

# **DRAINAGE**

## SCHEDULE OF DRAINAGE STRUCTURES

WATERSHED		STATION	SKEW	FINISHED GRADE ELEV. (m)	CULVERT CHARACTERISTICS							STRUCTURES		CULVERT FLOW CAPACITY (cms)	REMARKS	RECOMMENDATION		
					INVERT ELEVATION (m)			SLOPE	RCPC (mm dia.)	RCBC (SxH) (mxm)	LENGTH (m)						INLET	OUTLET
NO.	Q (cms)	(kms)		LEFT	CENTER	RIGHT							LEFT	RIGHT	TOTAL			
<b>MAIN BYPASS</b>																		
1	8.67	119+007	50' RF	34.396	32.00	32.05	32.10	0.00256	1-910		19.50	19.50	39.00	F	F	0.94	IRRIGATION STRUCTURE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
		119+241	35' RF	33.304	29.55	29.60	29.65	0.00319		1-2.40x2.40	15.70	15.60	31.30	W	W	15.58	IRRIGATION STRUCTURE	CONSTRUCT RCBC. PROVIDE WINGWALLS.
2	<b>BRIDGE NO. 10</b>															<b>NEW BRIDGE</b>		
	119+534.178			<b>FIRST APPROACH</b>														
120+659.878			<b>SECOND APPROACH</b>															
3	1.87	121+128	10' RF	35.365	31.60	31.65	31.70	0.00312	1-910		16.00	16.00	32.00	F	F	1.04	IRRIGATION STRUCTURE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
		121+284	30' RF	36.145	31.20	31.30	31.40	0.00426	1-1070		23.50	23.50	47.00	F	F	3.75	STORM WATER DRAINAGE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
		121+406	55' RF	36.755	34.30	34.40	34.50	0.00339	1-910		31.00	28.00	59.00	F	F	1.09	IRRIGATION STRUCTURE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
		121+460		37.025	34.60	34.65	34.70	0.00303	1-910		16.50	16.50	33.00	F	F	1.03	STORM WATER DRAINAGE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.
<b>ACCESS ROAD</b>																		
<b>STA. 121 + 381.056 - ROAD INTERSECTION A-21a</b>																		
		0+082		36.560	34.80	34.82	34.85	0.00633	1-1070		3.00	3.00	6.00	F	F	2.62	LATERAL PIPE	INSTALL. PROVIDE FLARED TYPE HEADWALLS.

**LEGEND:**  
 S - STRAIGHT      W - WINGWALL  
 F - FLARED

## SCHEDULE OF SIDE DITCH

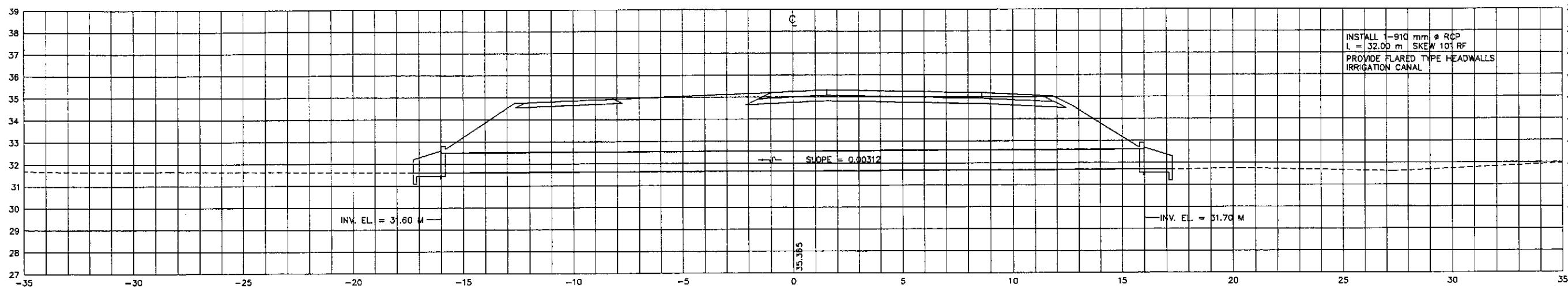
STATION		LENGTH (m)	TYPE	LOCATION	REMARKS
FROM	TO				
<b>SIDE DITCH ( MAIN BYPASS )</b>					
118+990	119+110	120.00	C-1	LEFT SIDE	LINED
119+020	119+140	120.00	C-2	RIGHT SIDE	LINED
119+130	119+230	100.00	C-3	LEFT SIDE	LINED
119+140	119+220	80.00	E-2	RIGHT SIDE	LINED
121+390	121+460	70.00	E-1	LEFT SIDE	LINED
<b>SIDE DITCH ( ACCESS ROAD )</b>					
<b>ROAD INTERSECTION A-21</b>					
0+900.00	0+950.00	50.00	U	RIGHT SIDE	LINED
0+930.00	0+960.00	30.00	C-3	LEFT SIDE	LINED
1+060.00	1+100.00	40.00	U	LEFT SIDE	LINED

## QUANTITIES FOR RCBC

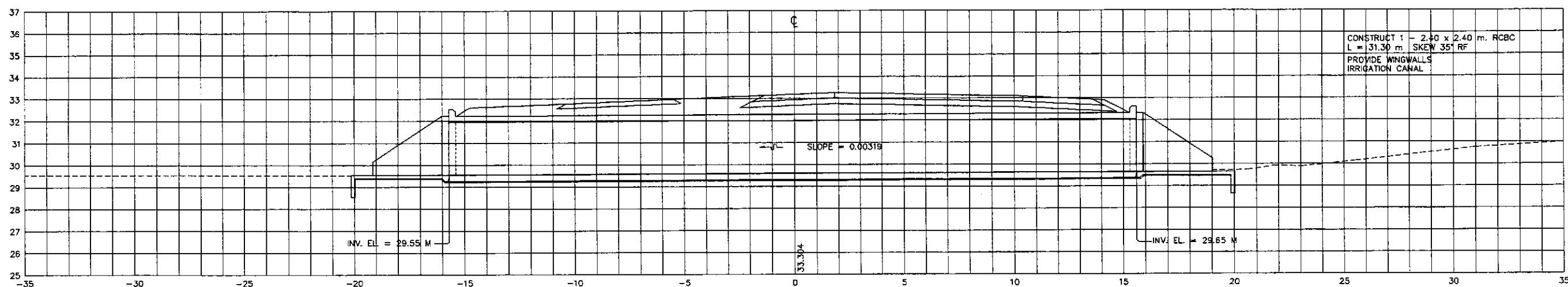
STATION	SIZE	ITEM 103 (1)	ITEM 103 (3) a		ITEM 404 (1)		ITEM 405 (1) a		ITEM 405 (B)	
		STRUCTURAL EXCAVATION (m <sup>3</sup> )	GRAVEL	FONDATION FILL (m <sup>3</sup> )	REINFORCING BAR (GRADE 40) (kg)	STRUCTURAL CONCRETE CLASS "A" (m <sup>3</sup> )	LEAN CONCRETE (m <sup>3</sup> )	RCBC	WW	
		RCBC & WW	RCBC	WW	RCBC	WW	RCBC	WW	RCBC	WW
<b>MAIN BYPASS</b>										
<b>STA. 119 + 000.000 - STA. 121 + 600.000</b>										
119+241	1-2.40x2.40	164.95	9.39	5.36	9,831.33	1,260.00	72.30	22.84	4.70	2.68
<b>T O T A L</b>		164.95	9.39	5.36	9,831.33	1,260.00	72.30	22.84	4.70	2.68

	DATE: 10/18/02 DESIGNED: [Signature] CHECKED: 10/17/02 SUBMITTED: 10/19/02	SIGNATURE: [Signature] P.J.M. - 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 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) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : SCHEDULE OF DRAINAGE STRUCTURES & SIDE DITCH / QUANTITIES FOR RCBC	SHEET NO. : DG-01
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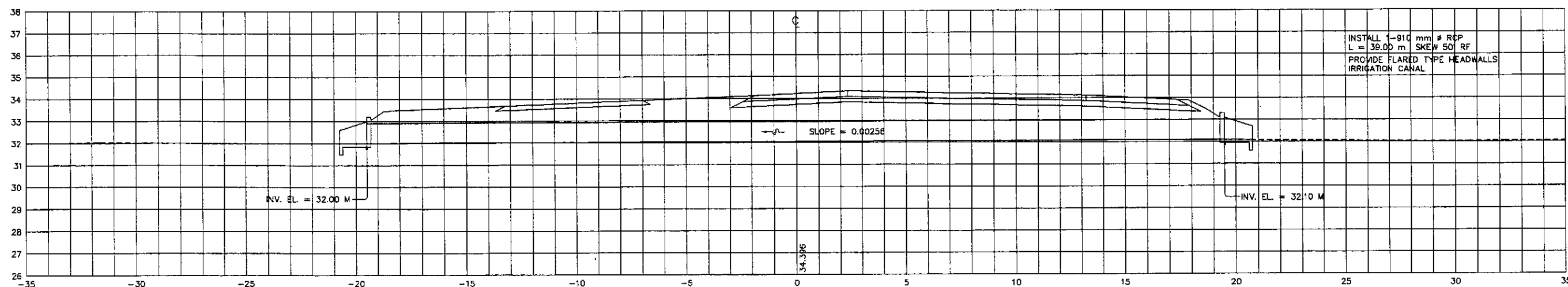
121+128



119+241



119+007



**JICA**  
JAPAN INTERNATIONAL COOPERATION AGENCY

**KATAHIRA & ENGINEERS**  
INTERNATIONAL

**YEO** YACHIYO ENGINEERING CO., LTD.

DESIGNED	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		
CHECKED	10/18/02	[Signature]	BUREAU OF DESIGN		
SUBMITTED	10/19/02	[Signature]	OFFICE OF THE SECRETARY		
Submitted By: DANILO C. TRAJANO Project Director			Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OIC, Director IV	Approved By: MANUEL M. BONGAN Undersecretary

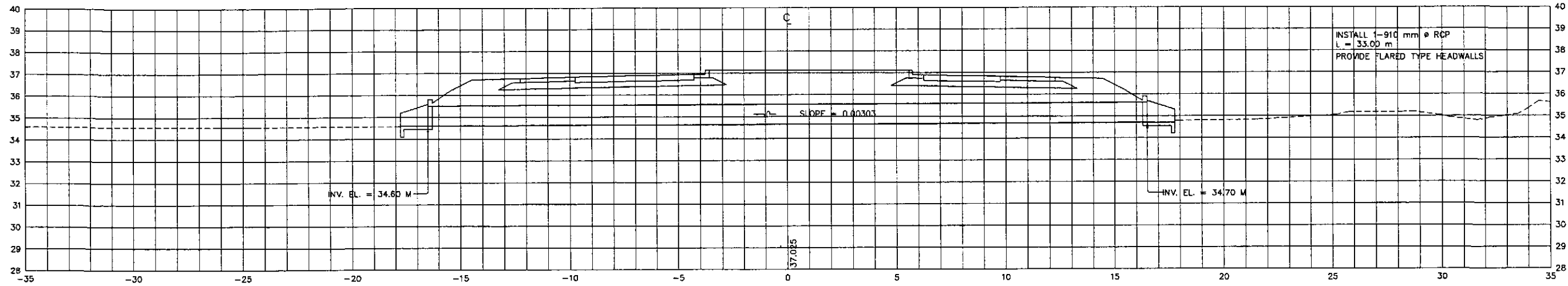
PROJECT AND LOCATION :  
THE DETAILED DESIGN STUDY ON  
UPGRADING INTER-URBAN HIGHWAY SYSTEM  
ALONG THE PAN-PHILIPPINE HIGHWAY  
(Plaridel, Cabanatuan and San Jose Bypasses)  
CABANATUAN BYPASS - CONTRACT PACKAGE III

SCALE :  
1:100  
FULL SIZE A1

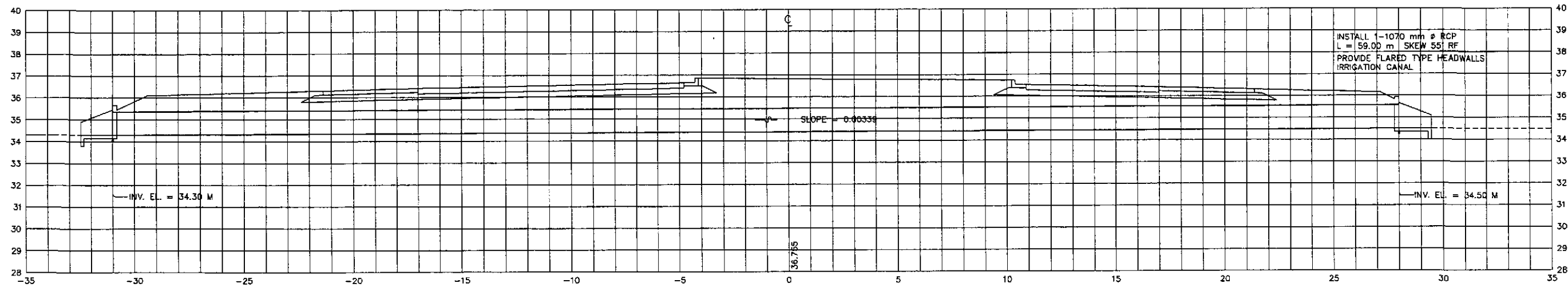
SHEET CONTENTS :  
DRAINAGE CROSS-SECTION  
ALONG BYPASS ( INITIAL STAGE )  
STA. 119+007 - STA. 121+128

SHEET NO. :  
DC-01

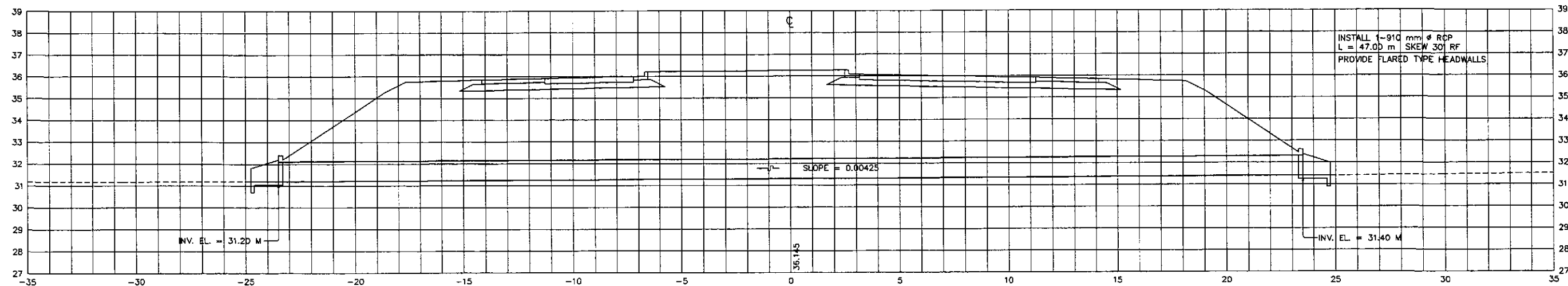
121+460



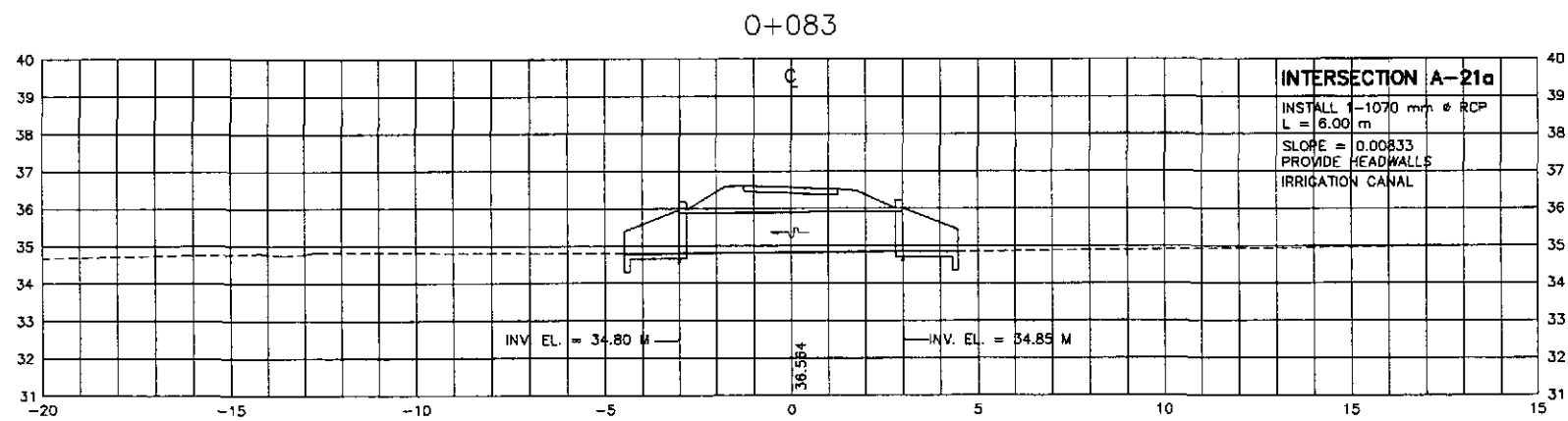
121+406



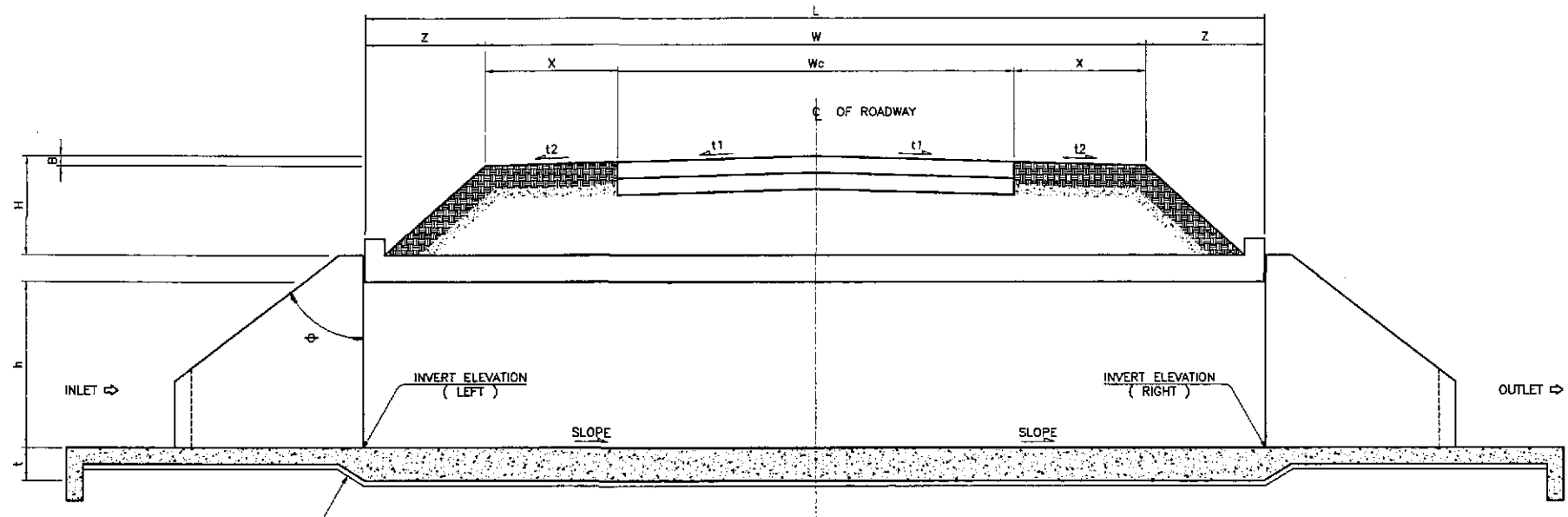
121+284



	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	PROJECT AND LOCATION :			SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	10/17/02	<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. 121+284 - STA. 121+460	DC-02
	SUBMITTED	10/19/02	<i>[Signature]</i>		OFFICE OF THE SECRETARY	CABANATUAN BYPASS - CONTRACT PACKAGE III			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 OC, Director IV		MANUEL M. BONGAON 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	10/26/02		BUREAU OF DESIGN		OFFICE OF THE SECRETARY		<b>THE DETAILED DESIGN STUDY ON            UPGRADING INTER-URBAN HIGHWAY SYSTEM            ALONG THE PAN-PHILIPPINE HIGHWAY            (Plaridel, Cabanatuan and San Jose Bypasses)</b>  <b>CABANATUAN BYPASS - CONTRACT PACKAGE III</b>	1:100	<b>DRAINAGE CROSS-SECTION            ALONG ACCESS ROAD            INTERSECTION A-21a</b>	<b>DC-03</b>
	CHECKED	10/27/02		Submitted By:	Reviewed By:	Recommended By:	Approved By:				
SUBMITTED	10/29/02		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				



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

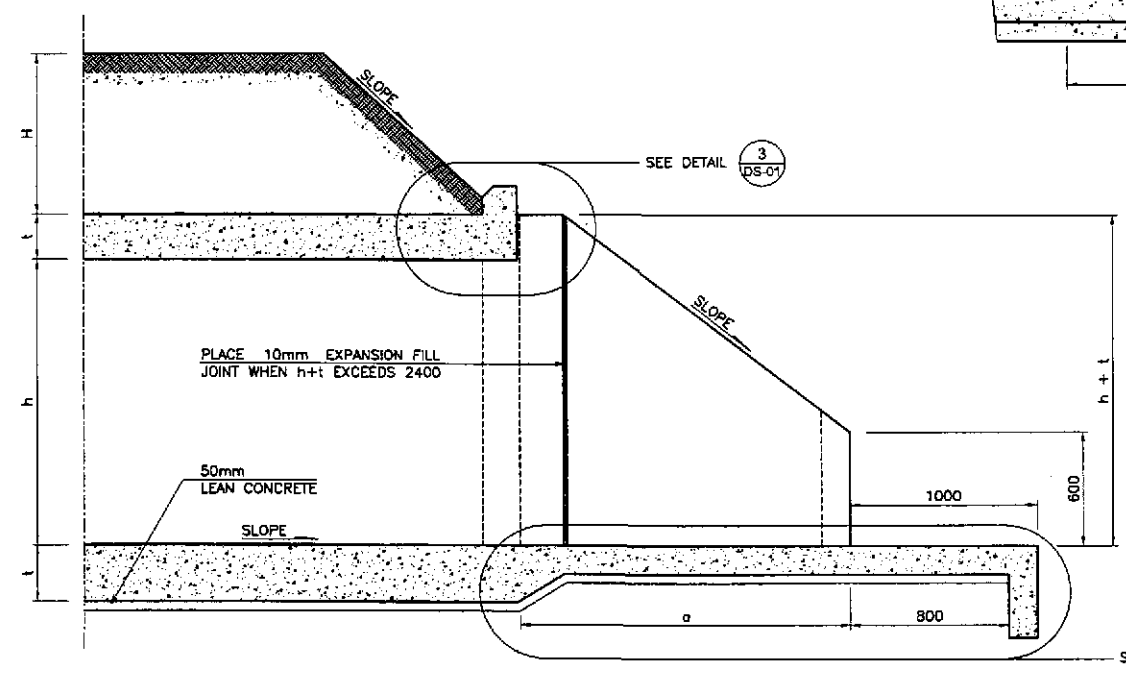
LEGEND:

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

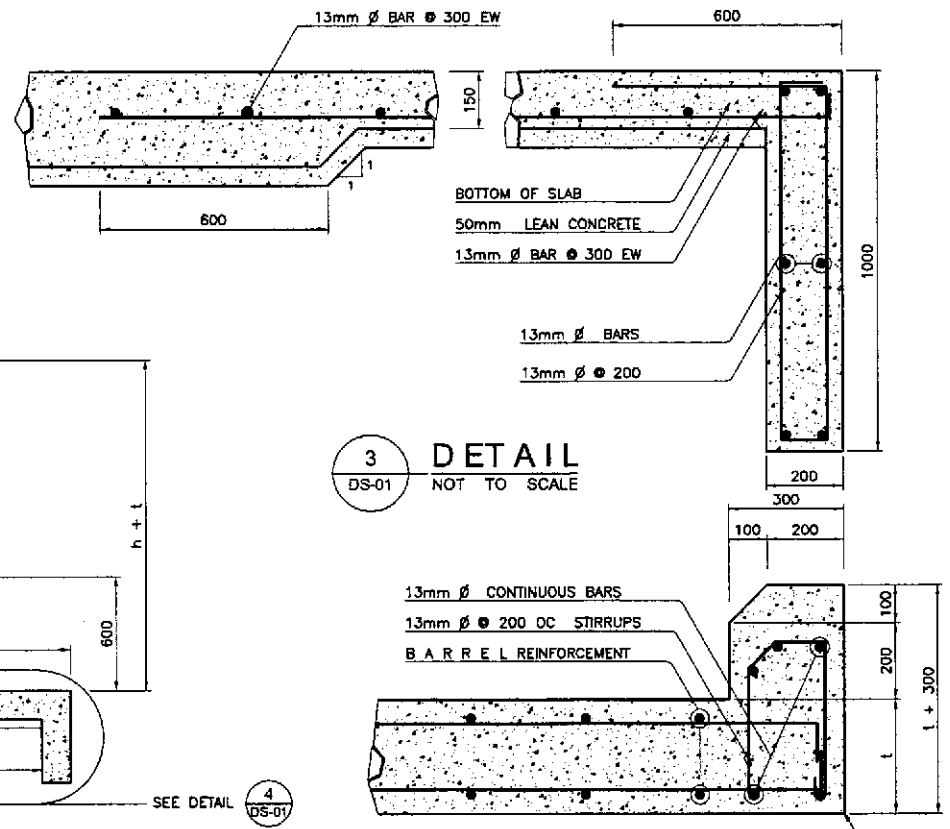
HORIZONTAL SKEW ANGLE CC	L (mm)
90°	$W + 2t \tan \phi [(H+t) - (B+200)]$
60°	$1.1547 (W + 2t \tan \phi [(H+t) - (B+200)])$
45°	$1.4142 (W + 2t \tan \phi [(H+t) - (B+200)])$

NOTES:

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.



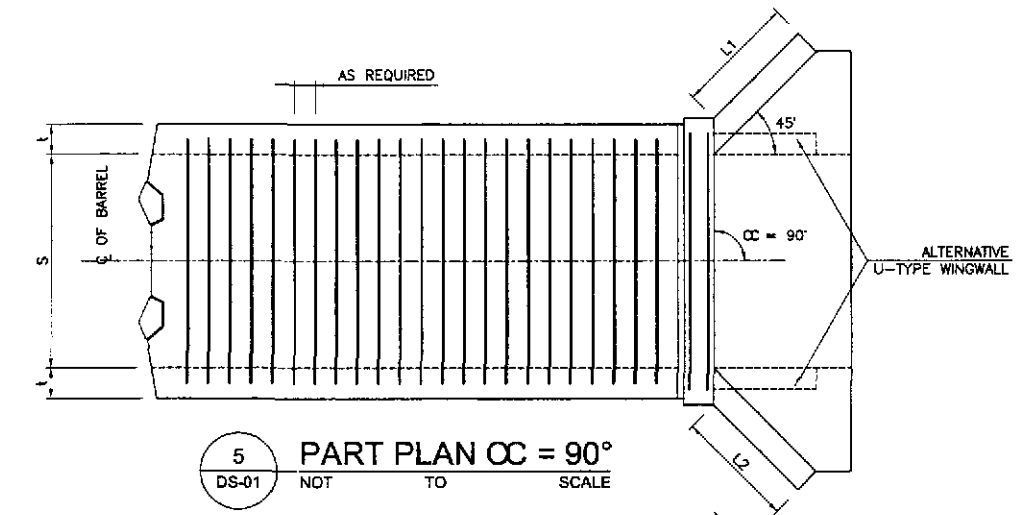
2 PART SECTION ALONG C OF CULVERT  
DS-01 NOT TO SCALE



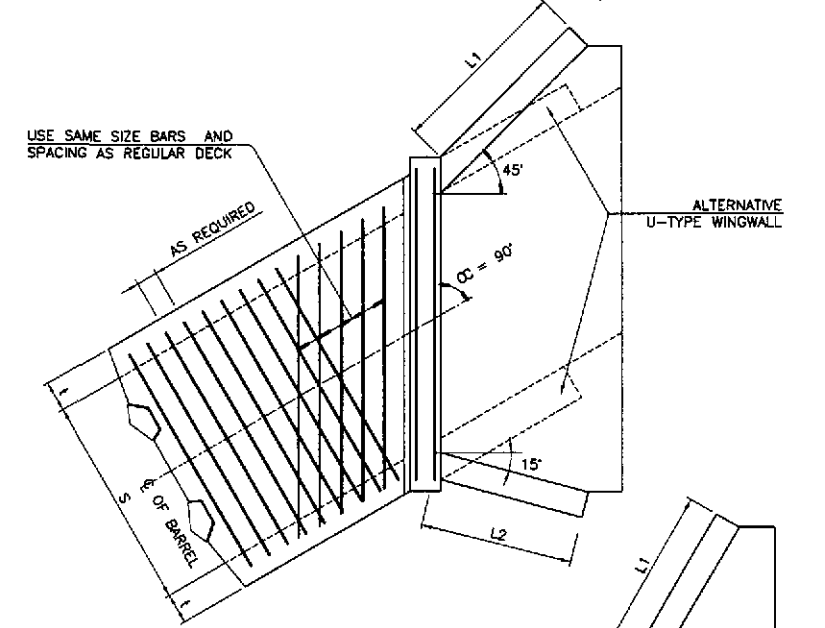
3 DETAIL  
DS-01 NOT TO SCALE

4 DETAIL  
DS-01 NOT TO SCALE

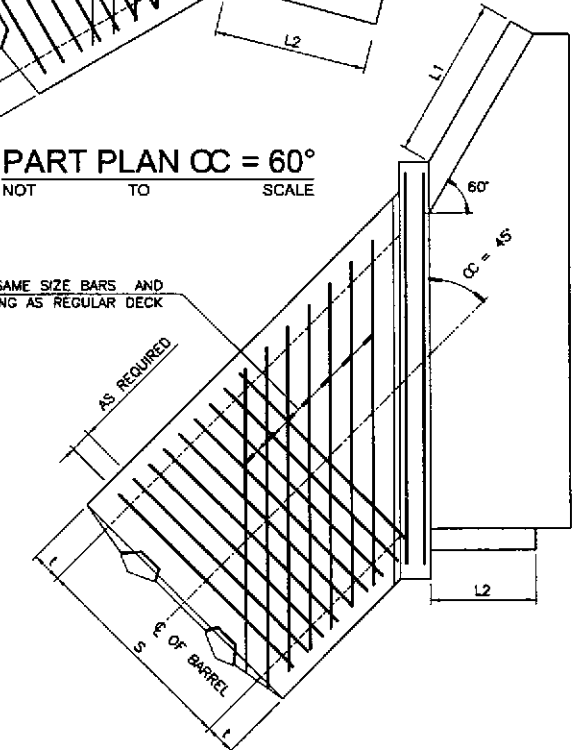
ROUND TO APPROXIMATE 150mm RADIUS (FOR INLET PORTION ONLY)



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



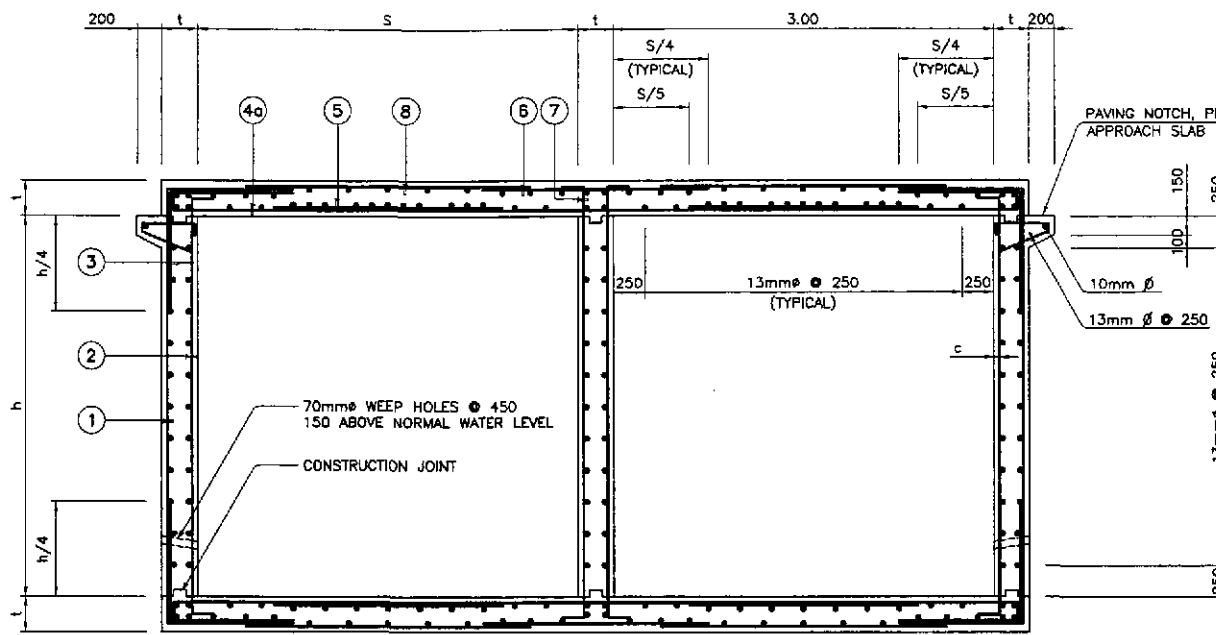
6 PART PLAN CC = 60°  
DS-01 NOT TO SCALE



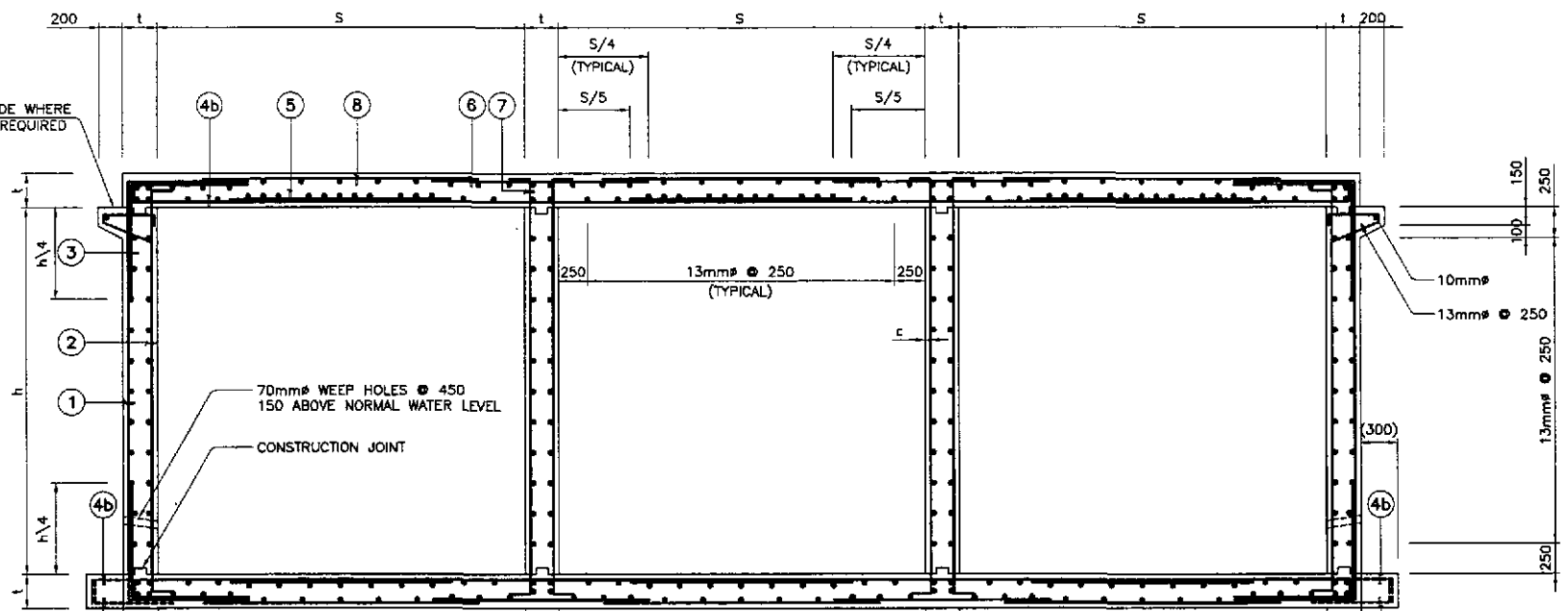
7 PART PLAN CC = 45°  
DS-01 NOT TO SCALE

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

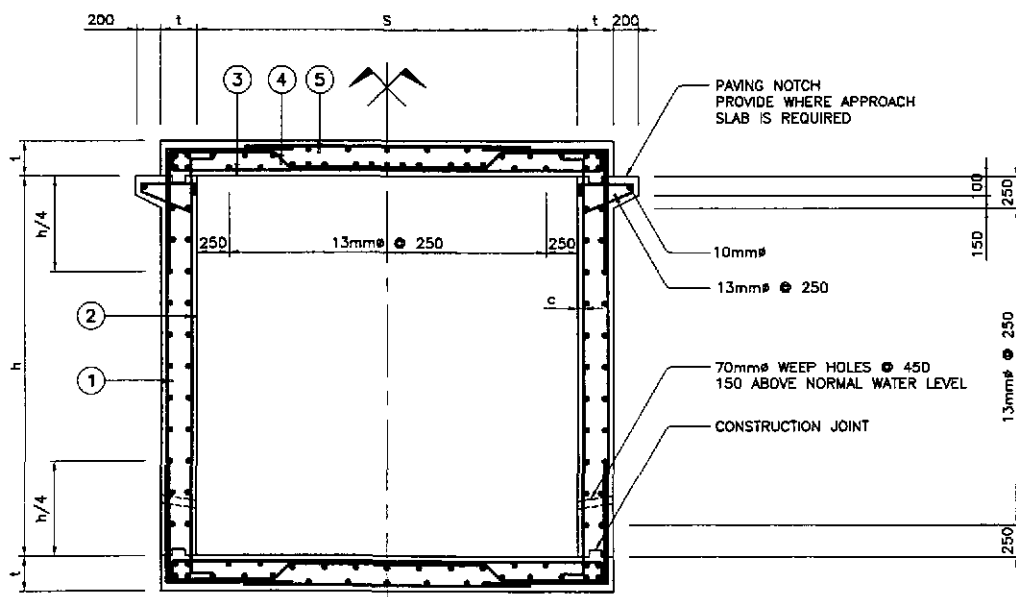
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)	SHEET NO. : DS-01	
	CHECKED				BUREAU OF DESIGN							
	SUBMITTED				OFFICE OF THE SECRETARY							
					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. BONGAON Undersecretary	SIMEON A. DATUMANONG Secretary			



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



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



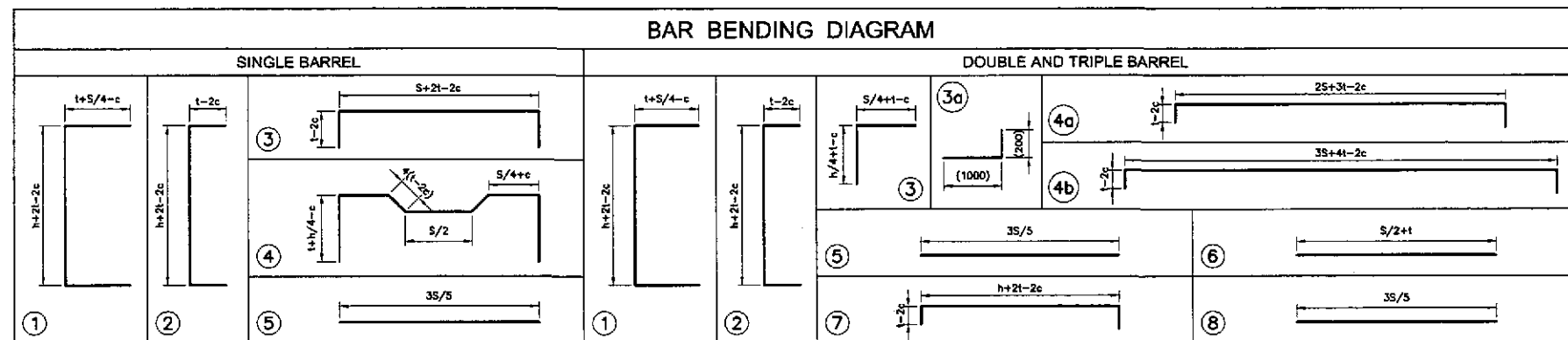
**1 SINGLE BARREL SECTION**  
 DS-02 SCALE 1:30

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



CLEAR SPAN S	HEIGHT h	t	SINGLE BARREL BOX CULVERT										DOUBLE AND TRIPLE BARREL BOX CULVERT																
			BAR 1	BAR 2	BAR 3	BAR 4	BAR 5	BAR 1	BAR 2	BAR 3	BAR 4	BAR 5	BAR 6	BAR 7	BAR 8														
			Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	Ø	SPACING	
1250	1000	180	13	300	13	300	13	300	13	300	13	300	180	13	300	13	300	13	300	13	300	13	300	20	200	13	300	13	300
	1250	180	13	300	13	300	13	300	13	300	13	300	180	13	300	16	300	13	300	13	300	13	300	20	200	13	300	13	300
	1500	180	13	300	13	280	13	300	13	300	13	300	180	13	300	16	280	13	300	13	300	13	300	20	200	13	300	13	300
	1800	180	13	300	13	260	13	300	13	300	13	300	180	13	300	16	260	13	300	13	300	13	300	20	200	13	300	13	300
1500	1000	180	16	240	16	300	16	240	16	240	13	300	200	16	300	16	300	16	300	16	300	16	300	20	200	13	300	13	280
	1250	180	16	240	16	300	16	240	16	240	13	300	200	16	300	16	300	16	300	16	300	16	300	20	200	13	300	13	280
	1500	180	16	240	16	280	16	240	16	240	13	300	200	16	300	16	280	16	300	16	300	16	300	20	200	13	300	13	280
	1800	180	16	240	16	280	16	240	16	240	13	300	200	16	300	16	260	16	300	16	300	16	300	20	200	13	300	13	280
1800	1250	200	16	260	16	300	16	260	16	260	13	280	250	16	300	16	300	16	300	16	300	16	300	20	190	13	300	13	220
	1500	200	16	260	16	300	16	260	16	260	13	280	250	16	300	16	280	16	300	16	300	16	300	20	190	13	300	13	220
	1800	200	16	260	16	280	16	260	16	260	13	280	250	16	300	16	280	16	300	16	300	16	300	20	190	13	300	13	220
	2100	200	16	260	16	260	16	260	16	260	13	280	250	16	300	16	260	16	300	16	300	16	300	20	190	13	300	13	220
2400	1800	220	16	220	16	280	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2100	220	16	220	16	280	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2400	220	16	220	16	200	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
3000	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	15	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200
	2400	280	16	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200
	2750	280	16	260	16	240	16	220	16	220	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	16	300	13	200

**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	10/17/07	[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)	1:30	STANDARD DETAILS OF RCBC BARRELS	DS-02
SUBMITTED	10/19/07	[Signature]	OFFICE OF THE SECRETARY					CABANATUAN BYPASS - CONTRACT PACKAGE III	FULL SIZE A1				

QUANTITIES FOR STANDARD BOX CULVERTS							
SPAN S	HEIGHT h	QUANTITY PER METER OF BARREL					
		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	296.18
	1250	1.03	121.63	1.77	216.22	2.51	312.39
	1500	1.12	130.98	1.90	232.07	2.69	330.39
	1800	1.23	141.71	2.07	249.50	2.91	352.09
1500	1000	1.03	165.90	2.04	253.90	2.92	354.80
	1250	1.12	177.10	2.19	256.00	3.12	370.20
	1500	1.21	189.60	2.34	279.60	3.32	387.10
	1800	1.32	202.50	2.52	296.20	3.58	407.10
1800	1250	1.38	189.20	3.11	312.30	4.45	437.00
	1500	1.48	199.90	3.30	326.10	4.70	454.00
	1800	1.60	214.80	3.53	342.80	5.00	475.20
	2100	1.72	239.60	3.75	357.50	5.30	494.40
2400	1800	2.04	272.70	5.04	431.80	7.20	619.10
	2100	2.17	288.50	5.31	447.30	7.56	637.10
	2400	2.31	314.10	5.58	461.80	7.92	656.40
	2750	2.46	356.70	5.90	478.60	8.34	677.70
3000	2100	3.17	308.70	6.03	635.70	8.64	899.70
	2400	3.34	321.30	6.30	652.00	9.00	919.60
	2750	3.53	374.40	6.82	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 (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	1.76	3.48	220	4.08	265	4.72	300	
2.12	1.68	2.29	4.56	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	
4.08	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, 18th 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=0 THE TOP OF SURFACE OF THE UPPER SLAB SHALL FOLLOW THE CROWN OF THE FINISHED ROADWAY. THE BOX CULVERT SHALL BE CONSTRUCTED ON A LAYER OF LEAN CONCRETE 50mm MINIMUM THICKNESS.

**LIVE LOAD DISTRIBUTION REINFORCEMENT :**

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

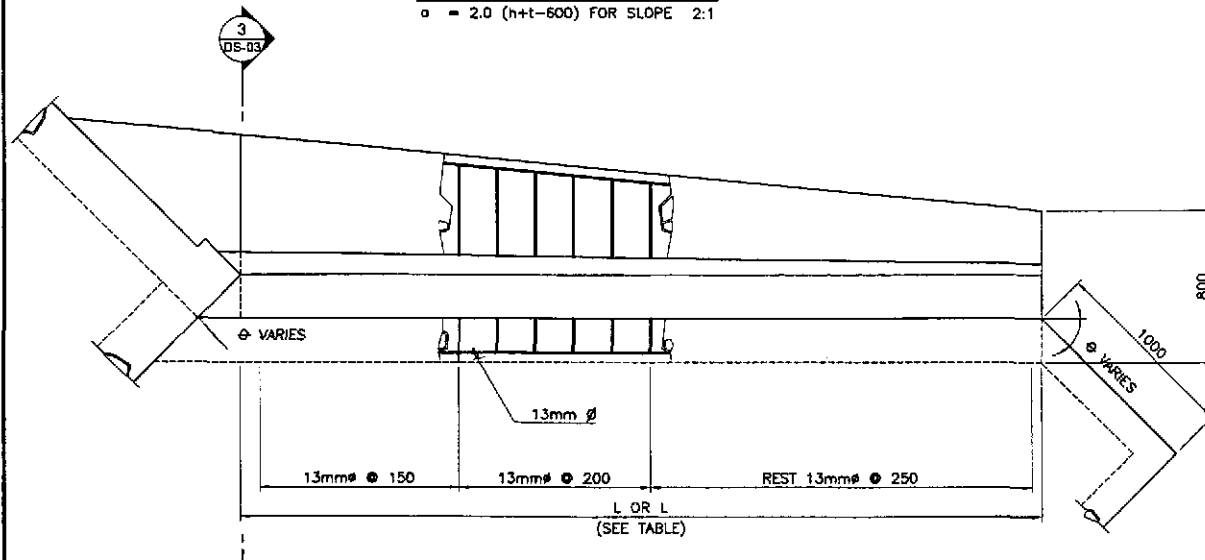
**HEIGHT OF FILL :**

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

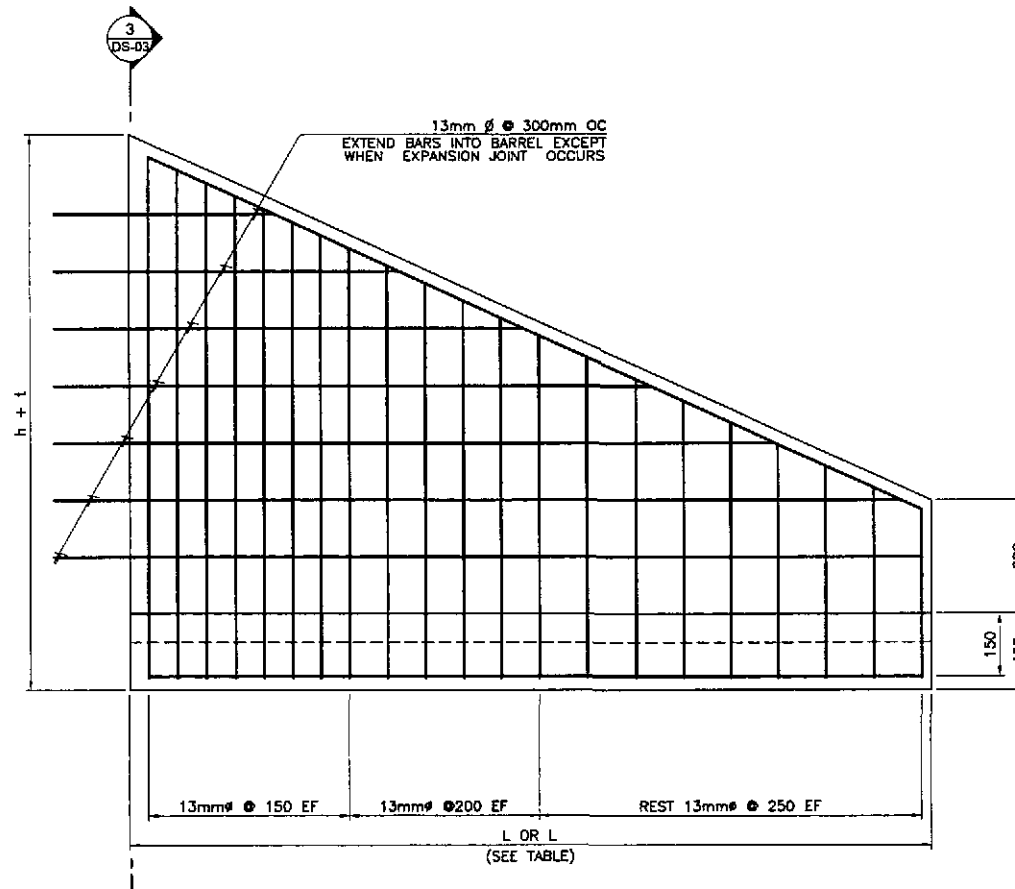
HORIZONTAL SKEW ANGLE CC	LENGTH OF WINGWALLS
90°	$L_1 = L_2 = 1.414a$
60°	$L_1 = 1.414a$ $L_2 = 1.035a$
45°	$L_1 = 2.000a$ $L_2 = a$

**WHERE :**

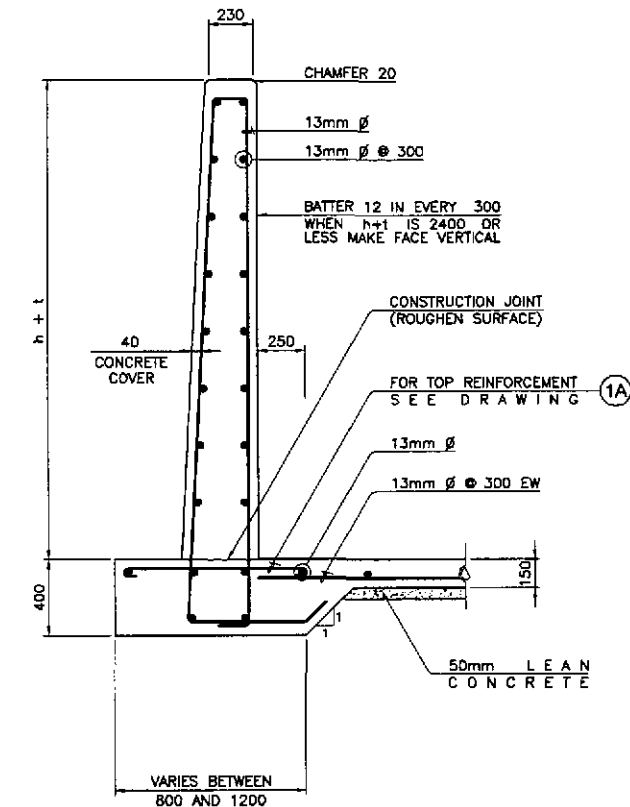
$a = 1.5 (h+t-600)$  FOR SLOPE 1.5:1  
 $a = 2.0 (h+t-600)$  FOR SLOPE 2:1



**1 WINGWALL PLAN**  
SCALE 1:40



**2 WINGWALL ELEVATION**  
SCALE 1:40

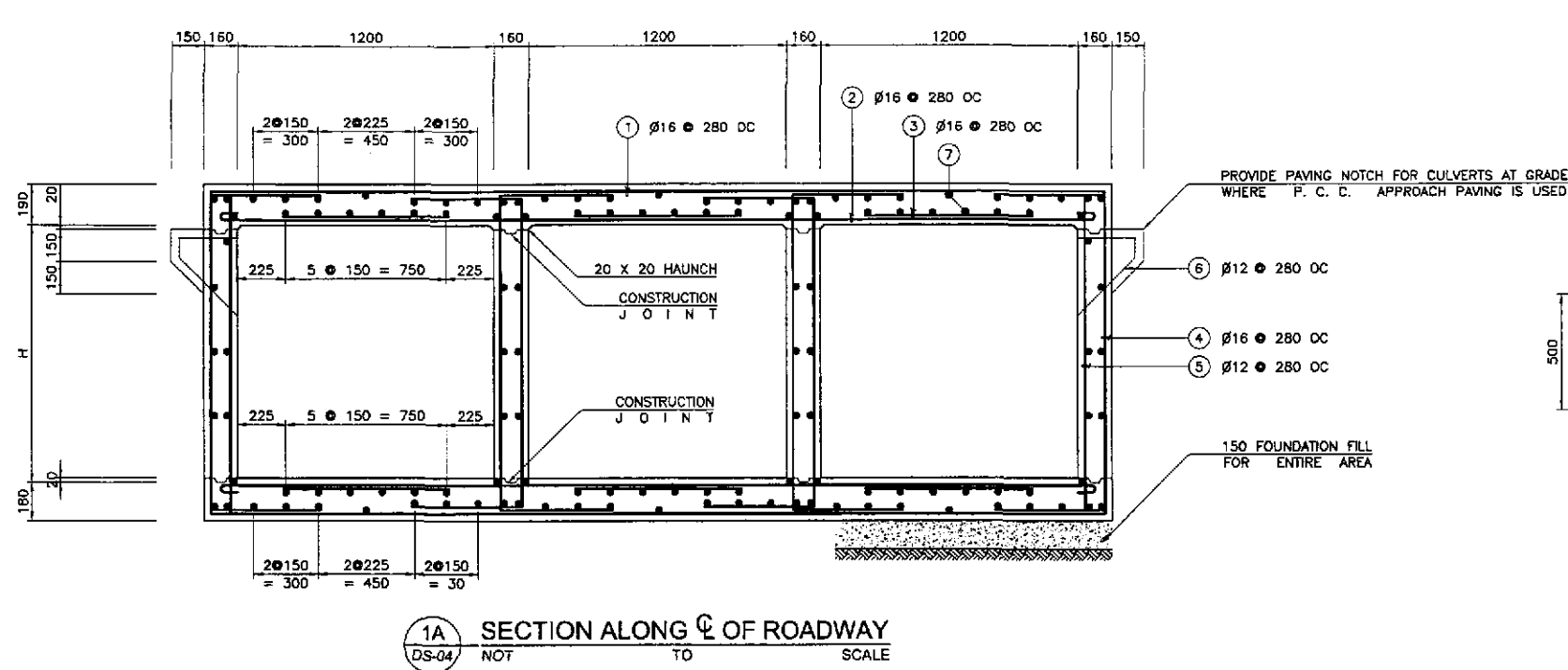


**3 SECTION**  
SCALE 1:40

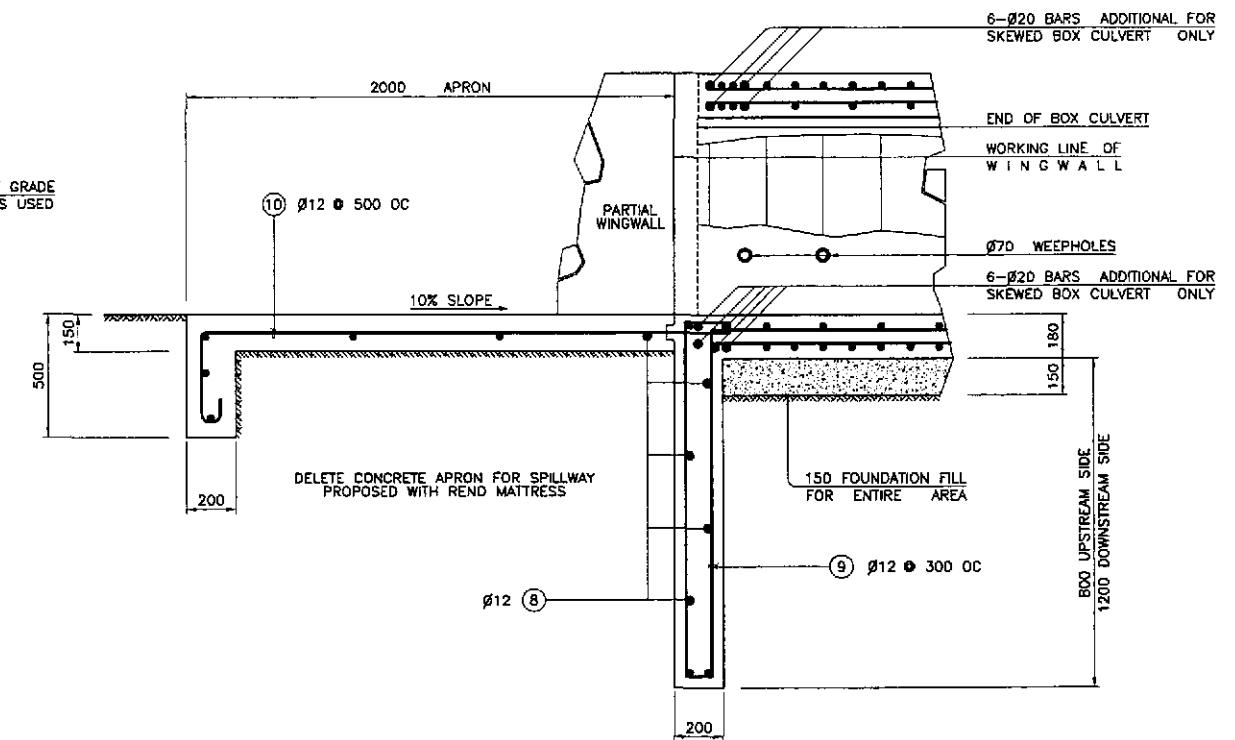
**RCBC WINGWALL DETAILS**

	DESIGNED: 10/18/02 CHECKED: 10/17/02 SUBMITTED: 10/19/02	SIGNATURE: [Signature] P.J.H. - P.W.D. 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 OK, Director N 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 (Piaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE : 1:40 FULL SIZE A1	SHEET CONTENTS : STANDARD DETAILS OF RCBC WINGWALLS	SHEET NO. : DS-03
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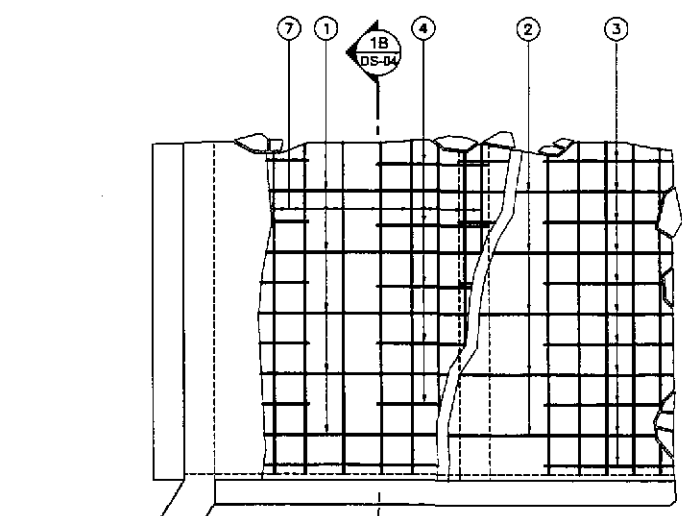




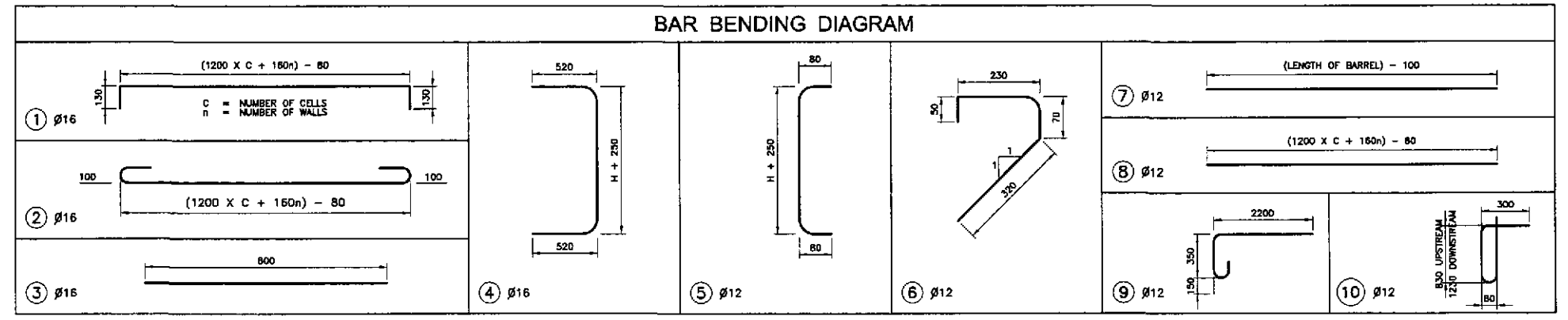
1A SECTION ALONG C OF ROADWAY  
DS-04 NOT TO SCALE



1B PARTIAL SECTION A  
DS-04 NOT TO SCALE



PARTIAL PLAN  
NOT TO SCALE



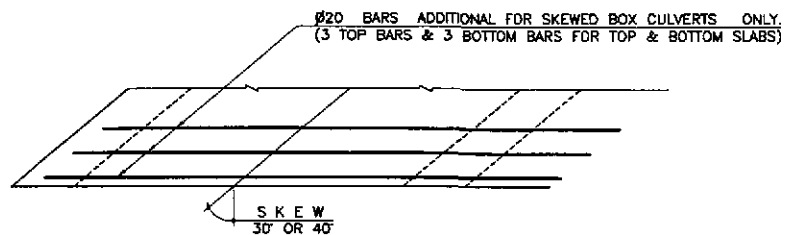
ESTIMATE OF QUANTITIES (PER LINEAR METER OF LENGTH)

HEIGHT OF CELL "H" (METER)	SINGLE BARREL				DOUBLE BARREL				TRIPLE BARREL			
	CONCRETE CLASS "A" (m <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.      30° SKEW = 46.5 kgs.  
 45° SKEW = 120.5 kgs.    45° SKEW = 57.0 kgs.

APRON AND END TOE FOR BOTH ENDS

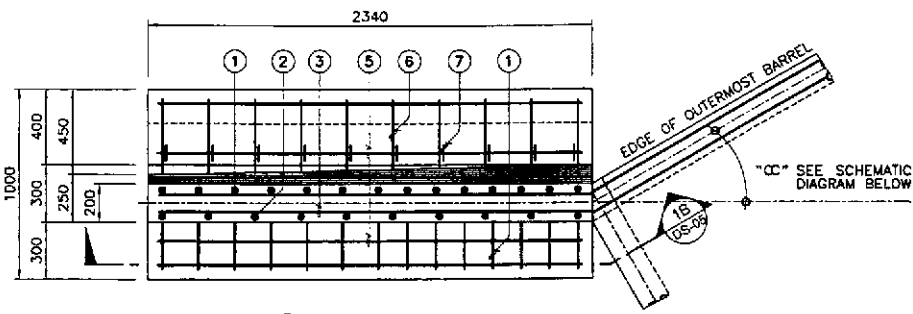
COMMON TO ALL HEIGHT OF CELL	SINGLE BARREL			DOUBLE BARREL			TRIPLE BARREL		
	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING STEEL (kg)	EXCAVATION (m <sup>3</sup> )	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCING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



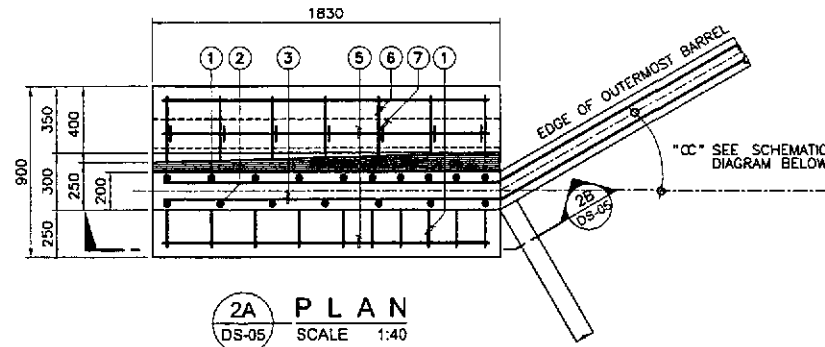
NOTE:  
 ALL OTHER REINFORCING BARS SHALL BE PERPENDICULAR OR PARALLEL, AS THE CASE MAYBE, TO BOX AXIS.

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

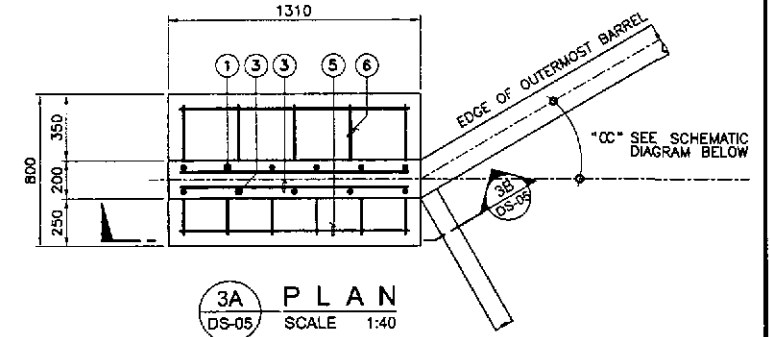
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Pardel, Cabanatuan and San Jose Bypasses)	SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)	SHEET NO. : DS-04
	CHECKED	DATE	SIGNATURE		PUHL - PWD Submitted By: DANILLO C. TRAJANO Project Director	BUREAU OF DESIGN Reviewed By: JOSEFINA M. ALACAR Chief, Highway Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES OIC, Director IV				



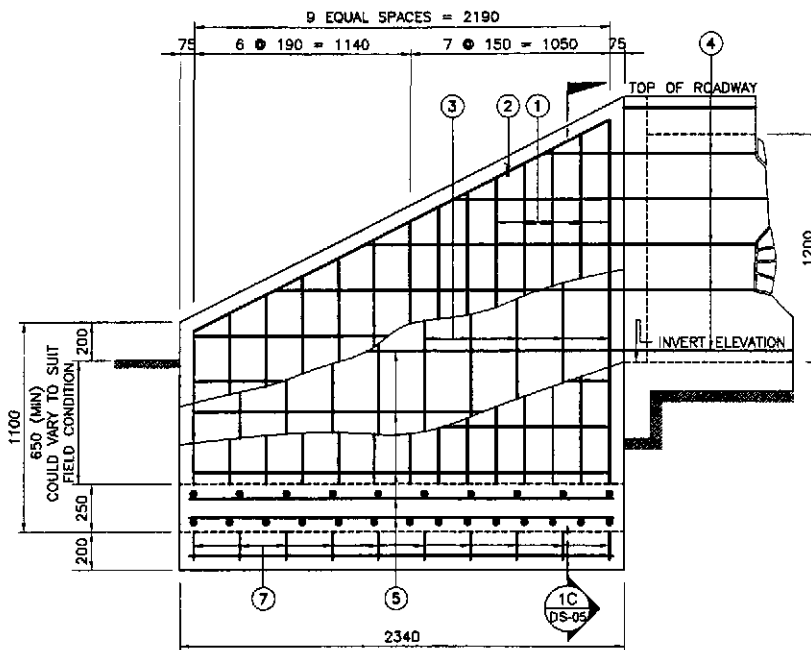
1A PLAN  
DS-05 SCALE 1:40



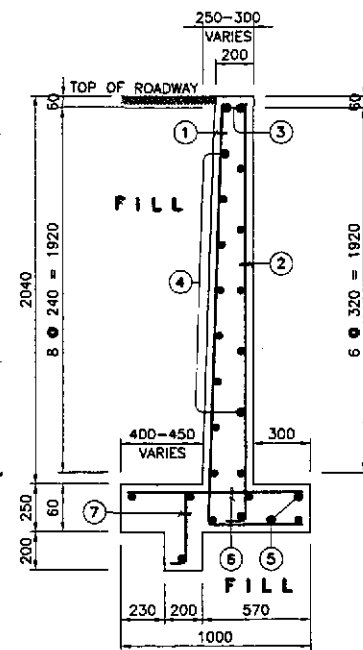
2A PLAN  
DS-05 SCALE 1:40



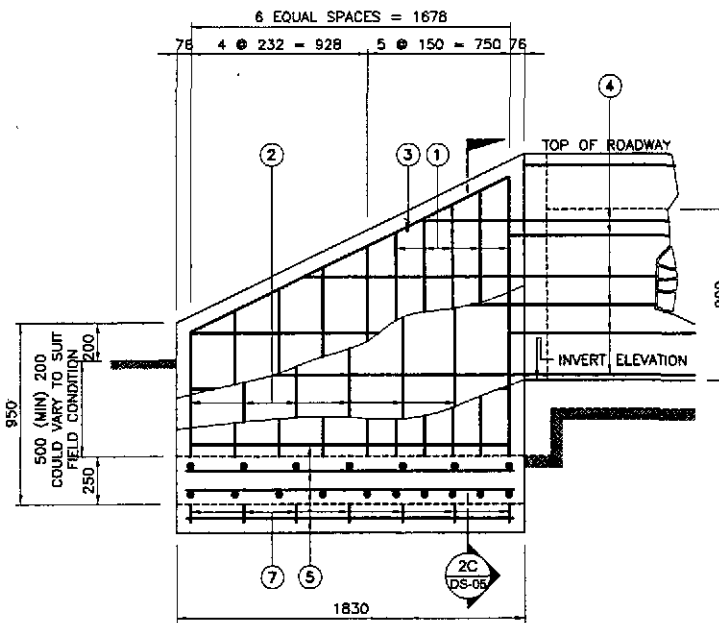
3A PLAN  
DS-05 SCALE 1:40



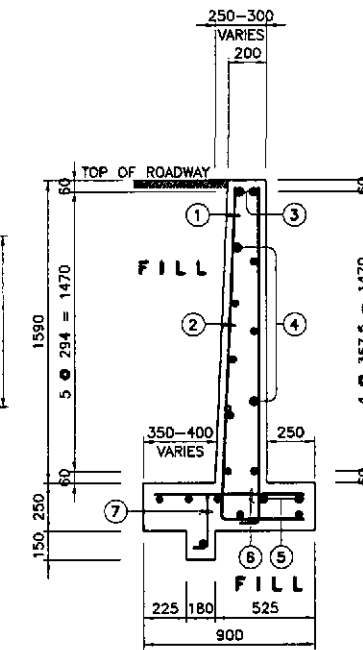
1A ELEVATION  
DS-05 SCALE 1:40



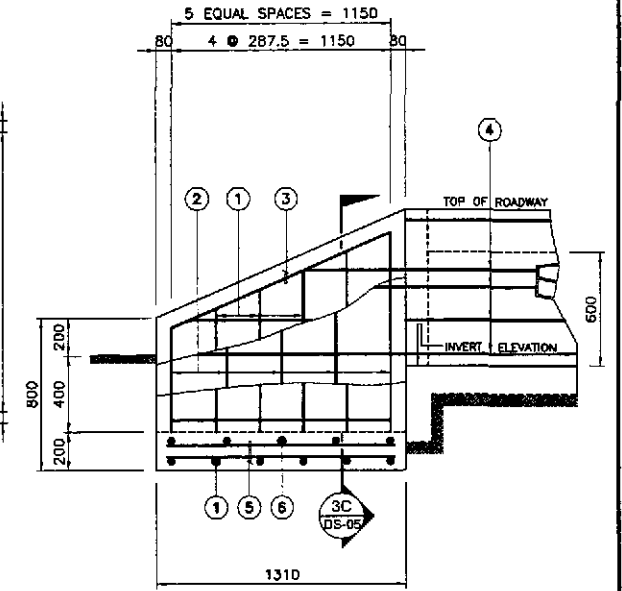
1C SECTION  
DS-05 SCALE 1:40



2B ELEVATION  
DS-05 SCALE 1:40



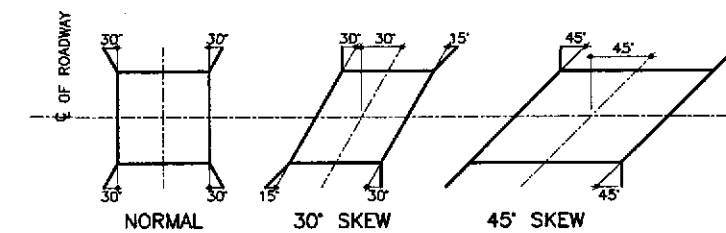
2C SECTION  
DS-05 SCALE 1:40



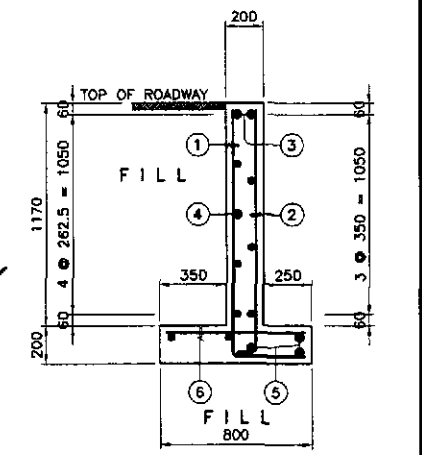
3B ELEVATION  
DS-05 SCALE 1:40

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 6-12mm#	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#

HEIGHT (m)	CONCRETE CLASS "A" (m <sup>3</sup> )	REINFORCEMENT (kg)	EXCAVATION (m <sup>3</sup> )	FOUNDATION FILL (m <sup>3</sup> )
1.20	2.96	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

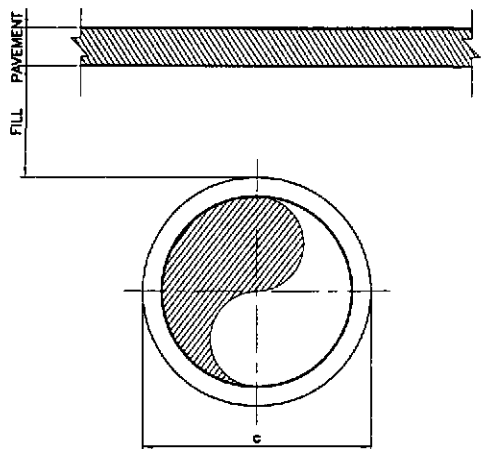


3C SECTION  
DS-05 SCALE 1:40

LOW DEPTH TYPE BOX CULVERT

	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	1/17/02	[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	1/19/02	[Signature]		DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	CABANATUAN BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		

# DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT

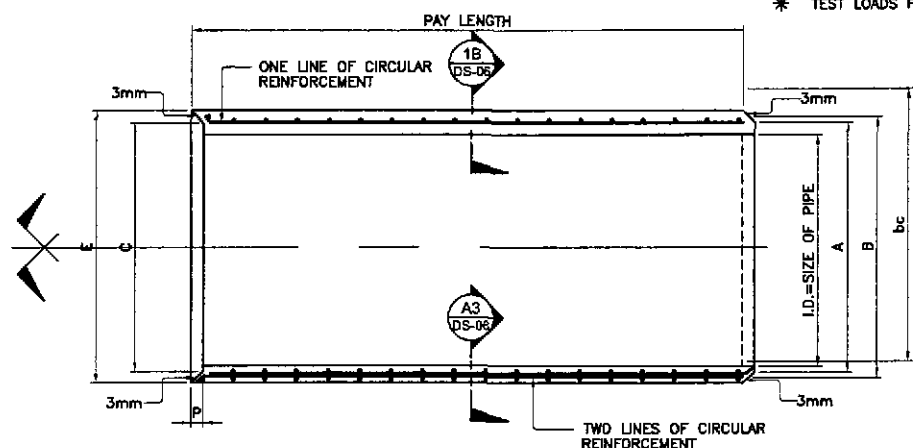


SIZE OF PIPE (mm)	STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS														EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS													
	CONCRETE 247 kg/cm <sup>2</sup> (3,500 lb/in <sup>2</sup> )							CONCRETE 317 kg/cm <sup>2</sup> (4,500 lb/in <sup>2</sup> )							STRENGTH TEST REQUIREMENTS 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					
	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 *		WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm <sup>2</sup> /m OF PIPE	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	0.00025m 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	5.984	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	22.364

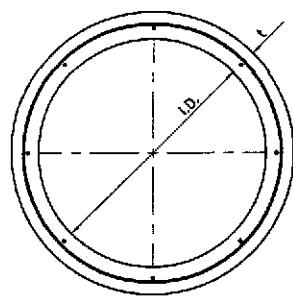
STANDARD STRENGTH PIPES:  
 FILL 1/2 E.D. FOR FLEXIBLE PAVEMENT OR MIN. OF 0.60 m  
 0.30 m FOR RIGID PAVEMENT  
 EXTRA STRENGTH PIPES:  
 FILL: 0.30 m FOR RIGID AND FLEXIBLE PAVEMENTS

### MINIMUM PIPE COVERING

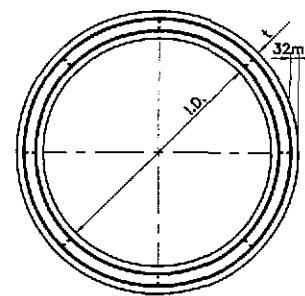
⊙ THE DISTANCE FROM CENTERLINE OF THE REINFORCEMENT TO THE NEAREST SURFACE OF THE CONCRETE HAS BEEN ASSUMED AS 32mm FOR PIPES WITH A SHELL THICKNESS OF 64mm OR MORE.  
 \* TEST LOADS FOR SAND-BEARING TEST SHALL BE ONE AND ONE - HALF TIMES THOSE SPECIFIED IN THIS TABLE FOR THE THREE - EDGE BEARING TEST.



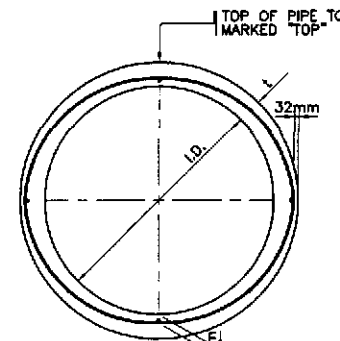
1A LONGITUDINAL SECTION  
 DS-06 NOT TO SCALE



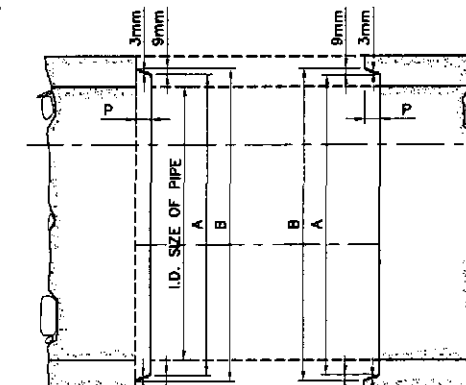
1B SECTION  
 DS-06



TWO LINES OF CIRCULAR REINFORCEMENT



ONE LINE OF ELLIPTICAL REINFORCEMENT

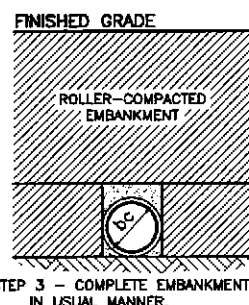


TONGUE END GROOVE END

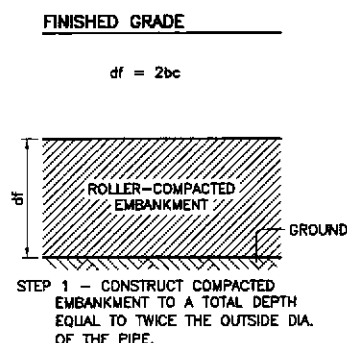
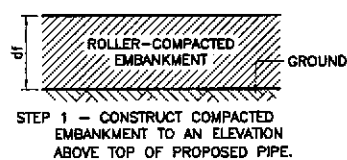
1D SECTION  
 DS-06

FINISHED GRADE  
 $df = bc + 15\text{cm}$  FOR PIPES  $< 760\text{mm}$   
 $df = bc + 75\text{cm}$  FOR PIPES  $\geq 760\text{mm}$

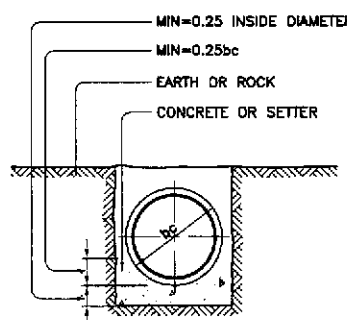
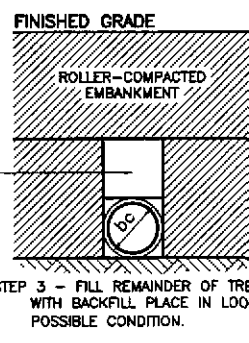
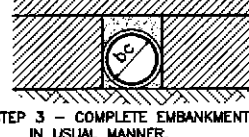
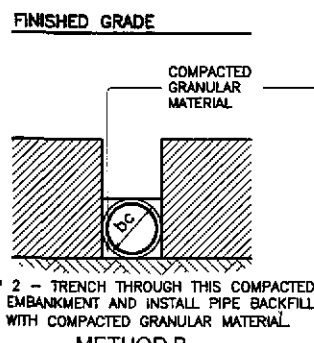
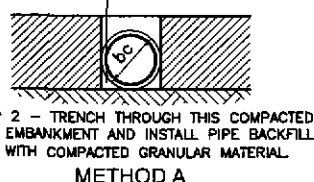
FINISHED GRADE  
 $df =$  DEPTH OF FILL  
 $bc =$  OUTSIDE DIAMETER OF PIPE



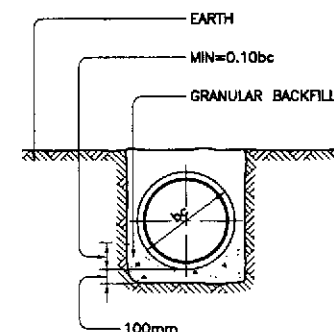
1 STANDARD REINFORCED CONCRETE PIPE CULVERTS  
 DS-06 SCALE AS SHOWN



2 METHODS OF PIPE INSTALLATION  
 DS-06 NOT TO SCALE

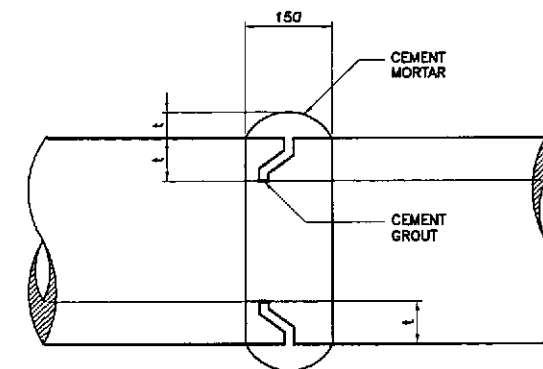


CONCRETE CRADLE BEDDING

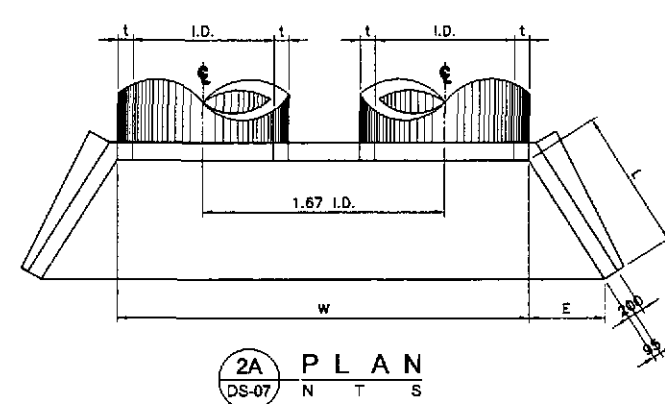
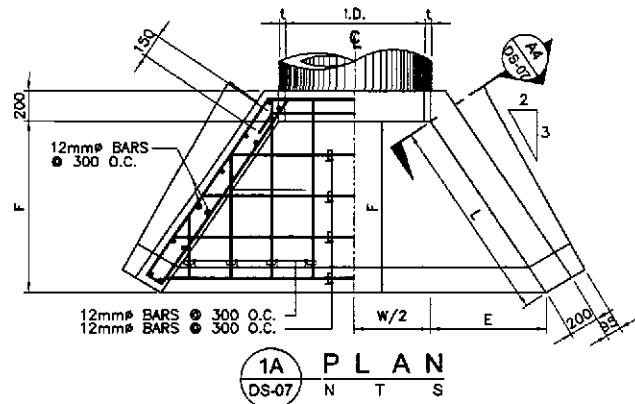
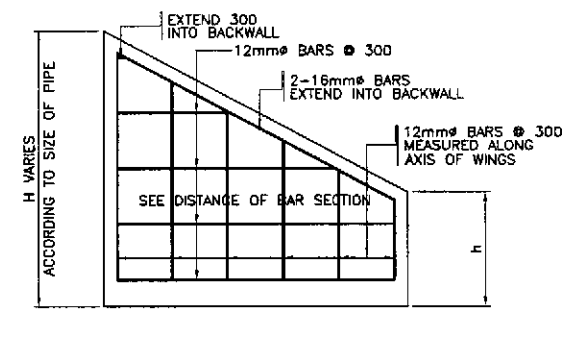
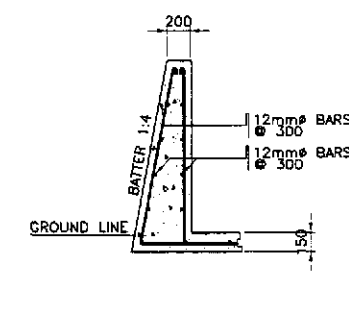
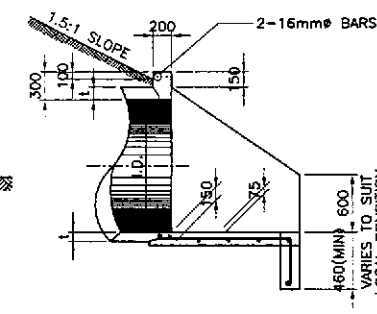
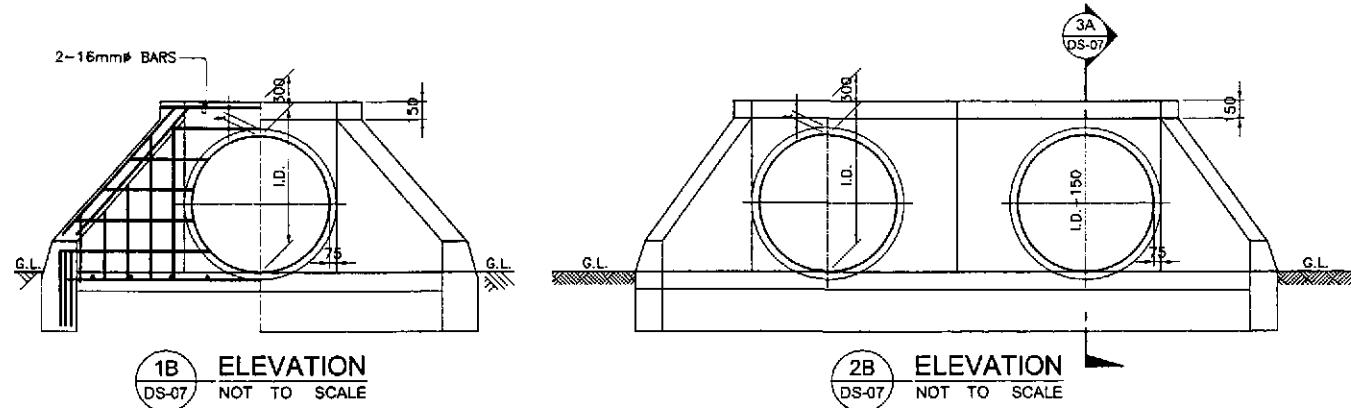


ORDINARY BEDDINGS

3 TYPICAL BEDDING FOR CONDUITS  
 DS-06 NOT TO SCALE



4 DETAIL OF PIPE COLLAR  
 DS-06 NOT TO SCALE



**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>	W (mm)	CONC. m <sup>3</sup>	REINF. STEEL kg.	AREA OF WATERWAY m <sup>2</sup>	W (mm)	CONC. m <sup>3</sup>	REINF. STEEL kg.	AREA OF WATERWAY m <sup>2</sup>	W (mm)	CONC. m <sup>3</sup>	REINF. STEEL kg.
480	51	710	380	590	D	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	D	0.29	780	0.82	36.46	0.58	1780	1.18	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	4228	5.47	228.18	5.43	6760	6.76	304.20	

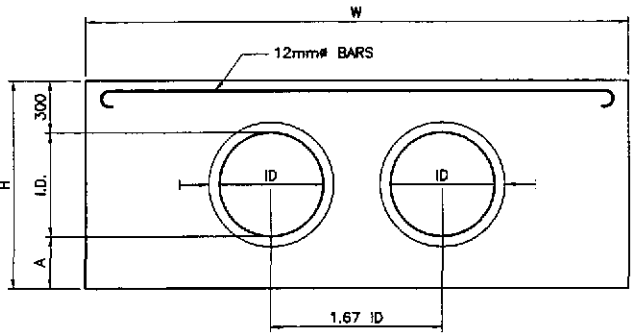
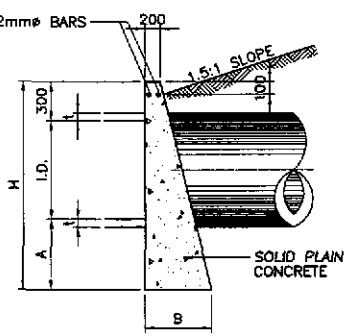
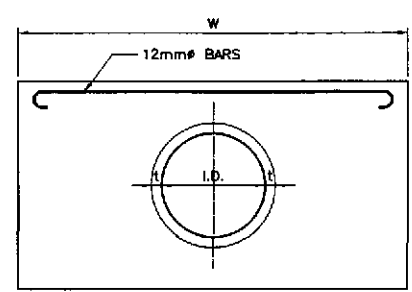
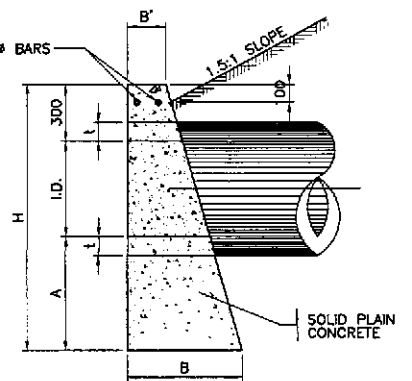
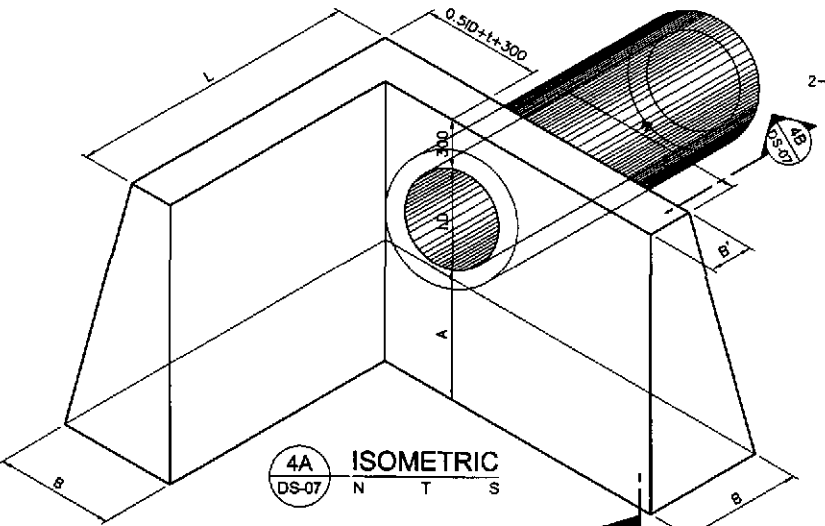
**1 FLARED TYPE HEADWALL (SINGLE PIPE)** DS-07 SCALE AS SHOWN  
**2 FLARED TYPE HEADWALL (DOUBLE PIPE)** DS-07 SCALE AS SHOWN

**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.
480	51	310	350	200	1070	1070	1070	0.66	6
610	64	410	430	200	1320	1220	1220	1.06	8
910	86	610	610	200	1820	1820	1820	2.76	11
1070	95	710	780	300	2080	1970	VARIABLES	-	-
1220	108	810	870	300	2330	2120	VARIABLES	-	-
1520	127	1010	980	300	3030	2420	VARIABLES	-	-

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

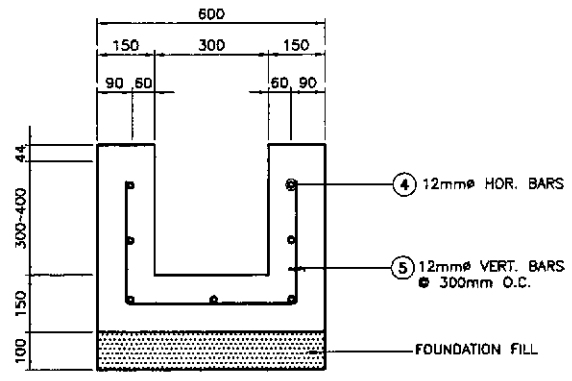
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)			SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m <sup>2</sup>	CONCRETE m <sup>3</sup>	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m <sup>2</sup>	CONCRETE m <sup>3</sup>	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m <sup>2</sup>	CONCRETE m <sup>3</sup>	REINF. STEEL kg.
480	51	310	350	1070	1500	0.15	0.46	3.48	2800	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** DS-07 NOT AS SHOWN  
**5 STRAIGHT TYPE HEADWALL** DS-07 NOT AS SHOWN

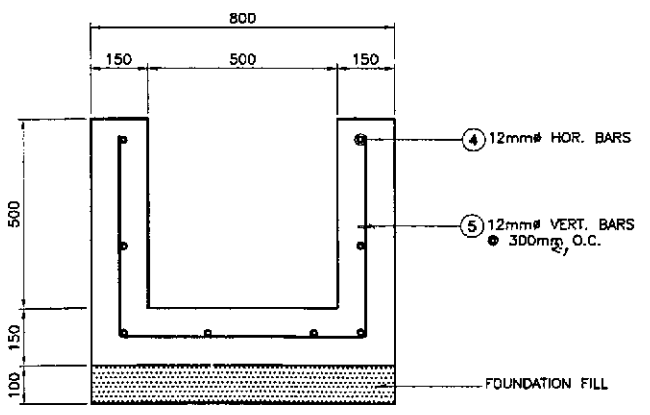
**STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC**

	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/17/02	<i>[Signature]</i>		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	10/19/02	<i>[Signature]</i>		BUREAU OF DESIGN			CABANATUAN BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		
				OFFICE OF THE SECRETARY							



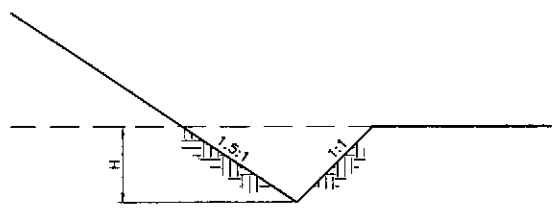
REINFORCED CONCRETE DITCH

1 TYPE BU  
DS-08 SCALE: 1:10

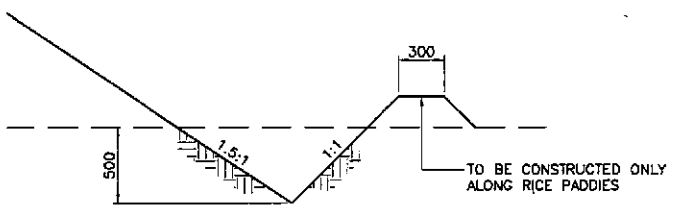


REINFORCED CONCRETE DITCH

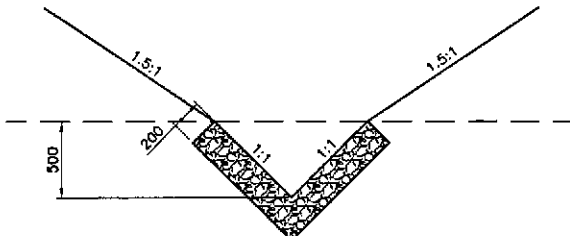
2 TYPE U  
DS-08 SCALE: 1:10



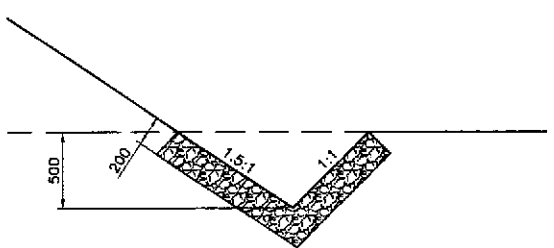
V-SHAPED UNLINED DITCH  
TYPE E-4



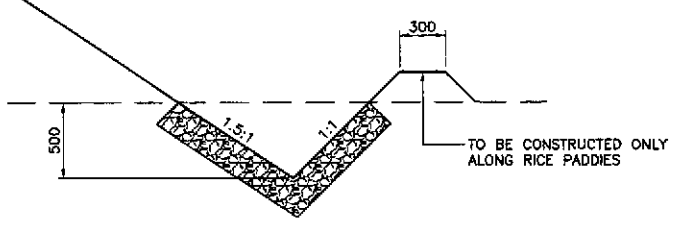
V-SHAPED UNLINED DITCH  
TYPE E-3



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

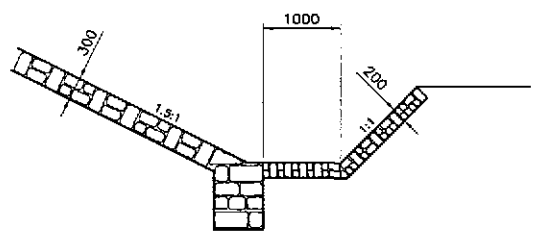


V-SHAPED LINED DITCH  
TYPE E-2

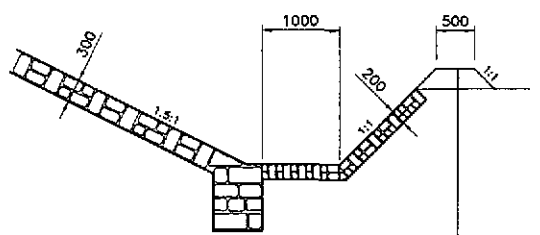


V-SHAPED LINED DITCH  
TYPE E-1

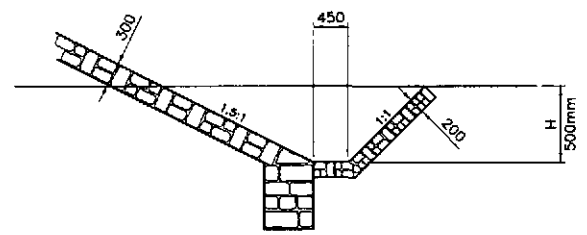
3 TYPE E  
DS-08 SCALE: 1:25



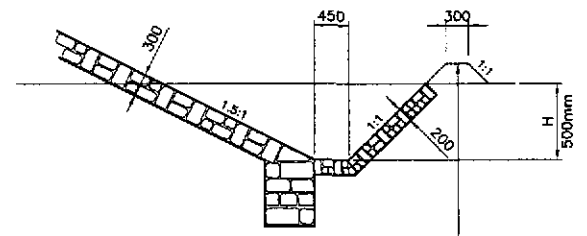
TYPE C-4



TYPE C-3

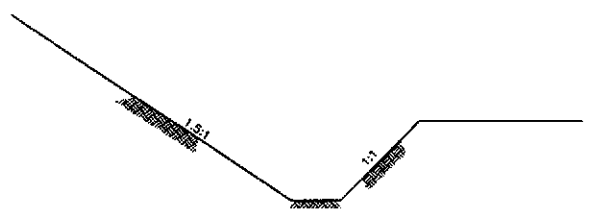


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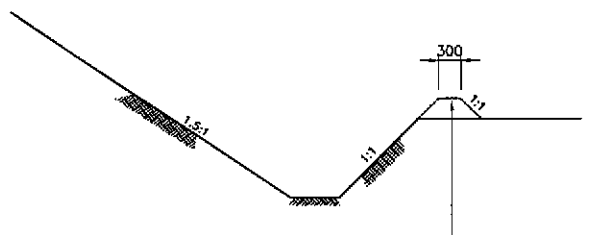


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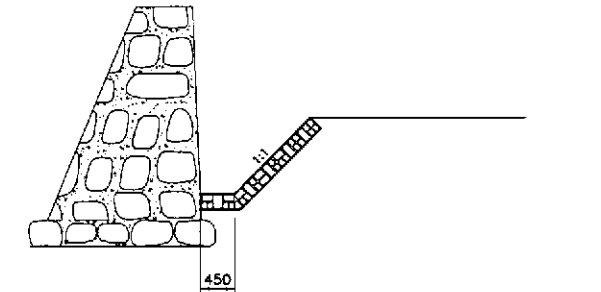
4 TYPE C  
DS-08 NOT TO SCALE



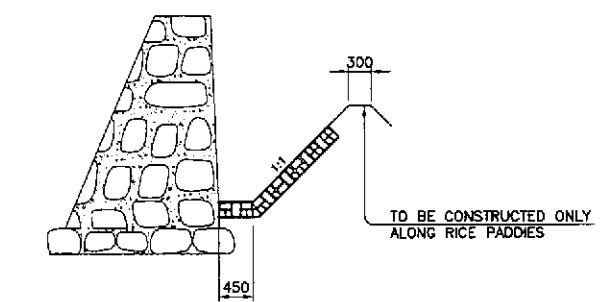
TYPE C-8



TYPE C-7



TYPE C-6



TYPE C-5

STANDARD DRAINAGE DITCHES

	DESIGNED	DATE	SIGNATURE		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) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	12/1/02	<i>[Signature]</i>		Submitted By:	BUREAU OF DESIGN	OFFICE OF THE SECRETARY		NOT TO SCALE	STANDARD DRAINAGE DITCHES	DS-08
	SUBMITTED	12/1/02	<i>[Signature]</i>		DANIL D. C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES DIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary	FULL SIZE A1	

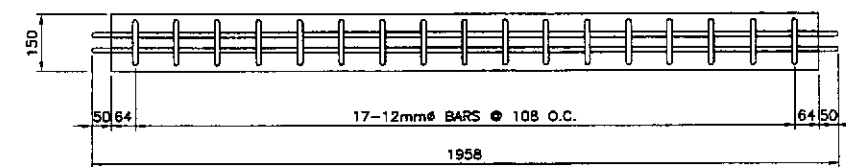
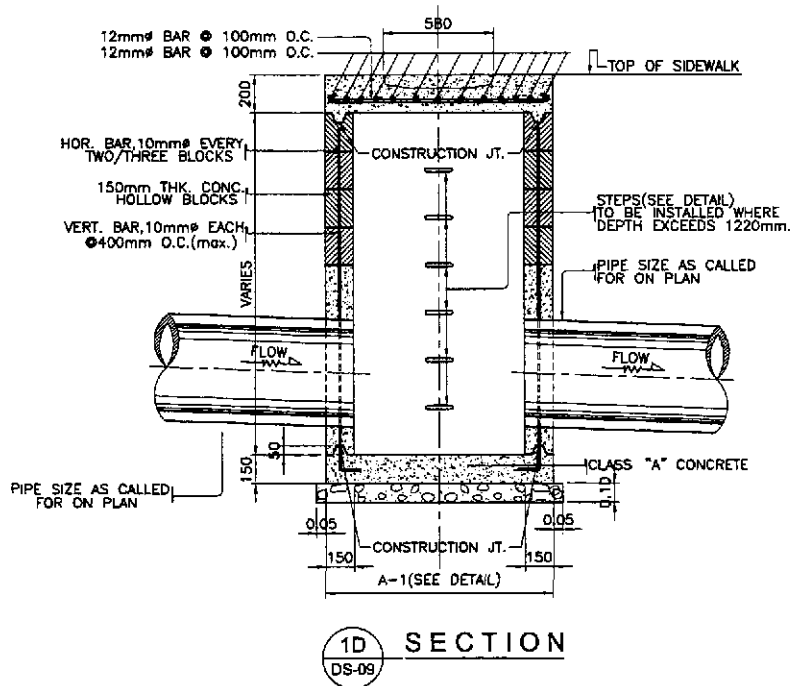
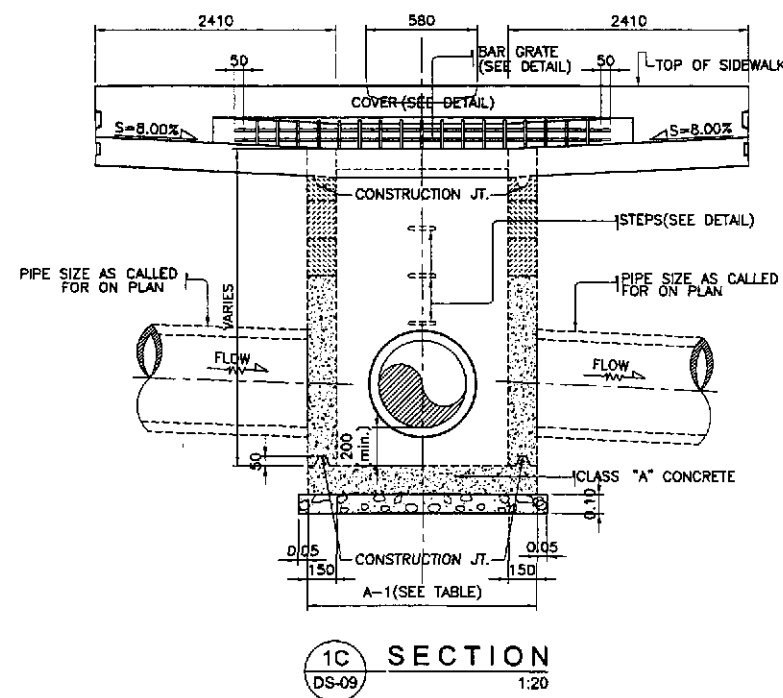
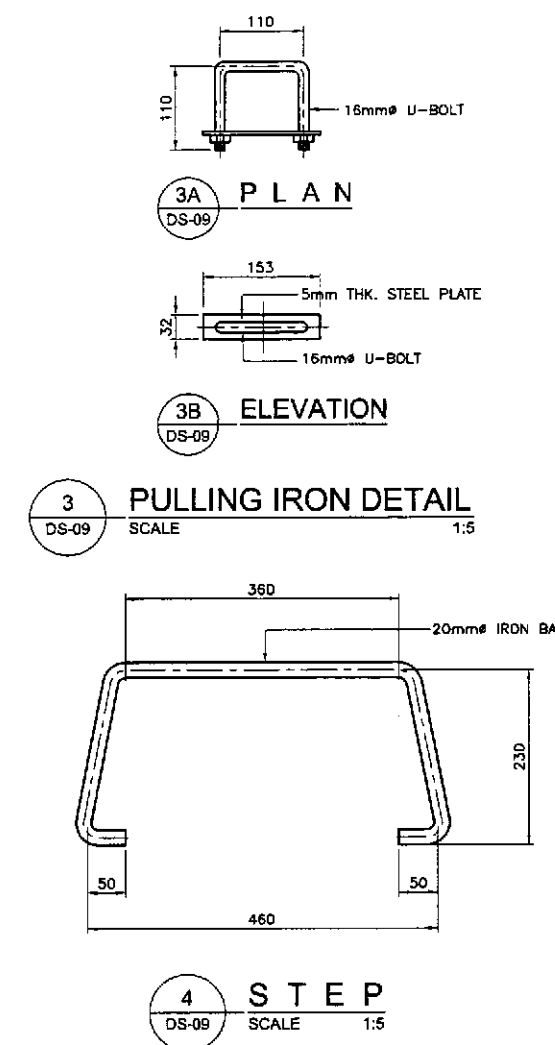
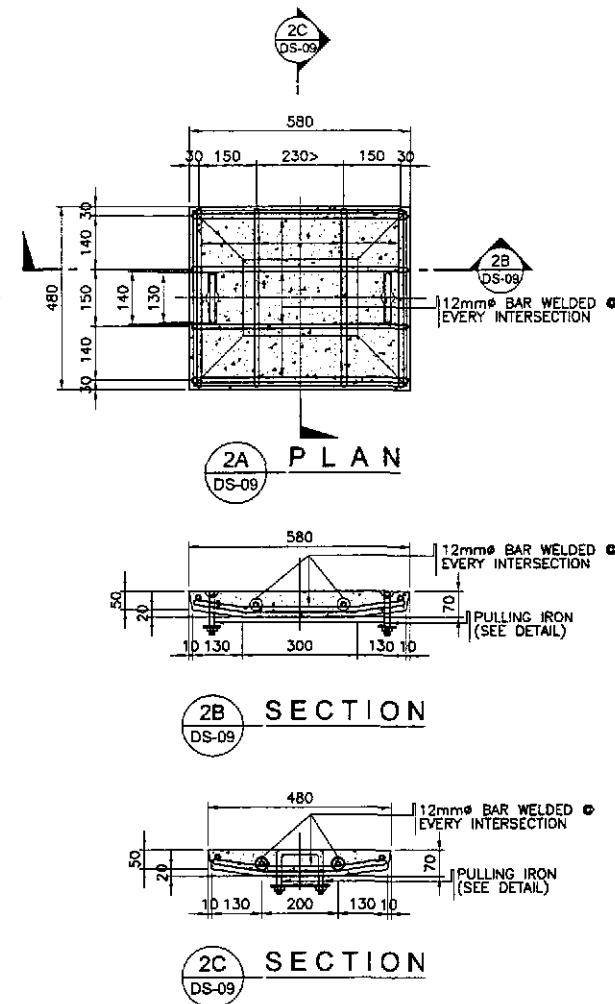
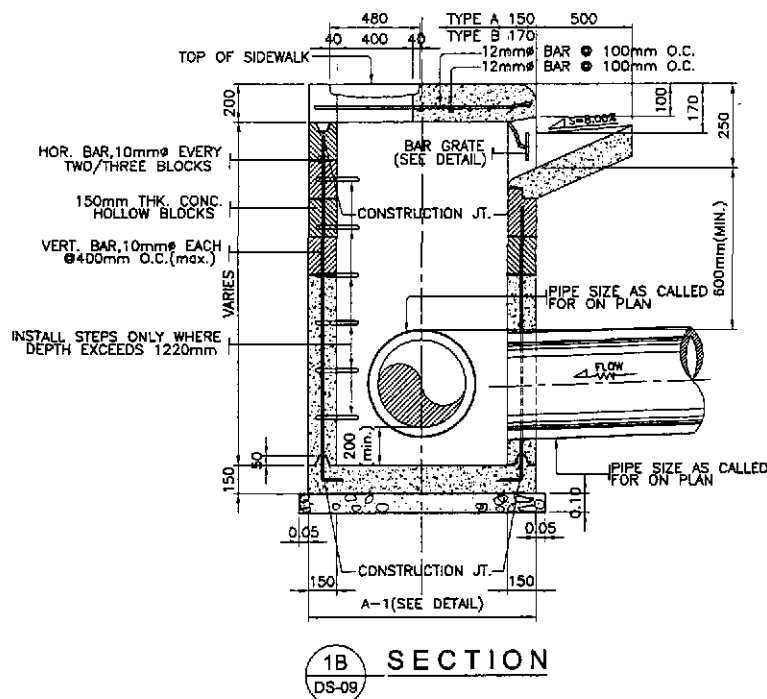
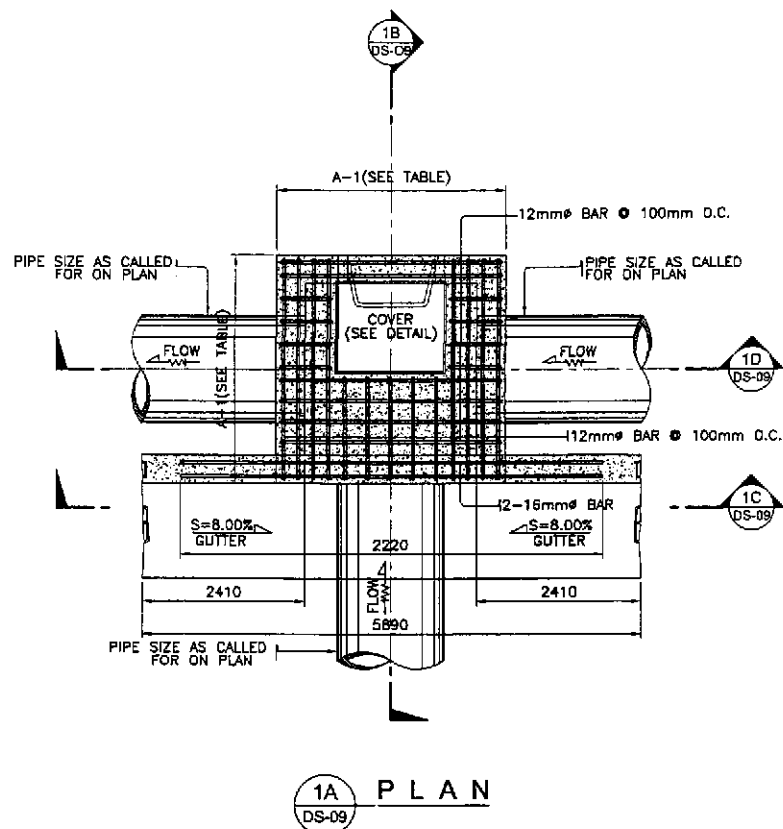


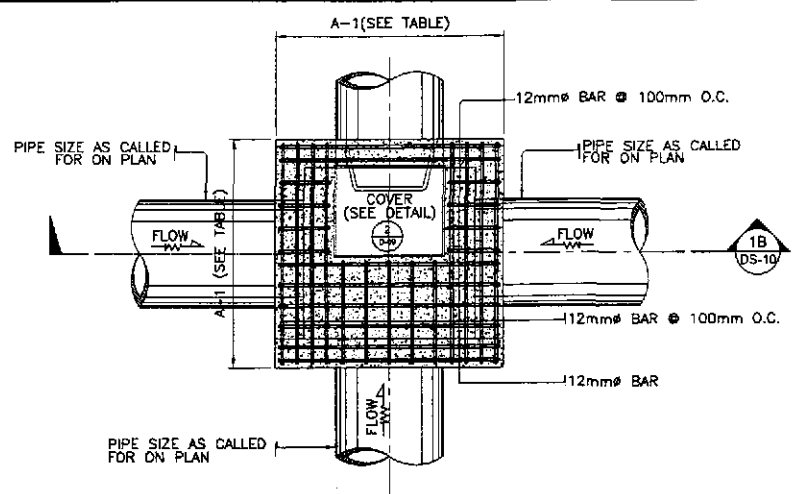
TABLE OF DIMENSION		
TYPE OF CIM	SIZE OF PIPE (mm)	A-1
T-1	300	1.12 M.
T-2	460	1.19 M.
T-3	610	1.37 M.
T-4	760	1.54 M.
T-5	910	1.73 M.
T-6	1070	1.90 M.
T-7	1220	2.08 M.
T-8	1520	2.43 M.

- 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.

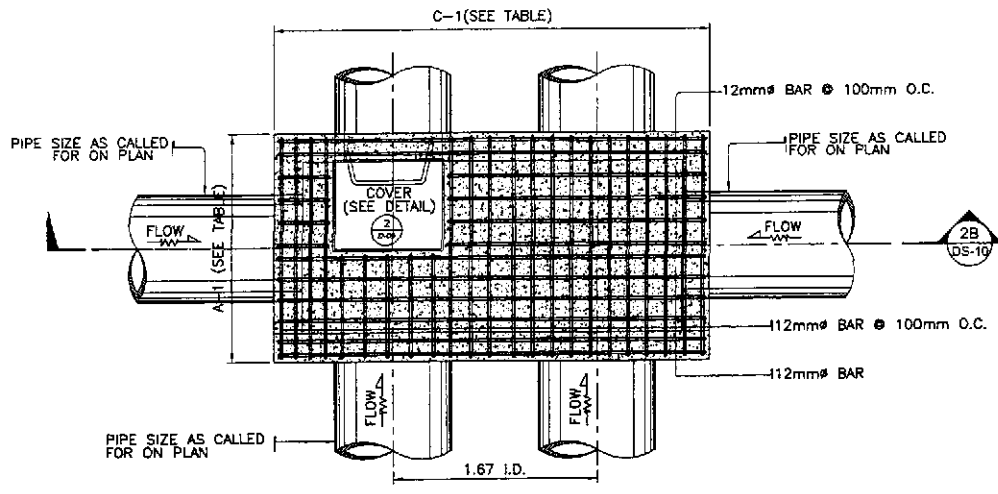
**1 CURB INLET MANHOLE**  
DS-09 SCALE 1:20

**DETAILS OF COMBINATION CURB INLET MANHOLE**

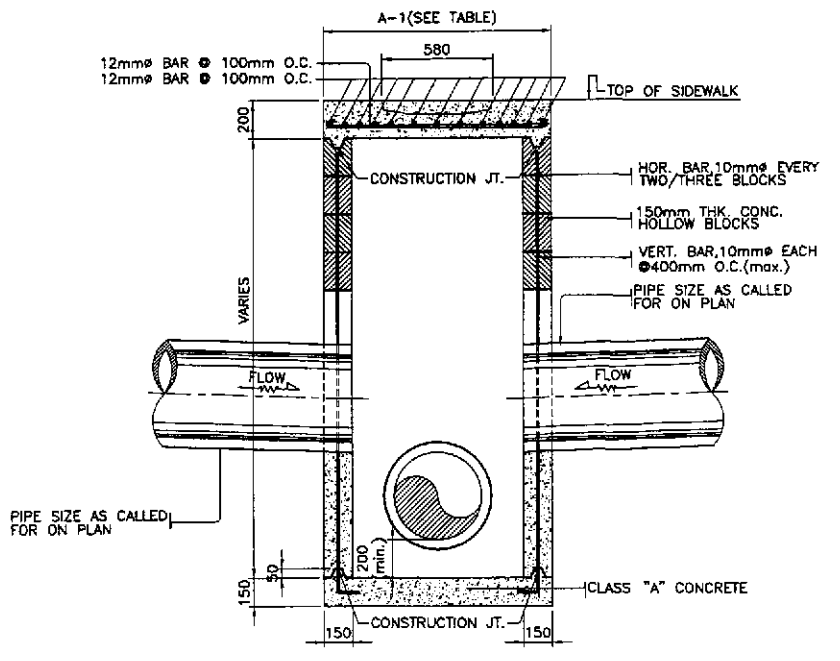
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/19/02	<i>[Signature]</i>		Submitted By:	BUREAU OF DESIGN	OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	STANDARD COMBINATION CURB INLET MANHOLE	DS-09
SUBMITTED	10/19/02	<i>[Signature]</i>	DANILO C. TRAJANO Project Director	Reviewed By:	JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By:	GILBERTO S. REYES OIC, Director IV	CABANATUAN BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		



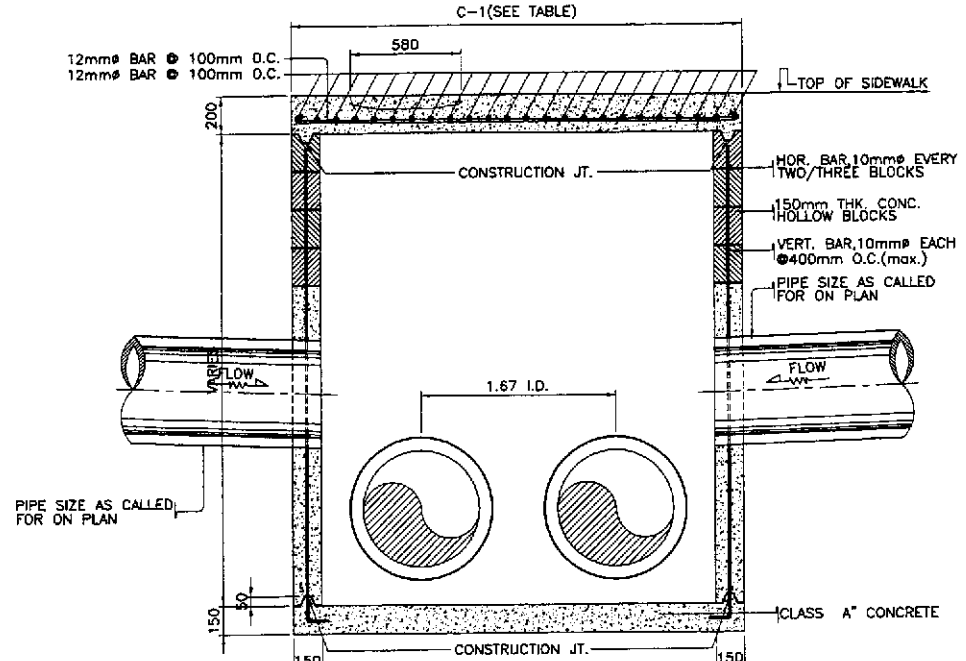
1A PLAN BOX-TYPE MANHOLE (SINGLE PIPE)  
DS-10



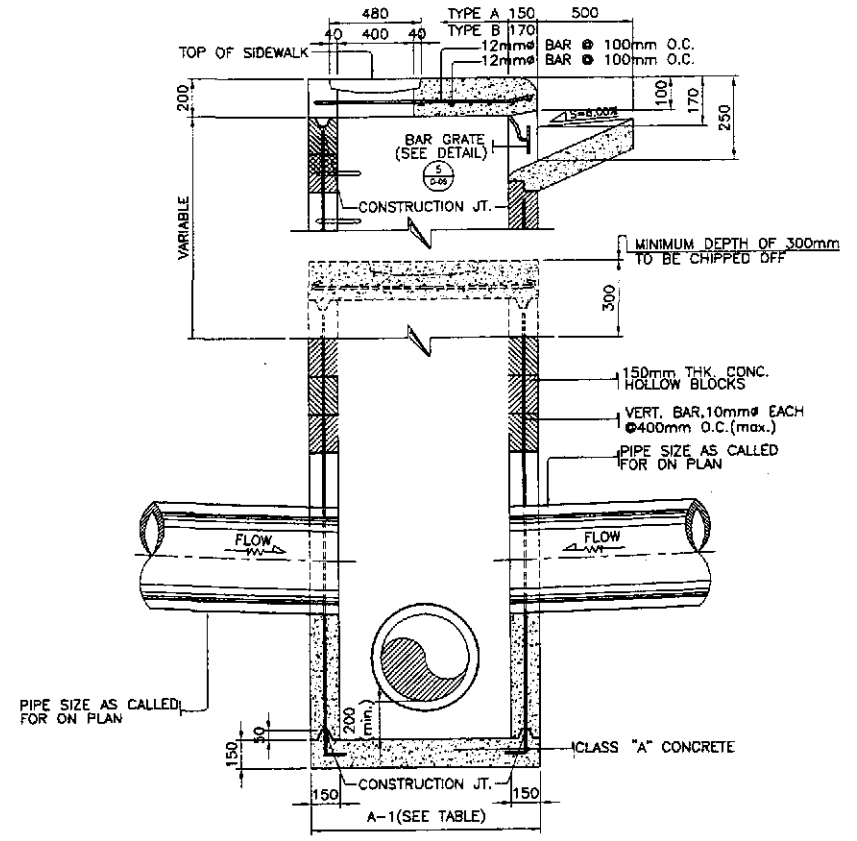
2A PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)  
DS-10



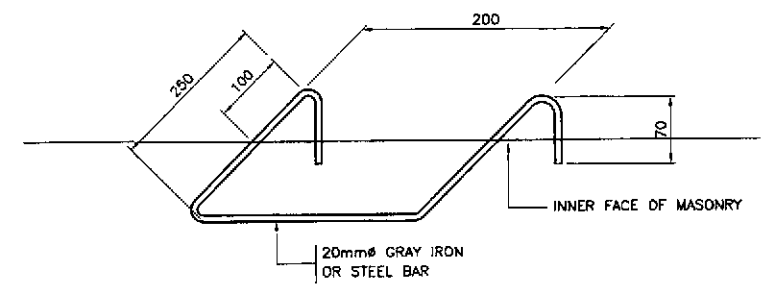
1B SECTION  
DS-10



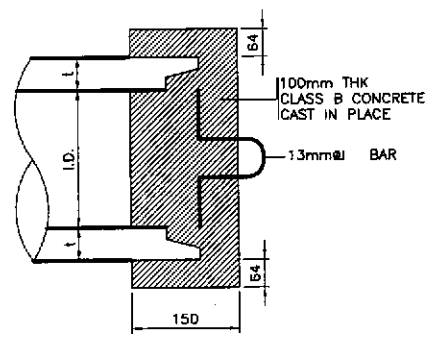
2B SECTION  
DS-10



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

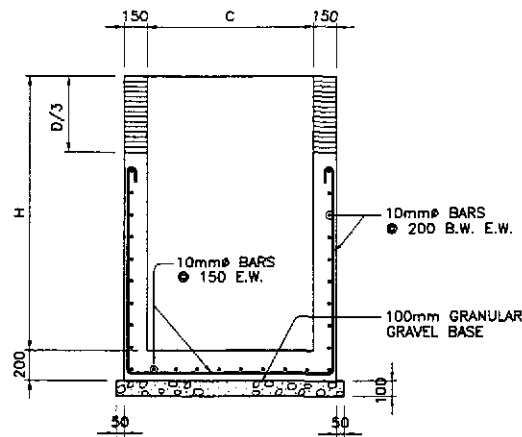
- NOTES:
- ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
  - PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
  - CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
  - CONCRETE HOLLOW BLOCKS OR DRESSED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

(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

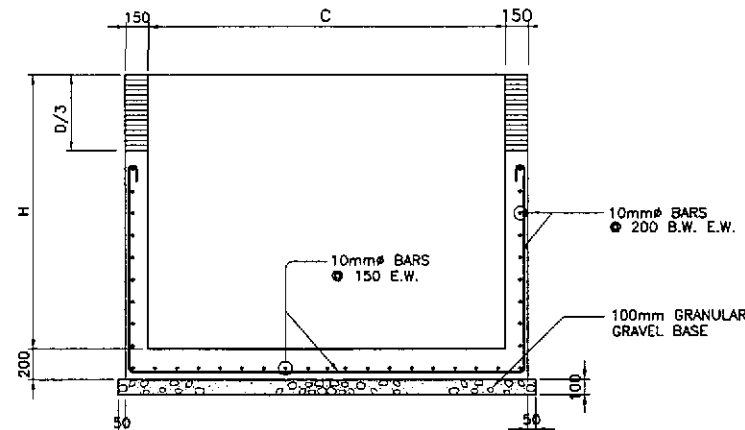
TYPE OF CIM	SIZE OF PIPE (mm)	TABLE OF DIMENSION	
		A-1 (m)	C-1 (m)
T-1	300	1.12	1.92
T-2	460	1.19	2.26
T-3	610	1.37	2.69
T-4	760	1.54	3.11
T-5	910	1.73	3.55
T-6	1070	1.90	3.98
T-7	1220	2.08	4.42
T-8	1520	2.43	5.27

SPECIAL JUNCTION BOX MANHOLE

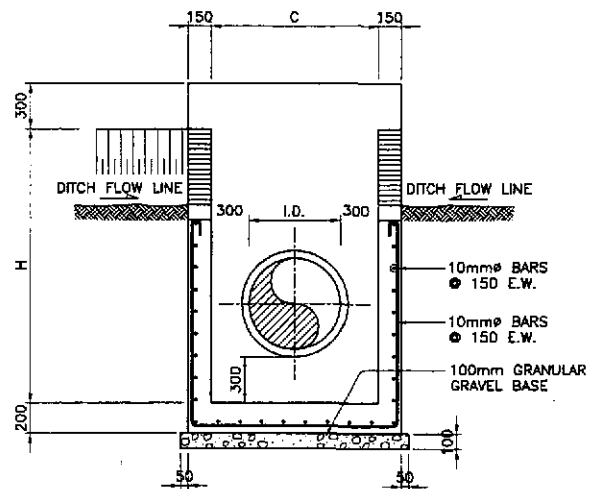
	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	10/17/02	<i>[Signature]</i>		<p>PROJECT DIRECTOR: DANILO C. TRAJANO</p> <p>CHIEF, HIGHWAYS DIVISION: JOSEFINA M. ALAGAR</p> <p>OIC, DIRECTOR IV: GILBERTO S. REYES</p> <p>UNDERSECRETARY: MANUEL M. BONDAN</p> <p>SECRETARY: SIMEON A. DATUMANONG</p>	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	10/19/02	<i>[Signature]</i>		<p>PROJECT DIRECTOR: DANILO C. TRAJANO</p> <p>CHIEF, HIGHWAYS DIVISION: JOSEFINA M. ALAGAR</p> <p>OIC, DIRECTOR IV: GILBERTO S. REYES</p> <p>UNDERSECRETARY: MANUEL M. BONDAN</p> <p>SECRETARY: SIMEON A. DATUMANONG</p>	CABANATUAN BYPASS - CONTRACT PACKAGE I	FULL SIZE A1		



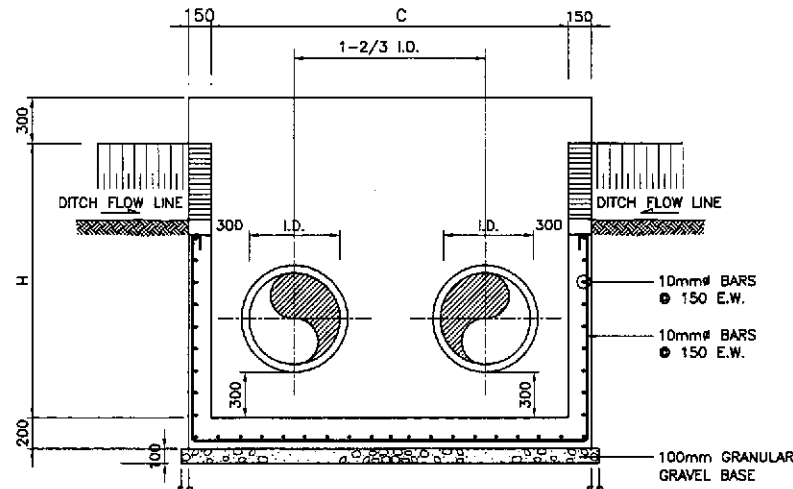
1C SECTION  
DS-11



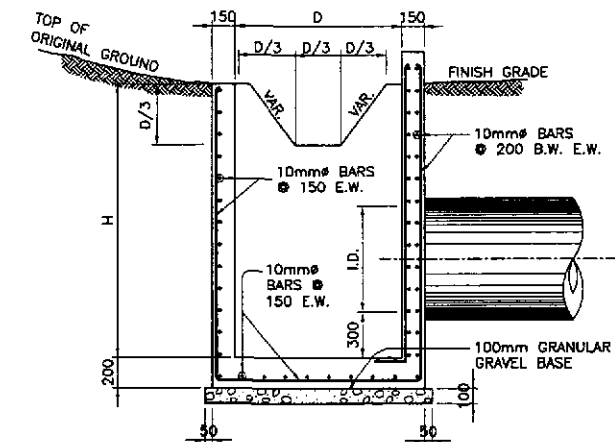
2C SECTION  
DS-11



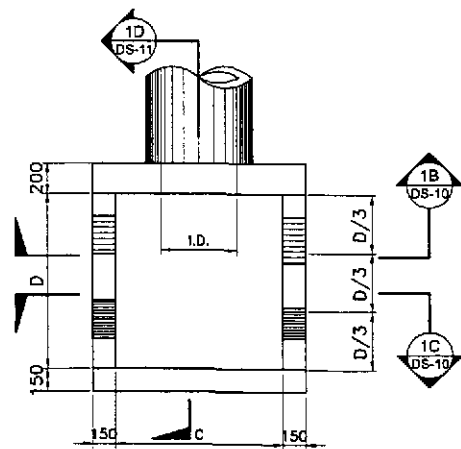
1B SECTION  
DS-11



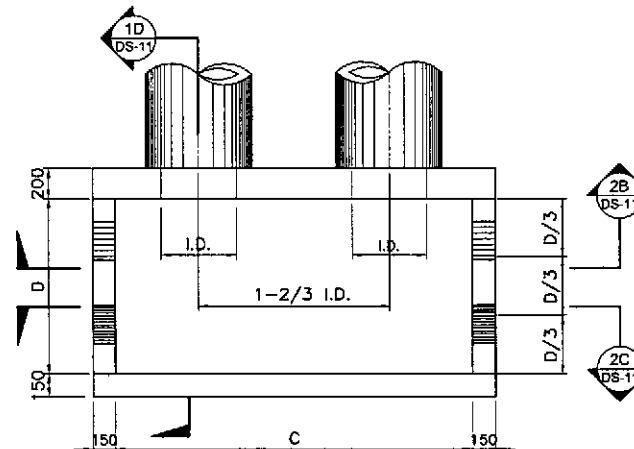
2B SECTION  
DS-11



1C SECTION  
DS-11



1A PLAN  
DS-11



2A PLAN  
DS-11

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

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

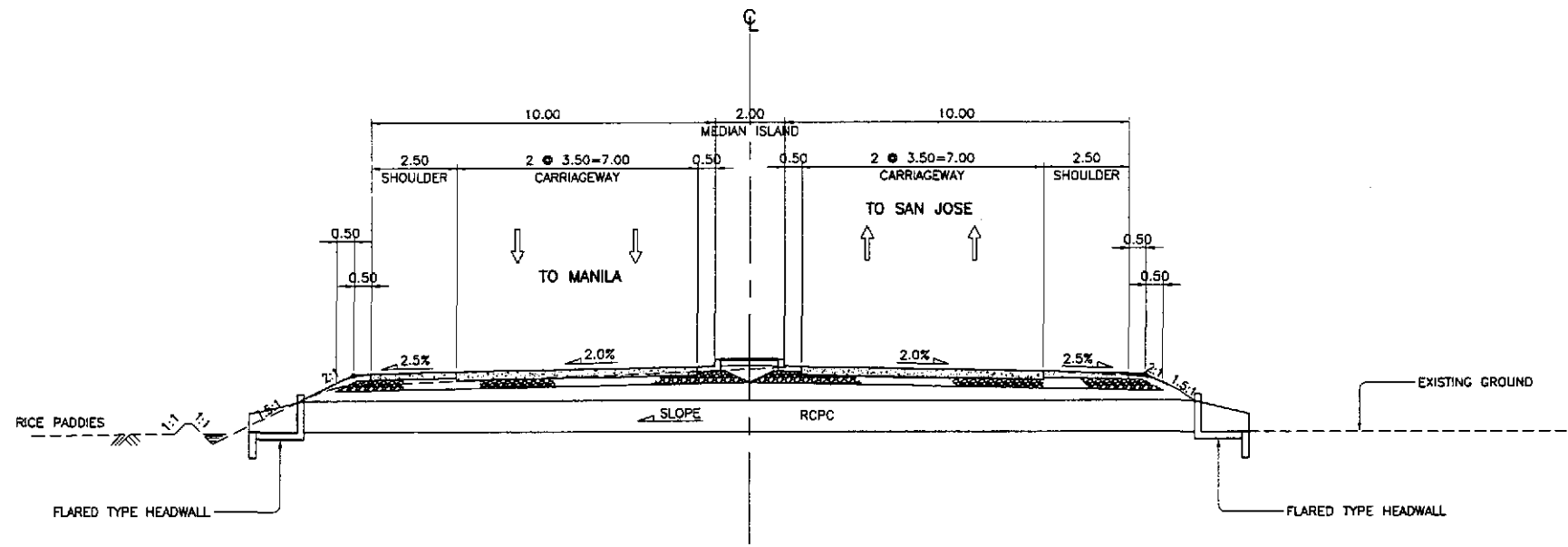
REINFORCED CONCRETE CATCH BASIN DIMENSION FOR RCPC

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

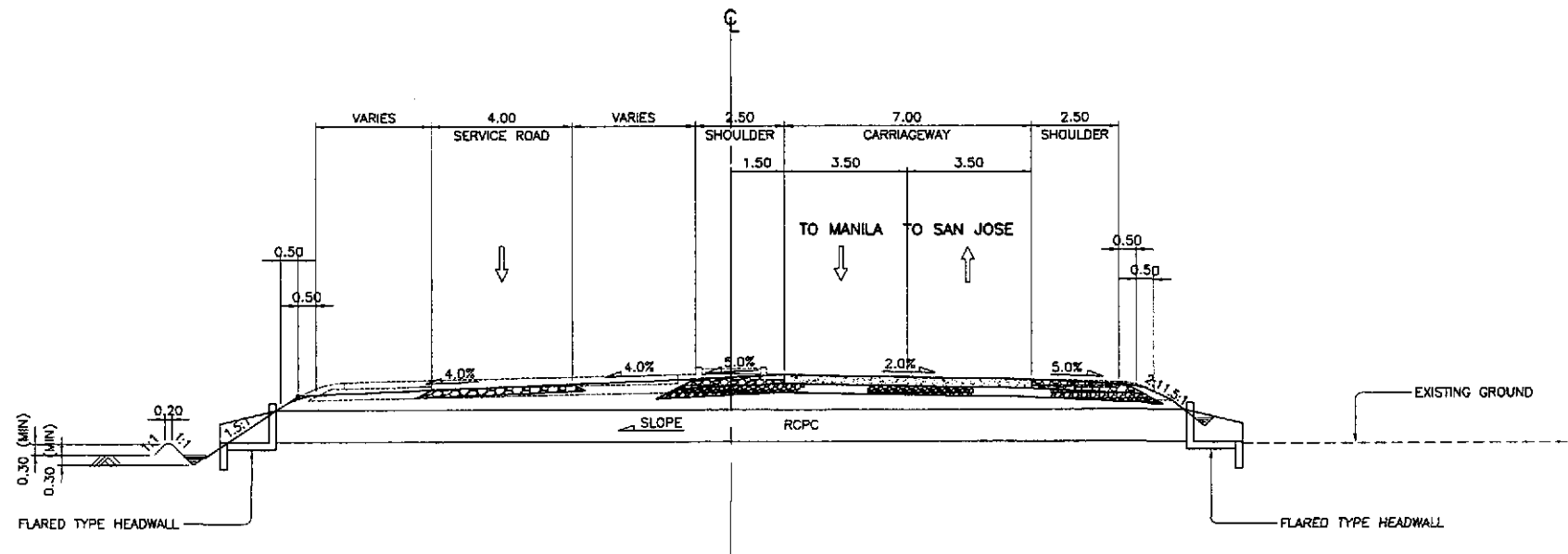
DETAILS OF REINFORCED CONCRETE CATCH BASIN FOR RCPC

	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	01/11/02	<i>[Signature]</i>		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)	1:25	STANDARD REINFORCED CONCRETE CATCH BASIN FOR RCPC	DS-11
	SUBMITTED	01/19/02	<i>[Signature]</i>		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		



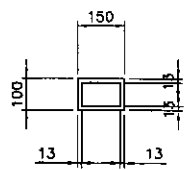


2  
DS-12 SCALE 1:100  
TYPICAL DRAINAGE SECTION ( ULTIMATE STAGE )

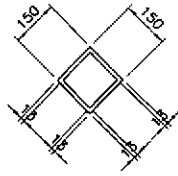


1  
DS-12 SCALE 1:100  
TYPICAL DRAINAGE SECTION ( INITIAL STAGE )

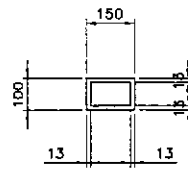
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/17/02	<i>[Signature]</i>		BUREAU OF DESIGN			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Pilarid, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	TYPICAL DRAINAGE SECTIONS ( INITIAL and ULTIMATE STAGE )	DS-12
	SUBMITTED	10/19/02	<i>[Signature]</i>		OFFICE OF THE SECRETARY			CABANATUAN BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		
	Submitted By: <i>[Signature]</i>				Reviewed By: DANILLO C. TRAJANO Project Director	Recommended By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OK, Director IV	Approved By: MANUEL M. BONDAN Undersecretary	Approved By: SIMEON A. DATUMANONG Secretary		



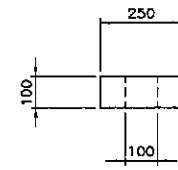
PLAN (POST)



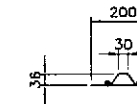
PLAN (POST)



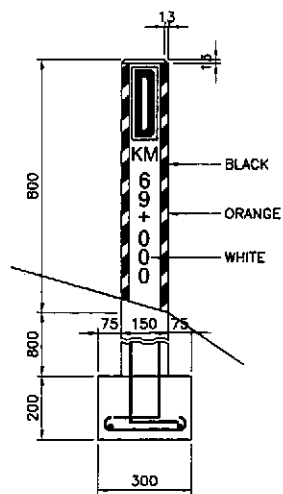
PLAN (POST)



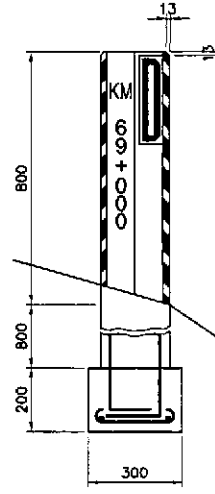
PLAN (POST)



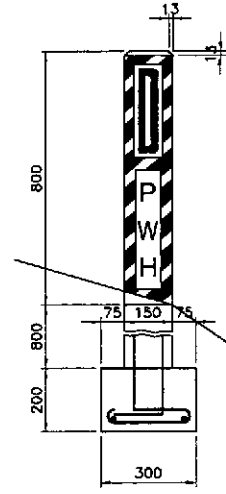
PLAN (POST)



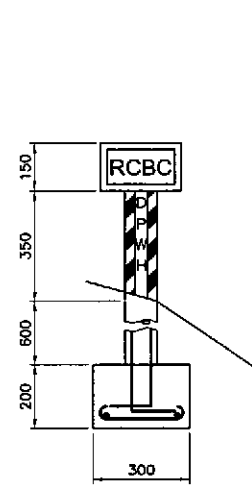
ELEVATION  
CONCRETE MARKER  
TYPE I-a



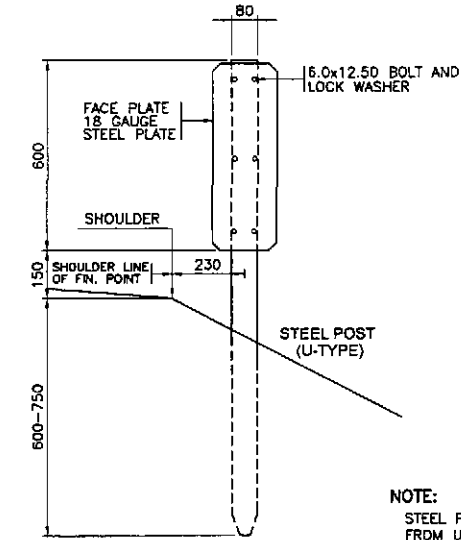
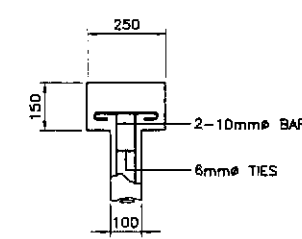
ELEVATION  
CONCRETE MARKER  
TYPE I-b



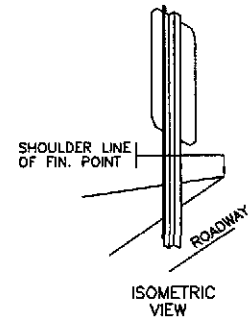
ELEVATION  
CONCRETE MARKER  
TYPE I-c



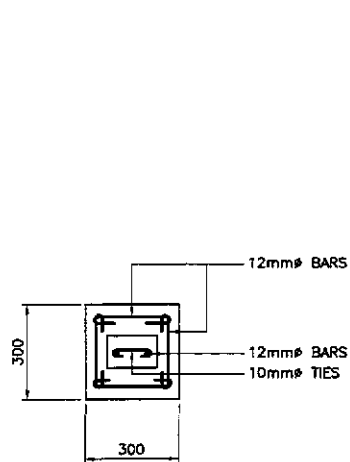
ELEVATION  
CONCRETE MARKER  
TYPE I-d



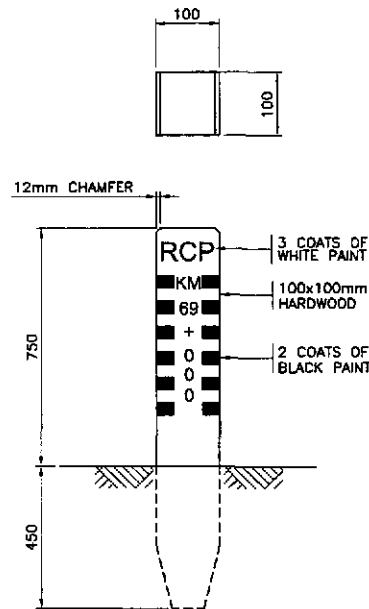
ELEVATION  
STEEL MARKER  
TYPE II



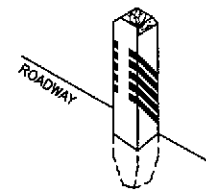
NOTE:  
STEEL POST MAY BE CHANNEL TAKEN FROM UNUSED BAILEY PANNELS MARKINGS AND PAINTINGS SAME AS FOR TYPE I AND TYPE II AS SHOWN.



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

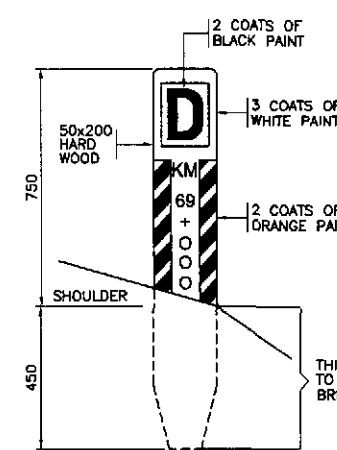


ELEVATION  
WOODEN MARKER  
TYPE III-a

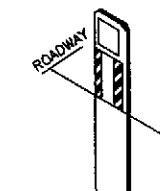


NOTE:  
FACING ROADWAY STAKED AT CENTER LINE OF DRAINAGE 254mm AWAY FROM SHOULDER LINE OF FINAL POINT.

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 GLOSS 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.

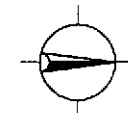
A STANDARD MAINTENANCE MARKERS  
DS-13 NOT TO SCALE

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

DESIGNED	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		
CHECKED			BUREAU OF DESIGN		
SUBMITTED			OFFICE OF THE SECRETARY		
			Submitted By:	Reviewed By:	Recommended By:
			DANILO C. TRAJAND Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES Dir. Director IV
					MANUEL M. BONDAN Undersecretary
					SIMEON A. DATMANONG Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD MAINTENANCE MARKERS	DS-13
CABANATUAN BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		

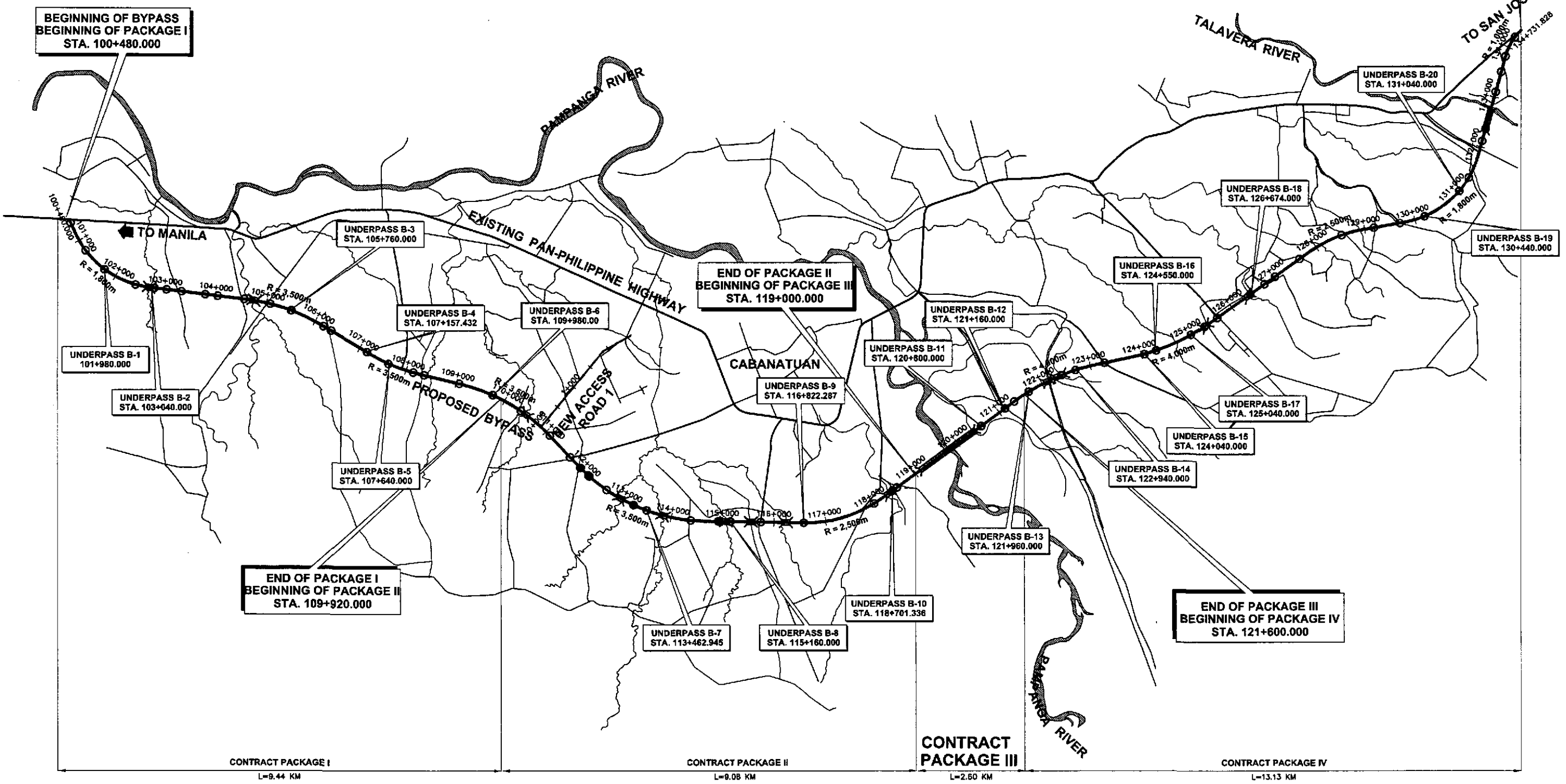
**UNDERPASS CROSSING ( BOX CULVERT )**



END OF PACKAGE IV  
STA. 134+731.828

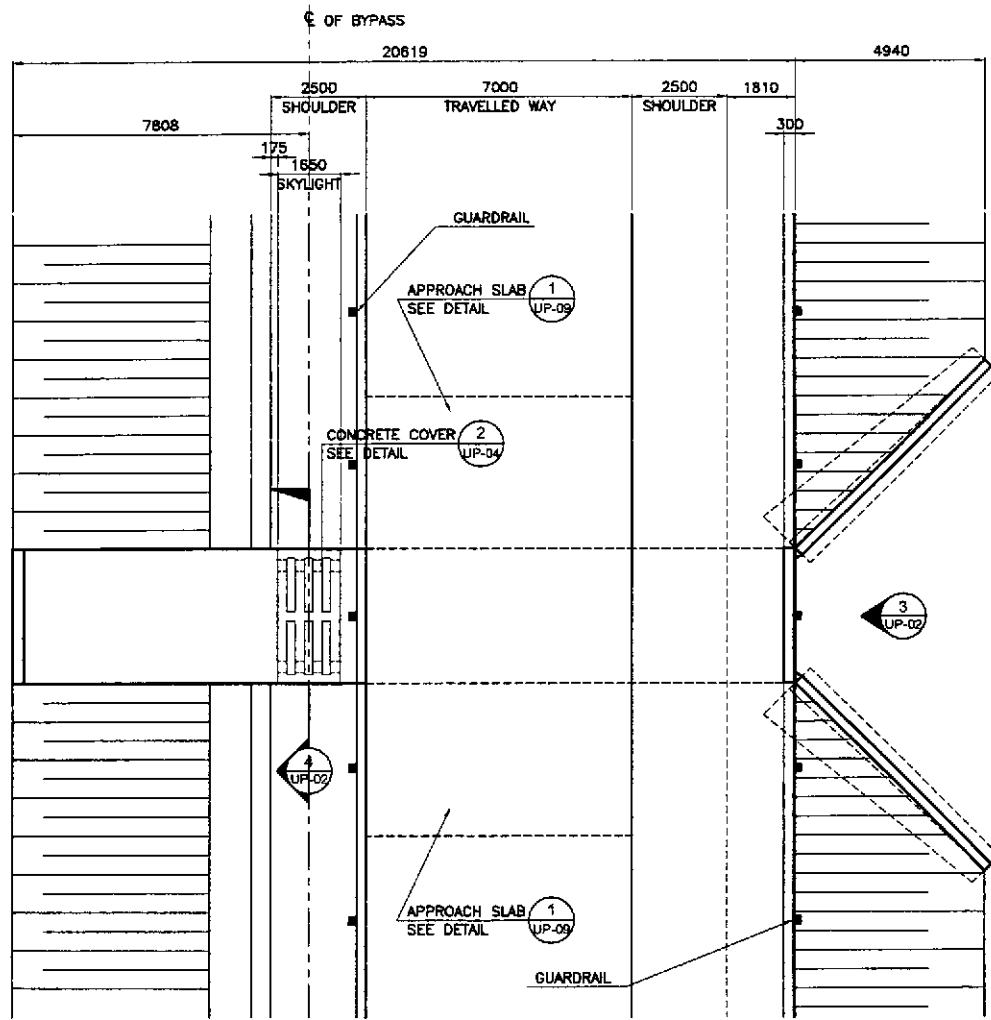
**LEGEND:**

- Intersection Type A ( At grade )
- ⊕ Intersection Type B ( Underpass )
- Intersection Type C ( Only access to frontage roads )
- ▭ Bridge

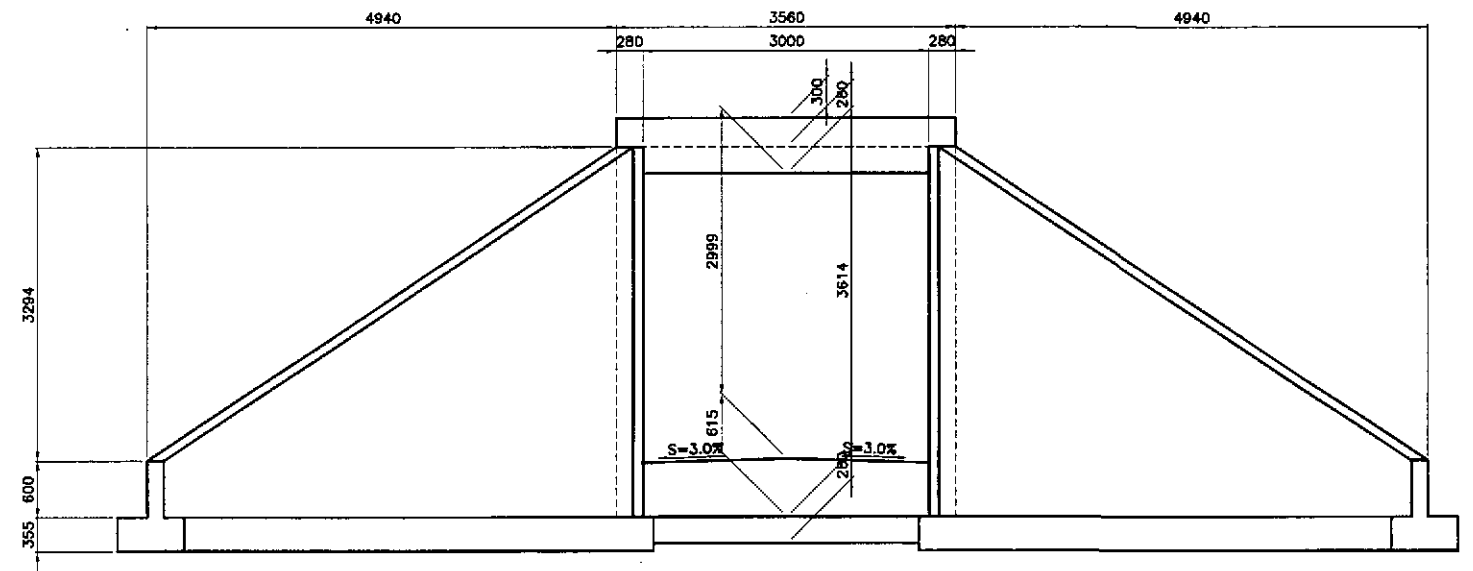


**A SITE DEVELOPMENT PLAN - UNDERPASSES ALONG BYPASS**  
UP-01 SCALE 1:40,000

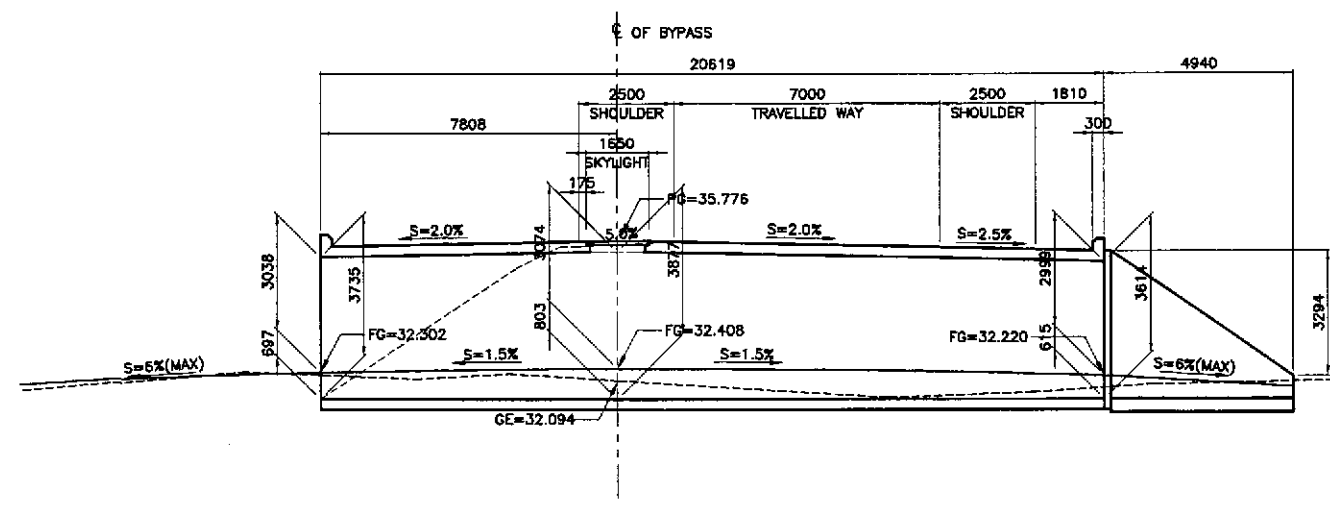
	DESIGNED	DATE	SIGNATURE	<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>	PROJECT AND LOCATION :			SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	08/02	<i>[Signature]</i>		BUREAU OF DESIGN	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)			1:40,000	SITE DEVELOPMENT PLAN UNDERPASSES ALONG BYPASS	UP-01
	SUBMITTED	10/19/02	<i>[Signature]</i>		OFFICE OF THE SECRETARY	CABANATUAN BYPASS - CONTRACT PACKAGE III			FULL SIZE A1		
<p>Submitted By: <b>DANILO C. TRAJANO</b> Project Director</p> <p>Reviewed By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division</p> <p>Recommended By: <b>GILBERTO S. REYES</b> OIC, Director IV</p> <p>Recommended By: <b>MANUEL M. BONDAN</b> Undersecretary</p> <p>Approved By: <b>SIMEON A. DATUMANONG</b> Secretary</p>											



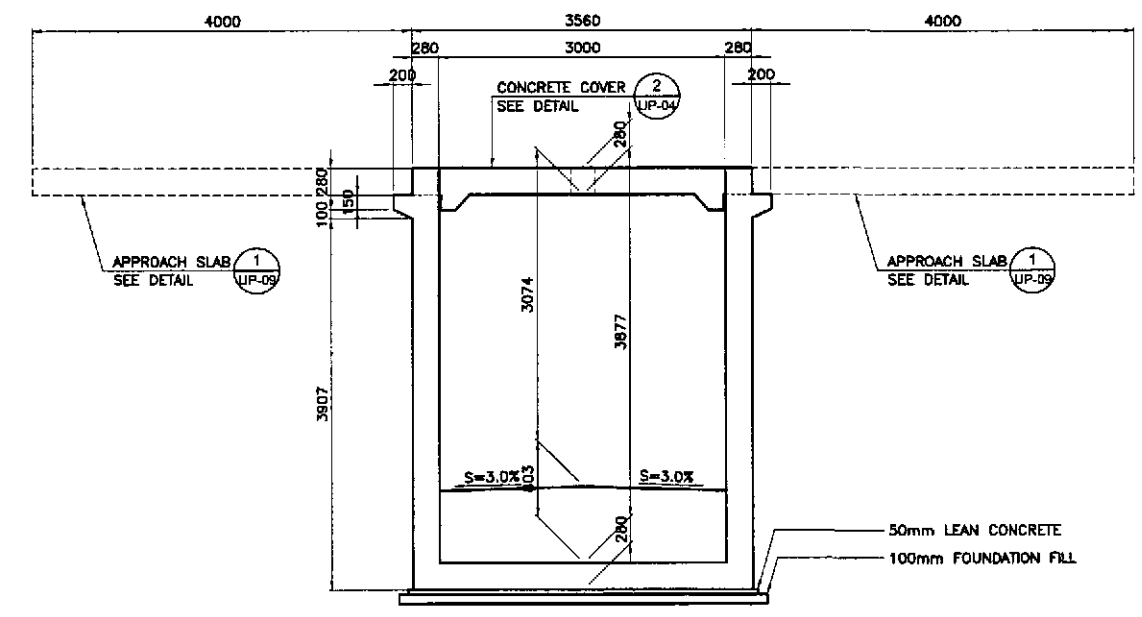
1 GENERAL PLAN  
UP-02 SCALE 1:100



3 ELEVATION  
UP-02 SCALE 1:40

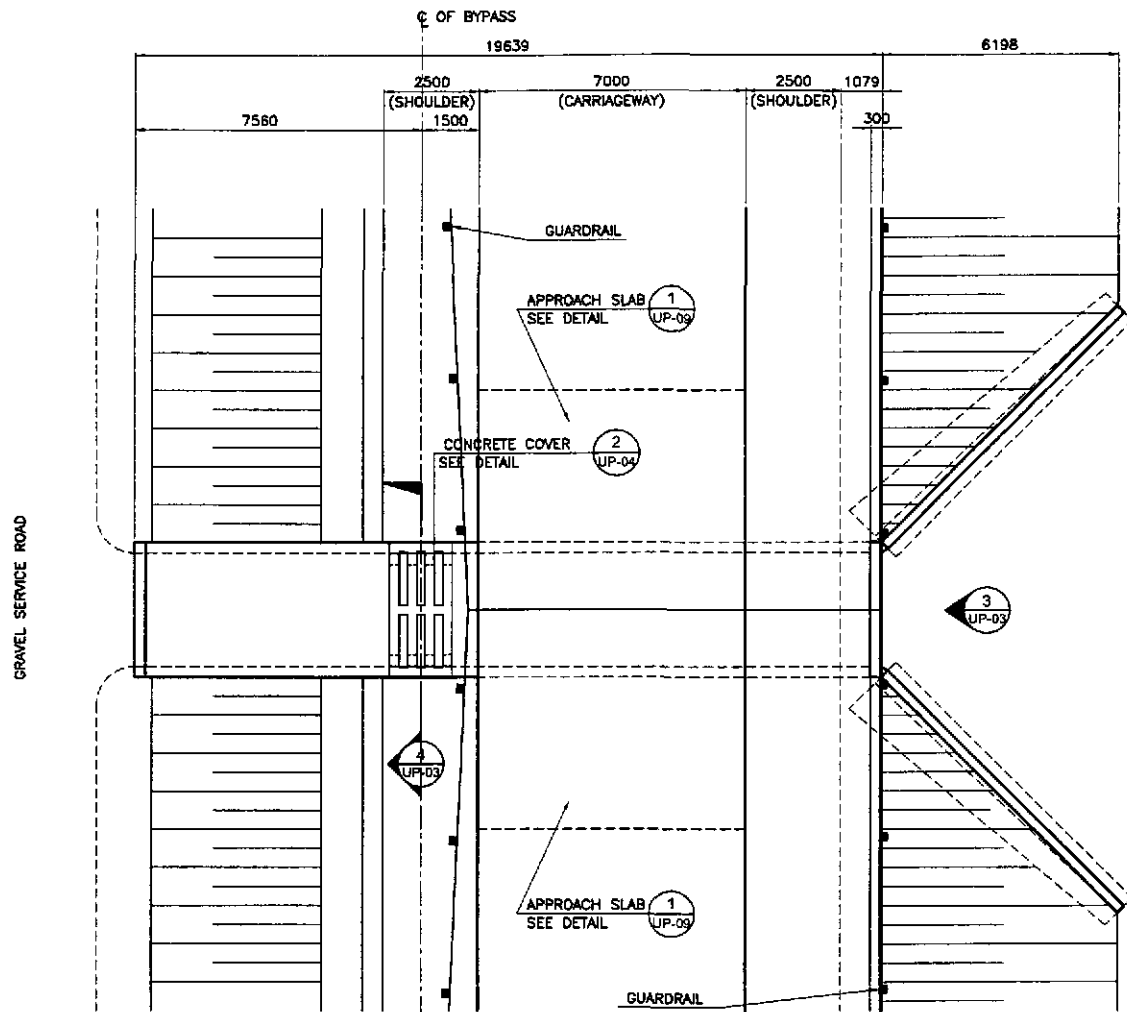


2 GENERAL ELEVATION  
UP-02 SCALE 1:100

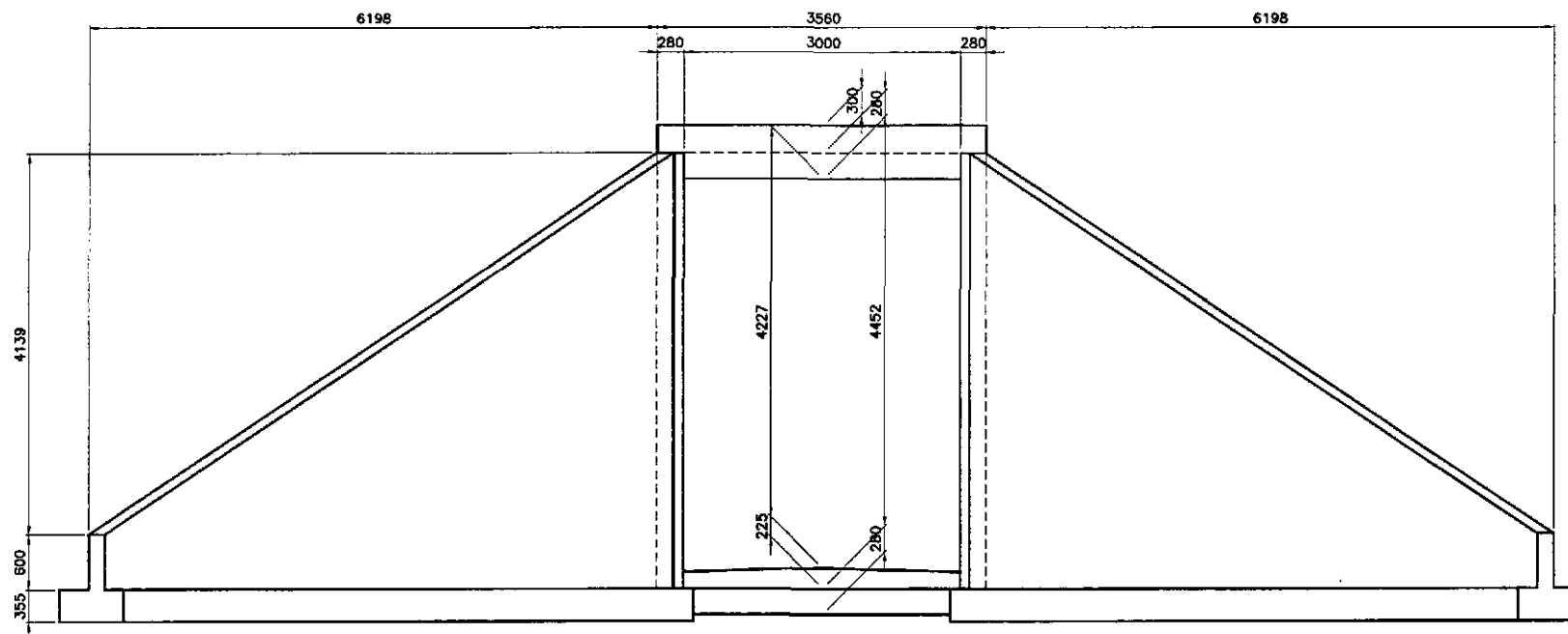


4 SECTION  
UP-02 SCALE 1:40

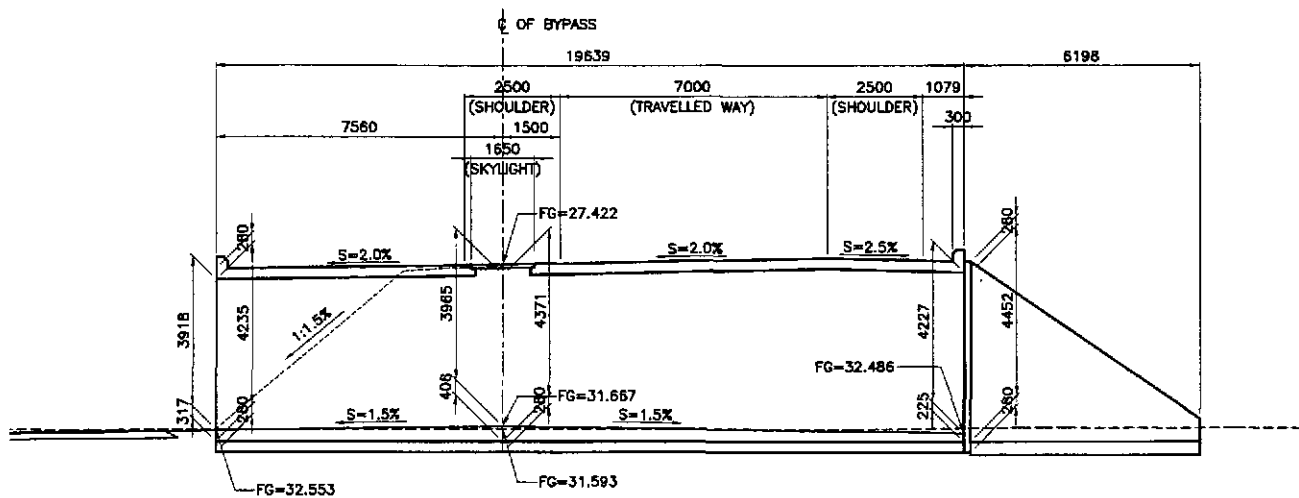
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (INITIAL STAGE) B-11 (STA. 120+800.00)	SHEET NO. : UP-02
	CHECKED	10/17/02	[Signature]		PJHL - PMO Submitted By: DANILLO C. TRAJANO Project Director	Reviewed By: JOSEFINA M. ALAGAR Chief, Highway Division	Recommended By: GILBERTO S. REYES OIC, Director IV				



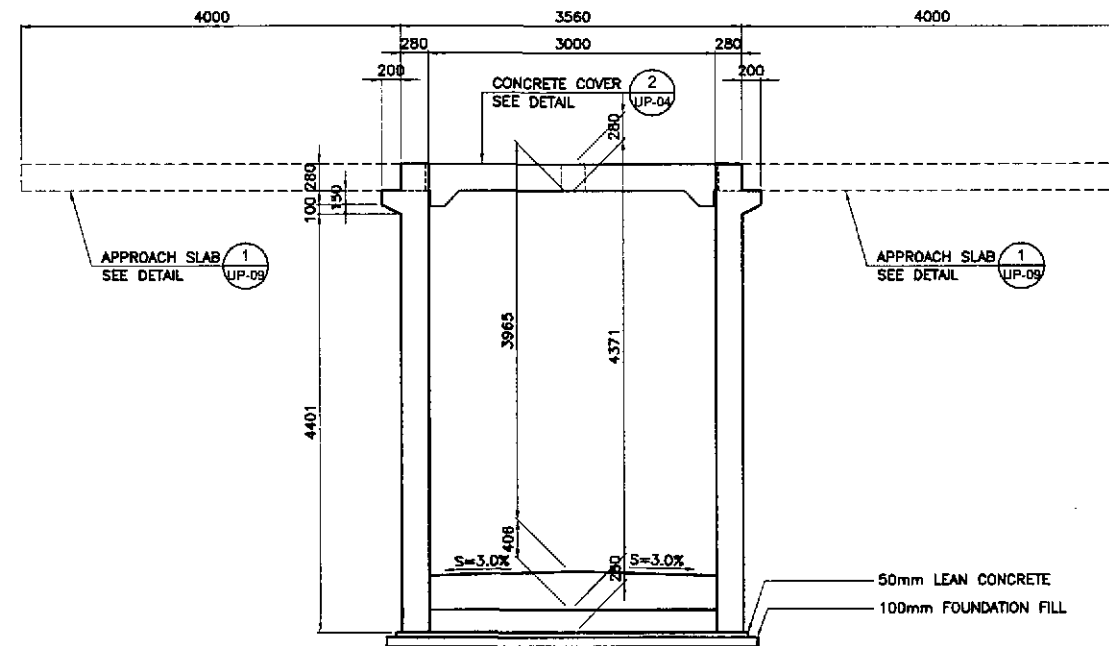
1 GENERAL PLAN  
UP-03 SCALE 1:100



3 ELEVATION  
UP-03 SCALE 1:40

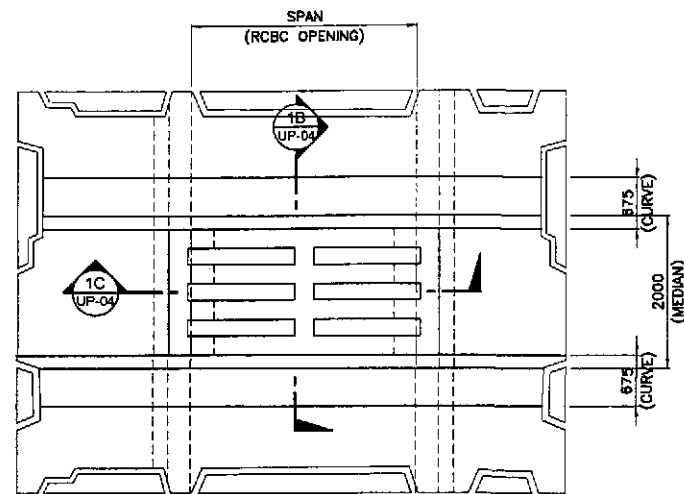


2 GENERAL ELEVATION  
UP-03 SCALE 1:100

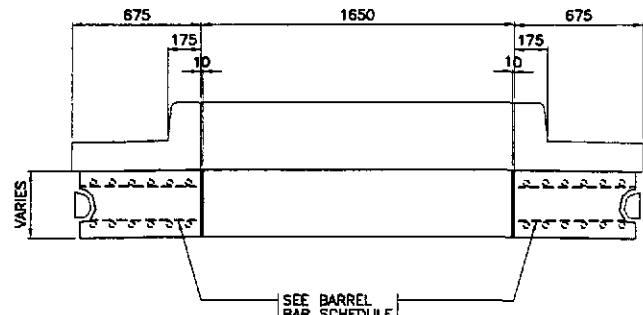


4 SECTION  
UP-03 SCALE 1:40

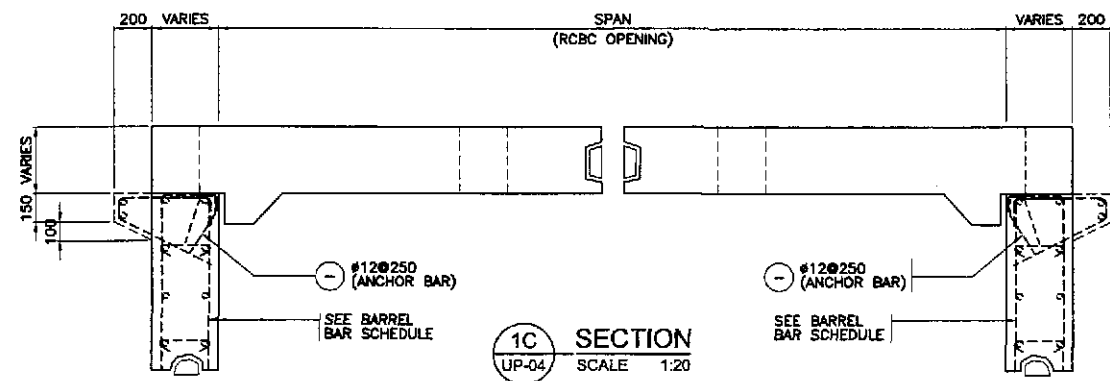
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) <b>CABANATUAN BYPASS - CONTRACT PACKAGE III</b>	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : <b>BOX CULVERT</b> GENERAL PLAN, ELEVATION & SECTION (INITIAL STAGE) B-12 (STA. 121+140.00)	SHEET NO. : <b>UP-03</b>
	CHECKED	10/17/02	<i>[Signature]</i>		BUREAU OF DESIGN Submitted By: <b>DANILO C. TRAJANO</b> Project Director	OFFICE OF THE SECRETARY Recommended By: <b>JOSEFINA M. ALAGAR</b> Chief, Highways Division	Recommended By: <b>GILBERTO S. REYES</b> Dir., Director IV				
	SUBMITTED	10/19/02	<i>[Signature]</i>								



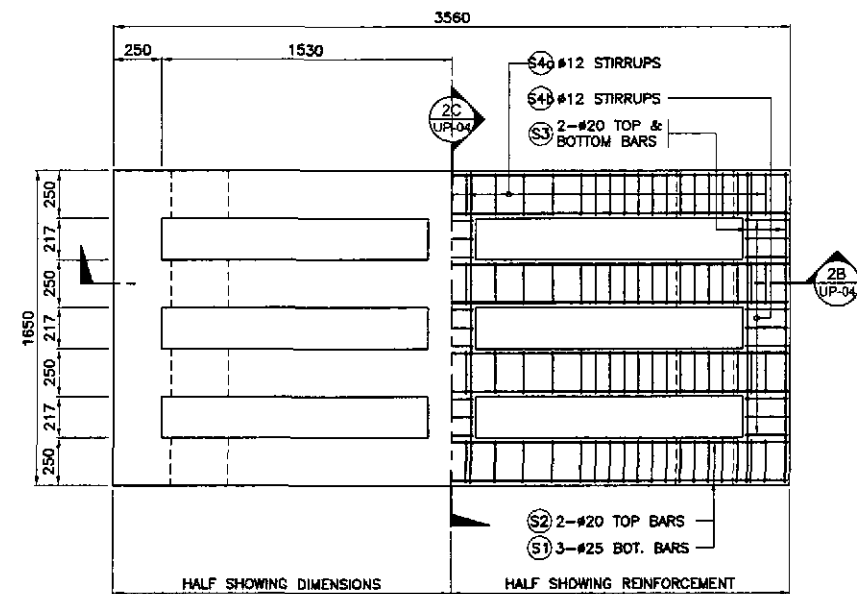
1A PARTIAL PLAN  
UP-04 SCALE 1:50



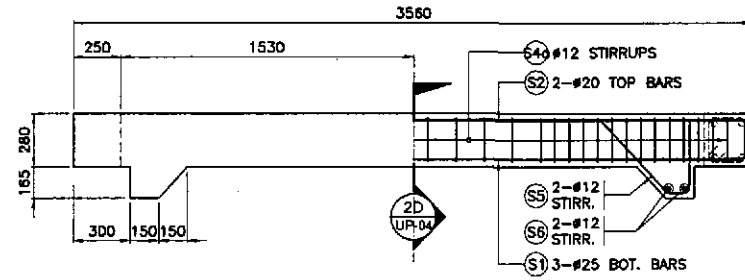
1B SECTION  
UP-04 SCALE 1:20



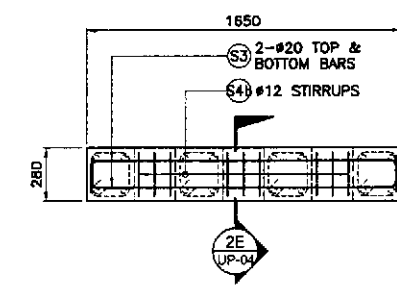
1 PARTIAL BOX SUPPORT DETAILS  
UP-04 SCALE AS SHOWN



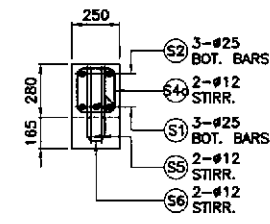
2A PLAN DETAIL  
UP-04 SCALE 1:20



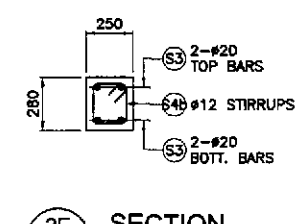
2B SECTION  
UP-04 SCALE 1:20



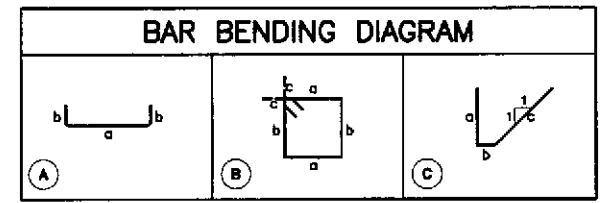
2C SECTION  
UP-04 SCALE 1:20



2D SECTION  
UP-04 SCALE 1:20



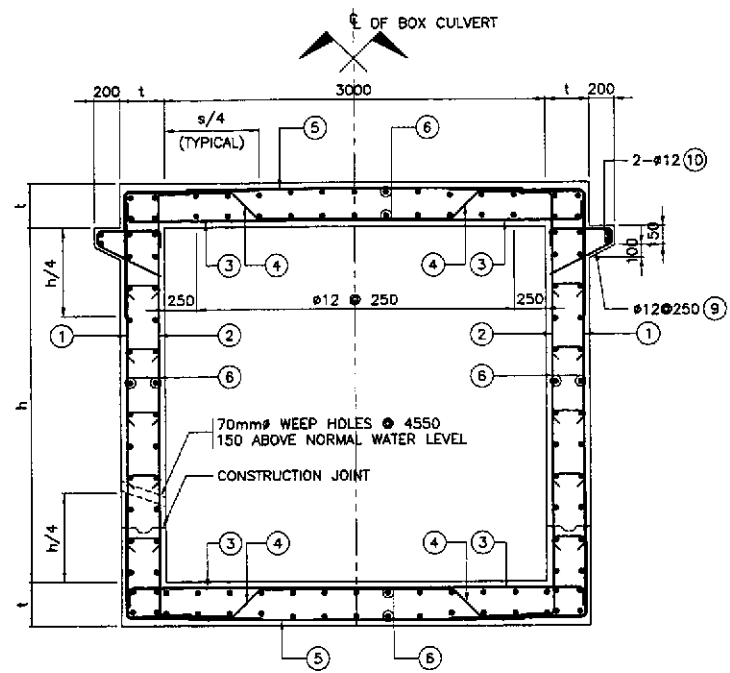
2E SECTION  
UP-04 SCALE 1:20



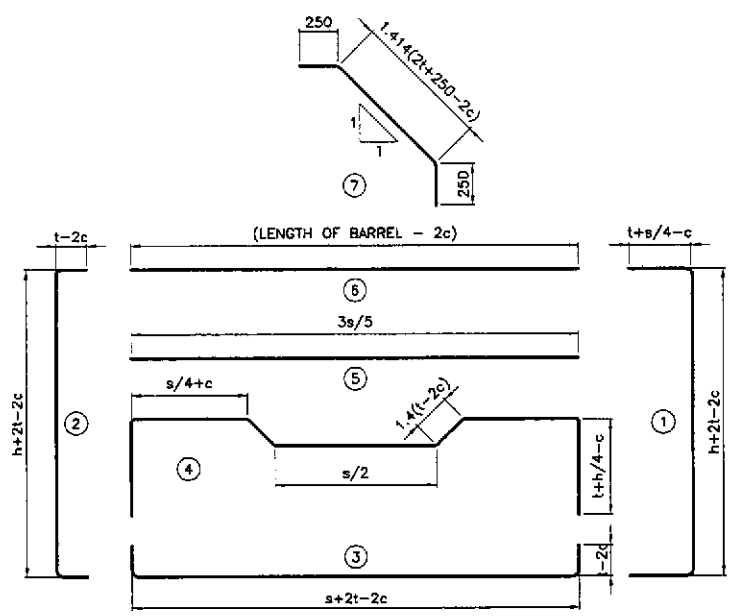
2 CONCRETE COVER DETAILS (3.0 M.)  
UP-04 SCALE AS SHOWN

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm)						LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m <sup>3</sup> )
						a	b	c	d	e	f					
3.0 M SPAN	S1	25	12	AS DWG	(A)	3510	206	-	-	-	-	3922	47.06	3.854	182	1.2
	S2	20	B	AS DWG	(A)	3510	206	-	-	-	-	3922	31.38	2.466	78	
	S3	20	12	AS DWG	(A)	1600	206	-	-	-	-	2012	24.14	2.466	60	
	S4a	12	144	AS DWG	(B)	200	206	115	-	-	-	1042	150.05	0.888	134	
	S4b	12	27	AS DWG	(B)	200	206	115	-	-	-	1042	28.13	0.888	25	
	S5	12	16	AS DWG	(C)	395	125	560	-	-	-	1080	17.28	0.888	16	
S6	12	16	AS DWG	(A)	100	385	-	-	-	-	870	13.92	0.888	13		
GRAND TOTAL =													508 KG	1.2		

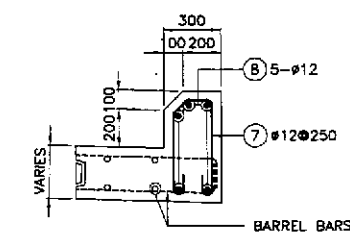
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Paridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : BOX CULVERT CONCRETE COVER DETAILS (3.0 M.) WITH BOX SUPPORT (RCBC OPENING) (INITIAL STAGE)	SHEET NO. : UP-04
	CHECKED	DATE	SIGNATURE		FUHL - PMO 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 OIC, Director IV				



1 SECTION - SINGLE BARREL  
UP-05 NOT TO SCALE



3 BAR BENDING DIAGRAM - SINGLE BARREL  
UP-05 NOT TO SCALE



2 PARAPET DETAIL  
UP-05 SCALE 1:20

DESIGN NOTES :

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

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

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

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

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

NO SURCHARGE ON WALL DUE TO LIVE LOAD.

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

UNIT STRESSES:  
 $f'_c = 28 \text{ MPa}$   
 $f_y = 276 \text{ MPa}$

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

OVER 3.0 COVER  
#12 @ 450 mm MAXIMUM.

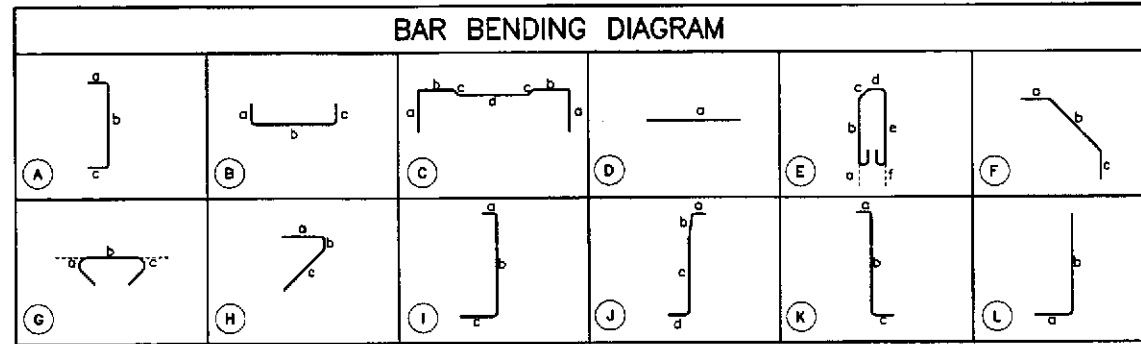
SHEAR:  
MAXIMUM ALLOWABLE SHEAR,  $y = 0.291 \sqrt{f'_c}$  MPa

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

NAME	S	h	t	BAR 1	BAR 2	BAR 3	BAR 4	BAR 5	BAR 6	BAR 7	REMARKS
	SPAN	HEIGHT	THICKNESS	# SPACING	# SPACING	# SPACING	# SPACING	# SPACING	# SPACING	# SPACING	
B-11	3000	3900	280	16 200	16 180	16 200	16 200	12 200	12 250	- -	FLUSHED TO ROADWAY
B-12	3000	4400	280	16 200	16 180	16 200	16 200	12 200	12 250	- -	FLUSHED TO ROADWAY

	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/15/02	[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) CABANATUAN BYPASS - CONTRACT PACKAGE III	AS SHOWN	BOX CULVERT BARREL DETAILS (INITIAL STAGE)	UP-05
	CHECKED	10/17/02	[Signature]	Submitted By:	Reviewed By:	Recommended By:	Approved By:				
SUBMITTED	10/19/02	[Signature]	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES O.C., Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary				





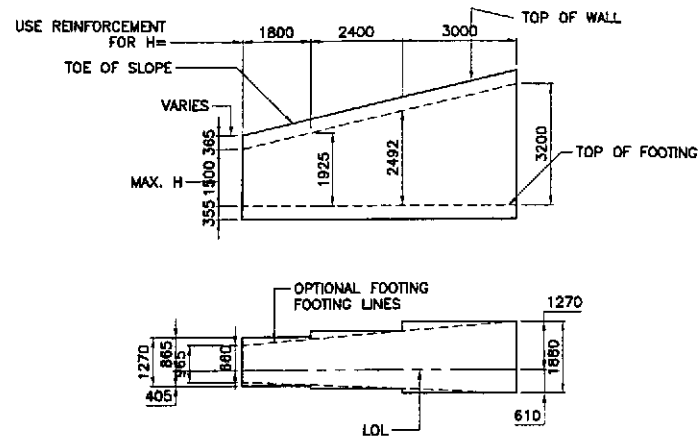
#### SCHEDULE OF REINFORCEMENTS (B11 - STA. 120+800.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm)						LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m³)
						a	b	c	d	e	f					
BARREL L=20.619m	1	16	208	200	(A)	980	4206	980	-	-	-	6166	1282.42	1.579	2025	85.17
	2	18	230	180	(A)	180	4206	180	-	-	-	4566	1050.07	1.579	1659	
	3	16	208	200	(B)	180	3460	180	-	-	-	3820	794.56	1.579	1255	
	4	16	208	200	(C)	1186	800	255	1500	-	-	5942	1224.02	1.579	1933	
	5	12	208	200	(D)	2000	-	-	-	-	-	2000	416	0.888	370	
	6	12	132	250	(D)	20519	-	-	-	-	-	20519	2708.51	0.888	2406	
	7	12	30	250	(E)	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	(D)	3460	-	-	-	-	-	3460	34.6	0.888	31	
	9	12	58	250	(H)	430	70	608	-	-	-	1108	64.27	0.888	58	
	10	12	4	AS DWG	(D)	6900	-	-	-	-	-	6900	27.6	0.888	25	
WINGWALLS (Wt)=4.022m	W1	12	4	AS DWG	(D)	600	8759	-	-	-	9359	37.43	0.888	34	23.81	
	W2	12	26	300	(D)	4193	-	-	-	-	4193	109.01	0.888	97		
	W3a	32	18	375	(I)	1711	3542	150	-	-	5403	88.45	6.313	546		
	W3b	16	28	175	(I)	761	2257	150	-	-	3188	82.38	1.579	131		
	W3c	12	12	275	(I)	711	1258	150	-	-	2119	25.43	0.888	23		
	W4	12	50	300	(I)	203	2543	150	-	-	2896	144.79	0.888	129		
	W5a	25	14	375	(D)	1889	-	-	-	-	1889	27.85	3.854	108		
	W5b	20	12	350	(D)	1453	-	-	-	-	1453	17.44	2.466	44		
W5c	12	12	275	(D)	912	-	-	-	-	912	10.94	0.888	10			
W6	12	14	AS DWG	(D)	7538	-	-	-	-	7538	105.53	0.888	94			
<b>GRAND TOTAL = 11013 KG 109</b>																

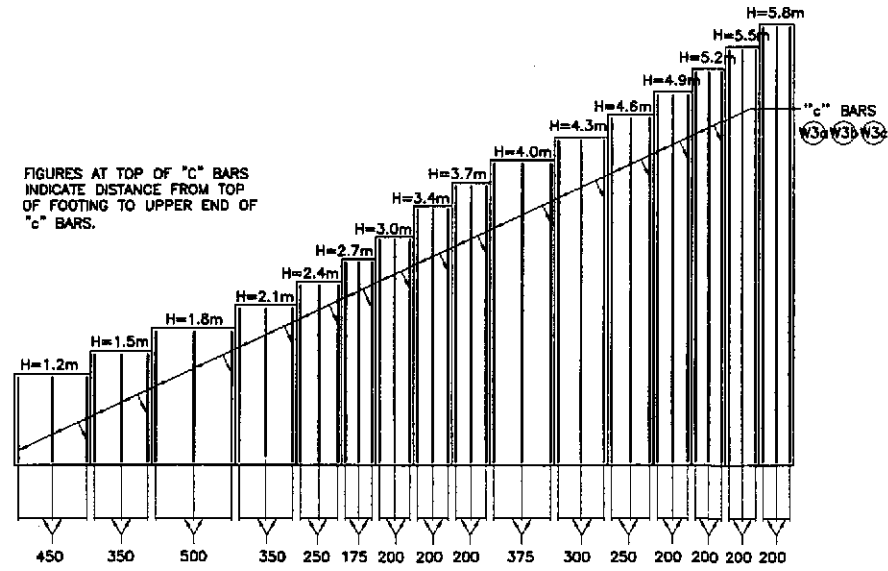
#### SCHEDULE OF REINFORCEMENTS (B12 - STA. 121+140.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm)						LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m³)
						a	b	c	d	e	f					
BARREL L=19.638m	1	16	196	200	(A)	980	4742	980	-	-	-	6702	1326.9	1.579	2096	87.06
	2	16	218	180	(A)	180	4742	180	-	-	-	5102	1112.13	1.579	1757	
	3	16	198	200	(B)	180	3460	180	-	-	-	3820	756.36	1.579	1195	
	4	16	198	200	(C)	1300	800	255	1500	-	-	6210	1217.13	1.579	1922	
	5	12	198	200	(D)	2000	-	-	-	-	-	2000	396	0.888	352	
	6	12	140	250	(D)	19539	-	-	-	-	-	19539	2735.46	0.888	2430	
	7	12	30	250	(E)	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	(D)	3460	-	-	-	-	-	3460	34.6	0.888	31	
	9	12	58	250	(H)	430	70	608	-	-	-	1108	64.27	0.888	58	
	10	12	4	AS DWG	(D)	6900	-	-	-	-	-	6900	27.6	0.888	25	
WINGWALLS (Wt)=4.562m	W1	12	4	AS DWG	(D)	600	9569	-	-	-	10169	40.68	0.888	37	28.32	
	W2	12	30	300	(D)	4536	-	-	-	-	4536	138.08	0.888	121		
	W3a	32	22	300	(I)	1732	3956	150	-	-	5848	128.66	6.313	813		
	W3b	20	26	200	(I)	882	2481	150	-	-	3513	91.33	2.466	226		
	W3c	12	14	275	(I)	732	1325	150	-	-	2207	30.9	0.888	28		
	W4	12	54	300	(I)	203	2811	150	-	-	3164	170.84	0.888	152		
	W5a	25	20	300	(D)	2027	-	-	-	-	2027	41.53	3.854	161		
	W5b	25	12	400	(D)	1720	-	-	-	-	1720	20.84	3.854	80		
W5c	12	14	275	(D)	908	-	-	-	-	908	12.71	0.888	12			
W6	12	14	AS DWG	(D)	8212	-	-	-	-	8212	114.97	0.888	103			
<b>GRAND TOTAL = 11634 KG 115.4</b>																

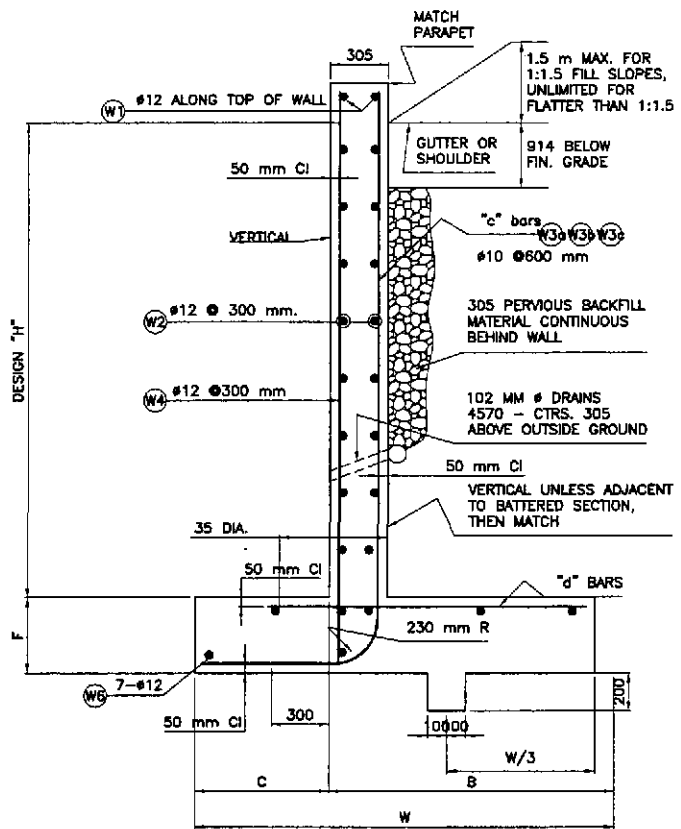
	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/12/02		BUREAU OF DESIGN				THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Palarid, Cabanatuan and San Jose Bypasses)	AS SHOWN	BOX CULVERT BOX CULVERT BARREL SCHEDULE (INITIAL STAGE)	UP-06
	CHECKED	10/17/02		P.W.D. - P.W.D.	Submitted By:	Reviewed By:	Recommended By:	Approved By:	FULL SIZE A1		
SUBMITTED	10/19/02		Project Director	Chief, Highways Division	OC, Director IV	Undersecretary	Secretary				



1 TYPICAL LAYOUT EXAMPLE  
UP-07 SCALE 1:100



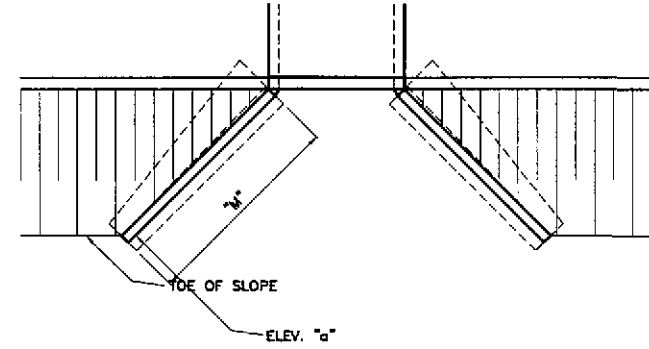
2 TYPICAL SECTION  
H=1.2 m THRU 3.7 m  
UP-07 SCALE 1:20



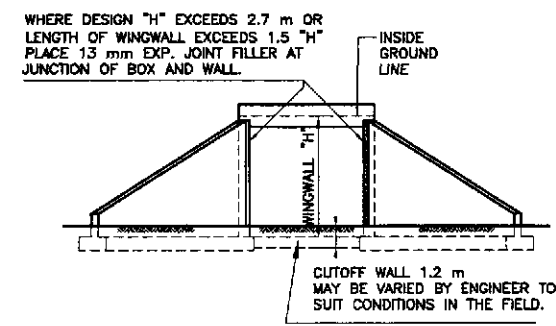
3 TYPICAL SECTION  
H=4.0 m THRU 4.9 m  
UP-07 SCALE 1:20

REINFORCED CONCRETE WINGWALLS																
H	1200	1500	1800	2100	2400	2700	3000	3400	3700	4000	4300	4600	4900	5200	5500	5800
W	965	1120	1270	1420	1575	1730	1880	2030	2185	2335	2490	2640	2795	2945	3050	3150
C	305	355	405	455	510	560	610	660	710	760	815	865	915	965	1015	1065
B	660	765	865	965	1085	1170	1270	1370	1475	1575	1675	1775	1880	1980	2035	2085
F	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355
Batter	None	None	None	None	None	None	None	None	None	1:25	1:25	1:25	1:25	1:25	1:25	1:27
S	305	305	305	305	305	305	305	305	305	465	475	490	500	500	500	500
"c" Bars	12@450	12@350	12@275	18@350	18@250	18@175	20@200	25@200	25@200	32@375	32@300	32@250	32@200	32@175	32@200	32@200
"d" Bars	12@450	12@350	12@275	16@350	16@250	20@350	25@400	25@400	25@400	25@375	25@300	25@250	25@200	25@175	28@200	28@200

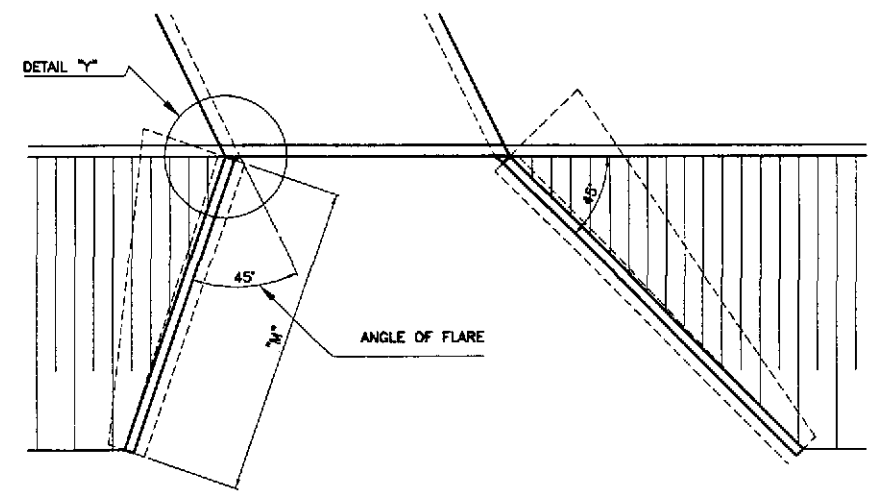
**NOTES**  
 UNIT STRESSES:  $f_c = 165 \text{ MPa}$ ,  $f_s = 9 \text{ MPa}$ ,  $n = 10$   
 MAXIMUM TDE PRESSURE = 160 kPa  
 ELEVATIONS, LENGTH AND ANGLE OF FLARE OF WINGS MAY BE VARIED BY THE ENGINEER TO SUIT CONDITIONS ENCOUNTERED IN THE FIELD. WALLS DESIGNED FOR 600 mm LEVELLOAD SURCHARGE, 1:1.5 SLOPING SURCHARGE NOT TO EXCEED 1.5 m IN ELEVATION PLUS 600 mm LEVELLOAD SURCHARGE, OR UNLIMITED 1:2 SURCHARGE  
 DIMENSIONS "H", "L", "M", "N", ELEVATION "a" AND "ANGLE OF FLARES" (AS APPLY) ARE SHOWN ON THE PLANS  
 WALL HEIGHT MAY BE EXCEEDED BY 150 mm BEFORE GOING TO NEXT GREATER "H".  
 ELIMINATE CUTOFF WALL IF ADJACENT CHANNEL IS PAVED AND SKEW IS 20° MAXIMUM  
 FOR WALL OFFSET VALUES, SEE STANDARD PLAN B3-B



4 PLAN  
UP-07 SCALE 1:100

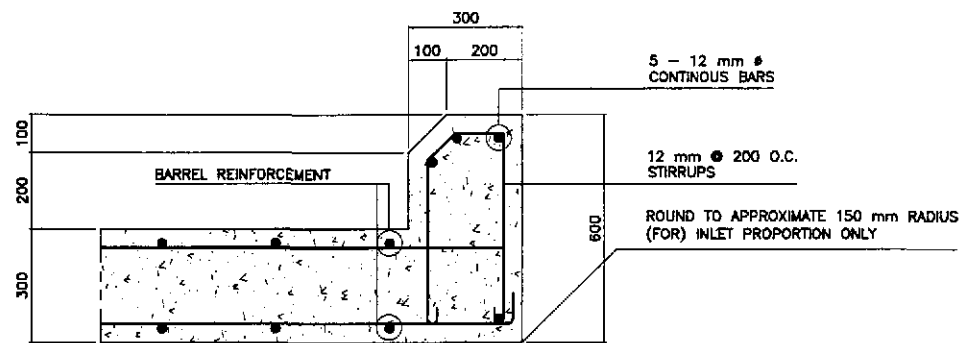


5 END ELEVATION  
UP-07 SCALE 1:100

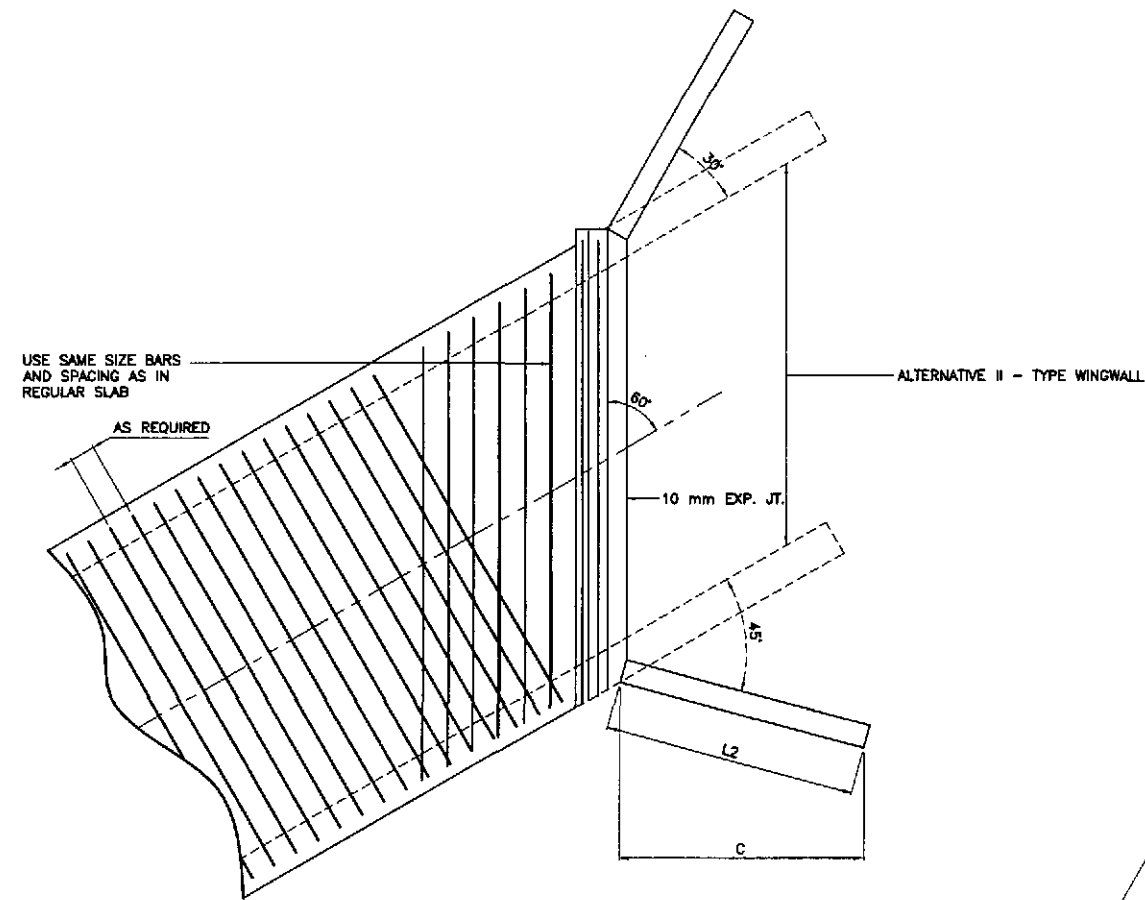


6 PLAN  
UP-07 SCALE 1:100

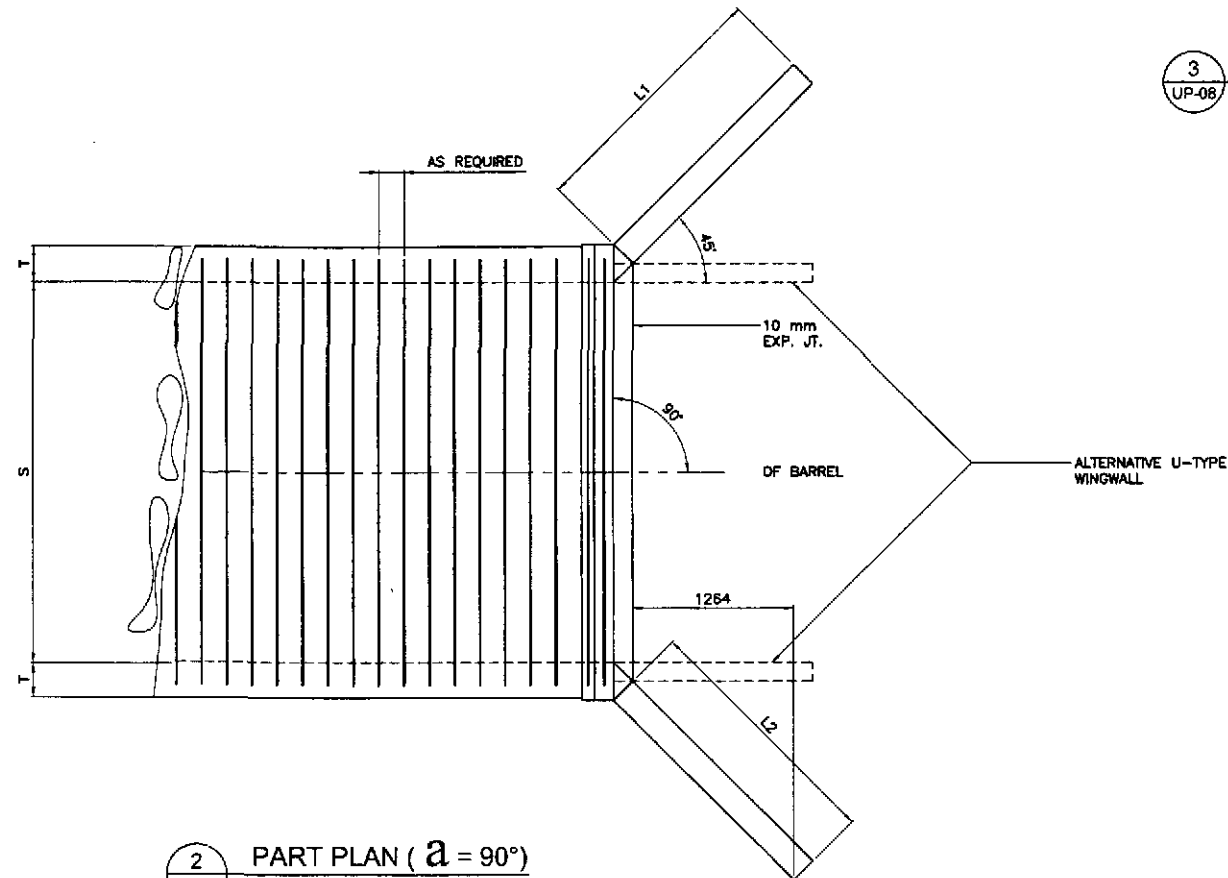
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) <b>CABANATUAN BYPASS - CONTRACT PACKAGE III</b>	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : BOX CULVERT WINGWALL DETAIL (INITIAL STAGE)	SHEET NO. : <b>UP-07</b>
	CHECKED	DATE	SIGNATURE		FUHL - PWD BUREAU OF DESIGN OFFICE OF THE SECRETARY 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: SIBELON A. DATUMANG, Secretary						



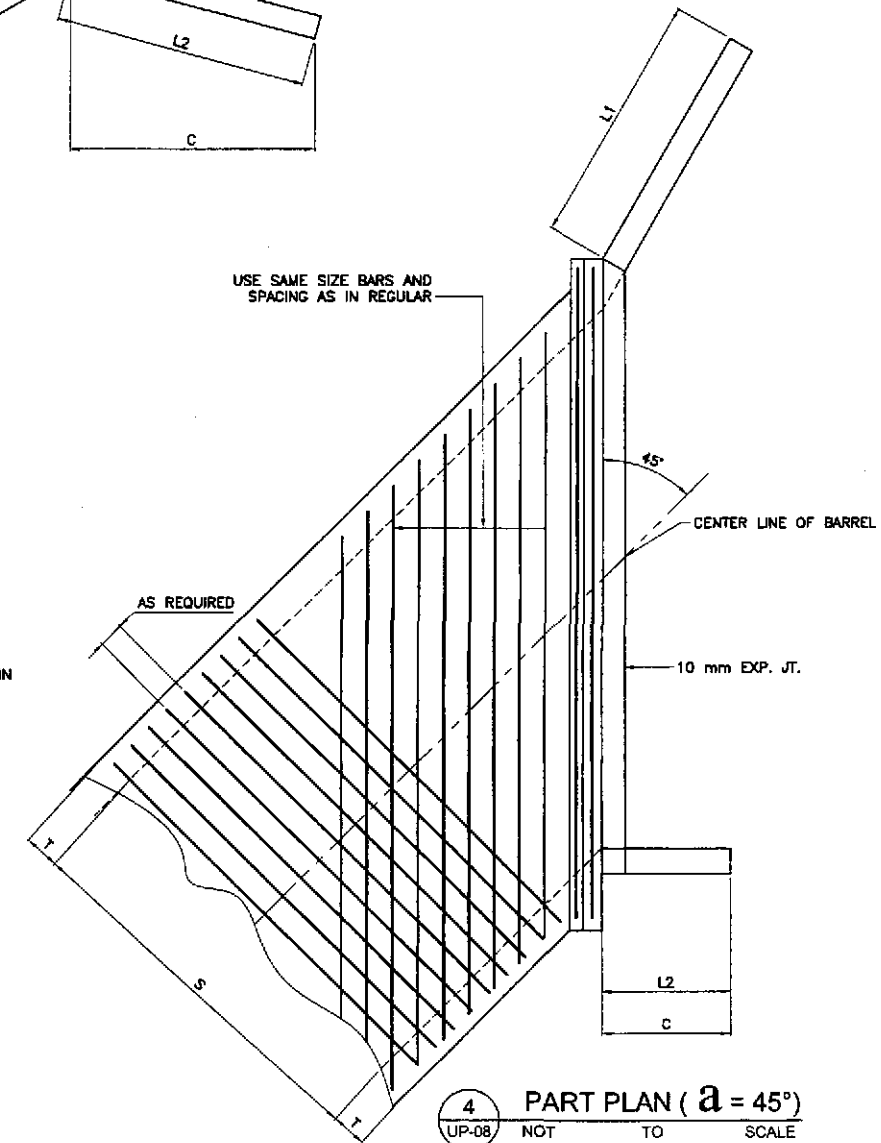
1 CURB DETAIL  
UP-08 SCALE 1:10



3 PART PLAN (a = 60°)  
UP-08 NOT TO SCALE



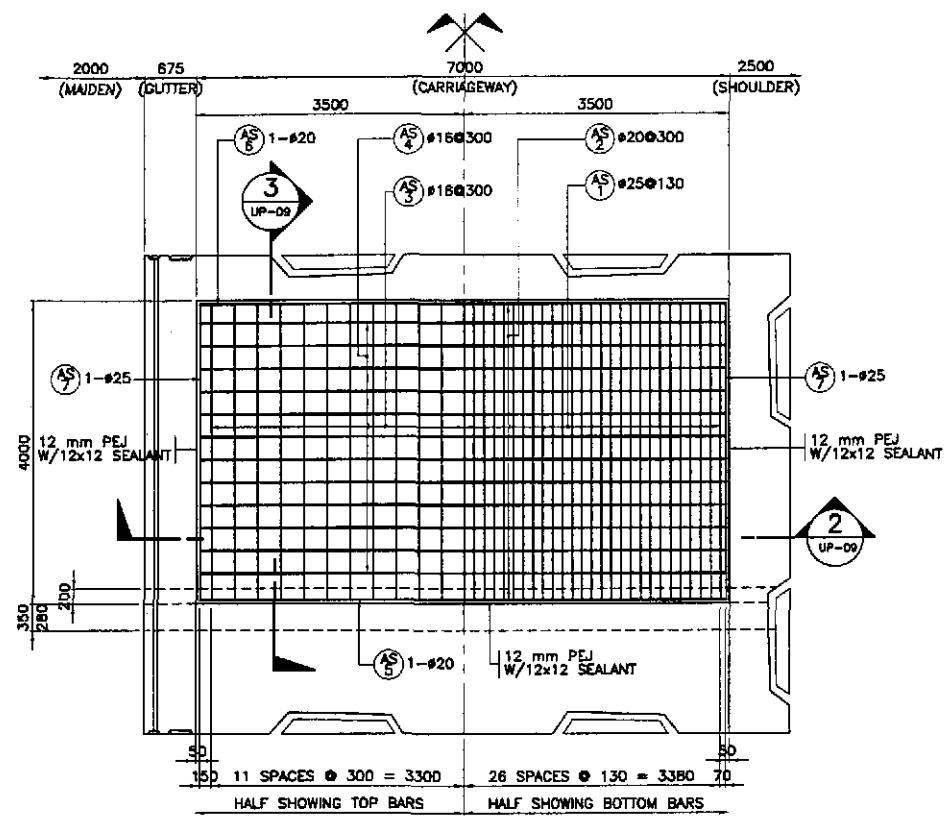
2 PART PLAN (a = 90°)  
UP-08 NOT TO SCALE



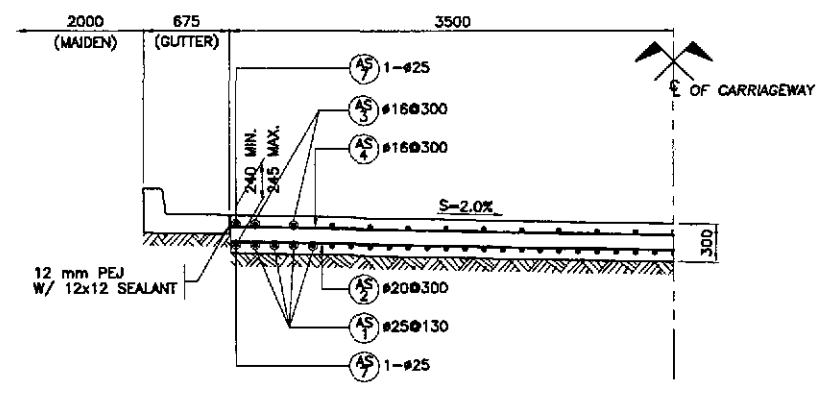
4 PART PLAN (a = 45°)  
UP-08 NOT TO SCALE

NOTE  
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED

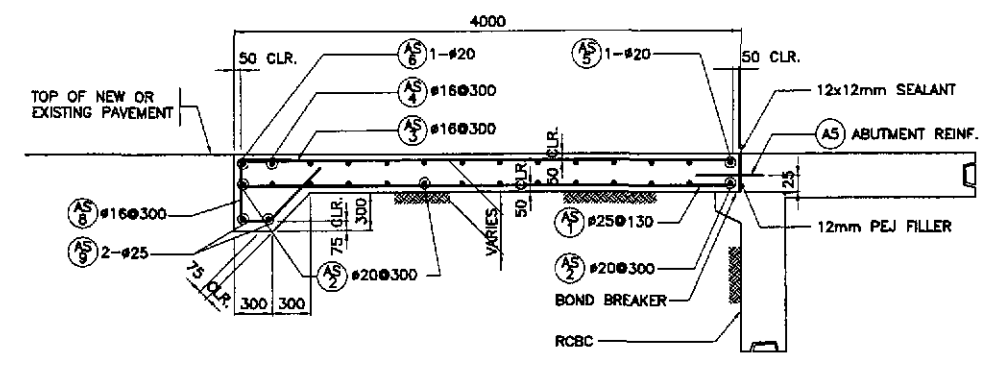
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Pilaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : BOX CULVERT TYPICAL PLAN REINFORCED CONCRETE AT END BOX CULVERT AND CURB DETAIL (INITIAL STAGE)	SHEET NO. : UP-08
	CHECKED	10/17/07	[Signature]		BUREAU OF DESIGN 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 SIMEDON A. DATUMANONG, Secretary						
SUBMITTED	10/19/07	[Signature]	TEAM LEADER								



1 PLAN  
UP-08 SCALE 1:50



2 SECTION  
UP-09 SCALE 1:30



3 SECTION  
UP-09 SCALE 1:30

BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF REBARS)	REINFORCEMENT										CONCRETE VOLUME (m <sup>3</sup> )	REMARKS		
	MARK	SIZE (mm)	QUANTITY	SPACING (mm)	SHAPE	BAR DIMENSIONS (mm)			LENGTH PER BAR (mm)	TOTAL LENGTH (m)			UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)
						a	b	c						
a A	AS 1	25	89	130	B	3900	150	-	4050	226.80	3.853	874	1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB	
	AS 2	20	14	300	A	7900	-	-	7900	55.30	2.466	136		
a B	AS 3	16	25	300	B	3900	150	-	4050	101.25	1.578	160		
	AS 4	16	12	300	A	7900	-	-	7900	47.40	1.578	75		
b C	AS 5	20	1	AS SHOWN	A	7200	-	-	7200	7.20	2.466	18		
	AS 6	20	1	AS SHOWN	A	7900	-	-	4050	53.20	1.578	84		
c	AS 7	25	4	AS SHOWN	A	1985	1965	-	3930	15.72	3.853	61		
	AS 8	16	27	300	C	415 MIN. 475 MAX.	250	650	1745	47.11	1.578	74		
	AS 9	25	2	AS SHOWN	A	7900	-	-	7900	15.80	3.853	61		
<b>GRAND TOTAL = 1543</b>											<b>9.58</b>			

<p>JAPAN INTERNATIONAL COOPERATION AGENCY</p>		<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>		<p>SCALE : AS SHOWN</p>		<p>SHEET CONTENTS : BOX CULVERT APPROACH SLAB DETAIL (INITIAL STAGE)</p>		<p>SHEET NO. : UP-09</p>	
DESIGNED	DATE	SIGNATURE	P.H.L. - PMO	BUREAU OF DESIGN	OFFICE OF THE SECRETARY						
CHECKED	01/17/02	[Signature]	Submitted By:	Reviewed By:	Recommended By:						
SUBMITTED	01/19/02	[Signature]	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEDN A. DATUMANONG Secretary				
<p>KATAHIRA &amp; ENGINEERS</p>		<p>YACHIYO ENGINEERING CO., LTD.</p>									

**BRIDGE**

# **GENERAL**

# GENERAL NOTES FOR BRIDGES - 1

## A. DESIGN CRITERIA

### 1. DESIGN SPECIFICATION

- A. DPWH DESIGN GUIDELINES CRITERIA AND STANDARDS FOR PUBLIC WORKS AND HIGHWAYS, VOL. II .
- B. NATIONAL STRUCTURAL CODE OF THE PHILIPPINES, VOL. II, 2nd ED. 1997
- C. THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 16TH EDITION, 1996.
- D. JAPAN ROAD ASSOCIATION SPECIFICATIONS FOR HIGHWAY BRIDGES

### 2. DESIGN METHODOLOGY

ALLOWABLE STRESS DESIGN ( ASD ) &  
LOAD FACTOR DESIGN ( ULTIMATE STRENGTH DESIGN)

### 3. LOADING

#### 3.1 DEAD LOADS

WEIGHT

A. CONCRETE	24.50 kN/m <sup>3</sup>
B. STEEL	77.00 kN/m <sup>3</sup>
C. EARTH	19.00 kN/m <sup>3</sup>
D. WEARING SURFACE (50mm THK.)	1.10 kN/m <sup>2</sup>

#### 3.2 LIVE LOADS

A. AASHTO MS18 (HS20) TRUCK AND EQUIVALENT LANE LOADING.

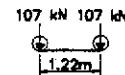
B. SIDEWALK LOAD

$$\text{SPAN} \leq 30.5\text{m} : 4.07 \text{ kN/m}^2$$

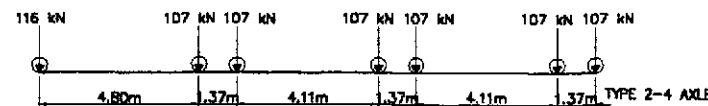
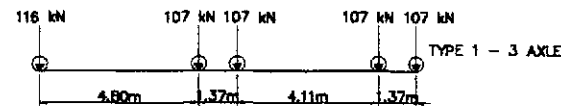
$$\text{SPAN} > 30.5\text{m} : (1.437 + \frac{43.798}{15.24})(16.76 - W) \text{ kN/m}^2 < 2.874 \text{ kN/m}^2$$

L : LOADED LENGTH      W : SIDEWALK WIDTH

C. ALTERNATE MILITARY LOADING.



D. PERMIT DESIGN LOAD (SPECIAL PERMIT REQUIRED BEFORE PASSING BRIDGE)



#### 3.3 IMPACT

IN ACCORDANCE WITH DIVISION 1 OF AASHTO STANDARD SPECIFICATIONS, 1996.

#### 3.4 SEISMIC LOAD

IN ACCORDANCE WITH DIVISION 1A OF THE 1996 AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES USING ACCELERATIONS COEFFICIENT OF 0.40 AND SEISMIC PERFORMANCE CATEGORY D.

#### 3.5 HYDRAULIC DESIGN DATA

50-YEAR DESIGN DISCHARGE,  $Q_{50} = 6,990 \text{ m}^3/\text{sec}$ .  
DESIGN FLOW VELOCITY,  $V_{50} = 1.88 \text{ m/sec}$ .  
DESIGN FLOOD WATER LEVEL, DFWL = EL + 32.3 m  
CATCHMENT AREA, CA = 2,508.6 km<sup>2</sup>

### 3.6 TEMPERATURE RANGES

ASSUMED BASE TEMPERATURE : +28C°  
MINIMUM AMBIENT AIR TEMPERATURE : +18C°  
MAXIMUM AMBIENT AIR TEMPERATURE : +38C°  
TEMPERATURE DIFFERENCE BETWEEN TOP OF SLAB AND OTHER PARTS OF STRUCTURE : +10C°

### 3.7 CONSTRUCTION LOADS

CONSTRUCTION LOADS SHALL BE AS STIPULATED IN THE AASHTO GUIDE SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT THESE LOADS ARE NOT EXCEEDED AND THAT THE MEMBER STRESSES ARE WITHIN ALLOWABLE DURING CONSTRUCTION.

### 3.8 OTHER LOADS

IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS, 1996.

### 3.9 LOAD COMBINATION (LOAD FACTOR DESIGN)

- A. GROUP I = 1.3 [1.0 D + 1.67(L+I)n + 1.0 SF ]
- B. GROUP 1B = 1.3 [1.0 D + 1.0(L+I)p + 1.0 SF ]
- C. GROUP VII = 1.3 [1.0 D + 1.0 SF + EQ ]
- D. OTHER LOAD COMBINATIONS SHALL BE IN ACCORDANCE WITH AASHTO GUIDE SPECIFICATIONS.

## B. MATERIALS

### 1. CONCRETE

UNLESS INDICATED OTHERWISE ON PLANS, THE CONCRETE CLASS AND STRENGTH SHALL BE AS FOLLOWS:

STRUCTURAL MEMBER	CLASS	28 - DAY CYLINDER STRENGTH		MAX. SIZE OF COARSE AGGREGATE mm ( in. )	REMARKS
		MPa	PSI		
CAST - IN PLACE GIRDERS, SLABS, DIAPHRAGMS, WINGWALLS, BACKWALLS, ABUTMENT COPINGS, COLUMNS, SLABS, SHEAR KEYS	AA2	28	4060	20	
FOOTINGS, PILE CAP, BORED PILES, APPROACH SLAB	AA1	28	4060	25	*SEE NOTE BELOW
THIN REINFORCED SECTIONS, PARAPET, RAILINGS & RAILPOST CURB AND SIDEWALK	C	21	3000	12	
PRESTRESSED CONCRETE MEMBERS : AASHTO GIRDERS, PRECAST DECK SLAB PANELS, C.I.P. POST-TENSIONED SLAB	PP	35	5075	20	⊕ TRANSFER
		41	5946	20	⊕ SERVICE
STEEL SHEET PILE CAP	A	21	3000	38	
RUBBLE CONC./CONC. BLOCKS FOR SLOPE PROTECTION	B	16.5	2400	50	
LEAN CONCRETE	-	17	1450	38	

#### \* NOTE :

THE CEMENT CONTENT OF THE DESIGN MIX SHALL BE ADJUSTED IN ACCORDANCE WITH THE AASHTO PROVISIONS WHEN CONCRETING UNDER WATER TO COMPENSATE FOR THE LOSS OF STRENGTH DUE TO WATER INFILTRATION.

### 2. REINFORCING STEEL

(a) REINFORCING STEEL SHALL CONFORM TO AASHTO M31 (ASTM A615), GRADES 40 & 60 DEFORMED WITH MINIMUM YIELD STRENGTH AS DESCRIBED BELOW.

REBAR GRADE	YIELD STRENGTH fy (MPa)	SIZE (mm)
40	276 (40 ksi)	16mm# & BELOW, UNLESS OTHERWISE NOTED
60	415 (60 ksi)	20mm# & ABOVE

(b) REINFORCING STEEL SHALL BE FREE OF MILL SCALES, OIL OR ANY SUBSTANCES WHICH WILL WEAKEN THE BOND WITH CONCRETE.

(c) REINFORCING STEEL SHALL BE WELDABLE TYPE. WELDING REINFORCING STEEL SHALL CONFORM TO ANSI/AWS D1.4.

### 3. PRESTRESSING STEEL

PRESTRESSING STEEL SHALL BE SEVEN-WIRE UNCOATED STRESS-RELIEVED STRANDS AND SHALL CONFORM TO AASHTO M203 (ASTM A416) WITH MINIMUM ULTIMATE STRENGTH OF  $F_y = 1860 \text{ MPa}$  (270,000psi).

### 4. STRUCTURAL STEEL, BOLTS AND WELDS

MATERIALS	YIELD STRENGTH fy (MPa)	REFERENCE SPECIFICATIONS
STRUCTURAL STEEL FOR MAIN GIRDERS	345 (SMA 490W / GRADE 50W)	JIS SMA 490W (ATMOSPHERIC CORROSION RESISTANT); AASHTO/ASTM M270 (A709)
STRUCTURAL STEEL OTHER THAN MAIN GIRDER	250 (SMA 400W / GRADE 36W)	JIS SMA 400W (ATMOSPHERIC CORROSION RESISTANT); AASHTO/ASTM M270 (A709)
SHEAR STUD CONNECTORS FOR MAIN BRIDGE	345	ASTM A108 (CORROSION RESISTANT)
HIGH STRENGTH BOLTS FOR MAIN BRIDGE		AASHTO M253, ASTM 490M (CORROSION RESISTANT)
WELDS		LATEST ANSI /AASHTO/AWS D1.5 BRIDGE WELDING CODE FOR CORROSION RESISTANT STEEL

### 5. ELASTOMERIC BEARING PADS

ELASTOMERIC BEARING PADS SHALL BE 100% VIRGIN CHLOROPRENE (NEOPRENE) PADS WITH DUROMETER HARDNESS 60 AND SHALL BE LAMINATED WITH NON-CORROSIVE MILD STEEL SHEETS (ASTM A570). ELASTOMERIC PADS SHALL CONFORM TO THE REQUIREMENTS AS PRESCRIBED IN DPWH D.O. NO. 25 SERIES OF 1997 "REVISED DPWH STANDARD SPECIFICATION FOR ELASTOMERIC BEARING PAD."

SPECIFICATIONS	
DURO HARDNESS, SHORE A (ASTM D-2240)	60 ± 5
TENSILE STRENGTH ASTM	D 412-175 Kg/cm <sup>2</sup> (min)
ULTIMATE ELONGATION %	350 % (min)
MATERIAL	NEOPRENE

## C. CONSTRUCTION

THESE NOTES ARE PROVIDED FOR QUICK REFERENCE ONLY AND SHALL BE READ IN CONJUNCTION WITH THE TECHNICAL SPECIFICATIONS FOR THE PROJECT.

THE DESIGN OF BRIDGES IS BASED ON THE CONSTRUCTION SEQUENCE SHOWN IN THE DRAWINGS. ANY VARIATION FROM THE SEQUENCE MUST BE APPROVED BY THE ENGINEER.

CONSTRUCTION SHALL COMPLY WITH 1995 DPWH STANDARD SPECIFICATION FOR HIGHWAYS, BRIDGES AND AIRPORTS OR MODIFIED BY SPECIAL PROVISIONS.

### 1. DIMENSIONS

- 1.1 SECTION, DIMENSIONS AND DISTANCES SHALL NOT BE SCALED FOR CONSTRUCTION PURPOSES. THE INDICATED DIMENSION SHALL GOVERN UNLESS OTHERWISE SPECIFIED.
- 1.2 ALL DIMENSIONS SHOWN ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
- 1.3 ALL STATIONING ARE IN KILOMETER PLUS METER AND ELEVATION IN METER.

	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	10/8/02	[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)  CABANATUAN BYPASS - CONTRACT PACKAGE III	AS SHOWN	BRIDGE NO. 10 PAMPANGA RIVER BRIDGE  GENERAL NOTES (1 OF 3) (INITIAL STAGE)	B10G-01
	CHECKED	10/17/02	[Signature]	OFFICE OF THE SECRETARY						
	SUBMITTED	10/19/02	[Signature]	Submitted By:	Reviewed By:	Recommended By:				
			DANILO C. TRAJANO Project Director	ADRIANO M. DORAY Chief, Bridge Division	GILBERTO S. REYES Director IV (DC)	MANUEL M. BORDAN Undersecretary				

# GENERAL NOTES FOR BRIDGES - 2

## 2. SETTING OUT

THE SETTING OUT AND THE ELEVATIONS OF THE DIFFERENT COMPONENTS OF THE STRUCTURE SHALL BE APPROVED BY THE ENGINEER PRIOR TO THE START OF ANY CONSTRUCTION WORK.

## 3. REINFORCED CONCRETE

3.1 CAST IN PLACE CONCRETE SHALL BE CLASS "AA1" OR "AA2" EXCEPT RAILINGS WHICH SHALL BE CLASS "C". UNLESS OTHERWISE NOTED ON THE PLANS, ALL EXPOSED EDGES SHALL BE CHAMFERED 20mm EXCEPT RAILINGS AND RE-ENTRANT ANGLES WHICH SHALL BE CHAMFERED AND FILLETED 13mm RESPECTIVELY.

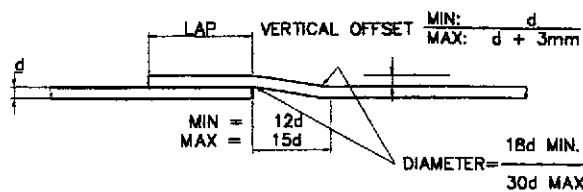
## 3.2 CONCRETE MIX AND PLACING

- DESIGN OF CONCRETE MIX SHALL MEET THE DESIGN CONCRETE STRENGTH GIVEN UNDER ITEM 1 OF MATERIALS.
- CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE WITH THE SPECIFICATION.
- FOR CONCRETE DEPOSITED AGAINST THE GROUND, LEAN CONCRETE WITH A MINIMUM THICKNESS OF 100mm SHALL BE LAID FIRST BEFORE INSTALLING THE REINFORCEMENT. THIS LEAN CONCRETE SHALL NOT BE CONSIDERED IN MEASURING THE STRUCTURAL DEPTH OF CONCRETE SECTION.
- THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL PLACING SEQUENCES FOR ALL CONCRETING WORK.

## 3.3 BAR BENDING, SPLICING AND PLACING

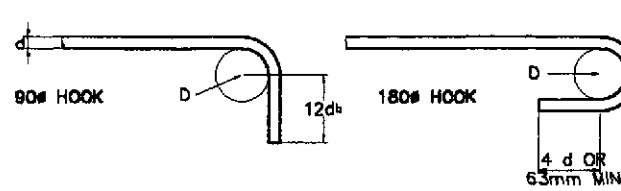
- THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER, FOR APPROVAL, SHOP DRAWINGS INDICATING THE BENDING, CUTTING, SPLICING AND INSTALLATION OF ALL REINFORCING BARS.
- BARS SHALL BE BENT COLD. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE ENGINEER.
- BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
- WELDED SPLICES, IF APPROVED BY THE ENGINEER, SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF THE BARS.
- NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION SHALL BE SPLICED.
- UNLESS OTHERWISE SHOWN ON DRAWINGS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN A LAYER SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL DIAMETER OF THE BAR NOR LESS THAN 1.5 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE. THE CLEAR DISTANCE BETWEEN LAYERS SHALL NOT BE LESS THAN 25mm NOR ONE BAR DIAMETER. THE BARS IN THE UPPER LAYER SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.

## (7) CRANKED SPLICES



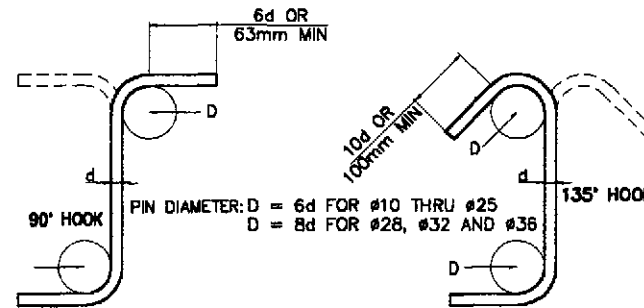
## (8) HOOKS AND BENDS

DIMENSIONS OF 90-DEGREE AND 180-DEGREE HOOKS



PIN DIAMETER:  $D = 6d$  FOR #10 THRU #25  
 $D = 8d$  FOR #28, #32 AND #36

DIMENSIONS FOR STIRRUPS AND TIE HOOKS



PIN DIAMETER:  $D = 6d$  FOR #10 THRU #25  
 $D = 8d$  FOR #28, #32 AND #36

## 3.4 CONCRETE COVER TO REINFORCEMENT

UNLESS OTHERWISE NOTED, ALL BAR DIMENSIONS ARE REFERRED TO THE CENTER OF BARS AND THE MINIMUM COVERING MEASURED FROM THE SURFACE OF THE CONCRETE TO THE FACE OF ANY BAR SHALL BE 40mm. FOR SUBSTRUCTURE PERMANENTLY EXPOSED TO EARTH, COVERING SHALL BE 75mm.

## 3.5 CONSTRUCTION JOINT

- THE POSITION AND FORM OF ANY CONSTRUCTION JOINT SHALL BE AS SHOWN ON DRAWINGS OR AS AGREED WITH THE ENGINEER.
- THE INTERFACE BETWEEN THE FIRST AND SECOND POUR CONCRETE SHALL BE ROUGHENED WITH AN AMPLITUDE OF 6MM MINIMUM.

## 3.6 FALSEWORK

ALL FALSEWORK SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO THE APPROVAL BY THE ENGINEER. FALSEWORKS SHOWN IN THE DRAWINGS SHALL SERVE AS REFERENCE ONLY.

## 3.7 FORMWORK

FORMWORKS SHALL BE CONSTRUCTED SUCH THAT IT WILL NOT YIELD UNDER THE LOAD AND SHALL BE SUCH AS TO AVOID THE FORMATION OF FINE. ALL CORNERS OF CONCRETE MEMBERS SHALL BE CHAMFERED TO 25mm UNLESS NOTED OTHERWISE ON DRAWINGS. STRIPPING OF FORMS AND SHORES SHALL BE AS DESIGNATED BY THE ENGINEER. THE FOLLOWING MAYBE USED AS A GUIDE.

	MIN. TIME
SHORING UNDER GIRDERS, BEAMS, FRAMES, . . . . .	14 DAYS
DECK SLABS . . . . .	14 DAYS
WALLS . . . . .	7 DAYS
COLUMNS . . . . .	7 DAYS
SIDES OF BEAMS AND ALL OTHER VERTICAL SURFACES . . . . .	2 DAYS

## 3.8 PROTECTION AND CURING OF CONCRETE

CONCRETE SURFACES SHALL BE PROTECTED FROM HARMFUL EFFECTS OF SUN, WIND AND RUNNING WATER AND SHALL BE KEPT DAMP FOR AT LEAST 7 DAYS.

## 4. EMBANKMENT CONSTRUCTION SEQUENCE

APPROACH EMBANKMENT SHALL BE CONSTRUCTED PRIOR TO CONSTRUCTION OF ABUTMENT PILES.

## 5. REINFORCED CONCRETE CAST-IN-PLACE BORED PILES

5.1 THE REQUIRED ALLOWABLE BEARING CAPACITY FOR EACH PILE DIAMETER IS AS FOLLOWS:

PILE DIA.	NORMAL (KN)		ULTIMATE (KN)	
	COMPRESSION	TENSION	COMPRESSION	TENSION
#1000	3000	1200	9000	3600
#1200	4000	1500	12000	7000
#1500	5500	1800	16500	9000

5.2 BOTTOM OF BORED PILES SHALL BE EMBEDDED AT LEAST TWO TIMES PILE DIAMETER (2D) INTO HARD STRATA CAPABLE OF DEVELOPING ALLOWABLE BEARING CAPACITY AS SPECIFIED. IF THE ABOVE CONDITION IS NOT MET DURING CONSTRUCTION, THE PILE SHALL BE INCREASED AND THE DESIGNER/CONSULTANT SHALL BE NOTIFIED FOR CONFIRMATION. AN ON-SITE SUBSURFACE INVESTIGATION SHALL ALSO BE UNDERTAKEN DURING CONSTRUCTION FOR CONFIRMATION/VERIFICATION OF DATA USED IN THE DESIGN.

5.3 PILE LENGTHS SHOWN ARE ESTIMATED LENGTHS DURING DESIGN. DETERMINATION OF REQUIRED PILE LENGTHS SHALL BE DETERMINED BY THE CONTRACTOR BASED ON THE RESULTS OF FIELD INVESTIGATIONS CARRIED OUT BY THE CONTRACTOR. SEE THE SPECIAL PROVISIONS OF THE TECHNICAL SPECIFICATIONS.

5.4 ULTRASONIC INTEGRITY TESTING (AS PER SPECIFICATIONS) SHALL BE CONDUCTED FOR ALL PILES TO VERIFY/CHECK THE CONCRETE HOMOGENEITY AND TO LOCATE/EVALUATE ANY POSSIBLE IRREGULARITY IN THE COMPLETED BORED PILES AS DESCRIBED IN THE SPECIAL PROVISIONS.

5.5 STATIC LOAD TEST AND HIGH STRAIN DYNAMIC LOAD TEST SHALL BE CONDUCTED AS INDICATED IN THE SCHEDULE OF PILE LOAD TEST OF THE COMPLETED BORED PILES. THE RESULT SHALL BE SUBMITTED FOR EVALUATION AND REFERENCE.

## 6. ADDITIONAL SOIL INVESTIGATION

ADDITIONAL SUBSURFACE INVESTIGATION (BORE HOLES) SHALL BE CONDUCTED FOR EACH PIER OF MAIN BRIDGE AND ABUTMENT LOCATION AND HALF THE NUMBER OF PIERS FOR THE APPROACH SPANS TO CONFIRM/VERIFY THE DESIGN SOIL PROFILE AND CAPACITIES. IF THE RESULTS OF THE SOIL INVESTIGATION DIFFERS FROM THE SOIL DATA USED IN DESIGN, THE CONTRACTOR SHALL NOTIFY THE ENGINEER/CONSULTANT TO MAKE THE NECESSARY ADJUSTMENTS IN THE FOUNDATION.

## 7. CAMBER

7.1 STEEL AND CONCRETE GIRDERS SHALL BE CONSTRUCTED WITH CAMBER INDICATED IN THE DRAWINGS.

7.2 AFTER ERECTION IS COMPLETE, THE FLANGE ELEVATION OF THE GIRDERS SHALL BE SURVEYED. BASED ON THIS INFORMATION, THE CONTRACTOR SHALL DETERMINE THE HAUNCH HEIGHTS REQUIRED ALONG THE STRUCTURE IN ORDER THAT THE FINISHED GRADE SHOWN IN THE DRAWINGS WILL BE ACHIEVED, TAKING DUE ACCOUNT OF FURTHER DEFLECTIONS TO BE INCURRED WHEN THE DECK AND SIDEWALKS ARE ADDED AND THE ORDER IN ERECTION OF DECK PANEL IS TO TAKE PLACE.

7.3 THE CONTRACTOR SHOULD PREPARE & SUBMIT A GEOMETRY CONTROL REPORT TO THE ENGINEER INDICATING THE ASSUMPTIONS AND CALCULATION PROCEDURES THAT HAVE BEEN FOLLOWED IN DETERMINING HAUNCH HEIGHTS. THE CONTRACTOR SHOULD MONITOR AND UPDATE THIS REPORT AS NECESSARY AS ERECTION PROCEEDS.

	DESIGNED	10/8/02	<i>[Signature]</i>		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	10/17/02	<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 (Palarod, Cabanatuan and San Jose Bypasses)	AS SHOWN	BRIDGE NO. 10 PAMPANGA RIVER BRIDGE GENERAL NOTES (2 OF 3) (INITIAL STAGE)	B10G-02
	SUBMITTED	10/19/02	<i>[Signature]</i>		DANILO C. TRAJANO Project Director	ADRIANO M. DOROY Chief, Bridges Division	GILBERTO S. REYES Director IV (OIC)	MANUEL M. BONOAN Undersecretary				



# GENERAL NOTES FOR BRIDGES - 3

## 8. STRUCTURAL STEEL

THE CONTRACTOR SHALL PREPARE AND SUBMIT SHOP DRAWINGS FOR ALL STRUCTURAL STEEL WORK. THESE SHOP DRAWINGS SHALL BE APPROVED BY THE ENGINEER BEFORE ANY FABRICATION COMMENCES. STRUCTURAL STEEL WORKS SHALL COMPLY WITH THE LATEST ANSI/AASHTO/AWS D1.5 BRIDGE WELDING CODE AND FABRICATION REQUIREMENTS.

## 9. SHORING

- 9.1 CAMBER FOR REINFORCED CONCRETE SUPERSTRUCTURES WERE DETERMINED BASED ON THE USE OF SHORINGS DURING CONSTRUCTION.
- 9.2 CAMBER FOR COMPOSITE SUPERSTRUCTURES WITH PRECAST PRESTRESSED GIRDERS WERE DETERMINED BASED ON UNSHORED CONDITIONS.

## 10. EXCAVATION

EXCAVATION FOR STRUCTURES SHALL BE TO THE NEAT LINES OF FOOTING OR AS SPECIFIED IN THE STANDARD SPECIFICATIONS.

## 11. WATER ELEVATION

WATER ELEVATIONS SHOWN ON PLANS ARE APPROXIMATE ONLY ANY VARIATION FOUND DURING CONSTRUCTION SHALL NOT BE CONSIDERED AS A BASIS FOR EXTRA COMPENSATION.

## 12. DETOUR

THE CONTRACTOR SHALL CONSTRUCT AND MAINTAIN DETOUR BRIDGES, AND/OR ROADS DURING CONSTRUCTION TO ALLOW CONTINUOUS FLOW OF TRAFFIC. THEY SHALL BE CONSTRUCTED ON LOCATION AS SHOWN ON PLANS OR AS DIRECTED BY THE ENGINEER. NO ADDITIONAL COST SHALL BE ALLOWED FOR ANY RELOCATION OF DETOUR.

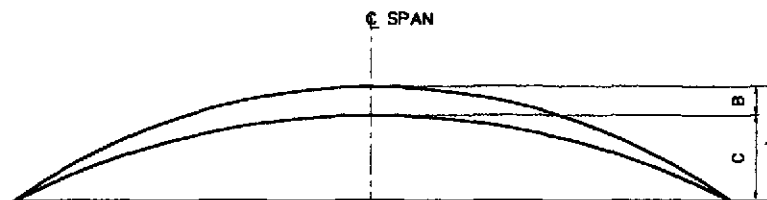
## 13. PRESTRESSED CONCRETE

### GIRDER DESIGN GUIDE

- 13.1 POST-TENSIONING ; THE PROPOSED TYPE OF TENDONS WHICH WILL BE USED IN THE POST-TENSIONED DESIGNS AND ALL NECESSARY ADDITIONAL DETAILS INCLUDING THOSE FOR END ANCHORAGES, METHODS TO BE EMPLOYED AND PROCEDURES TO BE FOLLOWED, SHALL BE AS APPROVED BY THE ENGINEER. PORTION OF THE TENDONS SHALL BE DRAPED LONGITUDINAL IN PARABOLIC PORTIONS. ALL TENDONS SHALL BE PLACED SO THAT THEIR CENTER OF GRAVITY WILL BE AT THE POSITION SHOWN ON PLANS. THE TOTAL POST-TENSION FORCE AFTER LOSSES REQUIRED AT MIDSPAN SHALL BE PROVIDED AS CALLED FOR IN THE VARIOUS DESIGNS. THE REQUIRED FORCES AFTER LOSSES SHALL BE OBTAINED BY APPLYING INITIAL TENSILE FORCES OF SUFFICIENT MAGNITUDE TO ALLOW FOR ALL SUBSEQUENT LOSSES, INCLUDING THOSE FOR ELASTIC SHORTENING, SHRINKAGE, CREEP, RELAXATION, FRICTION, AND EFFICIENCY OF END ANCHORAGES. AFTER SECURING THE END ANCHORAGES ALL TENDONS SHALL BE PRESSURE GROUTED IN THEIR CONDUITS IN ACCORDANCE WITH THE "SPECIFICATIONS".
- 13.2 CONCRETE FOR GIRDERS SHALL BE A MINIMUM STRENGTH OF  $41 \text{ N/mm}^2$  (5,945 PSI) AT THE AGE OF 28 DAYS.
- 13.3 CONCRETE FOR CAST-IN-PLACE SLAB HAVE A MINIMUM STRENGTH OF  $28 \text{ N/mm}^2$  (4,060 PSI) AT THE AGE OF 28 DAYS.
- 13.4 THE CONTRACTOR MAY PROPOSE ANY ALTERNATIVE TENDON SIZE AND LAYOUT WHICH SHALL MEET THE APPROVAL OF THE ENGINEER.
- 13.5 THE REQUIRED STRENGTH OF CONCRETE AT TIME OF TENSIONING SHALL BE 35 MPa (5,075 PSI). A GRID CONSISTING OF #12 BARS AT 100 CENTERS IN BOTH DIRECTIONS SHALL BE PLACED NEAR EACH ANCHORAGE OF THE POST-TENSIONING SYSTEM.

13.6 HANDLING PRESTRESSED CONCRETE BEAMS : THE BEAMS SHALL BE MAINTAINED IN AN UPRIGHT POSITION AND SHALL BE LIFTED BY SUITABLE DEVICES PROVIDED AT THE ENDS OF THE BEAMS. ATTENTION IS DIRECTED TO THE INCREASED DIFFICULTY OF LIFTING BEAMS WITHOUT END BLOCKS. THE CONTRACTOR'S PROPOSED LIFTING DETAILS SHOULD BE GIVEN CAREFUL CONSIDERATION BEFORE BEING SUBMITTED ON SHOP DRAWING FOR APPROVAL. THE USE OF HOLES FOR LIFTING PURPOSES WILL NOT BE PERMITTED.

13.7 CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE ENGINEER THE CALCULATED ELONGATION OF THE PRESTRESSING TENDONS CORRESPONDING TO THE REQUIRED JACKING FORCES.



DEAD LOAD CAMBER DIAGRAM

- A = INITIAL CAMBER - ESTIMATED PRESTRESS CAMBER LESS DEFLECTION DUE TO GIRDER DEAD LOAD
- B = DEFLECTION DUE TO SLAB, DIAPHRAGM, SIDEWALKS, RAILING AND RAILPOST
- C = FINAL CAMBER

NOTE: A AND B ARE THEORETICAL VALUES AND MAY VARY WITH ACTUAL (AGE) CONCRETE STRENGTH, VARIOUS PRESTRESSING CONDITIONS, CREEP FACTOR, AND PRESTRESS LOSSES. CONTRACTOR SHALL SURVEY TOP OF GIRDERS TO OBTAIN ACTUAL VALUE OF A AND ADJUST PROFILE ACCORDINGLY.

13.8 PRECAST GIRDERS AND DECK PANELS SHALL MEET THE TOLERANCES SPECIFIED IN THE AASHTO GUIDE SPECIFICATIONS FOR DESIGN AND CONSTRUCTION OF SEGMENTAL CONCRETE BRIDGES.

13.9 TRANSVERSE DEFLECTION OF PRECAST GIRDERS SHALL NOT EXCEED  $1/500_{th}$  OF THE GIRDER LENGTH. WHERE DEFLECTION EXCEED THIS VALUE, PROCEDURES FOR CORRECTION SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW, IF CORRECTION BY APPROVED PROCEDURE IS NOT POSSIBLE, THE GIRDER SHALL BE REJECTED.

## 14. PRECAST CONCRETE DECK PANELS

- 14.1 PRIOR TO START OF DECK PANEL FABRICATION, A REPORT SHALL BE PREPARED AND SUBMITTED TO THE ENGINEER FOR REVIEW OUTLINING THE COMPLETE FABRICATION AND ERECTION PROCESS FOR THE DECK PANEL. ALL ASPECTS AND STAGES OF THE CONSTRUCTION PROCESS SHALL BE FULLY DESCRIBED INCLUDING BUT NOT LIMITED TO CONCRETE PRODUCTION, PLACEMENT, CURING, TRANSVERSE PRESTRESSING, HANDLING, STORAGE, TRANSPORT, ERECTION, GEOMETRY CONTROL, INFILL CONCRETE SECTIONS, INFILL OF SHEAR STUD BLOCKOUTS, LEVELING GROUTS, ETC.
- 14.2 DECK PANELS SHALL BE CAST HORIZONTALLY.
- 14.3 FORMED LENGTH SHALL BE AS INDICATED IN THE DRAWINGS.
- 14.4 THE RUBBED FINISH APPLIED TO THE PRECAST CONCRETE SLAB SHALL PRODUCE A UNIFORM AND HOMOGENOUS APPEARANCE ACROSS ADJACENT PANELS.

		DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	12/18/02		BUREAU OF DESIGN	OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Piaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	BRIDGE NO. 10 PAMPANGA RIVER BRIDGE GENERAL NOTES (3 OF 3) (INITIAL STAGE)	B10G-03
	CHECKED	10/17/02		OFFICE OF THE SECRETARY	(See cover sheet for Signature/Approval)	CABANATUAN BYPASS - CONTRACT PACKAGE III	FULL SIZE A1		
SUBMITTED	10/19/02		SUBMITTED BY:	REVIEWED BY:	RECOMMENDED BY:				
			DANILO C. TRAJANO Project Director	ADRIANO M. DORAY Chief, Bridges Division	GILBERTO S. REYES Director IV (OC)				
			TEAM LEADER		MANUEL M. BONOAN Undersecretary				
					SAMEON A. DATUMANONG Secretary				

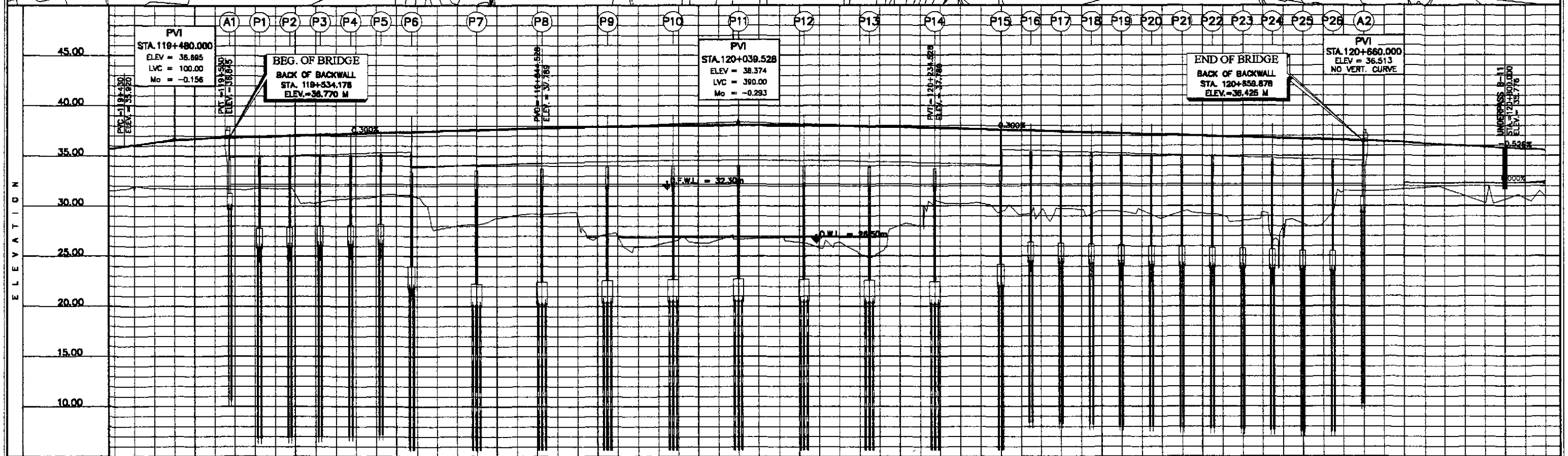
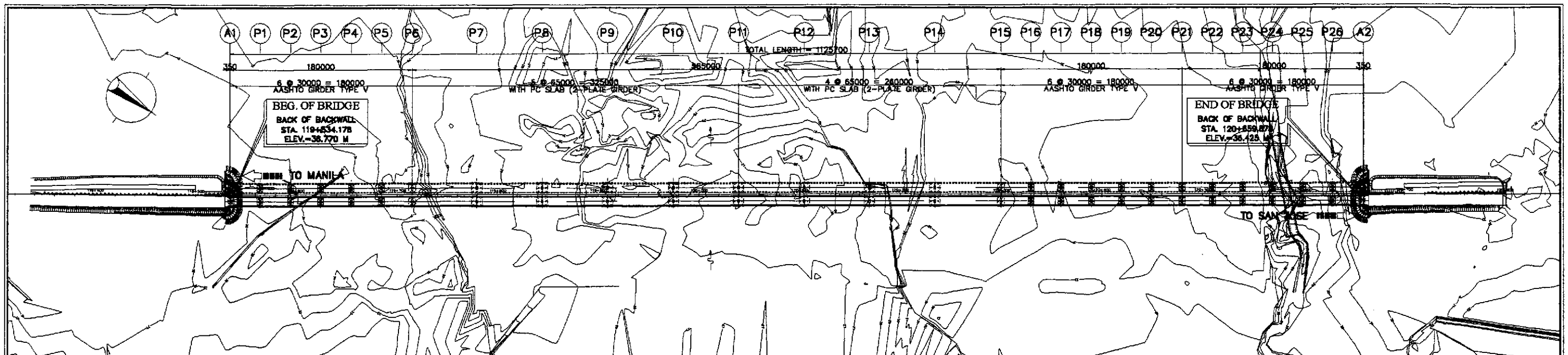


NOTES :  
SEE HIGHWAY PLANS FOR REFERENCE OF ALIGNMENT

B.M. NO.	COORDINATES		DESCRIPTION
	NORTHING	EASTING	
28	1,715,891.768	498,699.775	IT IS LOCATED ON THE RIGHT SIDE OF THE ALIGNMENT PLACED ON THE RIGHT SIDE OF A BARANGAY ROAD UNDER AN ACACIA TREE 1.00 M AWAY FROM ITS CENTERLINE BRGY. CRUZ ROJA.
30	1,716,304.852	498,373.638	IT IS LOCATED ON THE RIGHT SIDE OF THE ALIGNMENT PLACED ON THE UPPERMOST TOP BANK OF A CANAL AT THE SIDE OF A NIPA HUT IN BRGY. OBRERO, CABANATUAN CITY.
34	1,718,360.331	496,980.373	IT IS LOCATED ON THE RIGHT SIDE OF THE ALIGNMENT PLACED ON THE SIDE OF A DIRT ROAD 1.50 M AWAY FROM ITS CL. BET. 2 CAMACHILE TREE IN BRGY. SAPANG, CAB. CITY 3 M AWAY FROM AN IRRIG. CANAL'S TOP BANK.

**A HORIZONTAL & VERTICAL CONTROL MONUMENTS**  
SCALE 1 : 3000

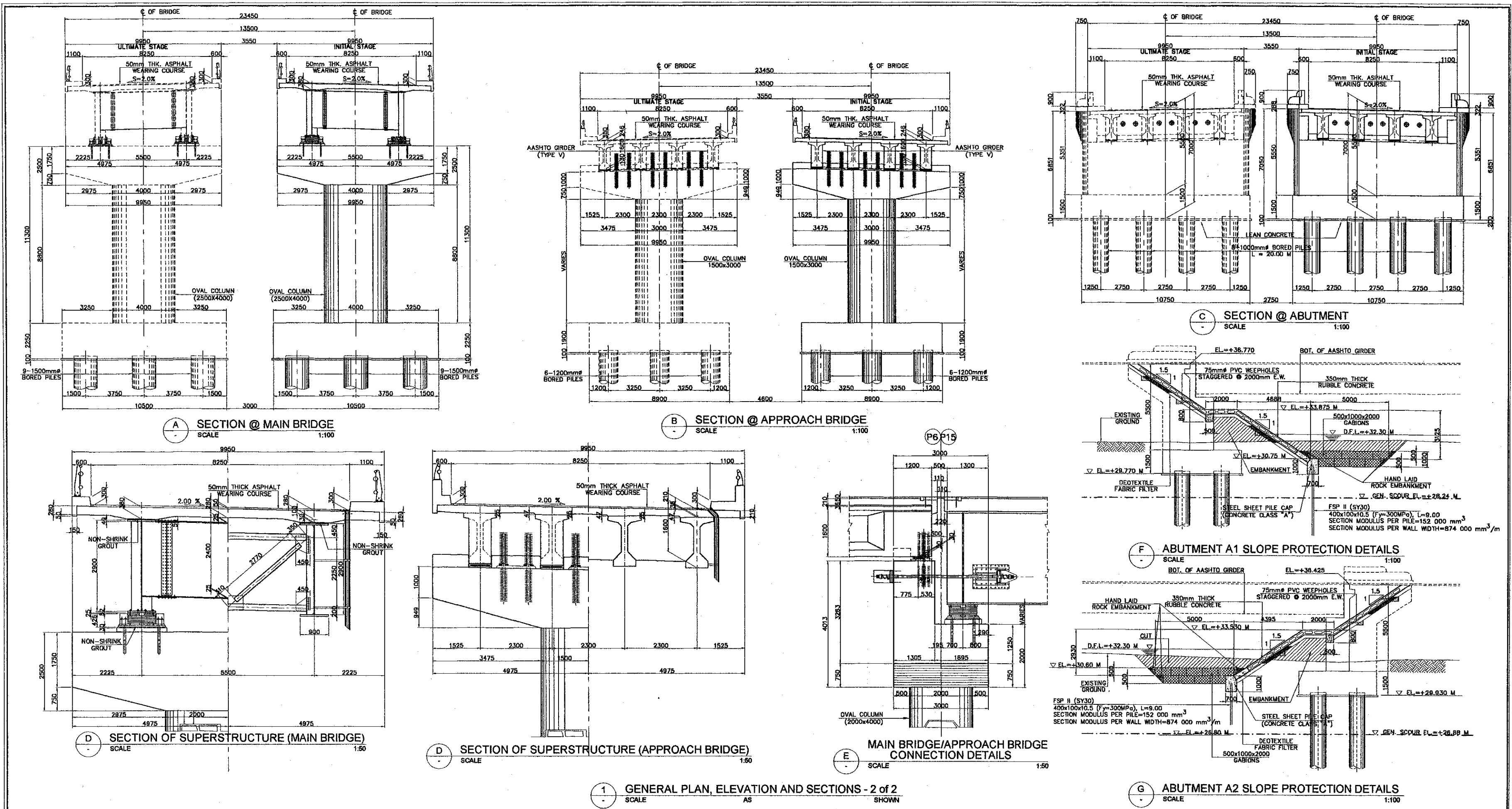
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS					PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE III	SCALE :  AS SHOWN  FULL SIZE A1	SHEET CONTENTS :  BRIDGE NO. 10 PAMPANGA RIVER BRIDGE HORIZONTAL & VERTICAL CONTROL MONUMENTS (INITIAL STAGE)	SHEET NO. :  <b>B10G-04</b>
	CHECKED	10/17/02	F. M. ALAS		BUREAU OF DESIGN								
	SUBMITTED	10/19/02	J. C. SANTOS		Submitted By: DANLO C. TRAJANO Project Director	Reviewed By: ADRIANO M. DOROY Chief, Bridges Division	Recommended By: GILBERTO S. REYES Director IV (OC)	Recommended By: MANUEL M. BONONAN Undersecretary	Approved By: SIMEON A. DATUMANONG Secretary				



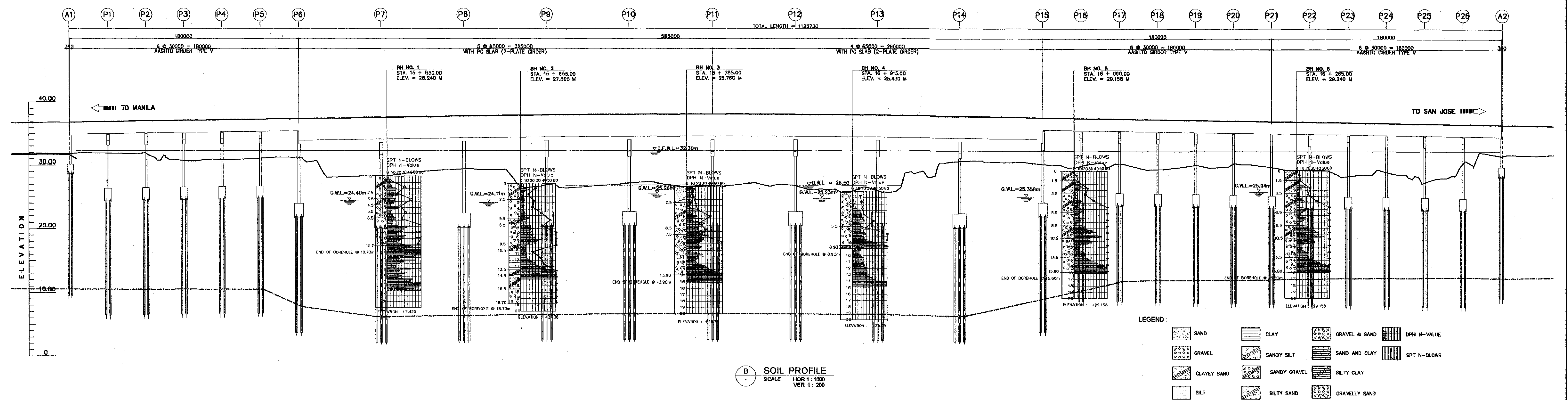
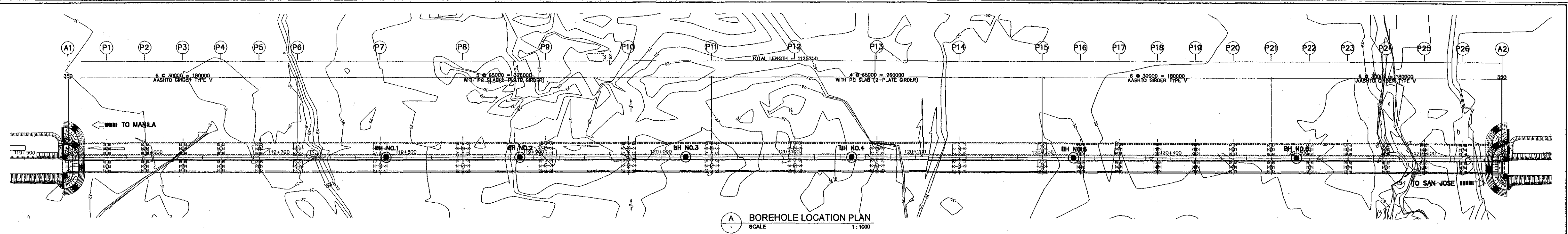
STATION	119+500	+600	+700	+800	+900	120+000	+100	+200	+300	+400	120+500	+600	+700	+800				
FINISHED GRADE @ BYPASS ALIGNMENT																		
FINISHED GRADE @ BRIDGE CENTERLINE																		
FINISHED ELEV. / STATION @ BRIDGE PIER CENTERLINE	36.770	36.875	36.935	36.995	37.055	37.115	37.175	37.235	37.295	37.355	37.415	37.475	37.535	37.595				
ORIGINAL GROUND ELEVATION	31.845	31.832	31.757	31.253	30.733	30.756	30.739	30.954	31.200	30.525	28.001	28.153	28.231	28.828				
HORIZONTAL CURVATURE	R=∞																	
VERTICAL CURVATURE	L=100 Mo=-0.156				g=-0.300%				L=390 Mo=-0.293				g=-0.300%				NO VERTICAL CURVE g=-0.526%	
SUPERELEVATION	NO																	

	DESIGNED: 10/18/07 CHECKED: 10/17/07 SUBMITTED: 10/19/07	DATE: 10/18/07 SIGNATURE: [Signature] F. M. BALAS R. M. SOTOS R. K. KIMURA TEAM LEADER		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN OFFICE OF THE 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 III	SCALE: AS SHOWN FULL SIZE A1	SHEET CONTENTS: BRIDGE NO. 10 PAMPANGA RIVER BRIDGE PLAN AND PROFILE (INITIAL STAGE)	SHEET NO.: <b>B10G-05</b>
	Submitted By: DANILLO C. TRAJANO Project Director	Reviewed By: ADRIANO M. DORAY Chief, Bridges Division	Recommended By: GILBERTO S. REYES Director IV (DC)	Recommended By: MANUEL M. BONONAN Undersecretary	Approved By: SIMEON A. DATUMANONG Secretary			
	APPROVED FOR THE SECRETARY: [Signature]							

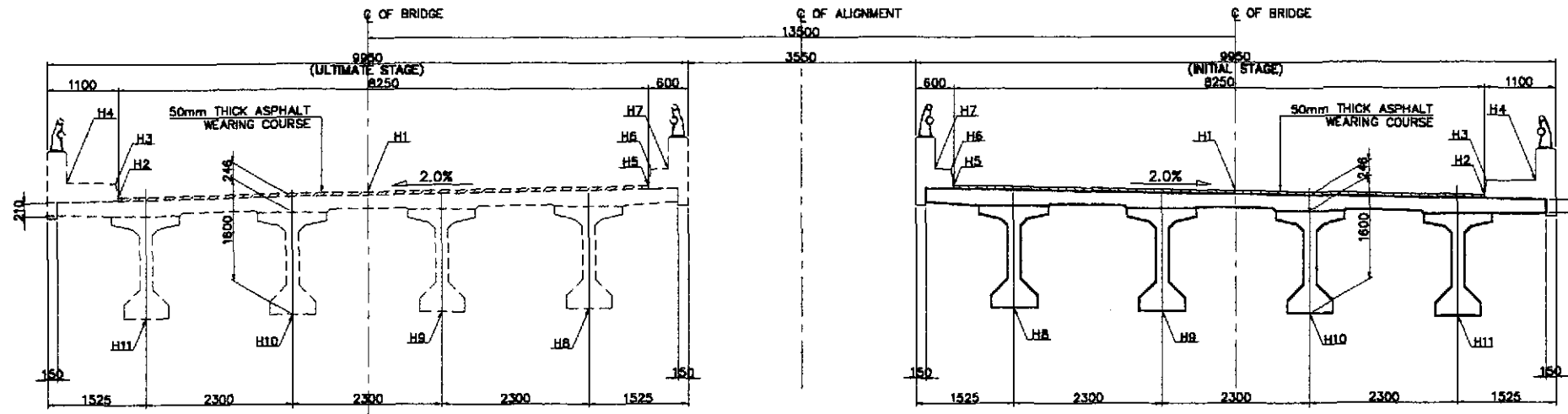




	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : <b>THE DETAILED DESIGN STUDY ON          UPGRADING INTER-URBAN HIGHWAY SYSTEM          ALONG THE PAN-PHILIPPINE HIGHWAY          (Plaridel, Cabanatuan and San Jose Bypasses)</b> <b>CABANATUAN BYPASS - CONTRACT PACKAGE III</b>	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : <b>BRIDGE NO. 10 PAMPANGA RIVER BRIDGE          GENERAL PLAN, ELEVATION AND          SECTIONS (2 of 2)          (INITIAL STAGE)</b>	SHEET NO. : <b>B10G-07</b>	
	DESIGNED	<i>[Signature]</i>	Submitted By:	BUREAU OF DESIGN					OFFICE OF THE SECRETARY
	CHECKED	<i>[Signature]</i>	Reviewed By:	Recommended By:					Approved By:
	SUBMITTED	<i>[Signature]</i>	Project Director	Chief, Bridge Division					Director IV (OC)



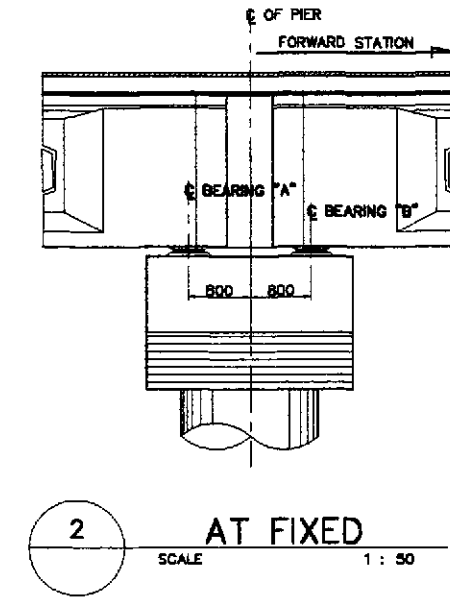
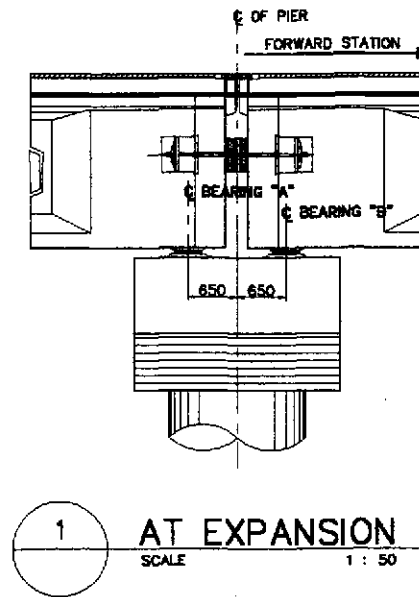
<p>JICA JAPAN INTERNATIONAL COOPERATION AGENCY</p>		<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p>		<p>PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE III</p>		<p>SCALE : AS SHOWN FULL SIZE A1</p>	<p>SHEET CONTENTS : BRIDGE NO. 10 PAMPANGA RIVER BRIDGE BOREHOLE LOCATION PLAN AND SOIL PROFILE (INITIAL STAGE)</p>	<p>SHEET NO. : B10G-08</p>
<p>DESIGNED: 6/12/12</p> <p>CHECKED: 10/17/12</p> <p>SUBMITTED: 10/17/12</p>	<p>DATE: 6/12/12</p> <p>SIGNATURE: [Signature]</p> <p>PROJECT DIRECTOR: DANILLO C. TRAMANO</p>	<p>DATE: 6/12/12</p> <p>SIGNATURE: [Signature]</p> <p>CHIEF, BRIDGE DIVISION: ADRIANO M. DOROS</p>	<p>DATE: 6/12/12</p> <p>SIGNATURE: [Signature]</p> <p>DIRECTOR (CC): GILBERTO S. REYES</p>	<p>DATE: 6/12/12</p> <p>SIGNATURE: [Signature]</p> <p>UNDERSECRETARY: MANUEL M. BONGAN</p>	<p>DATE: 6/12/12</p> <p>SIGNATURE: [Signature]</p> <p>SECRETARY: SIMEON A. DATUMANONG</p>			

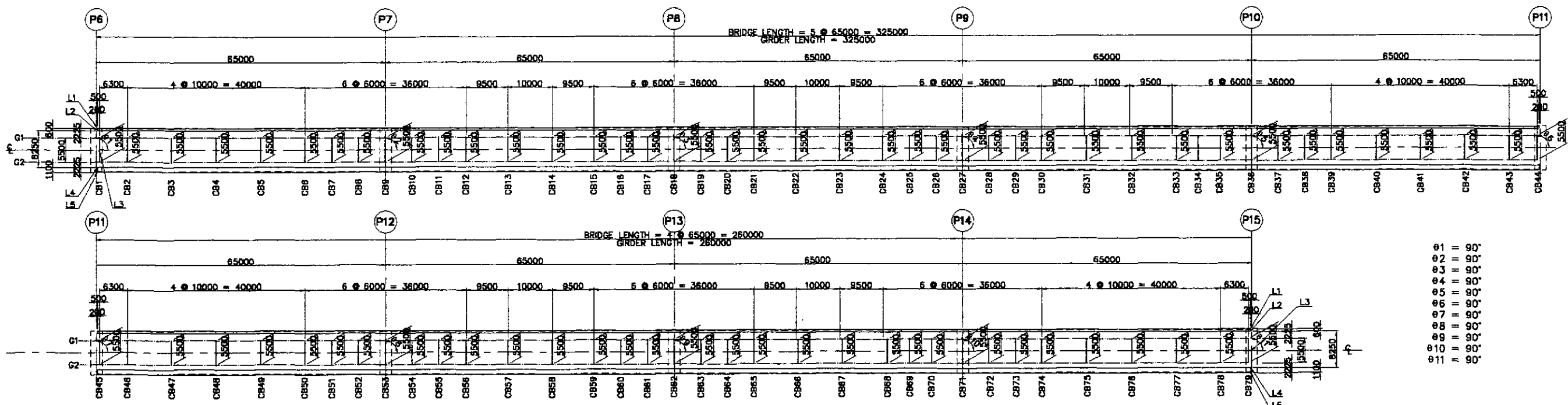


**A** TYPICAL SECTION @ APPROACH BRIDGE  
SCALE 1 : 50

STATION	H1	H2	H3	H4	H5	H6	H7
119+540.000	36.787	36.708	36.858	36.884	36.874	37.124	37.180
119+560.000	36.847	36.769	37.018	36.954	36.934	37.184	37.240
119+580.000	36.907	36.829	37.078	37.014	36.994	37.244	37.300
119+600.000	36.967	36.889	37.138	37.074	37.054	37.304	37.360
119+620.000	37.027	36.949	37.198	37.134	37.114	37.364	37.420
119+640.000	37.087	37.009	37.258	37.194	37.174	37.424	37.480
119+660.000	37.147	37.069	37.318	37.254	37.234	37.484	37.540
119+680.000	37.207	37.129	37.378	37.314	37.294	37.544	37.600
119+700.000	37.267	37.189	37.438	37.374	37.354	37.604	37.660
120+300.000	37.505	37.427	37.677	37.612	37.592	37.842	37.898
120+320.000	37.445	37.367	37.617	37.552	37.532	37.782	37.838
120+340.000	37.385	37.307	37.557	37.492	37.472	37.722	37.778
120+360.000	37.325	37.247	37.497	37.432	37.412	37.662	37.718
120+380.000	37.265	37.187	37.437	37.372	37.352	37.602	37.658
120+400.000	37.205	37.127	37.377	37.312	37.292	37.542	37.598
120+420.000	37.145	37.067	37.317	37.252	37.232	37.482	37.538
120+440.000	37.085	37.007	37.257	37.192	37.172	37.422	37.478
120+460.000	37.025	36.947	37.197	37.132	37.112	37.362	37.418
120+480.000	36.965	36.887	37.137	37.072	37.052	37.302	37.358
120+500.000	36.905	36.827	37.077	37.012	36.992	37.242	37.298
120+520.000	36.845	36.767	37.017	36.952	36.932	37.182	37.238
120+540.000	36.785	36.707	36.957	36.892	36.872	37.122	37.178
120+560.000	36.725	36.647	36.897	36.832	36.812	37.062	37.118
120+580.000	36.665	36.587	36.837	36.772	36.752	37.002	37.058
120+600.000	36.605	36.527	36.777	36.712	36.692	36.942	36.998
120+620.000	36.545	36.467	36.717	36.652	36.632	36.882	36.938
120+640.000	36.485	36.407	36.657	36.592	36.572	36.822	36.878

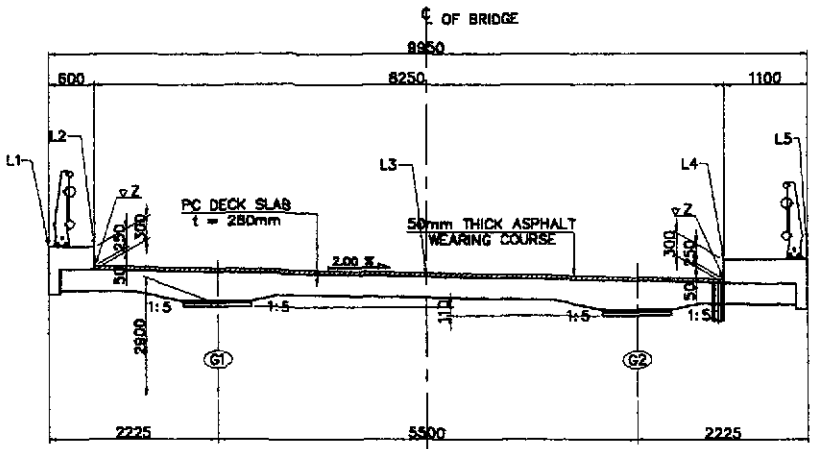
LOCATION	BEARING SIDE	STATION	HB	H9	H10	H11
ABUT. A1	A	119+534.688	34.945	34.888	34.853	34.807
PIER 1	B	119+563.778	35.032	34.986	34.940	34.894
	A	119+565.278	35.036	34.980	34.944	34.898
PIER 2	B	119+593.778	35.122	35.076	35.030	34.984
	A	119+595.278	35.212	35.166	35.120	35.074
PIER 3	B	119+623.778	35.214	35.168	35.122	35.076
	A	119+625.278	35.216	35.170	35.124	35.078
PIER 4	B	119+653.778	35.302	35.256	35.210	35.164
	A	119+655.278	35.306	35.260	35.214	35.168
PIER 5	B	119+683.778	35.392	35.346	35.300	35.254
	A	119+685.278	35.396	35.350	35.304	35.258
PIER 6	B					
PIER 15	A					
PIER 16	B	120+328.780	35.591	35.545	35.499	35.453
	A	120+330.280	35.587	35.541	35.495	35.449
PIER 17	B	120+358.780	35.503	35.457	35.411	35.365
	A	120+360.280	35.497	35.451	35.405	35.359
PIER 18	B	120+388.780	35.411	35.365	35.319	35.273
	A	120+390.280	35.407	35.361	35.315	35.269
PIER 19	B	120+418.780	35.321	35.275	35.229	35.183
	A	120+420.280	35.317	35.271	35.225	35.179
PIER 20	B	120+448.780	35.231	35.185	35.139	35.093
	A	120+450.280	35.227	35.181	35.135	35.089
PIER 21	B	120+478.905	35.141	35.095	35.049	35.003
	A	120+480.155	35.137	35.091	35.045	34.999
PIER 22	B	120+508.780	35.051	35.005	34.959	34.913
	A	120+510.280	35.047	35.001	34.955	34.909
PIER 23	B	120+538.780	34.961	34.915	34.869	34.823
	A	120+540.280	34.957	34.911	34.865	34.819
PIER 24	B	120+568.780	34.871	34.825	34.779	34.733
	A	120+570.280	34.867	34.821	34.775	34.729
PIER 25	B					
	A					
PIER 26	B	120+628.780	34.691	34.645	34.599	34.553
	A	120+630.280	34.687	34.641	34.595	34.549
ABUT. A2	B	120+659.356	34.600	34.554	34.508	34.462



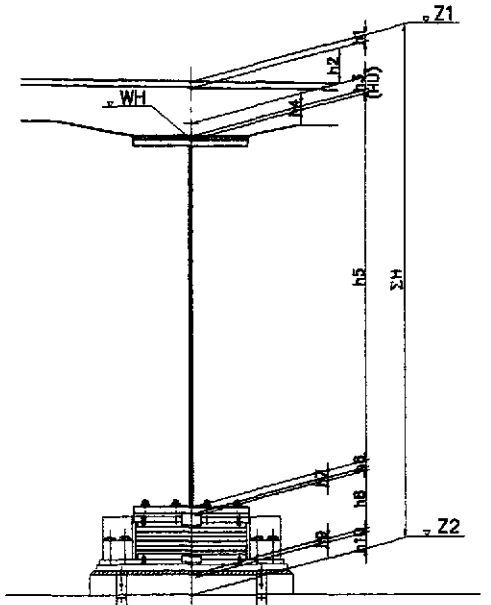


- 01 = 90°
- 02 = 90°
- 03 = 90°
- 04 = 90°
- 05 = 90°
- 06 = 90°
- 07 = 90°
- 08 = 90°
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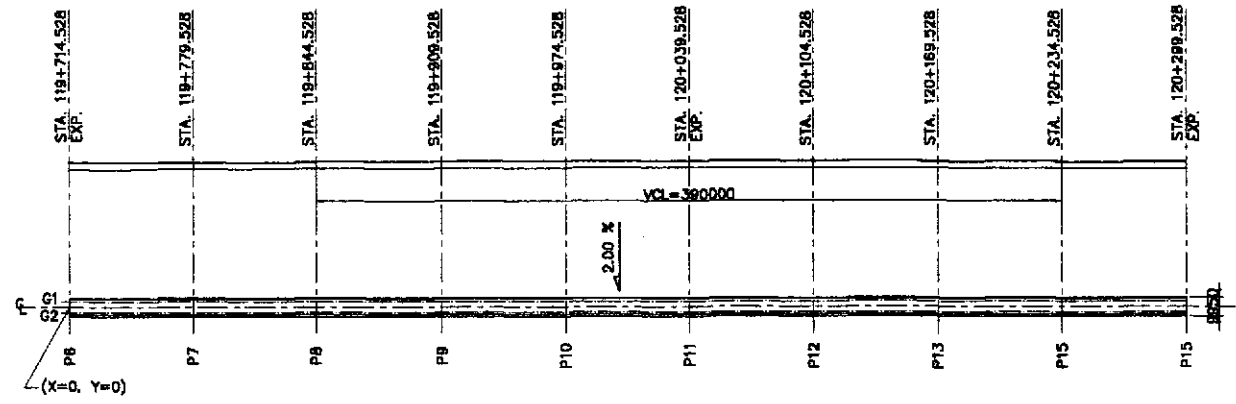
**A PLAN**  
SCALE 1:400



**B SECTION**  
SCALE 1:50



**C DETAIL**  
SCALE 1:25



**D PLAN**  
SCALE 1:1000

	P6		P7		P8		P9		P10		P11		P12		P13		P14		P15		
	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	G1	G2	
ROAD DESIGN ELEV.	Z1	37366	37256	37561	37451	37756	37646	37919	37809	38016	37906	38048	37938	38016	37906	37919	37809	37756	37646	37561	37451
WEARING COURSE	h1	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
SLAB THICKNESS	h2	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
HAUNCH	h3	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
LEVELING GROUT	h4	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
GIRDER HEIGHT	h5	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900	2900
BOTTOM FLANGE THK.	h6	47	47	86	86	56	56	56	56	86	86	47	47	86	86	56	56	86	86	47	47
SOLE PLATE THK.	h7	28	28	33	33	33	33	33	33	33	33	28	28	33	33	33	33	33	33	28	28
BEARING HEIGHT	h8	426	426	389.6	389.6	389.6	389.6	389.6	389.6	389.6	389.6	426	426	389.6	389.6	389.6	389.6	389.6	389.6	426	426
LEVELING MORTAR	h9	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
RISER	h10	160.6	50.6	196.8	86.8	163.6	53.6	163.6	53.6	196.8	86.8	160.6	50.6	196.8	86.8	163.6	53.6	196.8	86.8	160.6	50.6
TOTAL HEIGHT	ΣH	4051.6	3941.6	4095.4	3985.4	4032.2	3922.2	4032.2	3922.2	4095.4	3985.4	4051.6	3941.6	4095.4	3985.4	4032.2	3922.2	4095.4	3985.4	4051.6	3941.6
TOP OF COPING ELEV.	Z2	33314.4	33314.4	33465.6	33465.6	33723.8	33723.8	33686.8	33686.8	33920.6	33920.6	33996.4	33996.4	33920.6	33920.6	33886.8	33886.8	33660.6	33660.6	33509.4	33509.4

**1 SCHEDULE OF DIMENSIONS (PIER 6 to PIER 15) - 1 of 3**  
SCALE AS SHOWN

	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 (Parihel, Cabanatuan and San Jose Bypasses)</b> <b>CABANATUAN BYPASS - CONTRACT PACKAGE III</b>	SCALE :	SHEET CONTENTS : <b>BRIDGE NO. 10 PAMPANGA RIVER BRIDGE SCHEDULE OF DIMENSIONS (PIER 6 to PIER 15) - 1 of 3 (INITIAL STAGE)</b>	SHEET NO. :
	CHECKED	DATE	SIGNATURE		BUREAU OF DESIGN					AS SHOWN		<b>B10G-10</b>
	SUBMITTED	DATE	SIGNATURE		OFFICE OF THE SECRETARY					FULL SIZE A1		





		P11	CB45	CB46	CB47	CB48	CB49	CB50	CB51	CB52	CB53(P12)	CB54	CB55	CB56	CB57	CB58	CB59	CB60	CB61	CB62(P13)	CB63	CB64
L1	X	325.602	332.002	342.002	352.002	362.002	372.002	378.002	384.002	390.002	396.002	402.002	408.002	417.502	427.502	437.002	443.002	449.002	455.002	461.002	467.002	
	Y	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975
	Z	38.083	38.092	38.090	38.087	38.082	38.076	38.071	38.066	38.060	38.054	38.047	38.040	38.027	38.012	37.996	37.985	37.974	37.963	37.950	37.937	
L2	X	325.602	332.002	342.002	352.002	362.002	372.002	378.002	384.002	390.002	396.002	402.002	408.002	417.502	427.502	437.002	443.002	449.002	455.002	461.002	467.002	
	Y	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375
	Z	38.081	38.090	38.078	38.075	38.070	38.064	38.059	38.054	38.048	38.042	38.035	38.028	38.015	38.000	37.984	37.973	37.962	37.951	37.938	37.925	
G1	X	325.602	332.002	342.002	352.002	362.002	372.002	378.002	384.002	390.002	396.002	402.002	408.002	417.502	427.502	437.002	443.002	449.002	455.002	461.002	467.002	
	Y	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750
	Z	38.049	38.048	38.046	38.043	38.038	38.032	38.027	38.022	38.016	38.010	38.003	37.996	37.983	37.968	37.952	37.941	37.930	37.919	37.906	37.893	
	HU	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
L3	X	325.602	332.002	342.002	352.002	362.002	372.002	378.002	384.002	390.002	396.002	402.002	408.002	417.502	427.502	437.002	443.002	449.002	455.002	461.002	467.002	
	Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Z	37.994	37.993	37.991	37.988	37.983	37.977	37.972	37.967	37.961	37.955	37.948	37.941	37.928	37.913	37.897	37.886	37.875	37.864	37.851	37.838	
G2	X	325.602	332.002	342.002	352.002	362.002	372.002	378.002	384.002	390.002	396.002	402.002	408.002	417.502	427.502	437.002	443.002	449.002	455.002	461.002	467.002	
	Y	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750
	Z	37.939	37.938	37.936	37.933	37.928	37.922	37.917	37.912	37.906	37.899	37.893	37.886	37.873	37.858	37.842	37.831	37.820	37.809	37.796	37.783	
	HU	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130
L4	X	325.602	332.002	342.002	352.002	362.002	372.002	378.002	384.002	390.002	396.002	402.002	408.002	417.502	427.502	437.002	443.002	449.002	455.002	461.002	467.002	
	Y	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875
	Z	37.916	37.915	37.913	37.910	37.905	37.899	37.894	37.888	37.883	37.877	37.870	37.863	37.850	37.835	37.819	37.808	37.797	37.786	37.773	37.760	
L5	X	325.602	332.002	342.002	352.002	362.002	372.002	378.002	384.002	390.002	396.002	402.002	408.002	417.502	427.502	437.002	443.002	449.002	455.002	461.002	467.002	
	Y	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975
	Z	37.894	37.893	37.891	37.888	37.883	37.877	37.872	37.867	37.861	37.855	37.848	37.841	37.828	37.813	37.797	37.786	37.775	37.764	37.751	37.738	

		CB65	CB66	CB67	CB68	CB69	CB70	CB71(P14)	CB72	CB73	CB74	CB75	CB76	CB77	CB78	CB79	P15	SPAN 1	SPAN 2	SPAN 3	SPAN 4	TOTAL
L1	X	473.002	482.502	492.502	502.002	508.002	514.002	520.002	526.002	532.002	538.002	548.002	558.002	568.002	578.002	584.402	585.002	64.400	65.000	65.000	64.400	258.800
	Y	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975	-4.975					
	Z	37.924	37.902	37.877	37.852	37.835	37.818	37.800	37.782	37.764	37.746	37.716	37.696	37.656	37.626	37.607	37.605					
L2	X	473.002	482.502	492.502	502.002	508.002	514.002	520.002	526.002	532.002	538.002	548.002	558.002	568.002	578.002	584.402	585.002	64.400	65.000	65.000	64.400	258.800
	Y	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375	-4.375					
	Z	37.912	37.890	37.865	37.840	37.823	37.806	37.788	37.770	37.752	37.734	37.704	37.674	37.644	37.614	37.595	37.593					
G1	X	473.002	482.502	492.502	502.002	508.002	514.002	520.002	526.002	532.002	538.002	548.002	558.002	568.002	578.002	584.402	585.002	64.400	65.000	65.000	64.400	258.800
	Y	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750	-2.750					
	Z	37.880	37.858	37.833	37.808	37.791	37.774	37.756	37.738	37.720	37.702	37.672	37.642	37.612	37.582	37.563	37.561					
	HU	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130					
L3	X	473.002	482.502	492.502	502.002	508.002	514.002	520.002	526.002	532.002	538.002	548.002	558.002	568.002	578.002	584.402	585.002	64.400	65.000	65.000	64.400	258.800
	Y	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000					
	Z	37.825	37.803	37.778	37.753	37.736	37.719	37.701	37.683	37.665	37.647	37.617	37.587	37.557	37.527	37.508	37.506					
G2	X	473.002	482.502	492.502	502.002	508.002	514.002	520.002	526.002	532.002	538.002	548.002	558.002	568.002	578.002	584.402	585.002	64.400	65.000	65.000	64.400	258.800
	Y	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750					
	Z	37.770	37.748	37.723	37.698	37.681	37.664	37.646	37.628	37.610	37.592	37.562	37.532	37.502	37.472	37.453	37.451					
	HU	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130	0.130					
L4	X	473.002	482.502	492.502	502.002	508.002	514.002	520.002	526.002	532.002	538.002	548.002	558.002	568.002	578.002	584.402	585.002	64.400	65.000	65.000	64.400	258.800
	Y	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875	3.875					
	Z	37.747	37.725	37.700	37.675	37.658	37.641	37.623	37.605	37.587	37.569	37.539	37.509	37.479	37.449	37.430	37.428					
L5	X	473.002	482.502	492.502	502.002	508.002	514.002	520.002	526.002	532.002	538.002	548.002	558.002	568.002	578.002	584.402	585.002	64.400	65.000	65.000	64.400	258.800
	Y	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975	4.975					
	Z	37.725	37.703	37.678	37.653	37.636	37.619	37.601	37.583	37.565	37.547	37.517	37.487	37.457	37.427	37.408	37.406					





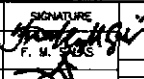
1 SCHEDULE OF DIMENSIONS (PIER 6 to PIER 15) - 3 of 3  
SCALE AS SHOWN

	DESIGNED	DATE	SIGNATURE	 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION			
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# SUMMARY OF QUANTITIES

## PAMPANGA RIVER BRIDGE CROSSING ( BRIDGE NO. 10 )

ITEM NO.	DESCRIPTION	UNIT	QUANTITIES			REMARKS
			APPROACH	MAIN	TOTAL	
<b>PART F BRIDGE CONSTRUCTION</b>						
<b>I SUPERSTRUCTURE</b>						
310(2)	Asphalt Mixture Wearing Course (t=50mm) incl. Tack Coat	m <sup>2</sup>	4,455.00	4,826.25	9,281.25	
401(2)a	Steel Railing Type A for (Angat, Talavera and approach of Pampanga Bridge)	m	1,080.00	-	1,080.00	
401(2)b	Steel Railing Type B (for Pampanga Main Bridge)	m	-	1,170.00	1,170.00	
SPL 401(3)b	Bridge Name Plate, 1000 x 600 for Pampanga Bridge	ea.	2	-	2	
403(3)	Structural Steel, furnished and fabricated	kg.	-	1,707,861.88	1,707,861.88	
403(5)	Structural Steel, erected	kg.	-	1,707,861.88	1,707,861.88	
403(8)a	Bearing Shoe for Steel Plate Girder Type 1 (max. R=250t)	ea.	-	8	8	
403(8)b	Bearing Shoe for Steel Plate Girder Type 2 (max. R=850t)	ea.	-	8	8	
403(8)c	Bearing Shoe for Steel Plate Girder Type 3 (max. R=650t)	ea.	-	6	6	
404(1)	Reinforcing Steel (Grade 40)	kg.	308,907.64	37,003.00	345,910.64	
404(2)	Reinforcing Steel (Grade 60)	kg.	114,227.82	-	114,227.82	
405(1)f	Structural Concrete Class AA2 (f'c=28 Mpa, max. aggregate 20mm) for Long Bridge Superstructures	m <sup>3</sup>	1,535.15	8.20	1,543.35	
405(3)	Structural Concrete Class C (f'c=21 MPa, max. aggregate 12mm) for Thin Reinforced Members	m <sup>3</sup>	473.04	349.25	822.29	
406(1)g	Precast Prestressed Structural Concrete Member (AASHTO Girder Type V, L=29.4m)	ea.	48	-	48	
406(1)h	Precast Prestressed Structural Concrete Member (AASHTO Girder Type V, L=29.55m)	ea.	24	-	24	
406(1)p	Precast Prestressed Structural Concrete (PC Deck slab, 280 x 2000 x 9650)	m <sup>2</sup>	-	5,643.32	5,643.32	
407(1)b	Elastomeric Bearing Pad (600x300x50mm)	ea.	136	8	144	
407(2)b	Expansion Joint, Multiflex M100 (Elastomeric) ±50mm movement	m	20.00	-	20.00	
407(2)c	Expansion Joint, Multiflex M140 (Elastomeric) ±70mm movement	m	10.00	-	10.00	
407(2)f	Expansion Joint Multiflex N330 (Elastomeric) ±165mm movement	m	-	30.00	30.00	
407(4)	G.I Drain Pipe Ø150mm for Bridge Drainage	m	191.25	361.35	552.60	
SPL 310(3)	Waterproofing Layer for Pampanga Deck Slab	m <sup>2</sup>	-	4,826.25	4,826.25	
SPL 407(3)a	Restraining Bar Ø32mm x 1495mm	ea.	12	-	12	
SPL 407(3)b	Restraining Bar Ø32mm x 1900mm	ea.	6	-	6	
SPL 407(3)c	Restraining Cable Ø65mm x 4121mm (PC 7- Ø15)	set	-	8	8	
SPL 407(3)d	Restraining Cable Ø65mm x 4224mm (PC 7- Ø15)	set	-	4	4	
<b>II SUBSTRUCTURE</b>						
103(2)a	Bridge Excavation above OWL (Common Soil)	m <sup>3</sup>	3,864.42	1,658.29	5,522.71	
103(2)c	Bridge Excavation below OWL (Common Soil)	m <sup>3</sup>	2,334.40	7,511.58	9,845.98	
104(4)	Embankment from Borrow (Selected Granular Material) for Bridge	m <sup>3</sup>	597.34	-	597.34	
200(1)	Aggregate Subbase Course	m <sup>3</sup>	25.76	-	25.76	
400(18)a	Cast-in-place Concrete Bored Piles Ø 1000mm	m	320.00	-	320.00	
400(18)b	Cast-in-place Concrete Bored Piles Ø 1200mm	m	1,626.00	-	1,626.00	
400(18)c	Cast-in-place Concrete Bored Piles Ø 1500mm	m	-	1,512.00	1,512.00	
400(21)	Static Pile Load Test for Ø1500mm Bored Piles	ea.	-	2	2	
404(1)	Reinforcing Steel (Grade 40)	kg.	37,907.77	12,890.48	50,798.25	
404(2)	Reinforcing Steel (Grade 60)	kg.	596,072.81	667,774.14	1,263,846.95	
405(1)e	Structural Concrete Class AA1 (f'c=28 Mpa, max. aggregate 20mm) for Long Bridge Substructures	m <sup>3</sup>	2,899.21	3,741.56	6,640.77	
405(6)	Lean Concrete (f'c=17 MPa max. aggregate 38mm)	m <sup>3</sup>	96.56	106.47	203.03	
SPL 311(2)	PCC Pavement (Reinforced) t=300mm Approach Slab	m <sup>2</sup>	91.04	-	91.04	
SPL 400(23)a	High Strain Dynamic Pile Test for Ø1000mm Bored Piles	ea.	1	-	1	
SPL 400(23)b	High Strain Dynamic Pile Test for Ø1200mm Bored Piles	ea.	2	-	2	
SPL 400(24)	Pile Integrity Test for Bored Piles of Various Diameter	ea.	66	-	66	
SPL 900(3)	Provisional Sum for Geotechnical Investigation	l.s.	-	-	1	
<b>III REVETMENT (RIVERBANK PROTECTION)</b>						
103(1)	Structure Excavation	m <sup>3</sup>	1,257.00	-	1,257.00	
104(3)	Embankment from borrow pit	m <sup>3</sup>	829.74	-	829.74	
405(1)a	Structural Concrete Class A (f'c=21 Mpa, max. aggregate 38mm) for Heavily Reinf. Structures	m <sup>3</sup>	63.65	-	63.65	
405(2)	Structural Concrete Class B (f'c=17 MPa, max. aggregate 50mm) for Plain or Lightly Reinf. Structures	m <sup>3</sup>	16.50	-	16.50	
504(5)	Grouted Riprap Class A	m <sup>3</sup>	28.32	-	28.32	
506(1)	Hand Laid Rock Apron (Loose Boulder Apron)	m <sup>3</sup>	48.15	-	48.15	
507(2)b	Steel Sheet Piles (400mmx85mm), furnish & driven	m	1,920.00	-	1,920.00	
509(1)	Gabions, (2.0 x 1.0 x 0.50)	m <sup>3</sup>	481.50	-	481.50	
510(1)	Rubble Concrete Slope Protection	m <sup>3</sup>	239.81	-	239.81	
SPL 407(5)b	Pier Protection Concrete Blocks for Pampanga Bridge	m <sup>2</sup>	-	840.00	840.00	
<b>IV TEMPORARY WORKS</b>						
SPL 420(2)b	Realignment of River/Stream	l.s.	1	-	1	
SPL 420(4)b	Temporary Craneway for Pampanga Bridge Construction	m	-	320.00	320.00	
SPL 420(5)b	Temporary Access Road (Causeway) for Pampanga Bridge Construction	m	880.00	-	880.00	
SPL 420(6)c	Temporary Cofferdam for Pier Construction (Pampanga Bridge)	ea.	-	5	5	
<b>V ELECTRICAL WORKS</b>						
SPL 620(4)c	Bridge Lighting Poles (Single Lamp)	ea.	18	19	37	
SPL 620(4)d	Street Lighting Service Pole with Panel	ea.	-	-	2	

 <b>JAPAN INTERNATIONAL COOPERATION AGENCY</b>		 <b>KATAHIRA &amp; ENGINEERS</b>		 <b>YEO YACHIYO ENGINEERING CO., LTD.</b>		 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 (Piradel, Cabanatuan and San Jose Bypasses)</b>		SCALE : <b>AS SHOWN</b>		SHEET CONTENTS : <b>BRIDGE NO. 10 PAMPANGA RIVER BRIDGE SUMMARY OF QUANTITIES (INITIAL STAGE)</b>		SHEET NO. : <b>B10G-13</b>	
DESIGNED	DATE	SIGNATURE	BUREAU OF DESIGN		OFFICE OF THE SECRETARY		REVIEWED BY:		RECOMMENDED BY:		APPROVED BY:		APPROVED BY:				
CHECKED	10/17/02		Submitted By: DANILO C. TRAJANO Project Director		Reviewed By: ADRIANO M. DORAY Chief, Bridge Division		Recommended By: GILBERTO S. REYES Director IV (DC)		Recommended By: MAHUEL M. BONDAN Undersecretary		Approved By: SINEON A. DATUMANONG Secretary		Approved By: (See cover sheet for Signature/Approval)				