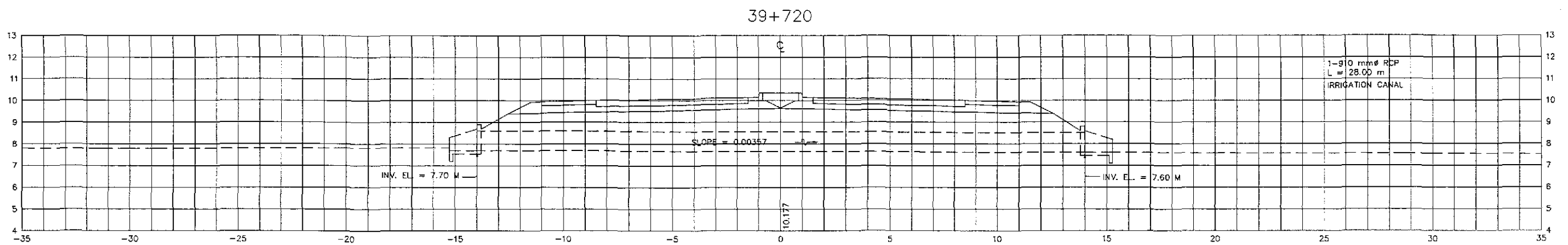
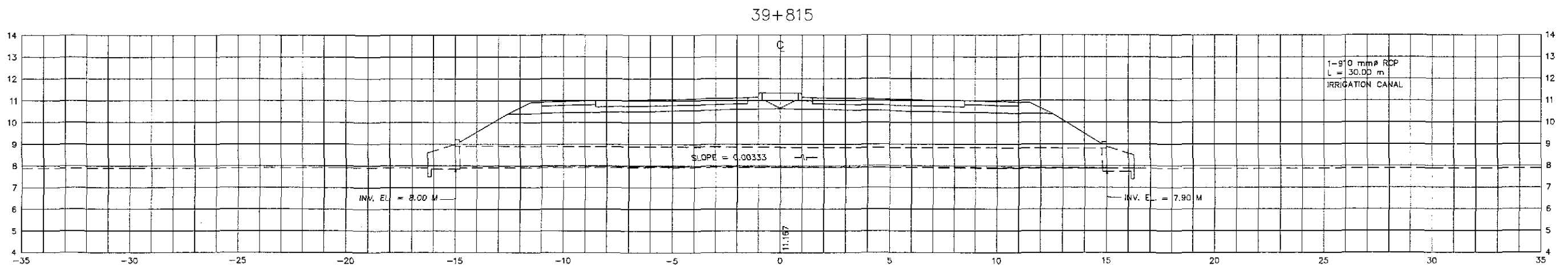
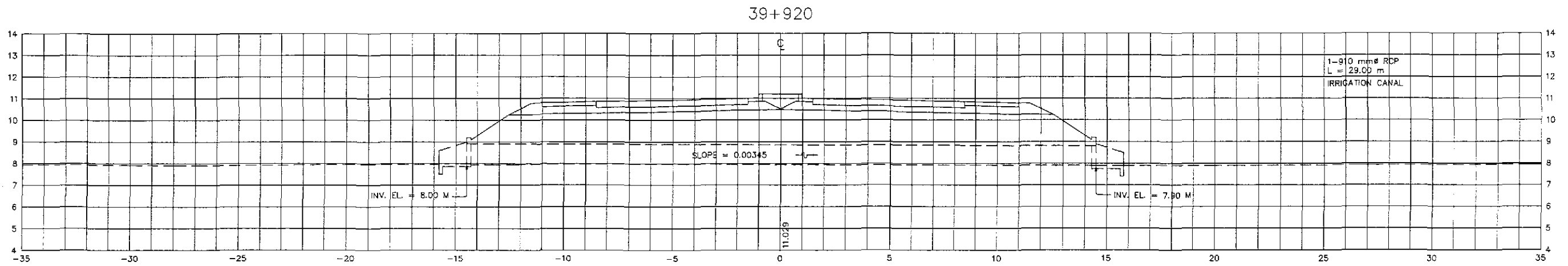
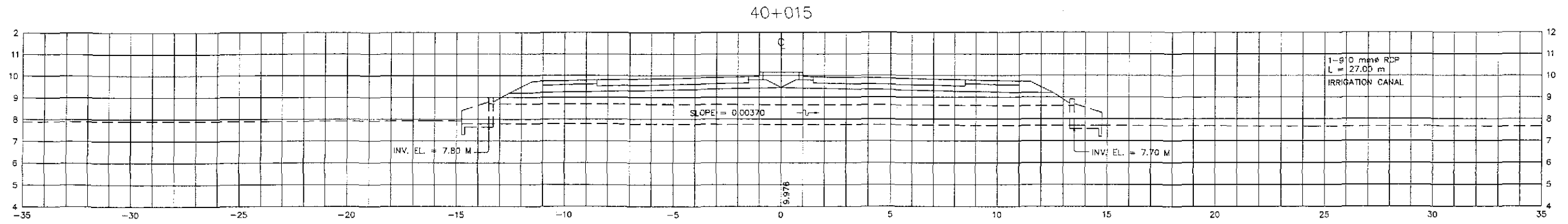
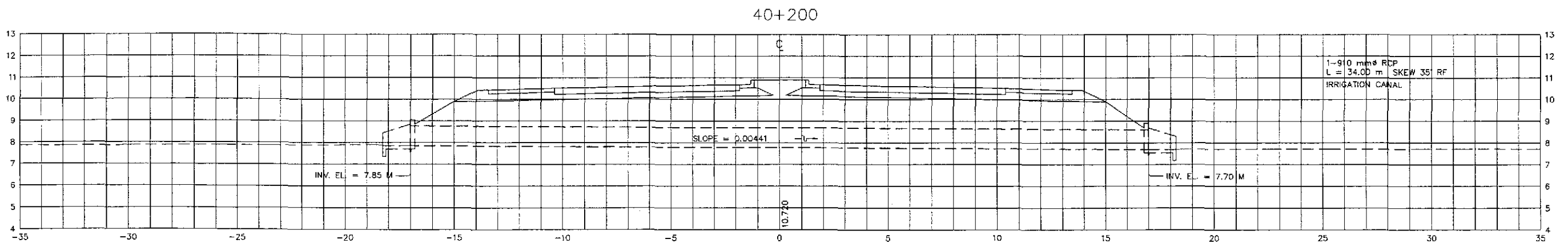
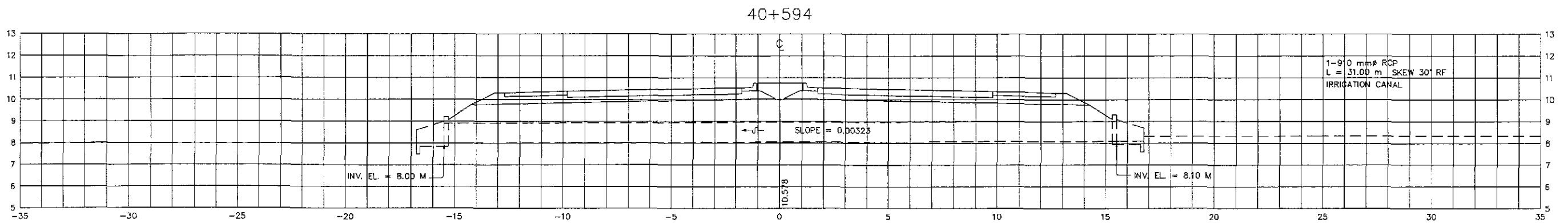
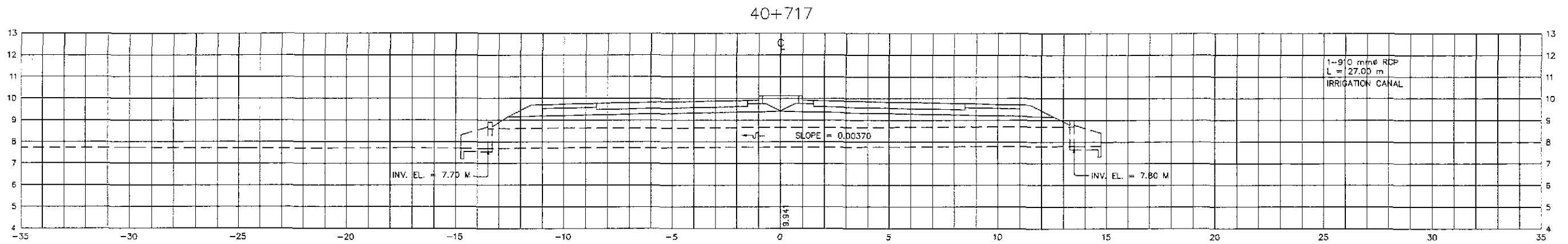
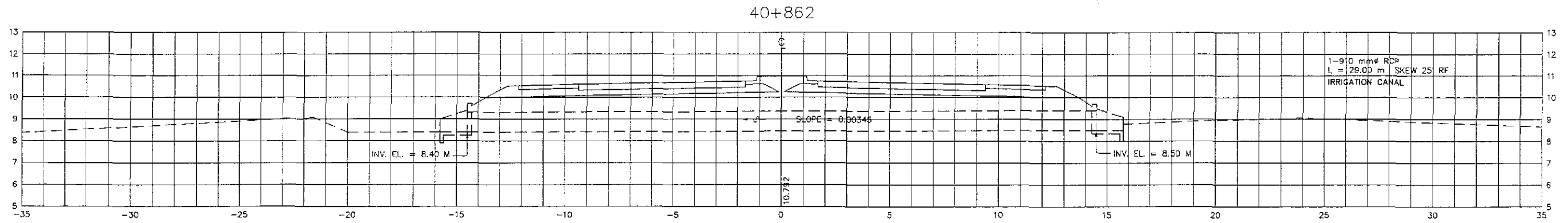


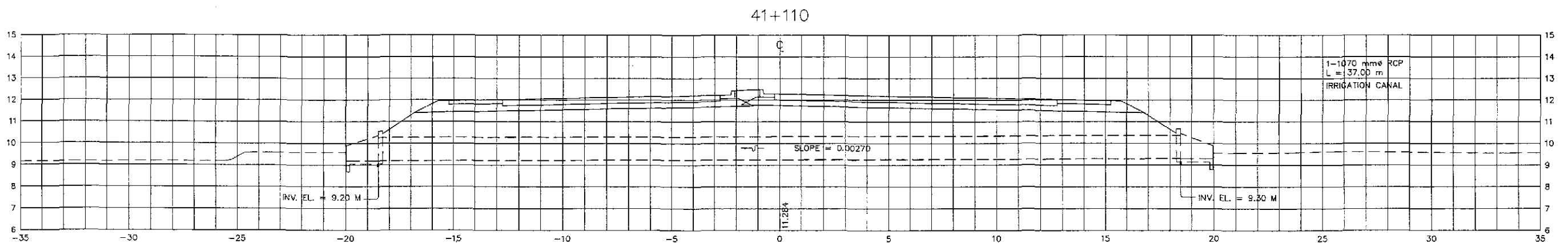
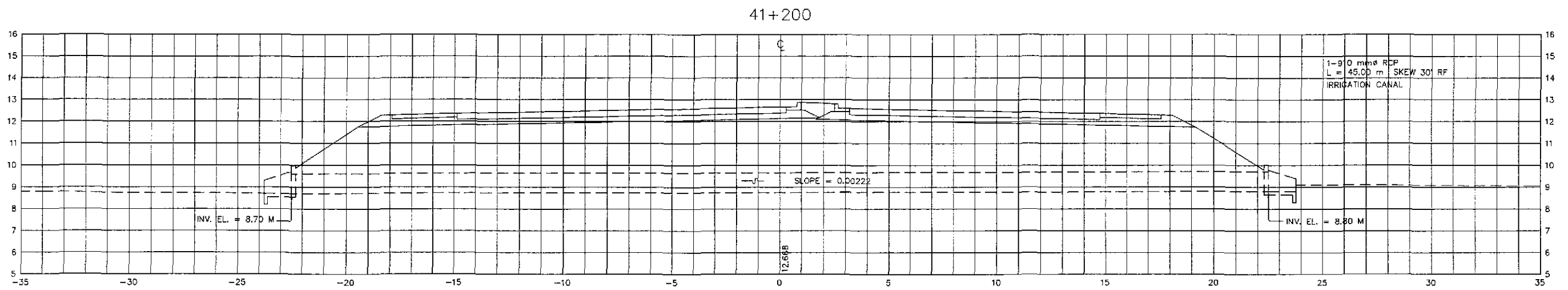
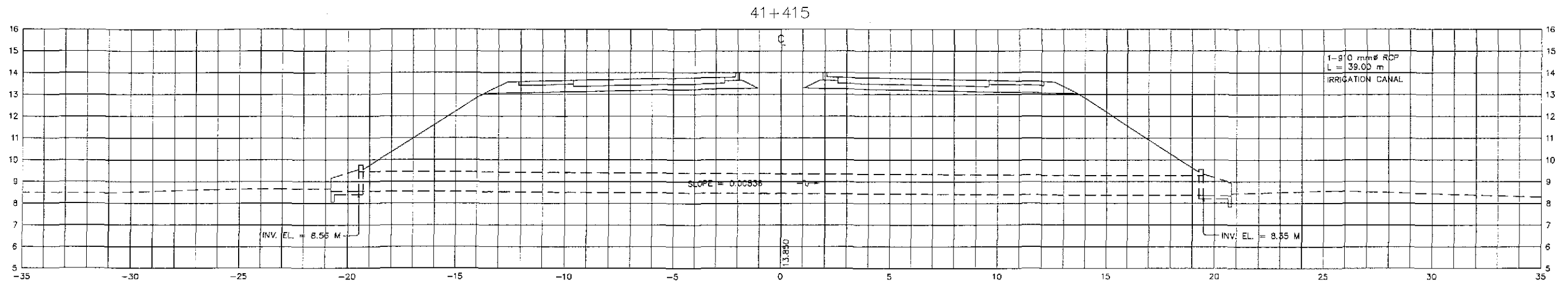
DRAINAGE



	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	PROJECT AND LOCATION :			SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	10/25/07	<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-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 39+720 - STA. 40+015	DC-01
	SUBMITTED	10/27/07	<i>[Signature]</i>		OFFICE OF THE SECRETARY	PLARIDEL BYPASS - CONTRACT PACKAGE II			FULL SIZE A1		
				Submitted By: DANILLO C. TRAJANO Project Director	Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES Dir. Director IV	Approved By: MANUEL M. BONDAN Undersecretary				

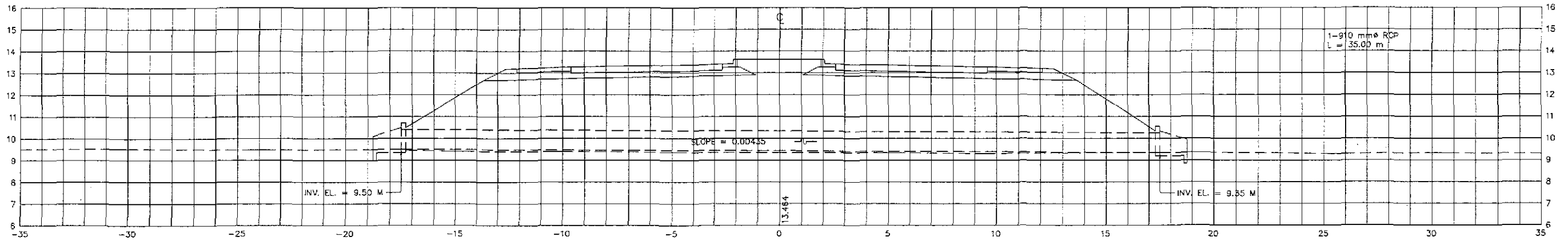


			REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 40+200 - STA. 40+862	SHEET NO. : DC-02	
	DESIGNED <i>10/21/02</i> CHECKED <i>10/25/02</i> SUBMITTED <i>10/27/02</i>	SIGNATURE <i>[Signatures]</i> Submitted By: DANILO C. TRAJANO Project Director	BUREAU OF DESIGN Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES C/C, Director IV	Recommended By: MANUEL M. BONOAN Undersecretary	Approved By: SIMEON A. DATUMANONG Secretary		
	JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YEC YACHIYO ENGINEERING CO., LTD.				PLARIDEL BYPASS - CONTRACT PACKAGE II			

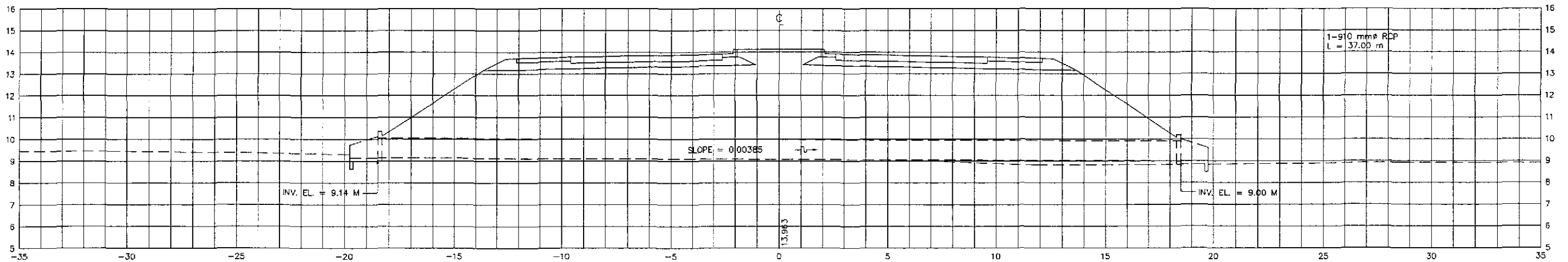


			REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 41+110 - STA. 41+415	SHEET NO. : DC-03	
	DESIGNED <i>[Signature]</i> CHECKED <i>[Signature]</i> SUBMITTED <i>[Signature]</i>	DATE 10/21/07 10/25/07 10/27/07	SIGNATURE <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>	BUREAU OF DESIGN Submitted By: DANILLO 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: SIMEON A. DATUMANONG Secretary	OFFICE OF THE SECRETARY (See cover sheet for Signature) (See cover sheet for Signature/Approval)	PLARIDEL BYPASS - CONTRACT PACKAGE II		
	JAPAN INTERNATIONAL COOPERATION AGENCY KATAMIRA & ENGINEERS INTERNATIONAL YEO YACHIYO ENGINEERING CO., LTD.				PLARIDEL BYPASS - CONTRACT PACKAGE II			

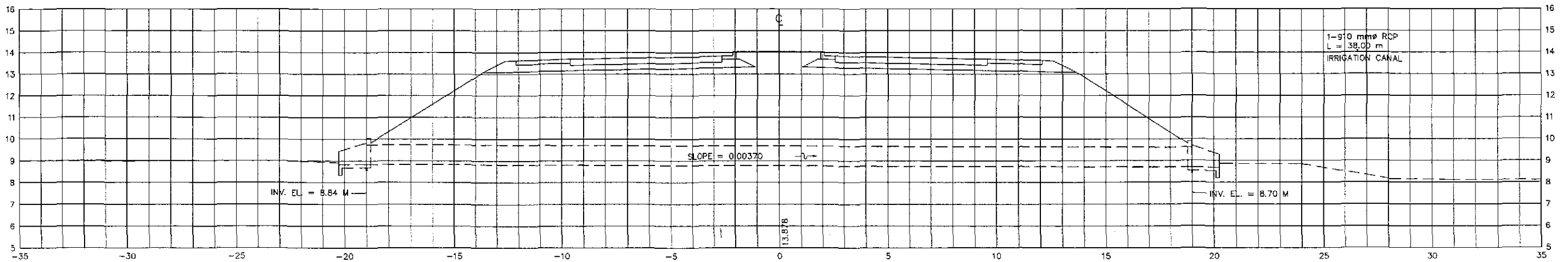
41+860



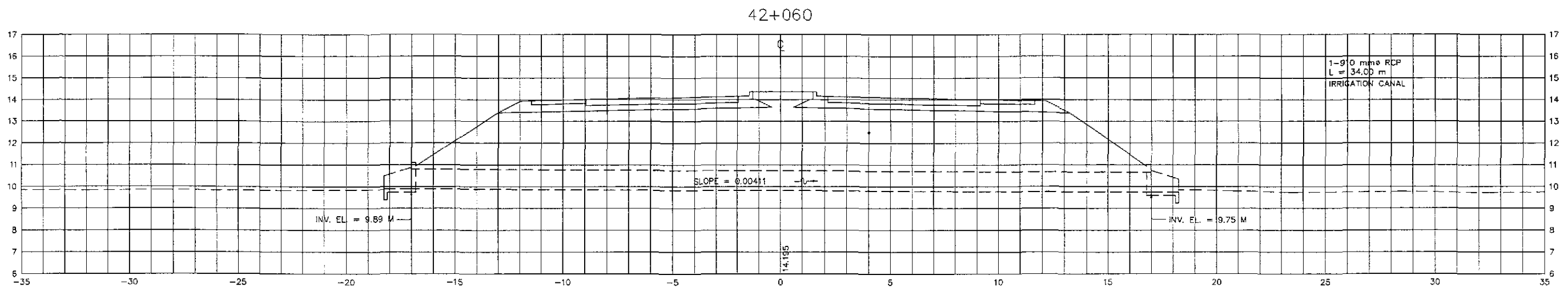
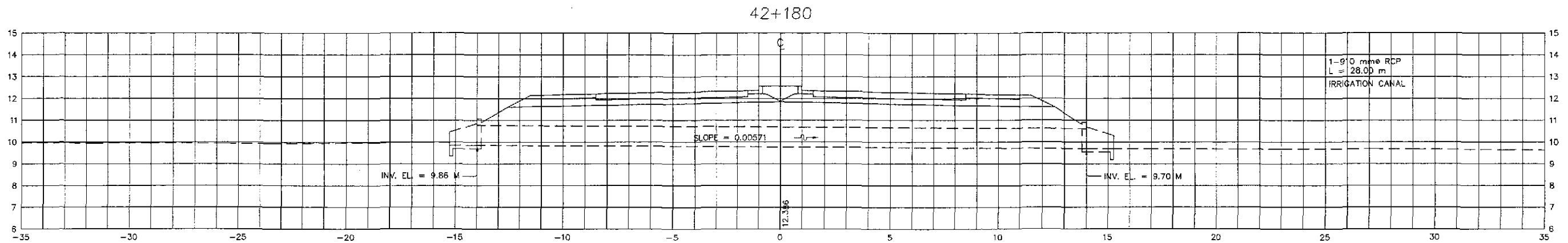
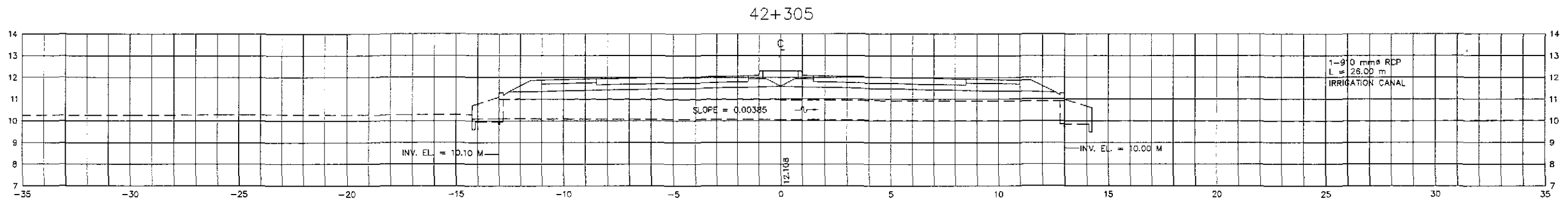
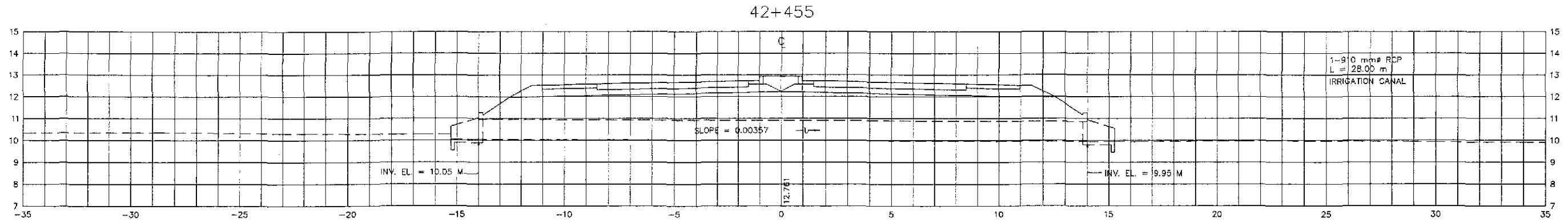
41+740



41+565

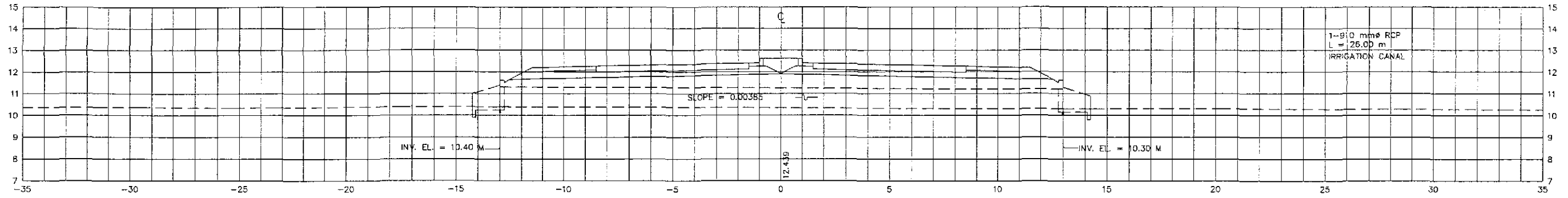


	DATE	SIGNATURE				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	<i>[Signature]</i>	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	1:100 FULL SIZE A1	DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 41+565 - STA. 41+860	DC-04
	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: (See cover sheet for Signature/Approval) SIMEDON A. DATUMANONG Secretary			

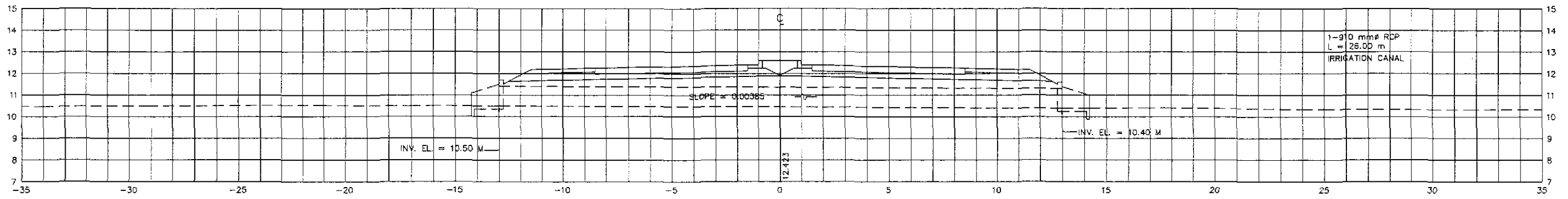


		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)			SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 42+060 - STA. 42+455	SHEET NO. : DC-05
	DESIGNED <i>10/21/02</i> CHECKED <i>10/25/02</i> SUBMITTED <i>10/27/02</i>	DATE SIGNATURE <i>[Signature]</i> Submitted By:	BUREAU OF DESIGN Reviewed By:	OFFICE OF THE SECRETARY Recommended By:	OFFICE OF THE SECRETARY Approved By:			
	PJHL - PMD DANILLO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary			

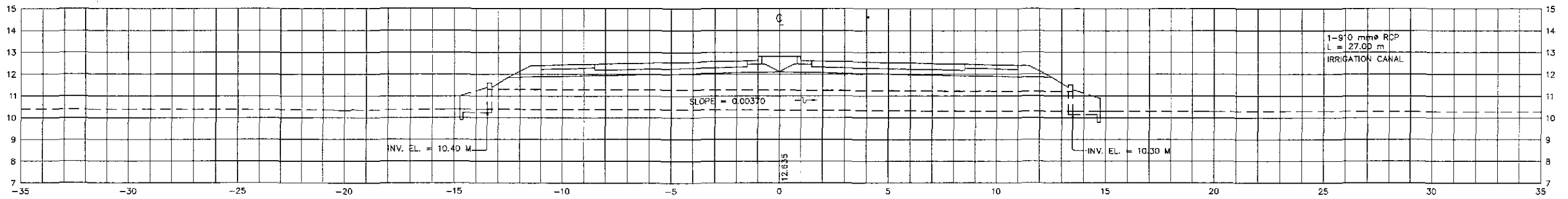
42+830



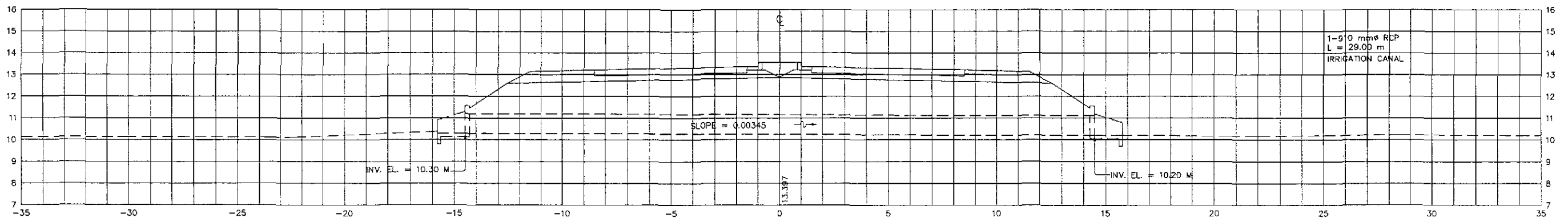
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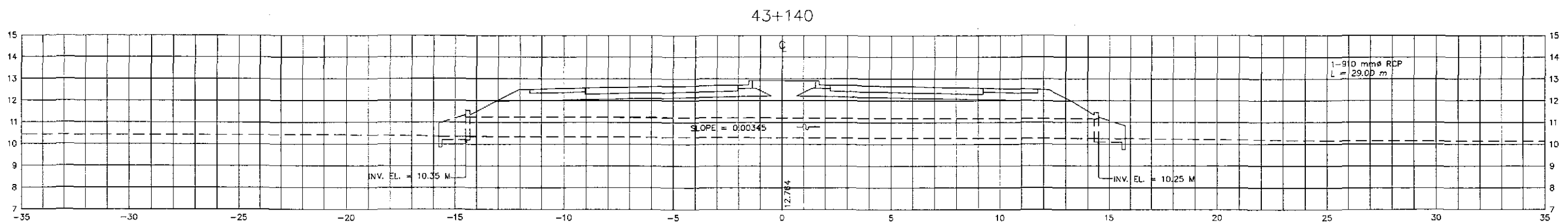
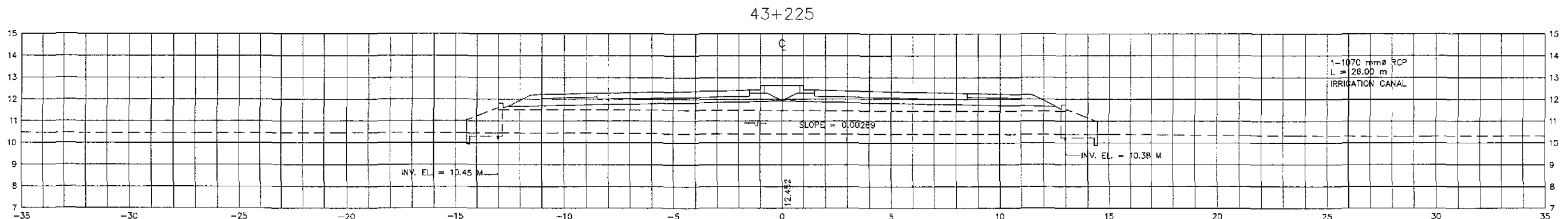
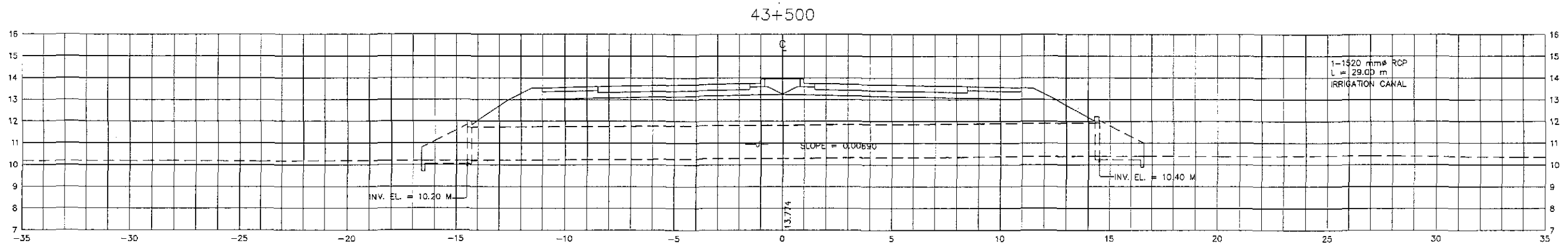
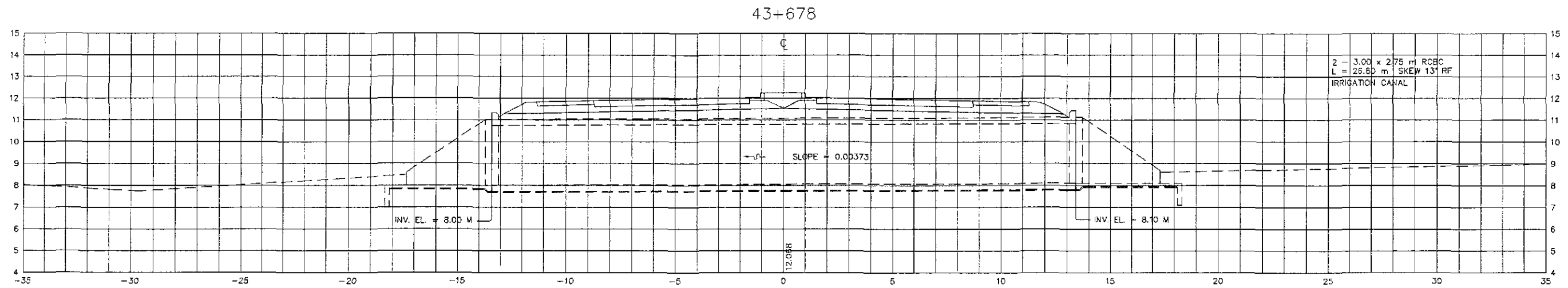
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42+605

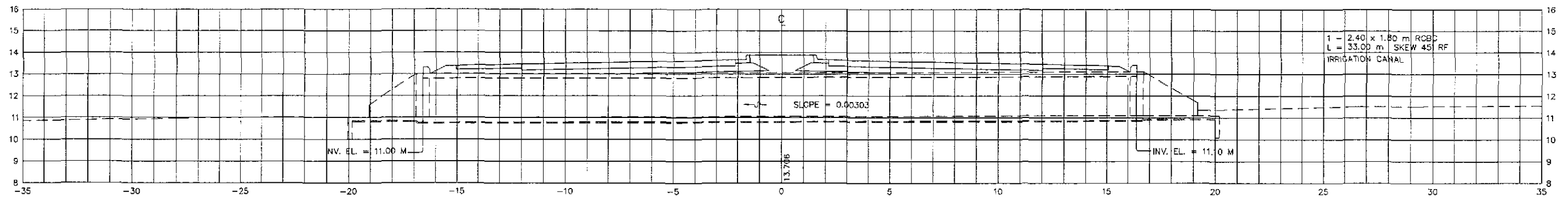


	DATE: 10/21/02 DESIGNED: [Signature] CHECKED: 10/25/02 [Signature] SUBMITTED: 10/27/02 [Signature]	SIGNATURE: [Signature] FJHL - PWD Submitted By:	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 42+605 - STA. 42+830	SHEET NO. : DC-06
	BUREAU OF DESIGN OFFICE OF THE SECRETARY			Reviewed By: JOSEFINA M. ALAGAR, Chief, Highways Division Recommended By: GILBERTO S. REYES, OIC, Director IV Recommended By: MANUEL M. BONCAN, Undersecretary Approved By: SIMEON A. DATUMANONG, Secretary			
	DANILLO C. TRAJANO, Project Director TEAM LEADER						

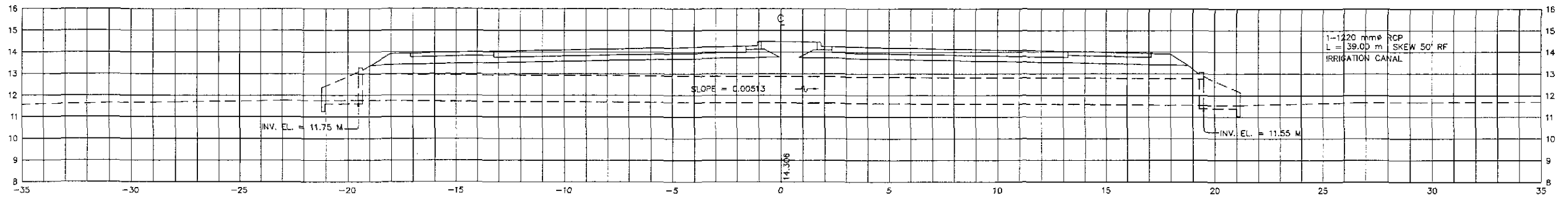


	DESIGNED <i>10/21/02</i> CHECKED <i>10/25/02</i> SUBMITTED <i>10/27/02</i>	SIGNATURE* <i>[Signatures]</i> TEAM LEADER	SUBMITTED BY: DANILLO C. TRAJANO Project Director	REVIEWED BY: JOSEFINA M. ALAGAR Chief, Highways Division	RECOMMENDED BY: GILBERTO S. REYES OIC, Director IV	RECOMMENDED BY: MANUEL M. BONGAN Undersecretary	APPROVED BY: SIMEON A. DATUMANONG Secretary	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 43+140 - STA. 43+678	SHEET NO. : DC-08
	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS										
	BUREAU OF DESIGN OFFICE OF THE SECRETARY										

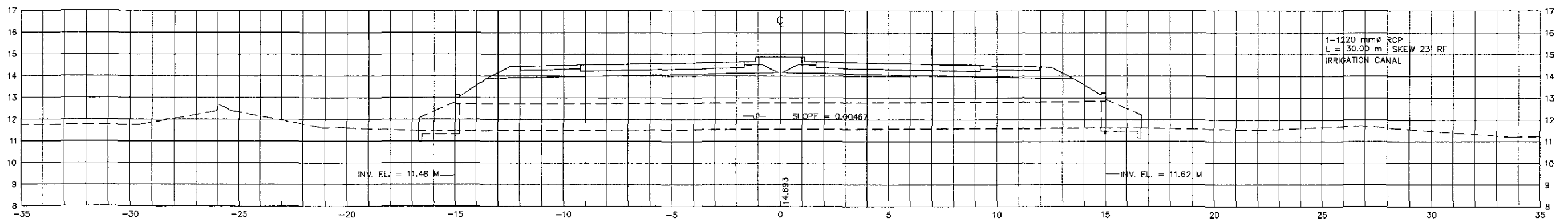
44+660



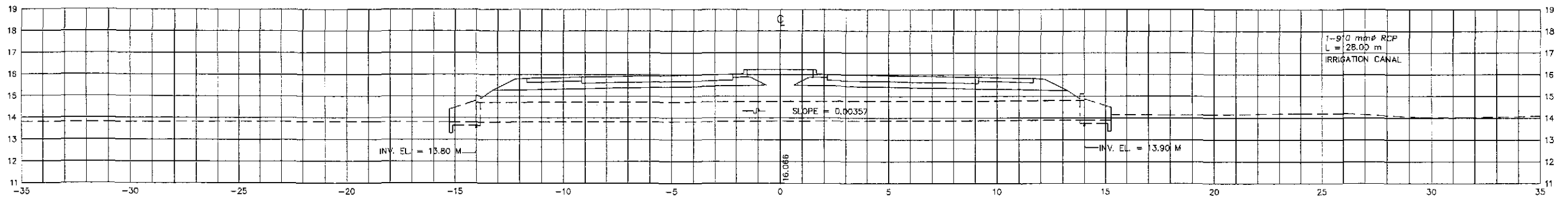
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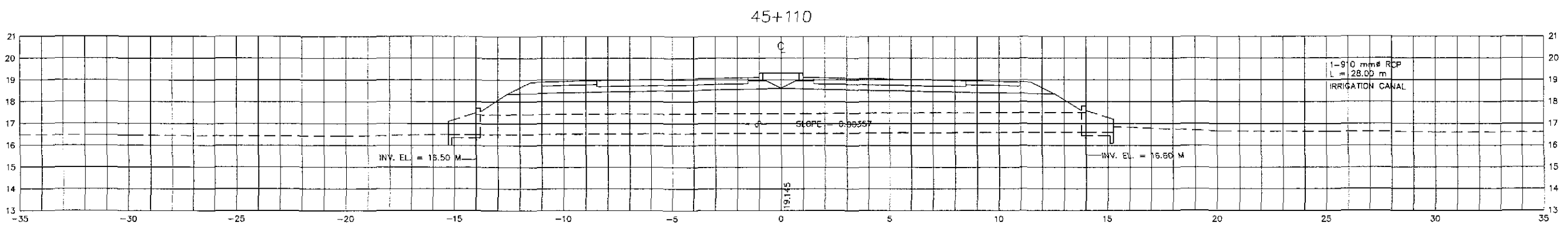
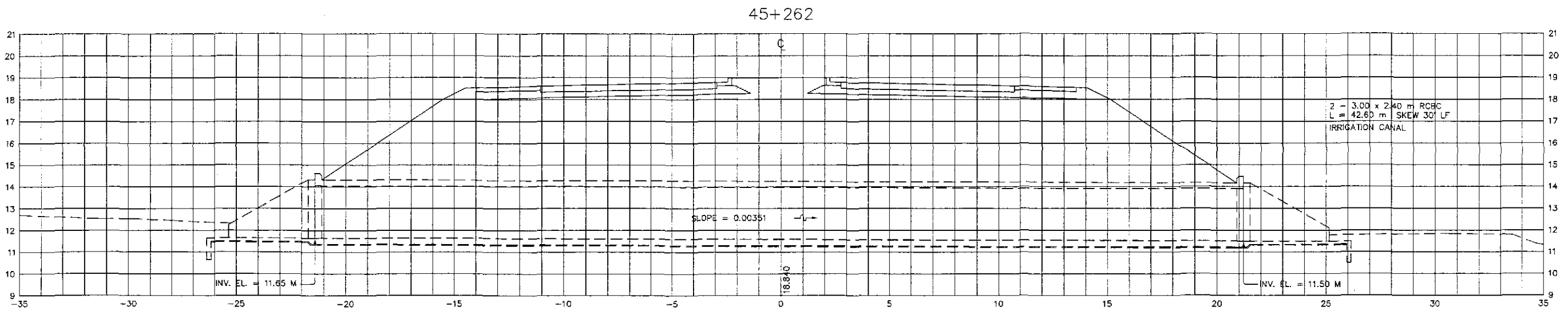
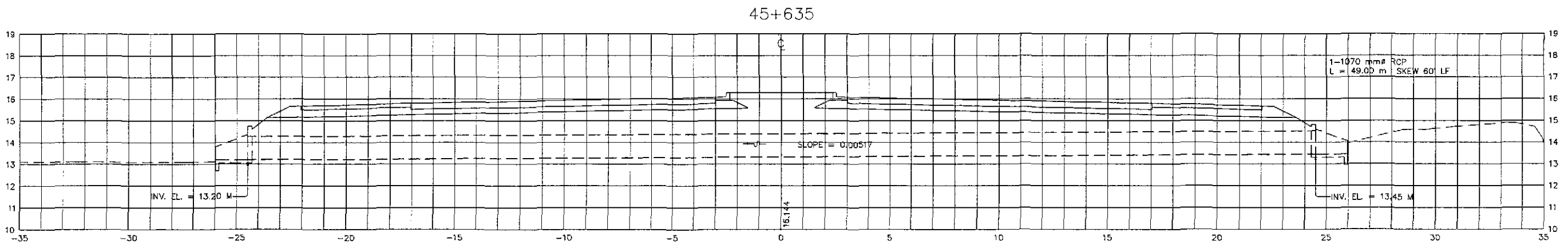
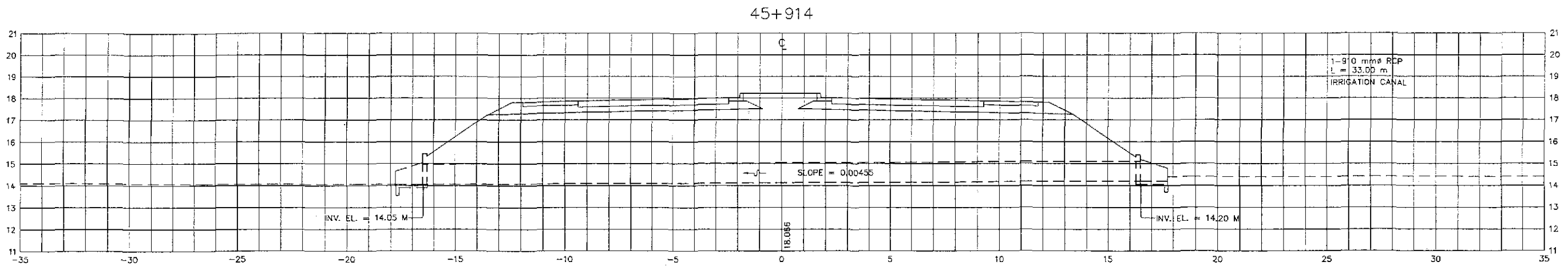
44+470



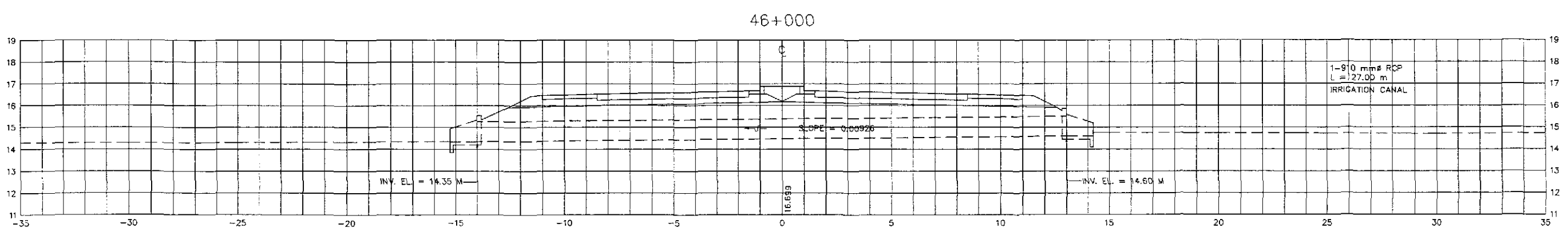
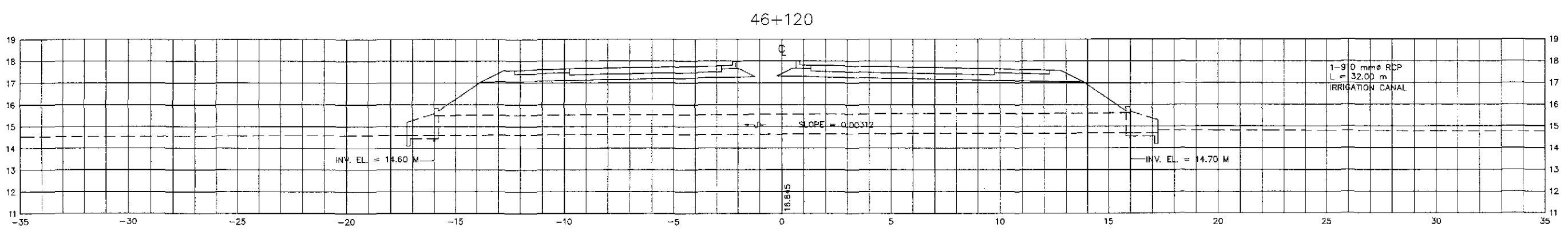
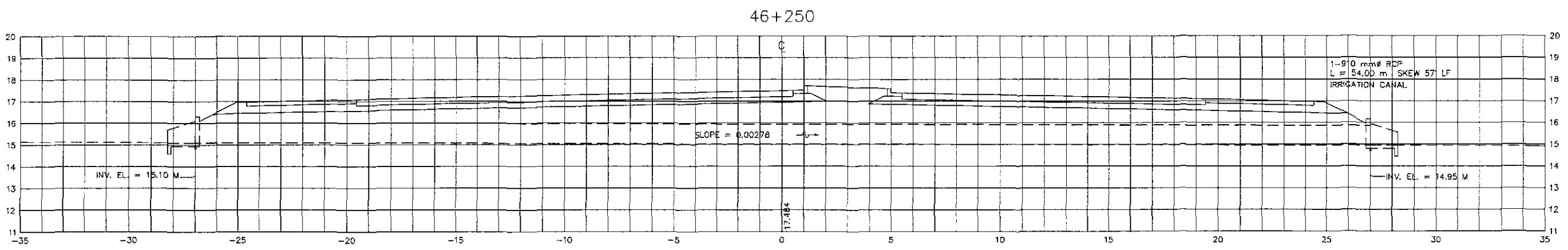
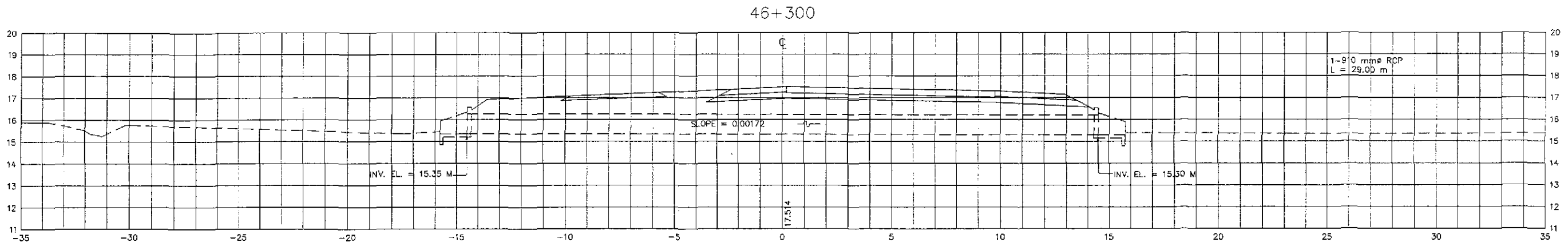
44+380



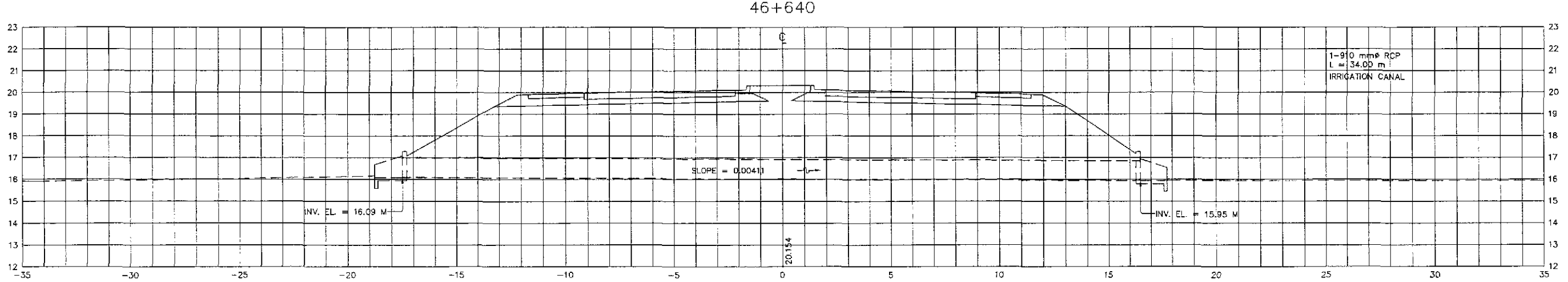
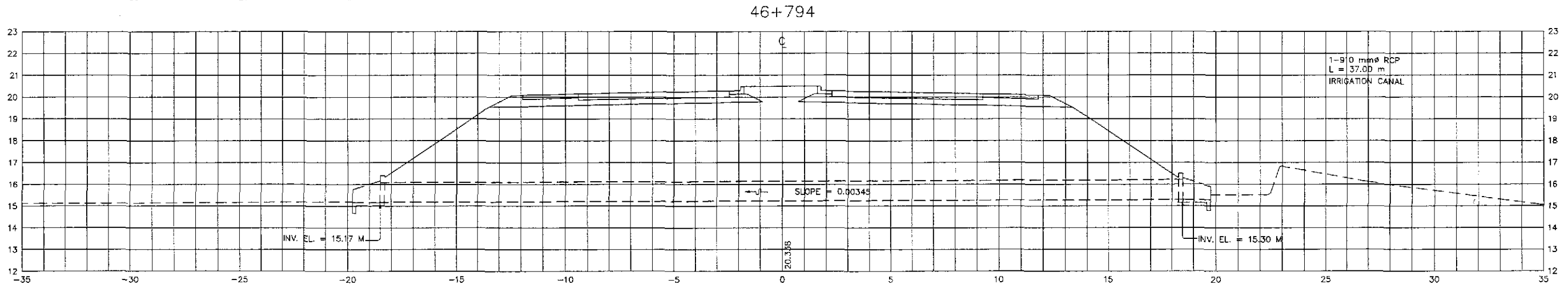
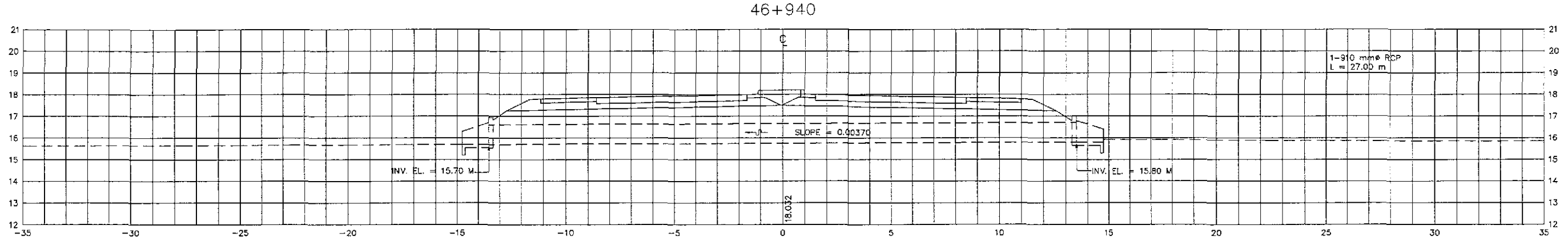
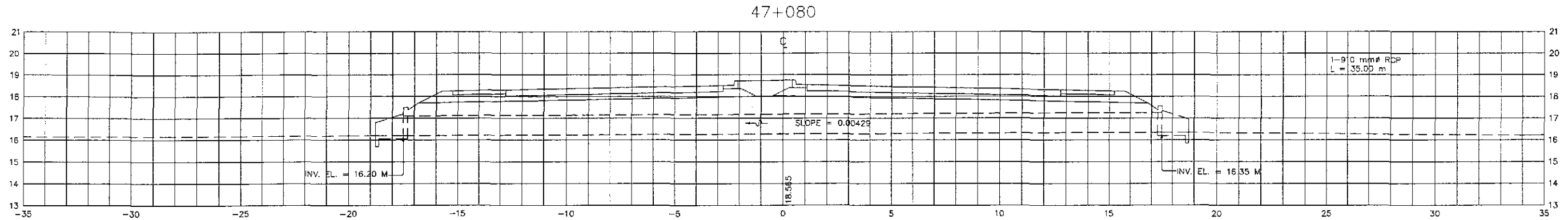
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	DESIGNED	<i>[Signature]</i>	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	1:100	DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 44+380 - STA. 44+660	DC-10
	CHECKED	<i>[Signature]</i>	BUREAU OF DESIGN Submitted By: DANILO C. TRAJANO Project Director	OFFICE OF THE SECRETARY Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES O/C, Director IV				



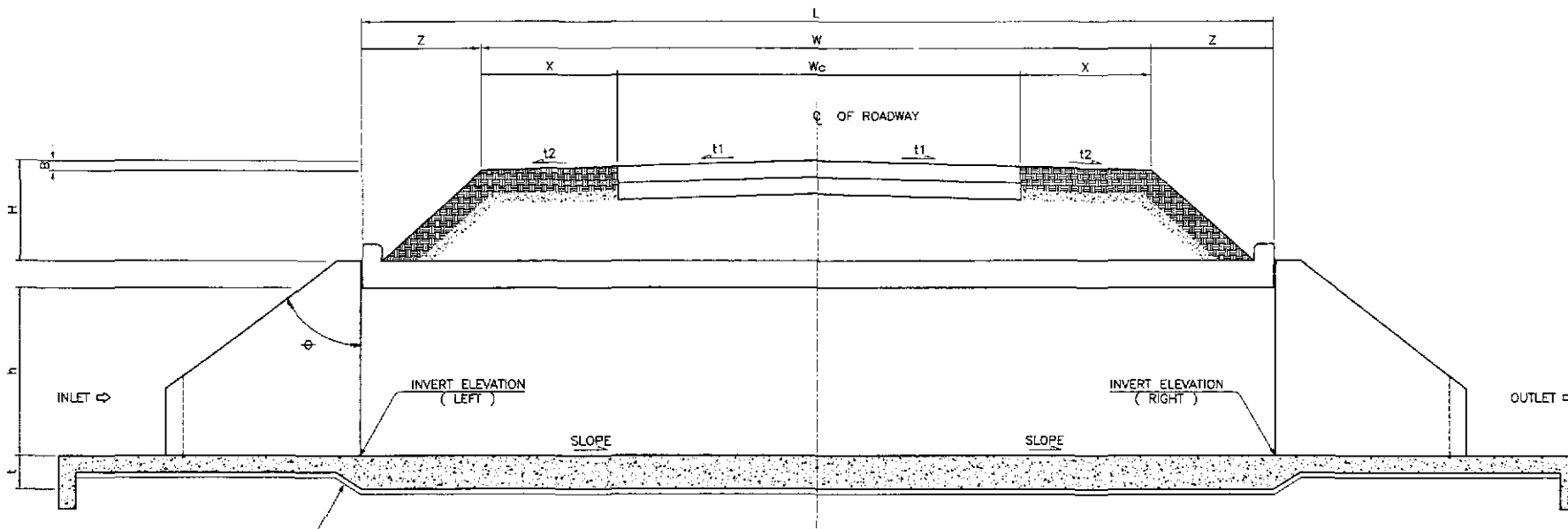
				REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 45+110 - STA. 45+914	SHEET NO. : DC-11	
	DESIGNED <i>[Signature]</i> CHECKED <i>[Signature]</i> SUBMITTED <i>[Signature]</i>	DATE 12/01/02 10/25/02 10/27/02	SIGNATURE <i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>	BUREAU OF DESIGN Submitted By: DANILLO C. TRAJANO Project Director	OFFICE OF THE SECRETARY Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OIC, Director IV	Approved By: (See cover sheet for Signature) MANUEL M. BONGAON Undersecretary	Approved By: (See cover sheet for Signature/Approval) SIMEON A. DATUMANONG Secretary	
	JICA JAPAN INTERNATIONAL COOPERATION AGENCY		KATAHIRA & ENGINEERS INTERNATIONAL YEO YACHIYO ENGINEERING CO., LTD.		PLARIDEL BYPASS - CONTRACT PACKAGE II				



	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/27/07	<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)	1:100	DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 46+000 - STA. 46+300	DC-12
	SUBMITTED	10/27/07	<i>[Signature]</i>	Submitted By: DANILO E. TRAJANO Project Director Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division Recommended By: GILBERTO S. REYES Dir., Director IV Approved By: MANUEL M. BONONAN Undersecretary SIMEON A. DATUMANONG Secretary	PLARIDEL BYPASS - CONTRACT PACKAGE II FULL SIZE A1	FULL SIZE A1	FULL SIZE A1	FULL SIZE A1	



				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 : 1:100 FULL SIZE A1	SHEET CONTENTS : DRAINAGE CROSS-SECTIONS ALONG BYPASS (ULTIMATE STAGE) STA 46+640 - STA. 47+080	SHEET NO. : DC-13	
	DESIGNED <i>[Signature]</i>	CHECKED <i>[Signature]</i>	SUBMITTED <i>[Signature]</i>	BUREAU OF DESIGN Submitted By: DANILO C. TRAJANO Project Director	OFFICE OF THE SECRETARY Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES OIC, Director IV	OFFICE OF THE SECRETARY Recommended By: MANUEL M. BONOAN Undersecretary	OFFICE OF THE SECRETARY Approved By: SIMEON A. DATUMANONG Secretary		
	JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YEC YACHIYO ENGINEERING CO., LTD.									



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

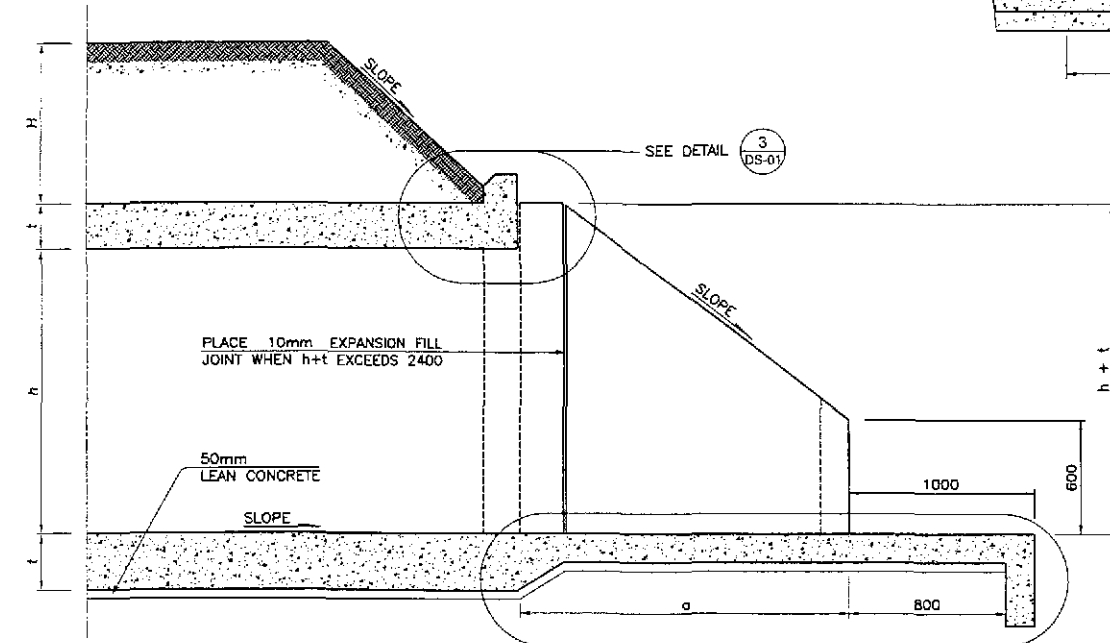
LEGEND:

- W — WIDTH OF ROADWAY FORMATION
- X — WIDTH OF SHOULDER
- Wc — WIDTH OF CARRIAGEWAY
- H — COVER ABOVE THE CULVERT
- L — TOTAL LENGTH OF BARREL
- t1 — SLOPE OF CARRIAGEWAY
- t2 — SLOPE OF SHOULDER
- Z — $[(H+t) - (B+200)] \tan \phi$
- B — $t_2 + 0.5 t_1 W_c$
- h — HEIGHT OF CULVERT OPENING
- t — THICKNESS OF CULVERT WALL OR SLAB
- ϕ — SLOPE OF EMBANKMENT
- OC — ANGLE OF SKEW

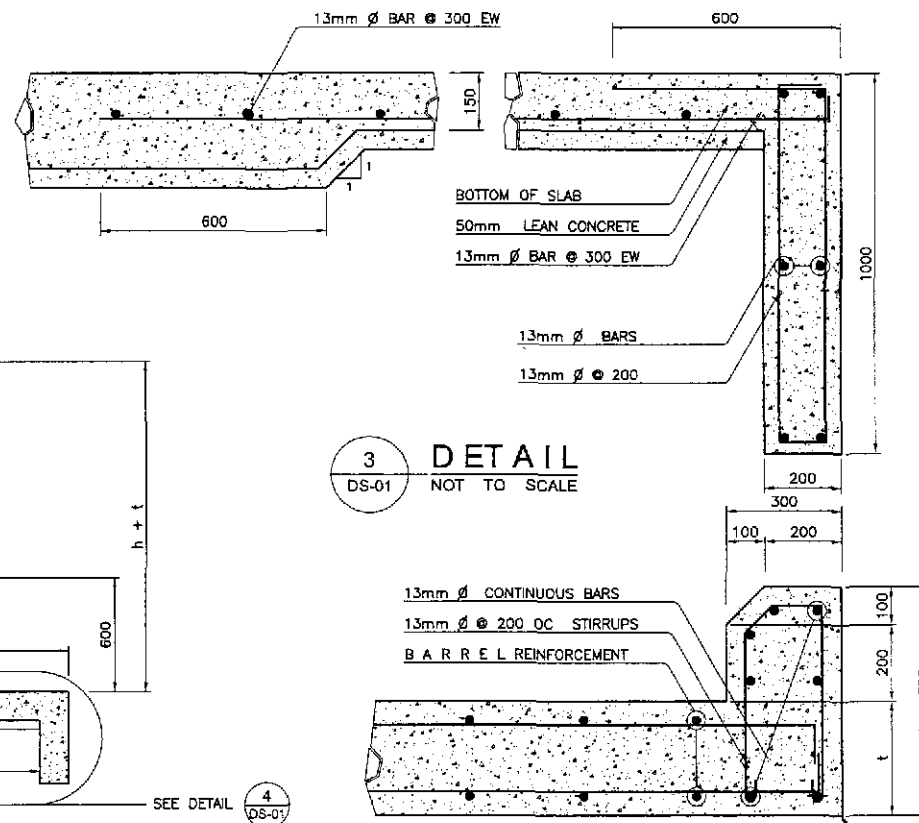
HORIZONTAL SKEW ANGLE OC	L (mm)
90°	$W + 2t \tan \phi [(H+t) - (B+200)]$
60°	$1.1547 (W + 2t \tan \phi [(H+t) - (B+200)])$
45°	$1.4142 (W + 2t \tan \phi [(H+t) - (B+200)])$

NOTES:

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



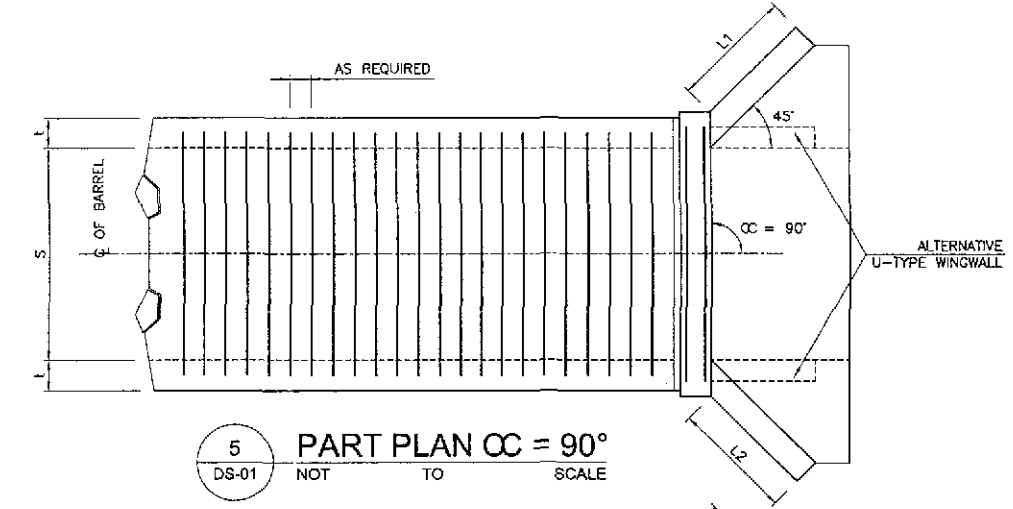
2 PART SECTION ALONG C OF CULVERT
DS-01 NOT TO SCALE



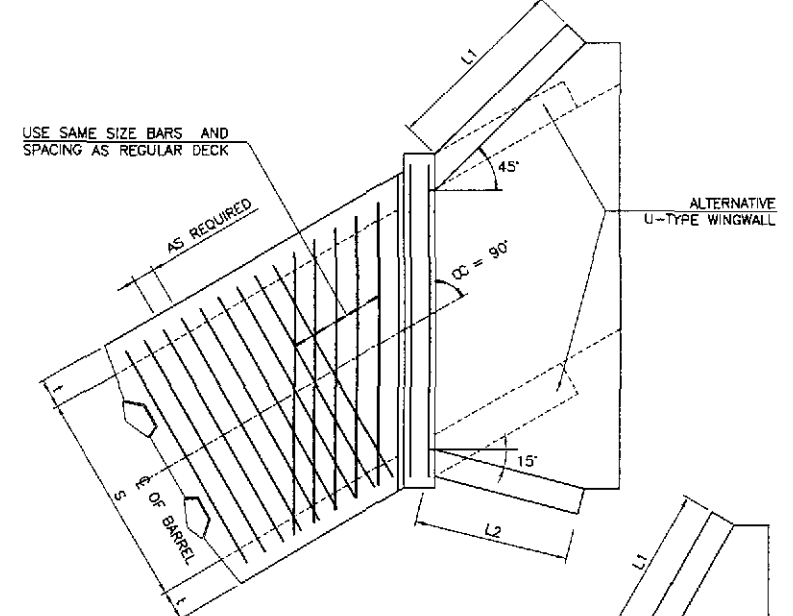
3 DETAIL
DS-01 NOT TO SCALE

4 DETAIL
DS-01 NOT TO SCALE

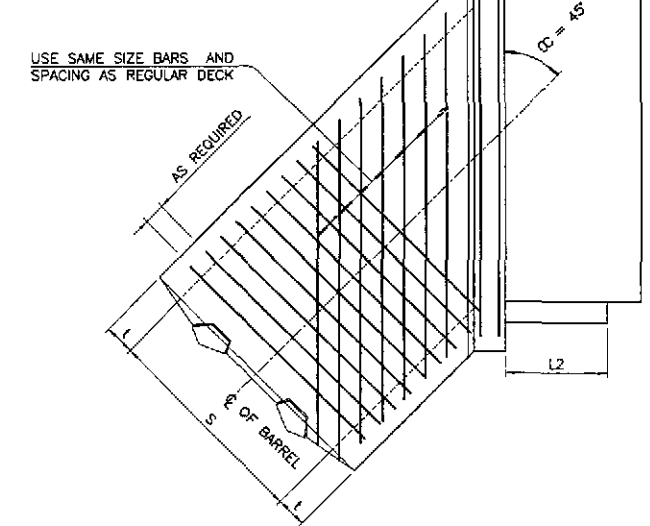
ROUND TO APPROXIMATE 150mm RADIUS (FOR INLET PORTION ONLY)



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



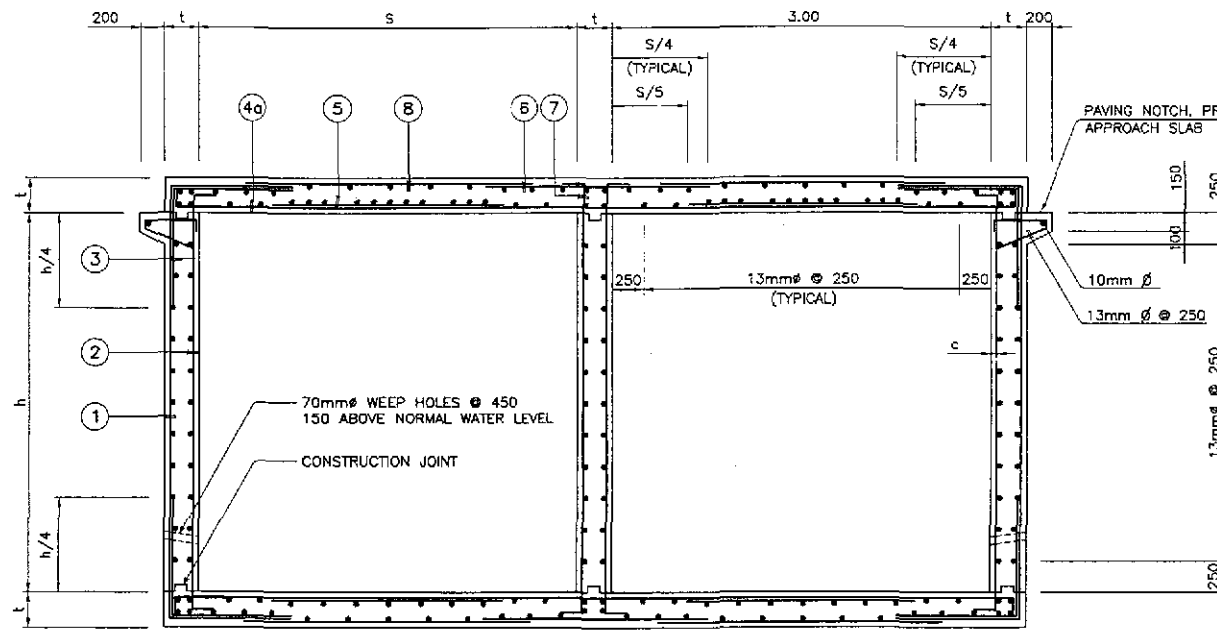
6 PART PLAN OC = 60°
DS-01 NOT TO SCALE



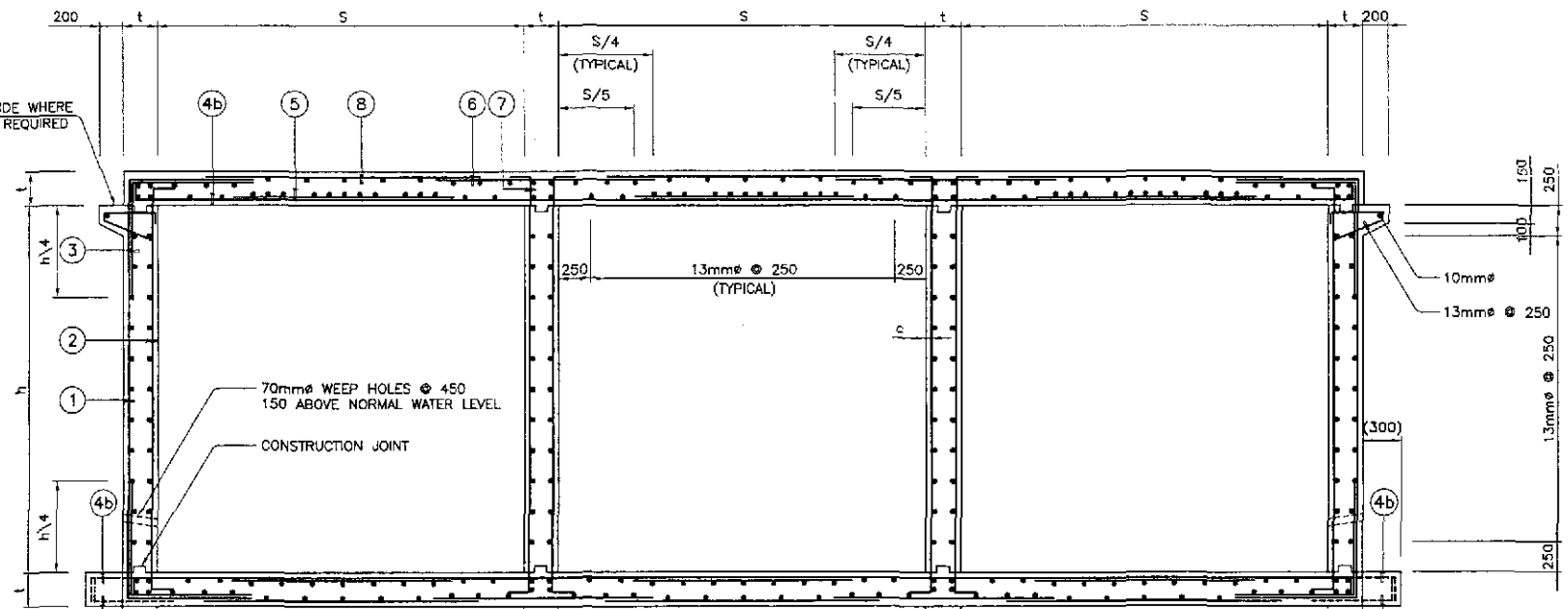
7 PART PLAN OC = 45°
DS-01 NOT TO SCALE

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

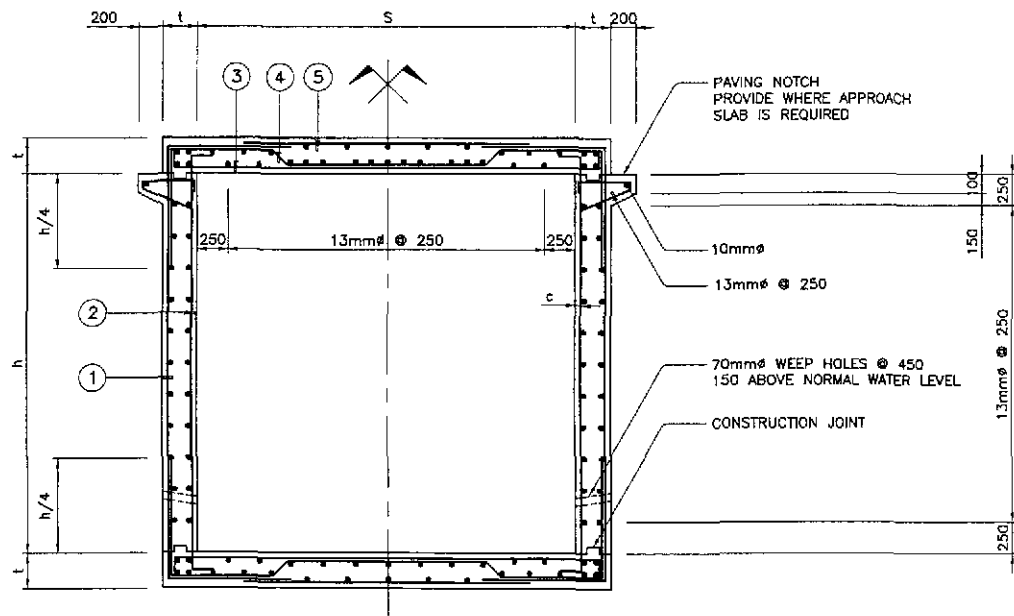
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II	SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)	SHEET NO. : DS-01
	CHECKED	10/25/02	<i>[Signature]</i>		DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS						
	SUBMITTED	10/27/02	<i>[Signature]</i>		PUHL - PMO Submitted By:	BUREAU OF DESIGN Reviewed By:	OFFICE OF THE SECRETARY Recommended By:				
			DAHILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMON A. DATUMANONG Secretary				



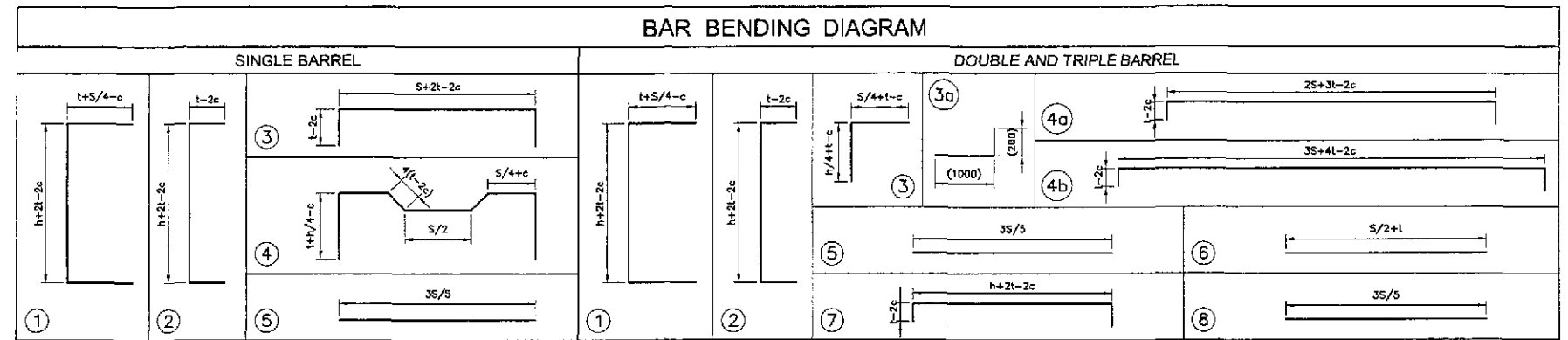
2 DOUBLE BARREL SECTION
DS-02 SCALE 1:30



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	
				ϕ	SPACING	ϕ	SPACING	ϕ	SPACING	ϕ	SPACING	ϕ	SPACING		ϕ	SPACING	ϕ	SPACING	ϕ	SPACING	ϕ	SPACING	ϕ	SPACING	ϕ	SPACING	ϕ	SPACING	ϕ	SPACING
1250	1000	180	13	300	13	300	13	300	13	300	13	300	180	13	300	13	300	13	300	13	300	13	300	20	200	13	300	13	300	
	1250	180	13	300	13	300	13	300	13	300	13	300	180	13	300	16	300	13	300	13	300	13	300	20	200	13	300	13	300	
	1500	180	13	300	13	280	13	300	13	300	13	300	180	13	300	16	280	13	300	13	300	13	300	20	200	13	300	13	300	
1500	1000	180	16	240	16	300	16	240	16	240	13	300	200	16	300	16	300	16	300	16	300	16	300	20	200	13	300	13	280	
	1250	180	16	240	16	300	16	240	16	240	13	300	200	16	300	16	300	16	300	16	300	16	300	20	200	13	300	13	280	
	1500	180	16	240	16	280	16	240	16	240	13	300	200	16	300	16	280	16	300	16	300	16	300	20	200	13	300	13	280	
1800	1250	200	16	260	16	300	16	260	16	260	13	280	250	16	300	16	300	16	300	16	300	16	300	20	190	13	300	13	220	
	1500	200	16	260	16	300	16	260	16	260	13	280	250	16	300	16	280	16	300	16	300	16	300	20	190	13	300	13	220	
	1800	200	16	260	16	280	16	260	16	260	13	280	250	16	300	16	280	16	300	16	300	16	300	20	190	13	300	13	220	
2400	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	
	1800	220	16	220	16	280	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200	
	2100	220	16	220	16	260	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200	
3000	2400	220	16	220	16	200	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200	
	2750	220	16	200	16	180	16	200	16	200	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200	
	2100	280	16	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200	
3000	2400	280	16	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200	
	2750	280	16	260	16	240	16	220	16	200	13	200	300	20	300	16	200	20	300	20	300	20	300	25	170	16	300	13	200	
3000	280	16	200	16	220	16	200	16	200	13	200	300	20	300	16	200	20	300	20	300	20	300	25	170	16	300	13	200		

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

	DATE	SIGNATURE		PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/21/11		[Signature]	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	1:30	STANDARD DETAILS OF RCBC BARRELS	DS-02
	CHECKED	10/25/11		[Signature]	BUREAU OF DESIGN	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	FULL SIZE A1	
SUBMITTED	10/27/11	[Signature]	OFFICE OF THE SECRETARY	PLARIDEL BYPASS - CONTRACT PACKAGE II				
			PUHL - RMO 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. BONGAN Undersecretary Approved By: SIMEON A. DATUMANONG Secretary					

QUANTITIES FOR STANDARD BOX CULVERTS

CLEAR		QUANTITY PER METER OF BARREL					
SPAN S	HEIGHT h	SINGLE		DOUBLE		TRIPLE	
		CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)
1250	1000	0.94	113.32	1.63	209.22	2.33	296.18
	1250	1.03	121.63	1.77	216.22	2.51	312.39
	1500	1.12	130.98	1.90	232.07	2.69	330.39
1500	1800	1.23	141.71	2.07	249.50	2.91	352.09
	1000	1.03	165.90	2.04	253.90	2.92	354.60
	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	1800	1.32	202.50	2.52	296.20	3.56	407.10
	1250	1.36	189.20	3.11	312.30	4.45	437.00
	1500	1.48	199.90	3.30	326.10	4.70	454.00
	1800	1.60	214.80	3.53	342.80	5.00	475.20
2400	2100	1.72	239.60	3.75	357.50	5.30	494.40
	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
3000	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
	2100	3.17	308.70	6.03	635.70	8.64	899.70
	2400	3.34	321.30	6.30	652.00	9.00	919.60
	2750	3.53	374.40	6.62	705.60	9.42	895.00
	3000	3.67	413.50	6.84	721.60	9.72	1015.40

QUANTITIES FOR STANDARD WINGWALLS

m (meter)	h+t (meter)	L (meter)	QUANTITY PER WINGWALL AND APRON SLAB					
			SINGLE		DOUBLE		TRIPLE	
			CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)
1.37	1.18	1.23	2.41	150	2.94	180	3.48	220
1.75	1.43	1.76	3.48	220	4.08	265	4.72	300
2.12	1.68	2.29	4.66	300	5.36	350	6.06	395
2.57	1.98	2.93	6.22	405	7.01	450	7.80	500
1.37	1.18	1.23	2.50	140	3.26	180	3.88	220
1.75	1.43	1.76	3.69	210	4.42	250	5.16	290
2.12	1.68	2.29	4.78	270	5.73	320	6.56	360
2.57	1.98	2.93	6.35	350	7.42	410	8.37	460
1.78	1.45	1.80	3.81	210	4.98	280	5.90	330
2.15	1.70	2.33	5.03	280	6.33	350	7.36	400
2.60	2.00	2.97	6.48	360	8.09	450	9.26	510
3.05	2.30	3.61	8.37	460	10.00	550	11.31	620
2.63	2.02	3.01	7.08	390	9.14	500	10.71	590
3.08	2.32	3.65	9.28	510	11.61	640	13.37	740
3.53	2.62	4.28	11.42	630	13.98	770	15.92	880
4.06	2.97	5.03	14.17	780	17.90	990	19.15	1050
3.17	2.38	3.78	10.08	560	12.38	660	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 1995.

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, $h=0$ THE TOP OF SURFACE OF THE UPPER SLAB SHALL FOLLOW THE CROWN OF THE FINISHED ROADWAY. THE BOX CULVERT SHALL BE CONSTRUCTED ON A LAYER OF LEAN CONCRETE 50mm MINIMUM THICKNESS.

LIVE LOAD DISTRIBUTION REINFORCEMENT :

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

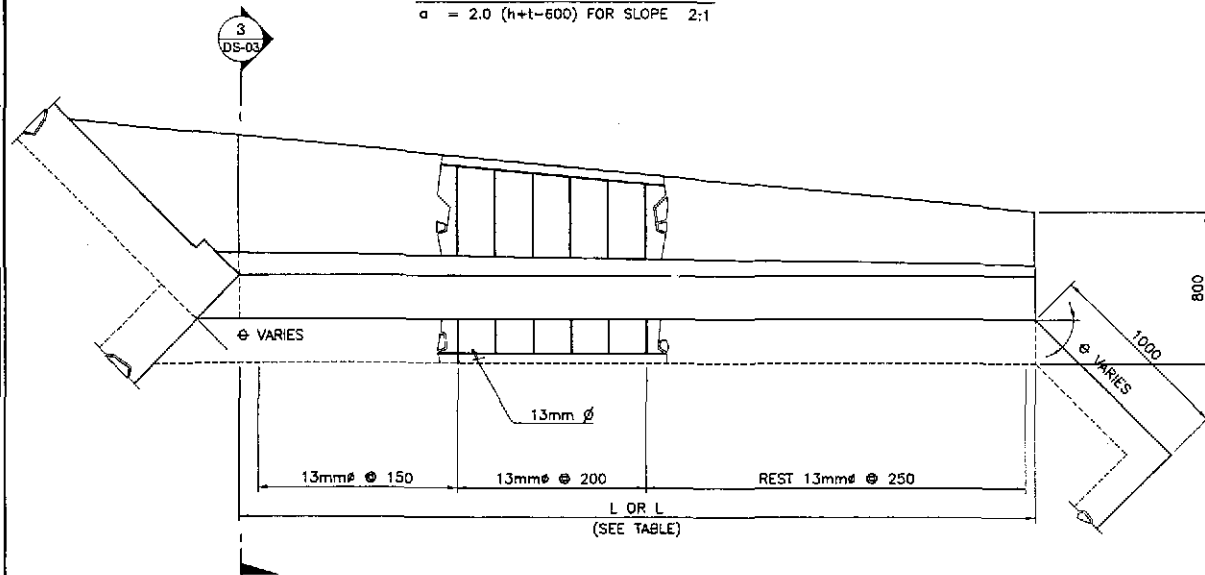
HEIGHT OF FILL :

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

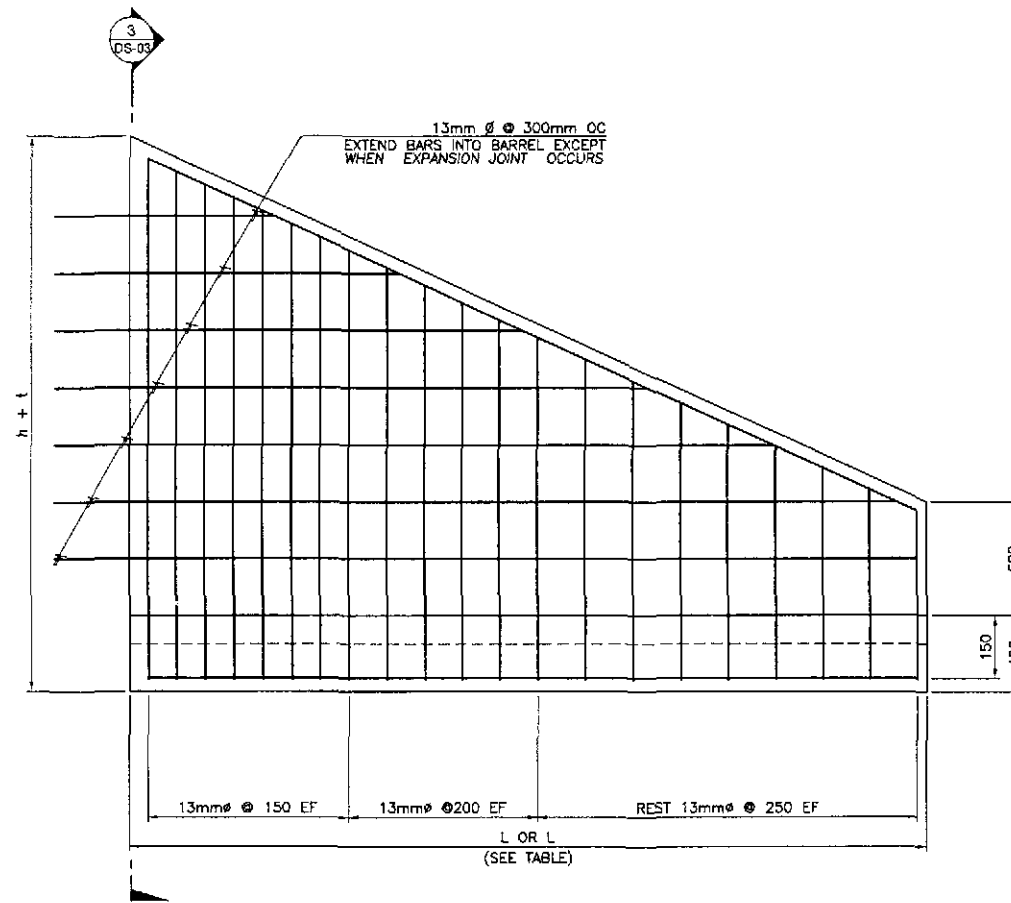
HORIZONTAL SKEW ANGLE α	LENGTH OF WINGWALLS
90°	$L_1 = L_2 = 1.414a$
60°	$L_1 = 1.414a$ $L_2 = 1.035a$
45°	$L_1 = 2.000a$ $L_2 = a$

WHERE :

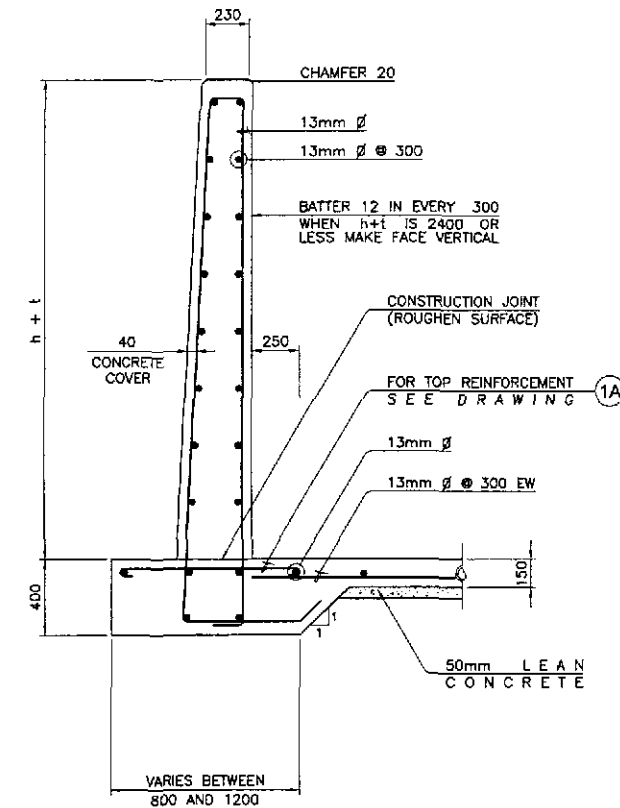
$a = 1.5 (h+t-600)$ FOR SLOPE 1.5:1
 $a = 2.0 (h+t-600)$ FOR SLOPE 2:1



1 WINGWALL PLAN
 DS-03 SCALE 1:40



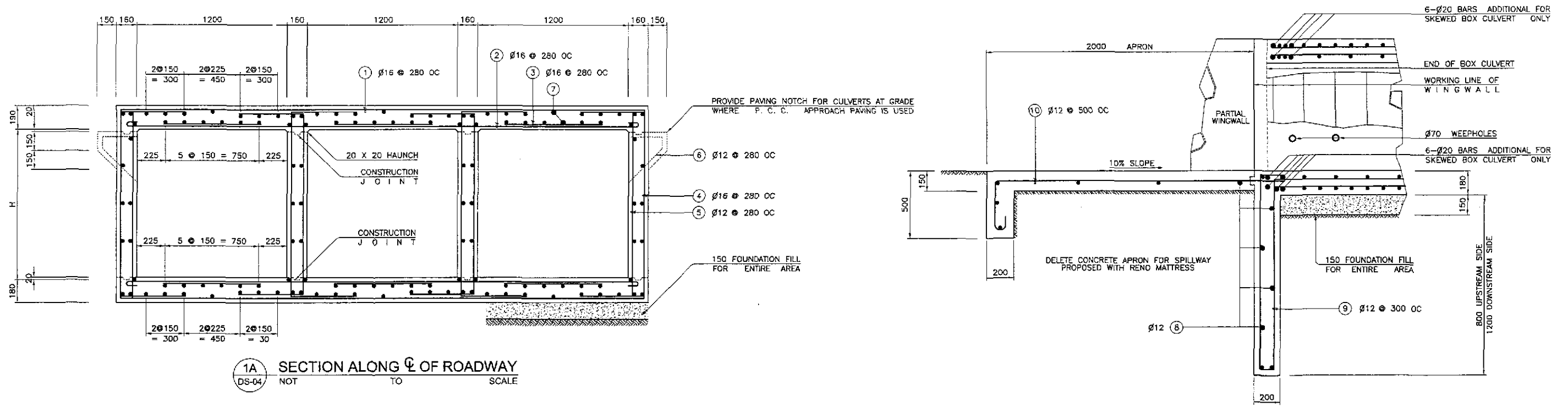
2 WINGWALL ELEVATION
 DS-03 SCALE 1:40



3 SECTION
 DS-03 SCALE 1:40

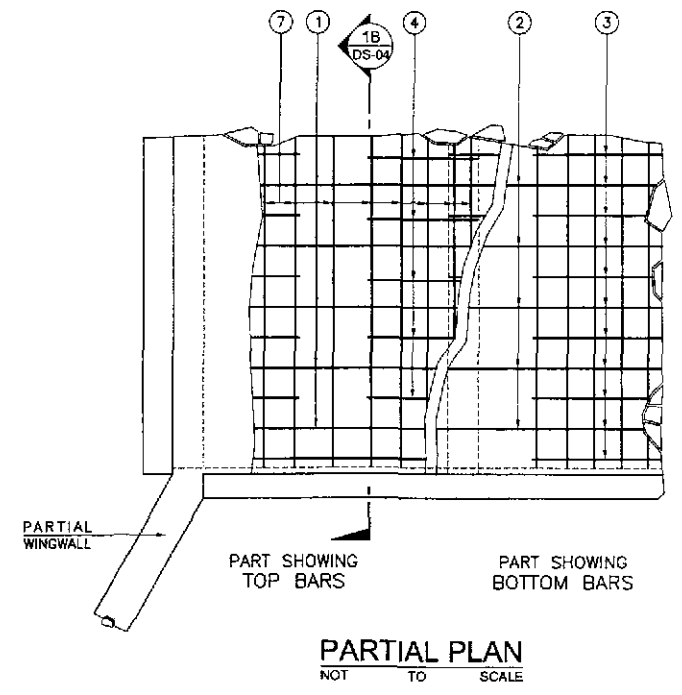
RCBC WINGWALL DETAILS

	DATE: 10/21/02 DESIGNED: [Signature] CHECKED: [Signature] SUBMITTED: 10/27/02	SIGNATURE: [Signature] P.U.H.L. - P.M.O. DANILLO C. TRAJANO Project Director	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES Recommended By: MANUEL M. BONDAN Recommended By: SIMEON A. DATUMANONG Approved By: [Signature]	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II	SCALE : 1:40 FULL SIZE A1	SHEET CONTENTS : STANDARD DETAILS OF RCBC WINGWALLS	SHEET NO. : DS-03
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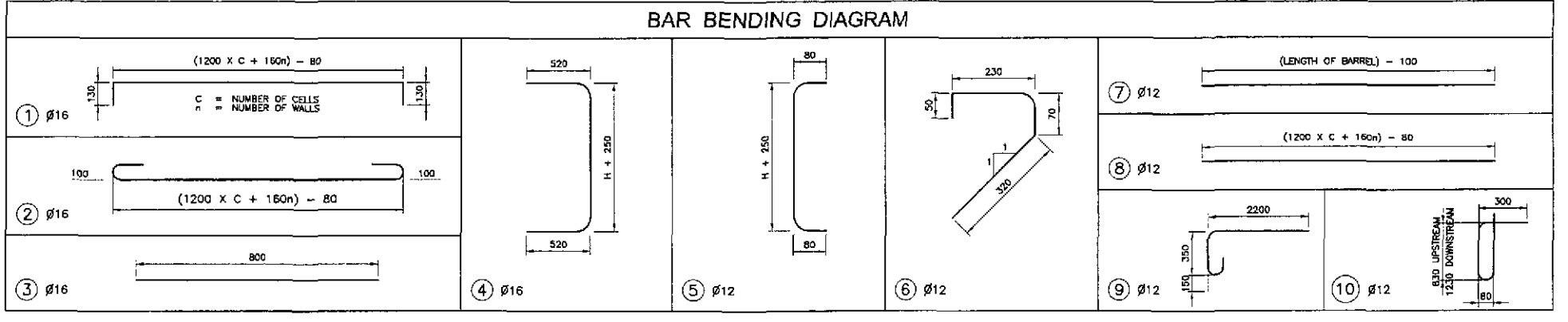


1A SECTION ALONG C OF ROADWAY
DS-04 NOT TO SCALE

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 ³)	REINFORCING STEEL (kg)	EXCAVATION (m ³)	FOUNDATION FILL (m ³)	CONCRETE CLASS "A" (m ³)	REINFORCING STEEL (kg)	EXCAVATION (m ³)	FOUNDATION FILL (m ³)	CONCRETE CLASS "A" (m ³)	REINFORCING STEEL (kg)	EXCAVATION (m ³)	FOUNDATION FILL (m ³)
1.20	0.95	132.59	0.67	0.27	1.64	217.00	1.12	0.48	2.34	299.62	1.56	0.68
0.90	0.85	127.30	0.67	0.27	1.50	209.08	1.12	0.48	2.14	289.04	1.56	0.68
0.60	0.75	122.01	0.67	0.27	1.35	201.15	1.12	0.48	1.95	278.48	1.56	0.68

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

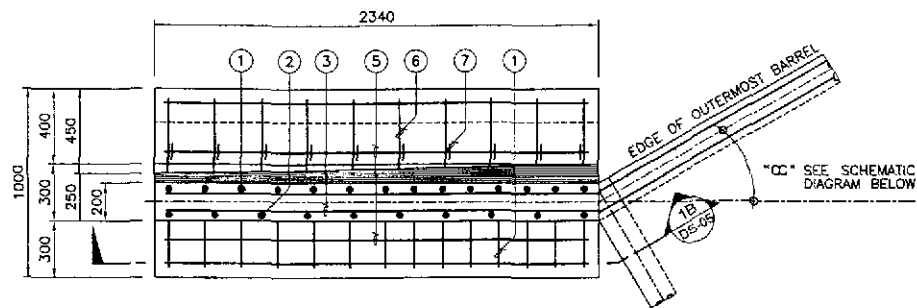
APRON AND END TOE FOR BOTH ENDS

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

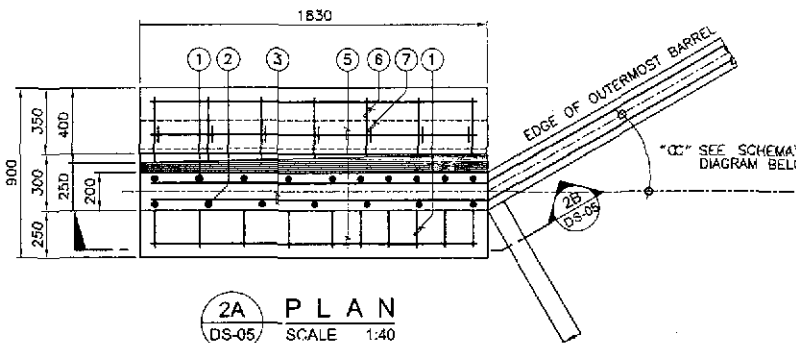
NOTE:
ALL OTHER REINFORCING BARS SHALL BE PERPENDICULAR OR PARALLEL AS THE CASE MAYBE, TO BOX AXIS.

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

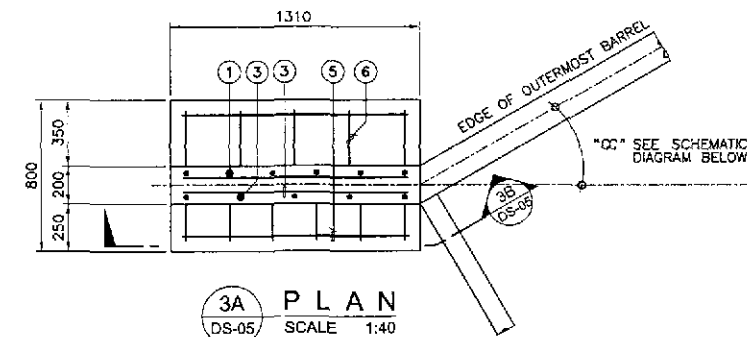
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :			
	CHECKED	10/25/02	<i>[Signature]</i>		BUREAU OF DESIGN				THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)				NOT TO SCALE	STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)	DS-04
	SUBMITTED	10/27/02	<i>[Signature]</i>		Submitted By:	Reviewed By:	Recommended By:	Recommended By:	PLARIDEL BYPASS - CONTRACT PACKAGE II						
			TEAM LEADER	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONGAN Undersecretary	SIMEDON A. DATUMANONG Secretary							



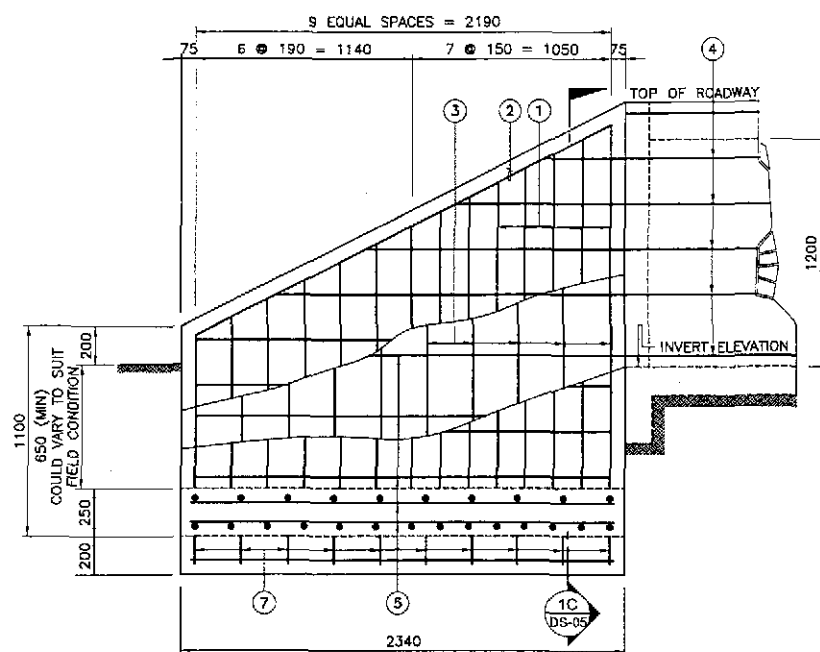
1A PLAN
DS-05 SCALE 1:40



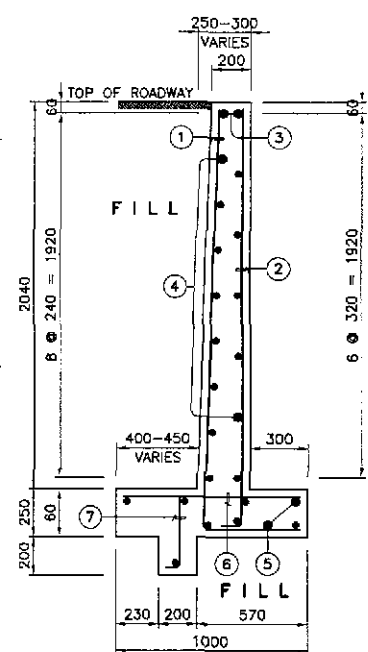
2A PLAN
DS-05 SCALE 1:40



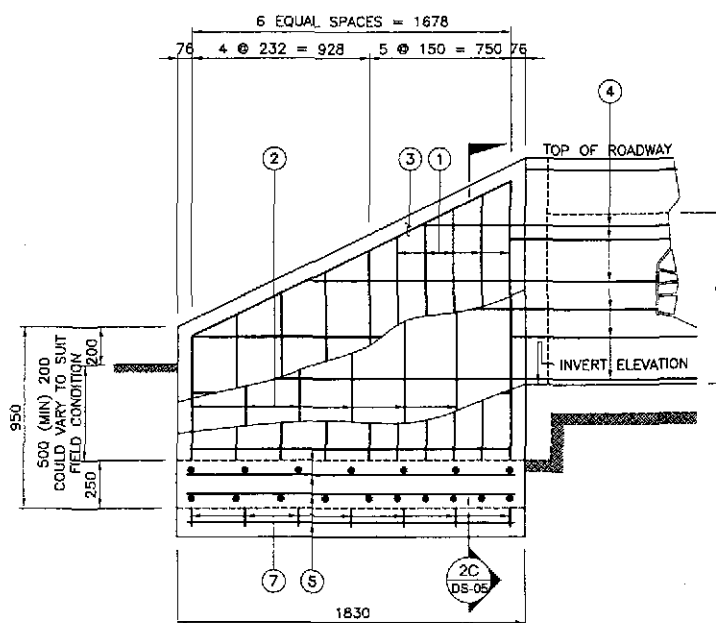
3A PLAN
DS-05 SCALE 1:40



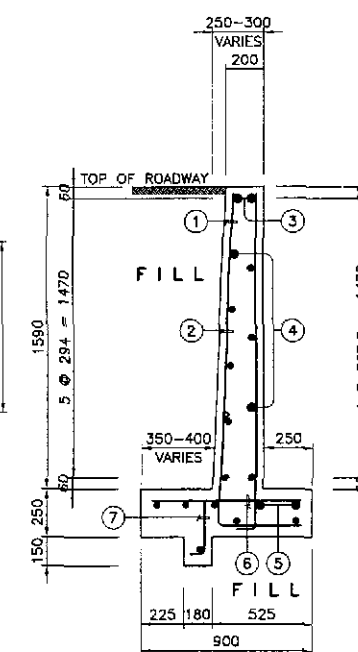
1A ELEVATION
DS-05 SCALE 1:40



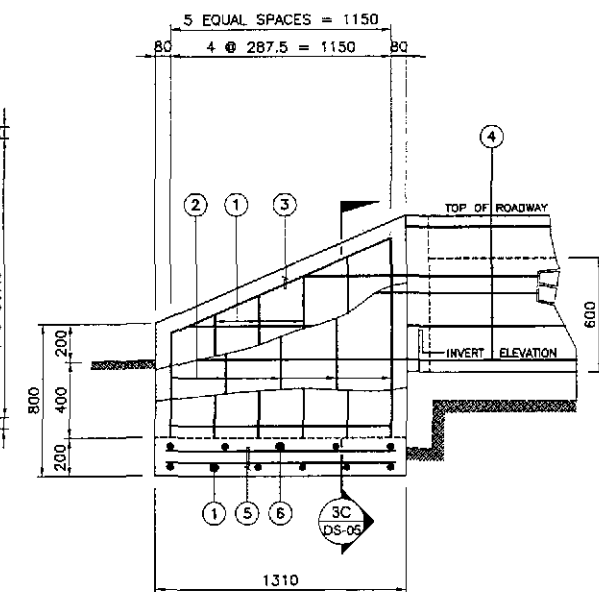
1C SECTION
DS-05 SCALE 1:40



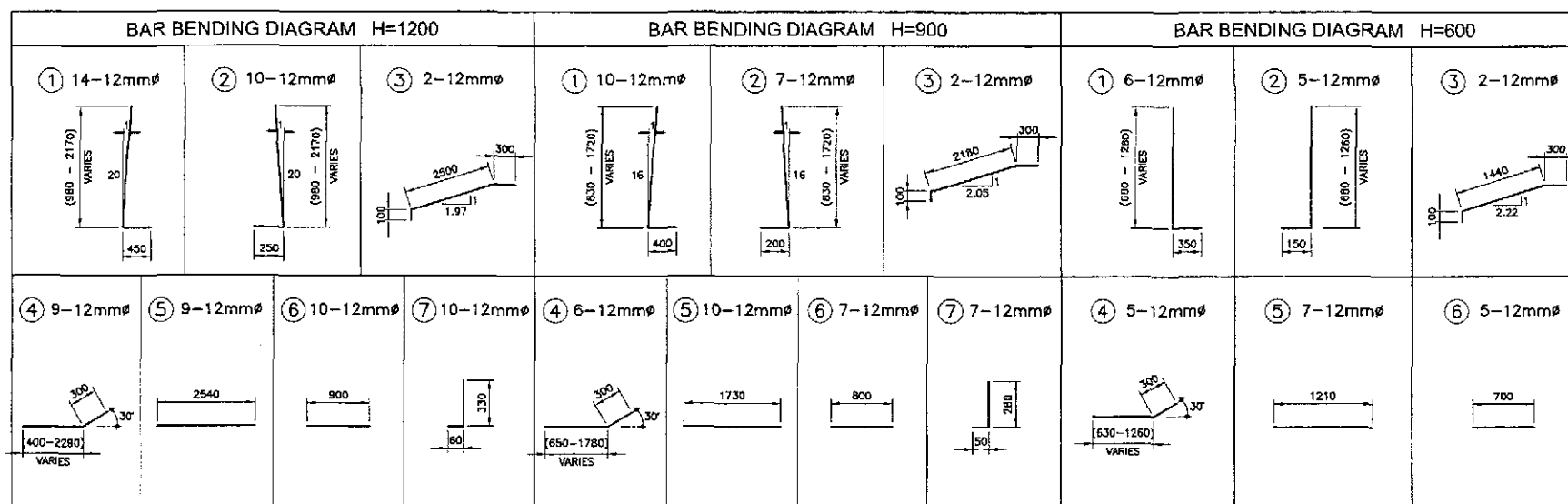
2B ELEVATION
DS-05 SCALE 1:40



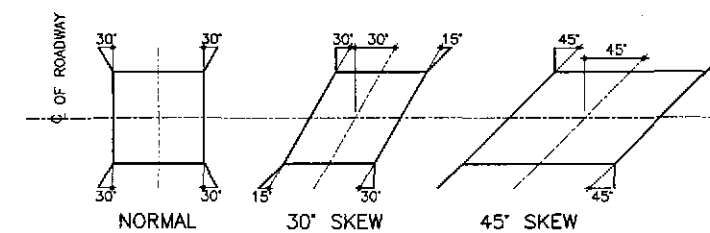
2C SECTION
DS-05 SCALE 1:40



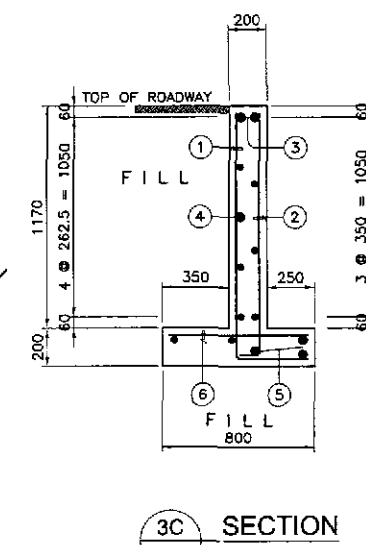
3B ELEVATION
DS-05 SCALE 1:40



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



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

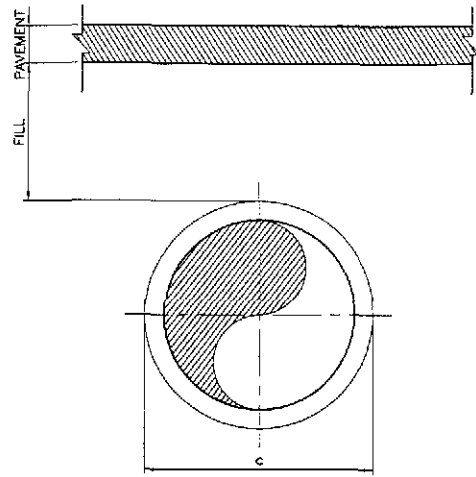


3C SECTION
DS-05 SCALE 1:40

LOW DEPTH TYPE BOX CULVERT

<p>JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YACHIYO ENGINEERING CO., LTD.</p>	<p>DESIGNED: 10/21/02</p> <p>CHECKED: 10/25/02</p> <p>SUBMITTED: 10/27/02</p>	<p>DATE: 10/21/02</p> <p>SIGNATURE: [Signature]</p> <p>PROJECT DIRECTOR: DANILO C. TRAJANO</p>	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p> <p>BUREAU OF DESIGN OFFICE OF THE SECRETARY</p> <p>REVIEWED BY: JOSEFINA M. ALAGAR (Chief, Highways Division)</p> <p>RECOMMENDED BY: GILBERTO S. REYES (OIC, Director IV)</p> <p>RECOMMENDED BY: MANUEL M. BONDAN (Undersecretary)</p> <p>APPROVED BY: SIMEON A. DATUMANONG (Secretary)</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> <p>PLARIDEL BYPASS - CONTRACT PACKAGE II</p>	<p>SCALE: AS SHOWN FULL SIZE A1</p>	<p>SHEET CONTENTS: STANDARD LOW DEPTH TYPE BOX CULVERT (2 of 2)</p>	<p>SHEET NO.: DS-05</p>
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DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT

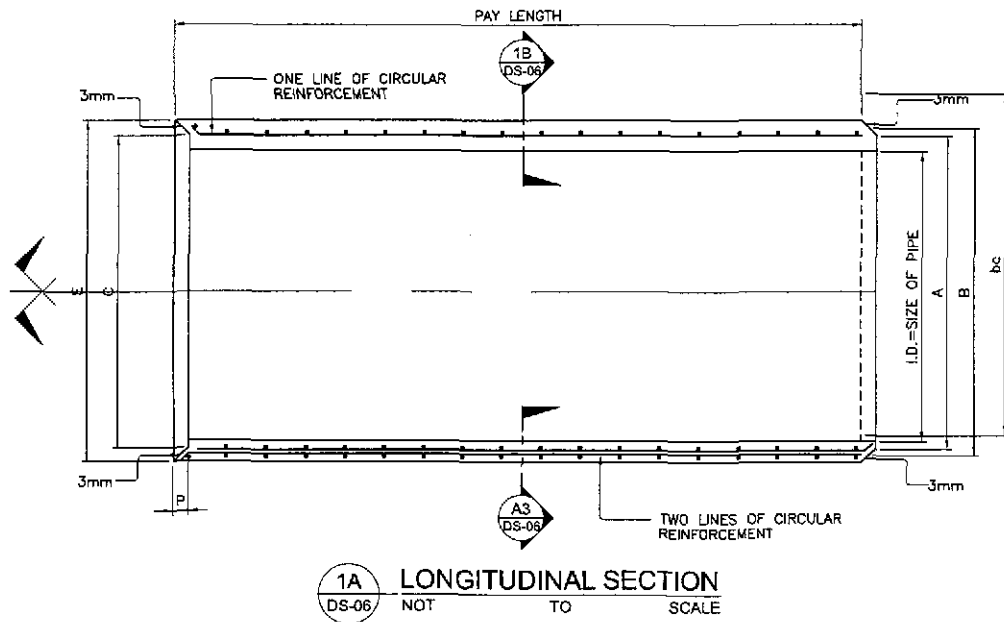


STANDARD STRENGTH PIPES:
 FILL 1/2 E.D. FOR FLEXIBLE PAVEMENT OR MIN. OF 0.60 m
 0.30 m FOR RIGID PAVEMENT
 EXTRA STRENGTH PIPES:
 FILL 0.30 m FOR RIGID AND FLEXIBLE PAVEMENTS

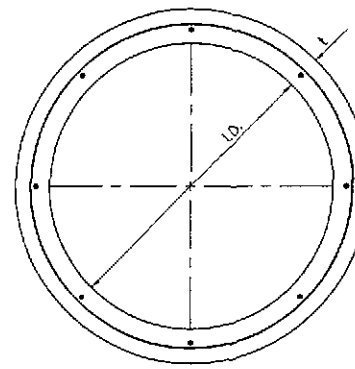
MINIMUM PIPE COVERING

STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS														EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS														
CONCRETE 247 kg/cm ² (3,500 lb/in ²)							CONCRETE 317 kg/cm ² (4,500 lb/in ²)							STRENGTH TEST REQUIREMENTS kg/m OF PIPE		CONCRETE 317 kg/cm ² (4,500 lb/in ²)					STRENGTH TEST REQUIREMENTS kg/m OF PIPE							
SIZE OF PIPE (mm)	WALL THICKNESS (mm)	TONGUE (mm)	GROOVE (mm)	DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		WALL THICKNESS (mm)	TONGUE (mm)	GROOVE (mm)	DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		THREE-EDGE-BEARING METHOD *	ULTIMATE LOAD	WALL THICKNESS (mm)	TONGUE (mm)	GROOVE (mm)	DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		THREE-EDGE-BEARING METHOD	LOAD ULTIMATE						
I.D.	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025m CRACK LOAD	ULTIMATE LOAD	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025m CRACK 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	11.182
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	15.655
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 6.98	1 LINE 6.98	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	22.354

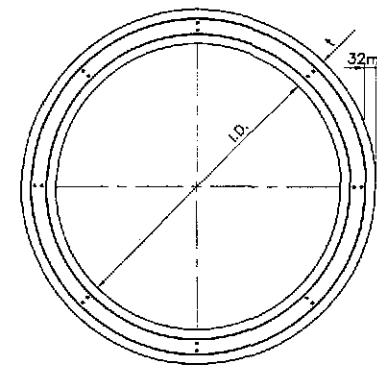
⊙ THE DISTANCE FROM CENTERLINE OF THE REINFORCEMENT TO THE NEAREST SURFACE OF THE CONCRETE HAS BEEN ASSUMED AS 32mm FOR PIPES WITH A SHELL THICKNESS OF 64mm OR MORE.
 * TEST LOADS FOR SAND-BEARING TEST SHALL BE ONE AND ONE - HALF TIMES THOSE SPECIFIED IN THIS TABLE FOR THE THREE - EDGE BEARING TEST.



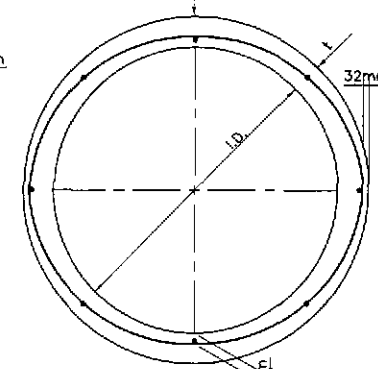
1A LONGITUDINAL SECTION
 DS-06 NOT TO SCALE



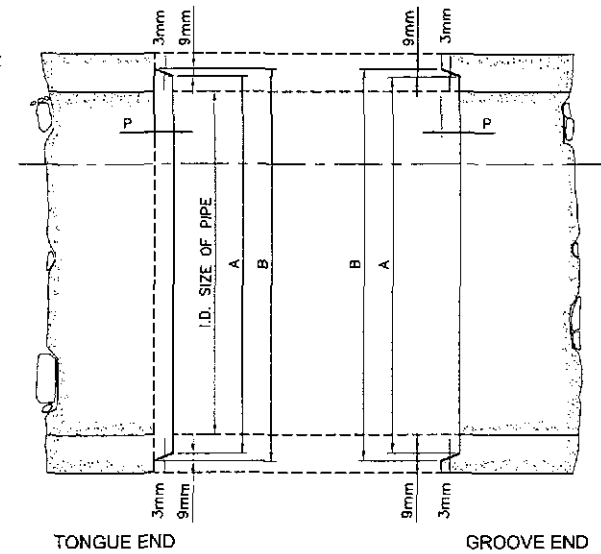
1B SECTION
 DS-06



1C SECTION
 DS-06

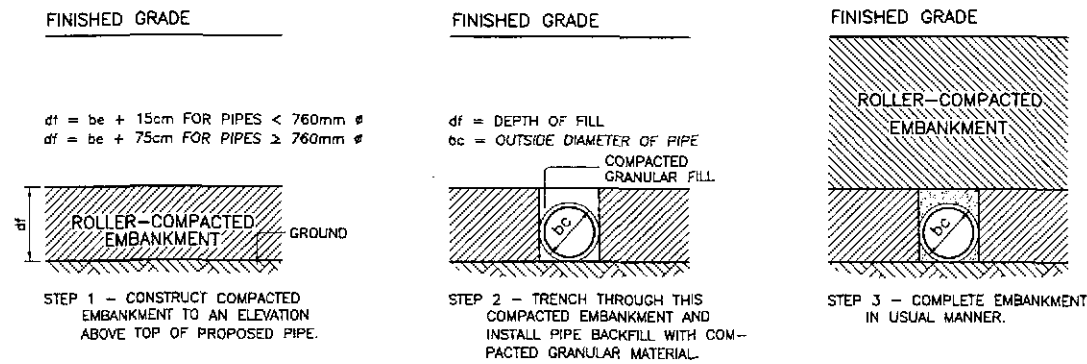


1D SECTION
 DS-06

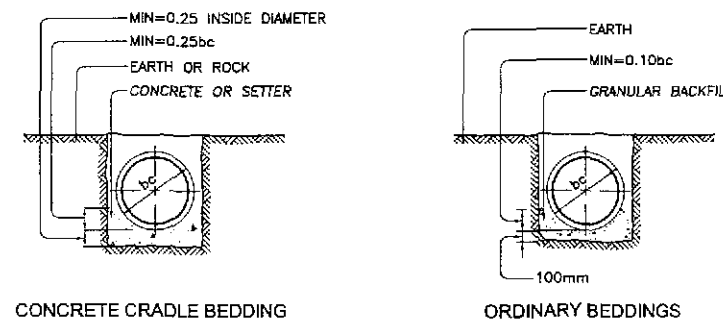


1E SECTION
 DS-06

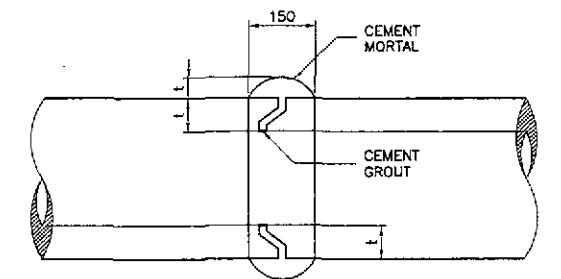
1 STANDARD REINFORCED CONCRETE PIPE CULVERTS
 DS-06 SCALE AS SHOWN



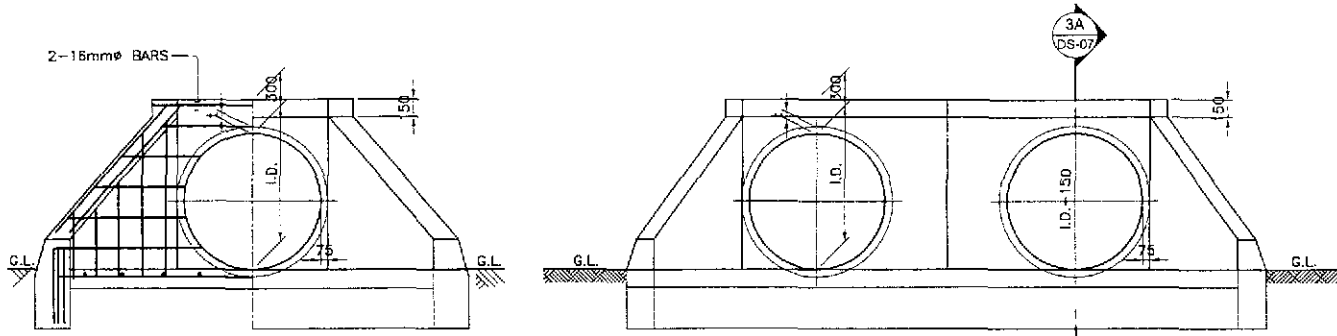
2 METHODS OF PIPE INSTALLATION
 DS-06 NOT TO SCALE



3 TYPICAL BEDDING FOR CONDUITS
 DS-06 NOT TO SCALE

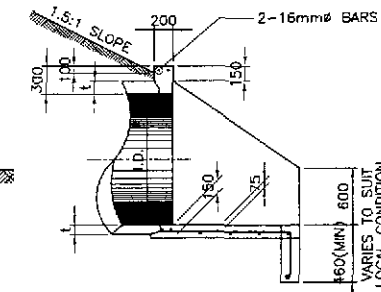


4 DETAIL OF PIPE COLLAR
 DS-06 NOT TO SCALE

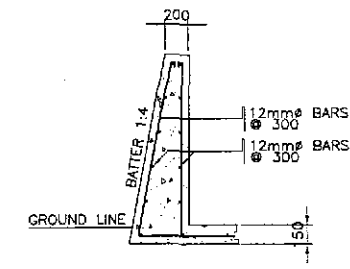


1B ELEVATION
DS-07 NOT TO SCALE

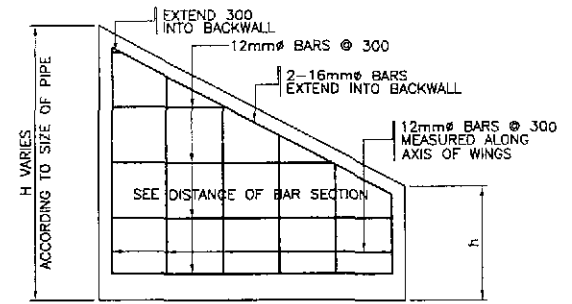
2B ELEVATION
DS-07 NOT TO SCALE



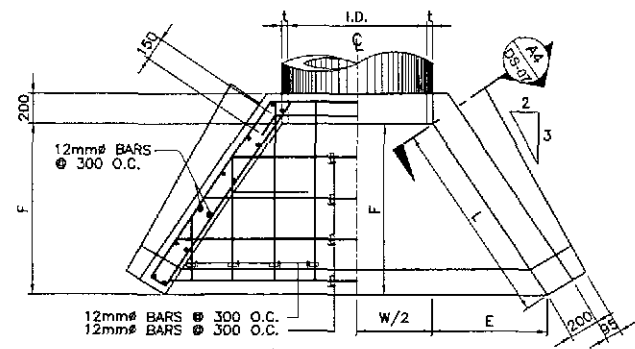
3A SECTION
DS-07 NOT TO SCALE



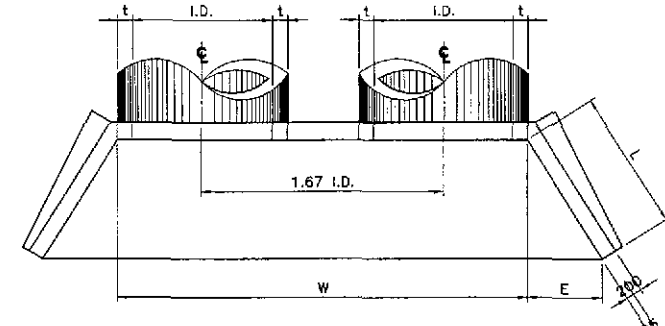
3B SECTION
DS-07 NOT TO SCALE



3C SECTION
DS-07 NOT TO SCALE



1A PLAN
DS-07 N T S



2A PLAN
DS-07 N T S

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

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

TABLE A (ONE FLARED TYPE HEADWALL 1.5:1)

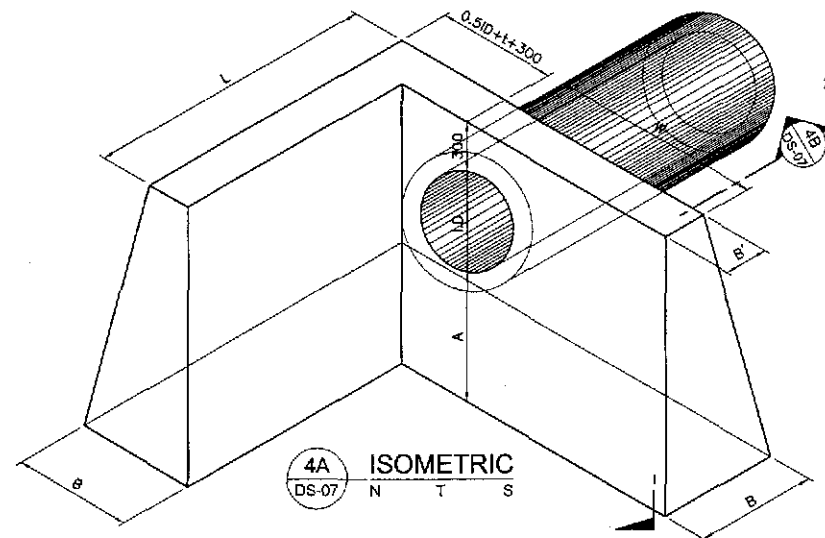
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)				SINGLE PIPE			DOUBLE PIPE			TRIPLE PIPE					
INTERNAL DIAMETER (I.D.)	MIN. THICKNESS SHELL (t)	L	E	F	h	AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES		AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES		AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES	
								CONC. m ³	REINF. STEEL kg.			CONC. m ³	REINF. STEEL kg.			CONC. m ³	REINF. STEEL kg.
460	51	710	390	590	0	0.17	610	0.57	25.65	0.32	1380	0.83	37.35	0.51	2150	1.27	57.15
610	64	960	530	800	0	0.29	760	0.82	36.46	0.58	1780	1.16	48.39	0.87	2800	1.75	76.75
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	3.66	178.20
1220	108	2040	1130	1690	600	1.17	1370	2.66	110.27	2.34	3400	3.71	154.77	3.51	5360	5.36	241.34
1520	127	2540	1410	2110	600	1.81	1680	3.93	174.74	3.63	4229	5.47	228.18	5.43	6760	6.76	304.20

TABLE C (ONE L-TYPE HEADWALL)

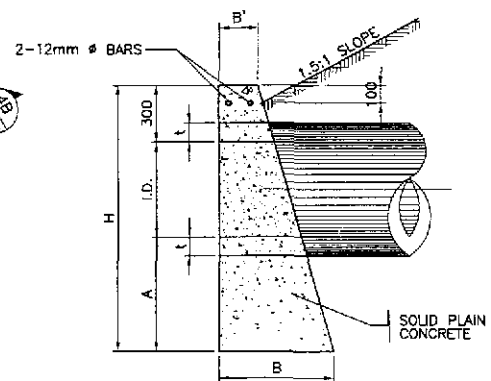
DIA. & THICKNESS (mm)		DIMENSIONS (mm)						SINGLE PIPE	
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	B'	H	W	L	CONCRETE m ³	REINF. STEEL kg.
610	64	410	430	200	1320	1220	1220	1.06	8
910	86	610	610	200	1820	1820	1820	2.76	11
1070	95	710	780	300	2080	1970	VARIES	-	-
1220	108	810	870	300	2330	2120	VARIES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

TABLE C (ONE STRAIGHT TYPE HEADWALL)

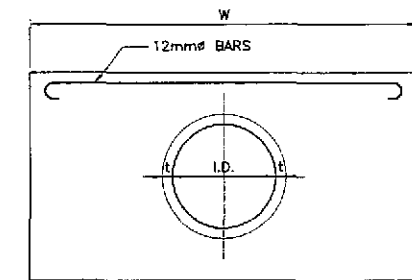
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)			SINGLE PIPE			DOUBLE PIPE			TRIPLE PIPE					
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF.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



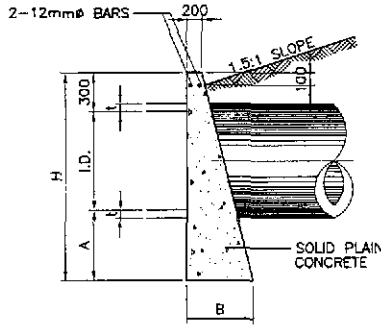
4A ISOMETRIC
DS-07 N T S



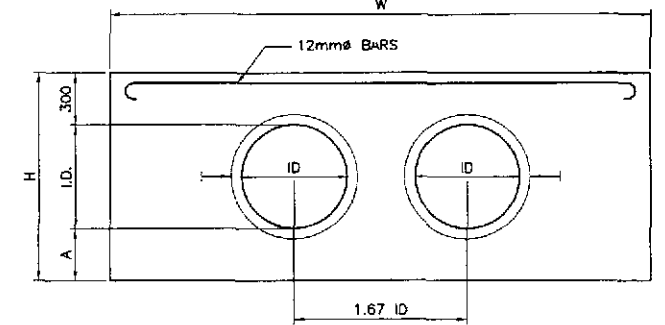
4B SECTION
DS-07 NOT TO SCALE



5A SINGLE PIPE
DS-07 NOT TO SCALE



5B SECTION
DS-07 NOT TO SCALE



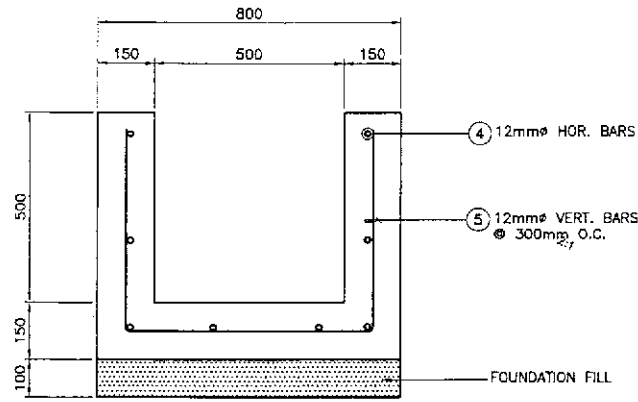
5C DOUBLE PIPE
DS-07 NOT TO SCALE
1-2/3 I.D.

4 L-TYPE HEADWALL
DS-07 NOT AS SHOWN

5 STRAIGHT TYPE HEADWALL
DS-07 NOT AS SHOWN

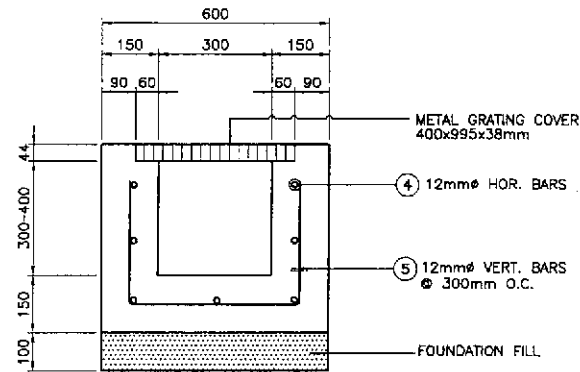
STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC

	DESIGNED	DATE	SIGNATURE		PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	10/25/02	[Signature]		REPUBLIC OF THE PHILIPPINES	THE DETAILED DESIGN STUDY ON	NOT TO SCALE	STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC	DS-07
	SUBMITTED	10/27/02	[Signature]		DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	FULL SIZE A1		
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: SIMEON A. DATUMANONG, Secretary				PLARIDEL BYPASS - CONTRACT PACKAGE II					

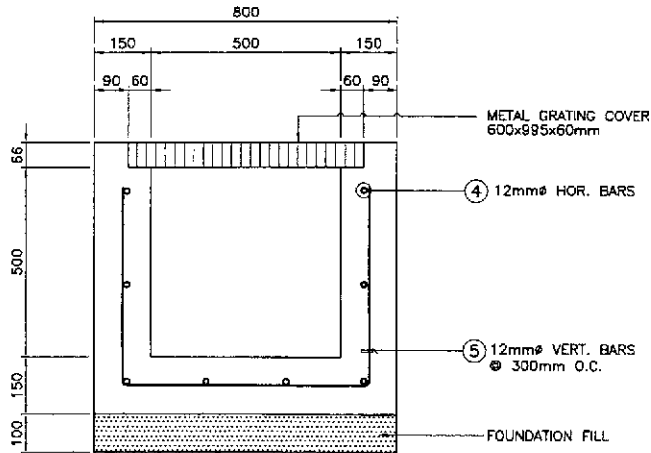


REINFORCED CONCRETE DITCH

2 TYPE U
DS-08 SCALE: 1:10

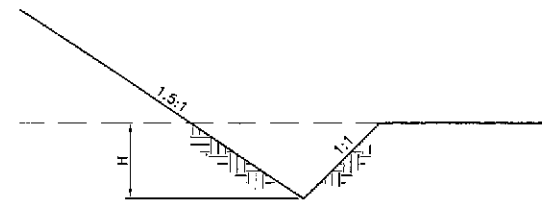


REINFORCED CONCRETE DITCH W/ COVER

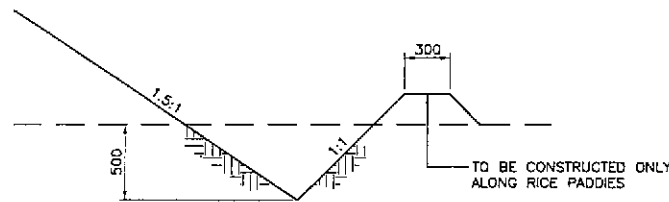


REINFORCED CONCRETE DITCH W/ COVER

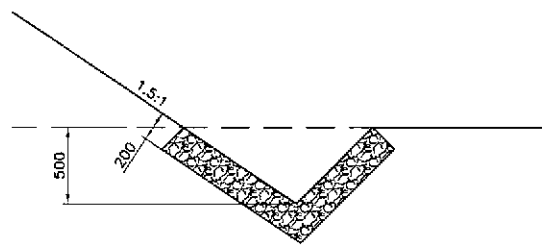
1 TYPE LU
DS-08 SCALE: 1:10



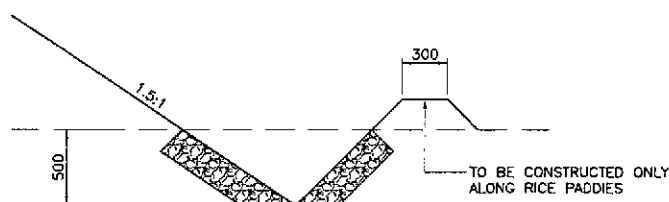
V-SHAPED UNLINED DITCH
TYPE E-4



V-SHAPED UNLINED DITCH
TYPE E-3

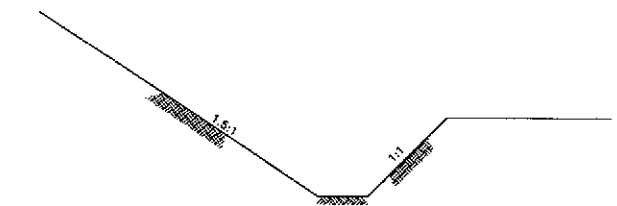


V-SHAPED LINED DITCH
TYPE E-2

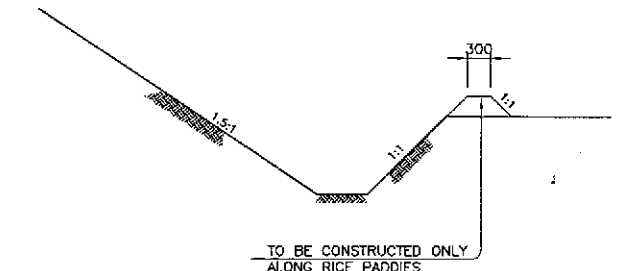


V-SHAPED UNLINED DITCH
TYPE E-1

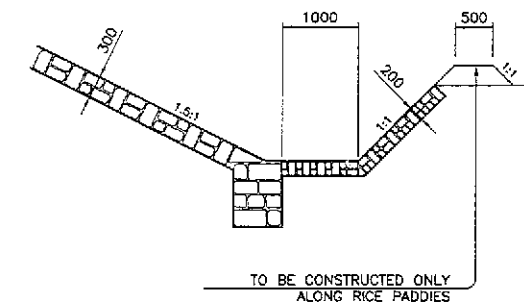
4 TYPE E
DS-08 SCALE: 1:25



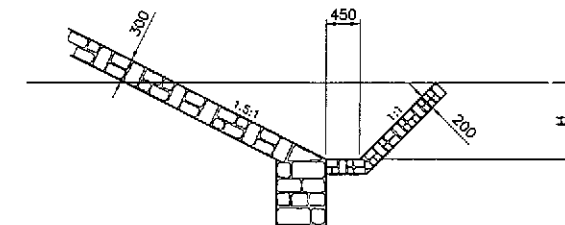
TYPE C-7



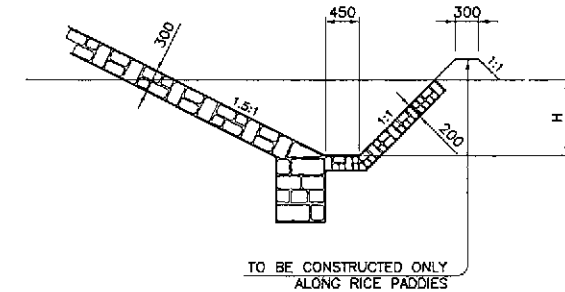
TYPE C-6



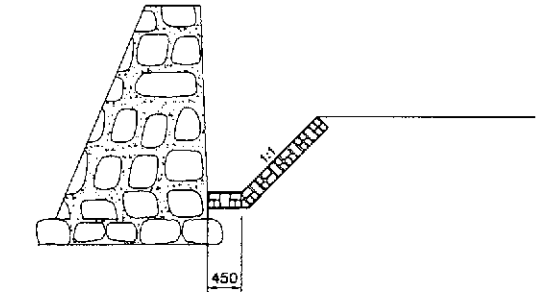
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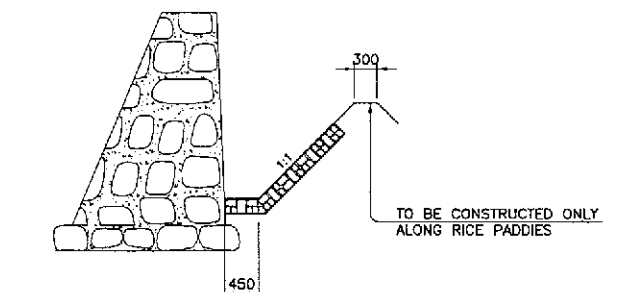
TYPE C-2



TYPE C-1



TYPE C-5

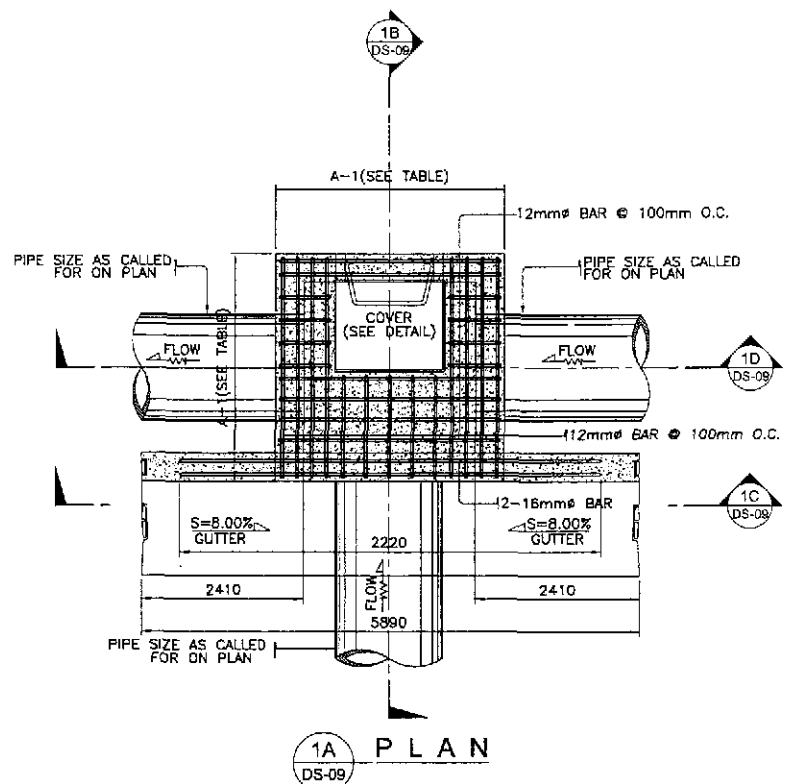


TYPE C-4

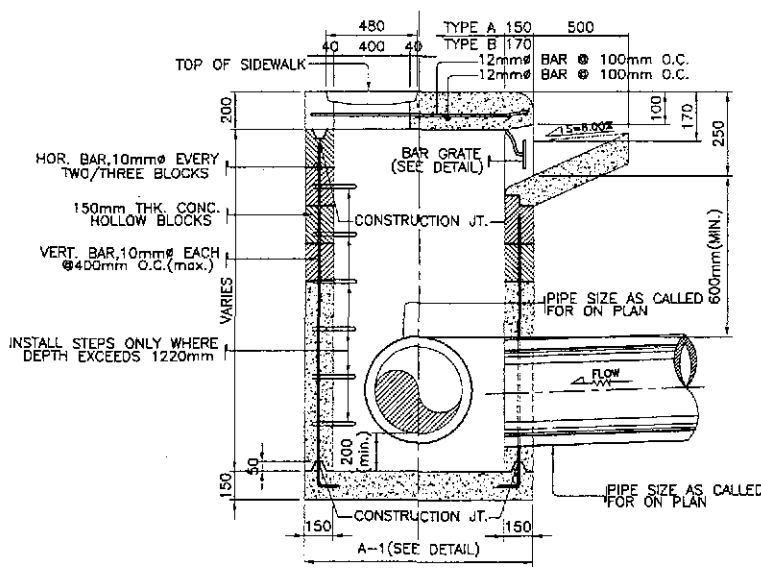
5 TYPE C
DS-08 NOT TO SCALE

STANDARD DRAINAGE DITCHES

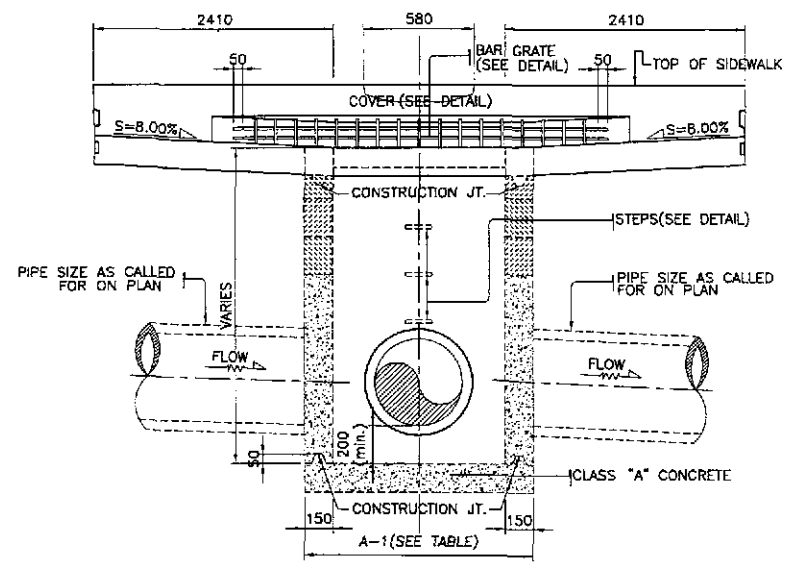
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II	SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : STANDARD DRAINAGE DITCHES	SHEET NO. : DS-08
	CHECKED	10/21/02	[Signature]		DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS						
	SUBMITTED	10/27/02	[Signature]		BUREAU OF DESIGN						
					OFFICE OF THE SECRETARY						
			Submitted By:	Reviewed By:	Recommended By:	Recommended By:	Approved By:				
			DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary				



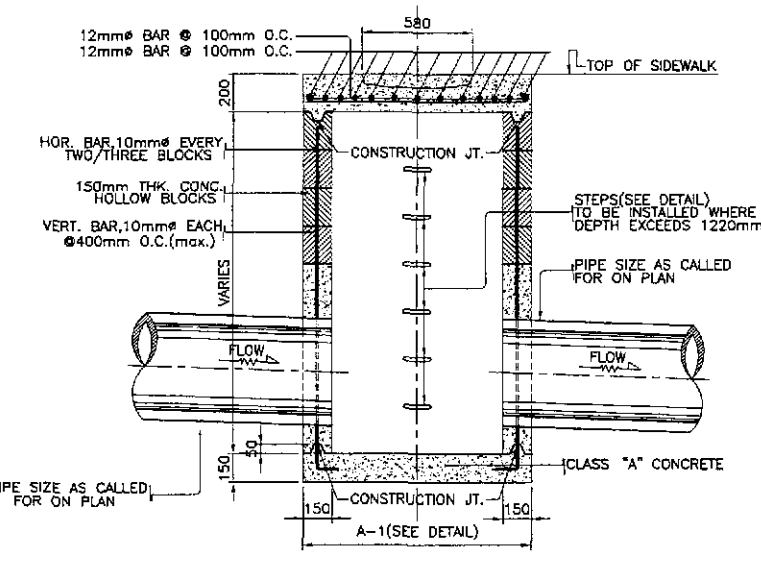
1A PLAN
DS-09



1B SECTION
DS-09

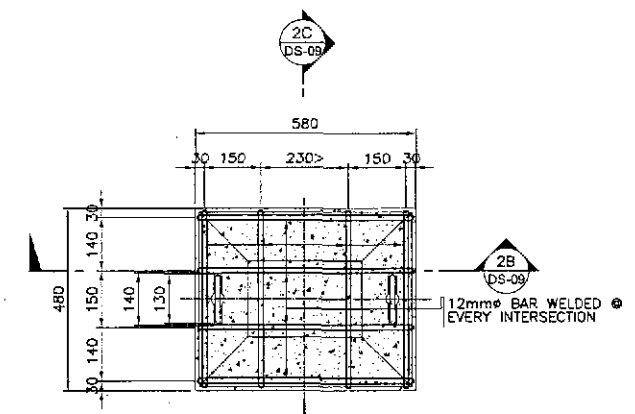


1C SECTION
DS-09 1:20

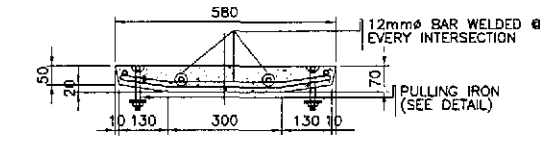


1D SECTION
DS-09

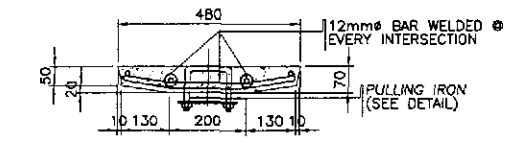
1 CURB INLET MANHOLE
DS-09 SCALE 1:20



2A PLAN
DS-09

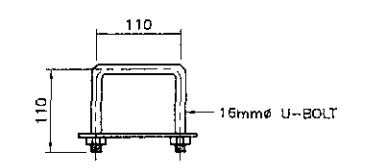


2B SECTION
DS-09

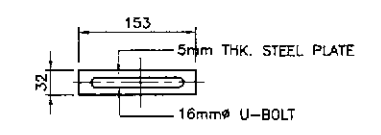


2C SECTION
DS-09

2 CONCRETE COVER DETAIL
DS-09 SCALE 1:10

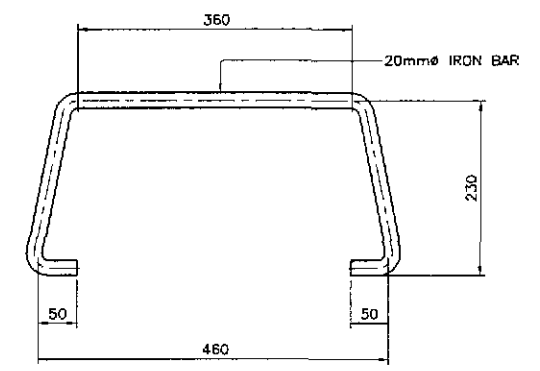


3A PLAN
DS-09

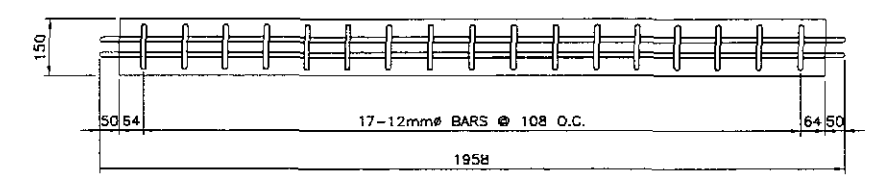


3B ELEVATION
DS-09

3 PULLING IRON DETAIL
DS-09 SCALE 1:5



4 STEP
DS-09 SCALE 1:5



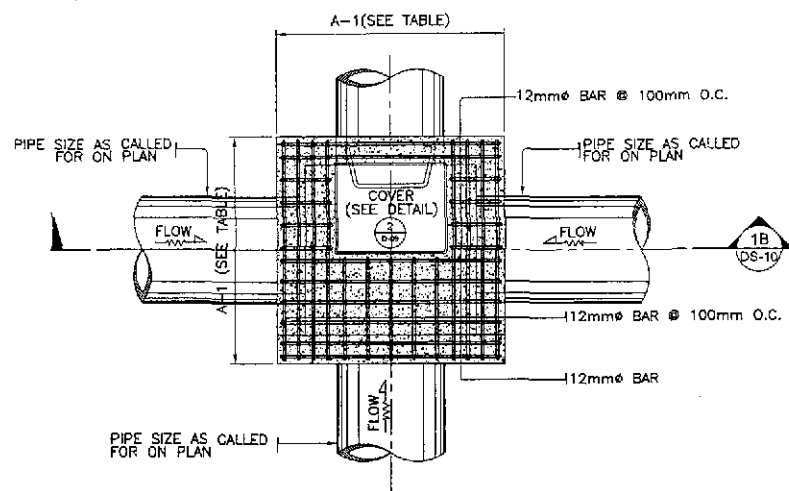
5 DETAIL OF BAR GRATE FOR OPENING OF CURB INLET
DS-09 SCALE 1:20

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.

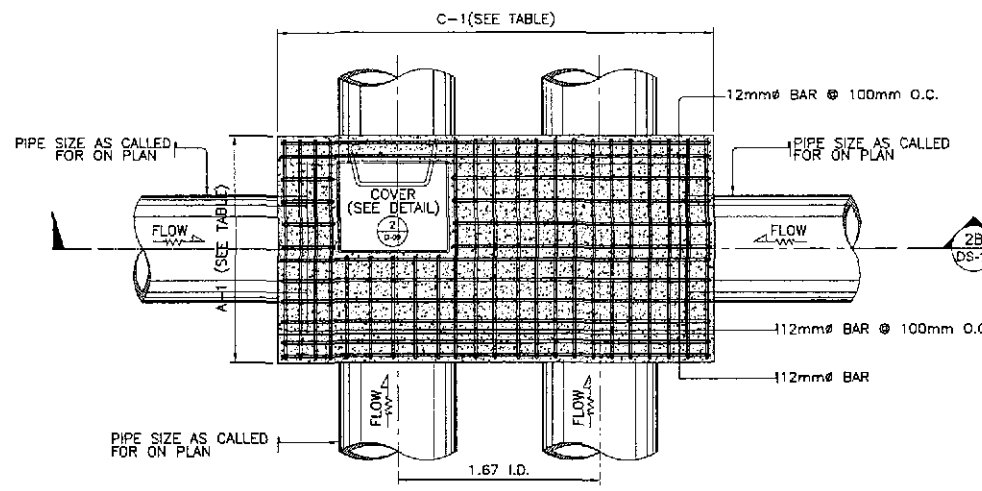
- NOTES:
- ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
 - PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
 - CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
 - CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS SHALL HAVE AN AVERAGE COMPRESSIVE STRENGTH OF 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.

DETAILS OF COMBINATION CURB INLET MANHOLE

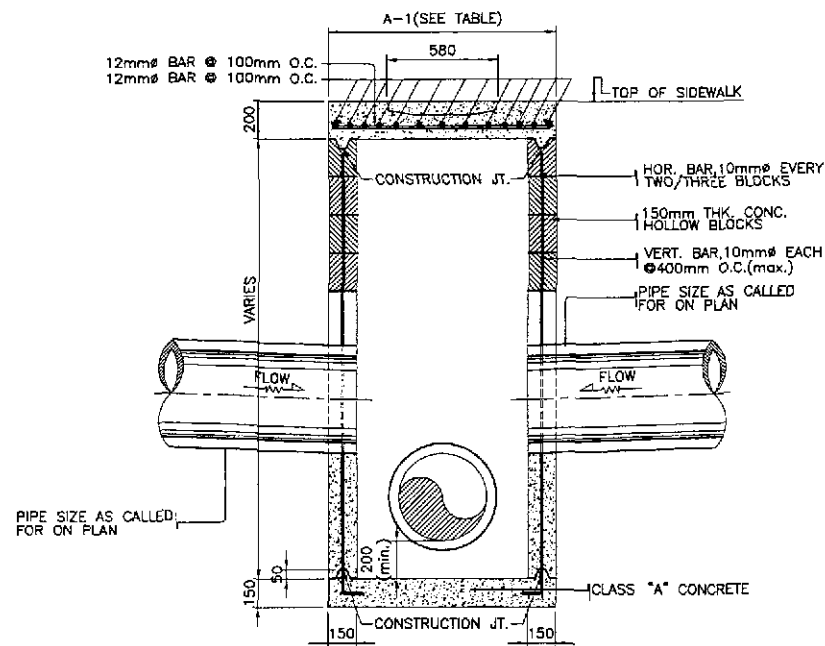
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/26/02	<i>[Signature]</i>		BUREAU OF DESIGN				THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	STANDARD COMBINATION CURB INLET MANHOLE	DS-09
	SUBMITTED	10/26/02	<i>[Signature]</i>		OFFICE OF THE SECRETARY				PLARIDEL BYPASS - CONTRACT PACKAGE II	FULL SIZE A1		
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. BONOAN, Undersecretary Approved By: SIMEON A. DATUMANONG, Secretary				PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II				SCALE :	SHEET CONTENTS :	SHEET NO. :		



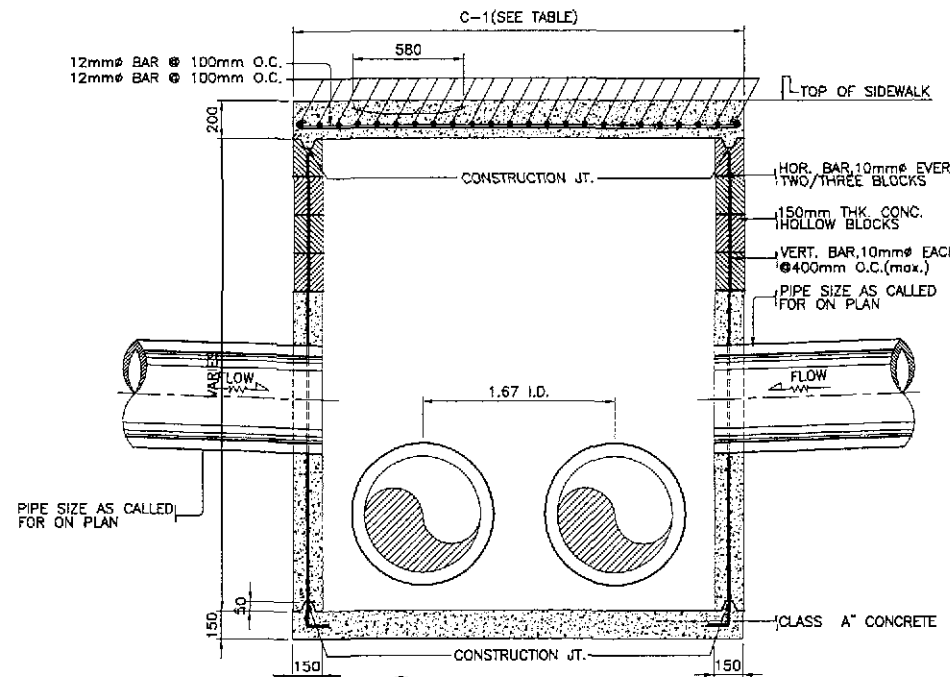
1A PLAN BOX-TYPE MANHOLE (SINGLE PIPE)
DS-10



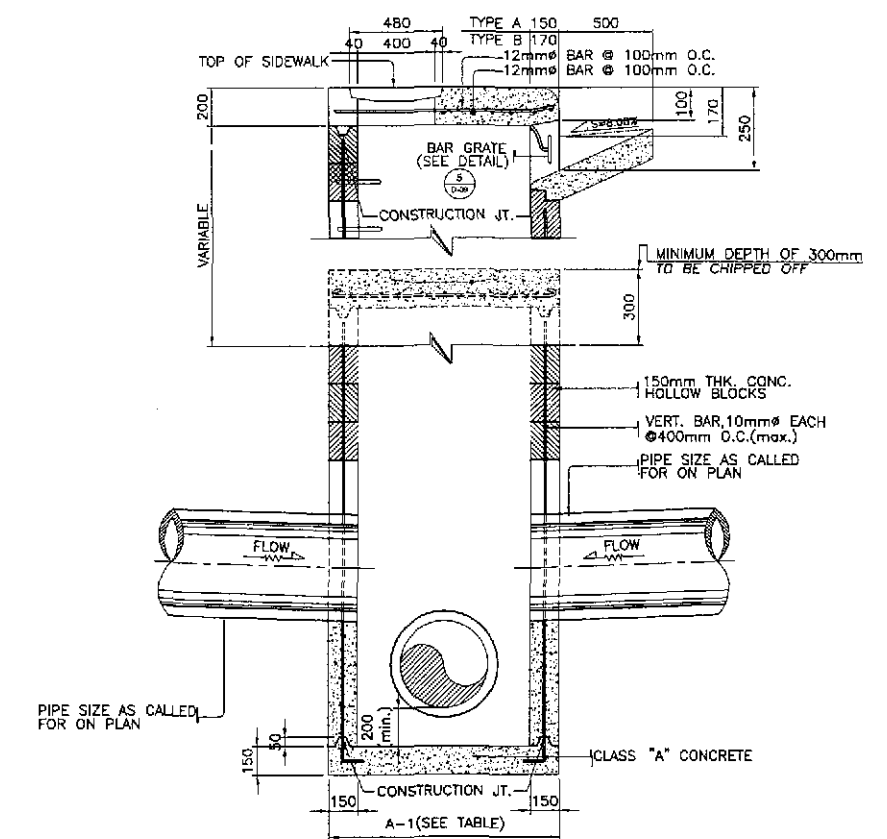
2A PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)
DS-10



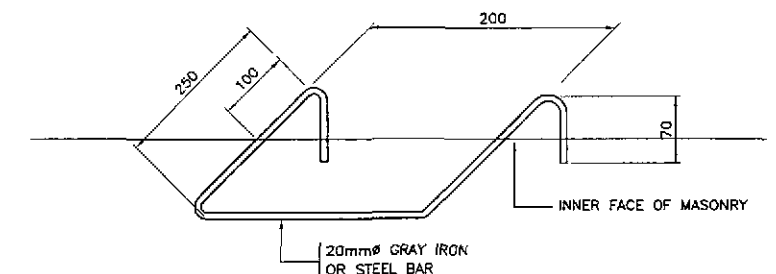
1B SECTION
DS-10



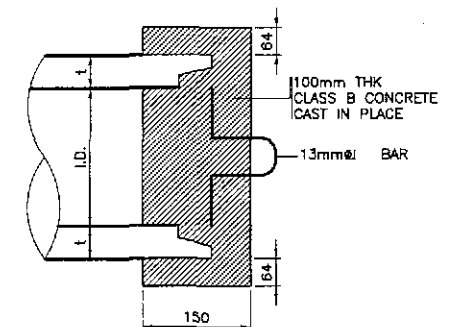
2B SECTION
DS-10



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



4 STD. STEP OR RUNG
DS-10



5 CONCRETE BLOCK PLUG @ SUBSURFACE PIPE
DS-10

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

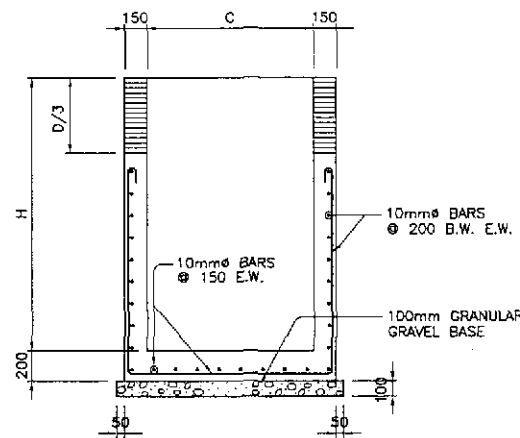
TABLE OF DIMENSION				
TYPE OF CIM	SIZE OF PIPE (mm)	A-1 (m)	C-1 (m)	
T-1	300	1.12	1.92	
T-2	460	1.19	2.26	
T-3	610	1.37	2.69	
T-4	760	1.54	3.11	
T-5	910	1.73	3.55	
T-6	1070	1.90	3.98	
T-7	1220	2.08	4.42	
T-8	1520	2.43	5.27	

NOTES:

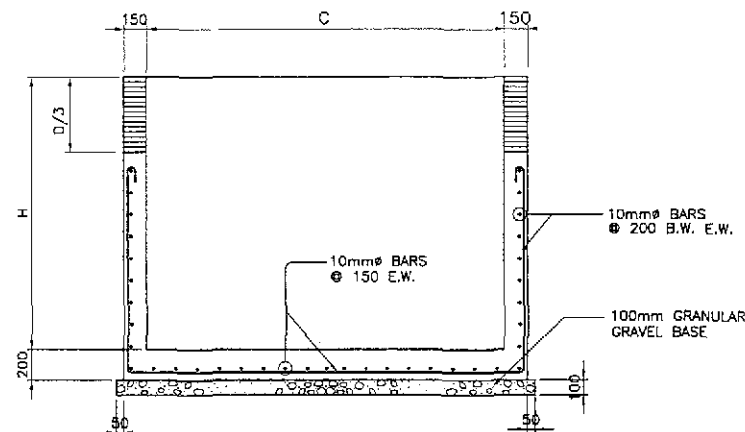
- ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
- PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
- CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
- CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS 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.

SPECIAL JUNCTION BOX MANHOLE

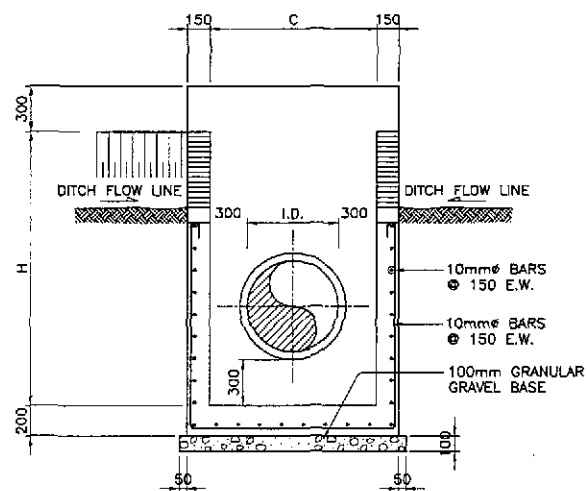
	DESIGNED	DATE	SIGNATURE		PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/25/02	[Signature]		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II	AS SHOWN	SPECIAL JUNCTION BOX MANHOLE
SUBMITTED 10/27/02 [Signature] TEAM LEADER	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: SIMEON A. DATUMANONG Secretary	FULL SIZE A1		



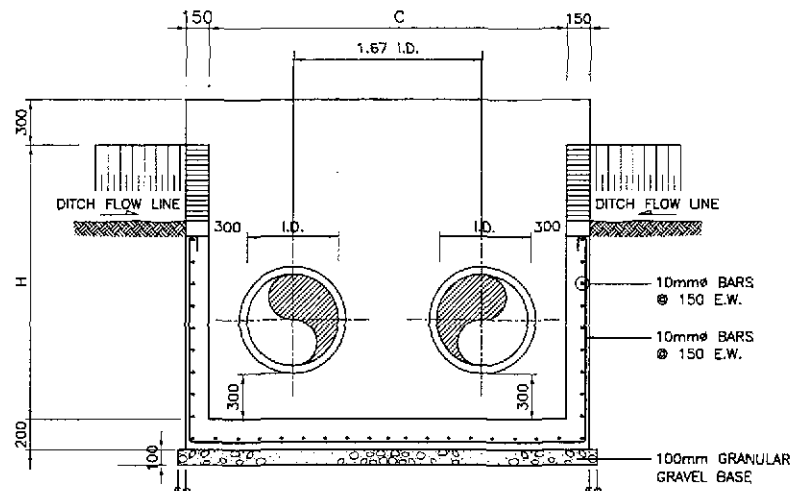
1C SECTION
DS-11



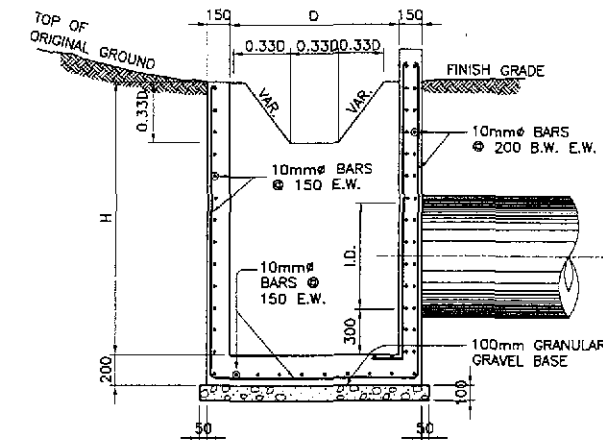
2C SECTION
DS-11



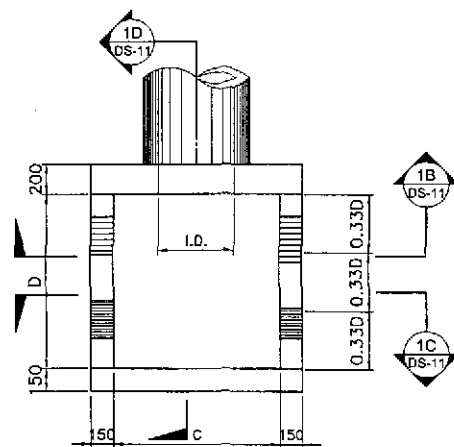
1B SECTION
DS-11



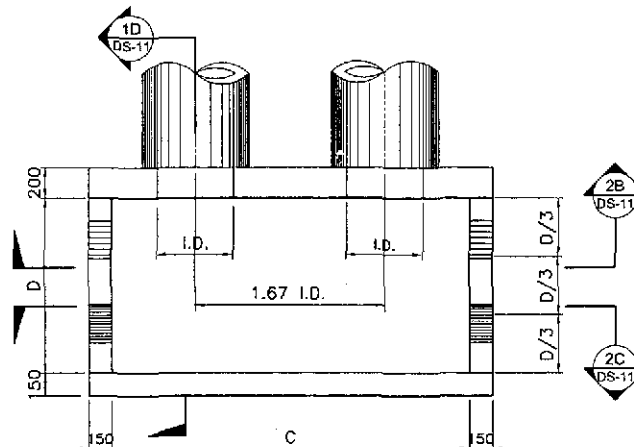
2B SECTION
DS-11



1C SECTION
DS-11



1A PLAN
DS-11



2A PLAN
DS-11

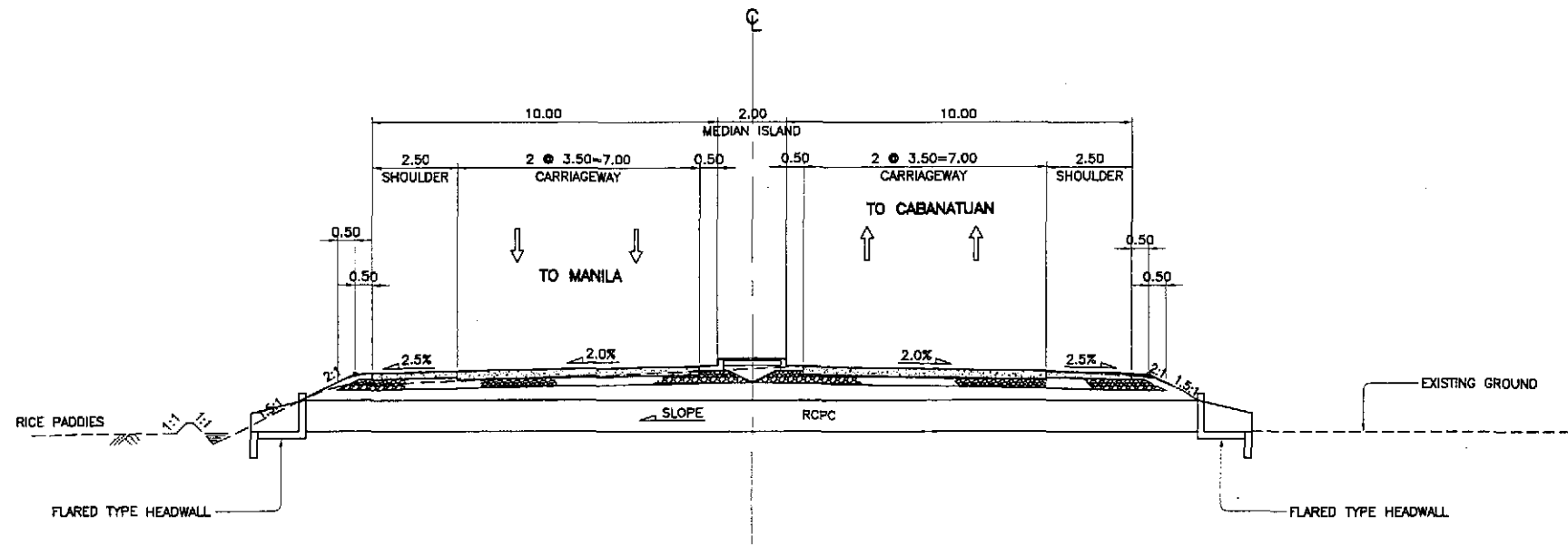
PIPE DIAMETER (mm)		610	910	1070	1220	1520
COMMON TO ALL NUMBER OF BARRELS	H	1.910	2.210	2.370	2.520	2.820
	D	1.200	1.500	1.650	1.800	2.100
SINGLE	C	1.210	1.510	1.670	1.820	2.120
DOUBLE	C	2.230	3.030	3.460	3.860	4.660
TRIPLE	C	3.250	4.550	5.240	5.890	7.120

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

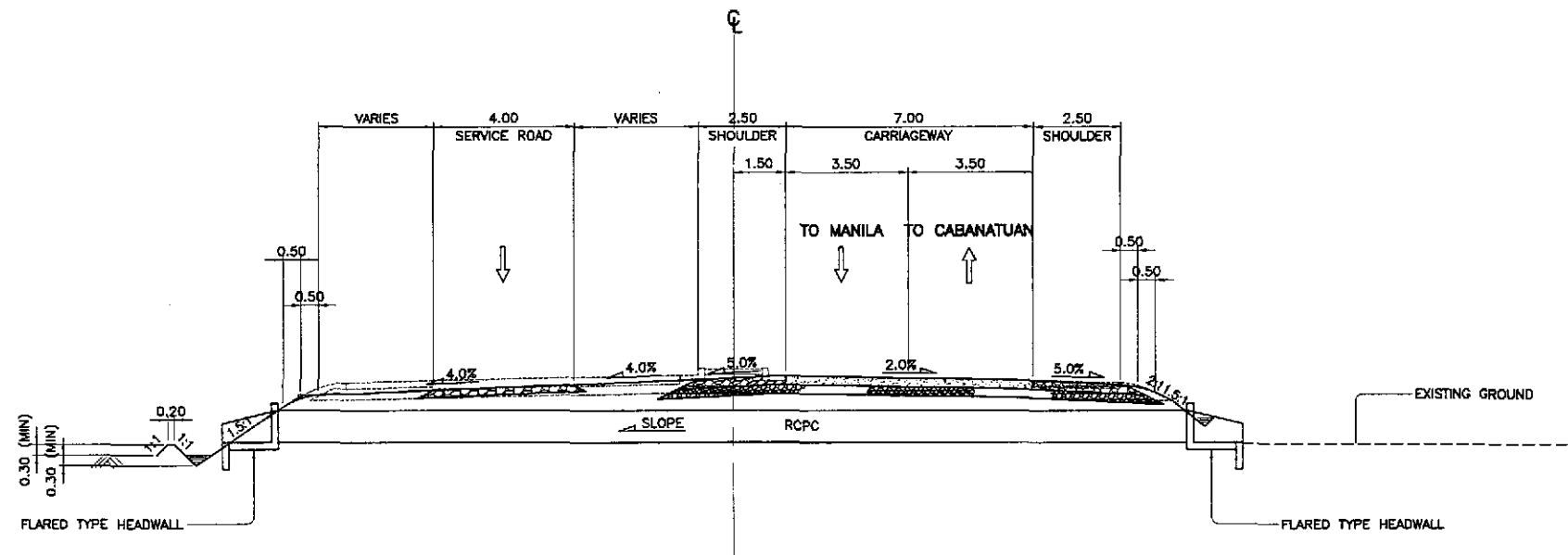
2 CONCRETE CATCH BASIN (DOUBLE PIPE)
DS-11 SCALE 1:25

DETAILS OF REINFORCED CONCRETE CATCH BASIN FOR RCPC

	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/25/02	[Signature]	BUREAU OF DESIGN			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) PLARIDEL BYPASS - CONTRACT PACKAGE II	1:25	STANDARD REINFORCED CONCRETE CATCH BASIN FOR RCPC	DS-11
	CHECKED	10/25/02	[Signature]	OFFICE OF THE SECRETARY						
	SUBMITTED	10/25/02	[Signature]	Submitted By:	Reviewed By:	Recommended By:				
			DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONGAN Undersecretary				
FULL SIZE A1										



2
DS-12 SCALE 1:100
TYPICAL DRAINAGE SECTION (ULTIMATE STAGE)



1
DS-12 SCALE 1:100
TYPICAL DRAINAGE SECTION (INITIAL STAGE)

	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	<p>PROJECT AND LOCATION :</p> <p>THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)</p> <p>PLARIDEL BYPASS - CONTRACT PACKAGE II</p>	SCALE :	<p>SHEET CONTENTS :</p> <p>TYPICAL DRAINAGE SECTIONS (INITIAL and ULTIMATE STAGE)</p>	SHEET NO. :
	CHECKED	10/25/02	<i>[Signature]</i>			BUREAU OF DESIGN		NOT TO SCALE
	SUBMITTED	10/27/02	<i>[Signature]</i>			Submitted by:		FULL SIZE A1
						Reviewed By:		
			Team Leader	Recommended By:				
			Project Director	Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary	