

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

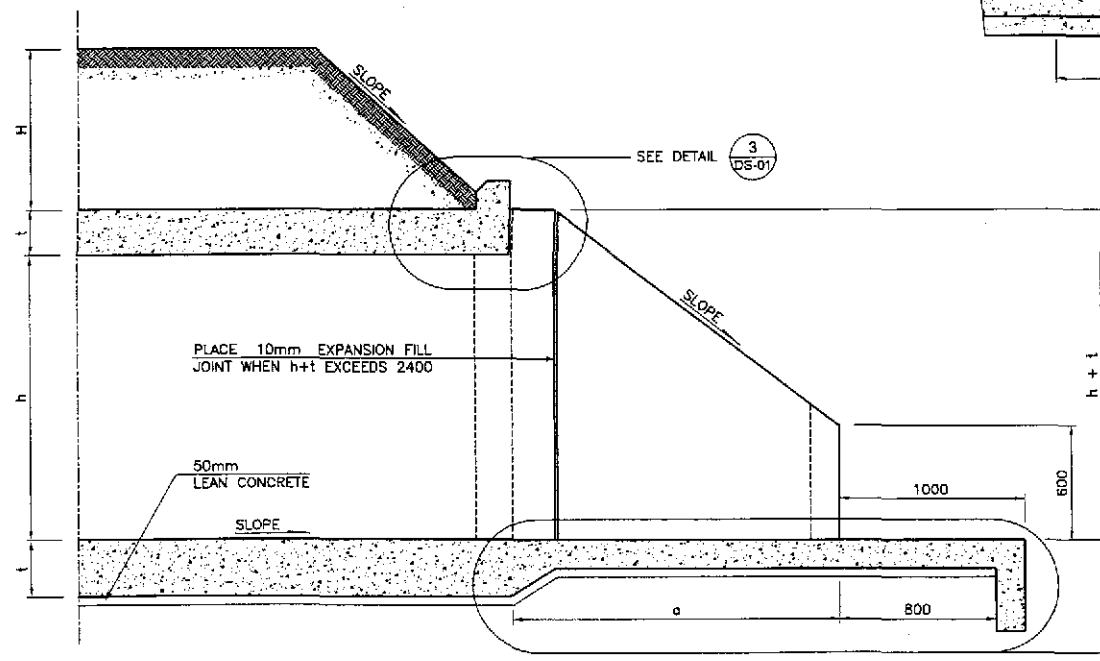
LEGEND:

- 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 — $x t_2 + 0.5 t_1 W_c$
- h — HEIGHT OF CULVERT OPENING
- t — THICKNESS OF CULVERT WALL OR SLAB
- ϕ — SLOPE OF EMBANKMENT
- α — ANGLE OF SKEW

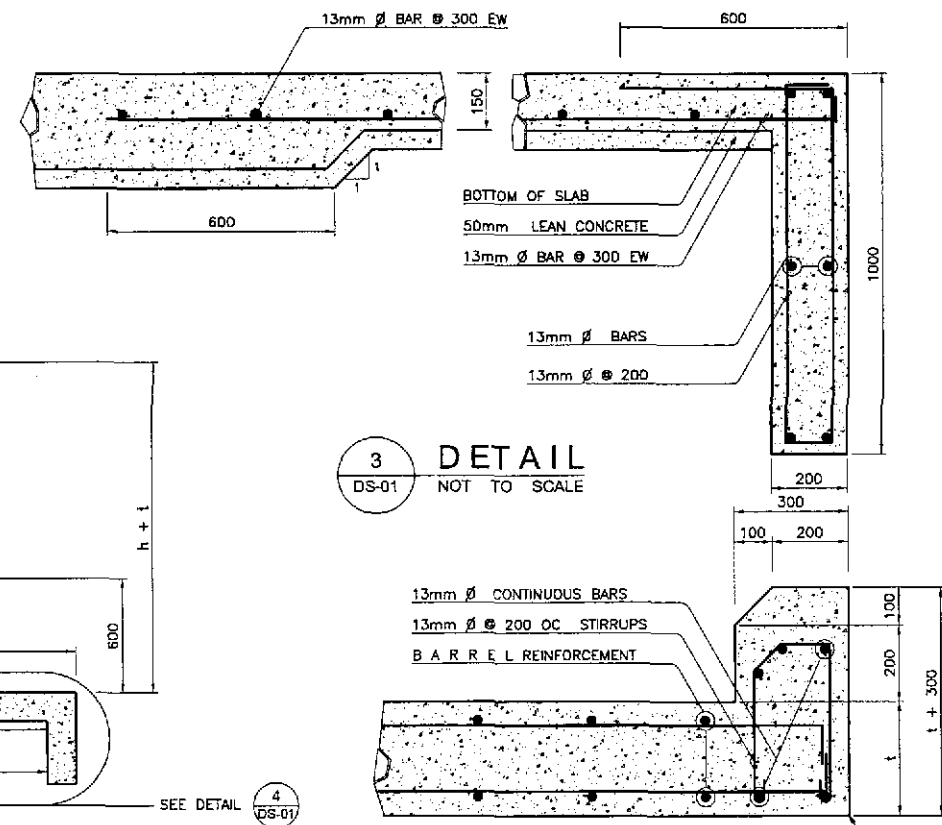
HORIZONTAL SKEW ANGLE α	L (mm)
90°	$W + 2 \tan \phi [(H+t) - (B+200)]$
60°	$1.1547 (W + 2 \tan \phi [(H+t) - (B+200)])$
45°	$1.4142 (W + 2 \tan \phi [(H+t) - (B+200)])$

NOTES:

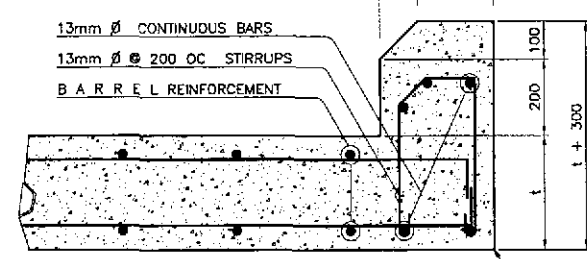
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. MINIMUM CONCRETE COVER SHALL BE 40 CLEAR. WHEN HEIGHT OF FILL $H=0$ INCREASE COVER BY 30.



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

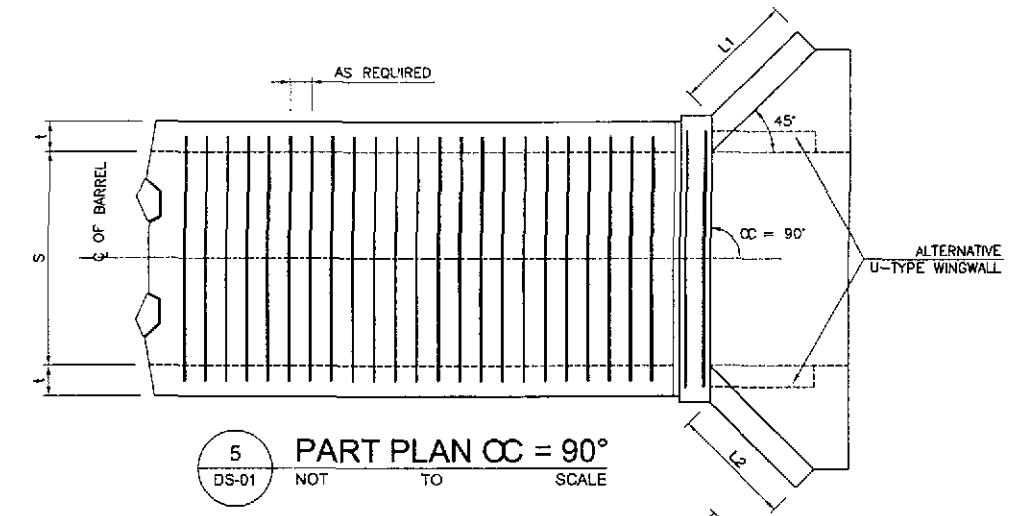


3 DETAIL
DS-01 NOT TO SCALE

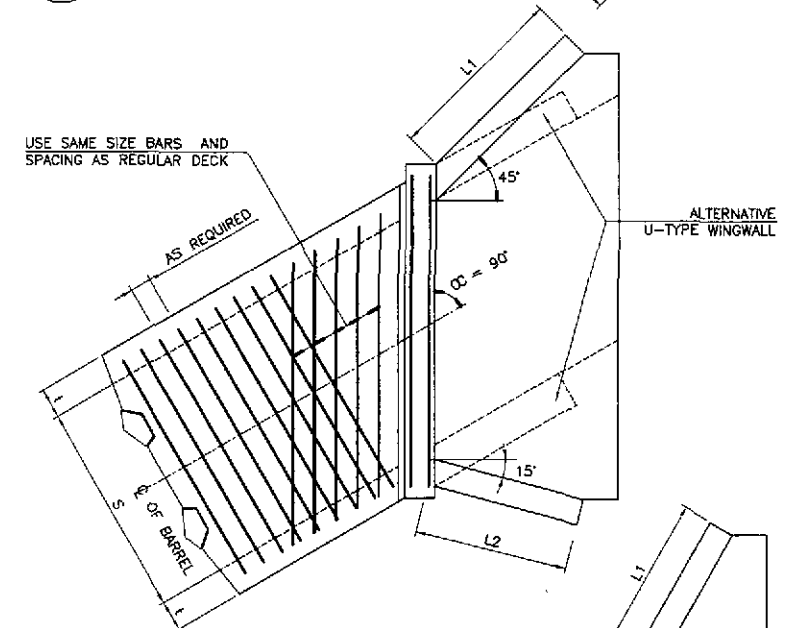


4 DETAIL
DS-01 NOT TO SCALE

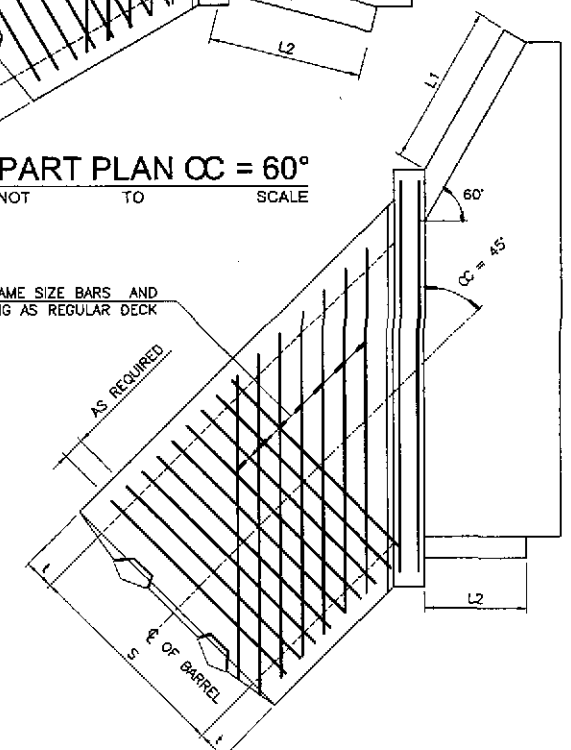
ROUND TO APPROXIMATE 150mm RADIUS (FOR INLET PORTION ONLY)



5 PART PLAN $\alpha = 90^\circ$
DS-01 NOT TO SCALE



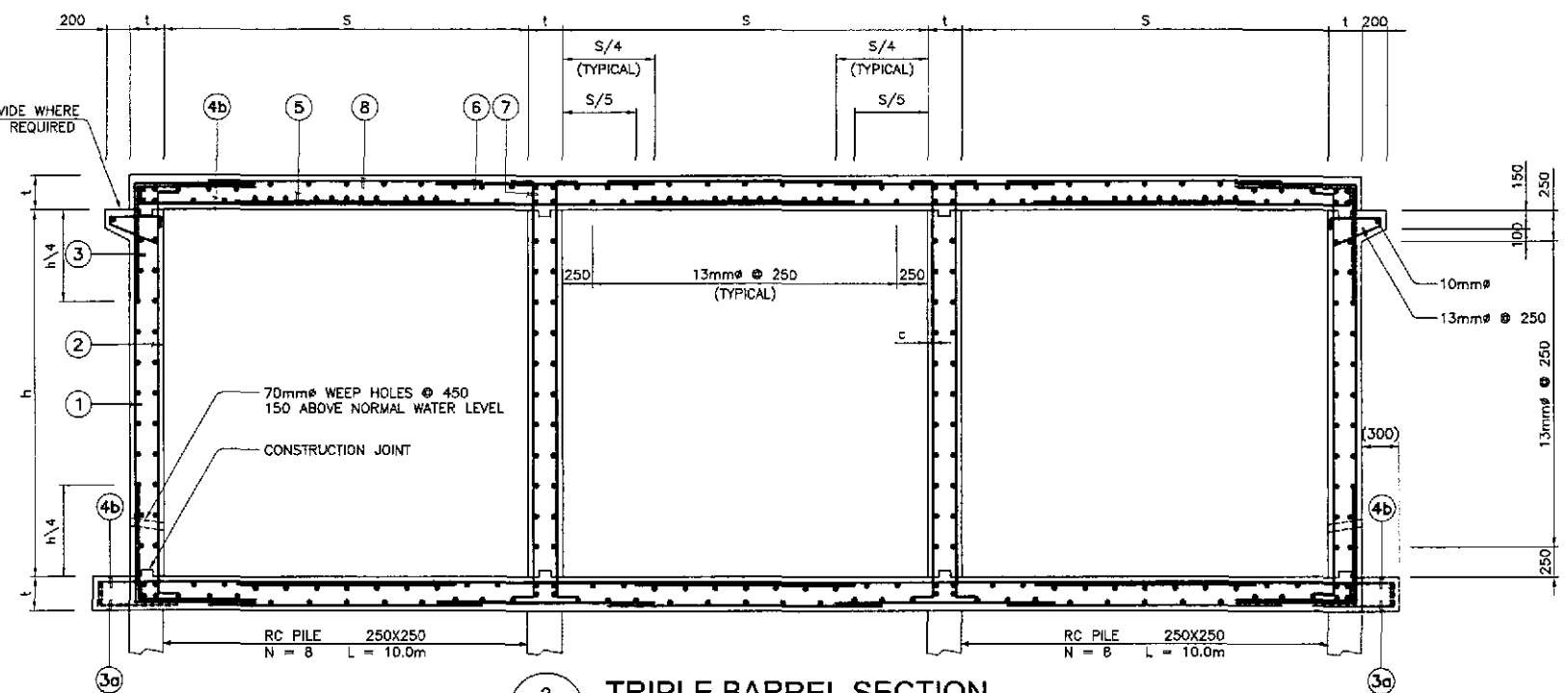
6 PART PLAN $\alpha = 60^\circ$
DS-01 NOT TO SCALE



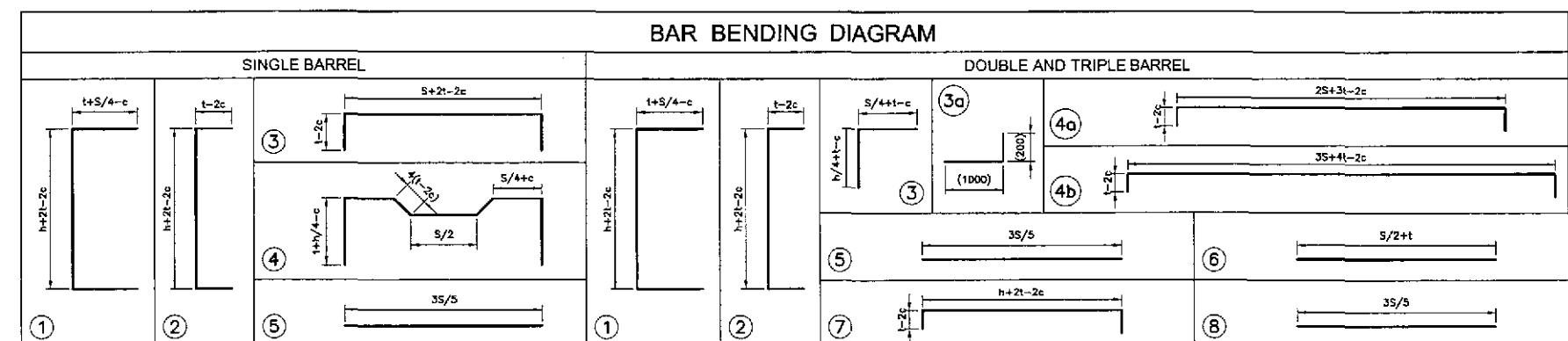
7 PART PLAN $\alpha = 45^\circ$
DS-01 NOT TO SCALE

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

JICA JAPAN INTERNATIONAL COOPERATION AGENCY		DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : 1:100	SHEET CONTENTS : STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)	SHEET NO. : DS-01
DESIGNED	10/09/02	SIGNATURE		P. H. M. P. M. Submitted By:	Reviewed By:	Recommended By:	Approved By:	Approved By:
CHECKED	10/16/02	SIGNATURE		A. HAKIM Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary
SUBMITTED	10/18/02	SIGNATURE		M. K. K. TEAM LEADER	DANILLO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary



3 TRIPLE BARREL SECTION
DS-02 SCALE 1:30



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

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

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC) BARRELS

QUANTITIES FOR STANDARD BOX CULVERTS

CLEAR		QUANTITY PER METER OF BARREL					
SPAN S	HEIGHT h	SINGLE		DOUBLE		TRIPLE	
		CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)
1250	1000	0.94	113.32	1.63	209.22	2.33	295.18
	1250	1.03	121.63	1.77	216.22	2.51	312.39
	1500	1.12	130.98	1.90	232.07	2.69	330.39
	1800	1.23	141.71	2.07	249.50	2.91	352.09
1500	1000	1.03	165.90	2.04	253.90	2.92	354.80
	1250	1.12	177.10	2.19	256.00	3.12	370.20
	1500	1.21	189.60	2.34	279.60	3.32	387.10
	1800	1.32	202.50	2.52	296.20	3.56	407.10
1800	1250	1.38	189.20	3.11	312.30	4.45	437.00
	1500	1.48	199.90	3.30	326.10	4.70	454.00
	1800	1.60	214.80	3.53	342.80	5.00	475.20
	2100	1.72	239.60	3.75	357.50	5.30	494.40
2400	1800	2.04	272.70	5.04	431.80	7.20	619.10
	2100	2.17	288.50	5.31	447.30	7.56	637.10
	2400	2.31	314.10	5.58	461.80	7.92	656.40
	2750	2.46	356.70	5.90	478.60	8.34	677.70
3000	2100	3.17	308.70	6.03	635.70	8.64	899.70
	2400	3.34	321.30	6.30	652.00	9.00	919.60
	2750	3.53	374.40	6.62	705.60	9.42	895.00
	3000	3.67	413.50	6.84	721.60	9.72	1015.40

QUANTITIES FOR STANDARD WINGWALLS

			QUANTITY PER WINGWALL AND APRON SLAB					
m (meter)	h+t (meter)	L (meter)	SINGLE		DOUBLE		TRIPLE	
			CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)	CONCRETE (m³)	REINFORCEMENT (kg)
1.37	1.18	1.23	2.41	150	2.94	180	3.48	220
1.75	1.43	1.76	3.48	220	4.08	265	4.72	300
2.12	1.68	2.29	4.66	300	5.36	350	6.06	395
2.57	1.98	2.93	6.22	405	7.01	450	7.80	500
1.37	1.18	1.23	2.50	140	3.26	180	3.88	220
1.75	1.43	1.76	3.69	210	4.42	250	5.16	290
2.12	1.68	2.29	4.78	270	5.73	320	6.56	360
2.57	1.98	2.93	6.35	350	7.42	410	8.37	460
1.78	1.45	1.80	3.81	210	4.98	280	5.90	330
2.15	1.70	2.33	5.03	280	6.33	350	7.36	400
2.60	2.00	2.97	6.48	360	8.09	450	9.26	510
3.05	2.30	3.61	8.37	460	10.00	550	11.31	620
2.63	2.02	3.01	7.08	390	9.14	500	10.71	590
3.08	2.32	3.65	9.28	510	11.61	640	13.37	740
3.53	2.62	4.28	11.42	630	13.98	770	15.92	880
4.06	2.97	5.03	14.17	780	17.90	990	19.15	1050
3.17	2.38	3.78	10.08	580	12.38	680	14.53	800
3.62	2.68	4.41	12.30	680	14.83	820	17.19	940
4.15	3.03	5.15	15.15	840	17.94	990	20.57	1130
4.52	3.28	5.68	17.34	960	20.33	1120	23.15	1270

GENERAL NOTES :

SPECIFICATION :

AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES, 16th EDITION 1995.

DESIGN LOAD :

LIVE LOAD MS-18 (HS 20-44)

CONCRETE :

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

STEEL REINFORCEMENT :

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

GENERAL :

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

LIVE LOAD DISTRIBUTION REINFORCEMENT :

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

HEIGHT OF FILL :

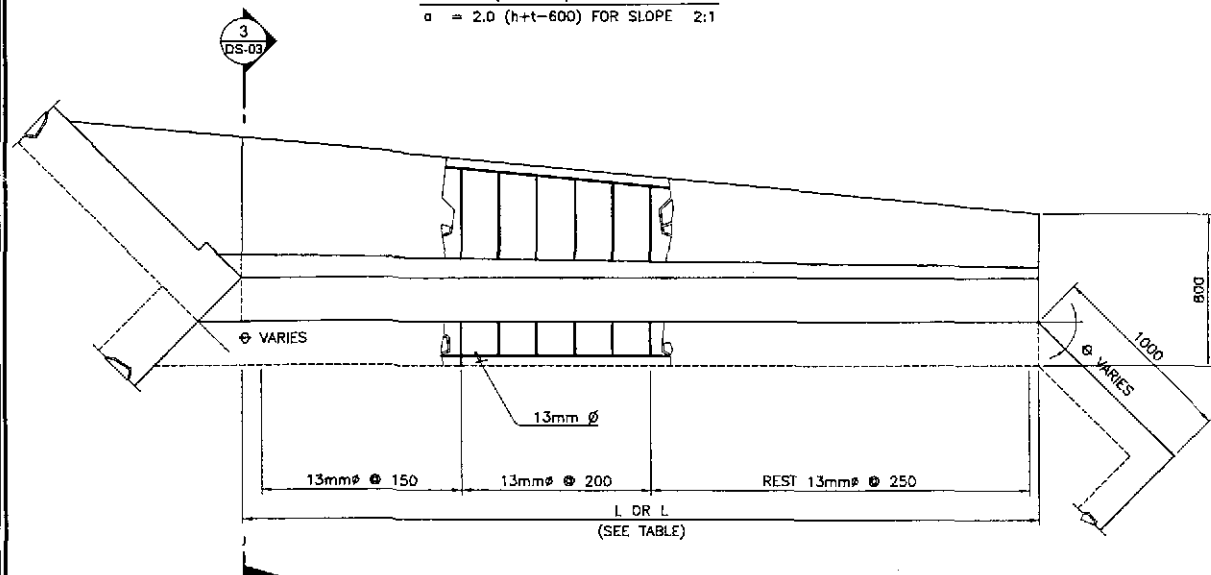
MAXIMUM HEIGHT OF FILL IS 3000mm ABOVE TOP SLAB, FOR HEIGHT OF FILL GREATER THAN 3000mm SPECIAL DESIGN OF BOX CULVERT SHOULD BE DONE.

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

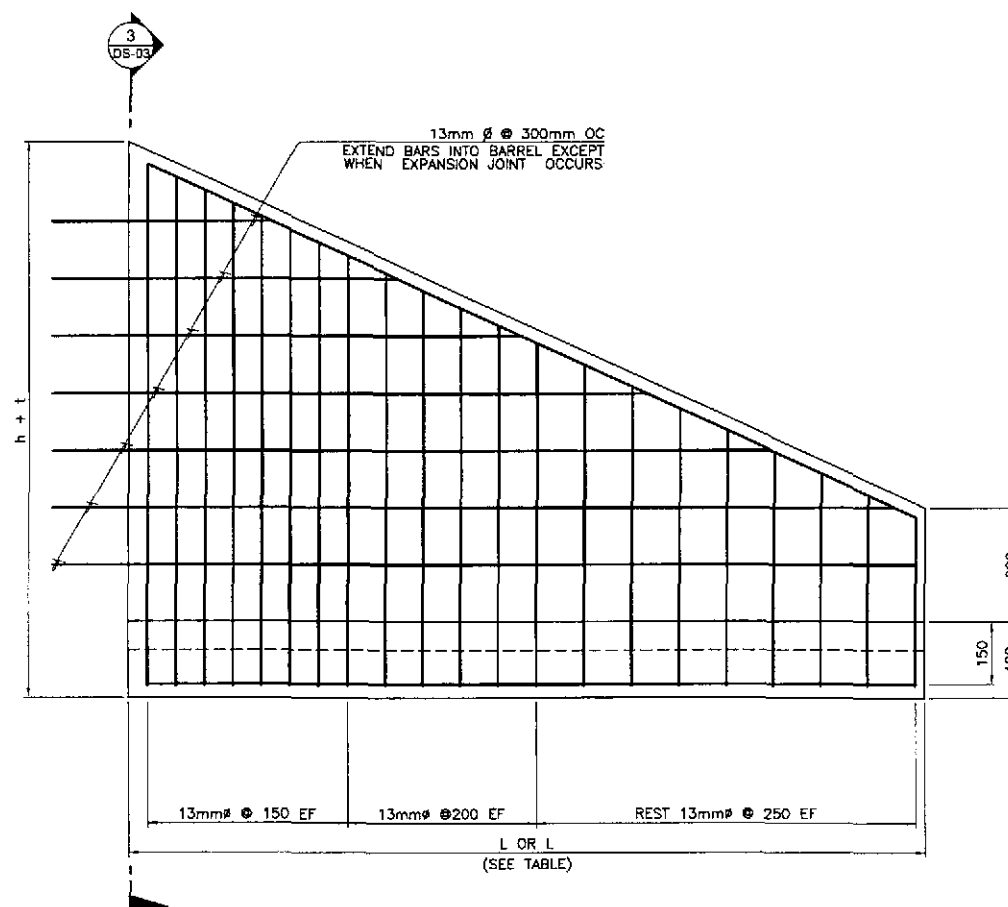
WHERE :

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

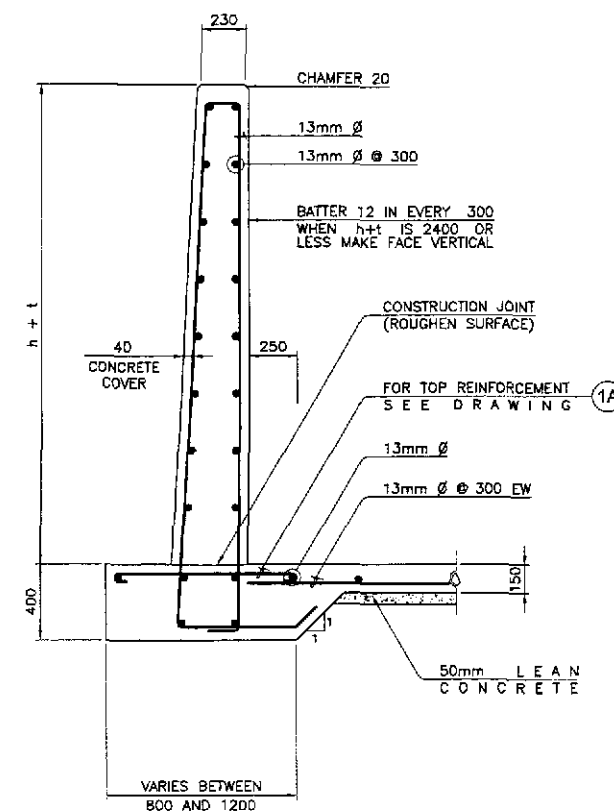
$a = 2.0 (h+t-600)$ FOR SLOPE 2:1



1 WINGWALL PLAN
DS-03 SCALE 1:40



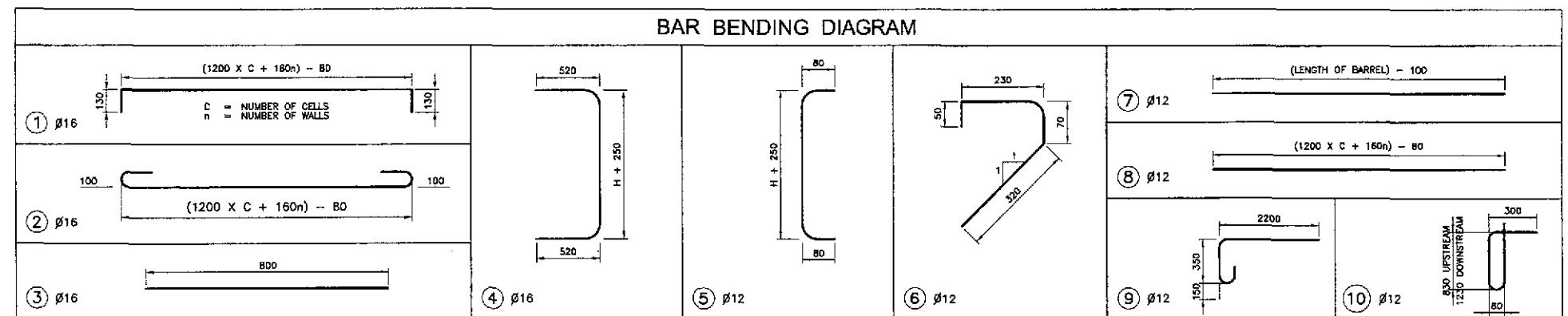
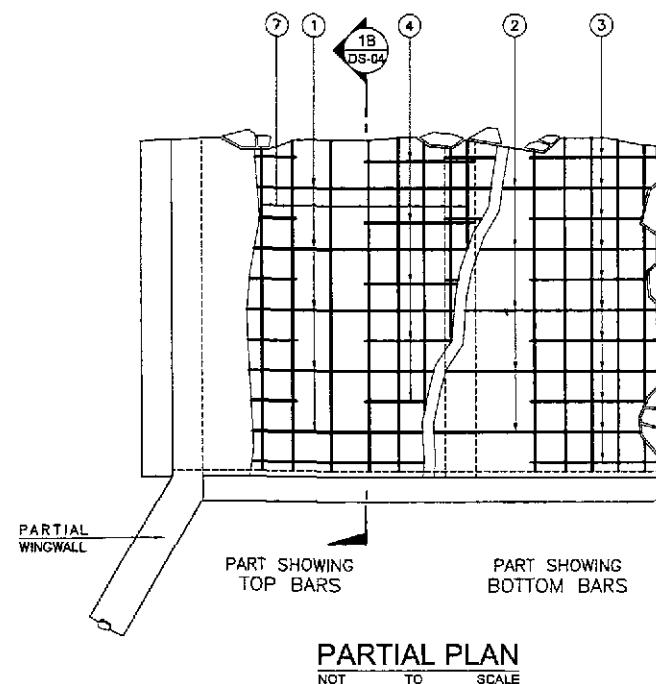
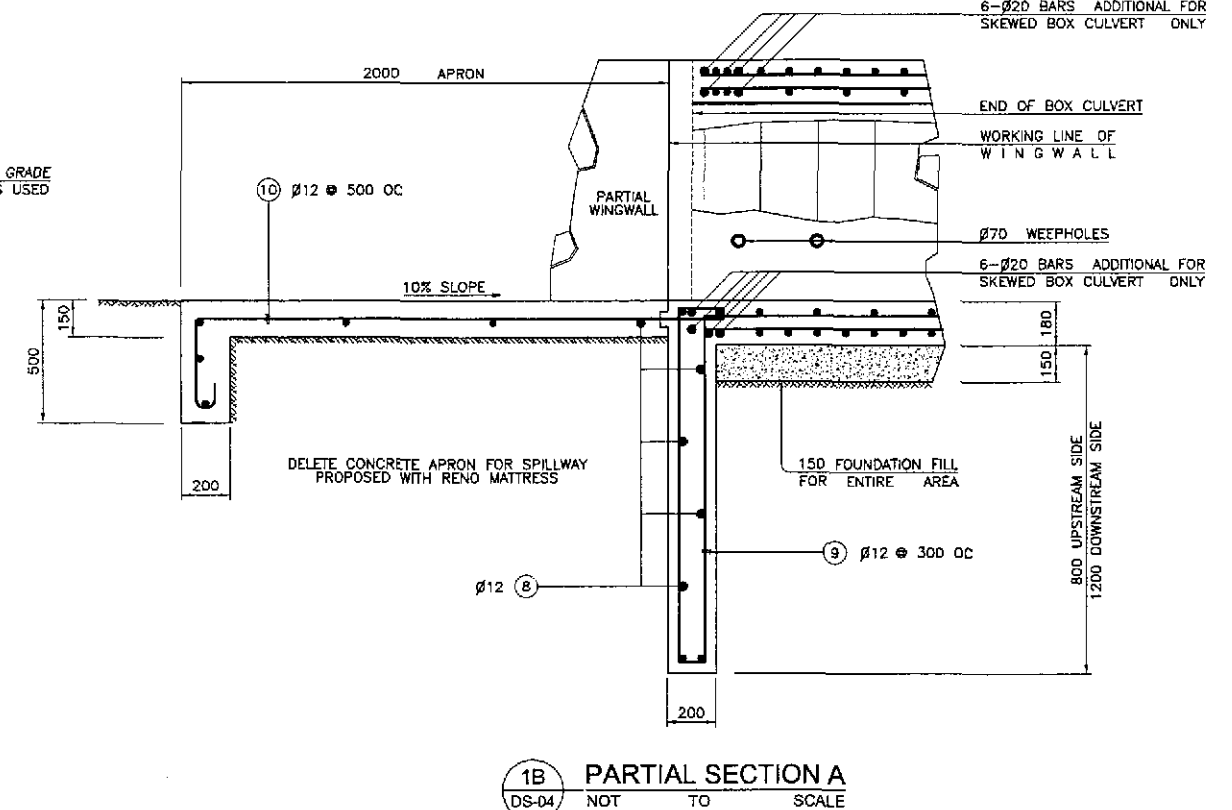
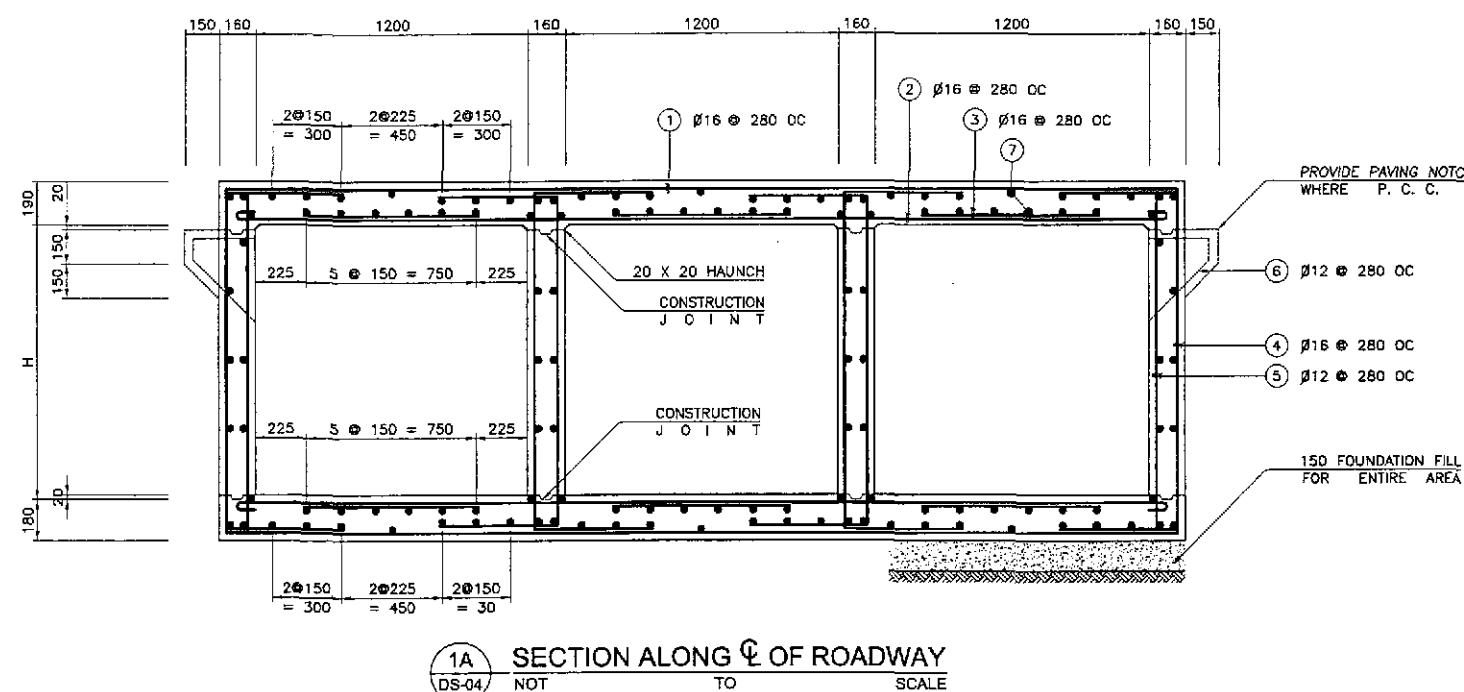
2 WINGWALL ELEVATION
DS-03 SCALE 1:40



3 SECTION
DS-03 SCALE 1:40

RCBC WINGWALL DETAILS

JICA JAPAN INTERNATIONAL COOPERATION AGENCY	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	SCALE : 1:40	SHEET CONTENTS : STANDARD DETAILS OF RCBC WINGWALLS	SHEET NO. : DS-03
DESIGNED : 10/09/02 10/16/02 10/18/02	CHECKED : 10/16/02 10/18/02	SUBMITTED : 10/18/02	DATE : 10/09/02 10/16/02 10/18/02	SIGNATURE : [Signatures]	TEAM LEADER : DANILO C. TRAYANO Project Director
REVIEWED BY : JOSEFINA M. ALAGAR Chief, Highways Division	REVIEWED BY : GILBERTO S. REYES DIC, Director IV	REVIEWED BY : MANUEL M. BONDAN Undersecretary	REVIEWED 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)	SCALE : 1:40
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ESTIMATE OF QUANTITIES (PER LINEAR METER OF LENGTH)

SINGLE BARREL					DOUBLE BARREL					TRIPLE BARREL				
HEIGHT OF CELL "H" (METER)	CONCRETE CLASS "A" (m ³)	REINFORCING STEEL (kg)	EXCAVATION (m ³)	FOUNDATION FILL (m ³)	CONCRETE CLASS "A" (m ³)	REINFORCING STEEL (kg)	EXCAVATION (m ³)	FOUNDATION FILL (m ³)	CONCRETE CLASS "A" (m ³)	REINFORCING STEEL (kg)	EXCAVATION (m ³)	FOUNDATION FILL (m ³)	CONCRETE CLASS "A" (m ³)	REINFORCING STEEL (kg)
1.20	0.95	132.59	0.67	0.27	1.84	217.00	1.12	0.48	2.34	299.62	1.56	0.68	2.34	299.62
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	2.14	289.04
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	1.95	278.48

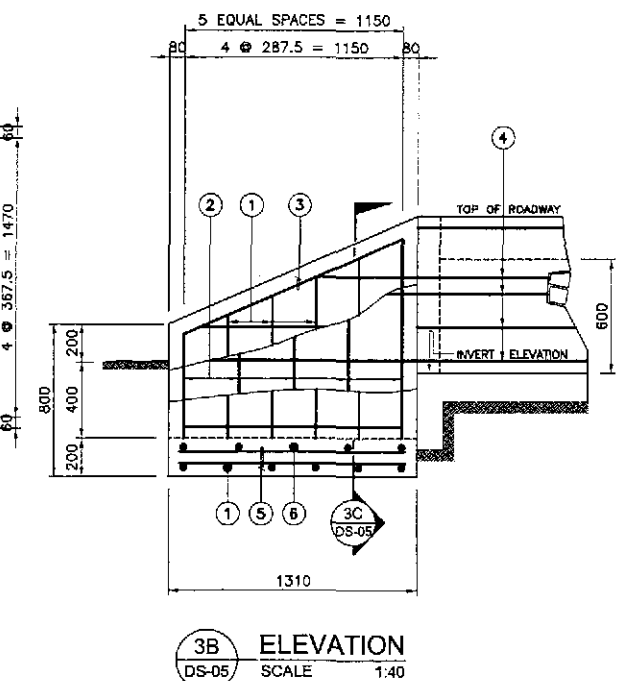
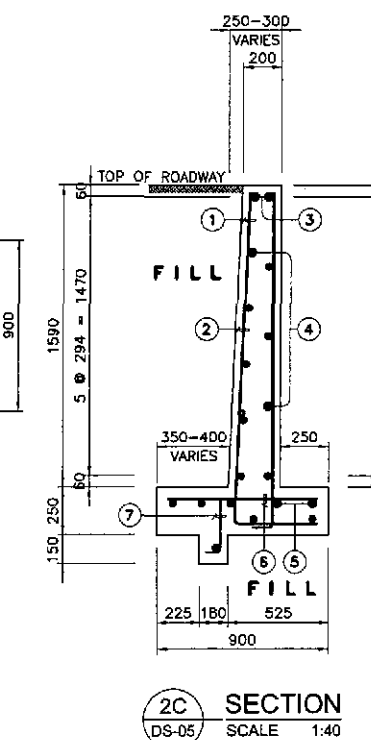
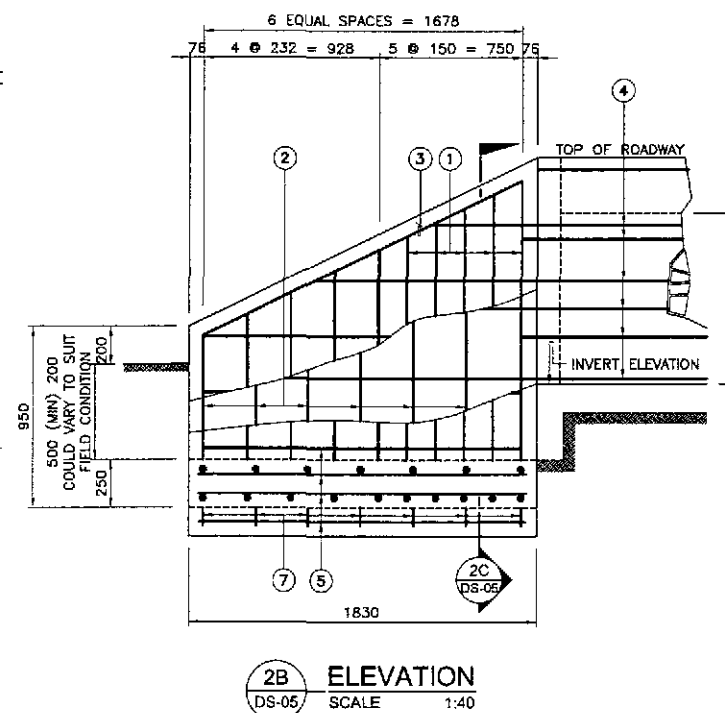
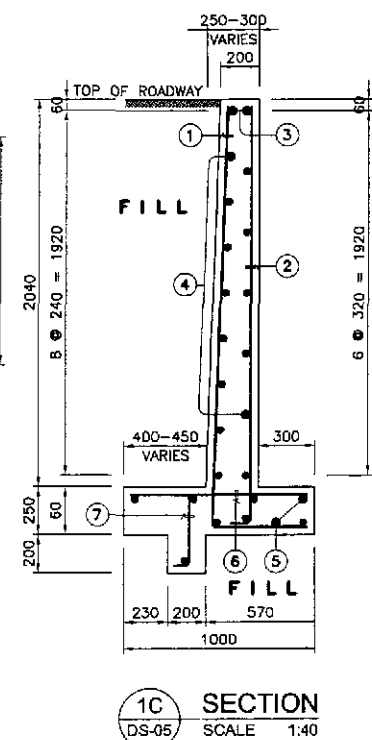
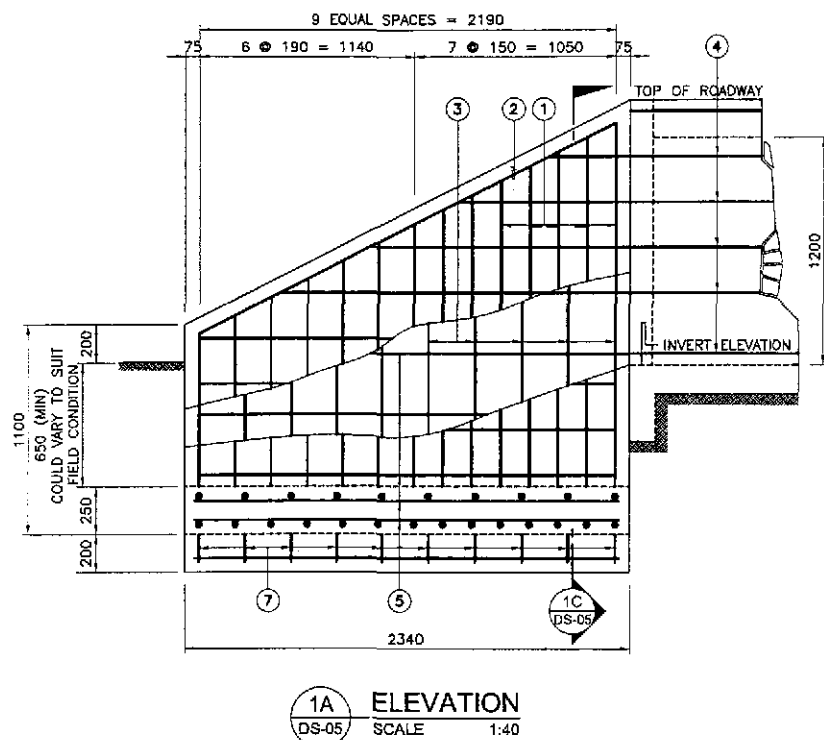
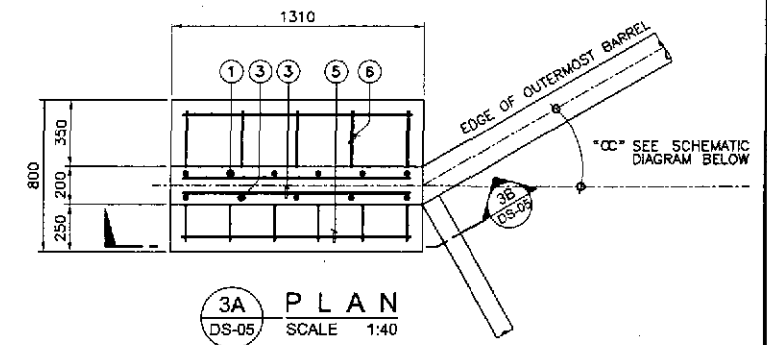
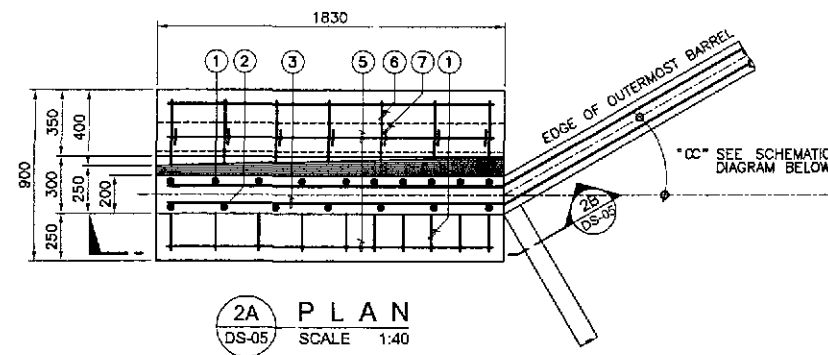
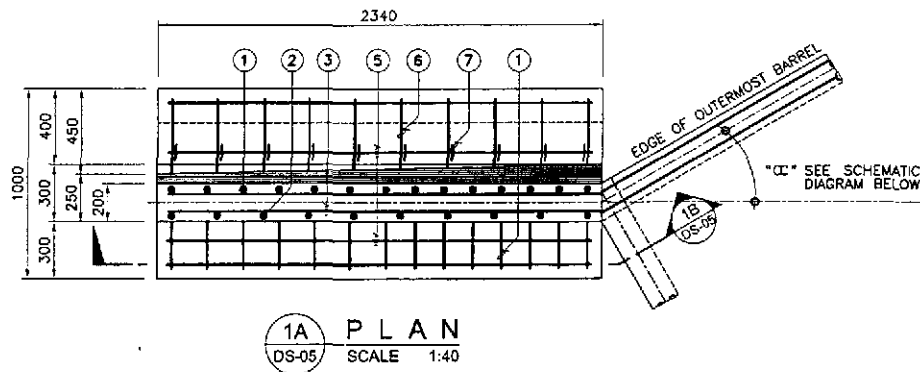
ADDITIONAL WEIGHT OF REINFORCEMENT PER END OF BOX CULVERT
 30° SKEW = 98.5 kgs.
 45° SKEW = 120.5 kgs.

APRON AND END TOE FOR BOTH ENDS

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

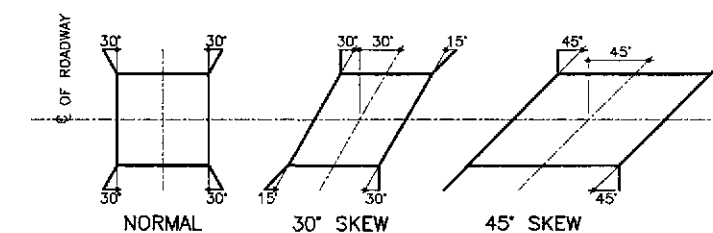
1 LOW DEPTH TYPE BOX CULVERT
DS-04 NOT TO SCALE

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

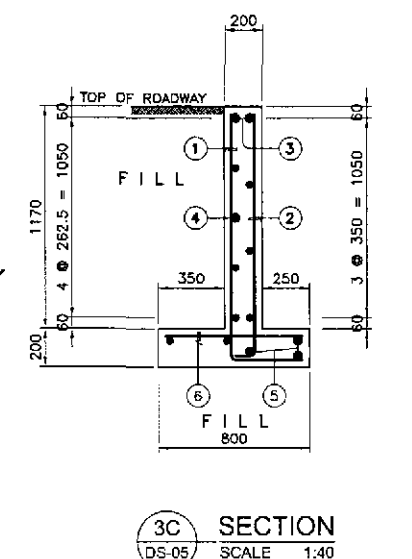


BAR BENDING DIAGRAM H=1200			BAR BENDING DIAGRAM H=900			BAR BENDING DIAGRAM H=600		
① 14-12mm ϕ	② 10-12mm ϕ	③ 2-12mm ϕ	① 10-12mm ϕ	② 7-12mm ϕ	③ 2-12mm ϕ	① 6-12mm ϕ	② 5-12mm ϕ	③ 2-12mm ϕ
④ 9-12mm ϕ	⑤ 9-12mm ϕ	⑥ 10-12mm ϕ	④ 6-12mm ϕ	⑤ 10-12mm ϕ	⑥ 7-12mm ϕ	④ 5-12mm ϕ	⑤ 7-12mm ϕ	⑥ 5-12mm ϕ

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



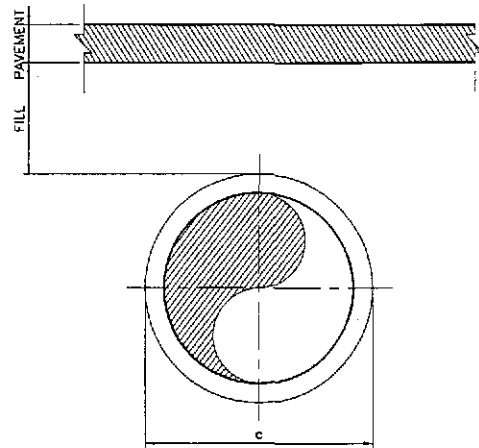
4 DS-05 NOT TO SCALE



LOW DEPTH TYPE BOX CULVERT

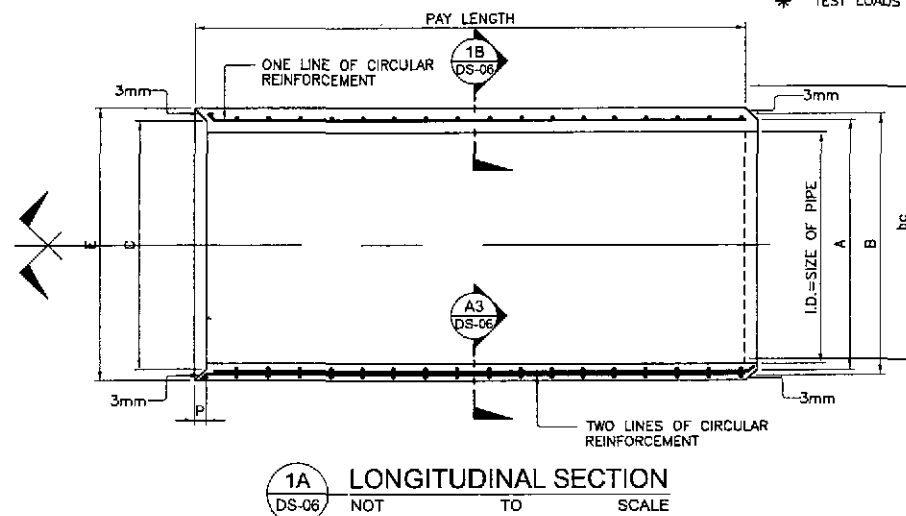
JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YEO YACHIYO ENGINEERING CO., LTD.		DATE: 10/09/02 DESIGNED: [Signature] CHECKED: 10/10/02 SUBMITTED: 10/18/02 TEAM LEADER: [Signature]	SIGNATURE: [Signature] P.J.H. - P.M.O. SUBMITTED BY: [Signature] REVIEWED BY: [Signature] RECOMMENDED BY: [Signature] APPROVED BY: [Signature]	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN OFFICE OF THE SECRETARY MANUEL M. BONDAN 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 II	SCALE: AS SHOWN FULL SIZE A1	SHEET CONTENTS: STANDARD LOW DEPTH TYPE BOX CULVERT (2 of 2)	SHEET NO.: DS-05
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DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT



STANDARD STRENGTH PIPES:
FILL 1/2 I.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



FINISHED GRADE

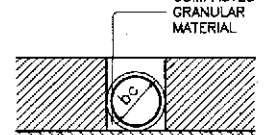
$df = bc + 15cm$ FOR PIPES $< 760mm \phi$
 $df = bc + 75cm$ FOR PIPES $\geq 760mm \phi$



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

FINISHED GRADE

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

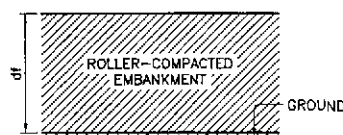


STEP 2 - TRENCH THROUGH THIS COMPACTED EMBANKMENT AND INSTALL PIPE BACKFILL WITH COMPACTED GRANULAR MATERIAL.

METHOD A

FINISHED GRADE

$df = 2bc$



STEP 1 - CONSTRUCT COMPACTED EMBANKMENT TO A TOTAL DEPTH EQUAL TO TWICE THE OUTSIDE DIA. OF THE PIPE.

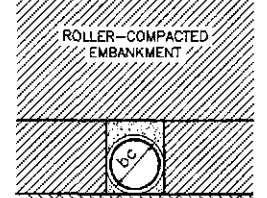
FINISHED GRADE



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

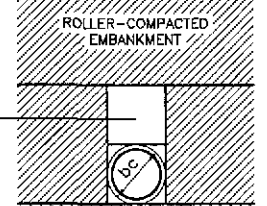
METHOD B

FINISHED GRADE



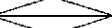
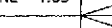
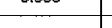
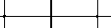
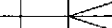
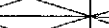
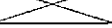
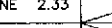
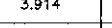
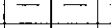
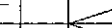
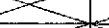
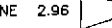
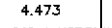
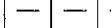

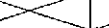
STEP 3 - COMPLETE EMBANKMENT IN USUAL MANNER.

FINISHED GRADE

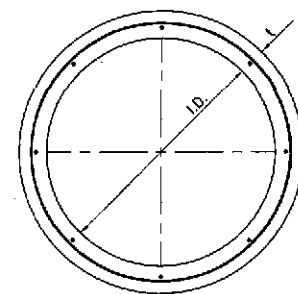


STEP 3 - FILL REMAINDER OF TRENCH WITH BACKFILL PLACE IN LOOSEST POSSIBLE CONDITION.

2 METHODS OF PIPE INSTALLATION

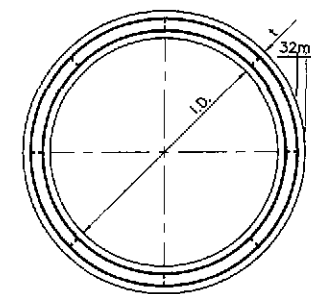
	STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS																	EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS											
	CONCRETE 247 kg/cm ² (3,500 lb/in ²)									CONCRETE 317 kg/cm ² (4,500 lb/in ²)								STRENGTH TEST REQUIREMENTS kg/m OF PIPE		CONCRETE 317 kg/cm ² (4,500 lb/in ²)									STRENGTH TEST REQUIREMENTS kg/m OF PIPE
SIZE OF PIPE (mm)	WALL THICK- NESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		WALL THICK- NESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		THREE-EDGE-BEARING METHOD *		WALL THICK- NESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /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	0.00025mCRACK LOAD	ULTIMATE LOAD	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	LOAD ULTIMATE	
300	57	344	363	351	370	44	1 LINE 1.48		51	495	514	502	521	44	1 LINE 1.69		3.355	5.218	—	—	—	—	—	—					
380	57	344	363	351	370	44	1 LINE 1.90		51	495	514	502	521	44	1 LINE 2.33		3.914	6.060	—	—	—	—	—	—					
450	64	508	527	514	534	44	1 LINE 2.54	1 LINE 2.12	51	495	514	502	521	44	1 LINE 2.96		4.473	6.709	—	—	—	—	—	—					
610	76	673	692	680	699	44	1 LINE 3.60	1 LINE 2.75	64	660	680	667	686	44	1 LINE 4.23	1 LINE 3.60	4.473	7.454	76	673	692	680	699	44	1 LINE 5.50	1 LINE 4.23	5.964	8.945	
760	89	858	857	845	864	51	1 LINE 4.66	1 LINE 3.60	76	825	845	832	851	51	1 LINE 5.92	1 LINE 4.44	5.032	8.573	89	838	857	845	864	51	1 LINE 6.56	1 LINE 5.08	7.454	11.182	
910	102	1003	1022	1010	1029	64	2 LINES EACH 3.81	1 LINE 3.81	86	988	1007	994	1013	64	2 LINES EACH 4.66	1 LINE 4.66	6.038	9.840	102	1003	1022	1010	1029	64	2 LINES EACH 5.92	1 LINE 5.92	8.945	13.418	
1070	114	1168	1187	1175	1194	64	2 LINES EACH 4.44	1 LINE 4.44	95	1150	1165	1156	1175	64	2 LINES EACH 5.29	1 LINE 5.29	7.045	10.958	114	1168	1187	1175	1194	64	2 LINES EACH 6.98	1 LINE 6.98	10.436	15.655	
1220	127	1334	1353	1340	1359	64	2 LINES EACH 5.29	1 LINE 5.29	108	1315	1334	1321	1340	64	2 LINES EACH 6.56	1 LINE 6.56	8.051	11.927	127	1334	1353	1340	1359	64	2 LINES EACH 8.04	1 LINE 8.04	11.927	17.891	
1520	152	1684	1683	1670	1690	64	2 LINES EACH 6.98	1 LINE 6.98	127	1639	1658	1645	1664	64	2 LINES EACH 8.68	1 LINE 8.68	8.945	14.909	152	1664	1683	1670	1690	64	2 LINES EACH 10.58	1 LINE 10.58	13.418	22.354	

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



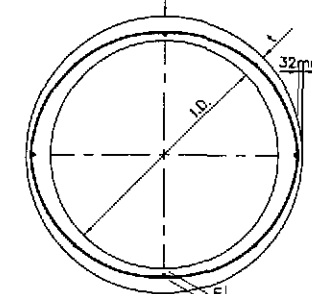
ONE LINE OF CIRCULAR REINFORCEMENT

1B SECTION

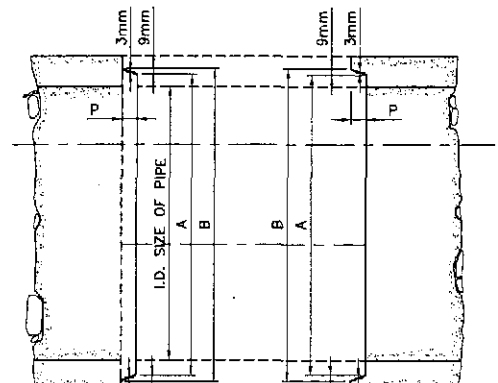


TWO LINES OF CIRCULAR REINFORCEMENT

1C SECTION

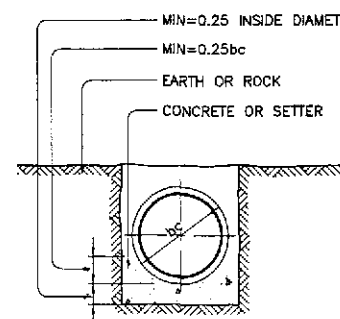


ONE LINE OF ELLIPTICAL REINFORCEMENT

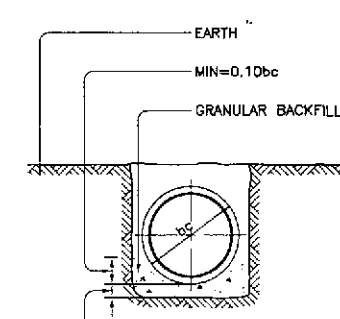


1D SECTION

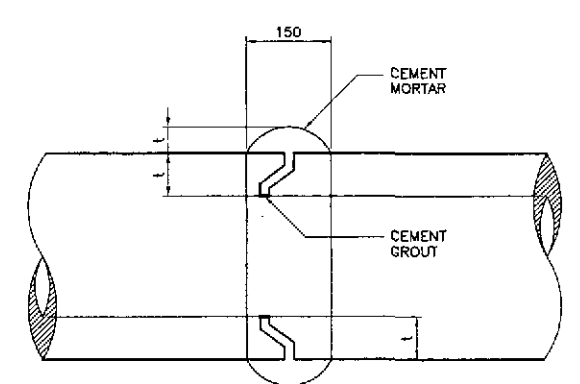
1 STANDARD REINFORCED CONCRETE PIPE CULVERTS



CONCRETE CRADLE BEDDING



ORDINARY BEDDINGS



3 TYPICAL BEDDING FOR CONDUITS

4 DETAIL OF PIPE COLLAR

JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YEO YACHIYO ENGINEERING CO., LTD.		DATE: 10/09/02 DESIGNED: [Signature] CHECKED: 10/10/02 SUBMITTED: 10/10/02 PJHL - PMO Submitted By: DANILLO C. TRAJANO Reviewed By: JOSEFINA M. ALAGAR Recommended By: GILBERTO S. REYES Approved By: MANUEL M. BONDAN Approved By: SIMEON A. DATUMANONG		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 (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE II		SCALE: AS SHOWN FULL SIZE A1	SHEET CONTENTS: STANDARD RCPC, METHOD OF PIPE INSTALLATION AND TYPICAL BEDDING FOR CONDUITS	SHEET NO.: DS-06
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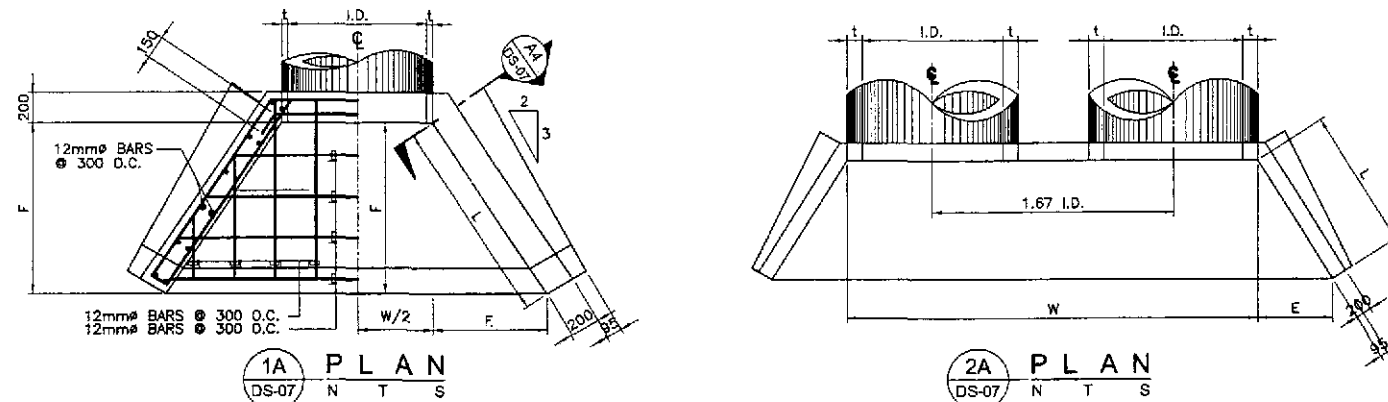
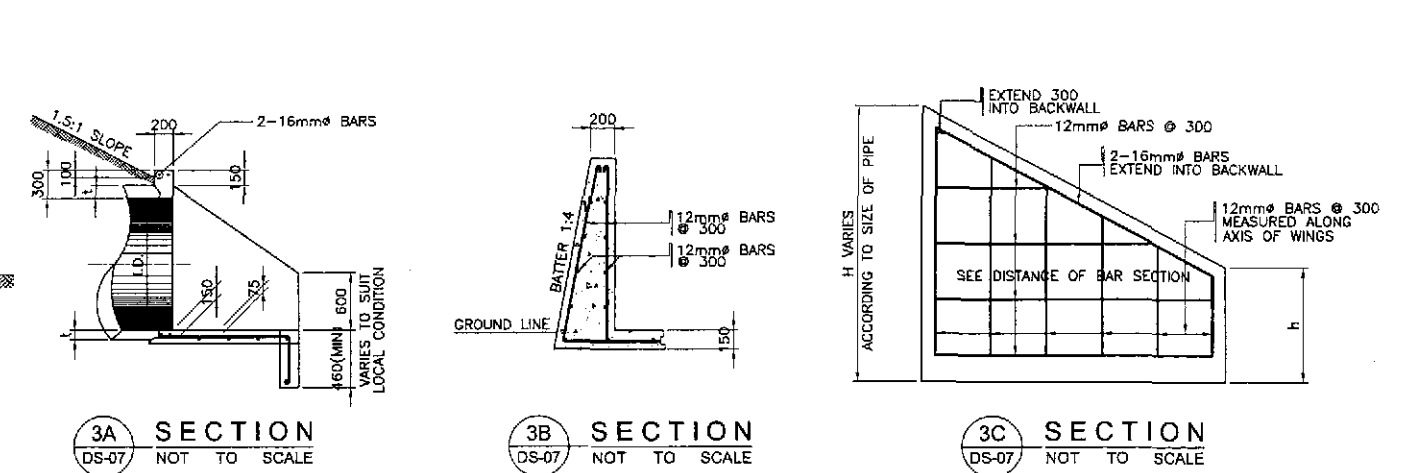
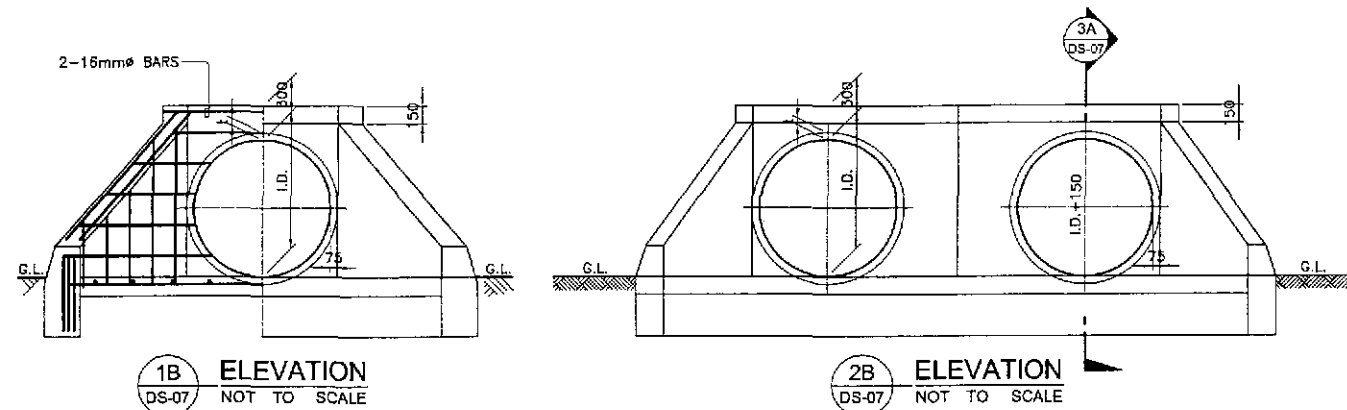
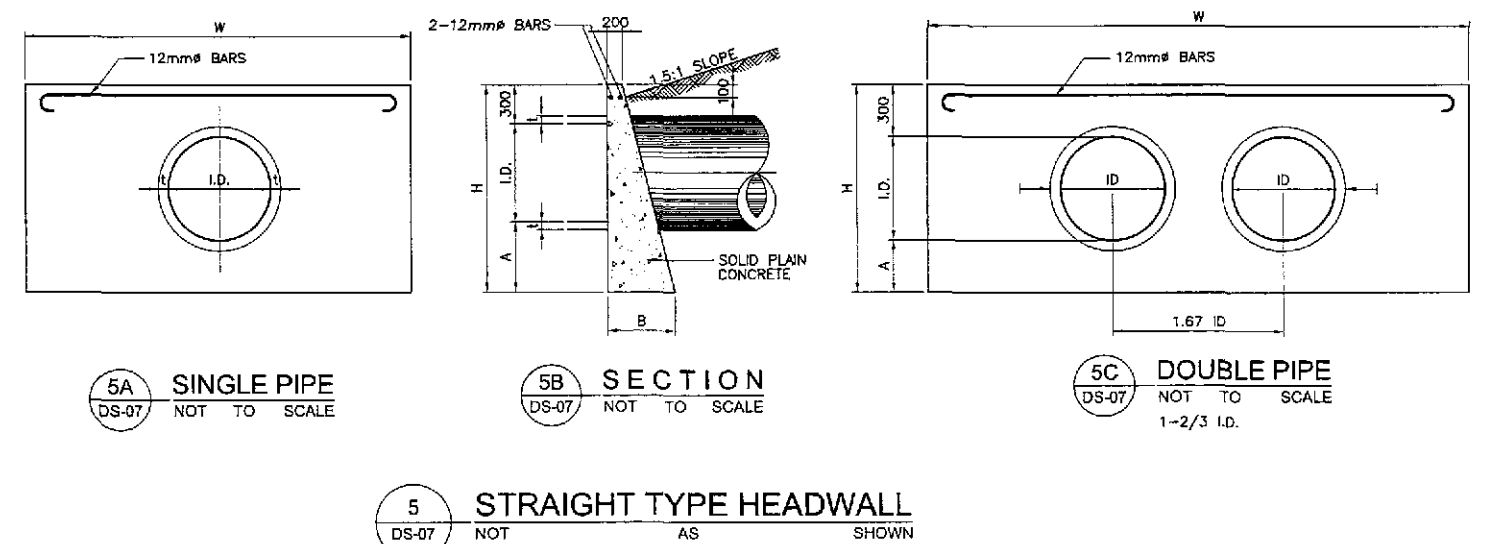
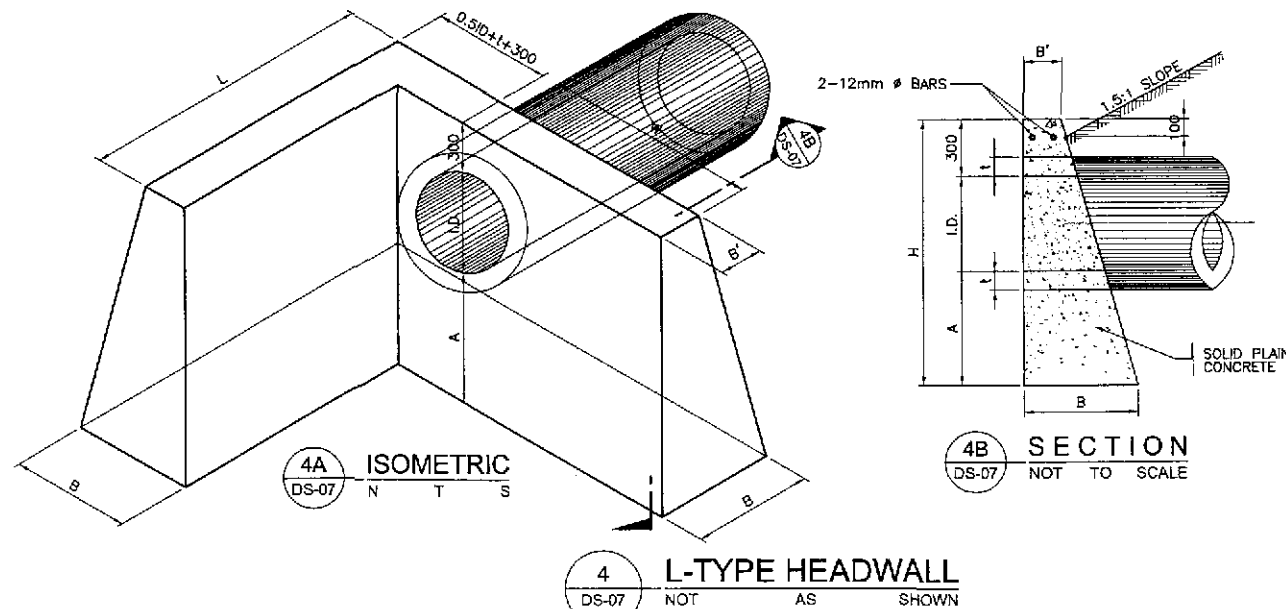


TABLE A (ONE FLARED TYPE HEADWALL 1.5:1)																	
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)				SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THICKNESS SHELL (t)	L	E	F	h	AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES		AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES		AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES	
								CONC. m ³	REINF. STEEL kg.			CONC. m ³	REINF. STEEL kg.			CONC. m ³	REINF. STEEL kg.
460	51	710	390	590	0	0.17	610	0.57	25.65	0.32	1380	0.83	37.35	0.51	2150	1.27	57.15
610	64	960	530	800	0	0.29	760	0.82	36.46	0.58	1780	1.16	48.39	0.87	2800	1.75	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	2.36	107.10	1.80	3020	3.05	137.25	2.70	4800	3.96	178.20
1220	108	2040	1130	1690	600	1.17	1370	2.66	110.27	2.34	3400	3.71	154.77	3.51	5360	5.36	241.34
1520	127	2540	1410	2110	600	1.81	1680	3.93	174.74	3.63	4229	5.47	228.18	5.43	6760	6.76	304.20

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

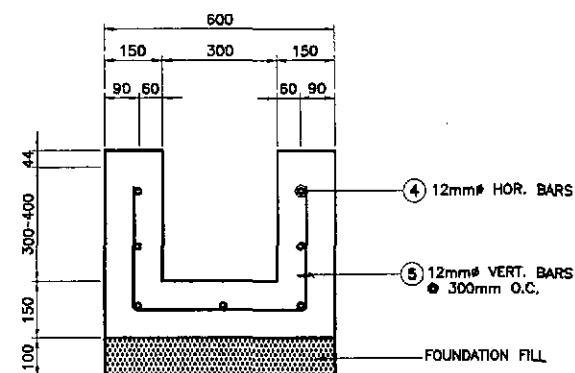
TABLE C (ONE L-TYPE HEADWALL)									
DIA. & THICKNESS (mm)		DIMENSIONS (mm)						SINGLE PIPE	
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	B'	H	W	L	CONCRETE m ³	REINF. STEEL kg.
460	51	310	350	200	1070	1070	1070	0.66	6
610	64	410	430	200	1320	1220	1220	1.06	8
910	86	610	610	200	1820	1820	1820	2.76	11
1070	95	710	780	300	2080	1970	VARIES	-	-
1220	108	810	870	300	2330	2120	VARIES	-	-
1520	127	1010	980	300	3030	2420	VARIES	-	-

TABLE C (ONE STRAIGHT TYPE HEADWALL)																
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)			SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.
							mm	mm			mm	mm				
460	51	310	350	1070	1500	0.15	0.46	3.48	2600	0.33	0.63	4.90	3400	0.45	0.80	5.97
610	64	410	430	1320	2400	0.29	0.87	4.55	3500	0.58	1.20	6.50	4600	0.87	1.51	8.45
910	86	610	600	1820	3800	0.65	2.28	6.68	5200	1.30	3.16	9.52	6800	1.95	3.85	12.35
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



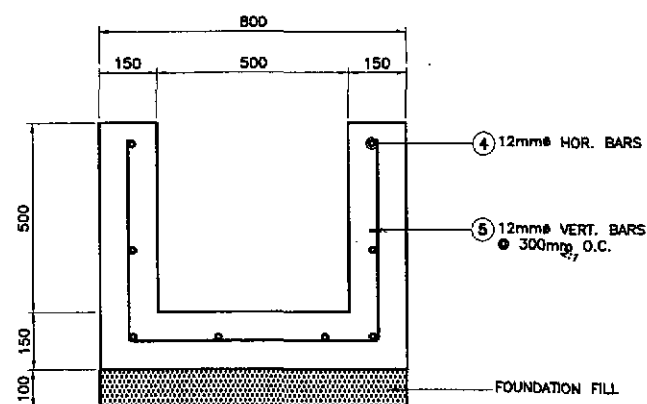
STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC

JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL		DATE: 10/10/02 DESIGNED: F. S. LARIA CHECKED: H. S. LARIA SUBMITTED: 10/10/02 TEAM LEADER		SIGNATURE: [Signature] PROJECT DIRECTOR		REVIEWED BY: DANILLO C. TRAJANO PROJECT DIRECTOR		RECOMMENDED BY: JOSEFINA M. ALAGAR CHIEF, HIGHWAYS DIVISION		RECOMMENDED BY: GILBERTO S. REYES OIC, DIRECTOR IV		RECOMMENDED BY: MANUEL M. BONDAN UNDERSECRETARY		RECOMMENDED BY: SIMON 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 II		SCALE: NOT TO SCALE FULL SIZE A1		SHEET CONTENTS: STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC		SHEET NO.: DS-07	
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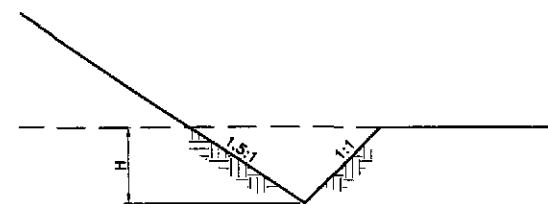
REINFORCED CONCRETE DITCH

1 TYPE BU
D-08 SCALE: 1:10

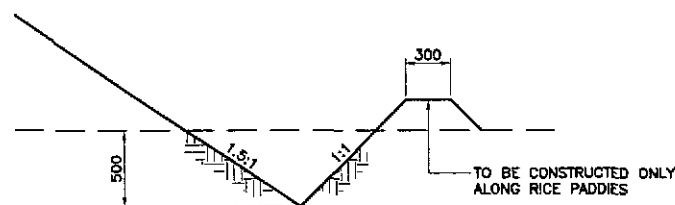


REINFORCED CONCRETE DITCH

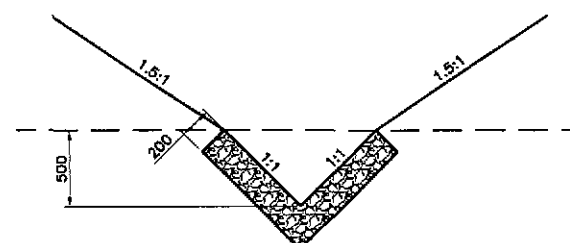
2 TYPE U
D-08 SCALE: 1:10



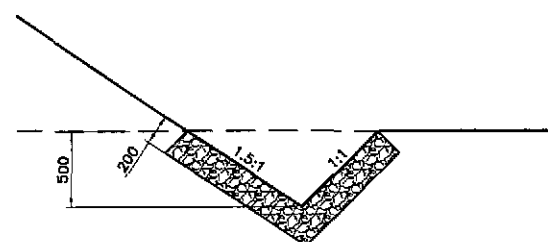
V-SHAPED UNLINED DITCH
TYPE E-4



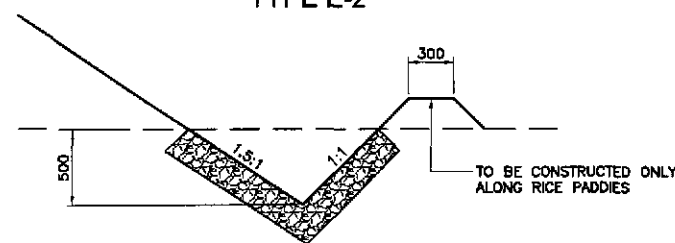
V-SHAPED UNLINED DITCH
TYPE E-3



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

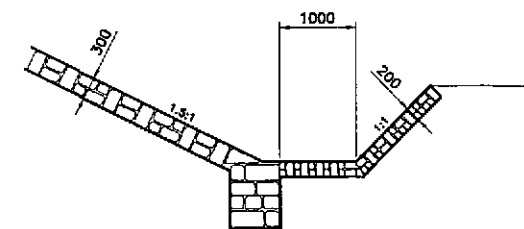


V-SHAPED LINED DITCH
TYPE E-2

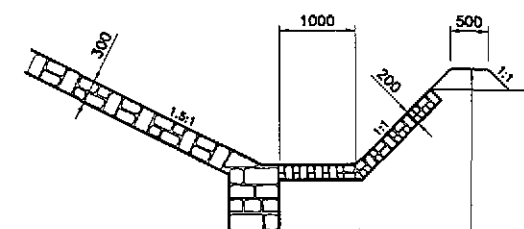


V-SHAPED LINED DITCH
TYPE E-1

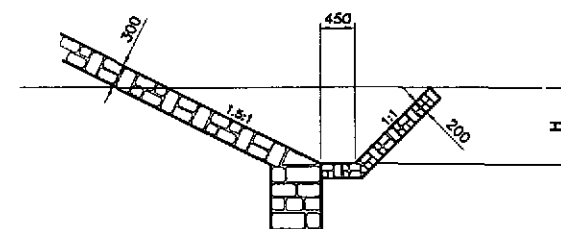
3 TYPE E
DS-08 SCALE: 1:25



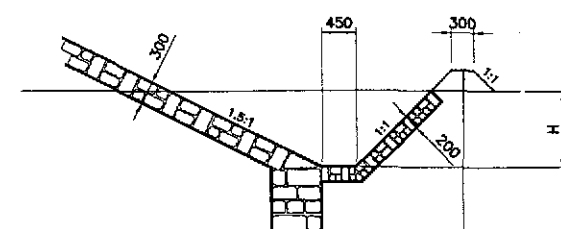
TYPE C-4



TYPE C-3

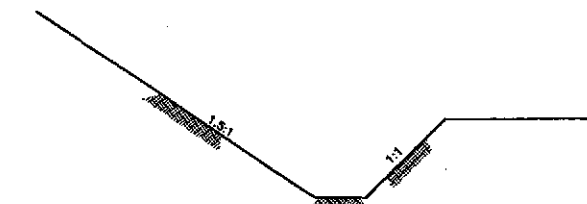


TYPE C-2

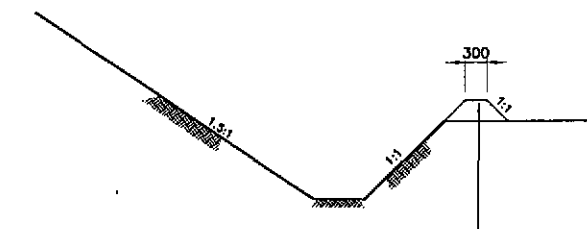


TYPE C-1

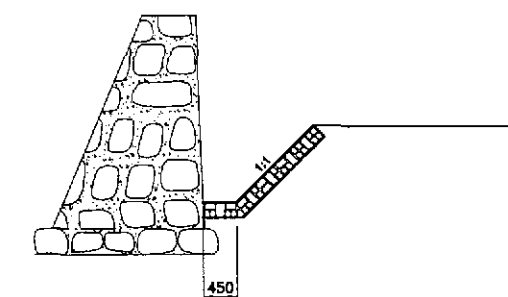
4 TYPE C
DS-08 NOT TO SCALE



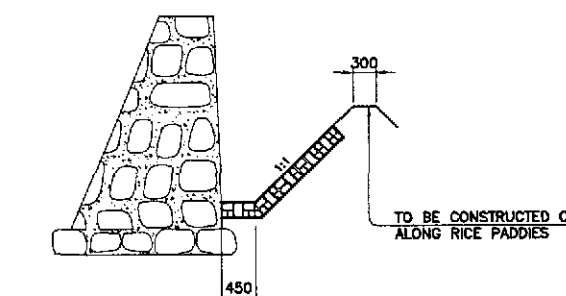
TYPE C-8



TYPE C-7



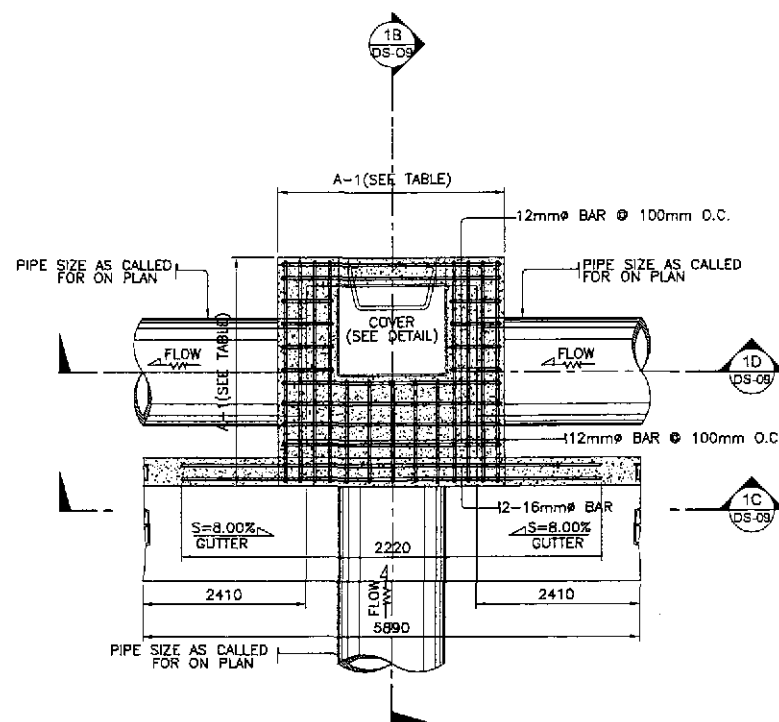
TYPE C-6



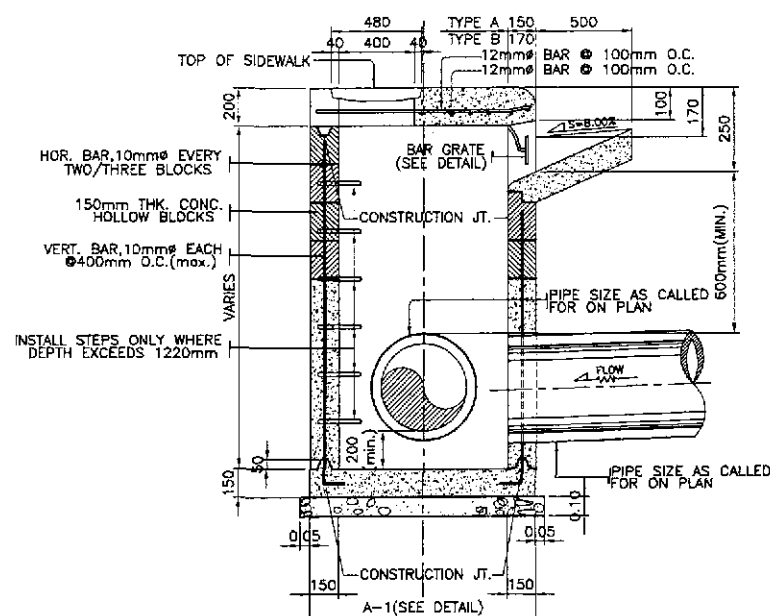
TYPE C-5

STANDARD DRAINAGE DITCHES

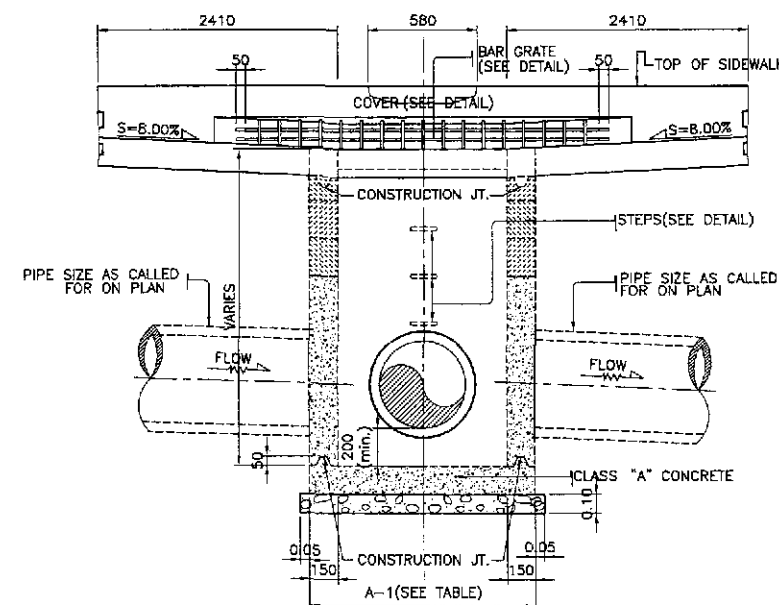
JICA JAPAN INTERNATIONAL COOPERATION AGENCY		DATE: 10/16/02 DESIGNED: [Signature] CHECKED: [Signature] SUBMITTED: 10/18/02	SIGNATURE: [Signature] PUBL - PMD Submitted By: [Signature] DANILLO C. TRAJANO Project Director	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN Reviewed By: [Signature] JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: [Signature] MANUEL M. BONDAN 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 II	SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : STANDARD DRAINAGE DITCHES	SHEET NO. : DS-08
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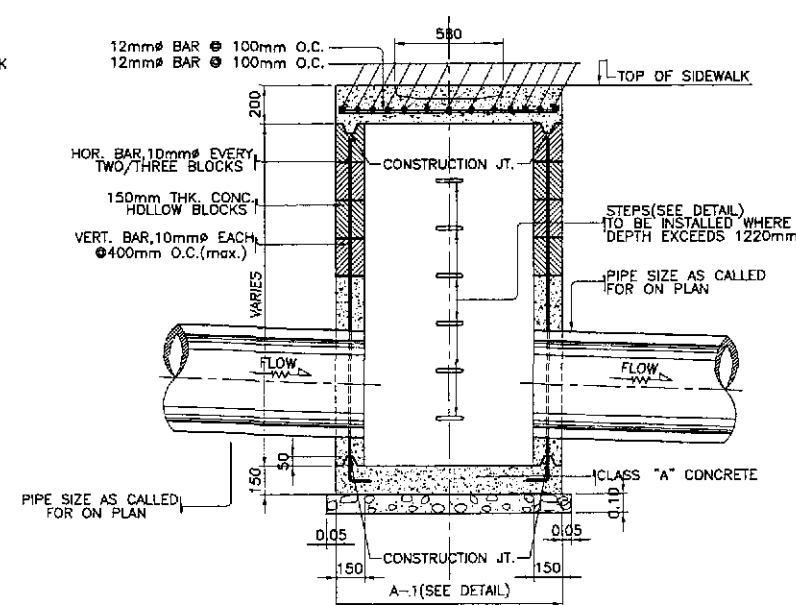
1A PLAN
DS-09



1B SECTION
DS-09

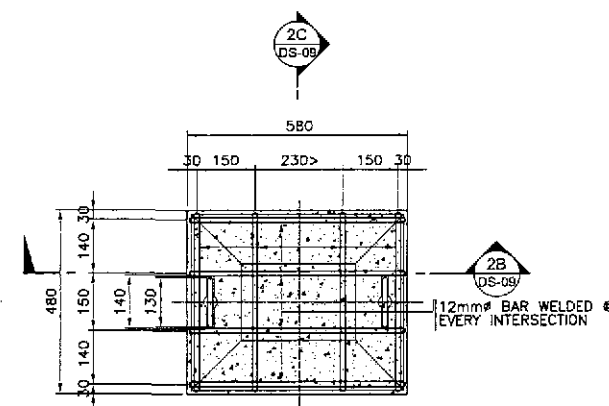


1C SECTION
DS-09

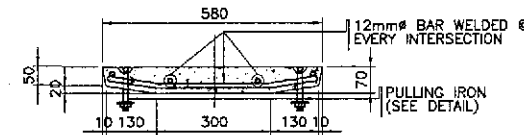


1D SECTION
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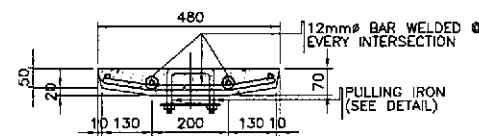
1 CURB INLET MANHOLE
DS-09 SCALE 1:20



2A PLAN
DS-09

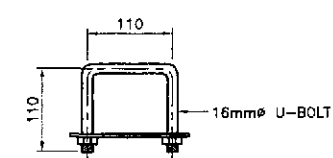


2B SECTION
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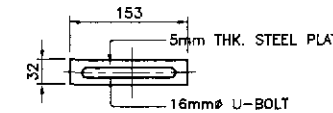


2C SECTION
DS-09

2 CONCRETE COVER DETAIL
DS-09 SCALE 1:10

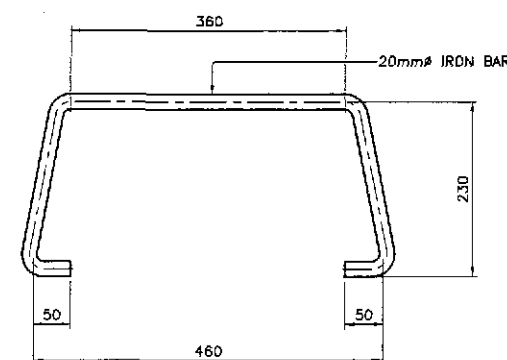


3A PLAN
DS-09

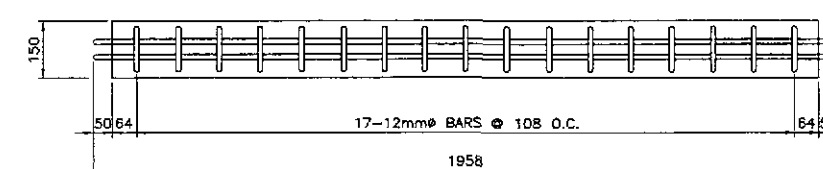


3B ELEVATION
DS-09

3 PULLING IRON DETAIL
DS-09 SCALE 1:5



4 STEP
DS-09 SCALE 1:5



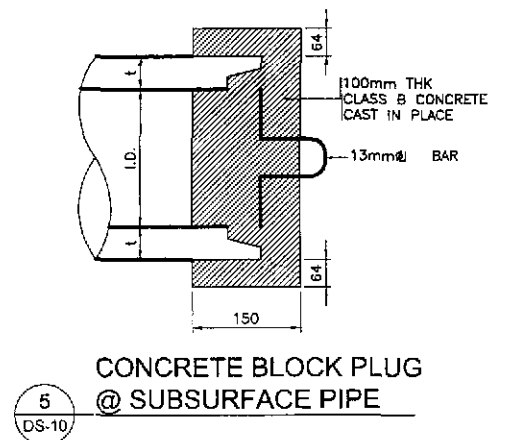
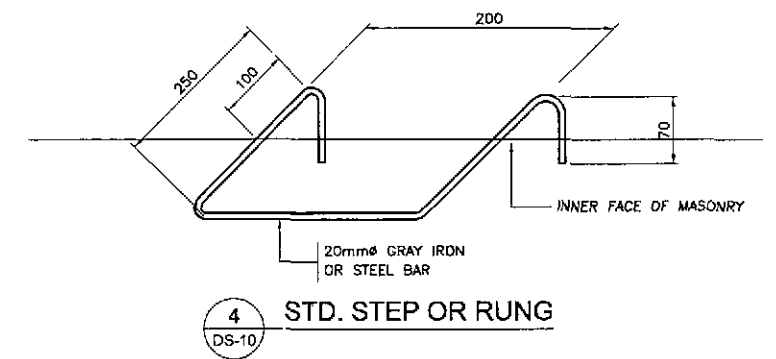
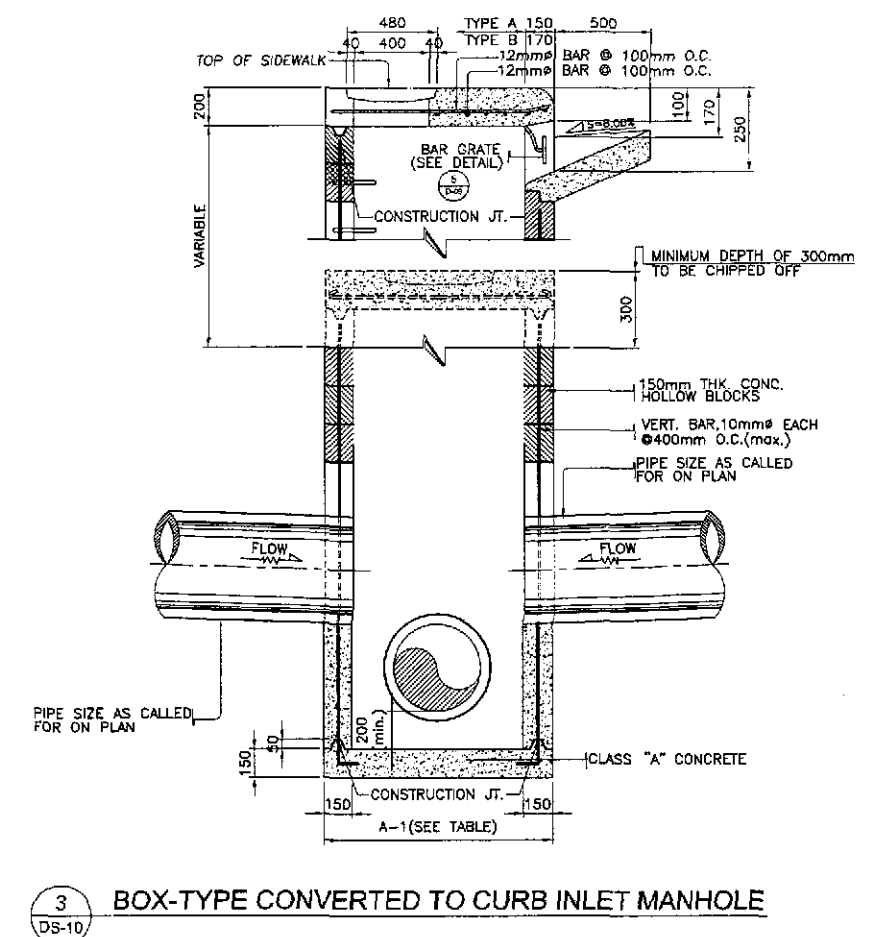
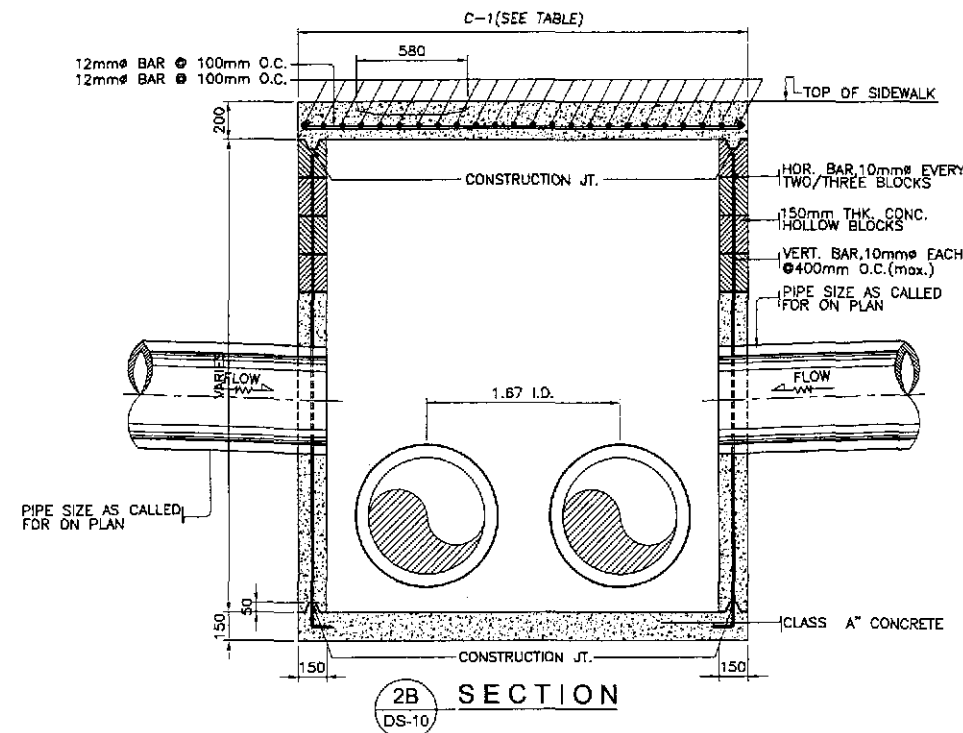
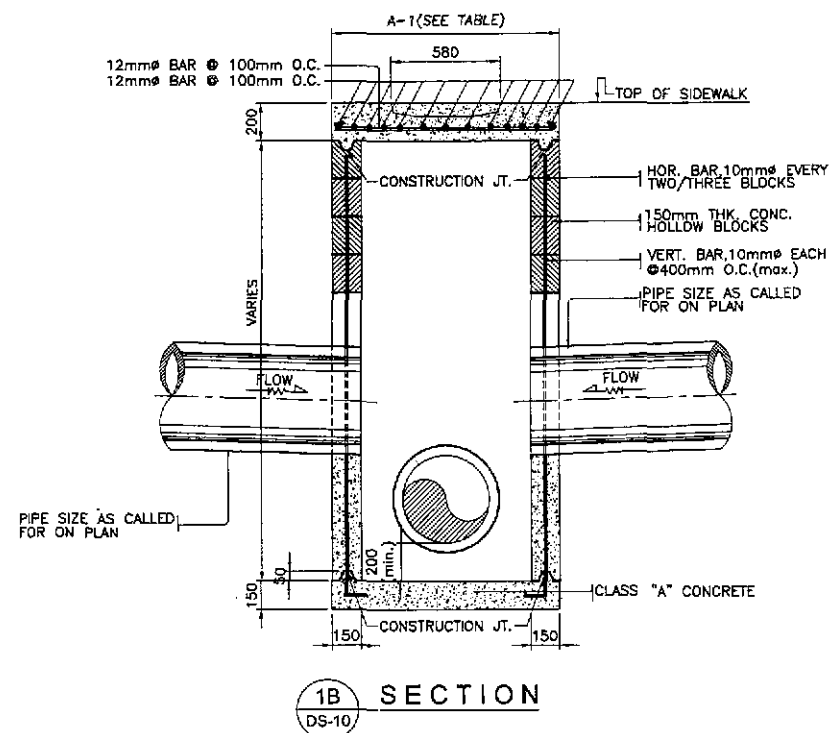
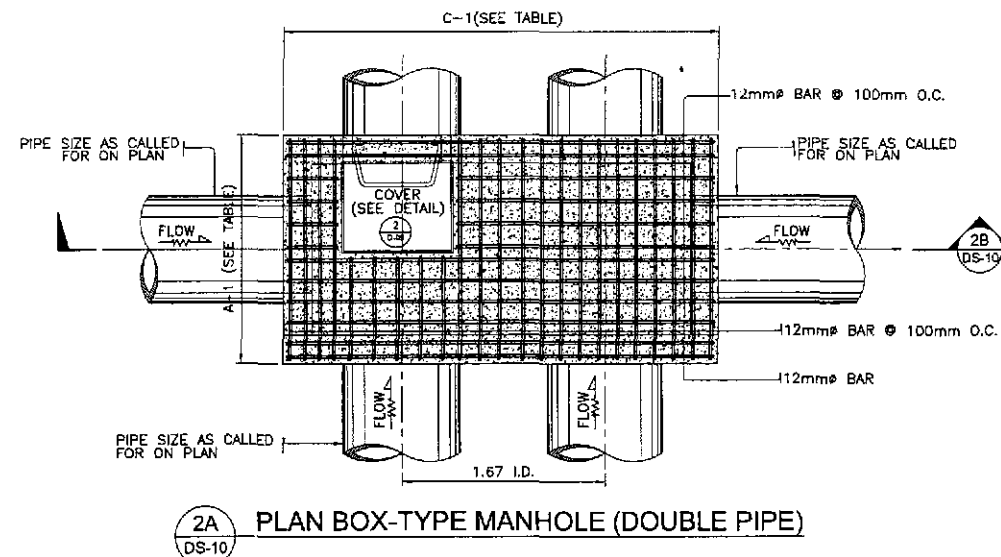
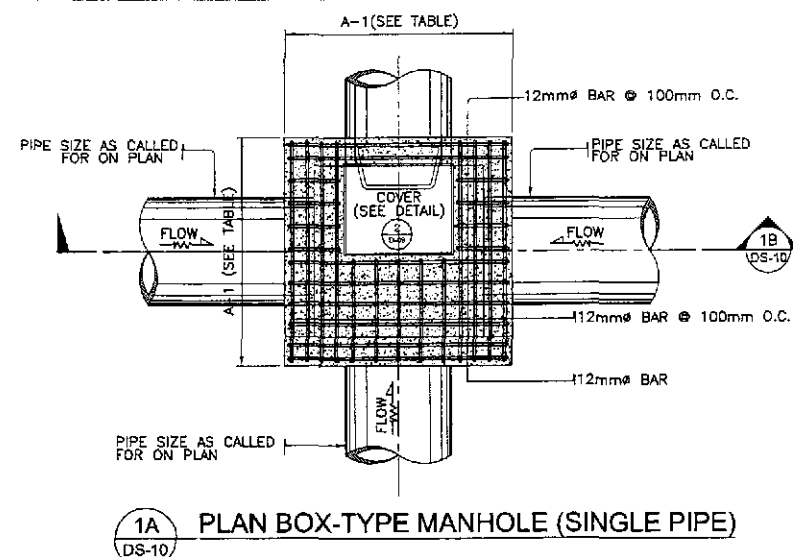
5 DETAIL OF BAR GRATE FOR OPENING OF CURB INLET
DS-09 SCALE 1:20

TABLE OF DIMENSION		
TYPE OF CIM	SIZE OF PIPE (mm)	A-1
T-1	300	1.12 M.
T-2	480	1.19 M.
T-3	610	1.37 M.
T-4	780	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 5.865MPa.
 - IN CONCRETE HOLLOW BLOCKS STRUCTURE, ALL HOLES SHALL BE FILLED WITH CEMENT MORTAR.
 - WHERE CONCRETE HOLLOW BLOCKS STRUCTURES ATTAIN A HEIGHT OF 1.20 METER, IT SHALL BE REINFORCED STEEL BARS SPACE AT NOT MORE THAN 0.60 M. O.C. BOTHWAYS.
 - INSTALL STEPS ONLY WHERE DEPTH EXCEEDS 1.22 METERS.

DETAILS OF COMBINATION CURB INLET MANHOLE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YEC YACHIYO ENGINEERING CO., LTD.		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 (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE II		SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : STANDARD COMBINATION CURB INLET MANHOLE	SHEET NO. : DS-09
DESIGNED	10/09/01	SIGNATURE	DATE	PROJECT	PROJECT DIRECTOR	REVIEWED BY	RECOMMENDED BY	APPROVED BY	APPROVED BY	APPROVED BY
CHECKED	10/10/01	SIGNATURE	DATE	PROJECT	PROJECT DIRECTOR	REVIEWED BY	RECOMMENDED BY	APPROVED BY	APPROVED BY	APPROVED BY
SUBMITTED	10/18/01	SIGNATURE	DATE	PROJECT	PROJECT DIRECTOR	REVIEWED BY	RECOMMENDED BY	APPROVED BY	APPROVED BY	APPROVED BY









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

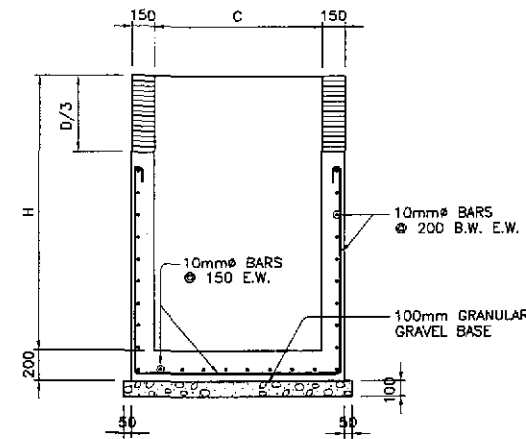
TYPE OF CIM	SIZE OF PIPE (mm)	A-1 (m)	C-1 (m)
T-1	300	1.12	1.92
T-2	450	1.19	2.26
T-3	610	1.37	2.69
T-4	760	1.54	3.11
T-5	910	1.73	3.55
T-6	1070	1.90	3.98
T-7	1220	2.08	4.42
T-8	1520	2.43	5.27

- NOTES:

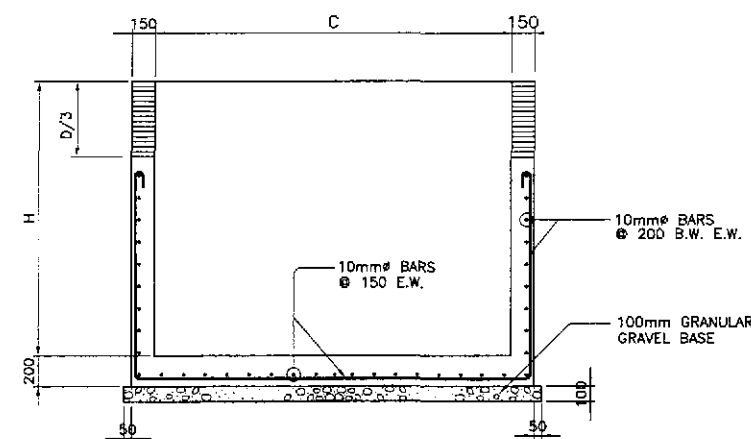
1. ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
2. PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
3. CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
4. CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS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

SPECIAL JUNCTION BOX MANHOLE

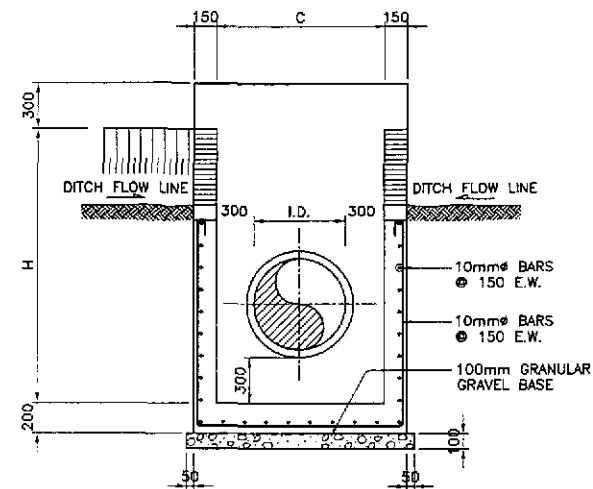
 JAPAN INTERNATIONAL COOPERATION AGENCY						REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Paridel, Cabanatuan and San Jose Bypasses)		SCALE : AS SHOWN	SHEET CONTENTS : SPECIAL JUNCTION BOX MANHOLE	SHEET NO. : DS-10
DESIGNED 10/09/02 	SIGNATURE F. S. SISON	DATE 10/09/02		DATE 10/09/02		DATE 10/09/02		DATE 10/09/02		DATE 10/09/02		
CHECKED 10/16/02 	SIGNATURE H. SISON	DATE 10/16/02		DATE 10/16/02		DATE 10/16/02		DATE 10/16/02		DATE 10/16/02		
SUBMITTED 10/18/02 	SIGNATURE M. B. SISON	DATE 10/18/02		DATE 10/18/02		DATE 10/18/02		DATE 10/18/02		DATE 10/18/02		
JICA JAPAN INTERNATIONAL COOPERATION AGENCY		PHIL - PMO 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)		SCALE : AS SHOWN	SHEET CONTENTS : SPECIAL JUNCTION BOX MANHOLE	SHEET NO. : DS-10		
KATAHIRA & ENGINEERS INTERNATIONAL		YACHIYO ENGINEERING CO., LTD.		Submitted By: DANILO C. TRAJANO Chief, Highways Division		Reviewed By: JOSEFINA M. ALAGAR OIC, Director IV		Recommended By: GILBERTO S. REYES OIC, Director IV		Approved By: MANUEL M. BONDAN Undersecretary		
YACHIYO ENGINEERING CO., LTD.		Submitted By: DANILO C. TRAJANO Chief, Highways Division		Reviewed By: JOSEFINA M. ALAGAR OIC, Director IV		Recommended By: GILBERTO S. REYES OIC, Director IV		Approved By: MANUEL M. BONDAN Undersecretary		Approved By: SIMEON A. DATUMANONG Secretary		
CABANATUAN BYPASS - CONTRACT PACKAGE II		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Paridel, Cabanatuan and San Jose Bypasses)		SCALE : FULL SIZE A1	SHEET CONTENTS : SPECIAL JUNCTION BOX MANHOLE	SHEET NO. : DS-10						



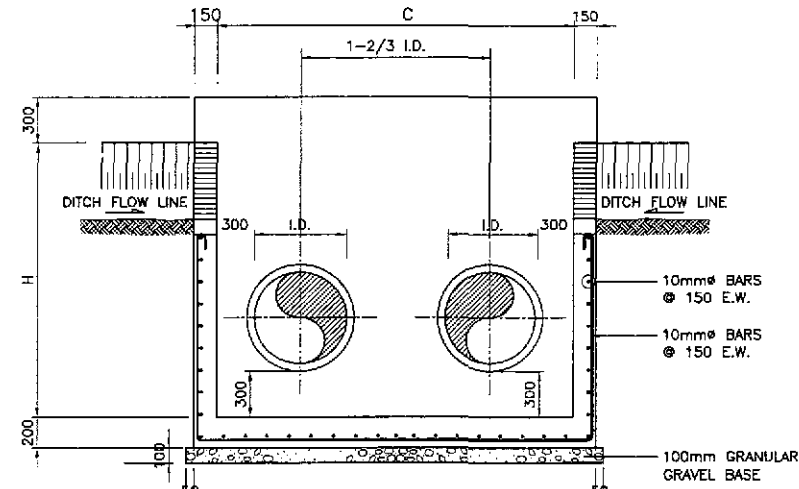
1C SECTION
DS-11



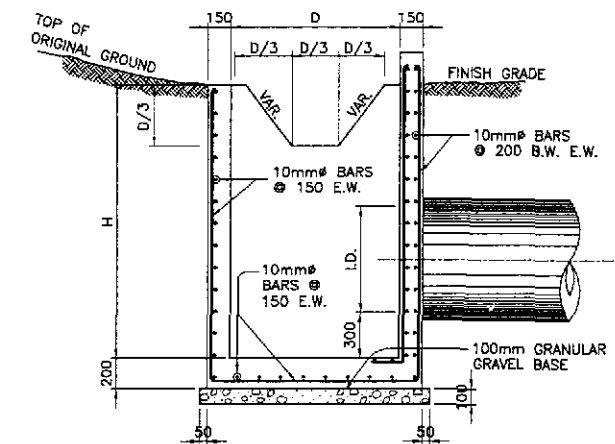
2C SECTION
DS-11



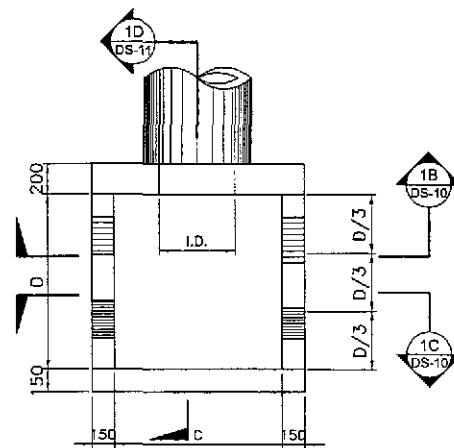
1B SECTION
DS-11



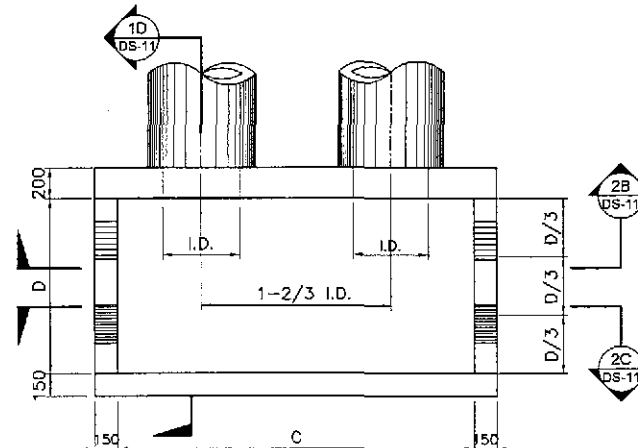
2B SECTION
DS-11



1C SECTION
DS-11



1A PLAN
DS-11



2A PLAN
DS-11

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

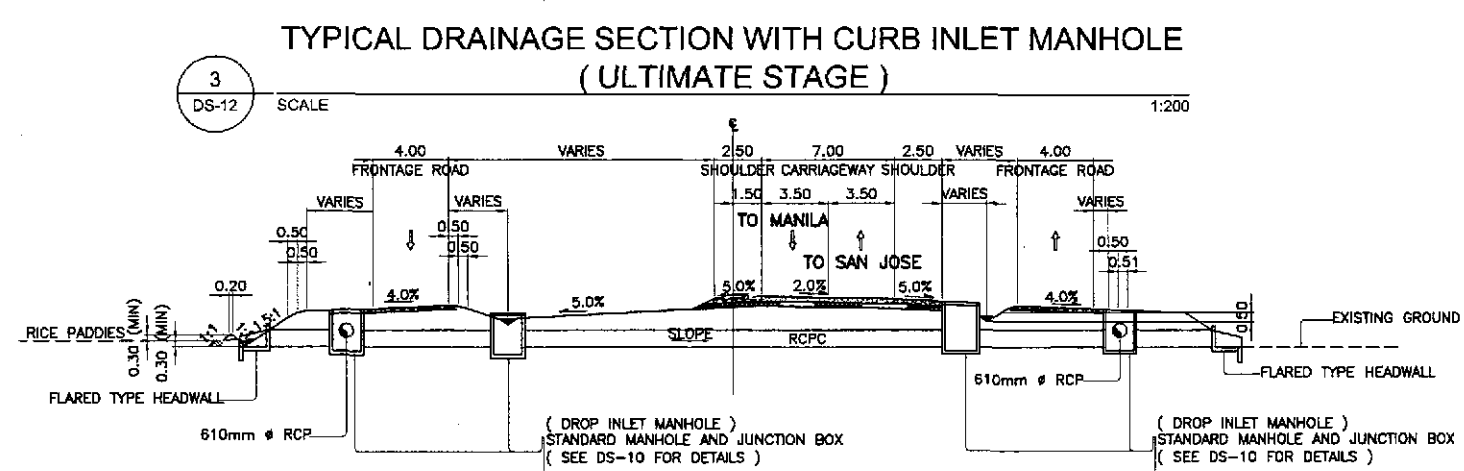
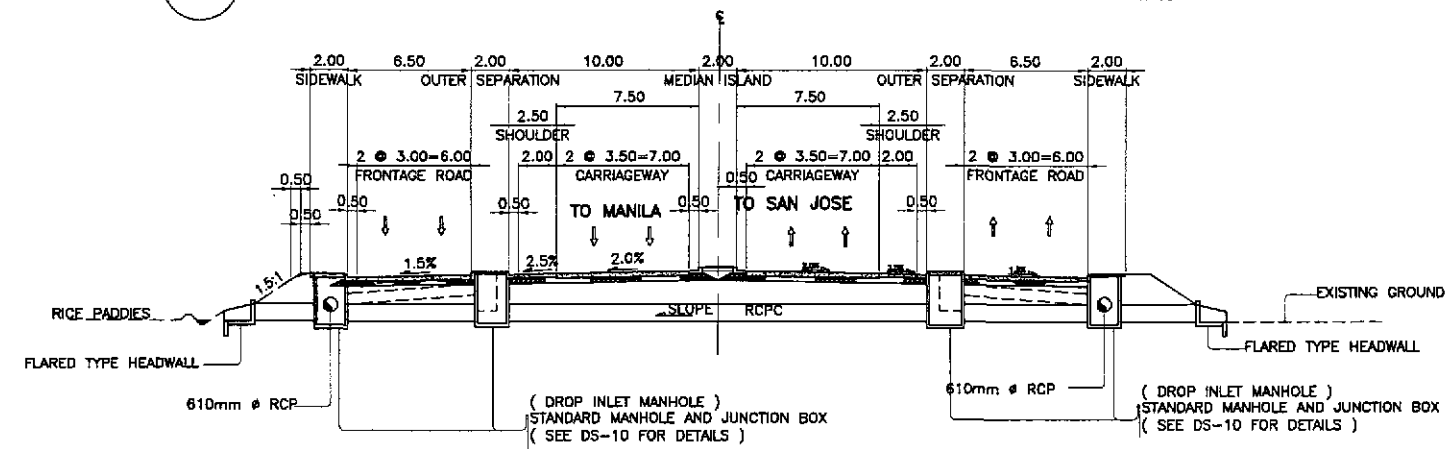
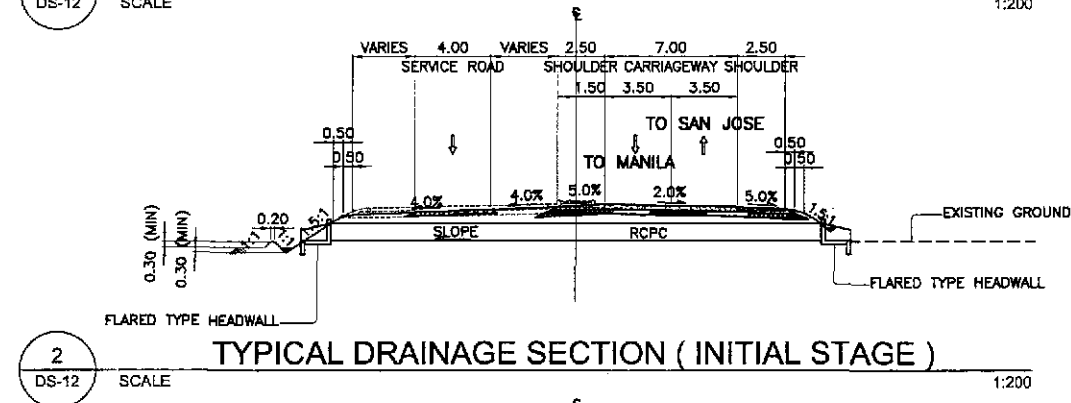
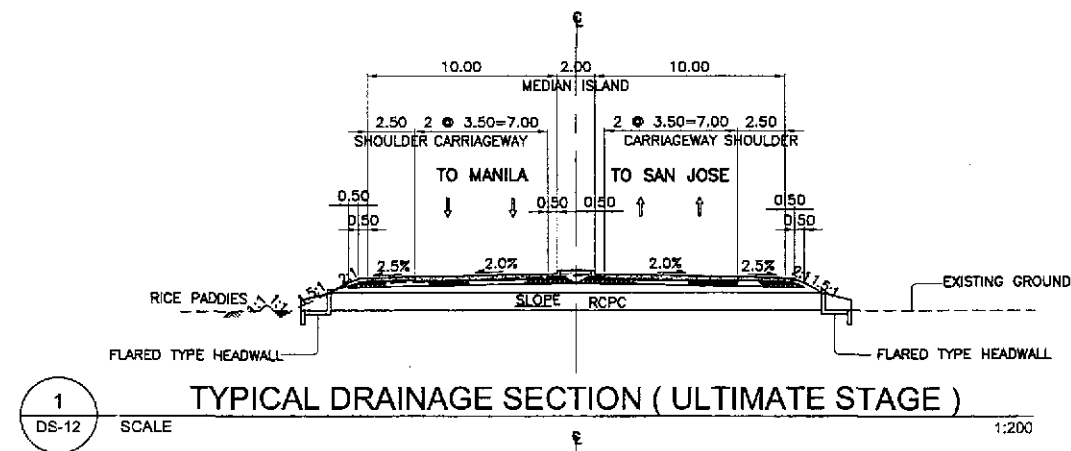
2 CONCRETE CATCH BASIN (DOUBLE PIPE)
DS-11 SCALE 1:25

REINFORCED CONCRETE CATCH BASIN DIMENSION FOR RCPC

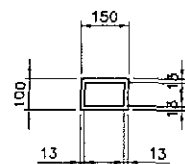
PIPE DIAMETER (mm)		610	910	1070	1220	1520
COMMON TO ALL NUMBER OF BARRELS	H	1.910	2.210	2.370	2.520	2.820
	D	1.200	1.500	1.650	1.800	2.100
SINGLE	C	1.210	1.510	1.670	1.820	2.120
DOUBLE	C	2.230	3.030	3.460	3.860	4.660
TRIPLE	C	3.250	4.550	5.240	5.890	7.120

DETAILS OF REINFORCED CONCRETE CATCH BASIN FOR RCPC

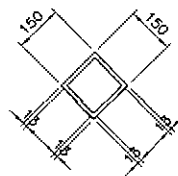
JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL yeo YACHIYO ENGINEERING CO., LTD.		DATE: 10/09/01 DESIGNED: [Signature] CHECKED: 10/10/01 SUBMITTED: 10/18/01 TEAM LEADER: [Signature] PROJECT DIRECTOR: DANILLO C. TRAJANO CHIEF, HIGHWAYS DIVISION: JOSEFINA M. ALAGAR OIC, DIRECTOR IV: GILBERTO S. REYES UNDERSECRETARY: MANUEL M. BONDAN SECRETARY: SIMEON A. DATUMANONG				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 II		SCALE: 1:25 FULL SIZE A1	SHEET CONTENTS: STANDARD REINFORCED CONCRETE CATCH BASIN FOR RCPC	SHEET NO.: DS-11
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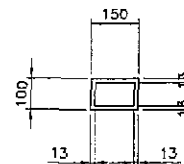
 JAPAN INTERNATIONAL COOPERATION AGENCY		 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : TYPICAL DRAINAGE SECTIONS WITH MANHOLE (INITIAL and ULTIMATE STAGE)	SHEET NO. : DS-12
DESIGNED 10/14/04 CHECKED 10/14/04 SUBMITTED 10/18/04	DATE 10/14/04 10/14/04 10/18/04	SIGNATURE [Signature] [Signature] [Signature]	SUBMITTED BY [Signature] [Signature] [Signature]	BUREAU OF DESIGN P.J.H.L. - PMO Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES OC, Director IV Recommended By: MANUEL M. BONGAN Undersecretary Approved By: SIMEON A. DATUMANONG Secretary	CABANATUAN BYPASS - CONTRACT PACKAGE II		



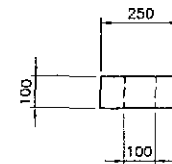
PLAN (POST)



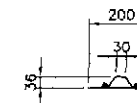
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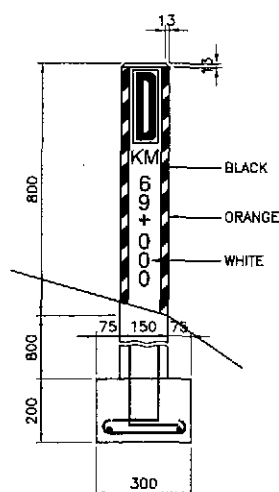
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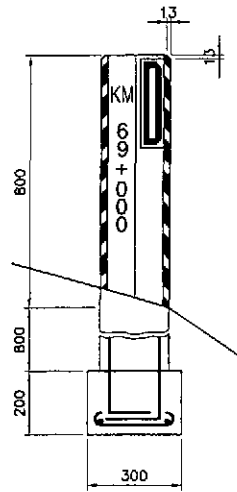
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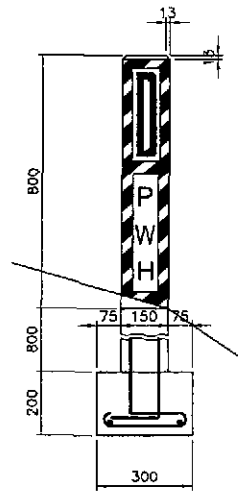
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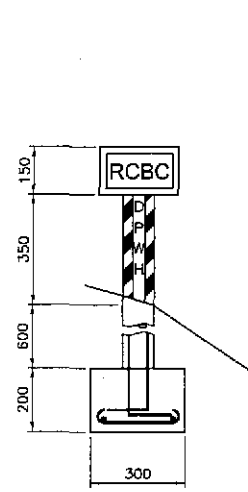
ELEVATION
CONCRETE MARKER
TYPE I-a



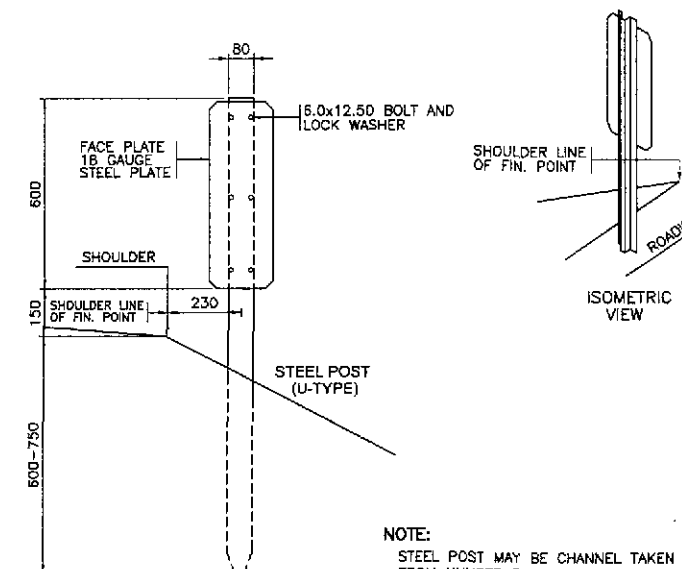
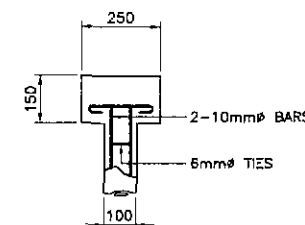
ELEVATION
CONCRETE MARKER
TYPE I-b



ELEVATION
CONCRETE MARKER
TYPE I-c

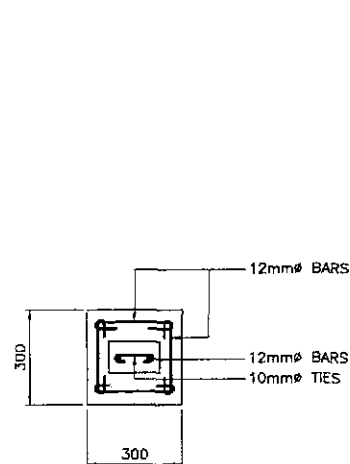


ELEVATION
CONCRETE MARKER
TYPE I-d

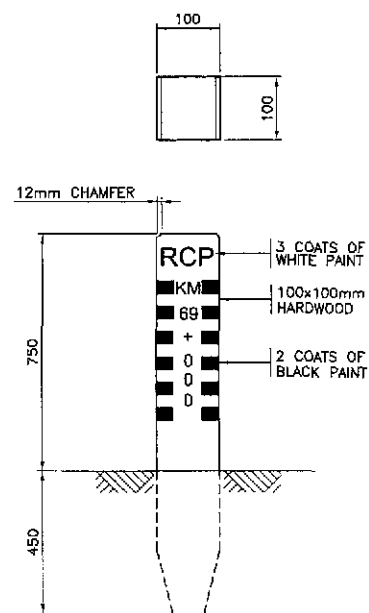


ELEVATION
STEEL MARKER
TYPE II

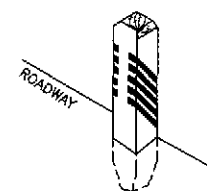
NOTE:
STEEL POST MAY BE CHANNEL TAKEN FROM UNUSED BAILEY PANELS MARKINGS AND PAINTINGS SAME AS FOR TYPE I AND TYPE II AS SHOWN.



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

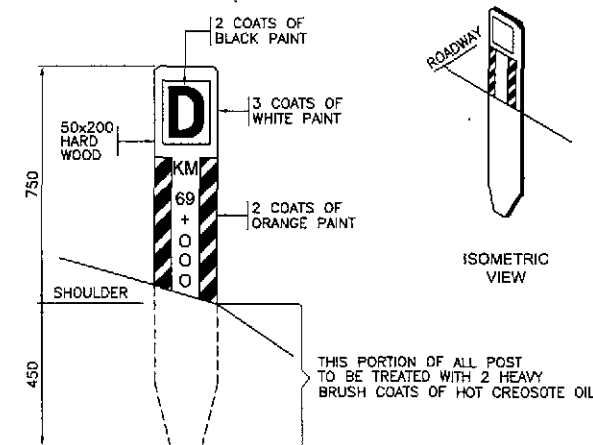


ELEVATION
WOODEN MARKER
TYPE III-a

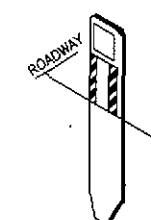


NOTE:
FACING ROADWAY STAKED AT CENTER LINE OF DRAINAGE 254mm AWAY FROM SHOULDER LINE OF FINAL POINT.

ISOMETRIC VIEW



ELEVATION
WOODEN MARKER
TYPE III-b



ISOMETRIC VIEW

GENERAL NOTES

CONCRETE:
ALL CONCRETE TO BE CLASS "A" AND EXPOSED TOP TO BE CHAMFERED 13.0mm. ALL CONCRETE SHALL POURED IN THE DRY.

REINFORCING STEEL:
UNLESS OTHERWISE SHOWN ALL BAR SPACINGS ARE TO THE CENTER OF BARS AND THE MINIMUM COVERING OF BARS MEASURED FROM THE SURFACE OF THE CONCRETE TO THE FACE OF ANY BARS SHALL BE 50.0mm.

MARKINGS:
ALL RECESSED LETTERS SHALL BE CAST INTO CONCRETE AND ALL NUMBERS SHALL BE PAINTED AS SHOWN USING LETTER AND NUMBER FORM.

PAINTINGS:
ALL CONCRETE POSTS, TWO COATS OF WHITE PAINT. ALL RECESSED LETTERS ONE (1) COAT OF BLACK PAINT AND ALL BACKGROUND STRIPE SHALL BE ONE (1) COAT OF BLACK/ORANGE GLOSSED PAINT. ALL STRUCTURAL PLATES TWO COATS WHITE SHARP PAINT.

LOCATION:
DRAINAGE CULVERT MARKER TO BE SET AT SHOULDER LINE AND AT CENTER LINE OF CULVERT FACING TRAFFIC/ROADWAY AS SHOWN AND AS STAKED BY ENGINEERS.

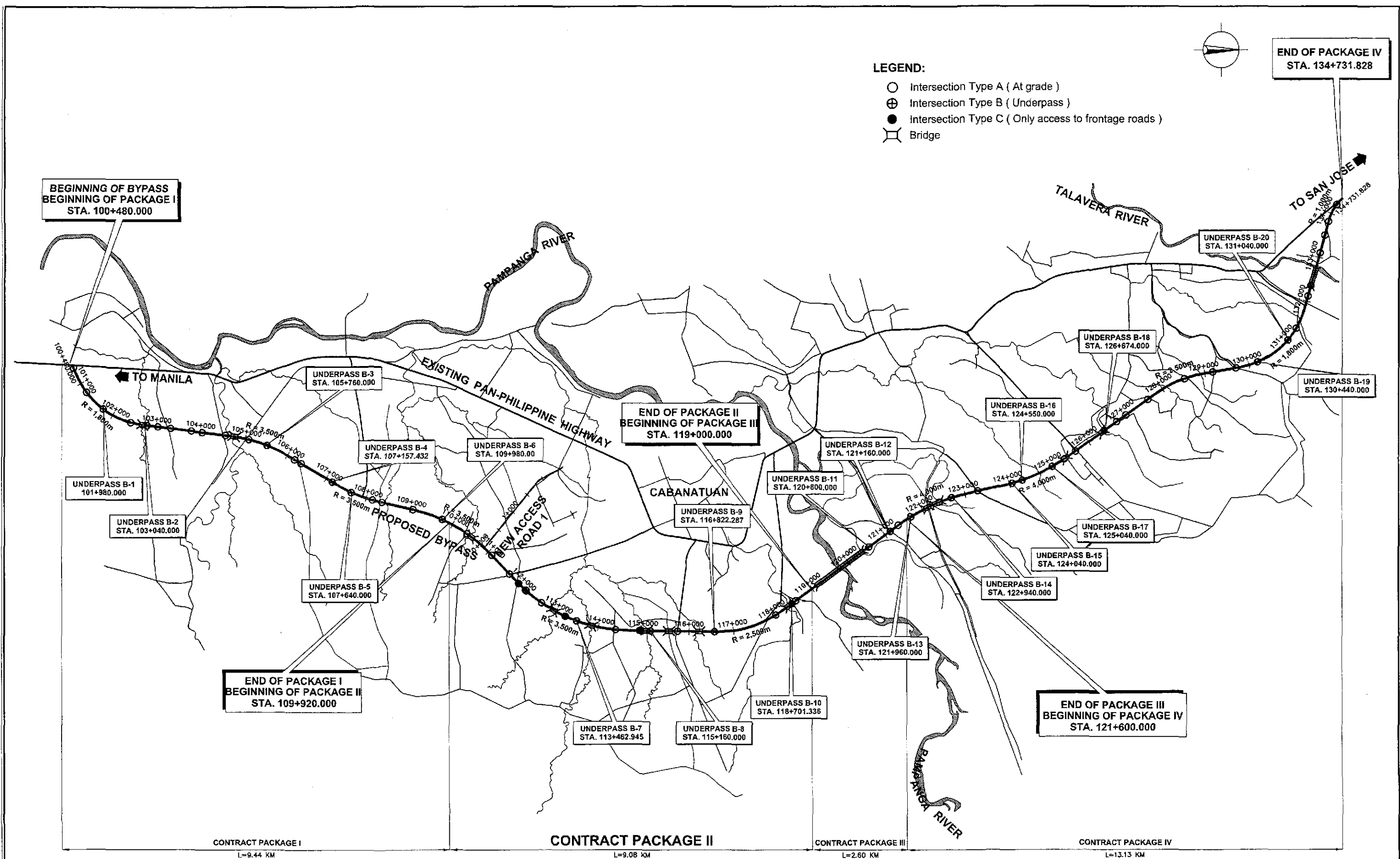
DIMENSION:
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE STATED.

A STANDARD MAINTENANCE MARKERS

DS-13 NOT TO SCALE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : NOT TO SCALE	SHEET CONTENTS : STANDARD MAINTENANCE MARKERS	SHEET NO. : DS-13
DESIGNED 10/6/62 10/18/62 10/18/62	CHECKED 10/18/62 10/18/62	SUBMITTED 10/18/62 10/18/62	P.M.L. - P.M.D. Submitted By: DANILO C. TRAJANO Project Director	BUREAU OF DESIGN Reviewed By: JOSEFINA M. ALACAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES D.C., Director IV MANUEL M. BONOAN Undersecretary SIMEON A. DATUMANONG Secretary	CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1	

UNDERPASS CROSSING (BOX CULVERT)



A
UP-01

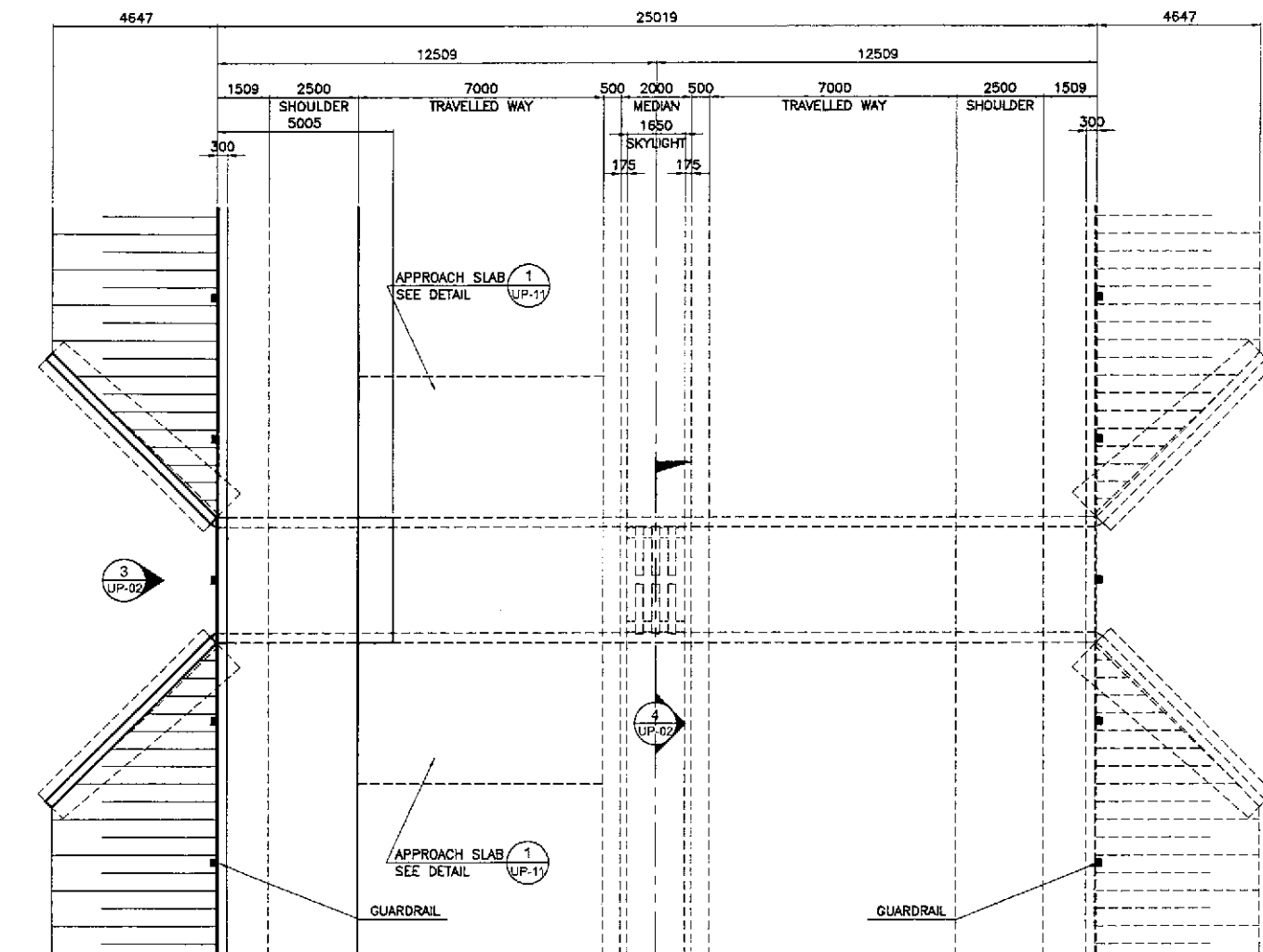
SITE DEVELOPMENT PLAN - UNDERPASSES ALONG BYPASS

SCALE

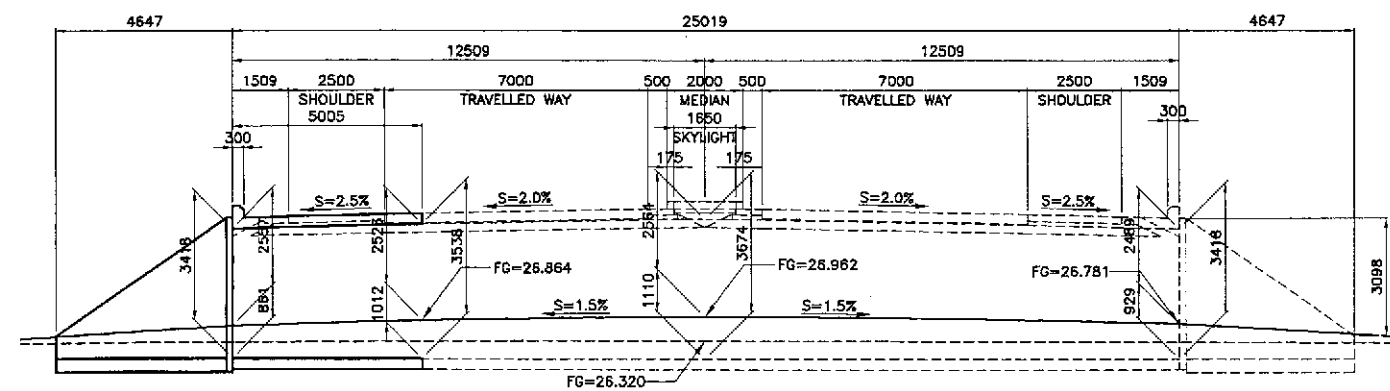
1:40,000

JICA JAPAN INTERNATIONAL COOPERATION AGENCY		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	SCALE : 1:40,000 FULL SIZE A1	SHEET CONTENTS : SITE DEVELOPMENT PLAN UNDERPASSES ALONG BYPASS	SHEET NO. : UP-01
DESIGNED 10/09/02 CHECKED 10/16/02 SUBMITTED 10/18/02	DATE 10/09/02 10/16/02 10/18/02	SIGNATURE Submitted By: Danilo C. Trajano Project Director	REVIEWED BY: JOSEFINA M. ALAGAR Chief, Highways Division	RECOMMENDED BY: GILBERTO S. REYES OIC, Director IV	OFFICE OF THE SECRETARY Recommended By: (See cover sheet for Signature) MANUEL M. BONDAN Undersecretary	Approved By: (See cover sheet for Signature/Approval) SIMEON A. DATUMANONG Secretary	CABANATUAN BYPASS - CONTRACT PACKAGE II		

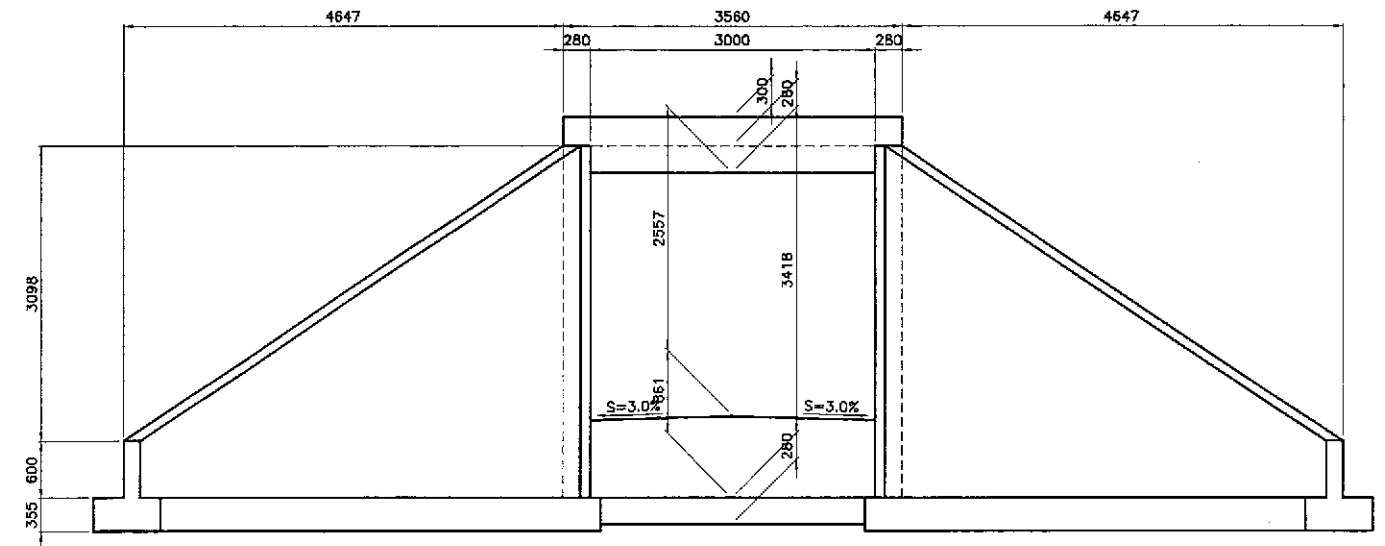
KATAHIRA & ENGINEERS
 YACHIYO ENGINEERING CO., LTD.



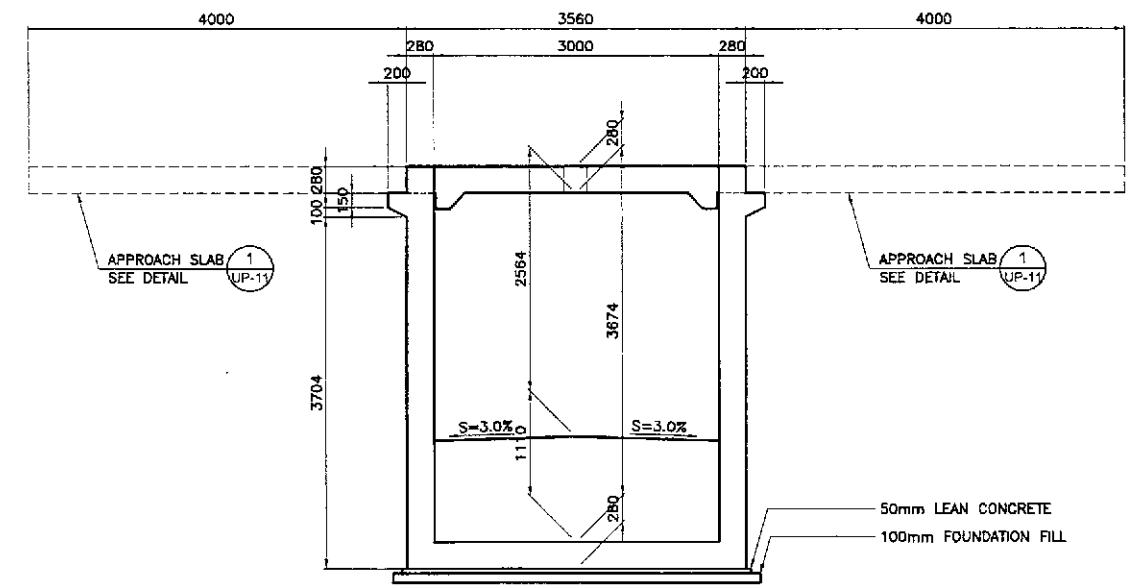
1 GENERAL PLAN
UP-02 SCALE 1:100



2 GENERAL ELEVATION
UP-02 SCALE 1:100

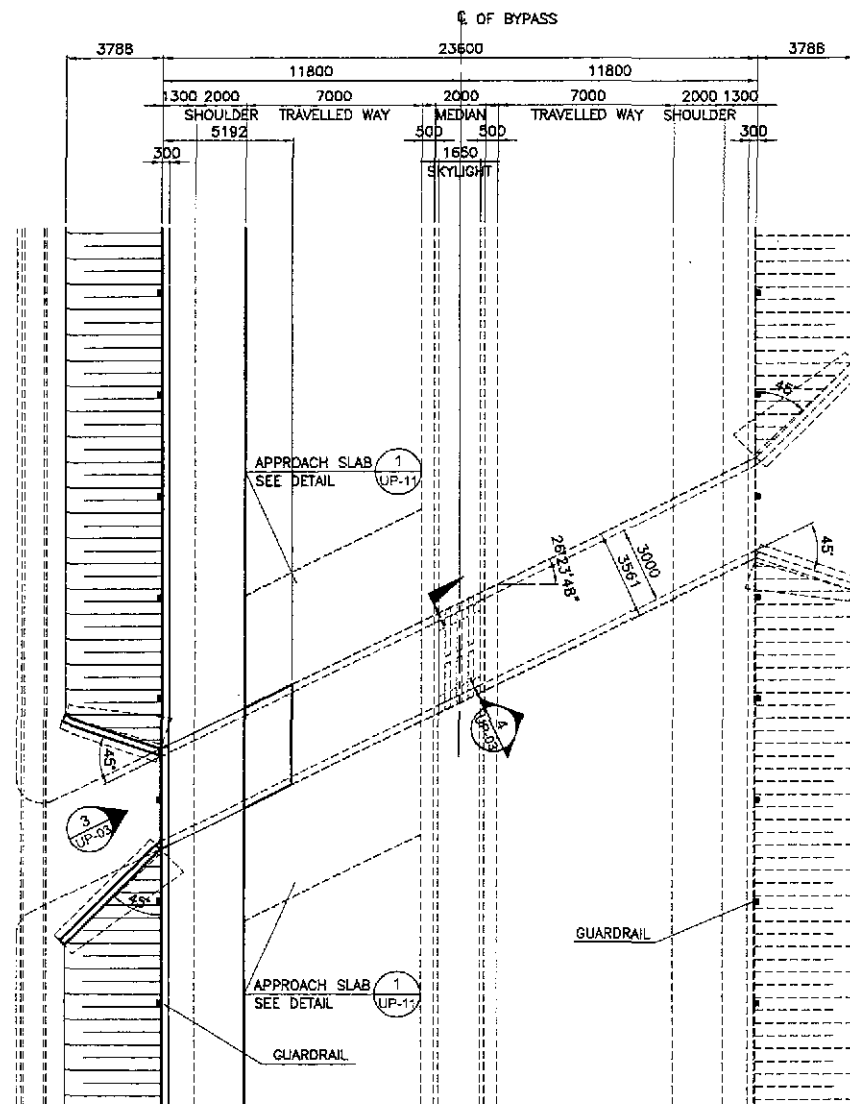


3 ELEVATION
UP-02 SCALE 1:40

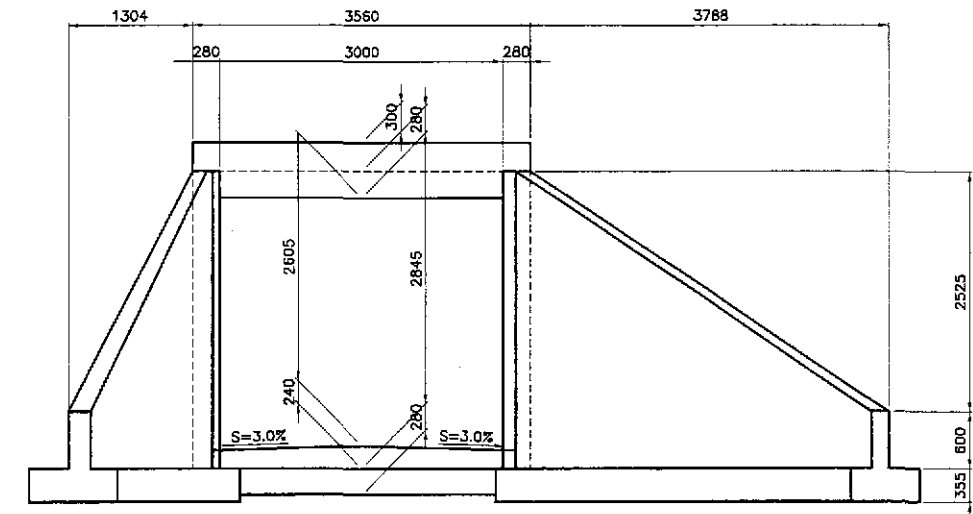


4 SECTION
UP-02 SCALE 1:40

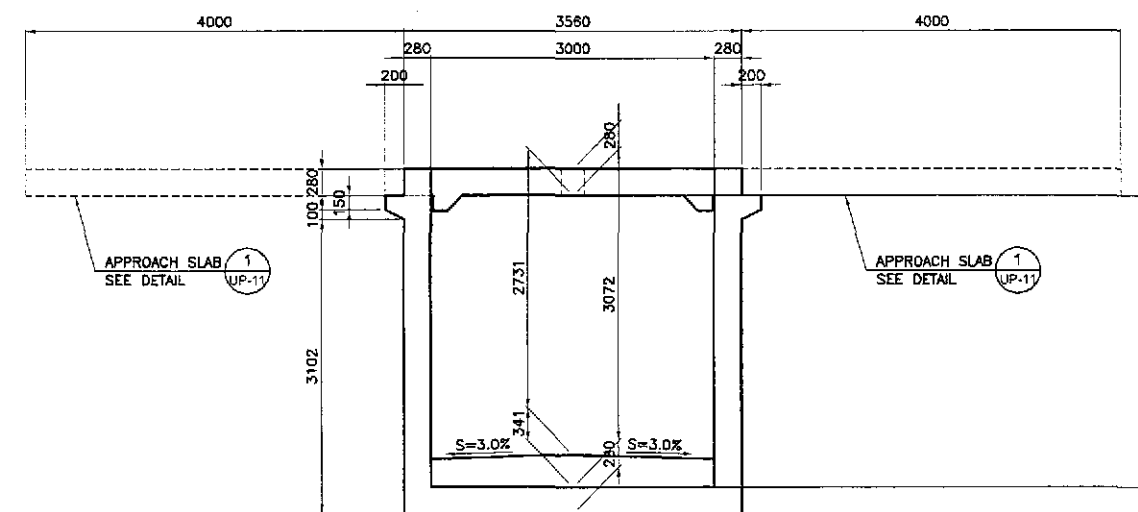
JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS YEO YACHIO ENGINEERING CO., LTD.		DATE: 10/09/02 DESIGNED: [Signature] CHECKED: 10/10/02 SUBMITTED: 10/18/02	SIGNATURE: [Signature] TEAM LEADER: [Signature]	PROJECT AND LOCATION: THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE II	SCALE: AS SHOWN FULL SIZE A1	SHEET CONTENTS: BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-6 (STA. 109+980.00)	SHEET NO.: UP-02
REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN OFFICE OF THE SECRETARY		SUBMITTED BY: DANILLO 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	APPROVED BY: SIMEON A. DATUMANONG Secretary	



1 GENERAL PLAN
UP-03 SCALE 1:150
















3 ELEVATION
UP-03 SCALE 1:40

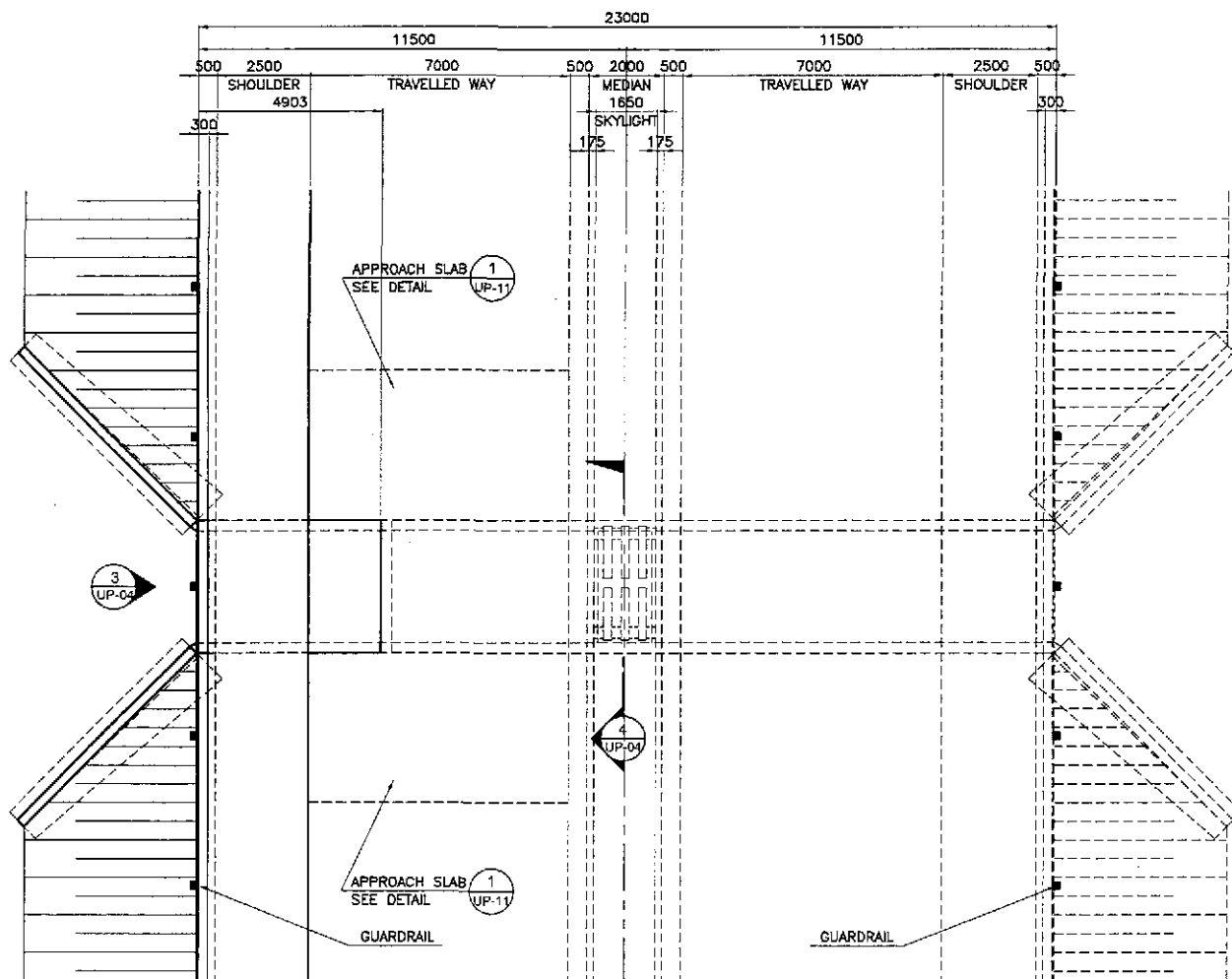


4 SECTION
UP-03 SCALE 1:40

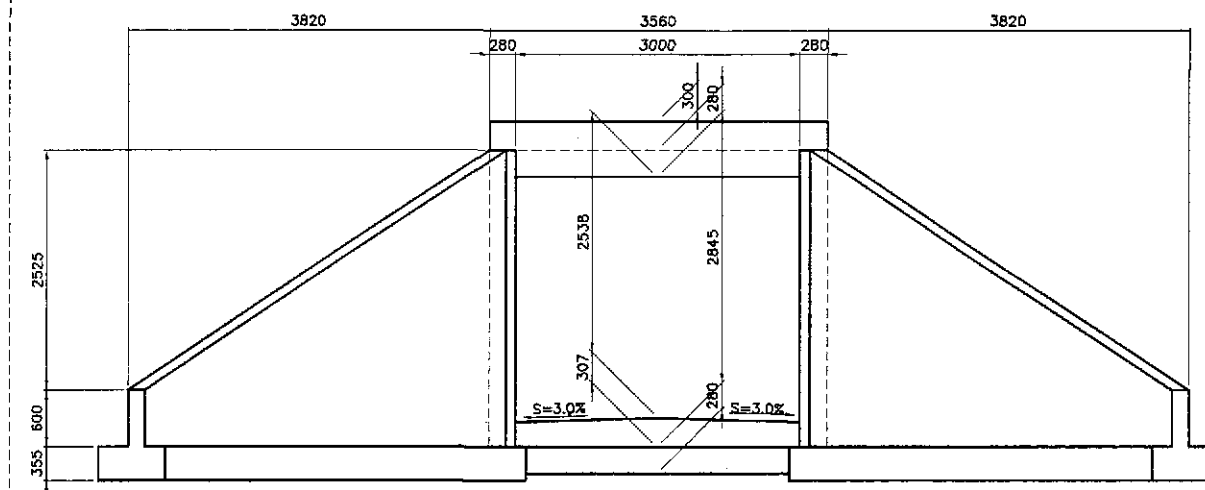
NOTE:
ALL THE DIMENSIONS ARE BASE ON LENGTH OF SKEW.

2 GENERAL ELEVATION
UP-03 SCALE 1:150

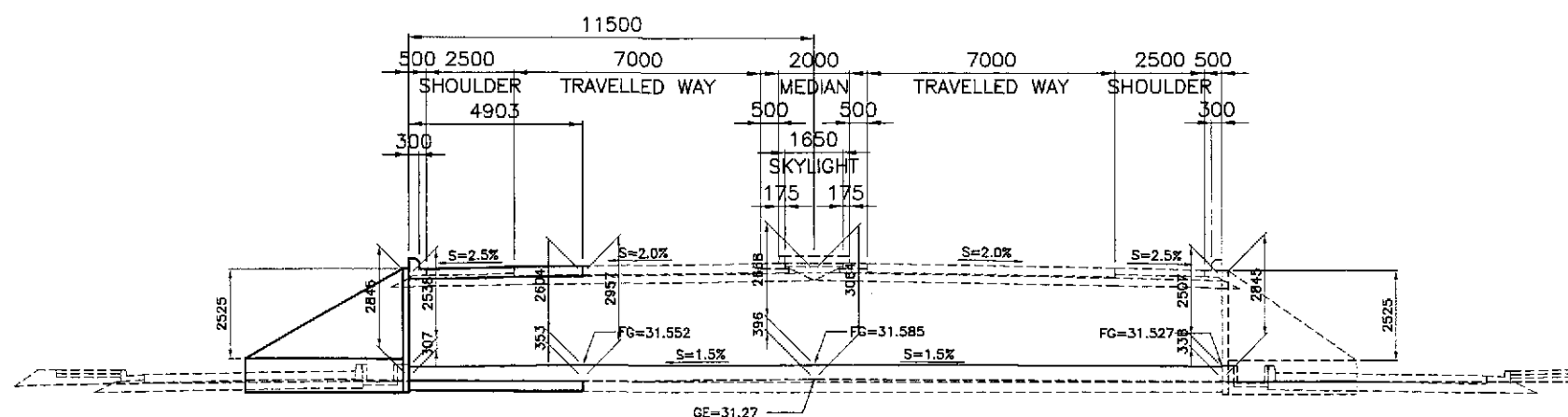
<div></div> <div>JAPAN INTERNATIONAL COOPERATION AGENCY</div> <div><div> KATAHIRA & ENGINEERS INTERNATIONAL</div><div> YACHIYO ENGINEERING CO., LTD.</div></div>			<table><tr><td>DATE</td><td>SIGNATURE</td></tr><tr><td>DESIGNED 10/09/02</td><td></td></tr><tr><td>CHECKED 10/14/02</td><td></td></tr><tr><td>SUBMITTED 10/18/02</td><td></td></tr></table>	DATE	SIGNATURE	DESIGNED 10/09/02		CHECKED 10/14/02		SUBMITTED 10/18/02		<div></div> <div>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</div> <table><tr><td colspan="2">BUREAU OF DESIGN</td><td>OFFICE OF THE SECRETARY</td></tr><tr><td>Submitted By:</td><td>Reviewed By:</td><td>Recommended By:</td></tr><tr><td>DANILO C. TRAJANO Project Director</td><td>JOSEFINA M. ALAGAR Chief, Highways Division</td><td>GILBERTO S. REYES OIC, Director IV</td></tr><tr><td></td><td></td><td>MANUEL M. BONDAN Undersecretary</td></tr><tr><td></td><td></td><td>SIMEON A. DATUMANONG Secretary</td></tr></table>	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	Submitted By:	Reviewed By:	Recommended By:	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV			MANUEL M. BONDAN Undersecretary			SIMEON A. DATUMANONG Secretary	<div>PROJECT AND LOCATION :</div> <div>THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)</div> <div>CABANATUAN BYPASS - CONTRACT PACKAGE II</div>	<div>SCALE :</div> <div>AS SHOWN</div> <div>FULL SIZE A1</div>	<div>SHEET CONTENTS :</div> <div>BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-7 (STA. 113+463.714)</div>	<div>SHEET NO. :</div> <div>UP-03</div>
DATE	SIGNATURE																														
DESIGNED 10/09/02																															
CHECKED 10/14/02																															
SUBMITTED 10/18/02																															
BUREAU OF DESIGN		OFFICE OF THE SECRETARY																													
Submitted By:	Reviewed By:	Recommended By:																													
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV																													
		MANUEL M. BONDAN Undersecretary																													
		SIMEON A. DATUMANONG Secretary																													



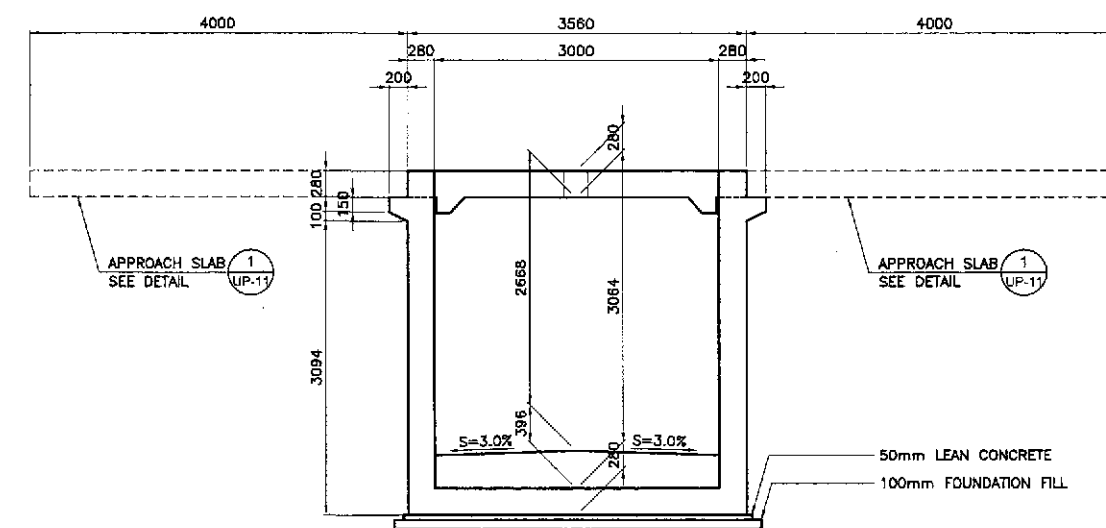
1 GENERAL PLAN
UP-04 SCALE 1:100



3 ELEVATION
UP-04 SCALE 1:40

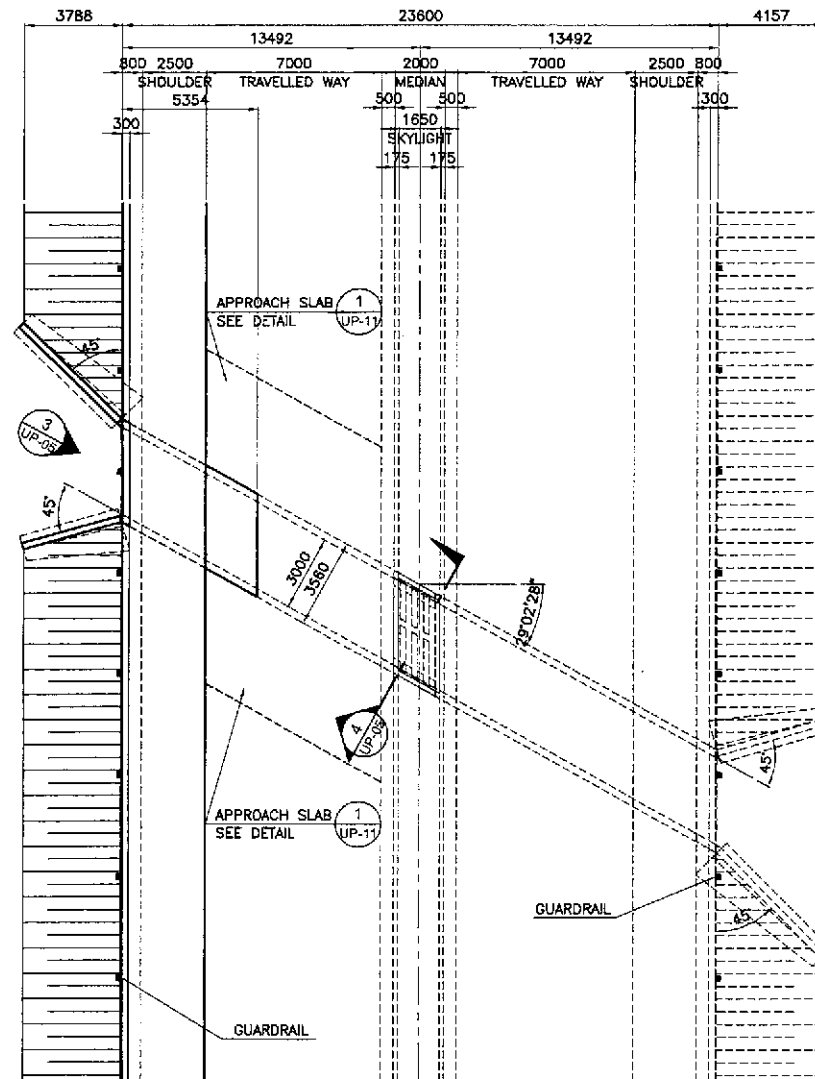


2 GENERAL ELEVATION
UP-04 SCALE 1:100

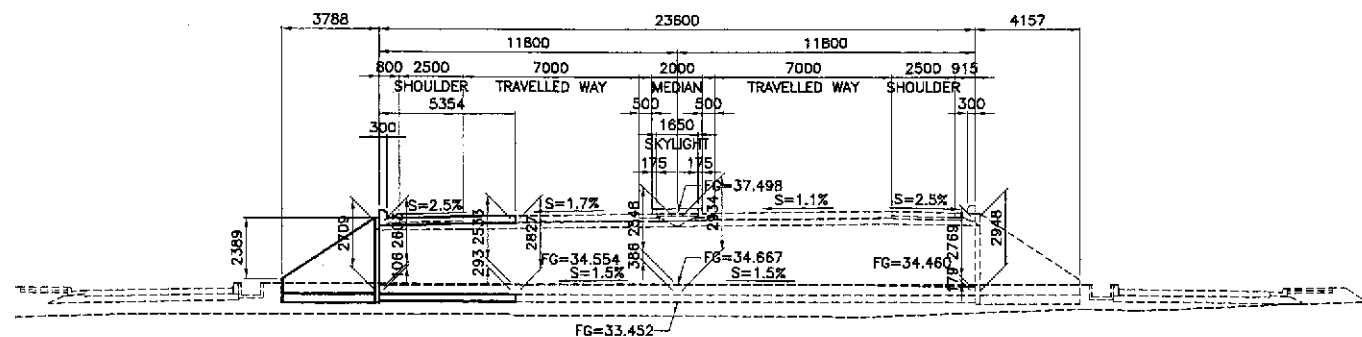


4 SECTION
UP-04 SCALE 1:40

JICA JAPAN INTERNATIONAL COOPERATION AGENCY		DATE: 10/09/02 SIGNATURE: [Signature]		DESIGNED: 10/09/02 CHECKED: 10/09/02 SUBMITTED: 10/09/02		TEAM LEADER: [Signature]		PROJECT AND LOCATION: THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE: AS SHOWN FULL SIZE A1		SHEET CONTENTS: BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-8 (STA. 115+160.00)		SHEET NO.: UP-04	
KATAHIRA & ENGINEERS INTERNATIONAL		YEO YACHIYO ENGINEERING CO., LTD.		SUBMITTED: 10/09/02		TEAM LEADER: [Signature]		PROJECT AND LOCATION: THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE: AS SHOWN FULL SIZE A1		SHEET CONTENTS: BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-8 (STA. 115+160.00)		SHEET NO.: UP-04	
PROJECT AND LOCATION: THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE: AS SHOWN FULL SIZE A1		SHEET CONTENTS: BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-8 (STA. 115+160.00)		SHEET NO.: UP-04		PROJECT AND LOCATION: THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE: AS SHOWN FULL SIZE A1		SHEET CONTENTS: BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-8 (STA. 115+160.00)		SHEET NO.: UP-04	

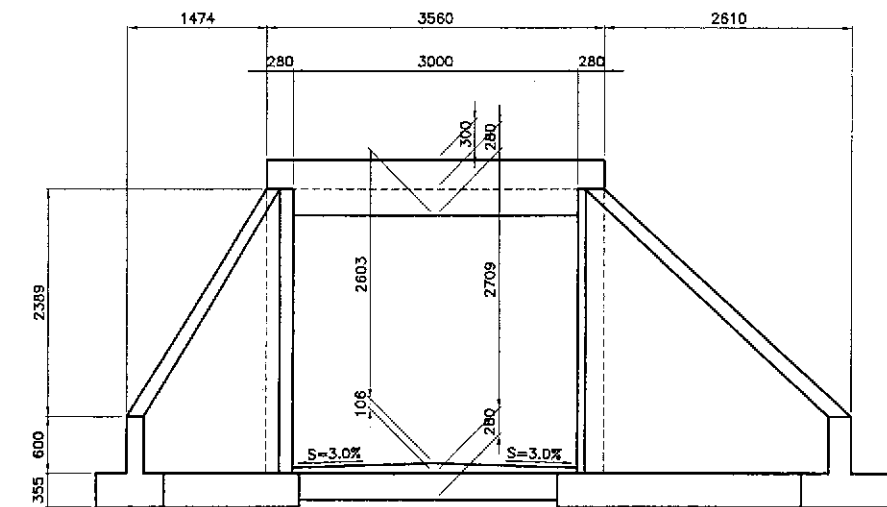


1 GENERAL PLAN
UP-05 SCALE 1:150

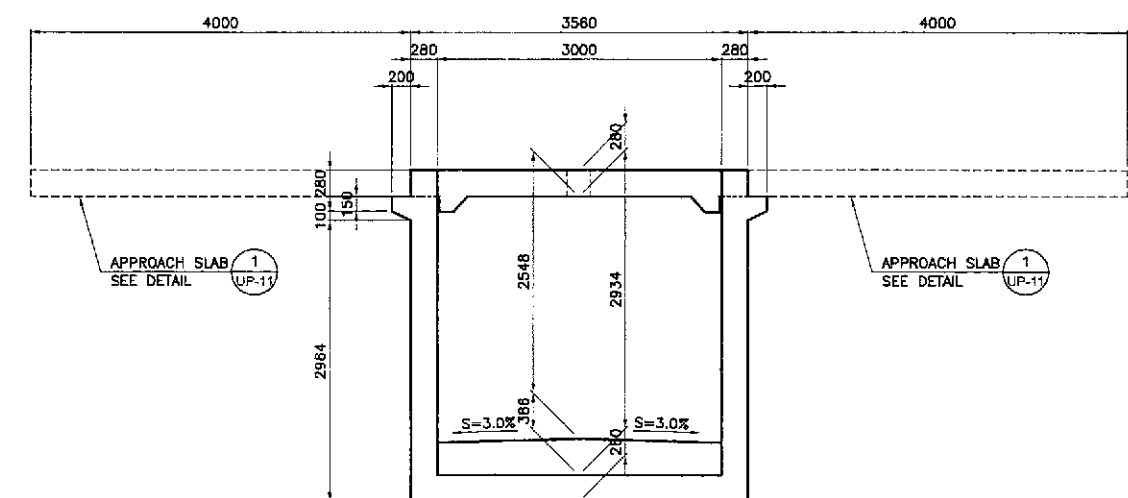


2 GENERAL ELEVATION
UP-05 SCALE 1:150

NOTE:
ALL THE DIMENSIONS ARE BASE ON LENGTH OF SKEW.

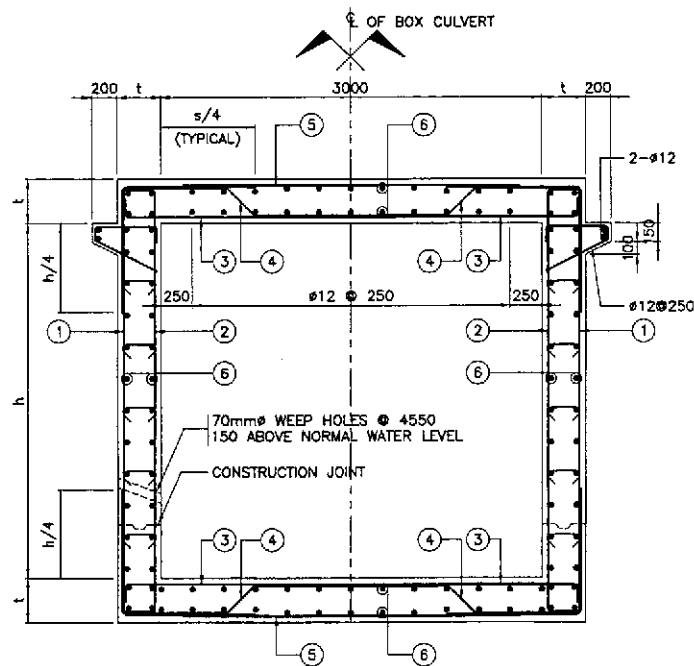


3 ELEVATION
UP-05 SCALE 1:40

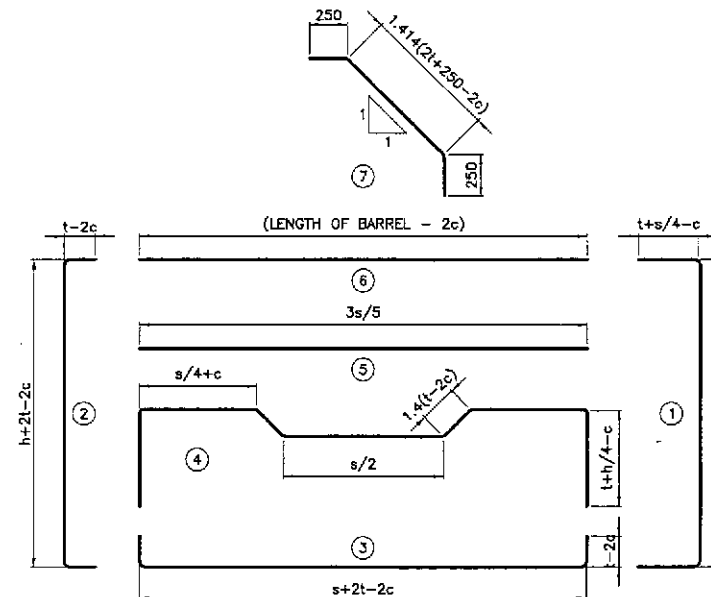


4 SECTION
UP-05 SCALE 1:40

JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS YEC YACHIYO ENGINEERING CO., LTD.		DATE 10/09/02 SIGNATURE [Signature] CHECKED 10/14/02 SUBMITTED 10/18/02	PUHL - PMO BUREAU OF DESIGN Submitted By: DANILO C. TRAJANO Project Director Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division Recommended By: GILBERTO S. REYES OIC, Director IV Recommended By: MANUEL M. BONDAN Undersecretary Approved By: SIMEON A. DATUMANONG Secretary	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 II	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-9 (STA. 116+822.287)	SHEET NO. : UP-05
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1 SECTION - SINGLE BARREL
UP-06 NOT TO SCALE



3 BAR BENDING DIAGRAM - SINGLE BARREL
UP-06 NOT TO SCALE

DESIGN NOTES :

SPECIFICATIONS:

DESIGN: BRIDGE DESIGN SPECIFICATION (1992 AASHTO SPECIFICATIONS)

LOAD FACTORS:

$$1.3 (D + 1.67 LL + 1.00 E)$$

$$1.3 (D + 1.67 LL + 0.50 E)$$

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:
 $\frac{55}{S}$, MAX. 50%

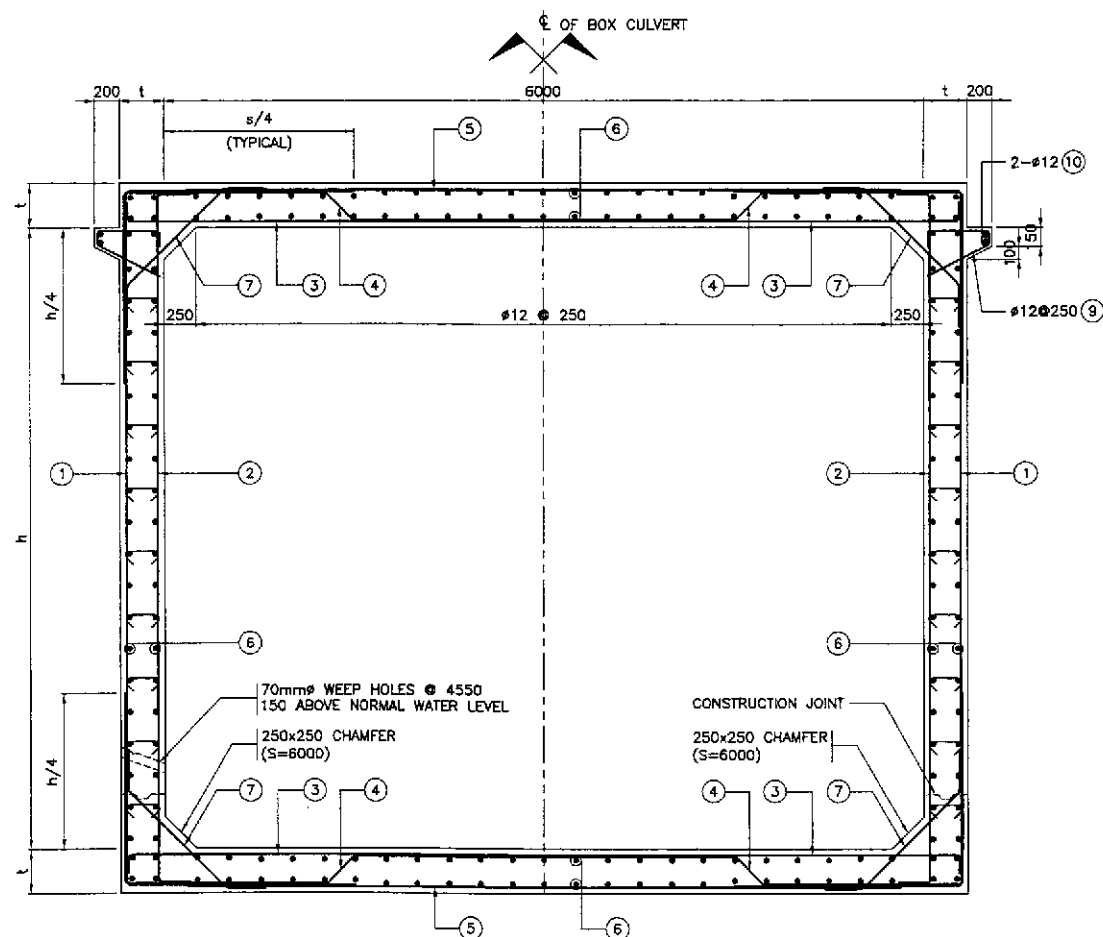
OVER 3.0 COVER
#12 @ 450 mm MAXIMUM.

SHEAR:

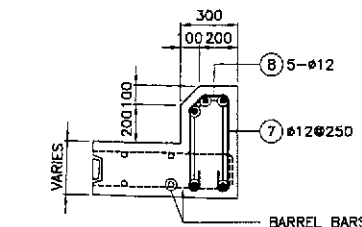
ULTIMATE SHEAR, $v = 0.16/\sqrt{f'_c} \text{ MPa}$

EXCLUSIONS:

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



2 SECTION - SINGLE BARREL
UP-06 NOT TO SCALE



4 PARAPET DETAIL
UP-06 SCALE 1:20

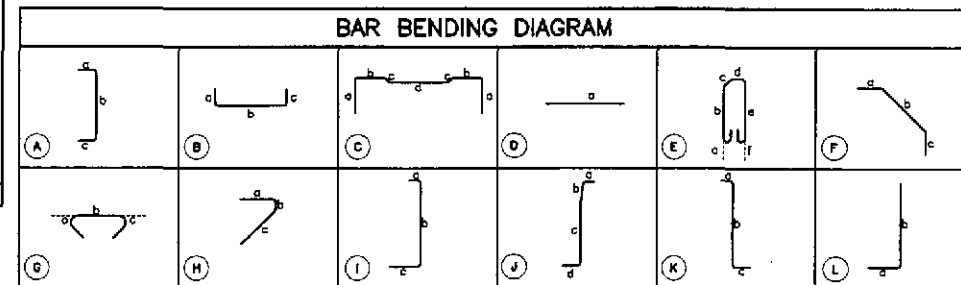
BAR SCHEDULE SINGLE BARREL BOX CULVERT											
NAME	S	h	t	BAR 1	BAR 2	BAR 3	BAR 4	BAR 5	BAR 6	BAR 7	REMARKS
B-6	3000	3700	280	16	200	16	180	16	200	12	250 - - FLUSHED TO ROADWAY
B-7	3000	3100	280	16	200	16	180	16	200	12	250 - - FLUSHED TO ROADWAY (SKEW 26° RF)
B-8	3000	3100	280	16	200	16	180	16	200	12	250 - - FLUSHED TO ROADWAY
B-9	3000	2900	280	16	200	16	180	16	200	12	250 - - FLUSHED TO ROADWAY
B-10	6000	5000	350	20	200	20	200	20	200	12	250 16 200 FLUSHED TO ROADWAY

JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS YEO YACHIYO ENGINEERING CO., LTD.		DATE: _____ DESIGNED: _____ CHECKED: _____ SUBMITTED: _____				SIGNATURE: _____ TEAM LEADER PROJECT DIRECTOR				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 (Palarid, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE II				SCALE : AS SHOWN FULL SIZE A1		SHEET CONTENTS : BOX CULVERT SPECIAL RCBC BARREL DETAILS (ULTIMATE STAGE)		SHEET NO. : UP-06	
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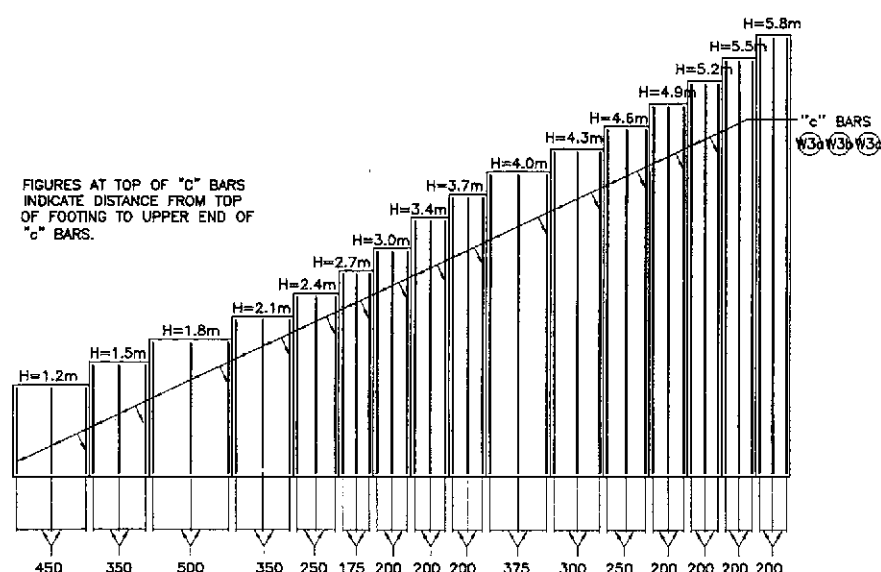
SCHEDULE OF REINFORCEMENTS (B6 - STA. 109+180.00)													
STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm)						LENGTH EA. BAR	TOTAL LENGTH
						a	b	c	d	e	f		
BARREL L=3.306m.	1	16	56	200	(A)	980	4008	980	-	-	-	9966	334.1
	2	16	58	180	(A)	180	4006	180	-	-	-	4366	253.23
	3	16	56	200	(B)	180	3460	180	-	-	-	3620	213.92
	4	16	54	200	(C)	1116	800	255	1500	-	-	5842	315.47
	5	12	56	200	(D)	2000	-	-	-	-	-	2000	112
	6	12	128	250	(D)	5206	-	-	-	-	-	5206	666.37
	7	12	30	250	(E)	114	380	71	150	480	114	1309	39.26
	8	12	10	AS DWG	(D)	3460	-	-	-	-	-	3460	34.6
	9	12	58	250	(H)	430	70	608	-	-	-	1108	64.27
	10	12	4	AS DWG	(D)	6900	-	-	-	-	-	6900	27.6
WINGWALLS (H+I)=3.826m.	W1	12	4	AS DWG	(D)	600	8259	-	-	-	-	8859	35.44
	W2	12	26	300	(D)	4002	-	-	-	-	-	4002	104.04
	W3a	25	30	200	(I)	1213	3516	150	-	-	-	4881	146.44
	W3b	16	24	175	(I)	753	2443	150	-	-	-	3346	80.3
	W3c	12	6	350	(I)	703	1368	150	-	-	-	2221	17.77
	W4	12	48	300	(I)	203	2443	150	-	-	-	2796	134.21
	W5a	25	14	400	(D)	1887	-	-	-	-	-	1897	26.56
	W5b	20	12	350	(D)	1458	-	-	-	-	-	1458	17.5
	W5c	12	6	350	(D)	819	-	-	-	-	-	815	6.52
	W6	12	14	AS DWG	(D)	7122	-	-	-	-	-	7122	99.71
GRAND TOTAL = 3801 KG													42

SCHEDULE OF REINFORCEMENTS (B7 - STA. 113+463.714)													
STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm)						LENGTH EA. BAR	TOTAL LENGTH
						a	b	c	d	e	f		
BARREL L=6.303m.	1	16	66	200	(A)	980	3418	980	-	-	-	5378	354.98
	2	16	70	180	(A)	180	3418	180	-	-	-	3778	264.5
	3	16	66	200	(A)	180	3460	180	-	-	-	3820	252.12
	4	16	64	200	(B)	970	800	255	1500	-	-	5548	355.1
	5	12	66	200	(C)	2000	-	-	-	-	-	2000	132
	6	12	120	250	(C)	6203	-	-	-	-	-	6203	744.4
	7	12	32	250	(E)	114	380	71	150	480	114	1309	41.88
	8	12	10	AS DWG	(D)	3449	-	-	-	-	-	3449	34.49
	9	12	58	250	(H)	430	70	608	-	-	-	1108	64.27
	10	12	4	AS DWG	(D)	6900	-	-	-	-	-	6900	27.6
WINGWALL (H+I)=3.236m. L=5.656m.	W1	12	2	AS DWG	(D)	600	6798	-	-	-	-	7398	14.8
	W2	12	11	300	(D)	3396	-	-	-	-	-	3396	37.35
	W3a	20	12	200	(I)	830	2919	150	-	-	-	3899	46.79
	W3b	16	7	250	(I)	730	1929	150	-	-	-	2809	18.67
	W3c	12	3	350	(I)	680	1160	150	-	-	-	1990	5.97
	W4	12	20	300	(I)	203	2149	150	-	-	-	2502	50.05
	W5a	25	5	400	(D)	1715	-	-	-	-	-	1715	8.58
	W5b	16	7	250	(D)	1229	-	-	-	-	-	1229	8.5
	W5c	12	3	350	(D)	822	-	-	-	-	-	822	2.47
	W6	12	7	AS DWG	(D)	5906	-	-	-	-	-	5906	41.34
WINGWALL (H+I)=3.236m. L=4.300m.	W1	12	2	AS DWG	(D)	600	5168	-	-	-	-	5768	11.54
	W2	12	11	300	(D)	2567	-	-	-	-	-	2567	28.23
	W3a	20	9	200	(I)	830	2919	150	-	-	-	3899	35.09
	W3b	16	5	250	(I)	730	1929	150	-	-	-	2809	14.05
	W3c	12	2	350	(I)	680	1160	150	-	-	-	1990	3.98
	W4	12	15	300	(I)	203	2149	150	-	-	-	2502	37.53
	W5a	25	4	400	(D)	1715	-	-	-	-	-	1715	8.86
	W5b	16	5	250	(D)	1229	-	-	-	-	-	1229	6.14
	W5c	12	2	350	(D)	822	-	-	-	-	-	822	1.64
	W6	12	7	AS DWG	(D)	4550	-	-	-	-	-	4550	31.85
GRAND TOTAL = 3459 KG													37.3

SCHEDULE OF REINFORCEMENTS (B8 - STA. 115+160.00)													
STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm)						LENGTH EA. BAR	TOTAL LENGTH
						a	b	c	d	e	f		
BARREL L=6.203m.	1	16	54	200	(A)	980	3418	980	-	-	-	5378	290.44
	2	16	58	180	(A)	180	3418	180	-	-	-	3778	219.15
	3	16	54	200	(B)	180	3460	180	-	-	-	3820	208.28
	4	16	52	200	(C)	970	800	255	1500	-	-	5548	288.52
	5	12	54	200	(D)	2000	-	-	-	-	-	2000	108
	6	12	120	250	(D)	5103	-	-	-	-	-	5103	612.36
	7	12	30	250	(E)	114	380	71	150	480	114	1309	39.26
	8	12	10	AS DWG	(D)	3460	-	-	-	-	-	3460	34.6
	9	12	58	250	(H)	430	70	608	-	-	-	1108	64.27
	10	12	4	AS DWG	(D)	6900	-	-	-	-	-	6900	27.6
WINGWALLS (H+I)=3.236m.	W1	12	4	AS DWG	(D)	600	6798	-	-	-	-	7398	29.59
	W2	12	22	300	(D)	3396	-	-	-	-	-	3396	74.7
	W3a	20	24	200	(I)	830	2919	150	-	-	-	3899	93.57
	W3b	16	14	250	(I)	730	1929	150	-	-	-	2809	39.33
	W3c	12	6	350	(I)	680	1160	150	-	-	-	1990	11.94
	W4	12	40	300	(I)	203	2149	150	-	-	-	2502	100.09
	W5a	25	10	400	(D)	1715	-	-	-	-	-	1715	17.15
	W5b	16	14	250	(D)	1229	-	-	-	-	-	1229	17.2
	W5c	12	6	350	(D)	822	-	-	-	-	-	822	4.93
	W6	12	14	AS DWG	(D)	5906	-	-	-	-	-	5906	82.69
GRAND TOTAL = 3039 KG													35.22

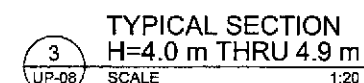
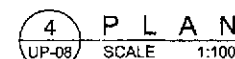
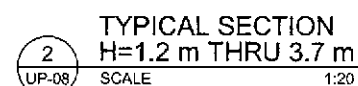


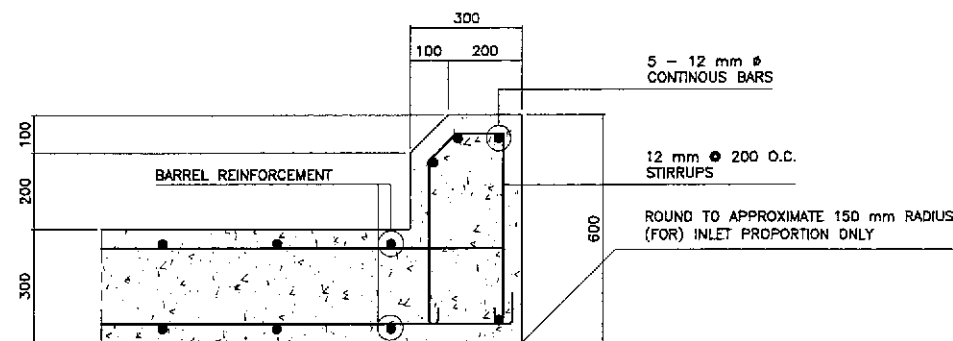
SCHEDULE OF REINFORCEMENTS (B9 - STA. 116+822.287)																
STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm)						LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME CONC. (m³)
						a	b	c	d	e	f					
BARREL L=6.406m.	1	16	76	200	(A)	980	3341	980	-	-	-	5301	402.9	1.579	637	26.02
	2	16	82	180	(A)	180	3341	180	-	-	-	3701	303.5	1.579	480	
	3	16	76	200	(A)	180	3460	180	-	-	-	3820	290.32	1.579	459	
	4	16	74	200	(B)	950	800	255	1500	-	-	5510	407.72	1.579	844	
	5	12	76	200	(C)	2000	-	-	-	-	-	2000	152	0.888	135	
	6	12	120	250	(C)	7295	-	-	-	-	-	7295	875.35	0.888	778	
	7	12	34	250	(E)	114	380	71	150	480	114	1309	44.5	0.888	40	
	8	12	10	AS DWG	(D)	3446	-	-	-	-	-	3446	34.46	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	
WINGWALL (H+I)=3.161m. L=5.368m.	W1	12	2	AS DWG	(D)	600	6451	-	-	-	-	7051	14.1	0.888	13	6.76
	W2	12	11	300	(D)	3219	-	-	-	-	-	3219	35.41	0.888	32	
	W3a	20	11	200	(I)	826	2858	150	-	-	-	3834	42.17	2.466	104	
	W3b	16	4	350	(I)	726	1887	150	-	-	-	2773	11.09	1.579	18	
	W3c	12	3	350	(I)	676	1150	150	-	-	-	1976	5.93	0.888	5	
	W4	12	19	300	(I)	203	2111	150	-	-	-	2464	46.81	0.888	42	
	W5a	25	5	400	(D)	1720	-	-	-	-	-	1720	8.6	3.854	34	
	W5b	16	4	350	(D)	1132	-	-	-	-	-	1132	4.53	1.579	8	
	W5c	12	3	350	(D)	824	-	-	-	-	-	824	2.47	0.888	3	
	W6	12	7	AS DWG	(D)	5818	-	-	-	-	-	5818	39.32	0.888	35	
WINGWALL (H+I)=3.161m. L=4.028m.	W1	12	2	AS DWG	(D)	600	4840	-	-	-	-	5440	10.88	0.888	10	5.11
	W2	12	11	300	(D)	2400	-	-	-	-	-	2400	26.4	0.888	24	
	W3a	20	9	200	(I)	826	2858	150	-	-	-	3834	34.5	2.466	86	
	W3b	16	3	350	(I)	726	1887	150	-	-	-	2773	8.32	1.579	14	
	W3c	12	2	350	(I)	676	1150	150	-	-	-	1976	3.95	0.888	4	
	W4	12	14	300	(I)	203	2111	150	-	-	-	2464	34.49	0.888	31	
	W5a	25	4	400	(D)	1720	-	-	-	-	-	1720	6.88	3.854	27	
	W5b	16	3	350	(D)	1132	-	-	-	-	-	1132	3.4	1.579	6	
	W5c	12	2	350	(D)	824	-	-	-	-	-	824	1.65	0.888	2	
	W6	12	7	AS DWG	(D)	4277	-	-	-	-	-	4277	26.94	0.888	27	
GRAND TOTAL =														3813	KG	37.9



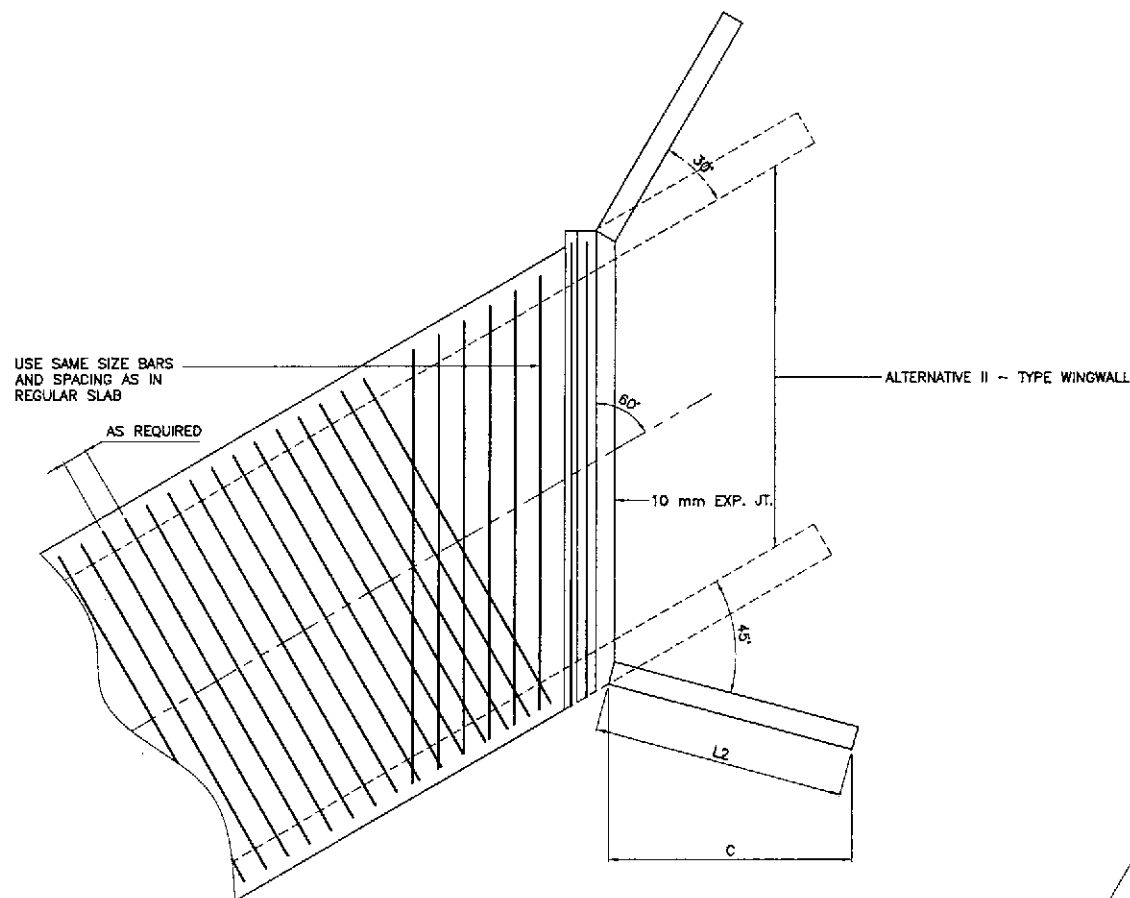
REINFORCED CONCRETE WINGWALLS																
H	1200	1500	1800	2100	2400	2700	3000	3400	3700	4000	4300	4600	4900	5200	5500	5800
W	965	1120	1270	1420	1575	1730	1880	2030	2185	2335	2490	2640	2795	2945	3050	3150
C	305	355	405	455	510	560	610	660	710	760	815	865	915	965	1015	1065
B	660	765	865	965	1065	1170	1270	1370	1475	1575	1675	1775	1880	1980	2035	2085
F	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355	355
Batter	None	None	None	None	None	None	None	None	None	1:25	1:25	1:25	1:25	1:25	1:26	1:27
S	305	305	305	305	305	305	305	305	305	465	475	490	500	500	500	500
"c" Bars	12@450	12@350	12@275	16@350	16@250	15@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

ELEVATIONS, LENGTH AND ANGLE OF FLARE OF WINGS MAY BE VARIED BY THE ENGINEER TO SUIT
 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 "o" AND "ANGLE OF FLARES" (AS APPLY) ARE SHOWN ON THE PLANS
 WALL HEIGHT MAY BE EXCEEDED BY 150 mm BEFORE GOING TO NEXT GREATER "H".
 ELIMINATE CUTOFF WALL IF ADJACENT CHANNEL IS PAVED AND SKEW IS 20° MAXIMUM
 FOR WALL OFFSET VALUES, SEE STANDARD PLAN B3-8

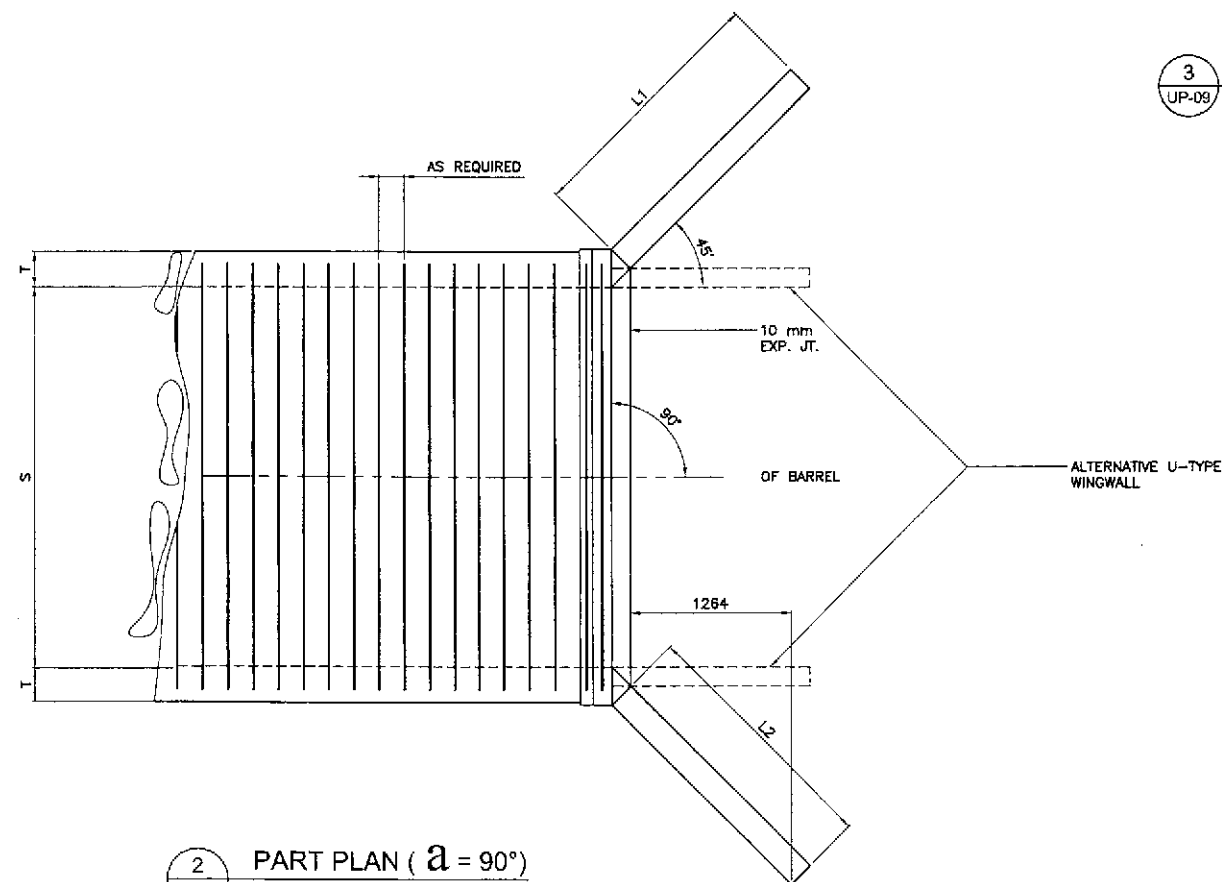




1 CURB DETAIL
UP-09 SCALE 1:10

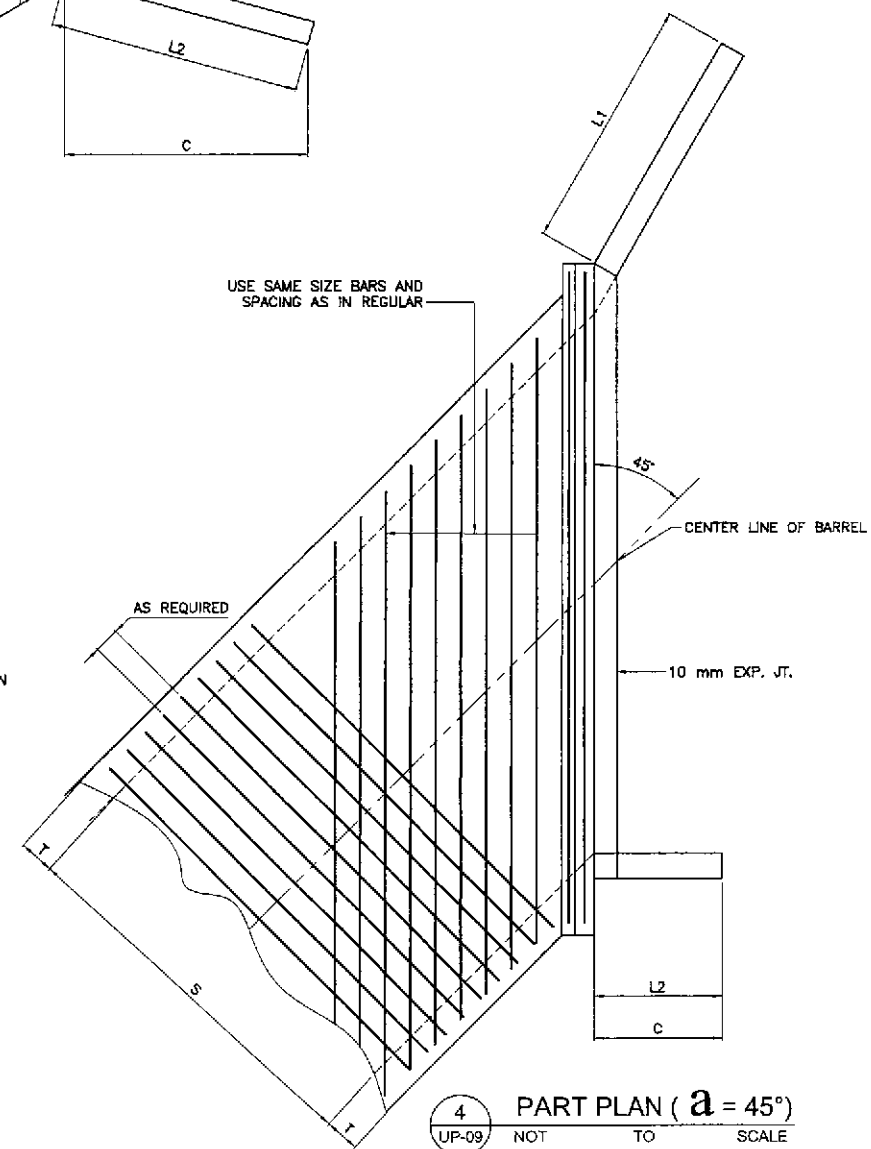


3 PART PLAN ($a = 60^\circ$)
UP-09 NOT TO SCALE



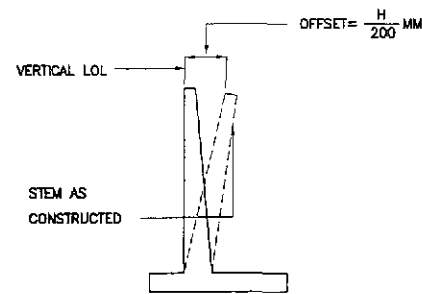
2 PART PLAN ($a = 90^\circ$)
UP-09 NOT TO SCALE

NOTE
ALL DIMENSIONS ARE IN
MILLIMETERS UNLESS
OTHERWISE SPECIFIED



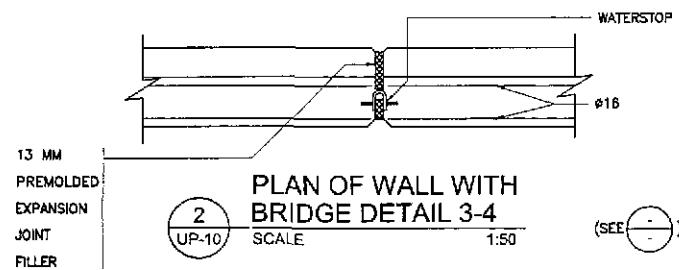
4 PART PLAN ($a = 45^\circ$)
UP-09 NOT TO SCALE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : BOX CULVERT TYPICAL PLAN REINFORCED CONCRETE AT END BOX CULVERT AND CURB DETAIL (ULTIMATE STAGE)	SHEET NO. : UP-09
KATAHIRA & ENGINEERS INTERNATIONAL		YACHIYO ENGINEERING CO., LTD.		CABANATUAN BYPASS - CONTRACT PACKAGE II				
DESIGNED	10/09/02	SIGNATURE		PJHL - PWD	BUREAU OF DESIGN	OFFICE OF THE SECRETARY		
CHECKED	10/16/02	SIGNATURE		Submitted By:	Reviewed By:	Recommended By:		
SUBMITTED	10/16/02	SIGNATURE		DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highway Division	GILBERTO S. REYES DIC, Director IV		
		SIGNATURE		MANUEL M. BONGAN Undersecretary	SIMEON A. DATUMANONG Secretary			

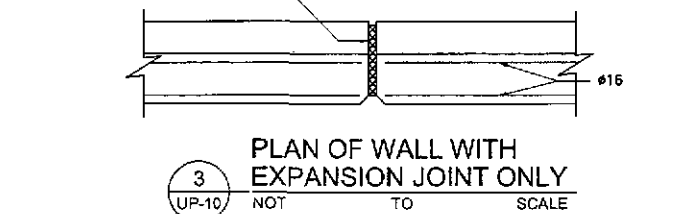


1 APPROXIMATE WALL OFFSET VALUES
UP-10 NOT TO SCALE

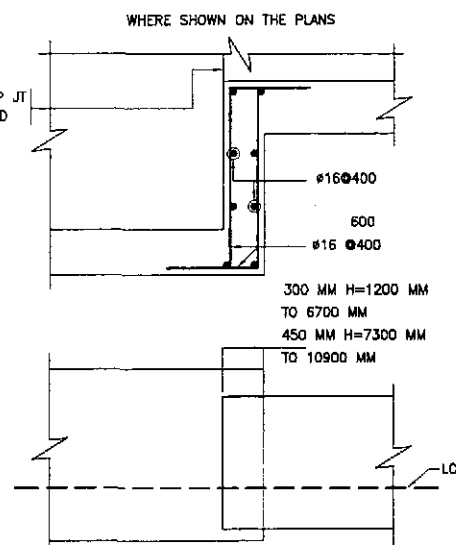
NOT REQUIRED FOR WALL TYPES 3 AND 4
VALUES FOR OFFSETTING FORMS TO BE
DETERMINED BY THE ENGINEER



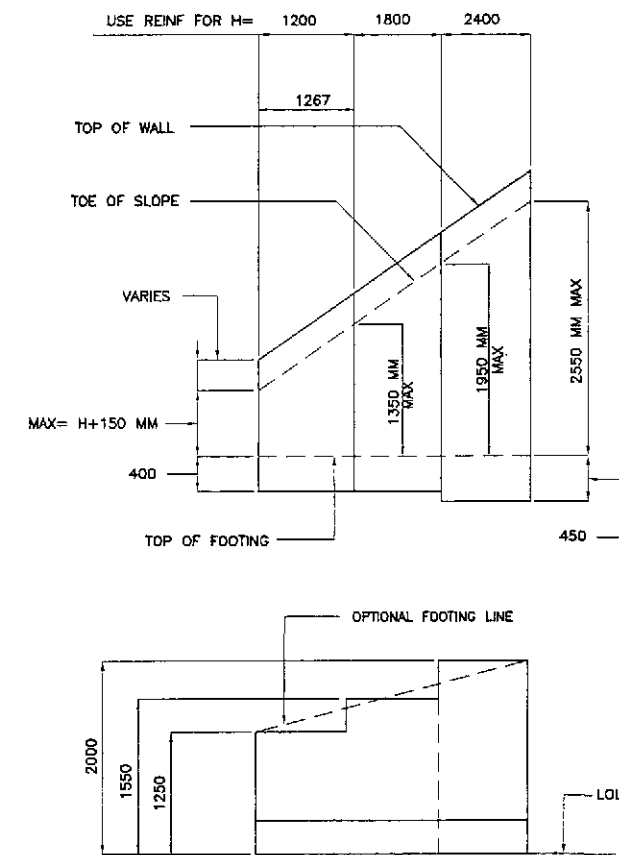
2 PLAN OF WALL WITH BRIDGE DETAIL 3-4
UP-10 SCALE 1:50



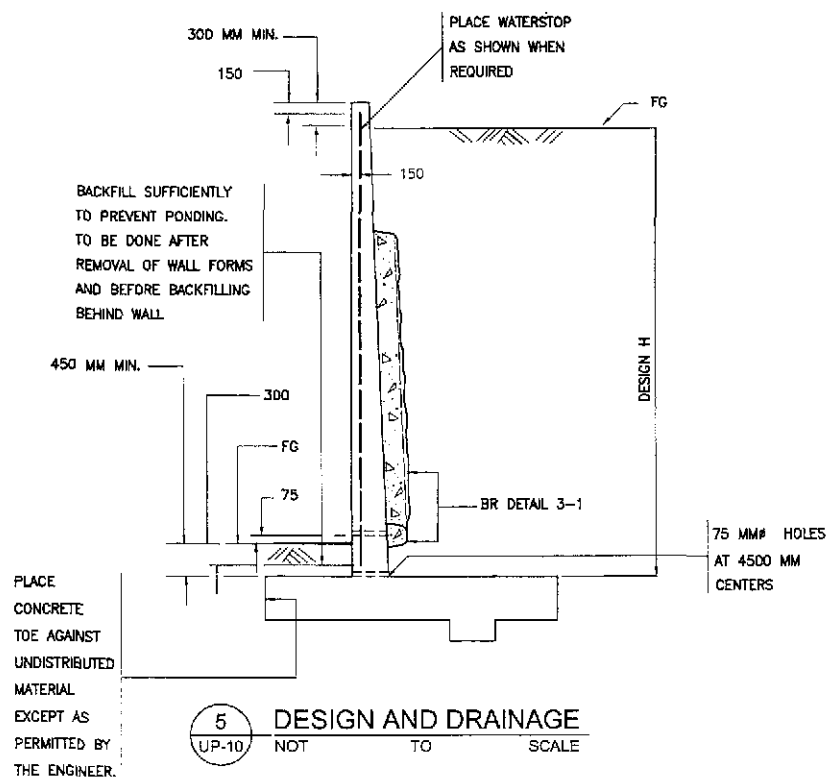
3 PLAN OF WALL WITH EXPANSION JOINT ONLY
UP-10 NOT TO SCALE



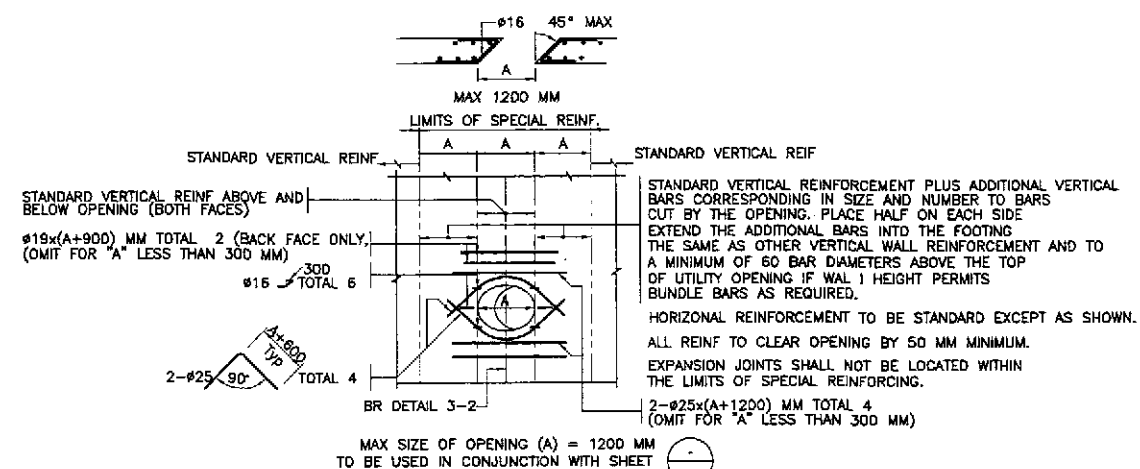
4 FOOTING ONLY
UP-10 NOT TO SCALE







6 TYPICAL LAYOUT EXAMPLE
UP-10 NOT TO SCALE

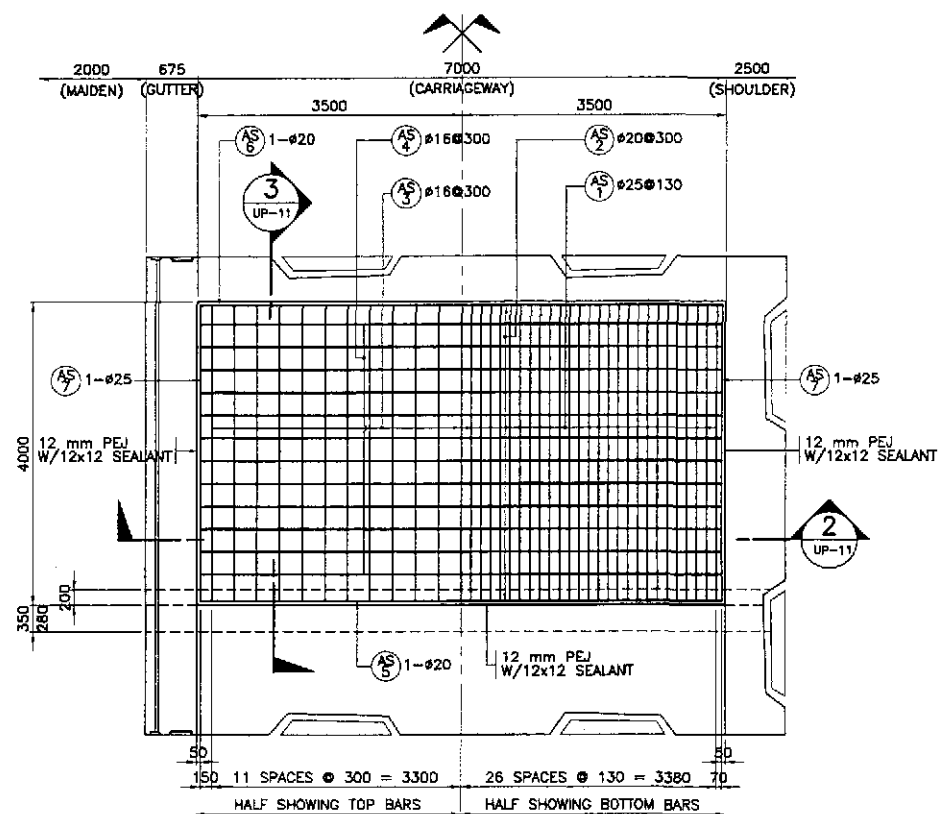


5 DESIGN AND DRAINAGE
UP-10 NOT TO SCALE

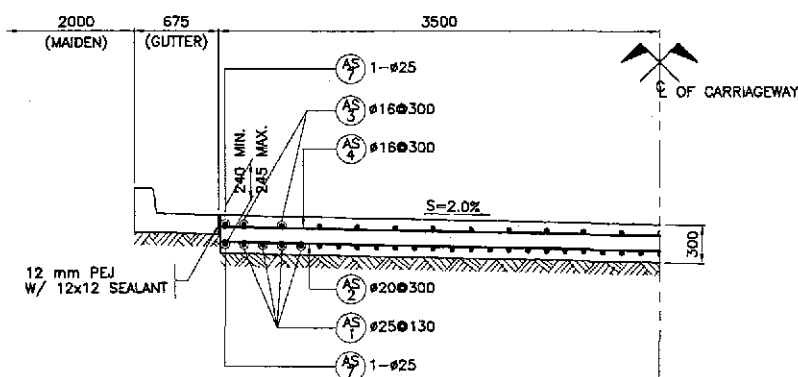


7 RETAINING WALL UTILITY OPENING
UP-10 NOT TO SCALE

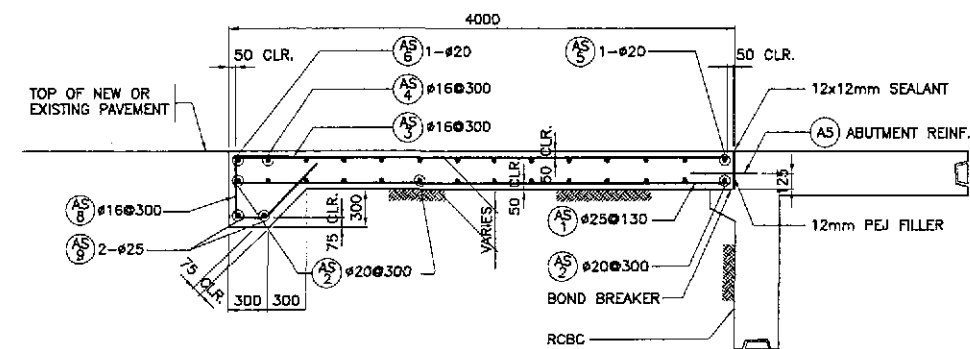
 JAPAN INTERNATIONAL COOPERATION AGENCY			 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : AS SHOWN	SHEET CONTENTS : BOX CULVERT RETAINING WALL TYPE I H=1200 THROUGH 9100 mm (ULTIMATE STAGE)	SHEET NO. : UP-10
DESIGNED 10/6/02 [Signature]			BUREAU OF DESIGN		OFFICE OF THE SECRETARY		CABANATUAN BYPASS - CONTRACT PACKAGE II	FULL SIZE A1	
CHECKED 10/16/02 [Signature]			Submitted By:	Reviewed By:	Recommended By:	Approved By:			
SUBMITTED 10/18/02 [Signature]			DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary			
 KATAHIRA & ENGINEERS INTERNATIONAL			 YACHIYO ENGINEERING CO., LTD.						



1 PLAN
UP-11 SCALE 1:50

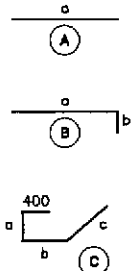


2 SECTION
UP-11 SCALE 1:30



3 SECTION
UP-11 SCALE 1:30

REINFORCEMENT SCHEDULE & ESTIMATED QUANTITIES FOR TWO LANES APPROACH SLABS

BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF REBARS)	REINFORCEMENT										CONCRETE VOLUME (m³)	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						
	AS 1	25	69	130	B	3900	150	—	4050	226.80	3.853	874	1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB	
	AS 2	20	14	300	A	7900	—	—	7900	55.30	2.466	136		
	AS 3	16	25	300	B	3900	150	—	4050	101.25	1.578	160		
	AS 4	16	12	300	A	7900	—	—	7900	47.40	1.578	75		
	AS 5	20	1	AS SHOWN	A	7200	—	—	7200	7.20	2.466	18		
	AS 6	20	1	AS SHOWN	A	7900	—	—	4050	53.20	1.578	84		
	AS 7	25	4	AS SHOWN	A	1965	1965	—	3930	15.72	3.853	61		
	AS 8	16	27	300	C	415 MIN, 475 MAX.	250	650	1745	47.11	1.578	74		
	AS 9	25	2	AS SHOWN	A	7900	—	—	7900	15.80	3.853	61		
	GRAND TOTAL = 1543													9.58



JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS
YACHIYO ENGINEERING
CO., LTD.

YACHIYO ENGINEERING
CO., LTD.

DESIGNED	CHECKED	SUBMITTED	DATE	SIGNATURE
10/09/02	10/10/02	10/10/02		

Submitted By:
DANILO C. TRAJANO
Project Director



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

BUREAU OF DESIGN	OFFICE OF THE SECRETARY
Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OIC, Director IV
Recommended By: MANUEL M. BONDAN Undersecretary	Approved By: SIMEON A. DATUMANONG Secretary

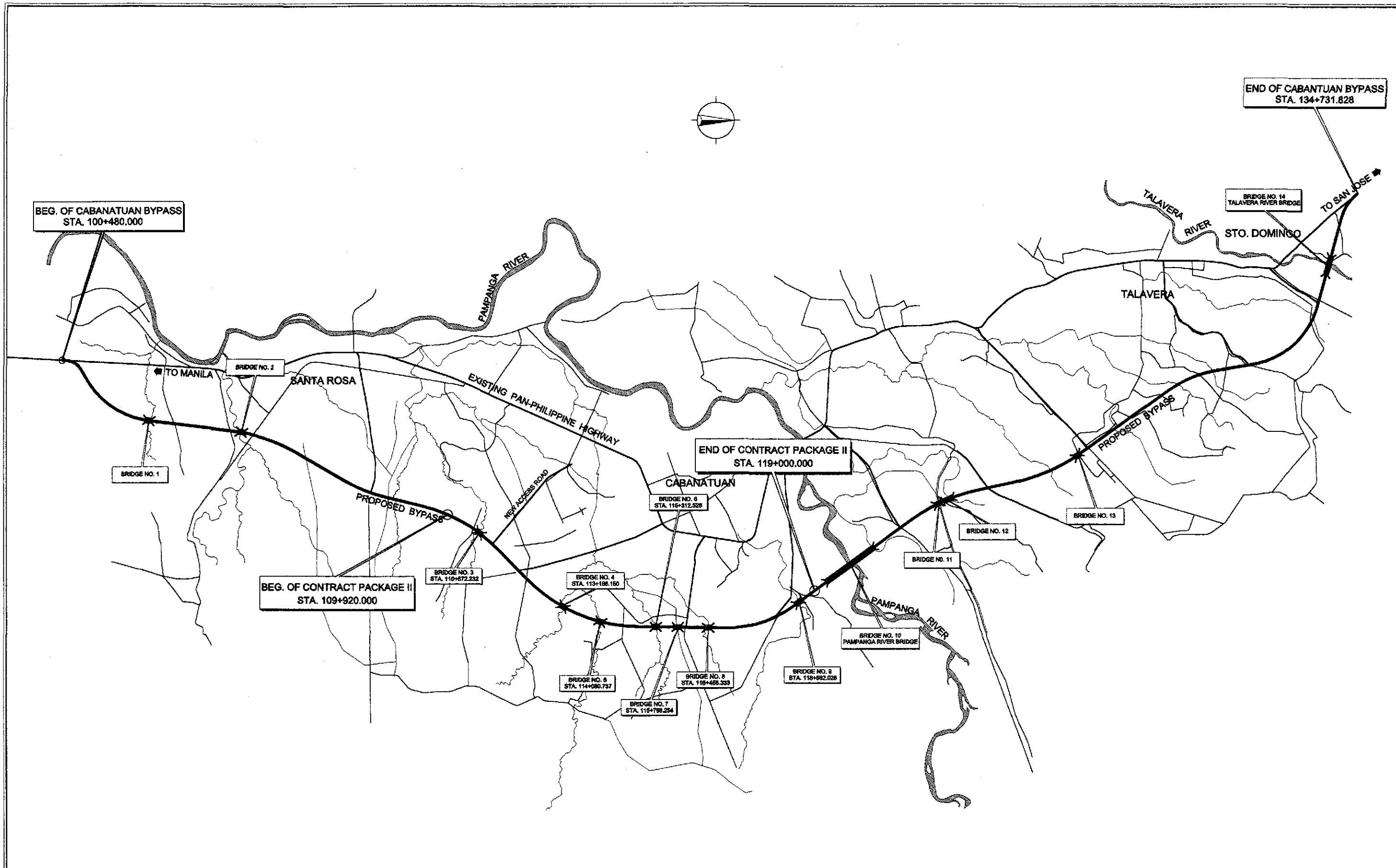
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE II

SCALE :
AS SHOWN
FULL SIZE A1



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

SHEET NO. :
UP-11

BRIDGES



CABANATUAN BYPASS BRIDGE LOCATION MAP

 JAPAN INTERNATIONAL COOPERATION AGENCY		 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : AS SHOWN	SHEET CONTENTS : BRIDGE LOCATION MAP (ULTIMATE STAGE)	SHEET NO. : BG-01	
DESIGNED	10/09/02 E. A. SALLAN	SUBMITTED BY: DANILO C. TRAJAND Project Director		BUREAU OF DESIGN REVIEWED BY: ADRIANO M. DOROS Chief, Bridge Division		OFFICE OF THE SECRETARY RECOMMENDED BY: MANUEL M. BONGAN Undersecretary		APPROVED BY: SIMEON A. DATUMANDONG Secretary	
CHECKED	10/16/02 M. KOBAYASHI	SUBMITTED		10/18/02 M. KOBAYASHI Team Leader					
KATAHIRA & ENGINEERS INTERNATIONAL		YACHYO ENGINEERING CO., LTD.							

GENERAL NOTES FOR BRIDGES

(SHEET 1 OF 2)

A. DESIGN CRITERIA

1. DESIGN SPECIFICATION

- (a) THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES 16TH EDITION, 1996.
- (b) NATIONAL STRUCTURAL CODE OF THE PHILIPPINES, VOLUME II-BRIDGES, 2ND EDITION, 1997.

2. DESIGN METHODOLOGY

LOAD FACTOR DESIGN METHOD (ULTIMATE STRENGTH DESIGN METHOD)

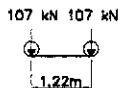
3. LOADING

3.1 DEAD LOADS

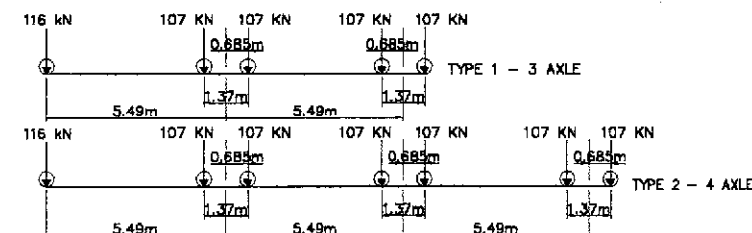
	WEIGHT
A. CONCRETE	24.00 kN/m ³
B. STEEL	77.00 kN/m ³
C. EARTH	19.00 kN/m ³
D. WEARING SURFACE	1.10 kN/m ²

3.2 LIVE LOADS

- A. AASHTO HS20 (MS18) TRUCK AND EQUIVALENT LANE LOADING.
- B. SIDEWALK LOAD 4.07 kN/m²
- 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 OTHER LOADS

IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS, 1996.

3.6 LOAD COMBINATION

- A. GROUP I = 1.3 [1.0 D + 1.67(L+I)n + 1.0 SF]
- B. GROUP II = 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]

B. MATERIALS

1. CONCRETE

UNLESS OTHERWISE INDICATED 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, COPINGS, COLUMNS	A (MOD)	21	3045	20 (3/4)	
FOOTINGS	A	21	3045	38 (1-1/2)	
PRECAST R.C. PILES	AA	28	4060	20 (3/4)	
THIN REINFORCED SECTIONS RAILINGS AND RAILPOST	C	21	3045	12 (1/2)	
PRESTRESSED CONCRETE MEMBERS	P	35	5075	20 (3/4)	TRANSFER
		41	5946	20 (3/4)	SERVICE
LEAN CONCRETE	-	17	2465	50 (2)	

2. REINFORCING STEEL

- (a) REINFORCING STEEL SHALL CONFORM TO AASHTO M31 (ASTM A615), GRADES 40 & 60 DEFORMED WITH MINIMUM YIELD STRENGTH.
- GRADE 40 (16mm ϕ AND SMALLER)
Fy = 276 MPa (40,000 psi)
- GRADE 60 (20mm ϕ AND LARGER)
Fy = 414 MPa (60,000 psi)

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

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 Fy = 1860 MPa (270,000psi).

4. STRUCTURAL STEEL, BOLTS AND WELDS

MATERIALS	UNIT WEIGHT
STEEL PLATES AND ROLLED SHAPES	AASHTO M183 (ASTM A36)
BOLTS	AASHTO M164 (ASTM A325)
WELDS	AWS D1.1 - 183, E70XX SERIES

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. 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
TENSILE STRENGTH ASTM D 412-175 Kg/cm² (min)
ULTIMATE ELONGATION % 350 % (min)
MATERIAL NEOPRENE

C. CONSTRUCTION

ALL WORKS SHALL COMPLY WITH 1995 DPWH SPECIFICATION FOR ROADS AND BRIDGES 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.

2. SETTING OUT

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

3. REINFORCED CONCRETE

- a. ALL CAST IN PLACE CONCRETE SHALL BE CLASS "A" EXCEPT RAILINGS WHICH SHALL BE CLASS "C" UNLESS OTHERWISE NOTED ON THE PLANS. ALL EXPOSED EDGES SHALL BE CHAMFERED 25mm EXCEPT RAILINGS AND RE-ENTRANT ANGLES WHICH SHALL BE CHAMFERED AND FILLETED 13mm RESPECTIVELY.

b. CONCRETE MIX AND PLACING

- (1) DESIGN OF CONCRETE MIX SHALL MEET THE DESIGN CONCRETE STRENGTH GIVEN UNDER ITEM 1 OF MATERIALS.
- (2) CONCRETE SHALL BE DEPOSITED, VIBRATED AND CURED IN ACCORDANCE WITH THE SPECIFICATION.

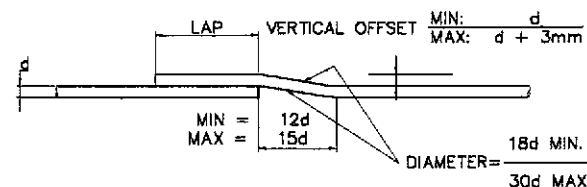
- (3) FOR CONCRETE DEPOSITED AGAINST THE GROUND, LEAN CONCRETE WITH A MINIMUM THICKNESS OF 200mm SHALL LAID FIRST BEFORE INSTALLING THE REINFORCEMENT. THIS LEAN CONCRETE SHALL NOT BE CONSIDERED IN MEASURING THE STRUCTURAL DEPTH OF CONCRETE SECTION.

- (4) THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER/CONSULTANT FOR APPROVAL PLACING SEQUENCES FOR ALL CONCRETING WORK.

c. BAR BENDING, SPLICING AND PLACING

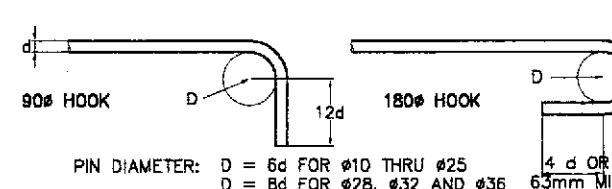
- (1) THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER/CONSULTANT FOR APPROVAL OF SHOP DRAWINGS INDICATING THE BENDING, CUTTING, SPLICING AND INSTALLATION OF ALL REINFORCING BARS.
- (2) BARS SHALL BE BEND COLD. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE FIELD BENT UNLESS PERMITTED BY THE ENGINEER/CONSULTANT.
- (3) BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
- (4) WELDED SPLICES, IF APPROVED BY THE ENGINEER, SHALL DEVELOP IN TENSION AT LEAST 125% OF THE SPECIFIED YIELD STRENGTH OF THE BARS.
- (5) NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION SHALL BE SPLICED.
- (6) 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 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

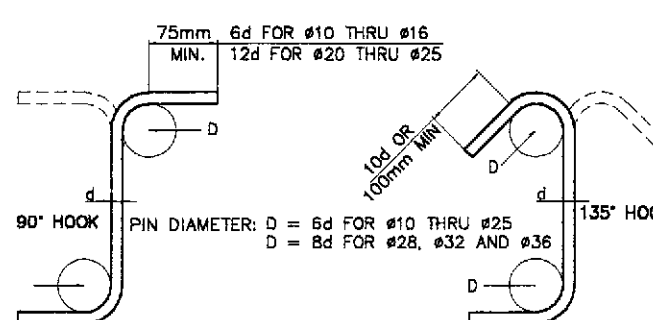


(8) HOOKS AND BENDS

DIMENSIONS OF 90-DEGREE AND 180-DEGREE HOOKS



DIMENSIONS FOR STIRRUPS AND TIE HOOKS



d. 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.

e. CONSTRUCTION JOINT

- (1) THE POSITION AND FORM OF ANY CONSTRUCTION JOINT SHALL BE AS SHOWN ON DRAWINGS OR AS AGREED WITH THE ENGINEER/CONSULTANT.
- (2) THE INTERFACE BETWEEN THE FIRST AND SECOND POUR CONCRETES SHALL BE ROUGHENED WITH AN AMPLITUDE OF 6MM MINIMUM.

f. FALSEWORK

ALL FALSEWORK SHALL BE DESIGNED BY THE CONTRACTOR SUBJECT TO THE APPROVAL BY THE ENGINEER/CONSULTANT.

g. 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/CONSULTANT. 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

h. PROTECTION AND CURING OF CONCRETE

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

6. EMBANKMENT CONSTRUCTION SEQUENCE

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

7. (a) REINFORCED CONCRETE PILES/TEST PILES

ALL PILES SHALL BE 400mm x 400mm AND 450mm x 450mm PRECAST REINFORCED CONCRETE, FRESH OR SALT WATER TYPE, UNLESS OTHERWISE NOTED. ALL PRECAST R.C. PILES SHALL BE DRIVEN TO A MINIMUM BEARING CAPACITY OF 50 TONNES (490 KN) AND 70 TONNES (680 KN), RESPECTIVELY EACH AND TO THE FULL AUTHORIZED PAY LENGTH AND IN ACCORDANCE WITH ITEM 400 (13) (PILE DRIVING) OF THE STANDARD SPECIFICATIONS FOR ROADS AND BRIDGES, VOL.II 1995. ACTUAL CASTING LENGTH SHALL BE DETERMINED FROM THE RESULT OF DRIVING TEST PILE. CUT-OFF SHALL BE AUTHORIZED ONLY UPON PRIOR APPROVAL OF THE ENGINEER/CONSULTANT. ALL PILES SHALL BE PROVIDED WITH METAL SHOES FOR HARD DRIVING. TEST PILE SHALL BE DRIVEN AS DIRECTED BY THE ENGINEER/CONSULTANT.

(b) STEEL H-PILES/SHEET PILES

THE MINIMUM QUANTITY REQUIREMENT FOR FOUNDATION PILING SHALL ONFORM TO THE SPECIFICATION FOR STRUCTURAL STEEL FOR BRIDGES, AASHTO M270 (ASTM A 709) GRADE 36 AND/OR JIS G 3101 SS400. FULL-LENGTH PILES SHALL BE USED WHERE PRACTICABLE. IF SPLICING IS PERMITTED, THE METHOD OF SPLICING SHALL BE AS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER/CONSULTANT.

JICA JAPAN INTERNATIONAL COOPERATION AGENCY		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : AS SHOWN	SHEET CONTENTS : GENERAL NOTES FOR BRIDGES (SHEET 1 OF 2) (ULTIMATE STAGE)	SHEET NO. : BG-02
DESIGNED	10/09/02 E. N. SALLAN	APPROVED	10/10/02 M. S. SALLAN	BUREAU OF DESIGN Submitted By: DANILLO C. TRAJANO Reviewed By: ADRIANO M. DOROS Recommended By: GILBERTO S. REYES Approved By: MANUEL M. BONGAN SIMEON A. DATUMANONG				
CHECKED	10/10/02 M. S. SALLAN	SUBMITTED		10/18/02 M. S. SALLAN TEAM LEADER				

GENERAL NOTES FOR BRIDGES (SHEET 2 OF 2)

B. 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.

9. SHORING

- (a) CAMBER FOR REINFORCED CONCRETE SUPERSTRUCTURES WERE DETERMINED BASED ON THE USE OF SHORINGS DURING CONSTRUCTION.
- (b) 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 AND 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/CONSULTANT. NO ADDITIONAL COST SHALL BE ALLOWED FOR ANY RELOCATION OF DETOUR.

13. PRESTRESSED CONCRETE

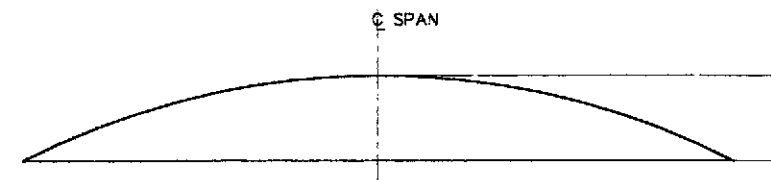
GIRDER DESIGN GUIDE

- a.) POST-TENSIONING : THE PROPOSED TYPE OF TENDONS WHICH WILL BE USED IN THE POST-TENSIONED DESIGNS, ALL NECESSARY ADDITIONAL DETAILS INCLUDING THOSE FOR END ANCHORAGES, METHODS TO BE EMPLOYED AND PROCEDURES TO BE FOLLOWED, SHALL BE AS APPROVED BY THE ENGINEERS/CONSULTANT. A PORTION OF THE TENDONS SHALL BE DRAPED LONGITUDINAL IN PARABOLIC POSITIONS. 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 "SPECIFICATIONS".

- b.) CONCRETE FOR GIRDERS SHALL BE A MINIMUM STRENGTH OF 41 N/mm² (6,000 PSI) AT THE AGE OF 28 DAYS.
- c.) CONCRETE FOR CAST-IN-PLACE SLAB HAVE A MINIMUM STRENGTH 21 N/mm² (3,000 PSI) AT THE AGE OF 28 DAYS.
- d.) THE CONTRACTOR MAY PROPOSE ANY ALTERNATIVE TENDON SIZE AND LAYOUT AND SUBJECT SHALL MEET THE APPROVAL OF THE ENGINEER.
- e.) THE REQUIRED STRENGTH OF CONCRETE AT TIME OF TENSIONING SHALL BE 35 MPa (5,000 PSI). A GRID CONSISTING OF #12 BARS AT 100 CENTERS IN BOTH DIRECTIONS SHALL BE PLACED NEAR EACH ANCHORAGE OF THE POST-TENSIONING SYSTEM.
- f.) 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 CONTRACTORS 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.
- g.) CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE ENGINEER THE CALCULATED ELONGATION OF THE PRESTRESSING TENDONS CORRESPONDING TO THE REQUIRED JACKING FORCES.
- h.) SHOP DRAWING SHALL SUBMIT FOR APPROVAL PRIOR TO FABRICATION.

14. DRAWINGS

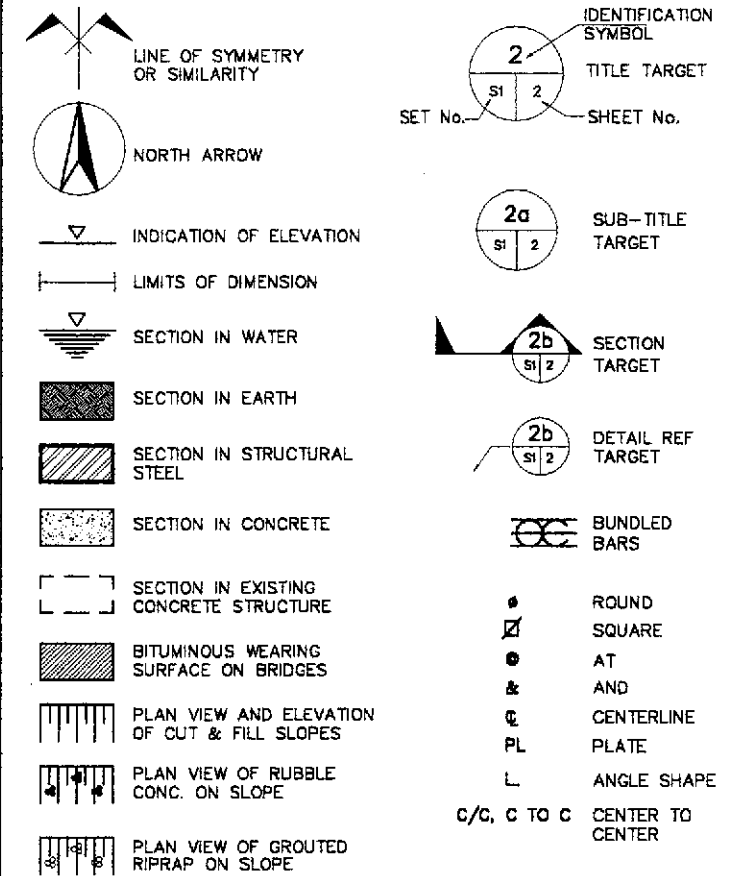
- a.) ALL ELEVATIONS, STATIONING AND DIMENSIONS SHALL BE VERIFIED PRIOR TO CONSTRUCTION.
- b.) ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.



DEAD LOAD CAMBER DIAGRAM

A = FABRICATION CAMBER - ESTIMATED PRESTRESS CAMBER LESS DEFLECTION DUE TO GIRDER DEAD LOAD

SYMBOLS



ABBREVIATIONS

ABT	ABOUT	kPa	KILOPASCAL
ABUT	ABUTMENT	m	METER
BEG	BEGINNING	mm	MILLIMETER
BET	BETWEEN	MAX	MAXIMUM
BOTT	BOTTOM	MFWL	MAX. FLOOD WATER LEVEL
BR	BRIDGE	MIN	MINIMUM
BRG	BEARING	MO	MIDDLE ORDINATE
CLR	CLEAR	MPa	MEGAPASCAL
cm	CENTIMETER	N	NEWTON
COL	COLUMN	NF	NEAR FACE
CONC	CONCRETE	No.	NUMBER
CONST	CONSTRUCTION	O.C.	ON CENTER
CTR	CENTER	PEJ	PREMOULDED EXPANSION JOINT
DET	DETAIL	PVC	POLYVINYL CHLORIDE
DIAM	DIAMETER	PVI	POINT OF VERT. INTERSECTION
DIAPH	DIAPHRAGM	QTY	QUANTITY
DWG	DRAWING	R	RADIUS
EA	EACH	RC	REINFORCED CONCRETE
EF	EACH FACE	RDWY	ROADWAY
ELEV	ELEVATION	REINF	REINFORCEMENT
ENGR	ENGINEER	SDWK	SIDEWALK
EQ	EQUAL	SL	SLOPE
EW	EACHWAY	SP	SPIRAL
EXP	EXPANSION	SPCD	SPACED
EXT	EXTERIOR	SPCS	SPACES
EXIST	EXISTING	STD	STANDARD
FF	FAR FACE	STIR	STIRRUP
FTG	FOOTING	STA	STATION
GEN	GENERAL	STRUCT	STRUCTURE
HOR	HORIZONTAL	SYMM	SYMMETRY
HW	HIGH WATER	THK	THICK
INT	INTERIOR	TYP	TYPICAL
INTERM	INTERMEDIATE	VAR	VARIABLE
JT	JOINT	VERT	VERTICAL
L	LENGTH	VOL	VOLUME
LG	LONG	W	WIDTH
kg	KILOGRAM	W/	WITH
kN	KILONEWTON	&	AND








				PROJECT AND LOCATION :		SCALE :	SHEET CONTENTS :	SHEET NO. :
JAPAN INTERNATIONAL COOPERATION AGENCY		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		AS SHOWN	GENERAL NOTES FOR BRIDGES (SHEET 2 OF 2) (ULTIMATE STAGE)	BG-03
DESIGNED	10/09/02	SIGNATURE	E. N. SALLAN	Submitted By:	Reviewed By:	Recommended By:	Approved By:	
CHECKED	10/14/02	SIGNATURE	N. KOBAYASHI	Submitted By:	Reviewed By:	Recommended By:	Approved By:	
SUBMITTED	10/18/02	SIGNATURE	Mr. Ruch	Submitted By:	Reviewed By:	Recommended By:	Approved By:	
KATAHIRA & ENGINEERS INTERNATIONAL		YACHIO ENGINEERING CO., LTD.		DANIL D. TRAJANO Project Director	ADRIANO M. DORON Chief, Bridges Division	GILBERTO S. REYES Director IV (GIC)	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary
				CABANATUAN BYPASS - CONTRACT PACKAGE II		FULL SIZE A1		

BRIDGE NAME : BRIDGE NO. 4 (ULTIMATE STAGE)
BRIDGE LENGTH : 24.00 m
SPECIFICATION : 1 - 24.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES						
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "		
101(7)	Removal of Existing Slope Protection	cu.m.	34.00	30.00		64.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	89.00	93.00		182.00
104(3)	Embankment from Borrow Pit	cu.m.	282.00	370.00		652.00
104(4)	Embankment for Bridge Approach	cu.m.	215.00	227.00		443.00
200(1)	Aggregate Subbase Course	cu.m.	14.00	14.00		28.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	59.00	59.00		118.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	160.00	167.00		327.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	132.00	132.00		264.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	9.25	9.25		18.50
400(19)b	Pile Shoes for 450 mm x 450 mm Piles	each	23.00	24.00		47.00
401(1)a	Concrete Post and Railing	l.m.			48.00	48.00
404(1)	Reinforcing Steel, Grade 40	kg	3,088.00	3,214.00	12,190.00	18,492.00
404(2)	Reinforcing Steel, Grade 60	kg	7,012.00	7,408.00	1,087.00	15,507.00
405(1)b	Structural Concrete Class "A" (f'c= 21MPa)	cu.m.	114.00	124.00		238.00
405(1)d	Structural Concrete Class "A1" (f'c= 21MPa)	cu.m.			74.44	74.44
405(3)a	Structural Concrete Class "C" (f'c = 21MPa)	cu.m.	4.00	4.00	7.20	15.20
405(6)b	Structural Concrete Class "B" (Lean Concrete) f'c= 17MPa	cu.m.	14.00	15.00		29.00
406(1)c	Prestressed Concrete Girder Type IV L=24.00m	each			5.00	5.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	5.00	5.00		10.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	10.00	10.00		20.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	2.00	2.00		4.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			2.25	2.25
504(1)	Grouted Riprap, Class "A"	cu.m.	14.00	14.00		28.00
510(1)	Rubble Concrete Slope Protection	cu.m.	33.00	37.00		70.00
506(1)	Hand Laid Rock	cu.m.	26.00	26.00		52.00
507(2)a	Steel Sheet Pile (76x457x8mm), Furnished	l.m.	189.00	189.00		378.00

BRIDGE NAME : BRIDGE NO. 6 (ULTIMATE STAGE)
BRIDGE LENGTH : 31.00 m
SPECIFICATION : 1 - 31.00 m SPAN TYPE IV-B PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES						
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "		
101(7)	Removal of Existing Slope Protection	cu.m.	40.00	39.00		79.00
101(8)	Removal of Existing Slope Protection (Hand Laid Rock)	cu.m.	21.00	20.00		41.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	110.00	103.00		213.00
104(3)	Embankment from Borrow Pit	cu.m.	363.00	400.00		763.00
104(4)	Embankment for Bridge Approach	cu.m.	250.00	250.00		500.00
200(1)	Aggregate Subbase Course	cu.m.	14.00	14.00		28.00
311(2)	PCC Pavement (Reinforced) t=300mm, including Dowel Bars (Approach Slab)	sq.m.	59.00	59.00		118.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	241.00	189.00		430.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	208.00	156.00		364.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	11.25	9.25		20.50
400(19)b	Pile Shoes for 450 mm x450 mm piles	each	27.00	27.00		54.00
401(1)a	Concrete Post and Rolling	l.m.			62.00	62.00
404(1)	Reinforcing Steel, Grade 40	kg	3,690.00	3,690.00	15,394.00	22,774.00
404(2)	Reinforcing Steel, Grade 60	kg	8,153.00	8,153.00	1,336.00	17,642.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	143.00	143.00		286.00
405(1)c	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.			97.95	97.95
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	4.00	4.00	9.30	17.30
405(6)b	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	9.00	15.00		24.00
406(1)f	Prestressed Concrete Girder Type IV-B L=31.00m	each			5.00	5.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	5.00	5.00		10.00
407(2)a	Expansion Joint, (±40mm Movement)	l.m.	10.00	10.00		20.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	2.00	2.00		4.00
407(4)	Metal Drain (150 mm ø G.I. Drain Pipe)	l.m.			3.00	3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	14.00	14.00		28.00
510(1)	Rubble Concrete	cu.m.	40.00	43.00		83.00
506(1)	Hand Laid Rock	cu.m.	26.00	26.00		52.00

 JAPAN INTERNATIONAL COOPERATION AGENCY		DATE 14/9/2017	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 (Parídel, Cabanatuan and San José Bypasses)		SCALE : N. T. S.	SHEET CONTENTS : BRIDGE NO. 3, 4, 5 & 6 SUMMARY OF QUANTITIES	SHEET NO. : BG-04		
 KATAHIRA & ENGINEERS INTERNATIONAL		CHECKED 16/10/2017	SIGNED 	BUREAU OF DESIGN Submitted By: DANILLO C. TRAJANO Project Director				OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES Director IV (OIC) Undersecretary		Approved By: MANUEL M. BENOAN SIMEON A. DATUMANONG Secretary		FULL SIZE A1	(ULTIMATE STAGE)	
 YACHIYO ENGINEERING CO., LTD.		SUBMITTED 10/11/2017	SIGNED 											

BRIDGE NAME : BRIDGE NO. 7 (ULTIMATE STAGE)
BRIDGE LENGTH : 32.00 m
SPECIFICATION : (10.00 - 12.00 - 10.00) m SPAN FLAT SLAB ON SEAT TYPE ABUTMENT

BRIDGE NAME : BRIDGE NO. 8 (ULTIMATE STAGE)
BRIDGE LENGTH : 31.00 m
SPECIFICATION : 1 - 31.00 m SPAN TYPE IV-B PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES

[illegible]

BRIDGE NAME : BRIDGE NO. 9 (ULTIMATE STAGE)
BRIDGE LENGTH : 60.00 m
SPECIFICATION : 3 - 20.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES

PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "		
101(7)	Removal of Existing Slope Protection	cu.m.	41.00	41.00		82.00
101(8)	Removal of Existing Slope Protection (Hand Laid Rock)	cu.m.	21.00	21.00		42.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	109.00	124.00		233.00
104(3)	Embankment from Borrow Pit	cu.m.	302.00	475.00		778.00
104(4)	Embankment for Bridge Approach	cu.m.	227.00	272.00		499.00
200(1)	Aggregate Subbase Course	cu.m.	14.00	14.00		28.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	59.00	59.00		118.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	207.00	231.00		438.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	175.00	196.00		371.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	10.25	10.25		20.50
400(19)b	Pile Shoes for 450 mm x 450 mm Piles	each	26.00	29.00		55.00
401(1)a	Concrete Post and Railing	l.m.			62.00	62.00
404(1)	Reinforcing Steel, Grade 40	kg	3,511.00	3,683.00	15,540.00	22,934.00
404(2)	Reinforcing Steel, Grade 60	kg	7,628.00	9,000.00	1,336.00	17,964.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	128.00	160.00		288.00
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.			98.00	98.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	4.00	4.00	10.00	18.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	15.00	16.00		31.00
406(1)f	Prestressed Concrete Girder Type IV-B L=31.00m	each			5.00	5.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	5.00	5.00		10.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	10.00	10.00		20.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	2.00	2.00		4.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00	3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	13.00	14.00		27.00
510(1)	Rubble Concrete	cu.m.	41.00	50.00		91.00
506(1)	Hand Laid Rock	cu.m.	26.00	26.00		52.00

SUMMARY OF QUANTITIES

PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "	" P1 "	" P2 "		
101(7)	Removal of Existing Slope Protection	cu.m.	56.00	45.00				101.00
101(8)	Removal of Existing Slope Protection (Hand Laid Rock)	cu.m.	25.00	23.00				48.00
101(9)	Removal of Existing Gabions	cu.m.			12.00	12.00		24.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	140.00	118.00				258.00
103(2)c	Bridge Excavation, Common, Below O.W.L.	cu.m.			139.00	235.00		374.00
104(3)	Embankment from Borrow Pit	cu.m.	558.00	426.00				984.00
104(4)	Embankment for Bridge Approach	cu.m.	354.00	319.00				673.00
200(1)	Aggregate Subbase Course	cu.m.	15.00	15.00				30.00
311(2)	PCC Pavement (Reinforced) t=300mm, including Dowel Bars (Approach Slab)	sq.m.	59.00	59.00				118.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	289.00	319.00	215.00	215.00		1,032.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	245.00	286.00	182.00	182.00		895.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	10.25	14.25	10.25	10.25		45.00
400(19)b	Pile Shoes for 450 mm x 450 mm Piles	each	36.00	27.00	27.00	27.00		117.00
401(1)a	Concrete Post and Railing	l.m.					123.00	123.00
404(1)	Reinforcing Steel, Grade 40	kg	4,276.00	3,734.00	2,917.00	2,917.00	30,277.00	44,121.00
404(2)	Reinforcing Steel, Grade 60	kg	11,853.00	9,941.00	15,583.00	15,583.00	7,106.00	60,066.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	203.00	176.00	128.00	128.00		635.00
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.					208.00	208.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	4.00	4.00			27.00	35.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	24.00	23.00	7.00	7.00		61.00
406(1)a	Prestressed Concrete Girder Type IV L=20.00m	each					15.00	15.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	5.00	5.00	10.00	10.00		30.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	10.00	10.00				20.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	2.00	2.00				4.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.					6.00	6.00
504(1)	Grouted Riprap, Class "A"	cu.m.	18.00	19.00				37.00
506(1)	Hand Laid Rock	cu.m.	47.00	45.00				92.00
510(1)	Rubble Concrete	cu.m.	74.00	61.00				135.00
509(1)	Gabions	cu.m.			73.00	73.00		146.00

NOTE: ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION

BRIDGE NAME : BRIDGE NO. 4 (LEFT FRONTAGE)
BRIDGE LENGTH : 24.00 m
SPECIFICATION : 1 - 24.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES					
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		TOTAL
			" A1 "	" A2 "	
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	70.00	74.00	144.00
104(3)	Embankment from Borrow Pit	cu.m.	119.00	144.00	263.00
104(4)	Embankment for Bridge Approach	cu.m.	164.00	164.00	328.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00	24.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00	80.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	116.00	116.00	232.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	96.00	96.00	192.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	9.25	9.25	18.50
400(19)b	Pile Shoes	each	17.00	17.00	34.00
401(1)a	Concrete Post and Railing	l.m.			48.00
404(1)	Reinforcing Steel, Grade 40	kg	2,649.00	2,653.00	16,047.00
404(2)	Reinforcing Steel, Grade 60	kg	5,379.00	5,379.00	11,561.00
405(1)b	Structural Concrete Class "A" (fc'= 21MPa)	cu.m.	86.00	86.00	172.00
405(1)d	Structural Concrete Class "A1" (fc'= 21MPa)	cu.m.			59.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	25.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc'= 17MPa	cu.m.	15.00	15.00	30.00
406(1)c	Prestressed Concrete Girder Type IV L=24.00m	each			4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00	8.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	7.00	7.00	14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00	6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	11.00	12.00	23.00
506(1)	Hand Laid Rock Apron (Loose Boulder Apron)	cu.m.	31.00	31.00	62.00
510(1)	Rubble Concrete	cu.m.	26.00	30.00	56.00
507(2)b	Steel Sheet Pile (85x400x8mm Thk.), Furnished and Driven	l.m.	222.00	224.00	446.00

BRIDGE NAME : BRIDGE NO. 5 (LEFT FRONTAGE)
BRIDGE LENGTH : 24.00 m
SPECIFICATION : 1 - 24.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES					
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		TOTAL
			" A1 "	" A2 "	
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	73.00	78.00	151.00
104(3)	Embankment from Borrow Pit	cu.m.	132.00	126.00	258.00
104(4)	Embankment for Bridge Approach	cu.m.	182.00	182.00	364.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00	24.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00	80.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	124.00	124.00	248.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	102.00	102.00	204.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	9.25	9.25	18.50
400(19)b	Pile Shoes	each	18.00	18.00	36.00
401(1)a	Concrete Post and Railing	l.m.			48.00
404(1)	Reinforcing Steel, Grade 40	kg	2,683.00	2,683.00	16,111.00
404(2)	Reinforcing Steel, Grade 60	kg	5,818.00	5,818.00	12,439.00
405(1)b	Structural Concrete Class "A" (fc'= 21MPa)	cu.m.	94.00	94.00	188.00
405(1)d	Structural Concrete Class "A1" (fc'= 21MPa)	cu.m.			59.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	25.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc'= 17MPa	cu.m.	5.00	5.00	10.00
406(1)c	Prestressed Concrete Girder Type IV L=24.00m	each			4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00	8.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	7.00	7.00	14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00	6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	47.00	47.00	94.00
506(1)	Hand Laid Rock Apron	cu.m.	32.00	32.00	64.00


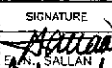

BRIDGE NAME : BRIDGE NO. 4 (RIGHT FRONTAGE)
BRIDGE LENGTH : 24.00 m
SPECIFICATION : 1 - 24.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES					
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		TOTAL
			" A1 "	" A2 "	
101(7)	Removal of Existing Slope Protection	cu.m.	34.00	30.00	64.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	84.00	70.00	154.00
104(3)	Embankment from Borrow Pit	cu.m.	217.00	166.00	383.00
104(4)	Embankment for Bridge Approach	cu.m.	155.00	155.00	310.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00	24.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00	80.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	116.00	116.00	232.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	96.00	96.00	192.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	9.25	9.25	18.50
400(19)b	Pile Shoes	each	17.00	17.00	34.00
401(1)a	Concrete Post and Railing	l.m.			48.00
404(1)	Reinforcing Steel, Grade 40	kg	2,888.00	2,671.00	16,104.00
404(2)	Reinforcing Steel, Grade 60	kg	5,517.00	5,379.00	11,699.00
405(1)b	Structural Concrete Class "A" (fc'= 21MPa)	cu.m.	88.00	86.00	174.00
405(1)d	Structural Concrete Class "A1" (fc'= 21MPa)	cu.m.			59.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	25.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc'= 17MPa	cu.m.	17.00	16.00	33.00
406(1)c	Prestressed Concrete Girder Type IV L=24.00m	each			4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00	8.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	7.00	7.00	14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00	6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	17.00	16.00	33.00
506(1)	Hand Laid Rock Apron	cu.m.	36.00	34.00	70.00
510(1)	Rubble Concrete	cu.m.	40.00	27.00	67.00
507(2)b	Steel Sheet Pile (85x400x8mm Thk.), Furnished and Driven	l.m.	258.00	245.00	503.00

BRIDGE NAME : BRIDGE NO. 5 (RIGHT FRONTAGE)
BRIDGE LENGTH : 24.00 m
SPECIFICATION : 1 - 24.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES					
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		TOTAL
			" A1 "	" A2 "	
101(7)	Removal of Existing Slope Protection	cu.m.	33.00	33.00	66.00
101(8)	Removal of Existing Slope Protection (Hand Laid)	cu.m.	19.00	19.00	38.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	73.00	78.00	151.00
104(3)	Embankment from Borrow Pit	cu.m.	203.00	214.00	417.00
104(4)	Embankment for Bridge Approach	cu.m.	182.00	182.00	364.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00	24.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00	80.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	124.00	124.00	248.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	102.00	102.00	204.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	9.25	9.25	18.50
400(19)b	Pile Shoes	each	18.00	18.00	36.00
401(1)a	Concrete Post and Railing	l.m.			48.00
404(1)	Reinforcing Steel, Grade 40	kg	2,563.00	2,627.00	15,935.00
404(2)	Reinforcing Steel, Grade 60	kg	5,706.00	5,818.00	12,327.00
405(1)b	Structural Concrete Class "A" (fc'= 21MPa)	cu.m.	93.00	94.00	187.00
405(1)d	Structural Concrete Class "A1" (fc'= 21MPa)	cu.m.			59.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	25.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc'= 17MPa	cu.m.	5.00	5.00	10.00
406(1)c	Prestressed Concrete Girder Type IV L=24.00m	each			4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00	8.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	7.00	7.00	14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00	6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	58.00	58.00	116.00
506(1)	Hand Laid Rock Apron	cu.m.	36.00	36.00	72.00

NOTE: ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION

 JAPAN INTERNATIONAL COOPERATION AGENCY		DESIGNED 10/9/2017 10/10/2017 10/19/2017	SIGNATURE  DATE 10/9/2017 10/10/2017 10/19/2017	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	SCALE : N. T. S.	SHEET CONTENTS : BRIDGE NO. 4 & 5 SUMMARY OF QUANTITIES (LEFT & RIGHT FRONTAGE) (ULTIMATE STAGE)	SHEET NO. : BG-06
 KATAHIRA & ENGINEERS YEO YACHYO ENGINEERING CO., LTD.		SUBMITTED 10/19/2017 10/19/2017		BUREAU OF DESIGN Submitted By: DANILLO C. TRAJANO Project Director		OFFICE OF THE SECRETARY Reviewed By: ADRIANO M. DOROS Chief, Bridges Division		CABANATUAN BYPASS - CONTRACT PACKAGE II		FULL SIZE A1	

BRIDGE NAME : BRIDGE NO. 6 (LEFT FRONTAGE)
BRIDGE LENGTH : 31.00 m
SPECIFICATION : 1 - 31.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES						
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "		
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	101.00	85.00		186.00
104(3)	Embankment from Borrow Pit	cu.m.	224.00	199.00		423.00
104(4)	Embankment for Bridge Approach	cu.m.	173.00	191.00		364.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00		24.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00		80.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	157.00	157.00		314.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	133.00	133.00		266.00
400(15)b	Test Piles (450 mm x 450 mm)	l.m.	10.25	10.25		20.50
400(19)b	Pile Shoes	each	20.00	20.00		40.00
401(1)a	Concrete Post and Rolling	l.m.			62.00	62.00
404(1)	Reinforcing Steel, Grade 40	kg	3,111.00	3,111.00	13,675.00	19,897.00
404(2)	Reinforcing Steel, Grade 60	kg	6,402.00	6,402.00	1,203.00	14,007.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	106.00	106.00		212.00
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.			78.00	78.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	19.00	29.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	17.00	17.00		34.00
406(1)f	Prestressed Concrete Girder Type IVB L=31.00m	each			4.00	4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00		8.00
407(2)a	Expansion Joint, Multiplex M80	l.m.	7.00	7.00		14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00		6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00	3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	9.00	10.00		19.00
506(1)	Hand Laid Rock Apron	cu.m.	35.00	33.00		68.00
510(1)	Rubble Concrete	cu.m.	38.00	37.00		75.00

BRIDGE NAME : BRIDGE NO. 7 (LEFT FRONTAGE)
BRIDGE LENGTH : 32.00 m
SPECIFICATION : (10.00 - 12.00 - 10.00) m SPAN FLAT SLAB ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES							
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER		TOTAL
			" A1 "	" A2 "	" P1 "	" P2 "	
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	63.00	63.00			126.00
103(2)c	Bridge Excavation, Common, Below O.W.L.	cu.m.			59.00	59.00	118.00
104(3)	Embankment from Borrow Pit	cu.m.	127.00	127.00			254.00
104(4)	Embankment for Bridge Approach	cu.m.	164.00	164.00			328.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00			24.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	39.00	39.00			78.00
400(4)a	RC Piles (400 mm x 400 mm) Furnished	l.m.	134.00	134.00	130.00	130.00	528.00
400(13)a	RC Piles (400 mm x 400 mm) Driven	l.m.	117.00	117.00	112.00	112.00	458.00
400(15)a	Test Piles (400 mm x 400 mm)	l.m.	12.25	12.25	11.25	11.25	47.00
400(19)a	Pile Shoes for 400 mm x 400 mm Piles	each	14.00	14.00	15.00	15.00	58.00
401(1)a	Concrete Post and Rolling	l.m.					64.00
404(1)	Reinforcing Steel, Grade 40	kg	1,692.00	1,692.00	1,528.00	1,528.00	13,166.00
404(2)	Reinforcing Steel, Grade 60	kg	4,835.00	4,835.00	4,602.00	4,602.00	35,322.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	78.00	78.00	40.00	40.00	236.00
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.					150.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	3.00	3.00			26.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	4.00	4.00	2.00	2.00	12.00
407(1)g	Elastomeric Bearing Pad (550x300x50, Duro 60)	each	3.00	3.00			6.00
407(2)b	Expansion Joint, Multiplex M80	l.m.	10.00	10.00			20.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00			6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.				3.00	3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	46.00	46.00			92.00



BRIDGE NAME : BRIDGE NO. 6 (RIGHT FRONTAGE)
BRIDGE LENGTH : 31.00 m
SPECIFICATION : 1 - 31.00 m SPAN TYPE IV-B PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES						
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "		
101(7)	Removal of Existing Slope Protection	cu.m.	40.00	39.00		80.00
101(8)	Removal of Existing Slope Protection (Hand Laid)	cu.m.	21.00	20.00		42.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	85.00	96.00		182.00
104(3)	Embankment from Borrow Pit	cu.m.	268.00	272.00		541.00
104(4)	Embankment for Bridge Approach	cu.m.	200.00	191.00		392.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00		25.00
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00		81.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	157.00	137.00		294.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	133.00	114.00		247.00
400(15)b	Test Piles (450 mm x 450 mm)	l.m.	10.25	9.25		19.50
400(19)b	Pile Shoes	each	20.00	20.00		40.00
401(1)a	Concrete Post and Rolling	l.m.			62.00	62.00
404(1)	Reinforcing Steel, Grade 40	kg	3,067.00	3,101.00	13,675.00	19,844.00
404(2)	Reinforcing Steel, Grade 60	kg	6,727.00	6,894.00	1,203.00	14,625.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	107.00	106.00		214.00
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.			78.00	78.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	19.00	30.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	18.00	19.00		38.00
406(1)f	Prestressed Concrete Girder Type IV-B L=31.00m	each			4.00	4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00		8.00
407(2)a	Expansion Joint, Multiplex M80	l.m.	7.00	7.00		14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00		7.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00	3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	14.00	17.00		32.00
506(1)	Hand Laid Rock Apron	cu.m.	36.00	38.00		75.00
510(1)	Rubble Concrete	cu.m.	39.00	42.00		82.00

BRIDGE NAME : BRIDGE NO. 7 (RIGHT FRONTAGE)
BRIDGE LENGTH : 32.00 m
SPECIFICATION : (10.00 - 12.00 - 10.00) m SPAN FLAT SLAB ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES									
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER		SUPER- STRUCTURE	TOTAL	
			" A1 "	" A2 "	" P1 "	" P2 "			
101(7)	Removal of Slope Protection	cu.m.	31.00	31.00				62.00	
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	63.00	63.00				126.00	
103(2)c	Bridge Excavation, Common, Below O.W.L.	cu.m.			59.00	59.00		118.00	
104(3)	Embankment from Borrow Pit	cu.m.	207.00	197.00				404.00	
104(4)	Embankment for Bridge Approach	cu.m.	164.00	164.00				328.00	
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00				24.00	
311(2)	PCC Pavement (Reinforced) t=300mm, Including Dowel Bars (Approach Slab)	sq.m.	39.00	39.00				78.00	
400(4)a	RC Piles (400 mm x 400 mm) Furnished	l.m.	134.00	134.00	130.00	130.00		528.00	
400(13)a	RC Piles (400 mm x 400 mm) Driven	l.m.	117.00	117.00	112.00	112.00		458.00	
400(15)a	Test Piles (400 mm x 400 mm)	l.m.	12.25	12.25	11.25	11.25		47.00	
400(19)a	Pile Shoes for 400 mm x 400 mm Piles	each	14.00	14.00	15.00	15.00		58.00	
401(1)a	Concrete Post and Rolling	l.m.					64.00	64.00	
404(1)	Reinforcing Steel, Grade 40	kg	1,716.00	1,716.00	1,528.00	1,528.00	6,726.00	13,214.00	
404(2)	Reinforcing Steel, Grade 60	kg	4,859.00	4,859.00	4,602.00	4,602.00	16,448.00	35,370.00	
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	78.00	79.00	40.00	40.00		238.00	
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.					150.00	150.00	
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	3.00	3.00			20.00	26.00	
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	4.00	4.00	2.00	2.00		12.00	
407(1)g	Elastomeric Bearing Pad (550x300x50, Duro 60)	each	3.00	3.00				6.00	
407(2)a	Expansion Joint, Multiplex M80	l.m.	10.00	10.00				20.00	
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00				6.00	
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.					3.00	3.00	
504(1)	Grouted Riprap, Class "A"	cu.m.	56.00	55.00				111.00	

NOTE: ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION

 JAPAN INTERNATIONAL COOPERATION AGENCY		DESIGNED: 10/09/07 E.N. SALLAN	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 (Marikina, Cabanatuan and San Jose Bypasses)	SCALE : N.T.S.	SHEET CONTENTS : BRIDGE NO. 6 & 7 SUMMARY OF QUANTITIES (LEFT & RIGHT FRONTAGE (ULTIMATE STAGE))	SHEET NO. : BG-07
 KATAHIRA & ENGINEERS YACHIO ENGINEERING CO., LTD.		CHECKED: 10/16/07 R. KASAHARA	BUREAU OF DESIGN Submitted By: DANILLO C. TRAJANO Project Director		OFFICE OF THE SECRETARY Recommended By: MANUEL M. BONGAN Undersecretary	FULL SIZE A1		
		SUBMITTED: 10/16/07 R. KASAHARA	Reviewed By: ADRIANO M. DORGY Chief, Bridges Division		Approved By: SIMEON A. DATUMANONG Secretary			




BRIDGE NAME : BRIDGE NO. 8 (LEFT FRONTAGE)
BRIDGE LENGTH : 31.00 m
SPECIFICATION : 1 - 31.00 m SPAN TYPE IVB PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES						
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "		
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	109.00	90.00		199.00
104(3)	Embankment from Borrow Pit	cu.m.	153.00	298.00		451.00
104(4)	Embankment for Bridge Approach	cu.m.	182.00	218.00		400.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00		24.00
311(2)	PCC Pavement (Reinforced) t=300mm, including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00		80.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	157.00	182.00		339.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	133.00	154.00		287.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	10.25	10.25		20.50
400(19)b	Pile Shoes	each	20.00	23.00		43.00
401(1)a	Concrete Post and Railing	l.m.			62.00	62.00
404(1)	Reinforcing Steel, Grade 40	kg	3,165.00	3,545.00	14,893.00	21,603.00
404(2)	Reinforcing Steel, Grade 60	kg	6,650.00	7,673.00	1,203.00	15,526.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	113.00	132.00		245.00
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.			78.00	78.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	19.00	29.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	17.00	18.00		35.00
406(1)f	Prestressed Concrete Girder Type IV-B L=31.00m	each			4.00	4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00		8.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	7.00	7.00		14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00		6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00	3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	12.00	13.00		25.00
506(1)	Hand Laid Rock Apron	cu.m.	32.00	36.00		68.00
510(1)	Rubble Concrete	cu.m.	28.00	49.00		77.00

BRIDGE NAME : BRIDGE NO. 8 (RIGHT FRONTAGE)
BRIDGE LENGTH : 31.00 m
SPECIFICATION : 1 - 31.00 m SPAN TYPE IVB PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES						
PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		SUPER- STRUCTURE	TOTAL
			" A1 "	" A2 "		
101(7)	Removal of Existing Slope Protection	cu.m.	41.00	41.00		82.00
101(8)	Removal of Existing Slope Protection (Hand Laid)	cu.m.	21.00	21.00		42.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	121.00	114.00		235.00
104(3)	Embankment from Borrow Pit	cu.m.	331.00	319.00		650.00
104(4)	Embankment for Bridge Approach	cu.m.	191.00	218.00		409.00
200(1)	Aggregate Subbase Course	cu.m.	12.00	12.00		24.00
311(2)	PCC Pavement (Reinforced) t=300mm, including Dowel Bars (Approach Slab)	sq.m.	40.00	40.00		80.00
400(4)b	RC Piles (450 mm x 450 mm) Furnished	l.m.	165.00	182.00		347.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	140.00	154.00		294.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	10.25	10.25		18.00
400(19)b	Pile Shoes	each	21.00	23.00		44.00
401(1)a	Concrete Post and Railing	l.m.			62.00	62.00
404(1)	Reinforcing Steel, Grade 40	kg	3,322.00	3,416.00	13,763.00	20,501.00
404(2)	Reinforcing Steel, Grade 60	kg	7,173.00	7,533.00	1,203.00	15,909.00
405(1)b	Structural Concrete Class "A" (fc' = 21MPa)	cu.m.	123.00	130.00		253.00
405(1)d	Structural Concrete Class "A1" (fc' = 21MPa)	cu.m.			78.00	78.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	19.00	29.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc' = 17MPa	cu.m.	19.00	20.00		39.00
406(1)f	Prestressed Concrete Girder Type IV-B L=31.00m	each			4.00	4.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	4.00	4.00		8.00
407(2)a	Expansion Joint, (± 40mm Movement)	l.m.	7.00	7.00		14.00
407(2)g	Expansion Joint, 30mm for Bridge Sidewalk	l.m.	3.00	3.00		6.00
407(4)	Metal Drain (150 mm Ø G.I. Drain Pipe)	l.m.			3.00	3.00
504(1)	Grouted Riprap, Class "A"	cu.m.	17.00	20.00		37.00
506(1)	Hand Laid Rock Apron	cu.m.	38.00	40.00		78.00
510(1)	Rubble Concrete	cu.m.	38.00	52.00		90.00

NOTE: ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION

 JAPAN INTERNATIONAL COOPERATION AGENCY		 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS		PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)		SCALE : N. T. S.	SHEET CONTENTS : BRIDGE NO. 8 SUMMARY OF QUANTITIES (LEFT & RIGHT FRONTAGE (ULTIMATE STAGE))	SHEET NO. : BG-08
 KATAHIRA & ENGINEERS YEO YACHIYO ENGINEERING CO., LTD.	DESIGNED 10/10/02 E. K. SALLAN	SUBMITTED 10/10/02 D. C. TRAJANO Project Director	REVIEWED BY: ADRIANO M. DOROS Chief, Bridges Division	RECOMMENDED BY: GILBERTO S. REYES Director IV (OC)	APPROVED BY: MANUEL M. BONOAN Undersecretary	APPROVED BY: SIMONE A. DATUMANONG Secretary		