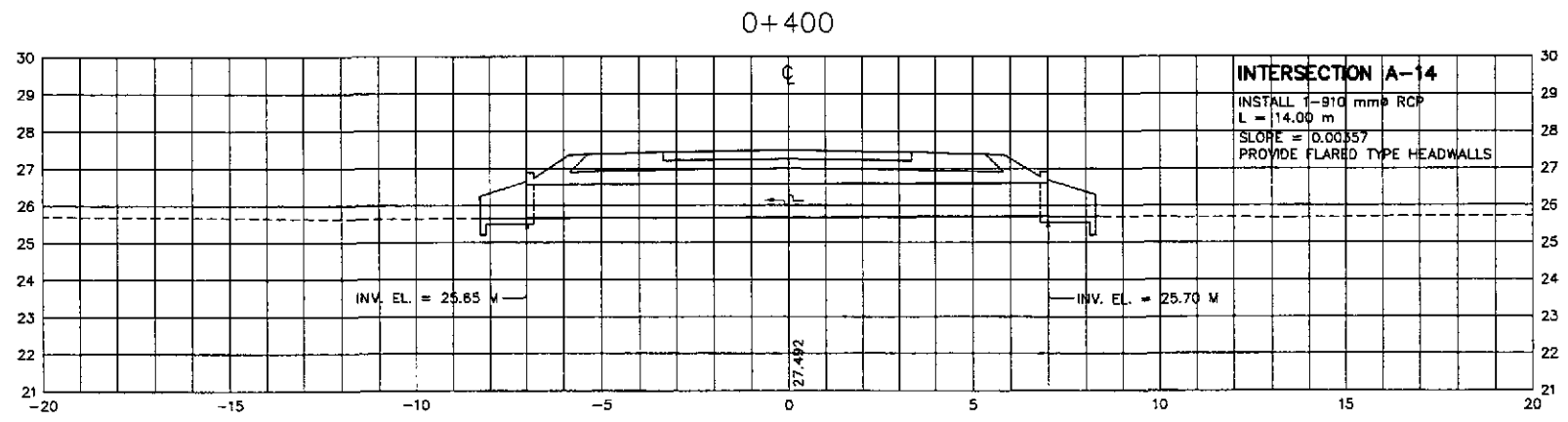
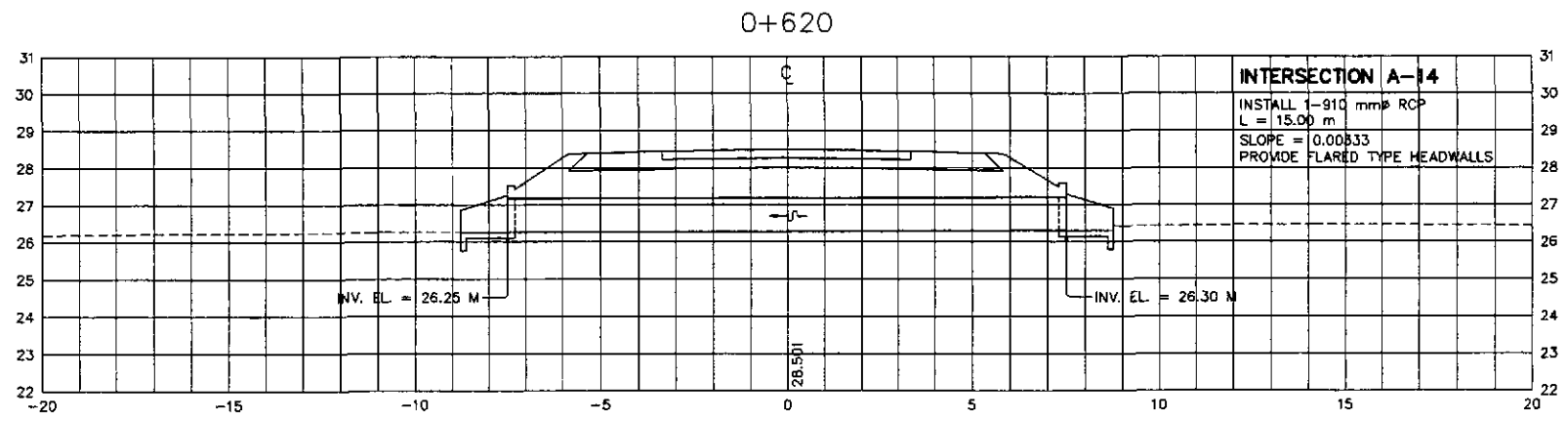
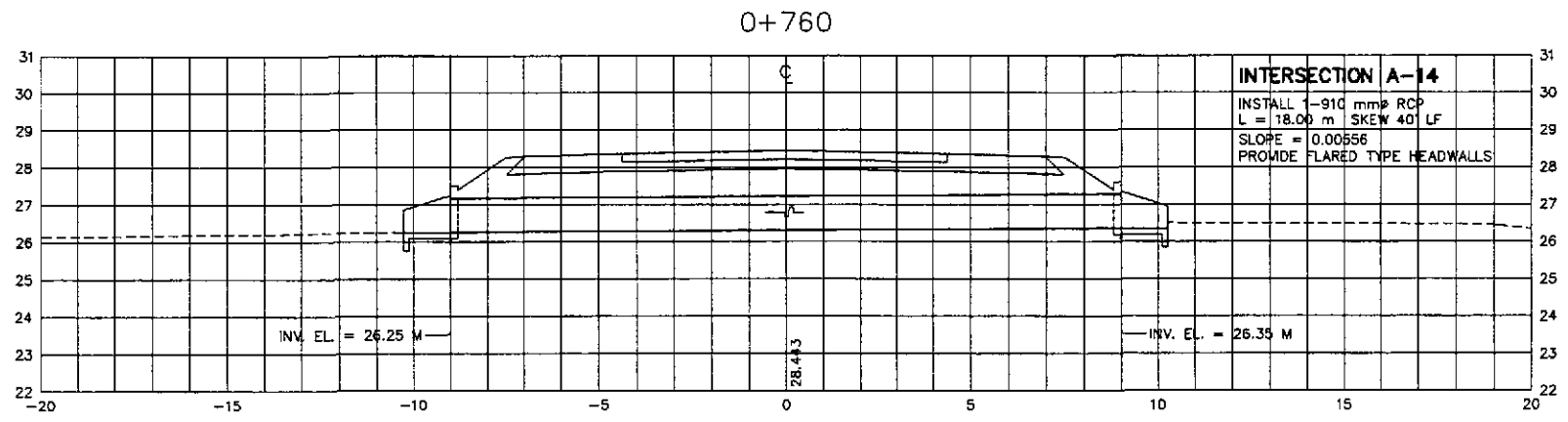


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	DESIGNED: <i>[Signature]</i> CHECKED: <i>[Signature]</i> SUBMITTED: <i>[Signature]</i>	P.H.L. - P.M.O. Submitted By: <b>DANILO C. TRAJANO</b> Project Director	BUREAU OF DESIGN Reviewed By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: <b>GILBERTO S. REYES</b> OIC, Director IV Recommended By: <b>MANUEL M. BORDON</b> Undersecretary Approved By: <b>SIMEON A. DATUMANONG</b> Secretary			
	DATE: 10/10/10 SIGNATURE: <i>[Signature]</i> TEAM LEADER						





		REPUBLIC OF THE PHILIPPINES <b>DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</b>	PROJECT AND LOCATION : <b>THE DETAILED DESIGN STUDY ON          UPGRADING INTER-URBAN HIGHWAY SYSTEM          ALONG THE PAN-PHILIPPINE HIGHWAY          (Plaridel, Cabanatuan and San Jose Bypasses)</b>	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : <b>DRAINAGE CROSS-SECTION          ALONG BYPASS ( INITIAL STAGE )          STA. 118+785 - STA. 118+900</b>	SHEET NO. : <b>DC-13</b>	
	DESIGNED <i>10/16/02</i> CHECKED <i>10/16/02</i> SUBMITTED <i>10/18/02</i>	P.J.H. - PMD Submitted By: <b>DANILO C. TRAJANO</b> Project Director	BUREAU OF DESIGN Reviewed By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: <b>MANUEL M. BONDAN</b> Undersecretary	Approved By: <b>SIMEON A. DATUMANONG</b> Secretary		
	<b>CABANATUAN BYPASS - CONTRACT PACKAGE II</b>						



**JICA**  
 JAPAN INTERNATIONAL COOPERATION AGENCY

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

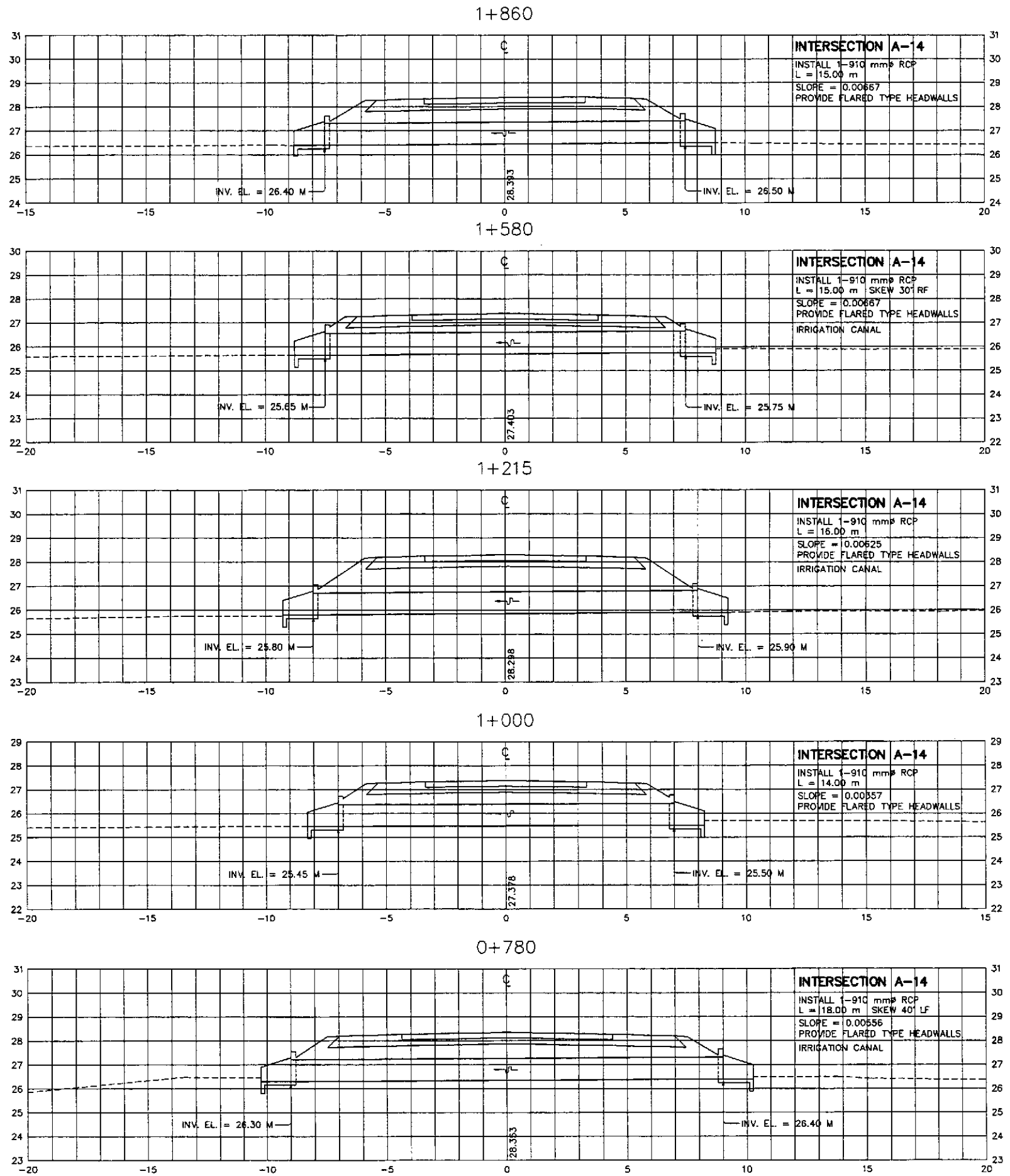
DESIGNED	10/1/02	<i>[Signature]</i>	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	
CHECKED	10/16/02	<i>[Signature]</i>	BUREAU OF DESIGN	
SUBMITTED	10/18/02	<i>[Signature]</i>	OFFICE OF THE SECRETARY	
			Submitted By: <b>DANILO C. TRAJANO</b> Project Director	Reviewed By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division
			Recommended By: <b>GILBERTO S. REYES</b> OIC, Director IV	Approved By: <b>MANUEL M. BONOAN</b> Undersecretary
				Approved By: <b>SIMEON A. DATUMANONG</b> Secretary

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

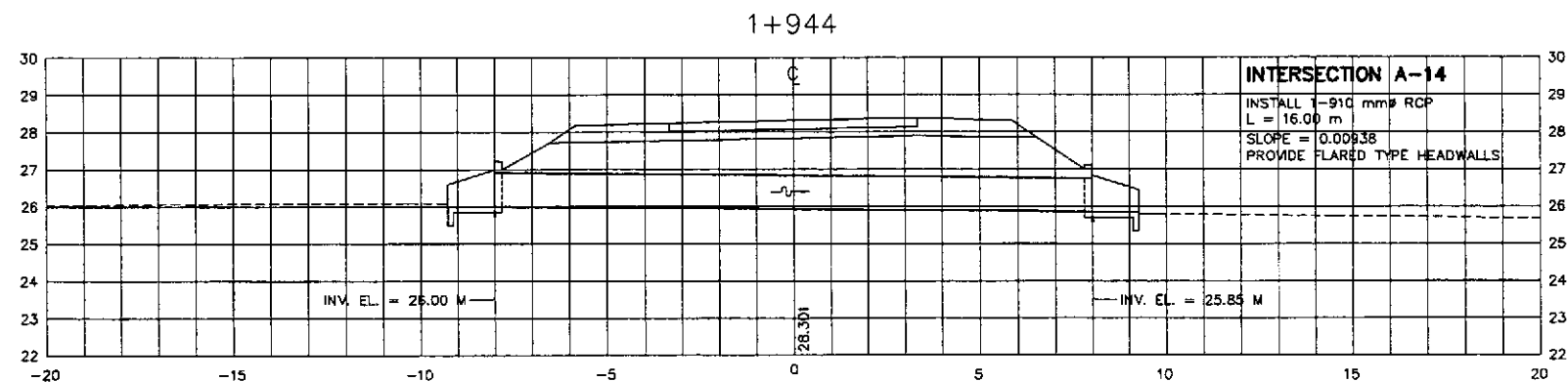
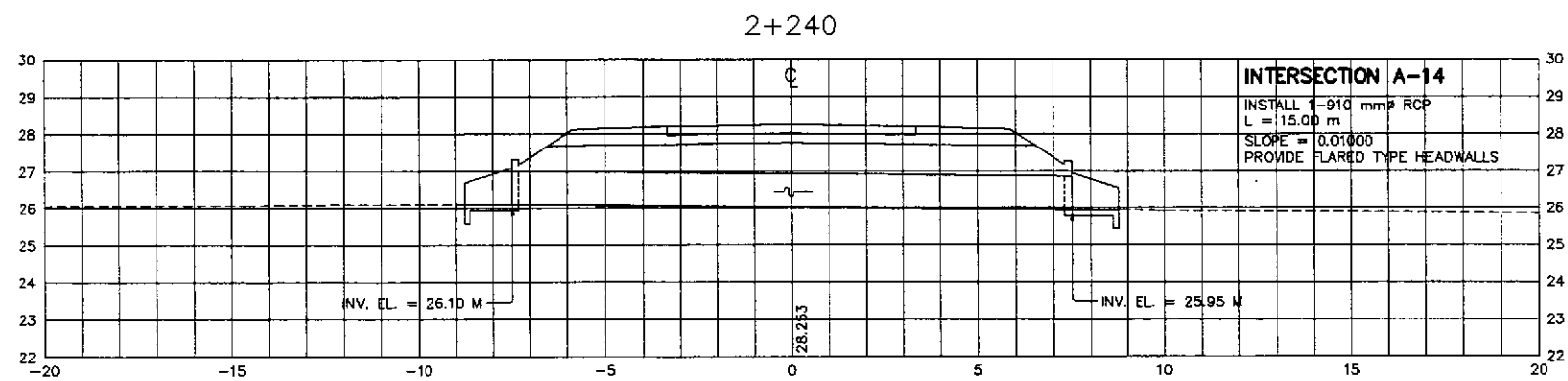
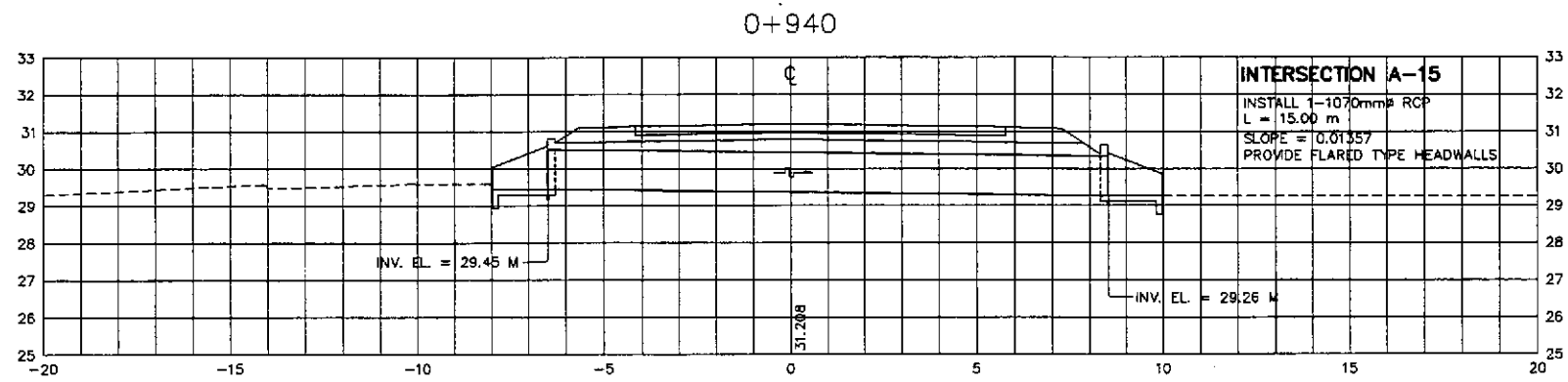
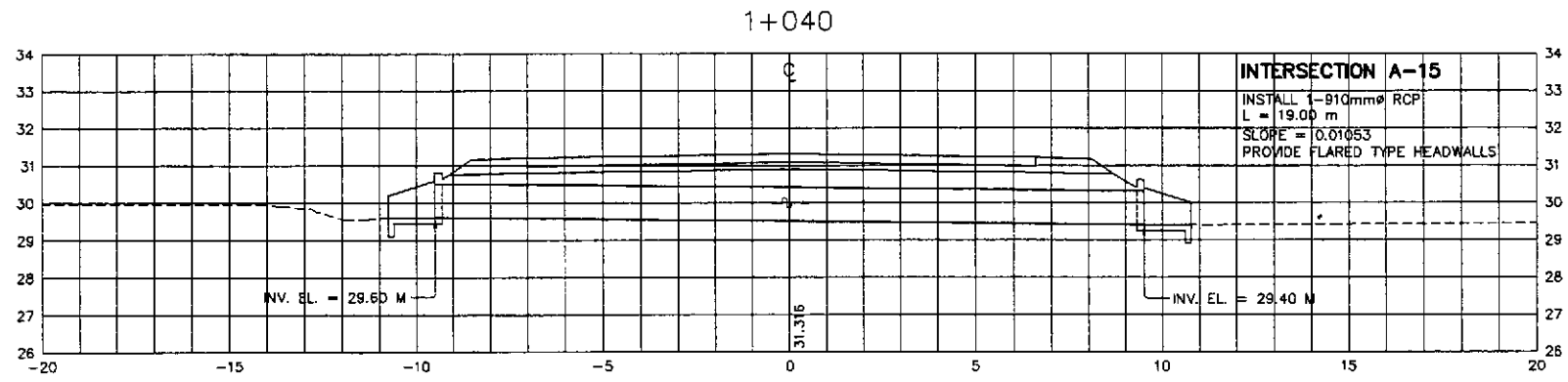
SCALE :  
 1:100  
 FULL SIZE A1

SHEET CONTENTS :  
**DRAINAGE CROSS-SECTION  
 ALONG ACCESS ROAD  
 INTERSECTION A-14 ( MAJOR )**

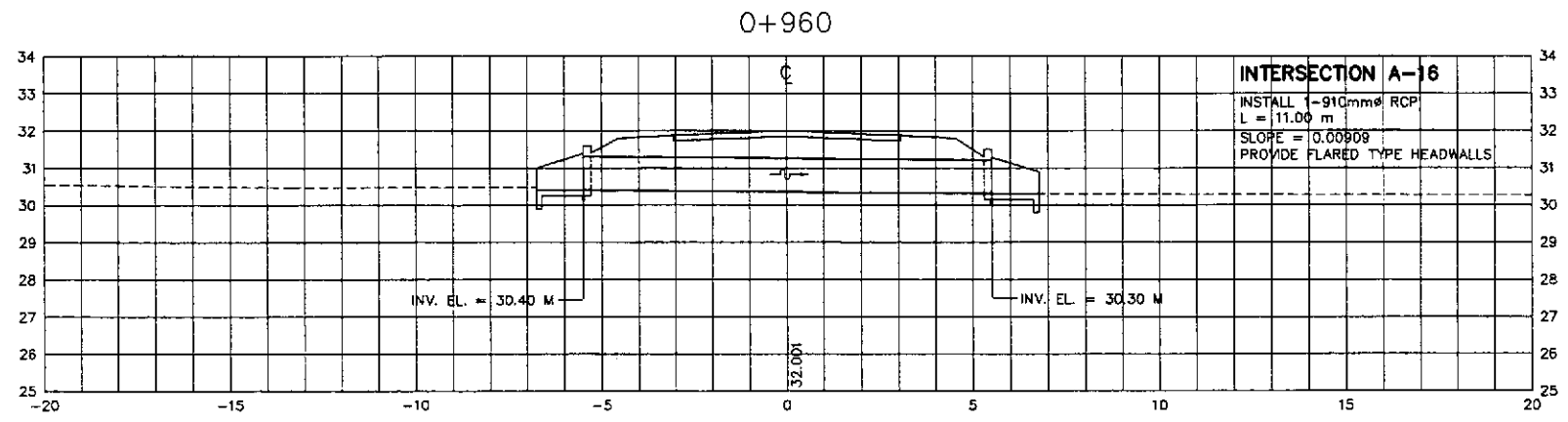
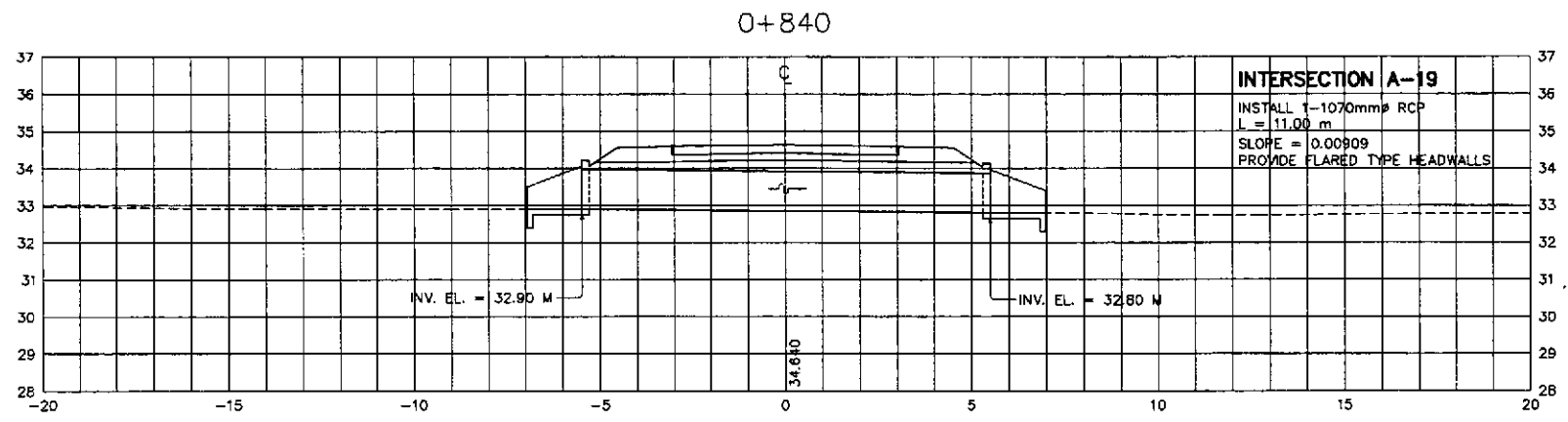
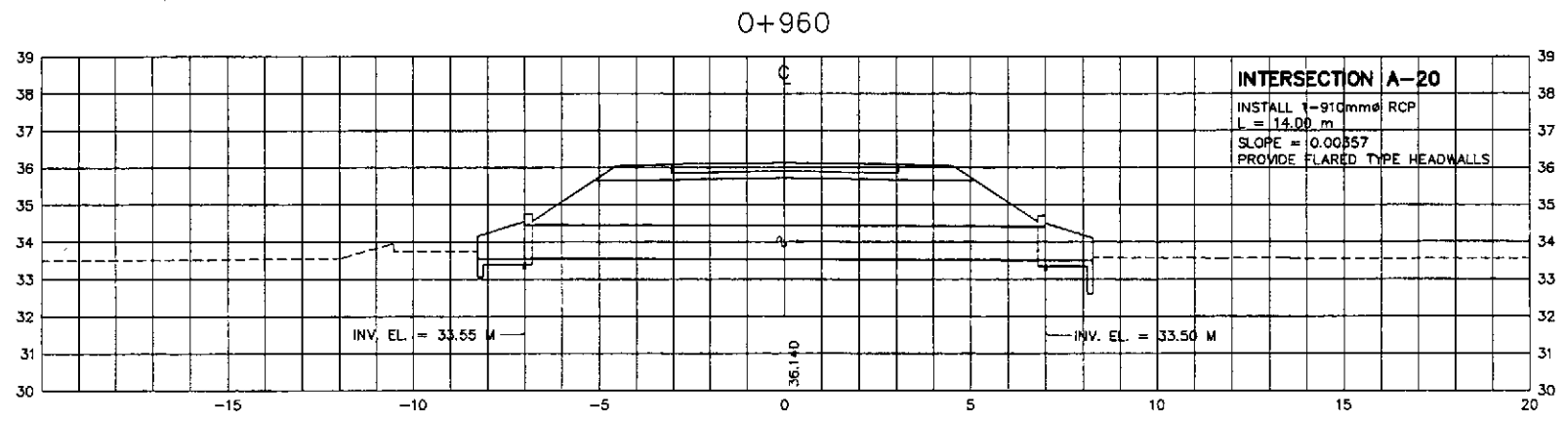
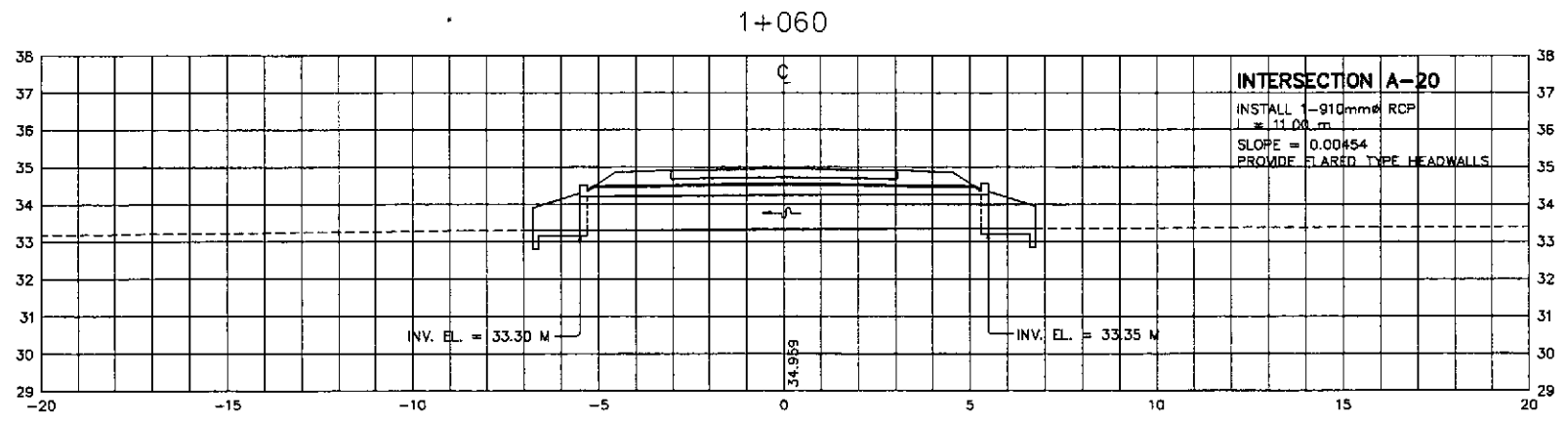
SHEET NO. :  
**DC-14**



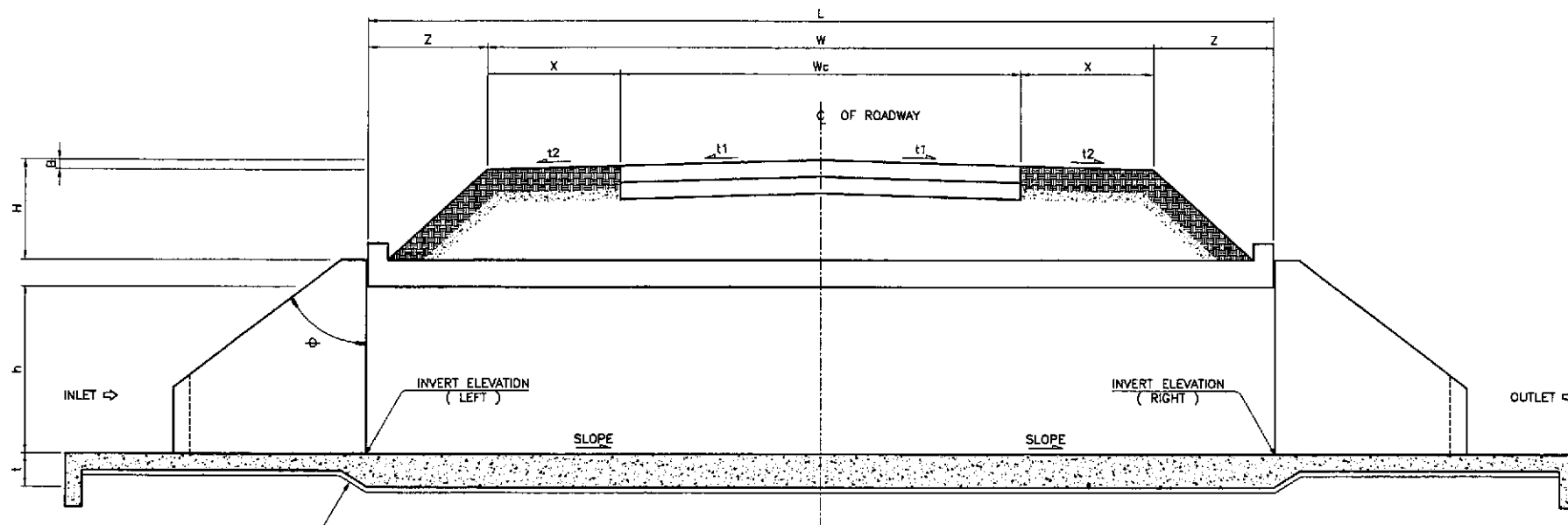
	DATE	SIGNATURE	 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION :			SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	<i>[Signature]</i>		BUREAU OF DESIGN	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)			1:100	DRAINAGE CROSS-SECTION ALONG ACCESS ROAD INTERSECTIONS A-14 ( MAJOR )	DC-15
	CHECKED	<i>[Signature]</i>		OFFICE OF THE SECRETARY	CABANATUAN BYPASS - CONTRACT PACKAGE II			FULL SIZE A1		
SUBMITTED	<i>[Signature]</i>	Submitted By: <b>DANILO C. TRAJANO</b> Project Director Reviewed By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division Recommended By: <b>GILBERTO S. REYES</b> OIC, Director IV Recommended By: <b>MANUEL M. BONGAON</b> Undersecretary Approved By: <b>SIMEON A. DATUMANONG</b> Secretary								



		DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/14/02	<i>[Signature]</i>	BUREAU OF DESIGN	OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Pinaridel, Cabanatuan and San Jose Bypasses)	1:100	CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1	DRAINAGE CROSS-SECTION ALONG ACCESS ROAD INTERSECTIONS A-14, A-15	DC-16
	CHECKED	10/16/02	<i>[Signature]</i>	Submitted By:	Recommended By:	(See cover sheet for Signature/Approval)	Approved By:				
SUBMITTED	10/18/02	<i>[Signature]</i>	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary				



	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : <b>THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Piaridel, Cabanatuan and San Jose Bypasses)</b> <b>CABANATUAN BYPASS - CONTRACT PACKAGE II</b>	SCALE :  1:100  FULL SIZE A1	SHEET CONTENTS :  <b>DRAINAGE CROSS-SECTION ALONG ACCESS ROAD INTERSECTIONS A-16, A-19, A-20</b>	SHEET NO. :  <b>DC-17</b>
	DESIGNED	<i>[Signature]</i>		BUREAU OF DESIGN	OFFICE OF THE SECRETARY					
	CHECKED	<i>[Signature]</i>		Submitted By: DANILO C. TRAJANO Project Director	Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OC, Director IV				

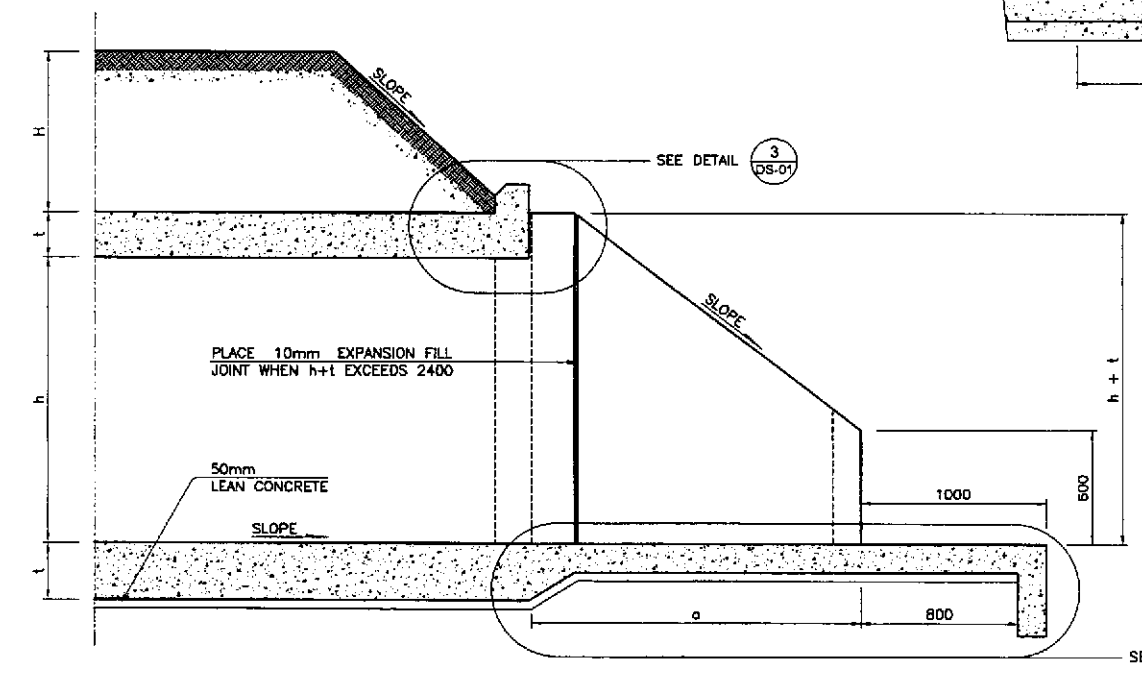


1 TYPICAL ROAD CROSS-SECTION  
DS-01 NOT TO SCALE

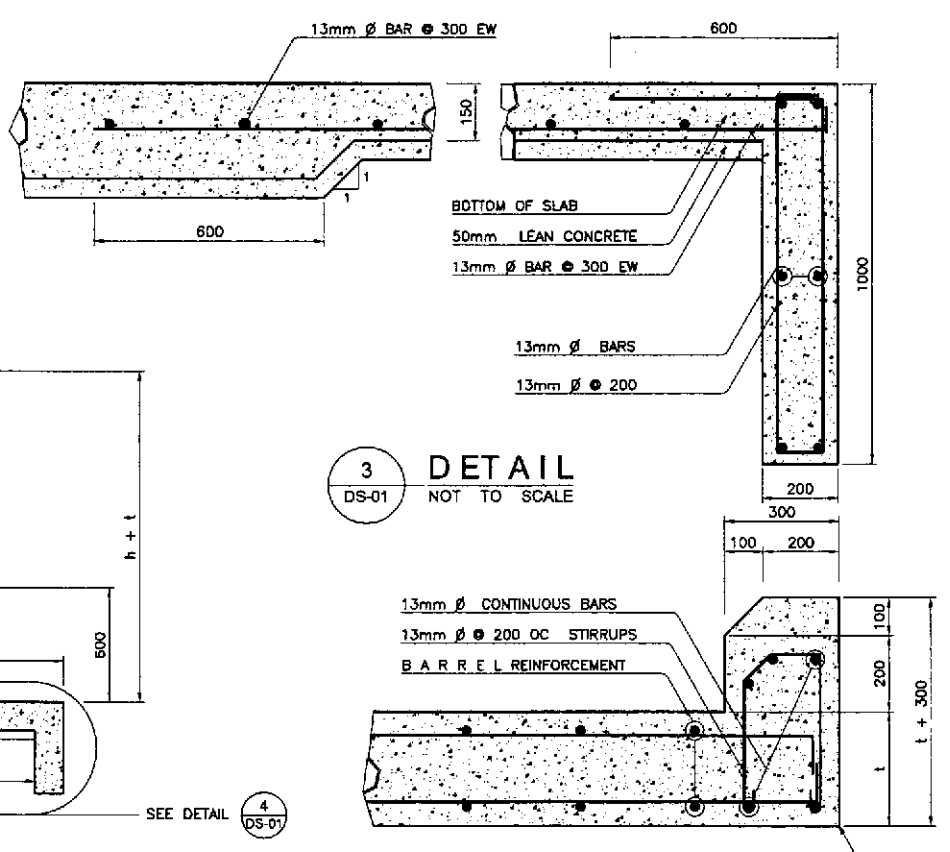
- LEGEND:
- W — WIDTH OF ROADWAY FORMATION
  - X — WIDTH OF SHOULDER
  - Wc — WIDTH OF CARRIAGEWAY
  - H — COVER ABOVE THE CULVERT
  - L — TOTAL LENGTH OF BARREL
  - t1 — THICKNESS OF CULVERT WALL OR SLAB
  - t2 — THICKNESS OF CULVERT WALL OR SLAB
  - Z —  $[(H+t) - (B+200)] \tan \phi$
  - B —  $xt_2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

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

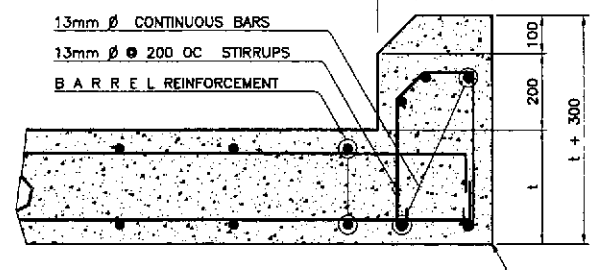
- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
  - MINIMUM CONCRETE COVER SHALL BE 40 CLEAR. WHEN HEIGHT OF FILL H=0 INCREASE COVER BY 30.



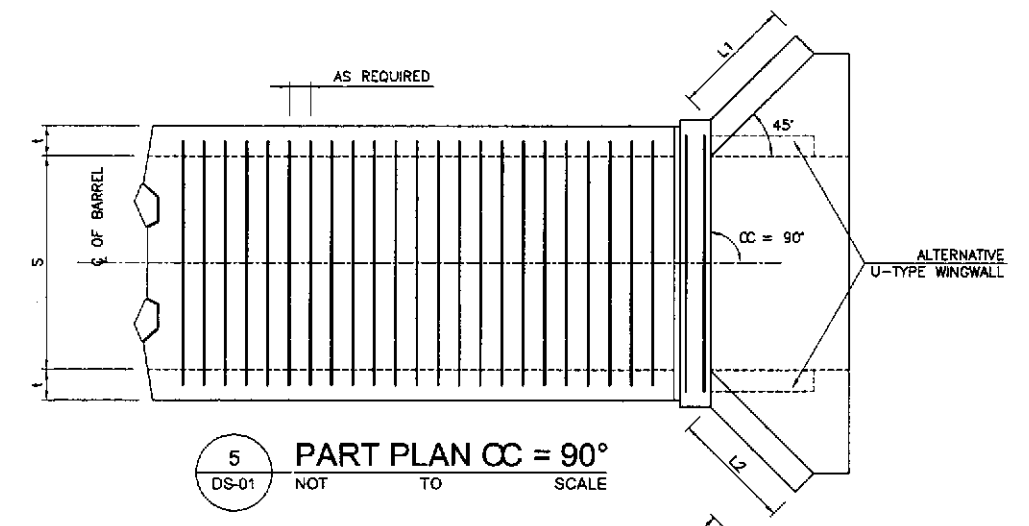
2 PART SECTION ALONG CL OF CULVERT  
DS-01 NOT TO SCALE



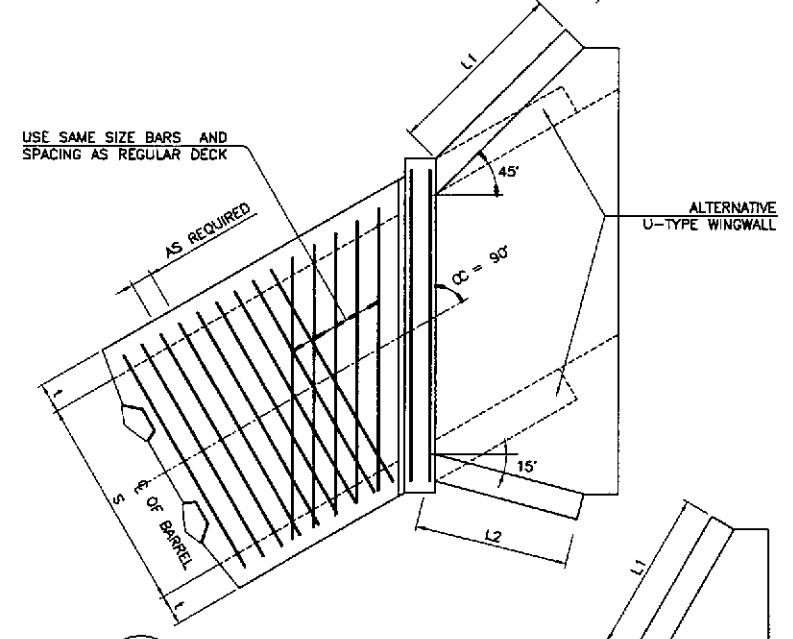
3 DETAIL  
DS-01 NOT TO SCALE



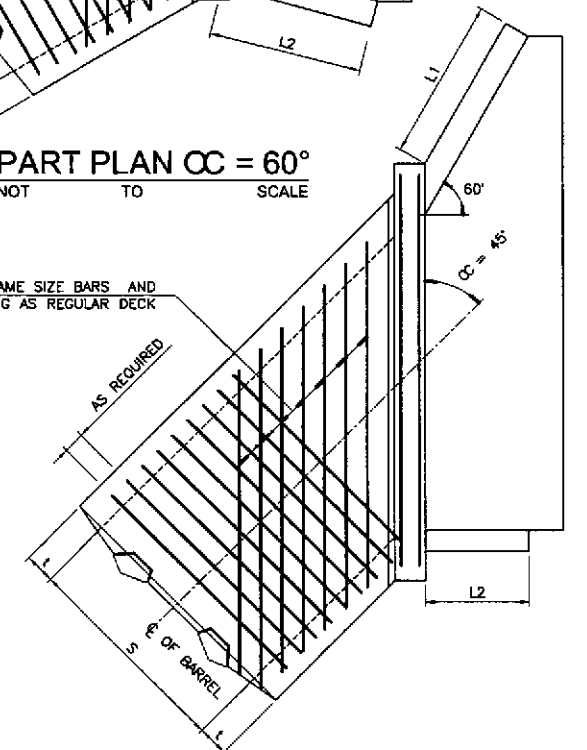
4 DETAIL  
DS-01 NOT TO SCALE



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



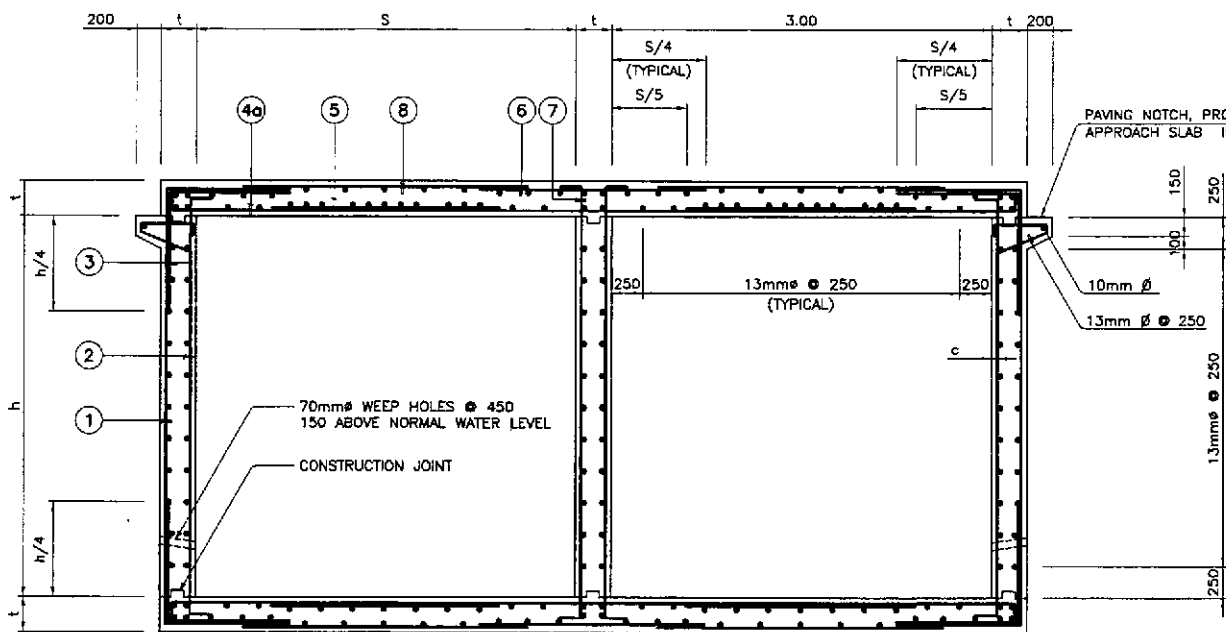
6 PART PLAN CC = 60°  
DS-01 NOT TO SCALE



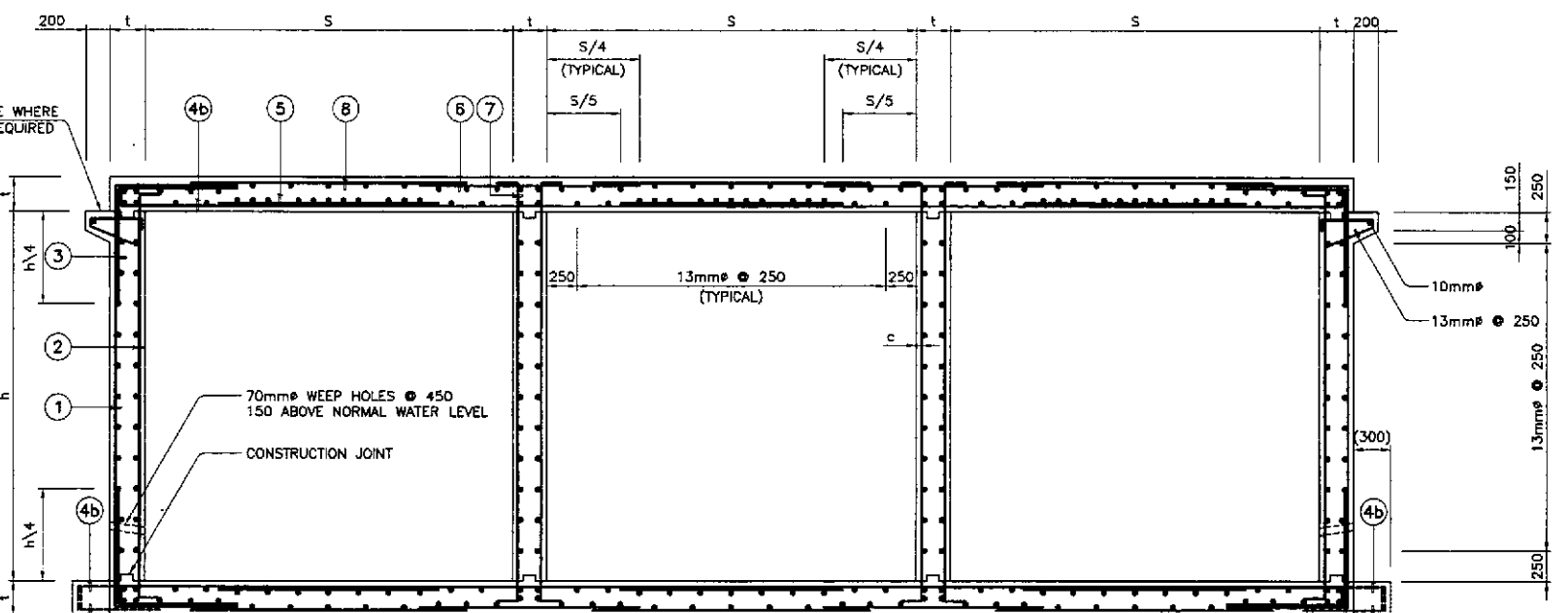
7 PART PLAN CC = 45°  
DS-01 NOT TO SCALE

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

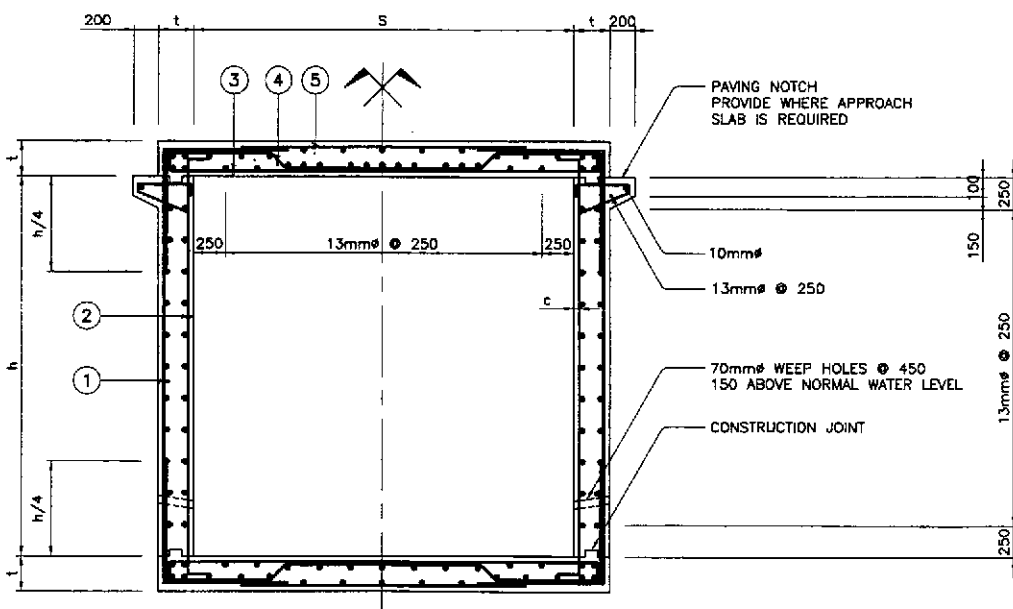
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : <b>THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)</b>	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : <b>STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)</b>	SHEET NO. : <b>DS-01</b>
	CHECKED	DATE	SIGNATURE		BUREAU OF DESIGN						
	SUBMITTED	DATE	SIGNATURE		P.J.H. - PMC Submitted By:	Reviewed By:	Recommended By:	Recommended By:	Approved By:		
					DANILO C. TRAJANO Project Director	JOSEFINA M. ALACAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONGAN Undersecretary	SIMON A. DATUMANONG Secretary		



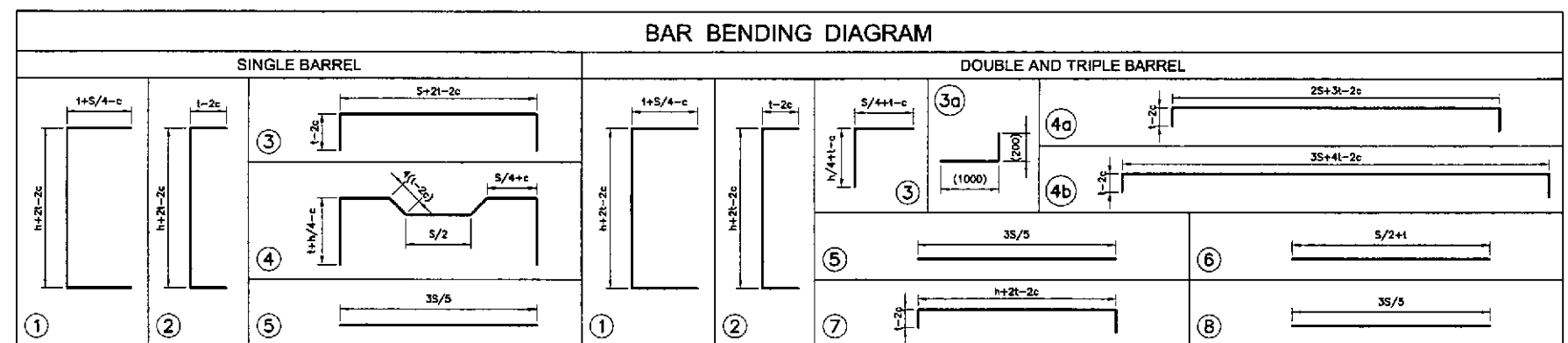
**2 DOUBLE BARREL SECTION**  
DS-02 SCALE 1:30



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



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



CLEAR SPAN S	HEIGHT h	SINGLE BARREL BOX CULVERT										DOUBLE AND TRIPLE BARREL BOX CULVERT																			
		t	BAR 1		BAR 2		BAR 3		BAR 4		BAR 5		t	BAR 1		BAR 2		BAR 3		BAR 4		BAR 5		BAR 6		BAR 7		BAR 8			
			Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	
1250	1000	180	13	300	13	300	13	300	13	300	13	300	180	13	300	13	300	13	300	13	300	13	300	20	200	13	300	13	300	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	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	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	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	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	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	13	280
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1800	1250	200	16	260	16	300	16	260	16	250	13	280	250	16	300	16	300	16	300	16	300	16	300	20	190	13	300	13	220	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	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	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	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	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	13	200
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	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	13	200

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

**LEGEND:**  
c = CONCRETE CLEAR COVER (50mm)  
○ = ADDITIONAL REBARS IF FILL IS LESS THAN 600mm

**STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC) BARRELS**

	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :			
	CHECKED	10/16/02	[Signature]		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)						1:30	STANDARD DETAILS OF RCBC BARRELS	DS-02
	SUBMITTED	10/18/02	[Signature]		Submitted By:	Reviewed By:	Recommended By:	Approved By:	CABANATUAN BYPASS - CONTRACT PACKAGE II						FULL SIZE A1

QUANTITIES FOR STANDARD BOX CULVERTS							
CLEAR		QUANTITY PER METER OF BARREL					
SPAN S	HEIGHT h	SINGLE		DOUBLE		TRIPLE	
		CONCRETE (m <sup>3</sup> )	REINFORCEMENT (kg)	CONCRETE (m <sup>3</sup> )	REINFORCEMENT (kg)	CONCRETE (m <sup>3</sup> )	REINFORCEMENT (kg)
1250	1000	0.94	113.32	1.63	209.22	2.33	298.18
	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	325.10	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									
CLEAR		QUANTITY PER WINGWALL AND APRON SLAB							
m (meter)	h+t (meter)	L (meter)	SINGLE		DOUBLE		TRIPLE		
			CONCRETE (m <sup>3</sup> )	REINFORCEMENT (kg)	CONCRETE (m <sup>3</sup> )	REINFORCEMENT (kg)	CONCRETE (m <sup>3</sup> )	REINFORCEMENT (kg)	
1.37	1.18	1.23	2.41	150	2.94	180	3.48	220	
1.75	1.43	1.78	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	9.28	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  $f'_c = 20.7 \text{ MPa}$  (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=D THE TOP OF SURFACE OF THE UPPER SLAB SHALL FOLLOW THE CROWN OF THE FINISHED ROADWAY. THE BOX CULVERT SHALL BE CONSTRUCTED ON A LAYER OF LEAN CONCRETE 50mm MINIMUM THICKNESS.

**LIVE LOAD DISTRIBUTION REINFORCEMENT :**

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

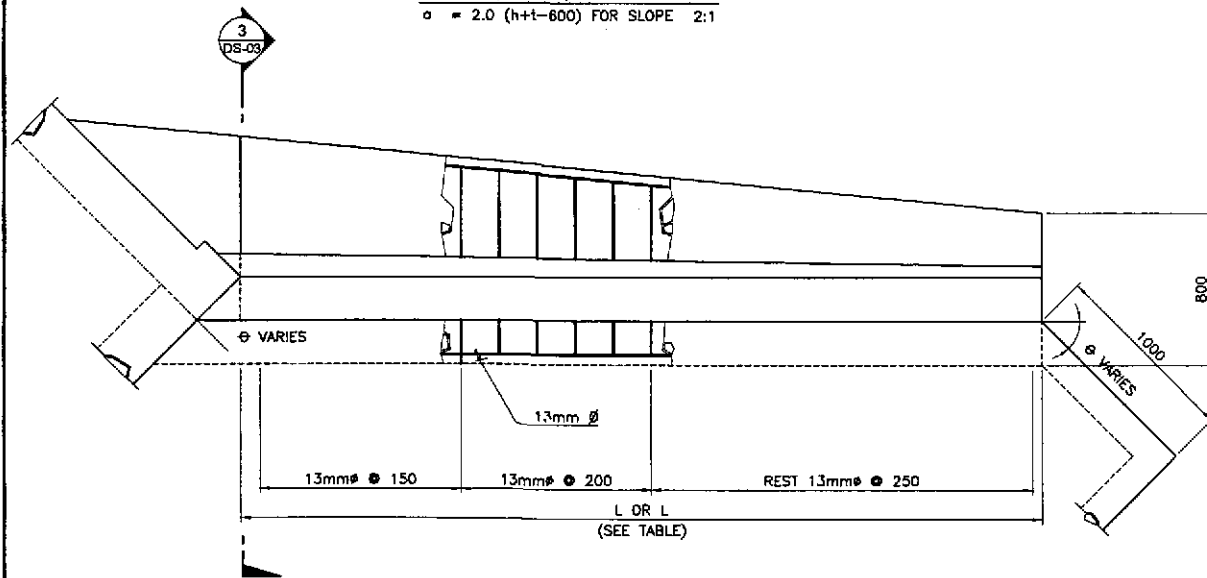
**HEIGHT OF FILL :**

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

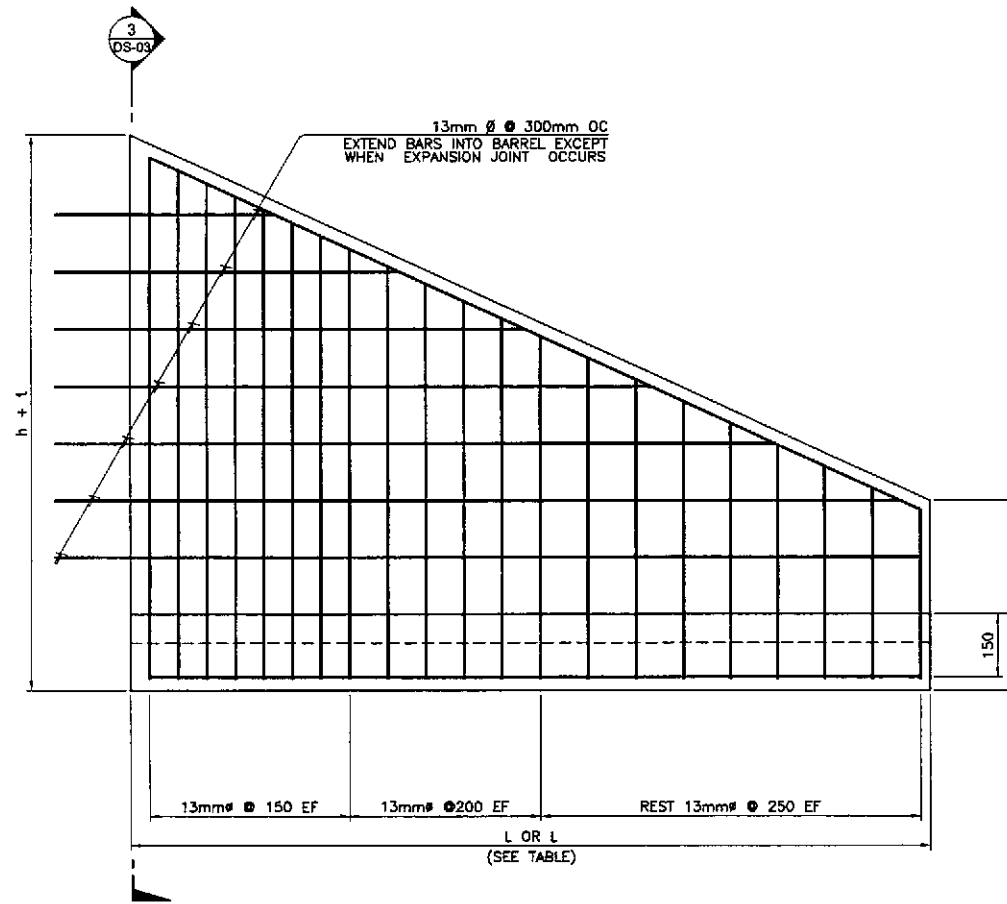
HORIZONTAL SKEW ANGLE CC	LENGTH OF WINGWALLS
90°	$L_1 = L_2 = 1.414a$
60°	$L_1 = 1.414a$ $L_2 = 1.035a$
45°	$L_1 = 2.000a$ $L_2 = a$

WHERE :

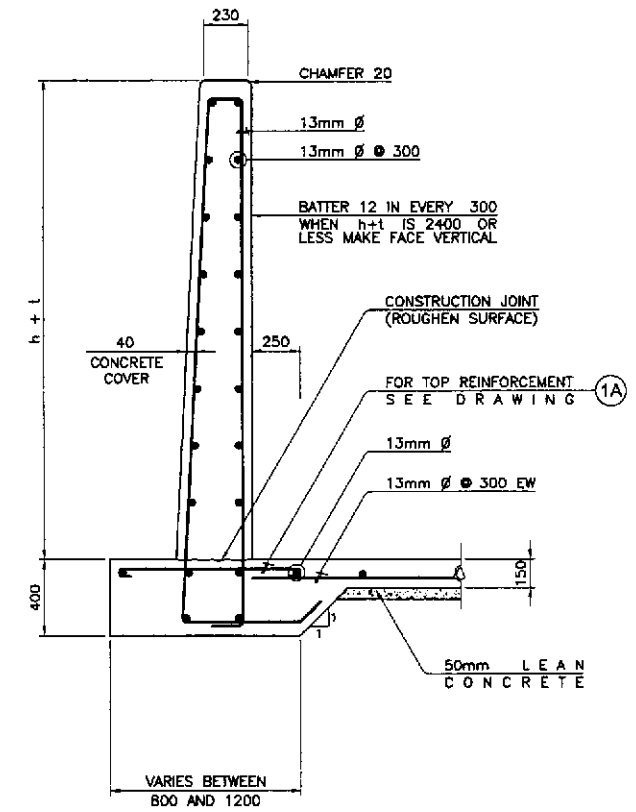
$a = 1.5 (h+t-600)$  FOR SLOPE 1.5:1  
 $a = 2.0 (h+t-600)$  FOR SLOPE 2:1



**1 WINGWALL PLAN**  
 DS-03 SCALE 1:40



**2 WINGWALL ELEVATION**  
 DS-03 SCALE 1:40

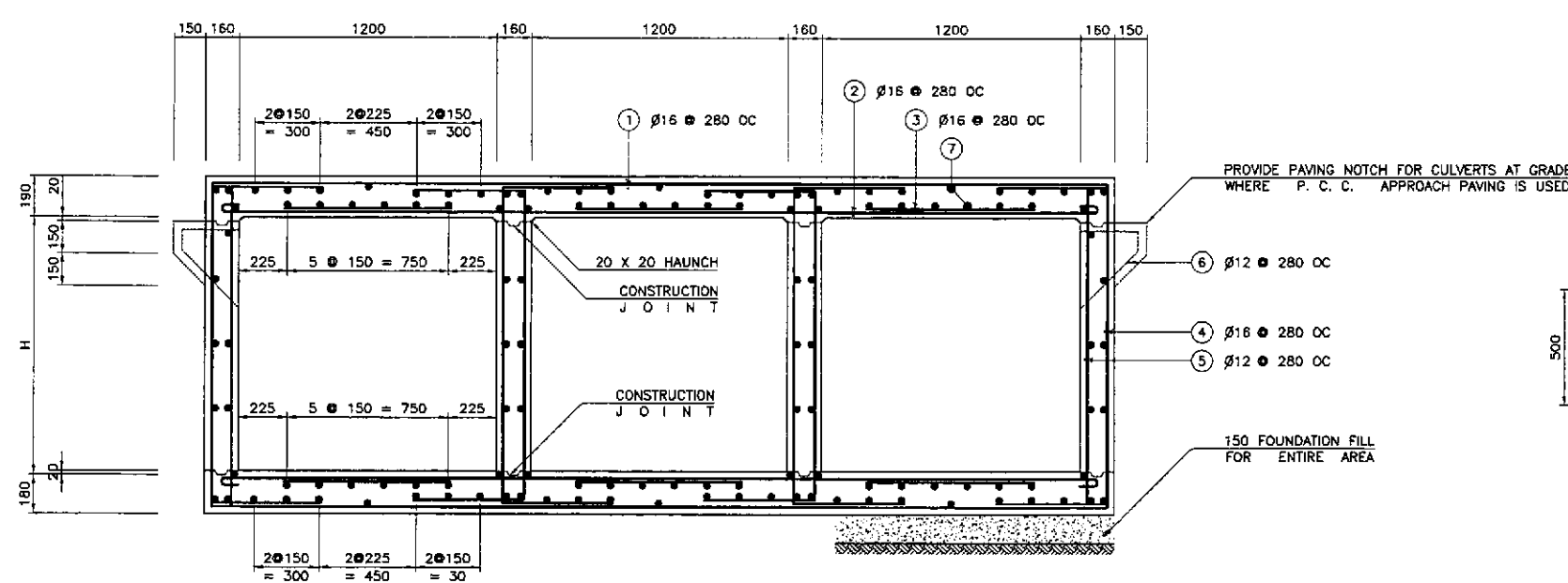


**3 SECTION**  
 DS-03 SCALE 1:40

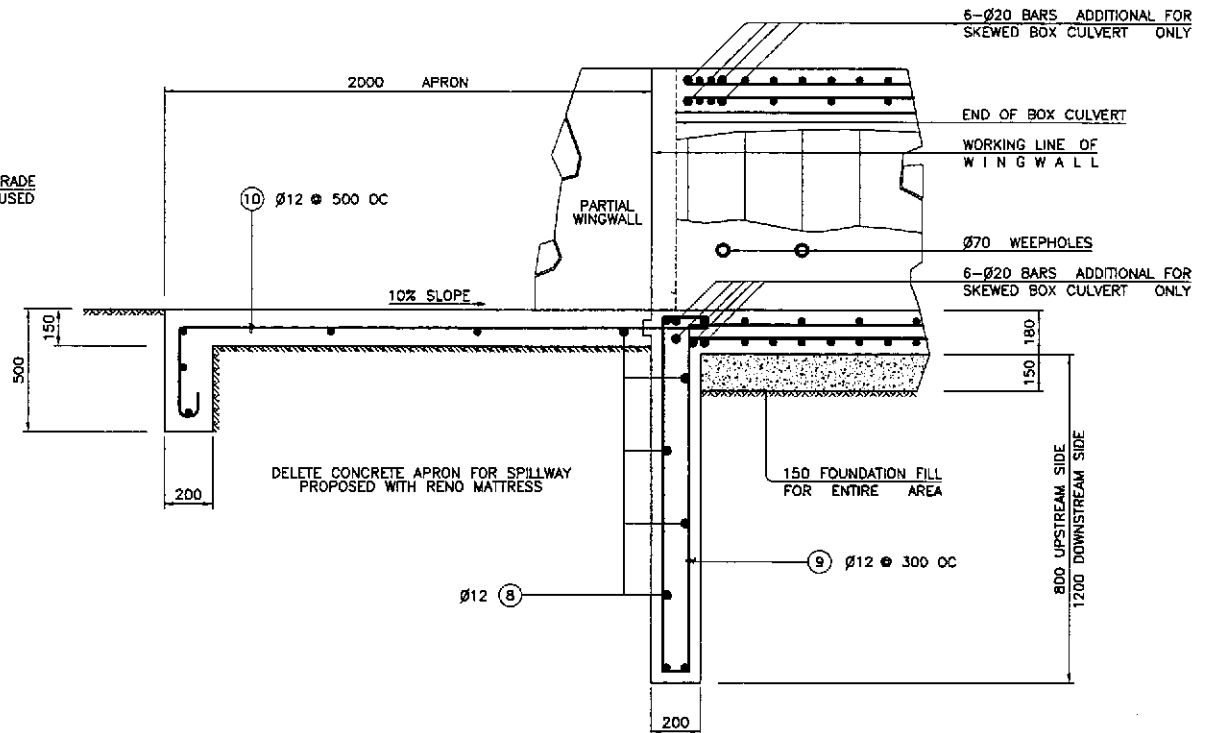
**RCBC WINGWALL DETAILS**

	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	<i>[Signature]</i>	PJHL - PMD	BUREAU OF DESIGN		THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	1:40	STANDARD DETAILS OF RCBC WINGWALLS	DS-03
	CHECKED	<i>[Signature]</i>	Submitted By:	Reviewed By:	Recommended By:	CABANATUAN BYPASS - CONTRACT PACKAGE II			
SUBMITTED	<i>[Signature]</i>	TEAM LEADER	DANILO C. TRAJANO Project Director	JOSEFINA M. ALADAR Chief, Highways Division	CILBERTO S. REYES OC, Director IV	MANUEL M. BONGAN Undersecretary	SIMEON A. DATUMANONG Secretary		

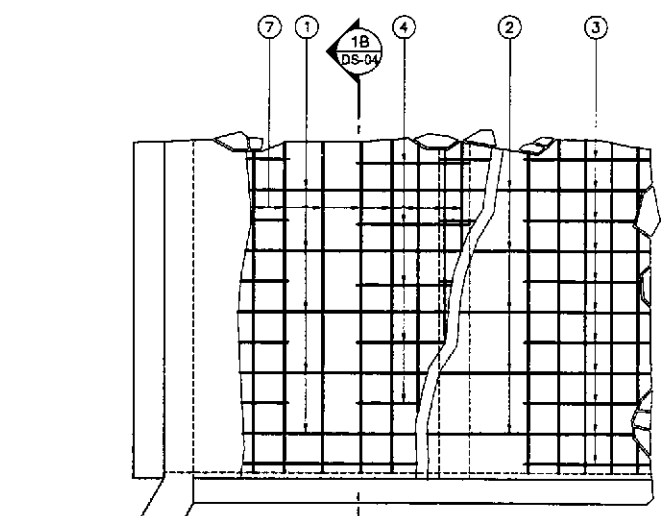




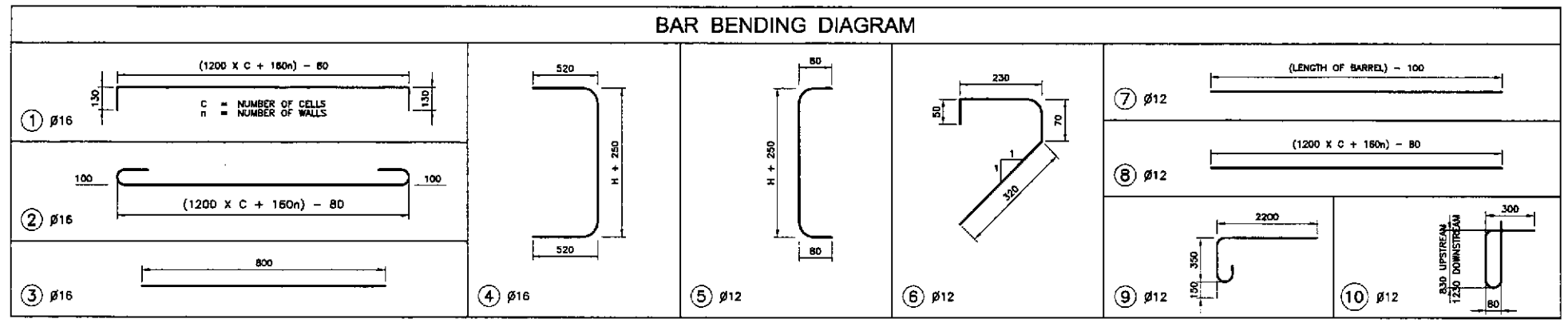
1A SECTION ALONG C OF ROADWAY  
DS-04 NOT TO SCALE



1B PARTIAL SECTION A  
DS-04 NOT TO SCALE



PARTIAL PLAN  
NOT TO SCALE



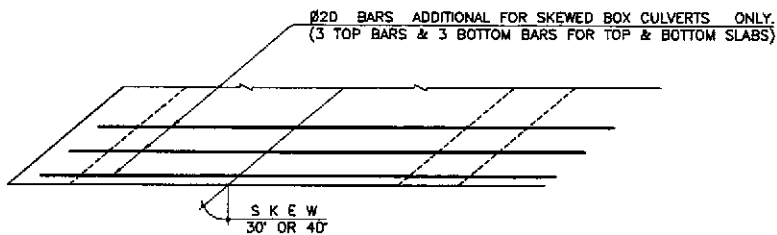
ESTIMATE OF QUANTITIES (PER LINEAR METER OF LENGTH)

HEIGHT OF CELL "H" (METER)	SINGLE BARREL				DOUBLE BARREL				TRIPLE BARREL			
	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )	FOUNDATION FILL (m <sup>3</sup> )	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )	FOUNDATION FILL (m <sup>3</sup> )	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )	FOUNDATION FILL (m <sup>3</sup> )
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.  
 45° SKEW = 120.5 kgs.  
 30° SKEW = 48.5 kgs.  
 45° SKEW = 57.0 kgs.

APRON AND END TOE FOR BOTH ENDS

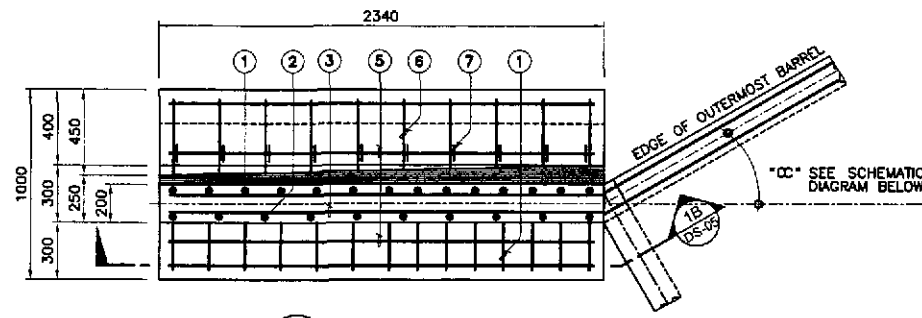
COMMON TO ALL HEIGHT OF CELL	SINGLE BARREL			DOUBLE BARREL			TRIPLE BARREL		
	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )
	1.73	57.94	3.64	3.26	111.34	6.08	4.63	164.70	8.53



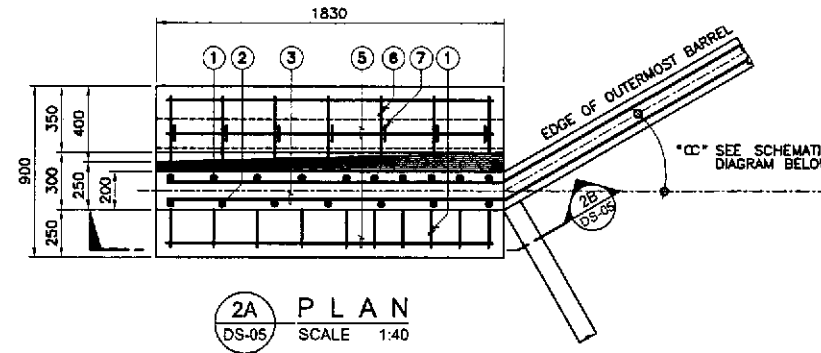
NOTE:  
 ALL OTHER REINFORCING BARS SHALL BE PERPENDICULAR OR PARALLEL, AS THE CASE MAYBE, TO BOX AXIS.

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

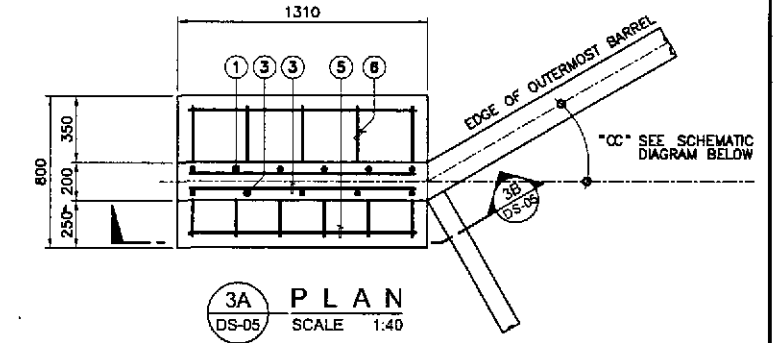
	DESIGNED	DATE	SIGNATURE		PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/16/02	<i>[Signature]</i>		THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)	DS-04
	SUBMITTED	10/18/02	<i>[Signature]</i>		CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1		



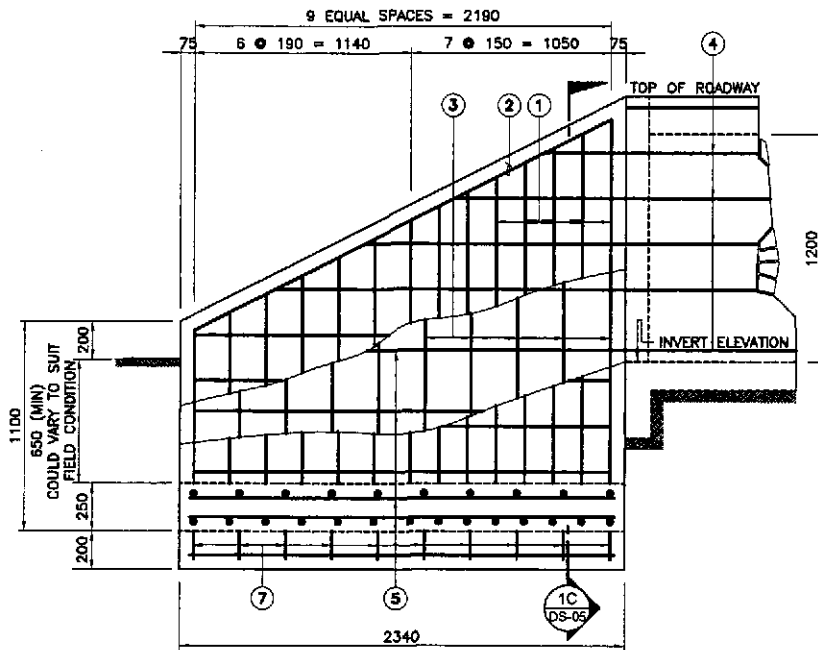
1A PLAN  
DS-05 SCALE 1:40



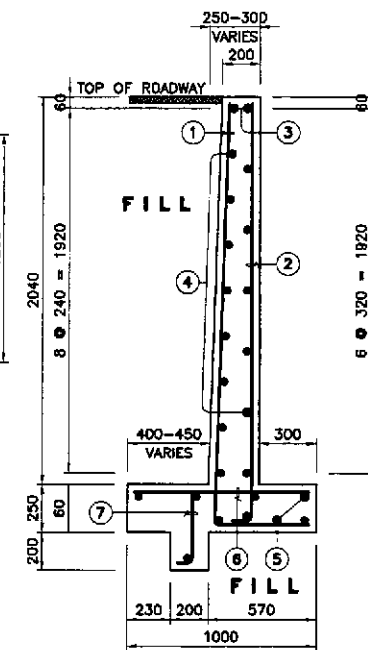
2A PLAN  
DS-05 SCALE 1:40



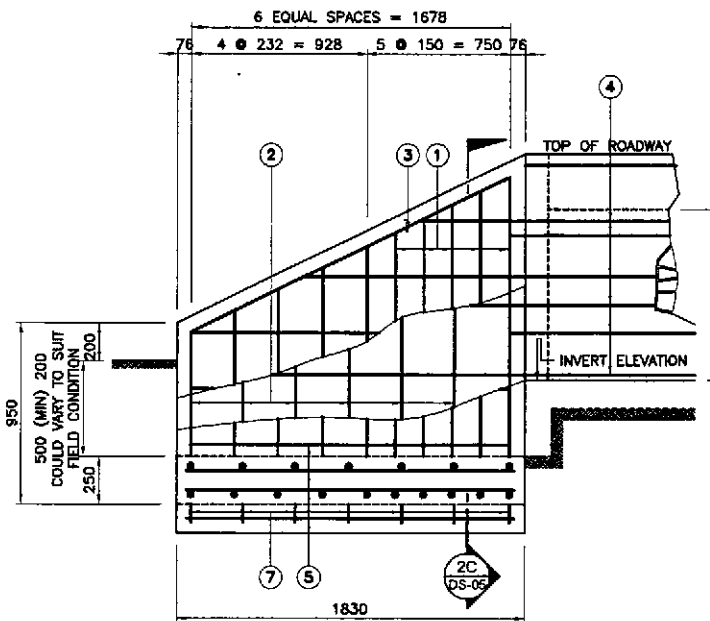
3A PLAN  
DS-05 SCALE 1:40



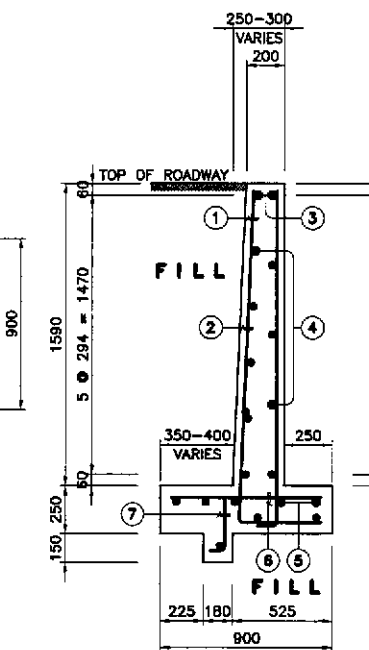
1A ELEVATION  
DS-05 SCALE 1:40



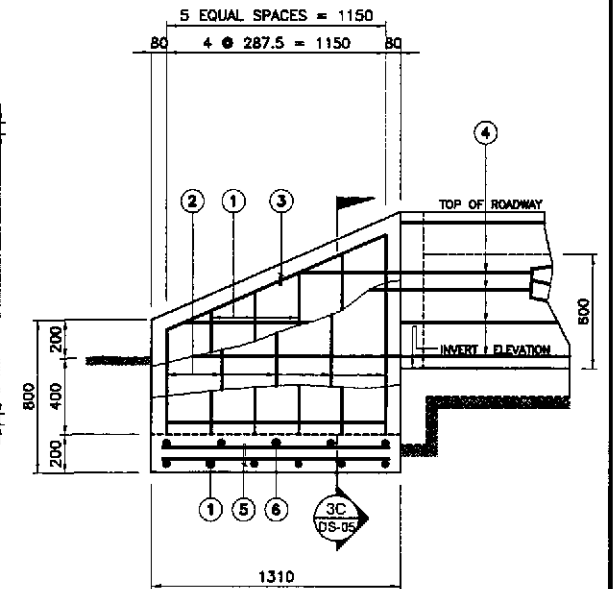
1C SECTION  
DS-05 SCALE 1:40



2B ELEVATION  
DS-05 SCALE 1:40



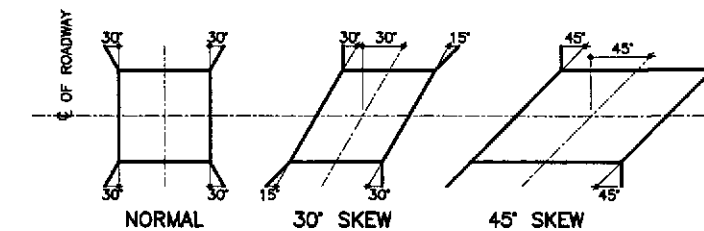
2C SECTION  
DS-05 SCALE 1:40



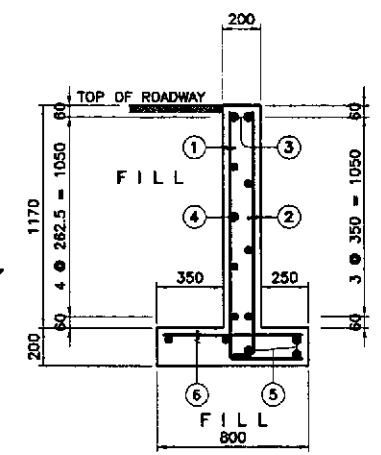
3B ELEVATION  
DS-05 SCALE 1:40

BAR BENDING DIAGRAM H=1200			BAR BENDING DIAGRAM H=900			BAR BENDING DIAGRAM H=600		
① 14-12mm#	② 10-12mm#	③ 2-12mm#	① 10-12mm#	② 7-12mm#	③ 2-12mm#	① 5-12mm#	② 5-12mm#	③ 2-12mm#
④ 9-12mm#	⑤ 9-12mm#	⑥ 10-12mm#	④ 6-12mm#	⑤ 10-12mm#	⑥ 7-12mm#	④ 5-12mm#	⑤ 7-12mm#	⑥ 5-12mm#

ESTIMATE OF QUANTITIES PER WINGWALL				
HEIGHT (m)	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCEMENT (kg)	EXCAVATION (m <sup>3</sup> )	FOUNDATION FILL (m <sup>3</sup> )
1.20	2.95	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 SCHEMATIC DIAGRAM SHOWING FLARE OF WINGWALL  
DS-05 NOT TO SCALE

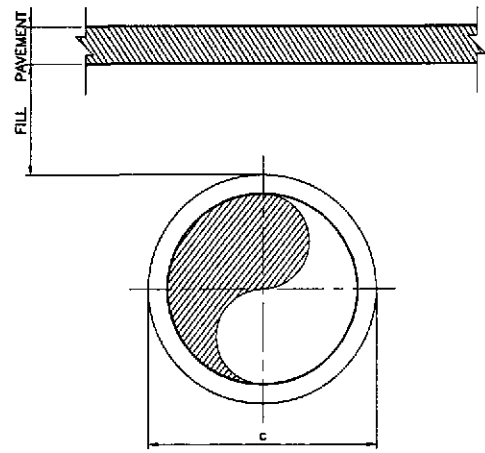


3C SECTION  
DS-05 SCALE 1:40

LOW DEPTH TYPE BOX CULVERT

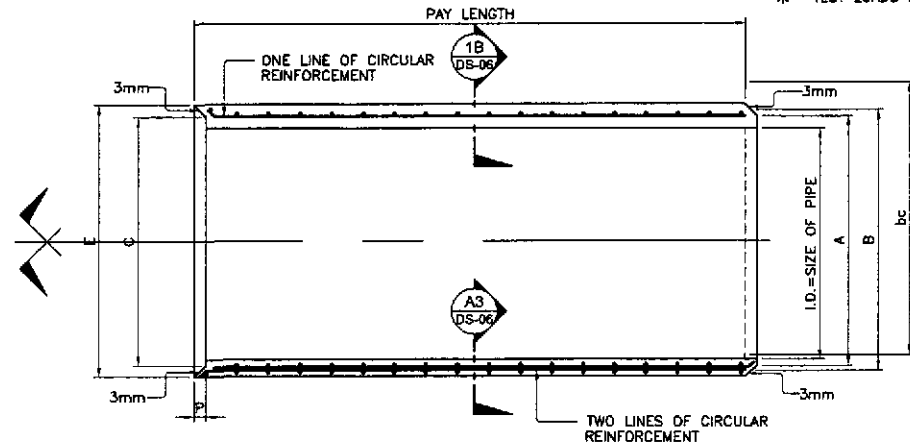
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/16/02	[Signature]		Submitted By:	BUREAU OF DESIGN	OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	STANDARD LOW DEPTH TYPE BOX CULVERT (2 of 2)	DS-05
	SUBMITTED	10/18/02	[Signature]	Project Director	DANILO C. TRAJANO	Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1		

# DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT

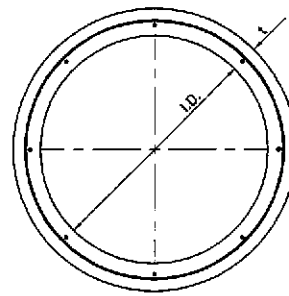


STANDARD STRENGTH PIPES:  
FILL 1/2 E.D. FOR FLEXIBLE PAVEMENT OR MIN. OF 0.60 m  
0.30 m FOR RIGID PAVEMENT  
EXTRA STRENGTH PIPES:  
FILL: 0.30 m FOR RIGID AND FLEXIBLE PAVEMENTS

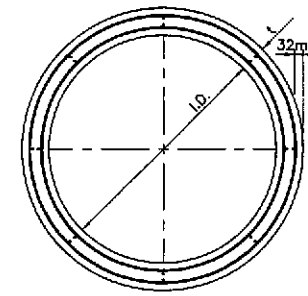
### MINIMUM PIPE COVERING



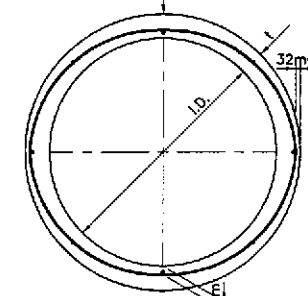
1A LONGITUDINAL SECTION  
DS-06 NOT TO SCALE



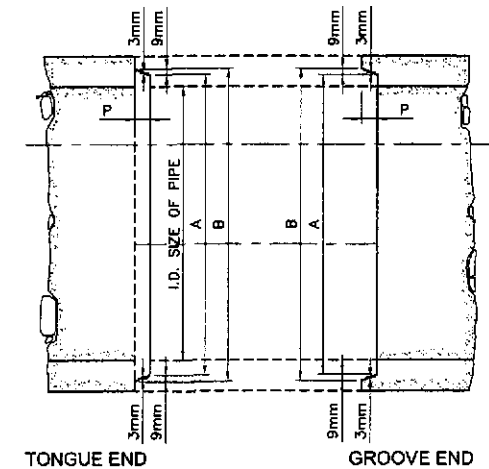
1B SECTION  
DS-06



1C SECTION  
DS-06



1D SECTION  
DS-06

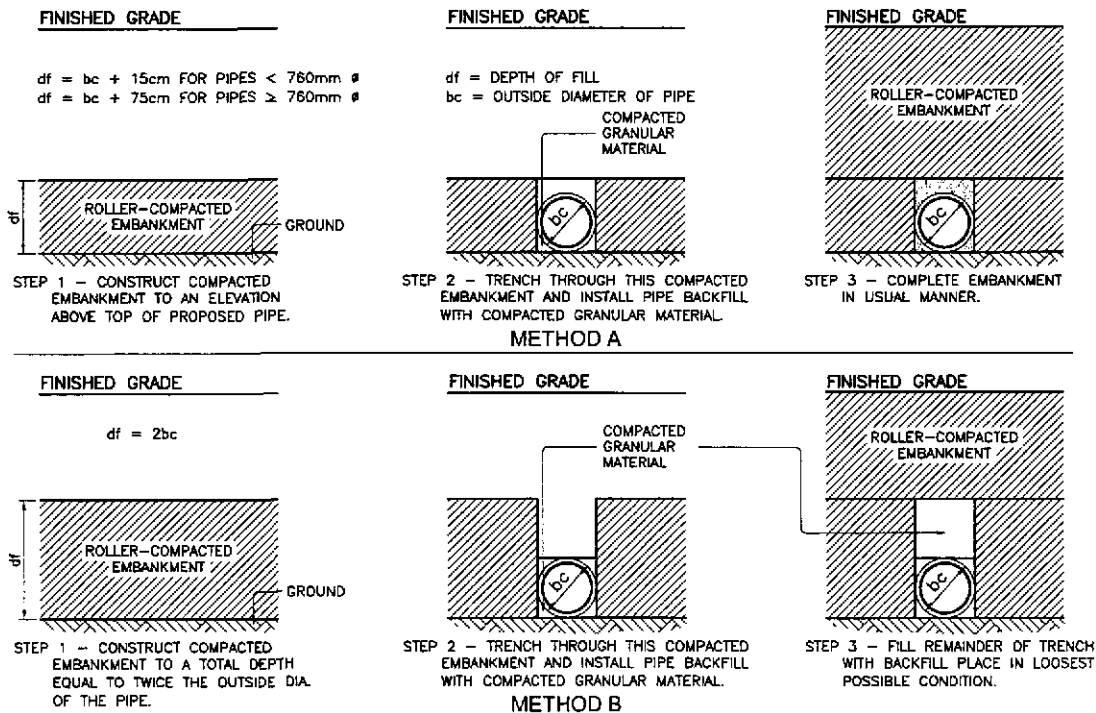


1E SECTION  
DS-06

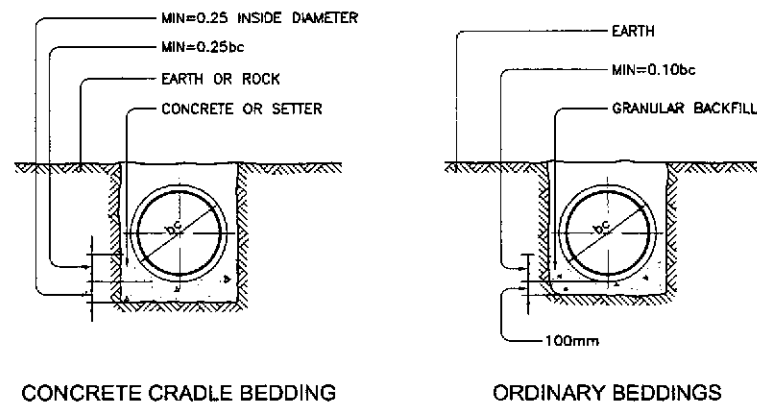
		STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS														EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS												
		CONCRETE 247 kg/cm <sup>2</sup> (3,500 lb/in <sup>2</sup> )							CONCRETE 317 kg/cm <sup>2</sup> (4,500 lb/in <sup>2</sup> )							STRENGTH TEST REQUIREMENTS kg/m OF PIPE				CONCRETE 317 kg/cm <sup>2</sup> (4,500 lb/in <sup>2</sup> )				STRENGTH TEST REQUIREMENTS kg/m OF PIPE				
SIZE OF PIPE (mm)	WALL THICKNESS (mm)	TONGUE (mm)	GROOVE (mm)	DEPTH (mm)	MINIMUM REINFORCEMENT cm <sup>2</sup> /m OF PIPE	WALL THICKNESS (mm)	TONGUE (mm)	GROOVE (mm)	DEPTH (mm)	MINIMUM REINFORCEMENT cm <sup>2</sup> /m OF PIPE	THREE-EDGE-BEARING METHOD *	THREE-EDGE-BEARING METHOD *	WALL THICKNESS (mm)	TONGUE (mm)	GROOVE (mm)	DEPTH (mm)	MINIMUM REINFORCEMENT cm <sup>2</sup> /m OF PIPE	THREE-EDGE-BEARING METHOD *	THREE-EDGE-BEARING METHOD *									
I.D.	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	ULTIMATE LOAD	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	LOAD ULTIMATE
300	57	344	363	351	370	44	1 LINE 1.48		51	495	514	502	521	44	1 LINE 1.69		3.355	5.218										
380	57	344	363	351	370	44	1 LINE 1.90		51	495	514	502	521	44	1 LINE 2.33		3.914	6.060										
460	64	508	527	514	534	44	1 LINE 2.54	1 LINE 2.12	51	495	514	502	521	44	1 LINE 2.96		4.473	6.709										
610	76	673	692	680	699	44	1 LINE 3.60	1 LINE 2.75	64	660	680	667	686	44	1 LINE 4.23	1 LINE 3.60	4.473	7.454	76	673	692	680	699	44	1 LINE 5.50	1 LINE 4.23	5.964	8.945
760	89	858	857	845	864	51	1 LINE 4.66	1 LINE 3.60	76	825	845	832	851	51	1 LINE 5.92	1 LINE 4.44	5.032	8.573	89	838	857	845	864	51	1 LINE 6.56	1 LINE 5.08	7.454	11.102
910	102	1003	1022	1010	1029	64	2 LINES EACH 3.81	1 LINE 3.81	86	988	1007	994	1013	64	2 LINES EACH 4.66	1 LINE 4.66	6.038	9.840	102	1003	1022	1010	1029	64	2 LINES EACH 5.92	1 LINE 5.92	8.945	13.418
1070	114	1168	1187	1175	1194	64	2 LINES EACH 4.44	1 LINE 4.44	95	1150	1165	1156	1175	64	2 LINES EACH 5.29	1 LINE 5.29	7.045	10.958	114	1168	1187	1175	1194	64	2 LINES EACH 6.98	1 LINE 6.98	10.436	15.855
1220	127	1334	1353	1340	1359	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	8.051	11.927	127	1334	1353	1340	1359	64	2 LINES EACH 8.04	1 LINE 8.04	11.927	17.891
1520	152	1664	1683	1670	1690	64	2 LINES EACH 6.88	1 LINE 6.88	127	1639	1658	1645	1664	64	2 LINES EACH 8.68	1 LINE 8.68	8.945	14.909	152	1664	1683	1670	1690	64	2 LINES EACH 10.58	1 LINE 10.58	13.418	22.364

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

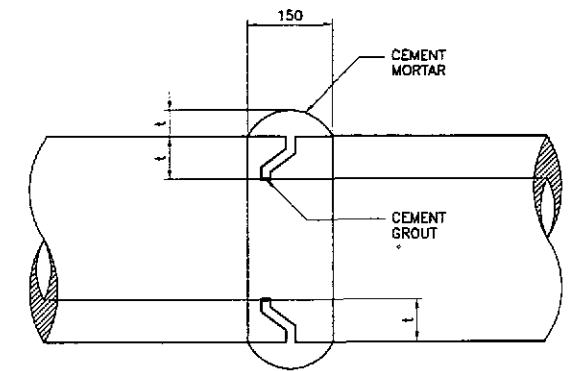
1 STANDARD REINFORCED CONCRETE PIPE CULVERTS  
DS-06 SCALE AS SHOWN



2 METHODS OF PIPE INSTALLATION  
DS-06 NOT TO SCALE

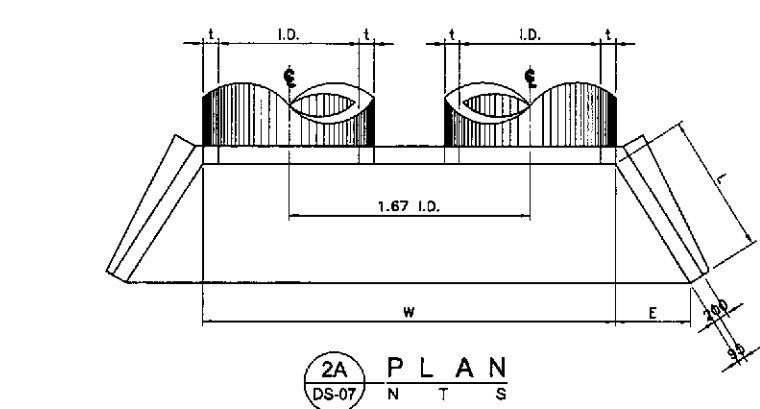
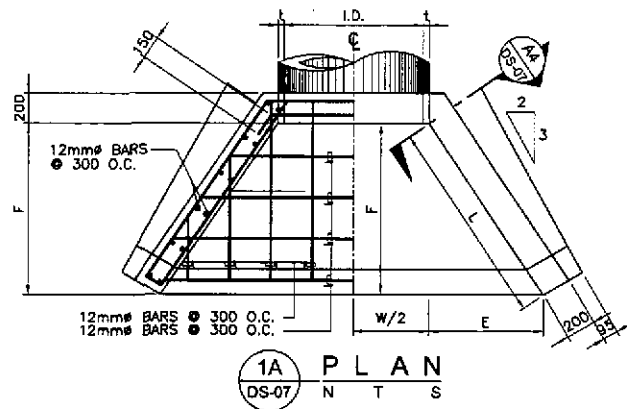
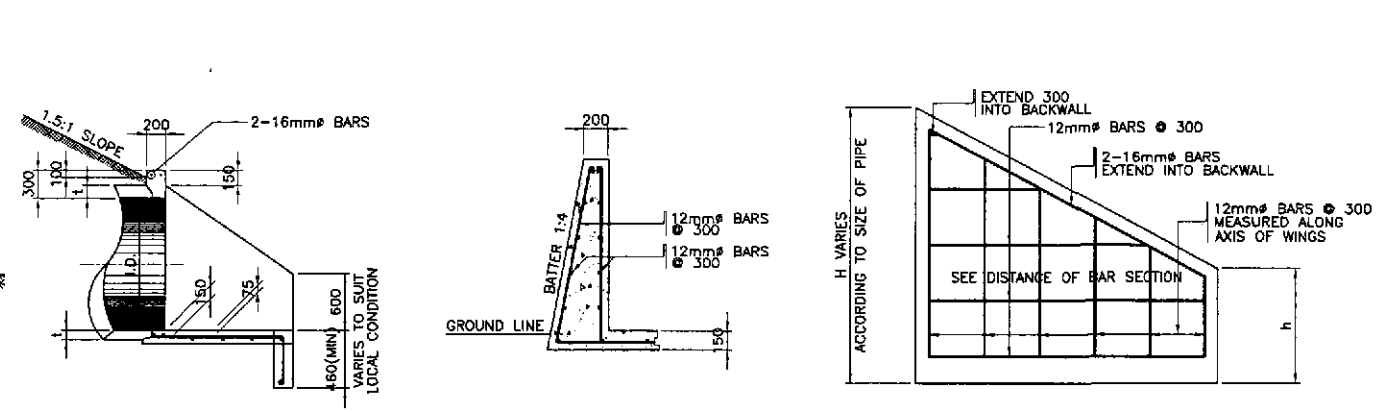
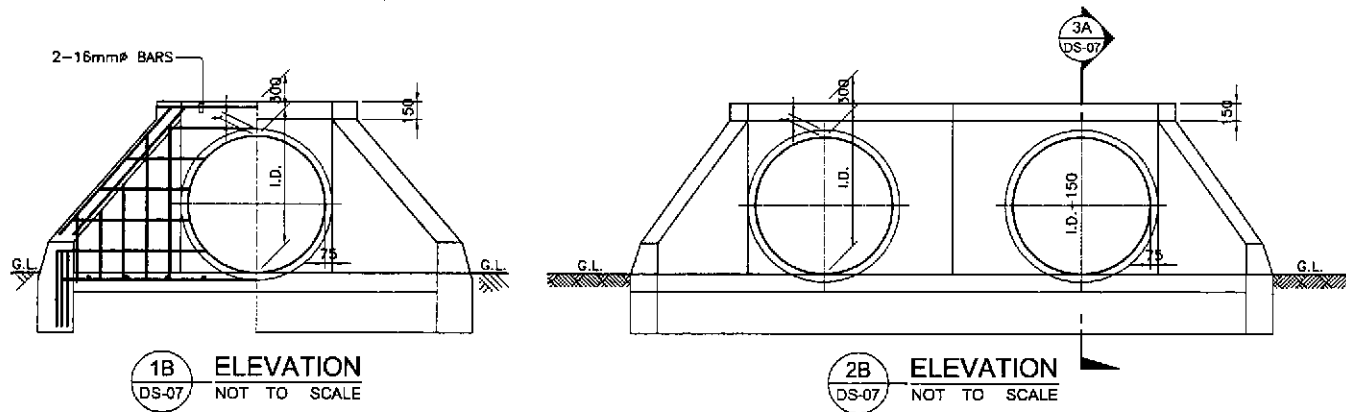


3 TYPICAL BEDDING FOR CONDUITS  
DS-06 NOT TO SCALE



4 DETAIL OF PIPE COLLAR  
DS-06 NOT TO SCALE

		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : AS SHOWN		SHEET CONTENTS : STANDARD RCPC, METHOD OF PIPE INSTALLATION AND TYPICAL BEDDING FOR CONDUITS		SHEET NO. : DS-06	
DESIGNED	DATE	SIGNATURE	PUHL - PMO BUREAU OF DESIGN		OFFICE OF THE SECRETARY		CABANATUAN BYPASS - CONTRACT PACKAGE II		FULL SIZE A1				
CHECKED	DATE	SIGNATURE	DANIL C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary						
SUBMITTED	DATE	SIGNATURE											



**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 <sup>2</sup>	EST. OF QUANTITIES		AREA OF WATERWAY m <sup>2</sup>	W (mm)	EST. OF QUANTITIES		AREA OF WATERWAY m <sup>2</sup>	W (mm)	EST. OF QUANTITIES		
							CONC. m <sup>3</sup>	REINF. STEEL kg.			CONC. m <sup>3</sup>	REINF. STEEL kg.			CONC. m <sup>3</sup>	REINF. STEEL kg.	
480	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	780	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

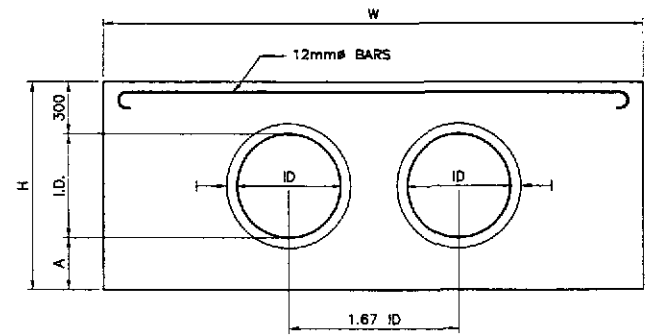
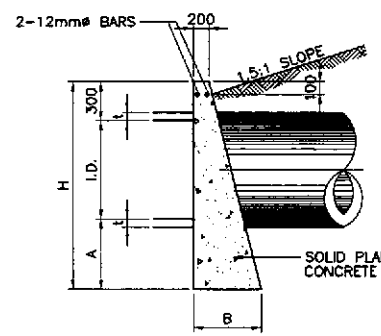
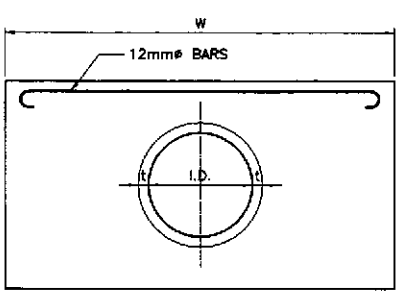
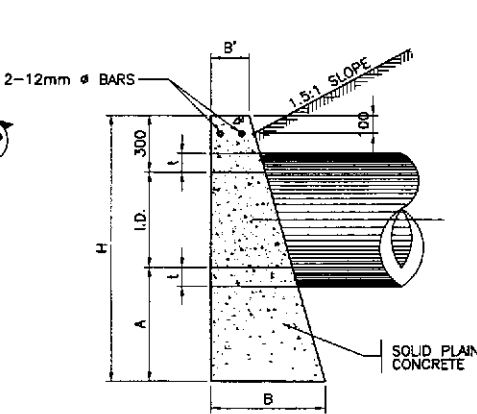
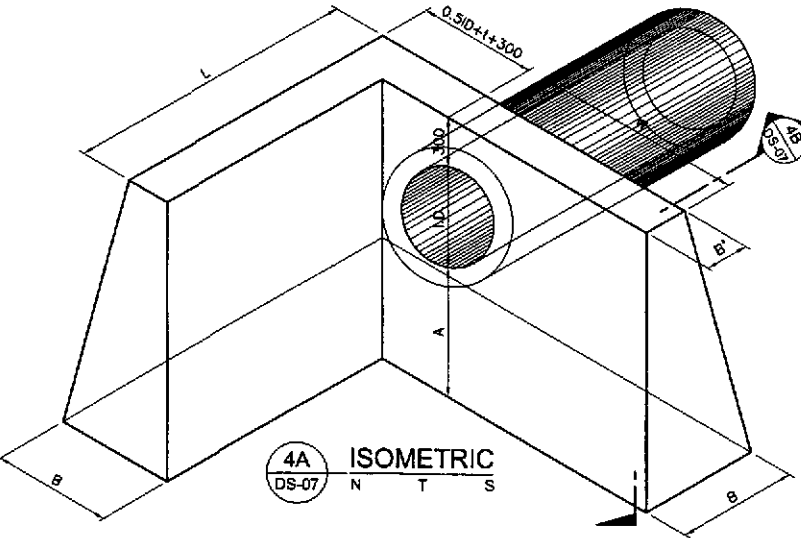
**1 FLARED TYPE HEADWALL (SINGLE PIPE)** SCALE AS SHOWN **2 FLARED TYPE HEADWALL (DOUBLE PIPE)** SCALE AS SHOWN

**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 <sup>3</sup>	REINF. STEEL kg.
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	VARIABLE	-	-
1220	108	810	870	300	2330	2120	VARIABLE	-	-
1520	127	1010	980	300	3030	2420	VARIABLE	-	-

**TABLE C (ONE STRAIGHT TYPE HEADWALL)**

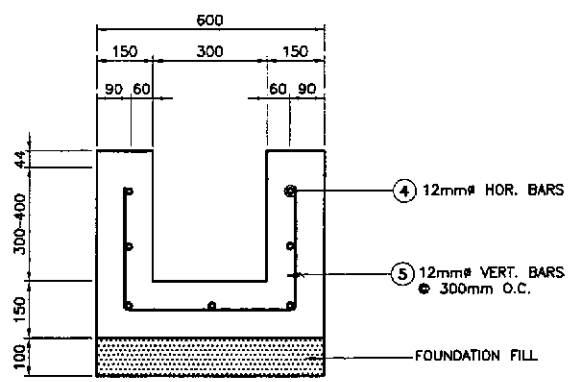
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)			SINGLE PIPE			DOUBLE PIPE			TRIPLE PIPE					
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m <sup>2</sup>	CONCRETE		W (mm)	AREA OF WATERWAY m <sup>2</sup>	CONCRETE		W (mm)	AREA OF WATERWAY m <sup>2</sup>	CONCRETE	
							m <sup>3</sup>	REINF. STEEL kg.			m <sup>3</sup>	REINF. STEEL kg.			m <sup>3</sup>	REINF. STEEL kg.
480	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



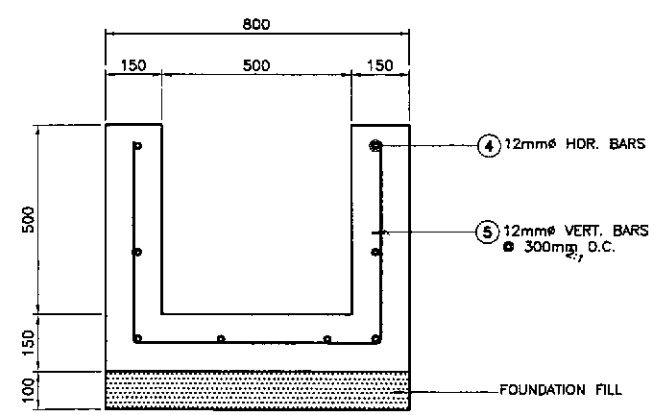
**4 L-TYPE HEADWALL** NOT AS SHOWN **5 STRAIGHT TYPE HEADWALL** NOT AS SHOWN

**STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC**

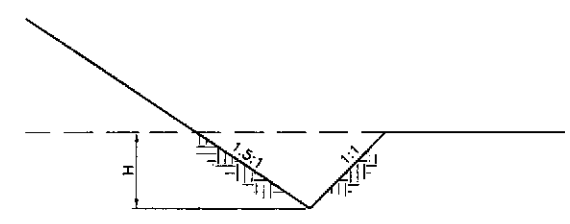
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES			PROJECT AND LOCATION :			SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/16/02	[Signature]		DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)			NOT TO SCALE	STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC	DS-07
	SUBMITTED	10/16/02	[Signature]		BUREAU OF DESIGN			CABANATUAN BYPASS - CONTRACT PACKAGE II			FULL SIZE A1		
Submitted By:		Reviewed By:		Recommended By:		Approved By:							
DANILO C. TRAJANO Project Director		JOSEFINA M. ALAGAR Chief, Highways Division		GILBERTO S. REYES D.C. Director IV		MANUEL M. BONDAN Undersecretary		SIMEON A. DATUMAHONG Secretary					



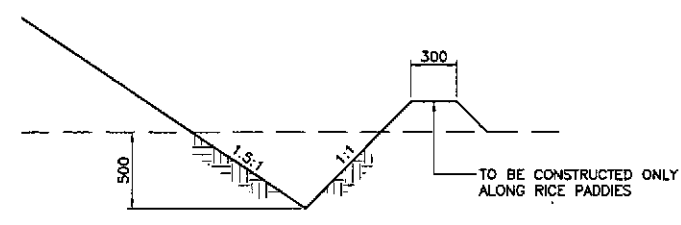
REINFORCED CONCRETE DITCH  
**1 TYPE BU**  
 DS-08 SCALE: 1:10



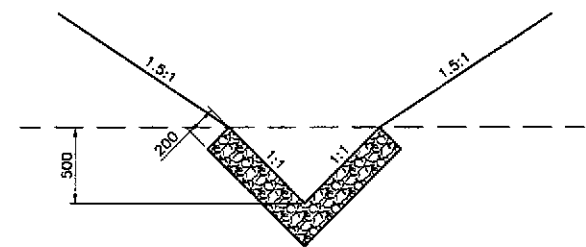
REINFORCED CONCRETE DITCH  
**2 TYPE U**  
 DS-08 SCALE: 1:10



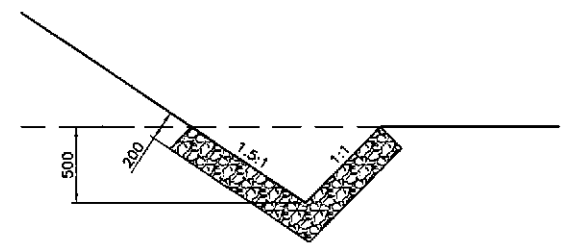
V-SHAPED UNLINED DITCH  
**TYPE E-4**



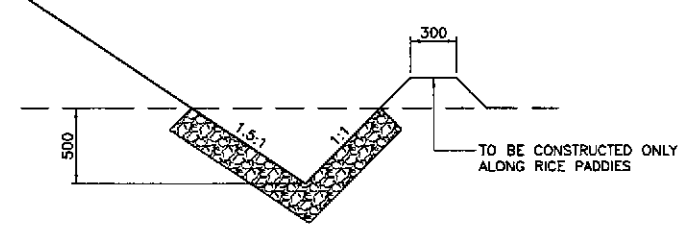
V-SHAPED UNLINED DITCH  
**TYPE E-3**  
 TO BE CONSTRUCTED ONLY ALONG RICE PADDIES



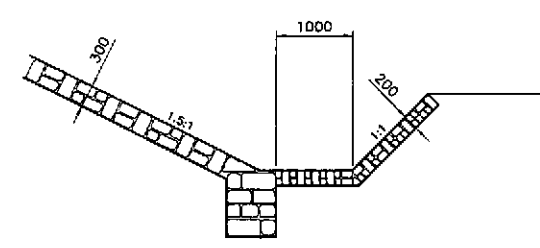
V-SHAPED LINED DITCH (OUTER SEPARATOR DITCH)  
**TYPE E-2a**



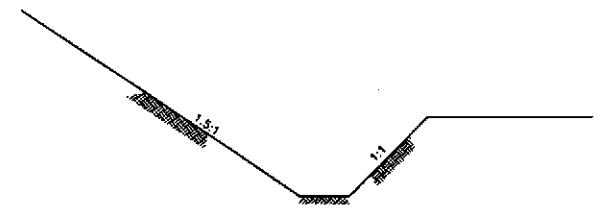
V-SHAPED LINED DITCH  
**TYPE E-2**



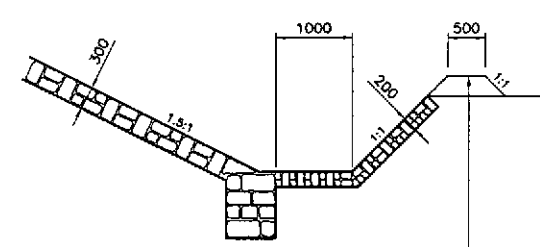
V-SHAPED LINED DITCH  
**TYPE E-1**  
 TO BE CONSTRUCTED ONLY ALONG RICE PADDIES



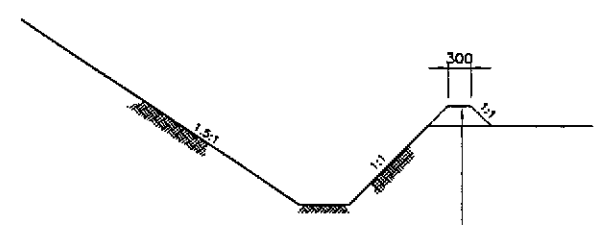
**TYPE C-4**



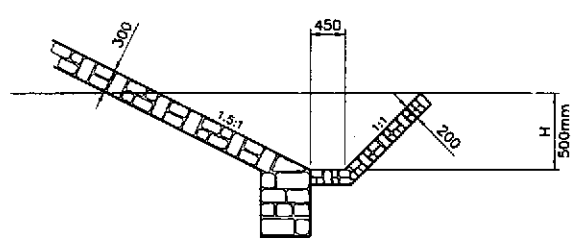
**TYPE C-8**



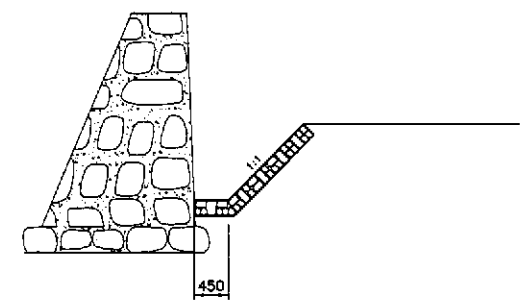
**TYPE C-3**  
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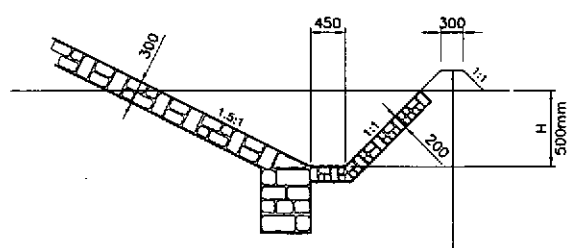
**TYPE C-7**  
 TO BE CONSTRUCTED ONLY ALONG RICE PADDIES



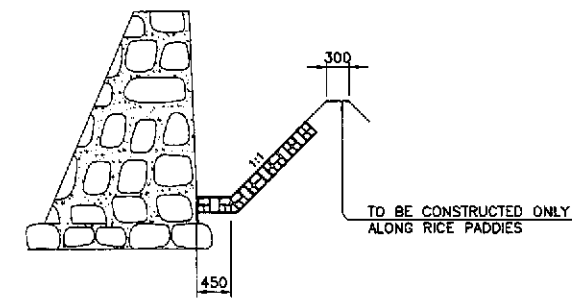
**TYPE C-2**



**TYPE C-6**



**TYPE C-1**  
 TO BE CONSTRUCTED ONLY ALONG RICE PADDIES



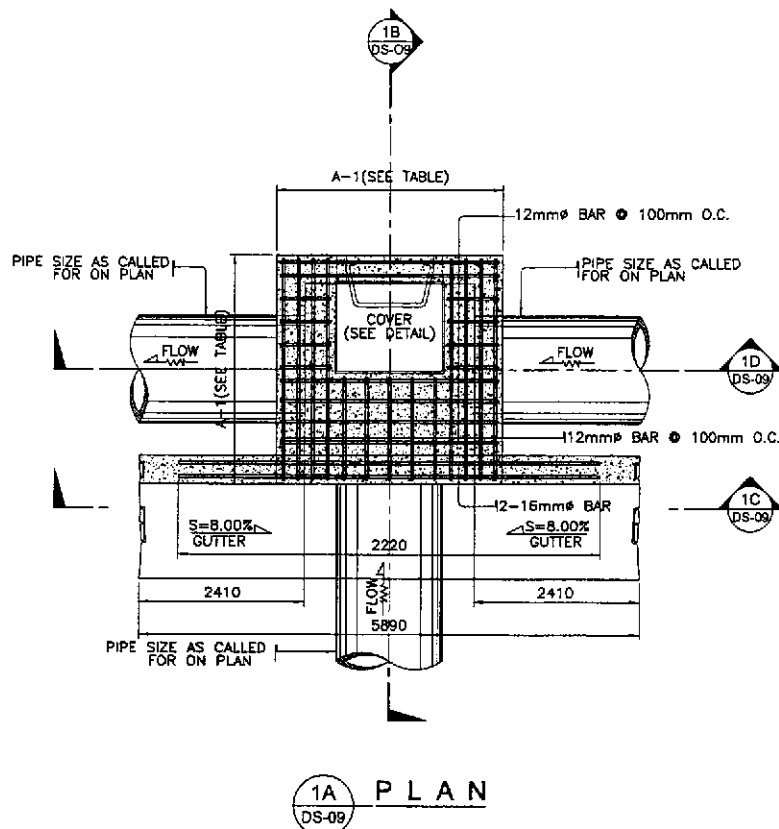
**TYPE C-5**  
 TO BE CONSTRUCTED ONLY ALONG RICE PADDIES

**3 TYPE E**  
 DS-08 SCALE: 1:25

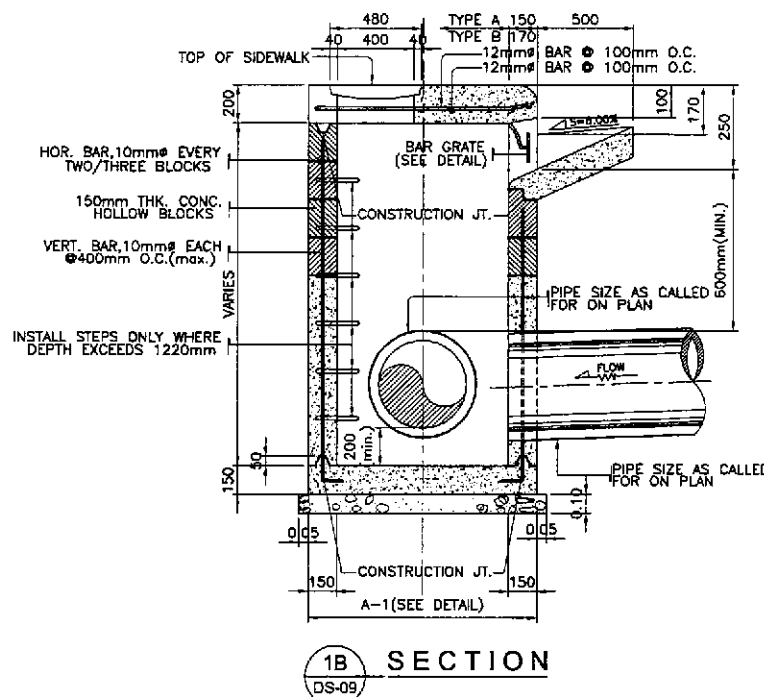
**4 TYPE C**  
 DS-08 NOT TO SCALE

**STANDARD DRAINAGE DITCHES**

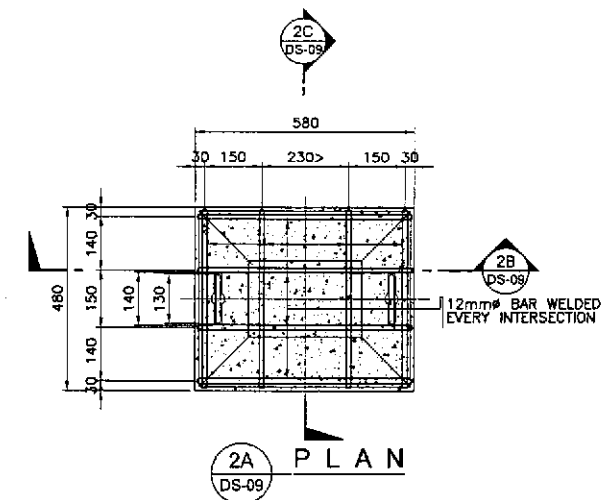
 JAPAN INTERNATIONAL COOPERATION AGENCY		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Pilaridel, Cabanatuan and San Jose Bypasses)		SCALE : NOT TO SCALE		SHEET CONTENTS : STANDARD DRAINAGE DITCHES		SHEET NO. : DS-08
DESIGNED	DATE	SIGNATURE	PJHL - PMO Submitted By:		BUREAU OF DESIGN Reviewed By:		OFFICE OF THE SECRETARY Recommended By:		Approved By:			
CHECKED	10/16/02	<i>[Signature]</i>	DANILLO C. TRAJANO Project Director		JOSEFINA M. ALAGAR Chief, Highways Division		GILBERTO S. REYES OIC, Director IV		MANUEL M. BONGAN Undersecretary		SIMON A. DATUMANDONG Secretary	
SUBMITTED	10/18/02	<i>[Signature]</i>	TEAM LEADER									
 KATAHIRA & ENGINEERS INTERNATIONAL		 YACHIYO ENGINEERING CO., LTD.										



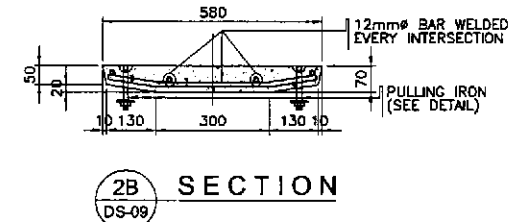
1A PLAN  
DS-09



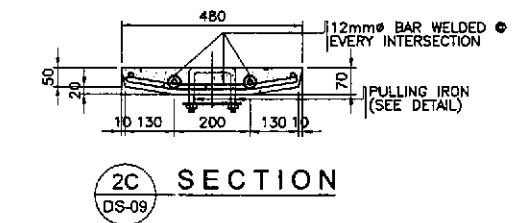
1B SECTION  
DS-09



2A PLAN  
DS-09

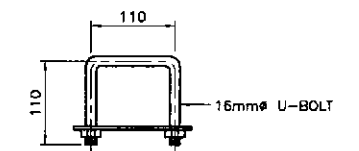


2B SECTION  
DS-09

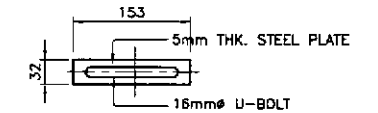


2C SECTION  
DS-09

2 CONCRETE COVER DETAIL  
DS-09 SCALE 1:10

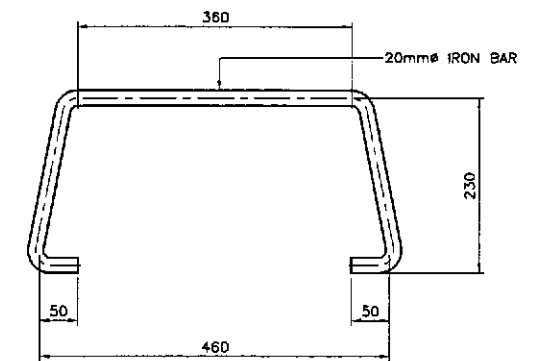


3A PLAN  
DS-09

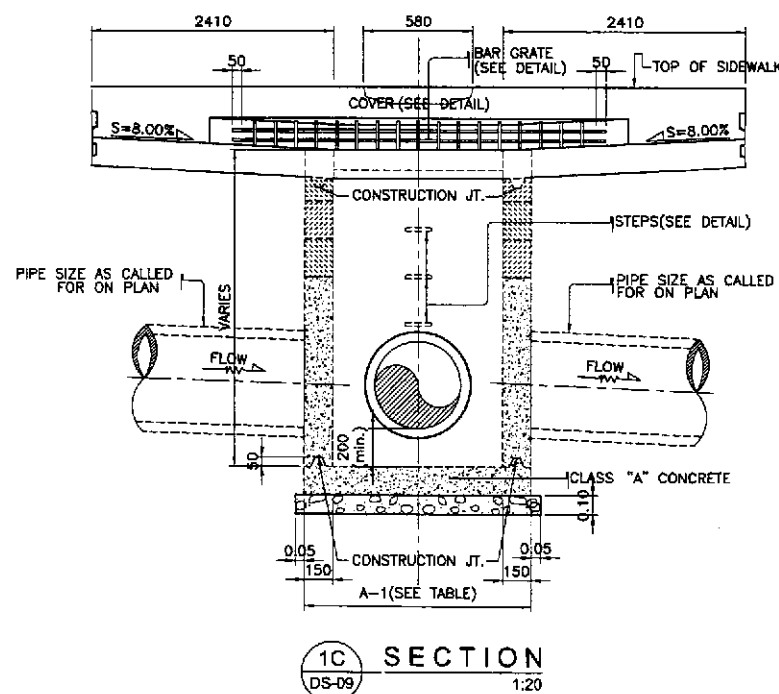


3B ELEVATION  
DS-09

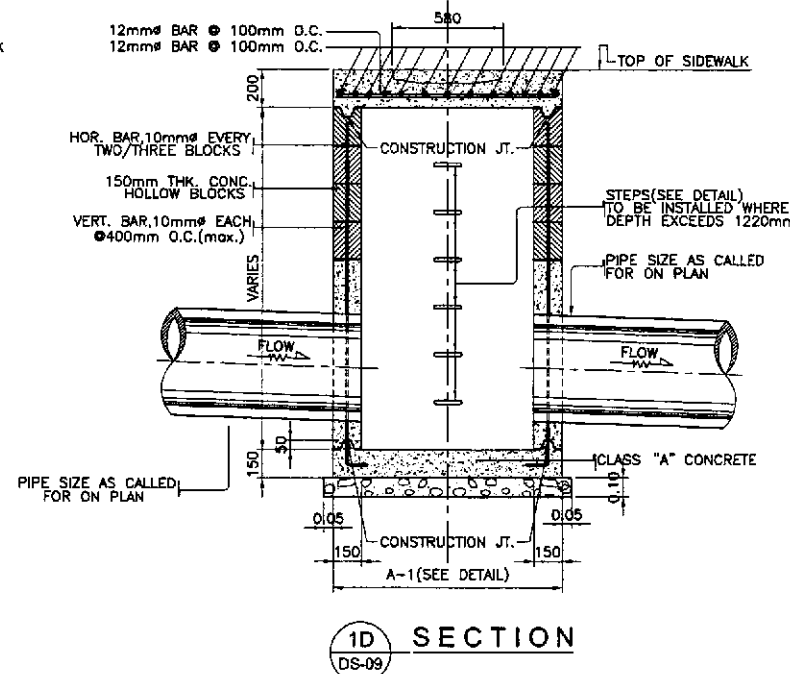
3 PULLING IRON DETAIL  
DS-09 SCALE 1:5



4 STEP  
DS-09 SCALE 1:5

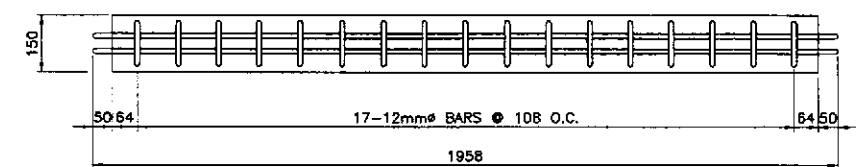


1C SECTION  
DS-09 1:20



1D SECTION  
DS-09

1 CURB INLET MANHOLE  
DS-09 SCALE 1:20



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

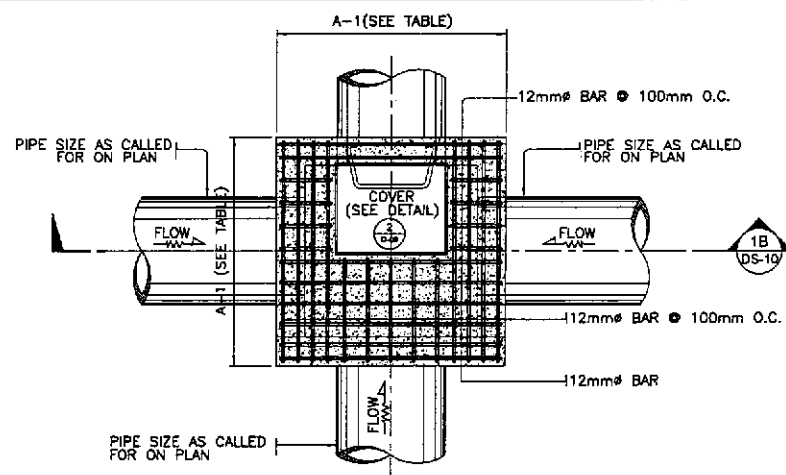
TABLE OF DIMENSION		
TYPE OF CIM	SIZE OF PIPE (mm)	A-1
T-1	300	1.12 M.
T-2	460	1.19 M.
T-3	610	1.37 M.
T-4	760	1.54 M.
T-5	910	1.73 M.
T-6	1070	1.90 M.
T-7	1220	2.08 M.
T-8	1520	2.43 M.

NOTES:

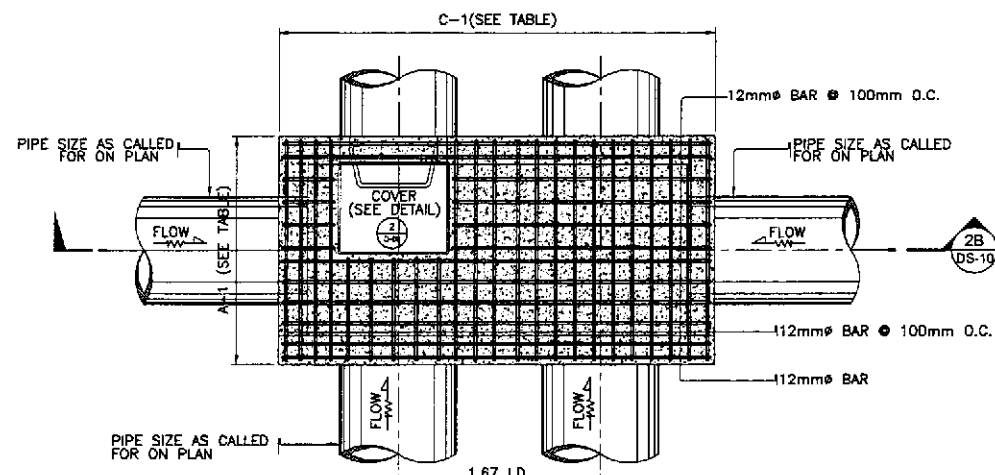
- ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
- PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
- CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
- CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS SHALL HAVE AN AVERAGE COMPRESSIVE STRENGTH OF 8.865MPa.
- IN CONCRETE HOLLOW BLOCKS STRUCTURE, ALL HOLES SHALL BE FILLED WITH CEMENT MORTAR.
- 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.
- INSTALL STEPS ONLY WHERE DEPTH EXCEEDS 1.22 METERS.

DETAILS OF COMBINATION CURB INLET MANHOLE

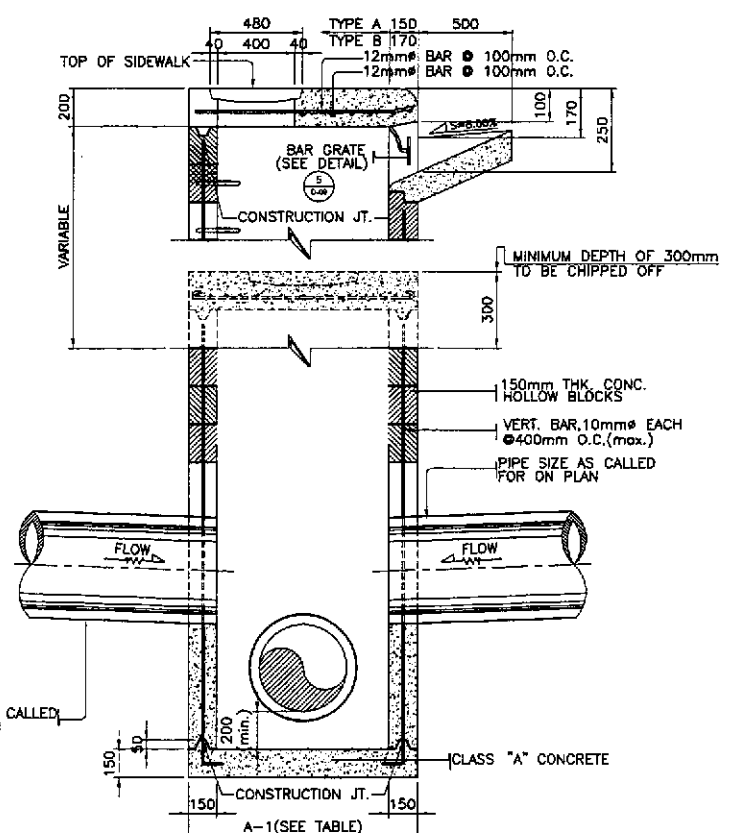
	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	10/16/02	[Signature]		<p>BUREAU OF DESIGN</p> <p>Submitted By: DANIL C. TRAJANO Project Director</p> <p>Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division</p> <p>Recommended By: GILBERTO S. REYES DC, Director IV</p> <p>Office of the Secretary</p> <p>Recommended By: MANUEL M. BONDAN Undersecretary</p> <p>Approved By: SIMEON A. DATUMANONG Secretary</p>	<p>THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)</p>	AS SHOWN	STANDARD COMBINATION CURB INLET MANHOLE	DS-09
	SUBMITTED	10/16/02	[Signature]		<p>Submitted By: DANIL C. TRAJANO Project Director</p>	CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1		



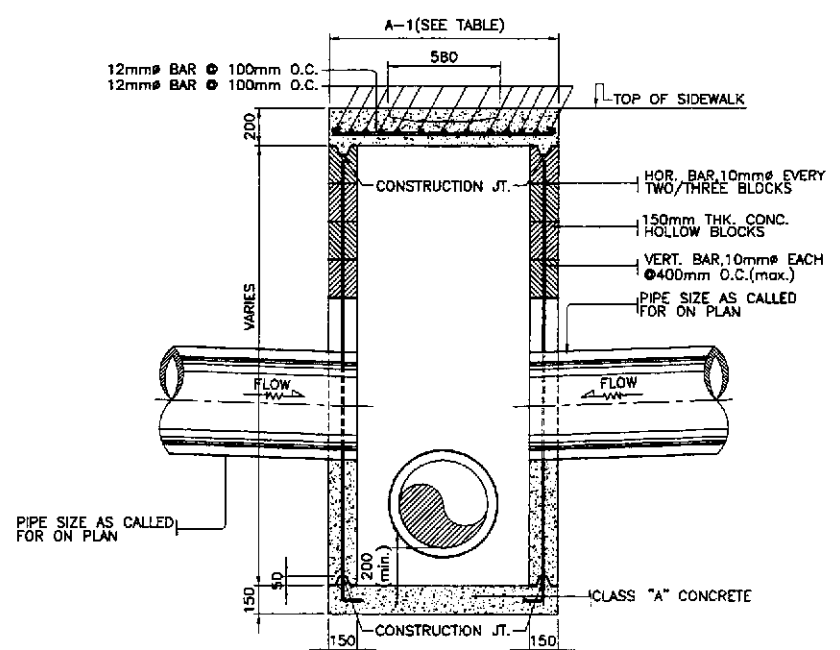
1A PLAN BOX-TYPE MANHOLE (SINGLE PIPE)



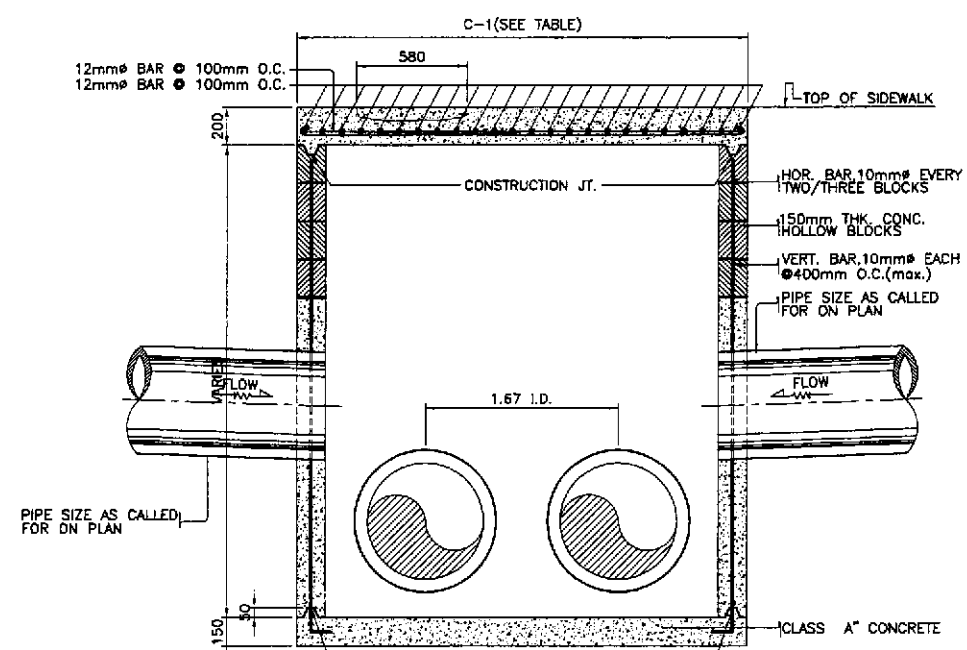
2A PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)



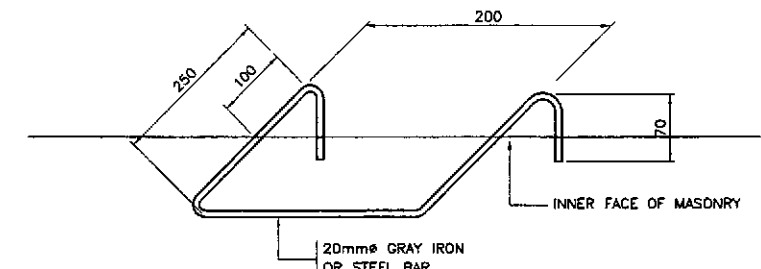
3 BOX-TYPE CONVERTED TO CURB INLET MANHOLE



1B SECTION



2B SECTION

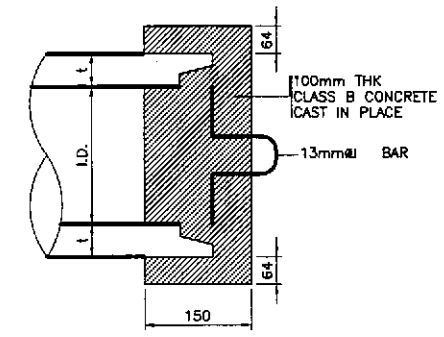


4 STD. STEP OR RUNG

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

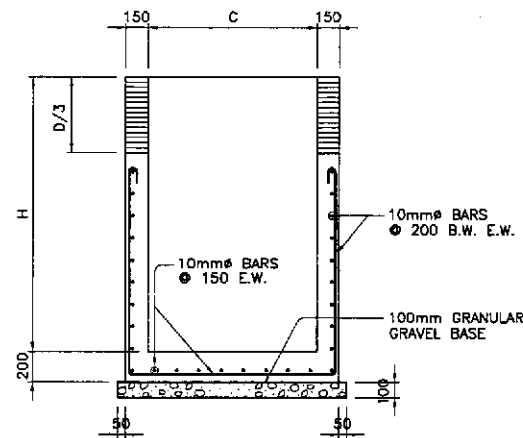
- NOTES:
- ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
  - PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
  - CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
  - CONCRETE HOLLOW BLOCKS OR DRESSED ADDBE BLOCKS SHALL HAVE AN AVERAGE COMPRESSIVE STRENGTH OF 6.865MPa.
  - IN CONCRETE HOLLOW BLOCKS STRUCTURE, ALL HOLES SHALL BE FILLED WITH CEMENT MORTAR.
  - 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.
  - INSTALL STEPS ONLY WHERE DEPTH EXCEEDS 1.22 METERS.
  - 150 mm BOTTOM SLAB THICKNESS FOR HEIGHT OF 1000 TO 4000mm. AND 200mm. FOR 5000 TO 8000mm IN HEIGHT.
  - FROM THE HEIGHT OF 3000 TO 8000mm. THE FIRST 2000mm, FROM THE TOP IS CHB WITH DETAILS FOR 2000mm HEIGHT.
  - REINFORCEMENT FOR BOTTOM SLAB ARE ALL 10mm# @ 400 B.W.
  - VERTICAL BARS ARE CUT AT HALF POINT FOR EVERY OTHER BAR AT SOLID WALL.
  - INSIDE SURFACES AND OUTSIDE SURFACES OF ALL MASONRY SHALL HAVE A PLASTER COAT 1/2" THICK.
  - BOX TYPE MANHOLE SHALL NOT BE CONSTRUCTED WITHIN THE RIDING SURFACE.



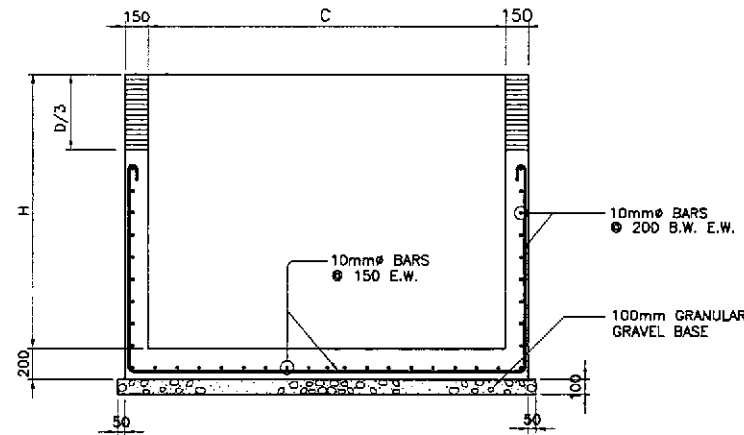
5 CONCRETE BLOCK PLUG @ SUBSURFACE PIPE

SPECIAL JUNCTION BOX MANHOLE

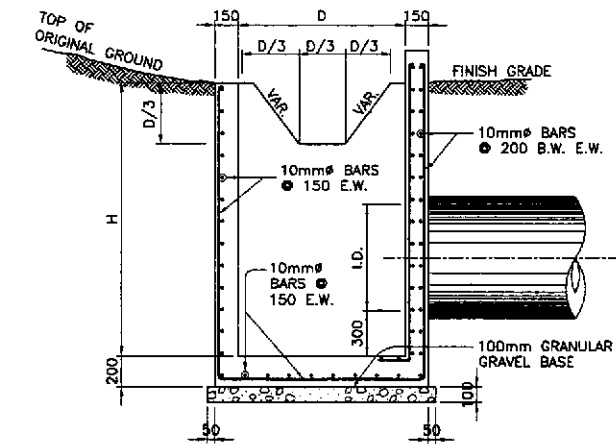
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES	PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/16/02	[Signature]		DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	SPECIAL JUNCTION BOX MANHOLE	DS-10
	SUBMITTED	10/16/02	[Signature]		BUREAU OF DESIGN	CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1		



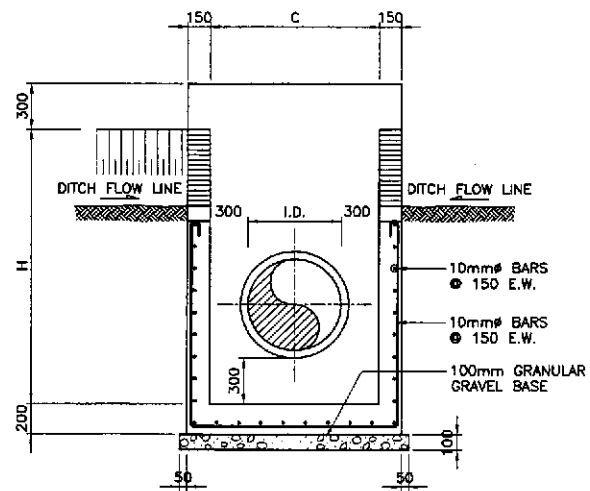
1C SECTION  
DS-11



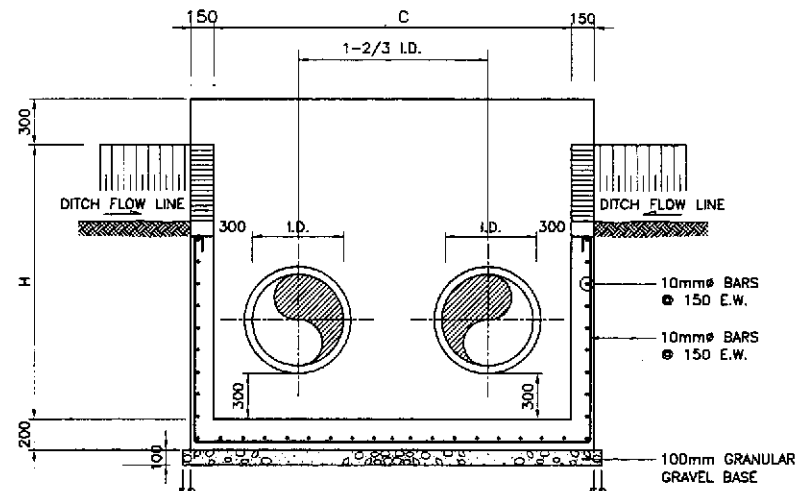
2C SECTION  
DS-11



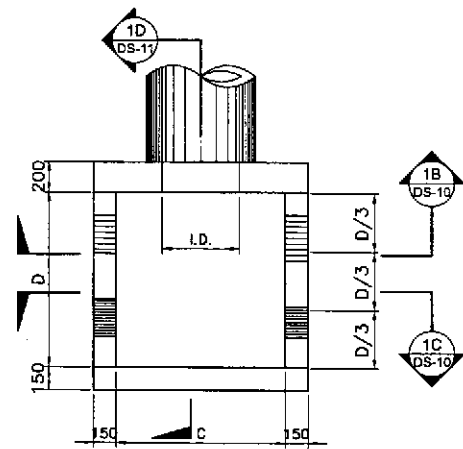
1C SECTION  
DS-11



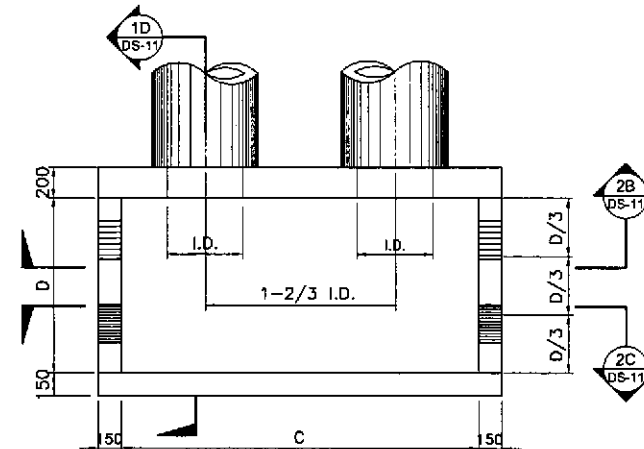
1B SECTION  
DS-11



2B SECTION  
DS-11



1A PLAN  
DS-11



2A PLAN  
DS-11

REINFORCED CONCRETE CATCH BASIN DIMENSION FOR RCPC

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

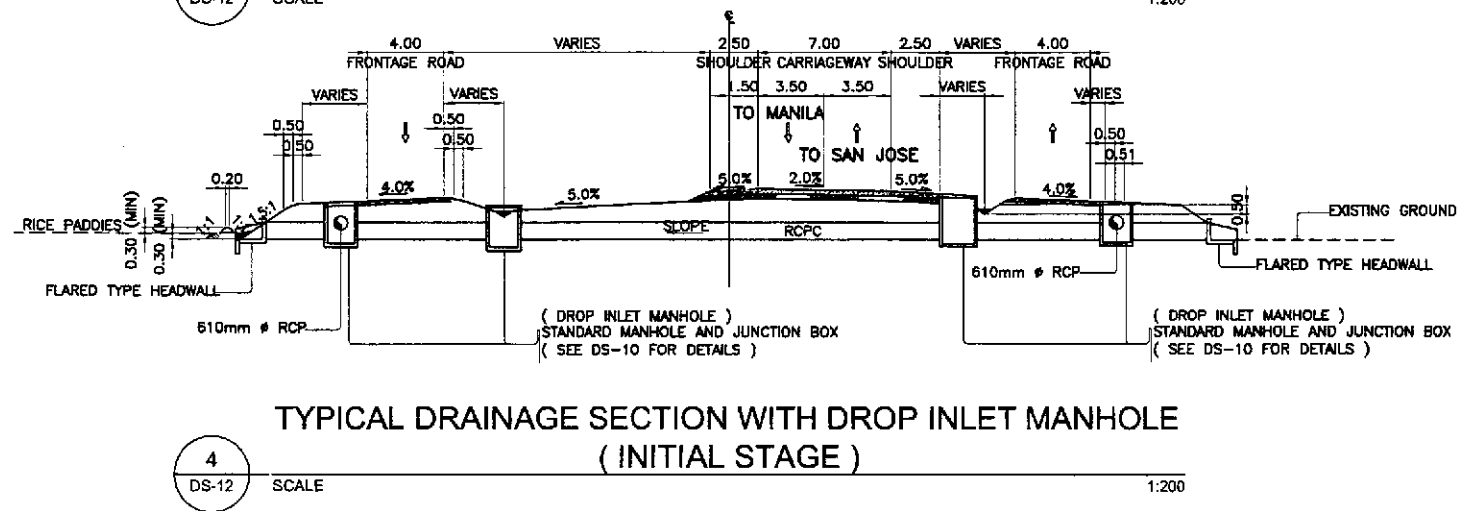
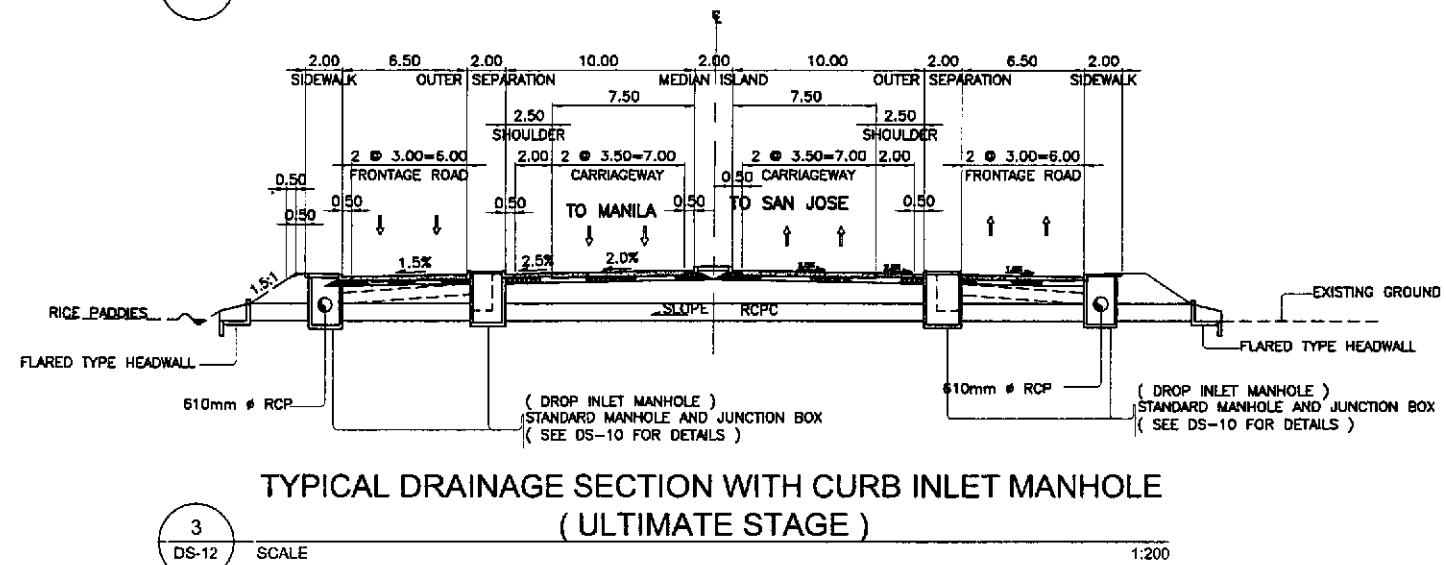
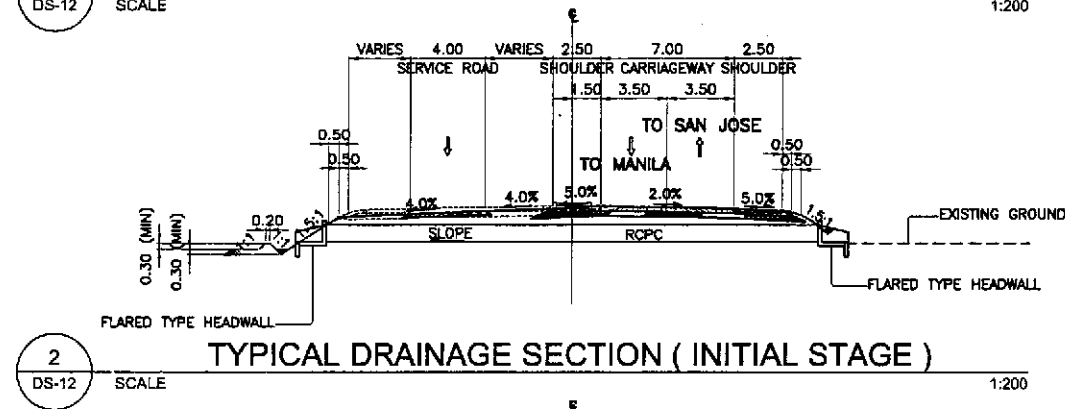
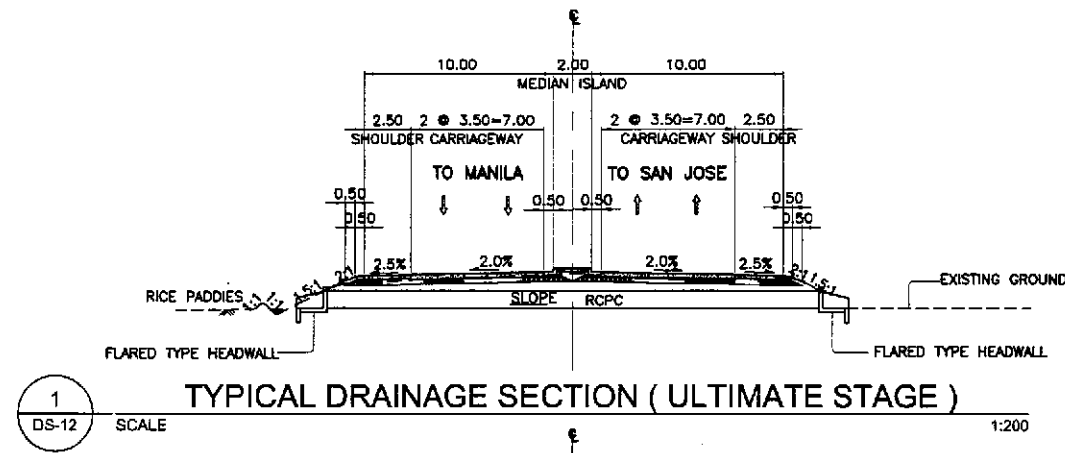
1 CONCRETE CATCH BASIN (SINGLE PIPE)  
DS-11 SCALE 1:25

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

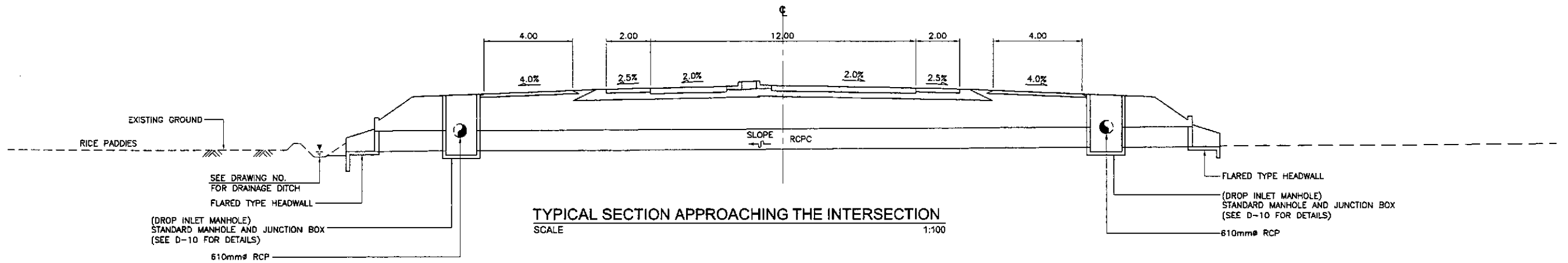
DETAILS OF REINFORCED CONCRETE CATCH BASIN FOR RCPC

	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : <b>THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)</b>	SCALE : 1:25 FULL SIZE A1	SHEET CONTENTS : <b>STANDARD REINFORCED CONCRETE CATCH BASIN FOR RCPC</b>	SHEET NO. : <b>DS-11</b>
	CHECKED				BUREAU OF DESIGN						
	SUBMITTED				Submitted By: DANIL C. TRAJANO Project Director	Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OIC, Director IV				

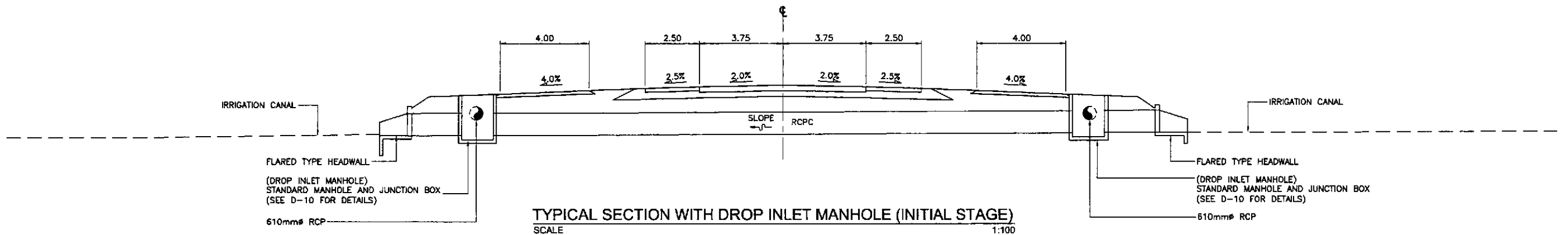




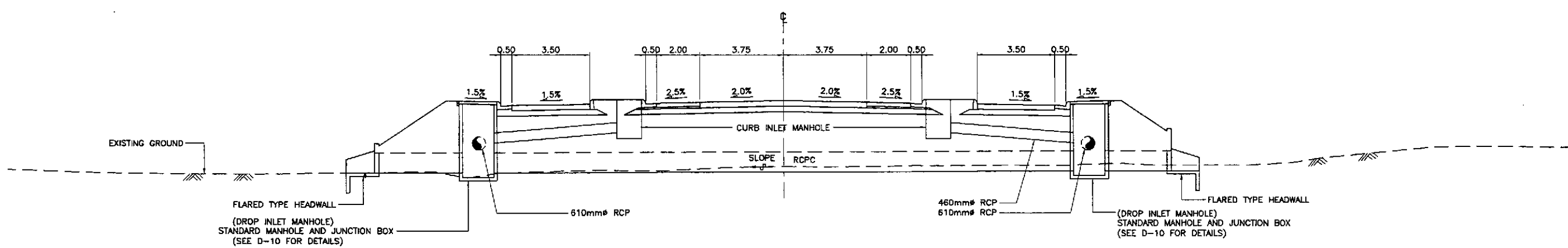
	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	<p>PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)</p>	SCALE :	<p>SHEET CONTENTS : TYPICAL DRAINAGE SECTIONS WITH MANHOLE ( INITIAL and ULTIMATE STAGE )</p>	SHEET NO. :			
	CHECKED	10/10/02	[Signature]			<p>BUREAU OF DESIGN</p> <p>Submitted By: DANLO C. TRAJANO Project Director</p>		<p>OFFICE OF THE SECRETARY</p> <p>Recommended By: GILBERTO S. REYES OIC, Director IV</p>	NOT TO SCALE	<p>FULL SIZE A1</p>	<p>DS-12</p>
	SUBMITTED	10/18/02	[Signature]			<p>Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division</p>		<p>Approved By: MANUEL M. BONGCAN Undersecretary</p>	<p>CABANATUAN BYPASS - CONTRACT PACKAGE II</p>		
						<p>Submitted By: [Signature]</p>		<p>Approved By: SIMEON A. DATUMANONG Secretary</p>			



TYPICAL SECTION APPROACHING THE INTERSECTION  
SCALE 1:100

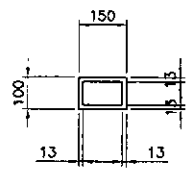


TYPICAL SECTION WITH DROP INLET MANHOLE (INITIAL STAGE)  
SCALE 1:100

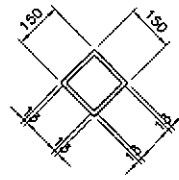


TYPICAL SECTION WITH DROP INLET MANHOLE (ULTIMATE STAGE)  
SCALE 1:100

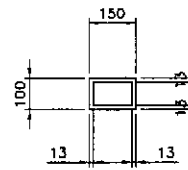
	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/9/02	<i>[Signature]</i>	BUREAU OF DESIGN OFFICE OF THE SECRETARY			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE II	1:100 FULL SIZE A1	TYPICAL DRAINAGE CROSS-SECTIONS (INITIAL & ULTIMATE STAGE)	DS-12
	CHECKED	10/16/02	<i>[Signature]</i>	Submitted By:	Reviewed By:	Recommended By:				
SUBMITTED	10/20/02	<i>[Signature]</i>	DANILO E. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary			



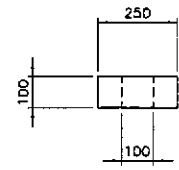
PLAN (POST)



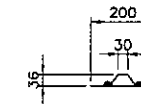
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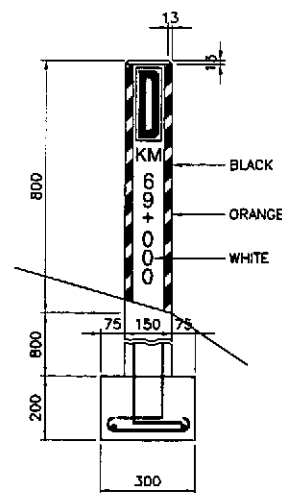
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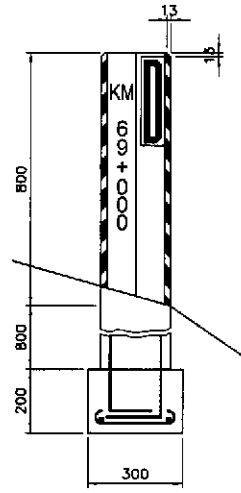
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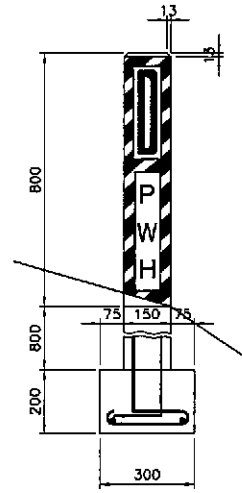
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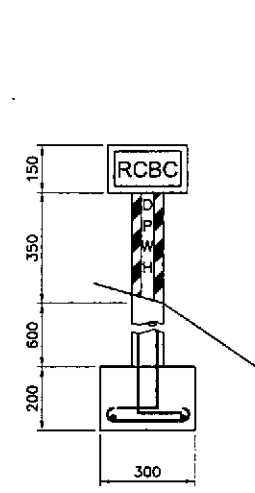
ELEVATION  
CONCRETE MARKER  
TYPE I-a



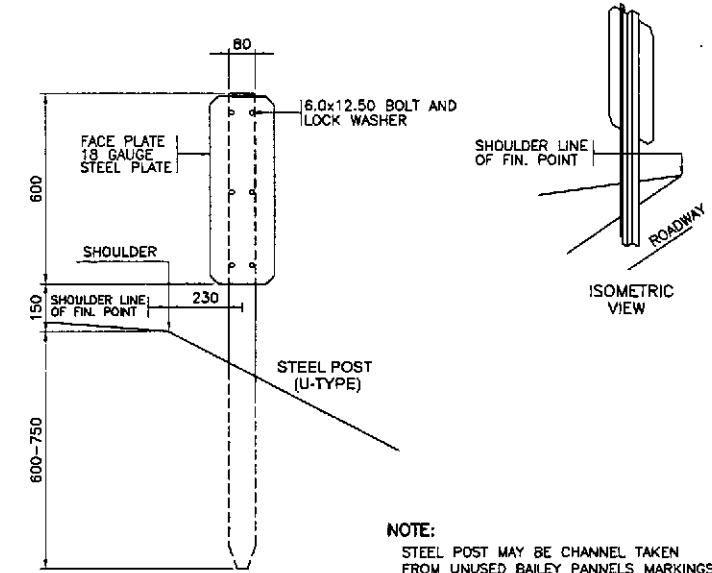
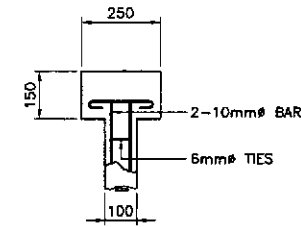
ELEVATION  
CONCRETE MARKER  
TYPE I-b



ELEVATION  
CONCRETE MARKER  
TYPE I-c

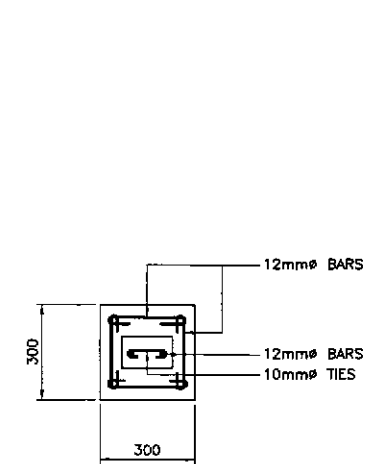


ELEVATION  
CONCRETE MARKER  
TYPE I-d

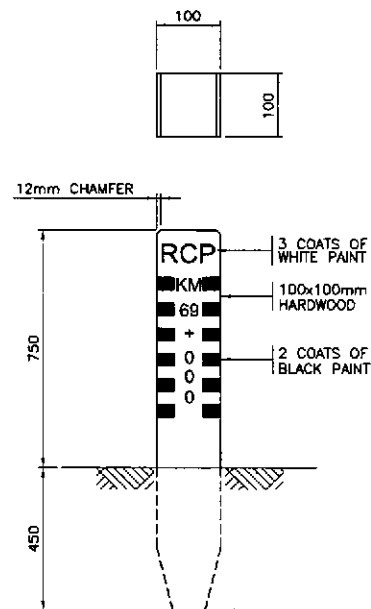


ELEVATION  
STEEL MARKER  
TYPE II

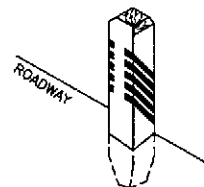
NOTE:  
STEEL POST MAY BE CHANNEL TAKEN FROM UNUSED BAILEY PANNELS MARKINGS AND PAINTINGS SAME AS FOR TYPE I AND TYPE II AS SHOWN.



TYPICAL FOOTING DETAIL  
CONCRETE MARKER  
(TYPE I-a,b,c,d)

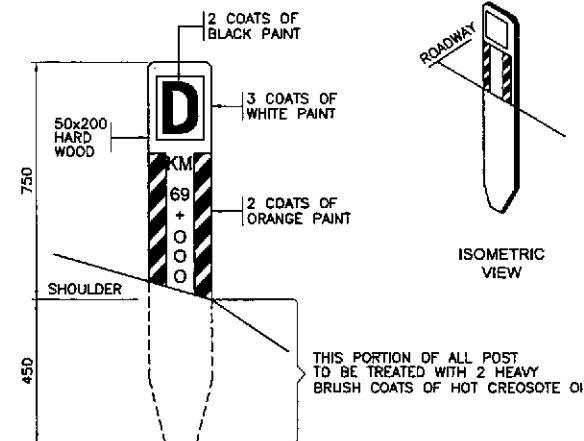


ELEVATION  
WOODEN MARKER  
TYPE III-a

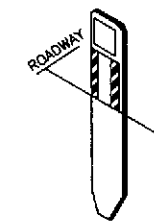


NOTE:  
FACING ROADWAY STAKED AT CENTER LINE OF DRAINAGE 254mm AWAY FROM SHOULDER LINE OF FINAL POINT.

ISOMETRIC VIEW



ELEVATION  
WOODEN MARKER  
TYPE III-b



ISOMETRIC VIEW

THIS PORTION OF ALL POST TO BE TREATED WITH 2 HEAVY BRUSH COATS OF HOT CREOSOTE OIL.

GENERAL NOTES

- CONCRETE:**  
ALL CONCRETE TO BE CLASS "A" AND EXPOSED TOP TO BE CHAMFERED 13.0mm. ALL CONCRETE SHALL POURED IN THE DRY.
- REINFORCING STEEL:**  
UNLESS OTHERWISE SHOWN ALL BAR SPACINGS ARE TO THE CENTER OF BARS AND THE MINIMUM COVERING OF BARS MEASURED FROM THE SURFACE OF THE CONCRETE TO THE FACE OF ANY BARS SHALL BE 50.0mm.
- MARKINGS:**  
ALL RECESSED LETTERS SHALL BE CAST INTO CONCRETE AND ALL NUMBERS SHALL BE PAINTED AS SHOWN USING LETTER AND NUMBER FORM.
- PAINTINGS:**  
ALL CONCRETE POSTS, TWO COATS OF WHITE PAINT. ALL RECESSED LETTERS ONE (1) COAT OF BLACK PAINT AND ALL BACKGROUND STRIPE SHALL BE ONE (1) COAT OF BLACK/ORANGE GLOSSED PAINT. ALL STRUCTURAL PLATES TWO COATS WHITE SHARP PAINT.
- LOCATION:**  
DRAINAGE CULVERT MARKER TO BE SET AT SHOULDER LINE AND AT CENTER LINE OF CULVERT FACING TRAFFIC/ROADWAY AS SHOWN AND AS STAKED BY ENGINEERS.
- DIMENSION:**  
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

A STANDARD MAINTENANCE MARKERS  
DS-13 NOT TO SCALE

	DATE: 10/1/02 DESIGNED: [Signature] CHECKED: [Signature] SUBMITTED: 10/1/02	SIGNATURE: [Signature] P.U.H. - PMO Submitted By: DANILLO C. TRAJANO Project Director	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES OIC, Director IV Approved By: MANUEL M. BONDAN 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)	SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : STANDARD MAINTENANCE MARKERS	SHEET NO. : DS-13
	CABANATUAN BYPASS - CONTRACT PACKAGE II							
	JICA JAPAN INTERNATIONAL COOPERATION AGENCY							