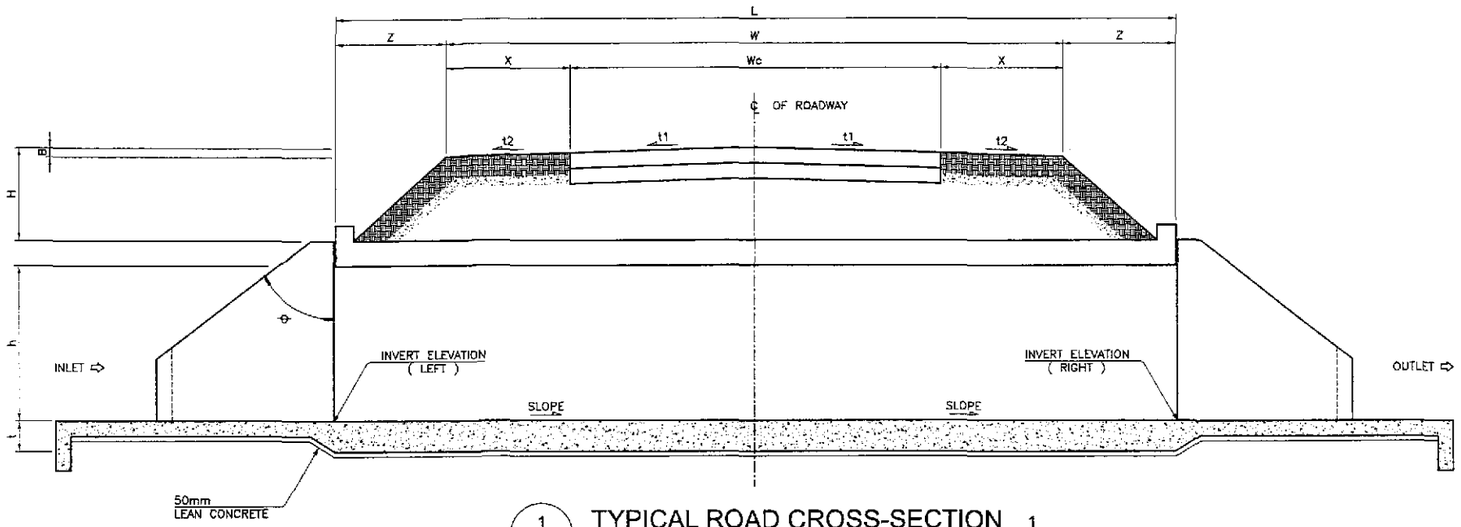
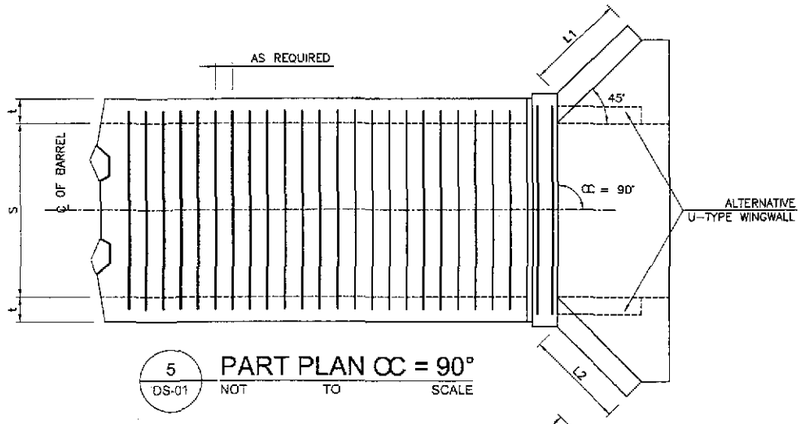


1 DS-01 **TYPICAL ROAD CROSS-SECTION** 1 — NOT TO SCALE



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

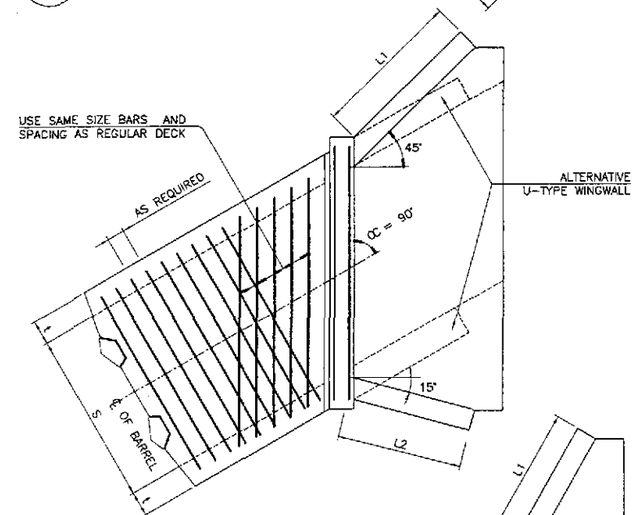
LEGEND :

W	—	WIDTH OF ROADWAY FORMATION
x	—	WIDTH OF SHOULDER
Wc	—	WIDTH OF CARRIAGEWAY
H	—	COVER ABOVE THE CULVERT
L	—	TOTAL LENGTH OF BARREL
t1	—	SLOPE OF CARRIAGEWAY
t2	—	SLOPE OF SHOULDER
Z	—	$[(H+t) - (B+200)]$ tan θ
B	—	$xt_2+0.5t_1Wc$
h	—	HEIGHT OF CULVERT OPENING
t	—	THICKNESS OF CULVERT WALL OR SLAB
θ	—	SLOPE OF EMBANKMENT
CC	—	ANGLE OF SKEW

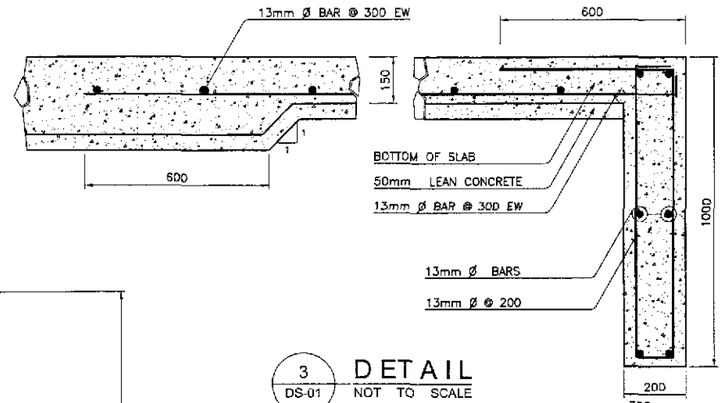
HORIZONTAL SKEW ANGLE CC	L (mm)
90°	W+2ton θ [(H+t) − (B+200)]
60°	1.1547 (W+2ton θ [(H+t)−(B+200)])
45°	1.4142 (W+2ton θ [(H+t)−(B+200)])

NOTES:

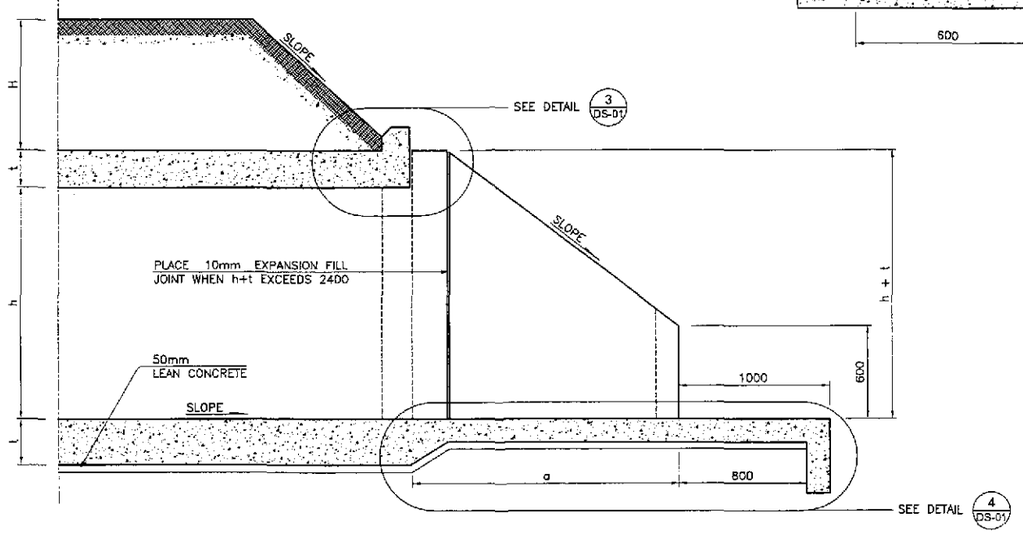
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
3. MINIMUM CONCRETE COVER SHALL BE 40 CLEAR. WHEN HEIGHT OF FILL H=D INCREASE COVER BY 30.



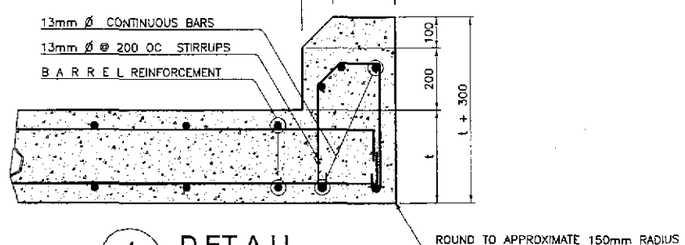
6 DS-01 **PART PLAN CC = 60°** — NOT TO SCALE



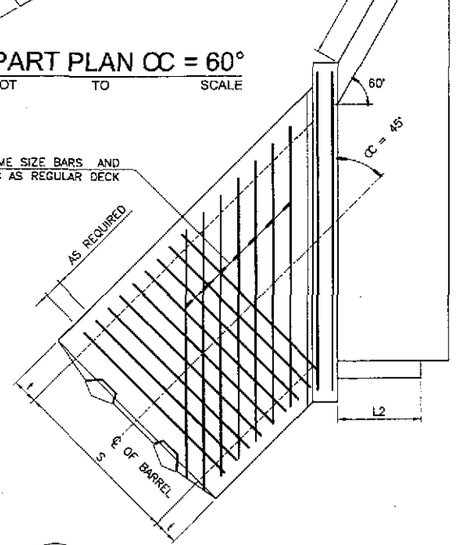
3 DS-01 **DETAIL** — NOT TO SCALE



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



4 DS-01 **DETAIL** — NOT TO SCALE



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

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

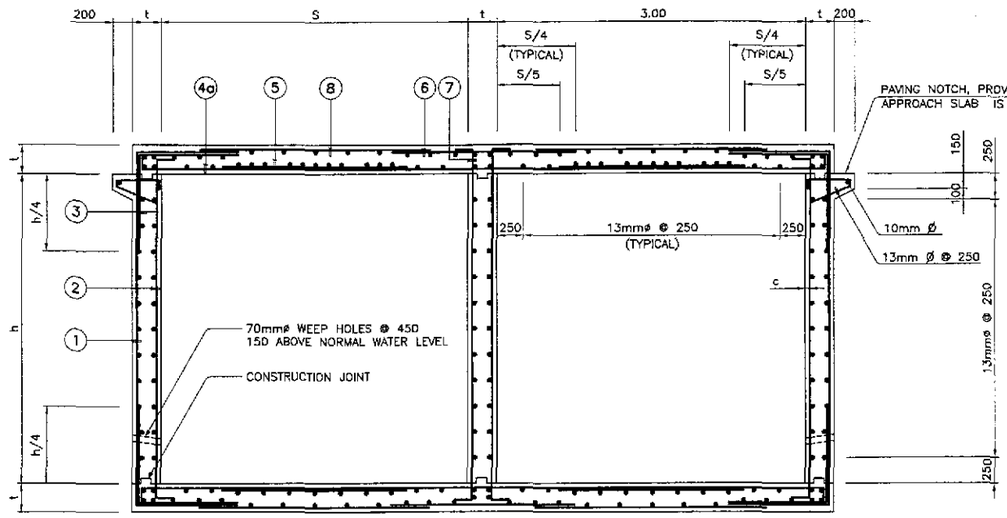
JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

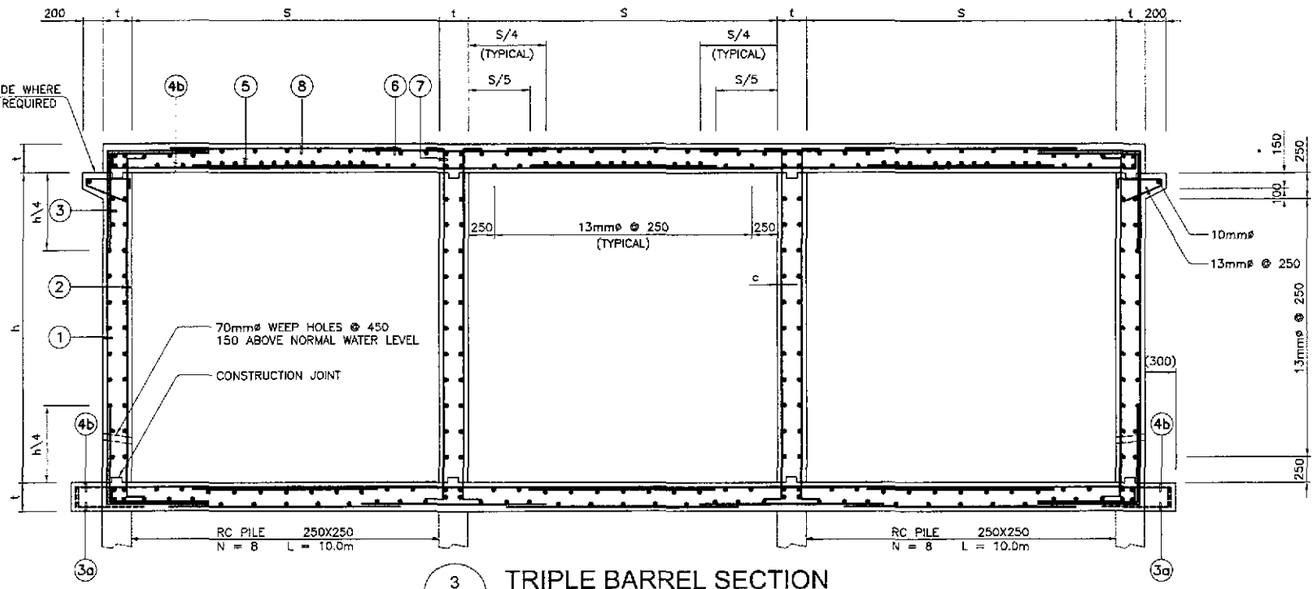
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	10/17/02		Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	10/19/02	A. HAKIMA	DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
SUBMITTED	10/21/02	TEAM LEADER	Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

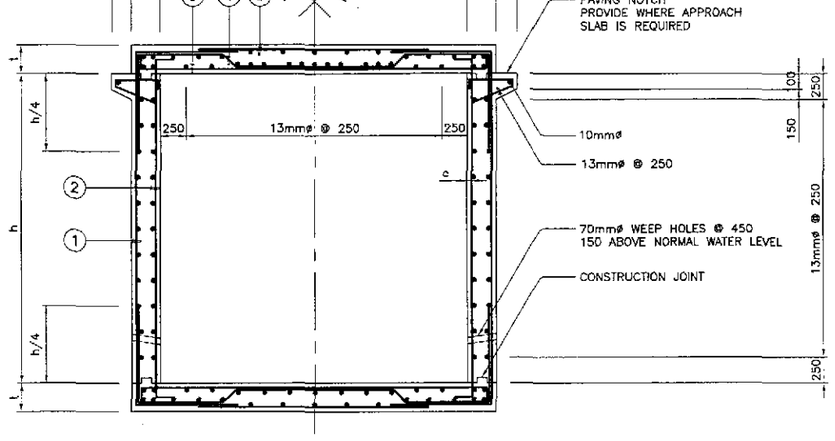
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	1:100	STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)	DS-01
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



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



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



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

NOTE:

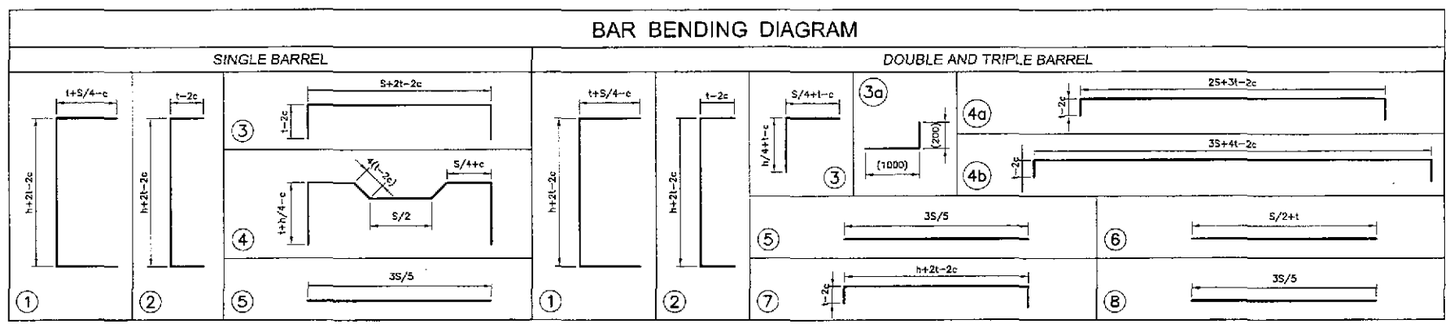
FOR WALL THICKNESS LESS THAN 240, STAGGER HORIZONTAL REINFORCEMENT AS SHOWN.

LEGEND:

c = CONCRETE CLEAR COVER (50mm)

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

BAR BENDING DIAGRAM



CLEAR		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
2400	1800	220	16	220	16	280	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2100	220	16	220	16	260	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2400	220	16	220	16	200	16	220	16	220	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
	2750	220	16	200	16	180	16	200	16	200	13	240	300	16	300	16	280	16	300	16	300	16	300	20	120	13	300	13	200
3000	2100	280	16	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200
	2400	280	16	260	16	260	16	260	16	260	13	200	300	20	300	16	280	20	300	20	300	20	300	25	170	13	300	13	200
	2750	280	16	200	16	240	16	220	16	200	13	200	300	20	300	16	200	20	300	20	300	20	300	25	170	16	300	13	200
	3000	280	16	200	16	220	16	200	16	200	13	200	300	20	300	16	200	20	300	20	300	20	300	25	170	16	300	13	200
3000	2500												300	20	300	16	200	20	300	20	300	20	300	25	170	16	300	13	200

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC) BARRELS

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	10/17/02	F. SINLAO MARIA					
CHECKED	10/19/02	A. HAKIM	Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
SUBMITTED	10/21/02	TEAM LEADER	DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONDAN	SIMEON A. DATUMANONG
			Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE IV	1:30 FULL SIZE A1	STANDARD DETAILS OF RCBC BARRELS	DS-02

QUANTITIES FOR STANDARD BOX CULVERTS

CLEAR SPAN S	CLEAR HEIGHT h	QUANTITY PER METER OF BARREL					
		SINGLE		DOUBLE		TRIPLE	
		CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	REINFORCEMENT (kg)
1250	1000	0.94	113.32	1.63	209.22	2.33	296.18
	1250	1.03	121.63	1.77	216.22	2.51	312.39
	1500	1.12	130.98	1.90	232.07	2.69	330.39
	1800	1.23	141.71	2.07	249.50	2.91	352.09
1500	1000	1.03	165.90	2.04	253.90	2.92	354.80
	1250	1.12	177.10	2.19	256.00	3.12	370.20
	1500	1.21	189.60	2.34	279.60	3.32	387.10
	1800	1.32	202.50	2.52	296.20	3.56	407.10
1800	1250	1.38	189.20	3.11	312.30	4.45	437.00
	1500	1.48	199.90	3.30	326.10	4.70	454.00
	1800	1.60	214.80	3.53	342.80	5.00	475.20
	2100	1.72	239.60	3.75	357.50	5.30	494.40
2400	1800	2.04	272.70	5.04	431.80	7.20	619.10
	2100	2.17	288.50	5.31	447.30	7.56	637.10
	2400	2.31	314.10	5.58	461.80	7.92	656.40
	2750	2.46	356.70	5.90	478.60	8.34	677.70
3000	2100	3.17	308.70	6.03	635.70	8.64	899.70
	2400	3.34	321.30	6.30	652.00	9.00	919.60
	2750	3.53	374.40	6.62	705.60	9.42	895.00
	3000	3.67	413.50	6.84	721.60	9.72	1015.40

QUANTITIES FOR STANDARD WINGWALLS

m (meter)	h+t (meter)	L (meter)	QUANTITY PER WINGWALL AND APRON SLAB					
			SINGLE		DOUBLE		TRIPLE	
			CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	REINFORCEMENT (kg)	CONCRETE (m3)	REINFORCEMENT (kg)
1.37	1.18	1.23	2.41	150	2.94	180	3.48	220
1.75	1.43	1.76	3.48	220	4.08	265	4.72	300
2.12	1.68	2.29	4.66	300	5.36	350	6.06	395
2.57	1.98	2.93	6.22	405	7.01	450	7.80	500
1.37	1.18	1.23	2.50	140	3.26	180	3.88	220
1.75	1.43	1.76	3.69	210	4.42	250	5.16	290
2.12	1.88	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	6.46	360	8.09	450	9.26	510
3.05	2.30	3.61	8.37	460	10.00	550	11.31	620
2.63	2.02	3.01	7.08	390	9.14	500	10.71	590
3.08	2.32	3.65	9.28	510	11.61	640	13.37	740
3.53	2.62	4.28	11.42	630	13.98	770	15.92	880
4.06	2.97	5.03	14.17	780	17.90	990	19.15	1050
3.17	2.38	3.78	10.08	560	12.38	680	14.53	800
3.62	2.68	4.41	12.30	680	14.83	820	17.19	940
4.15	3.03	5.15	15.15	840	17.94	990	20.57	1130
4.52	3.28	5.68	17.34	960	20.33	1120	23.15	1270

GENERAL NOTES :

SPECIFICATION :

AASHTO STANDARD SPECIFICATION FOR HIGHWAY BRIDGES. 16th EDITION 1996.

DESIGN LOAD :

LIVE LOAD MS-18 (HS 20-44)

CONCRETE :

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

STEEL REINFORCEMENT :

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

GENERAL :

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

LIVE LOAD DISTRIBUTION REINFORCEMENT :

WHEN THERE IS LESS THAN 500mm 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 :

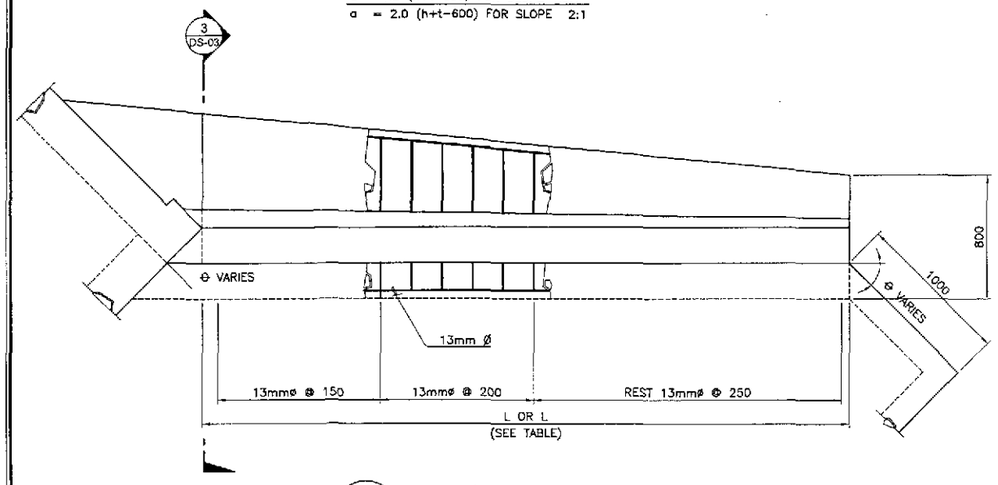
MAXIMUM HEIGHT OF FILL IS 3000mm ABOVE TOP SLAB, FOR HEIGHT OF FILL GREATER THAN 3000mm SPECIAL DESIGN OF BOX CULVERT SHOULD BE DONE.

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

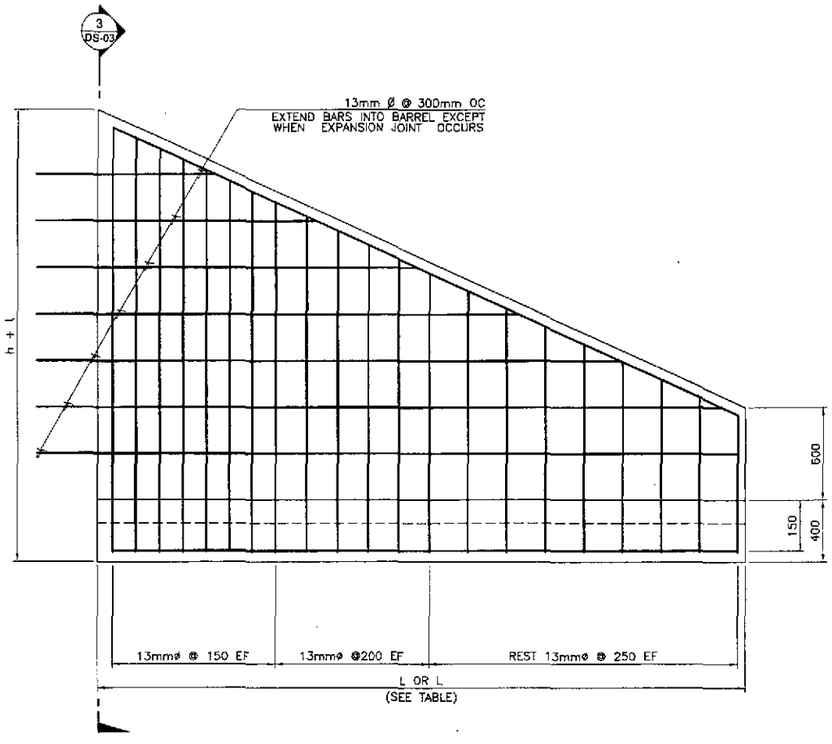
WHERE :

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

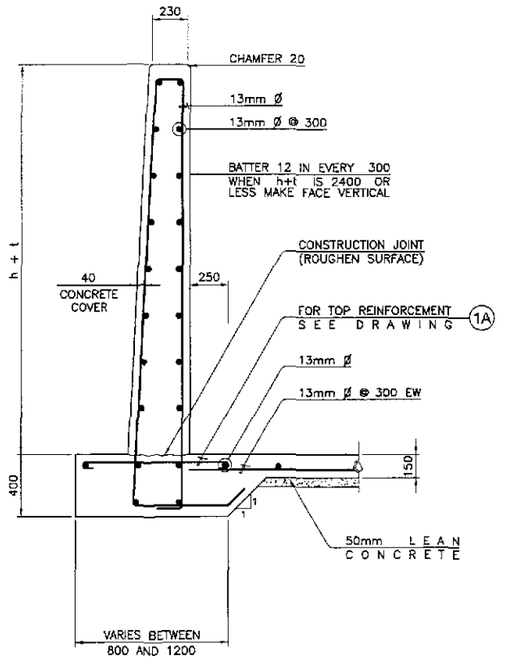
a = 2.0 (h+t-600) FOR SLOPE 2:1



1 DS-03 WINGWALL PLAN SCALE 1:40



2 DS-03 WINGWALL ELEVATION SCALE 1:40



3 DS-03 SECTION SCALE 1:40

RCBC WINGWALL DETAILS

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE
DESIGNED	10/17/02	T. STA. MARIA
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

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

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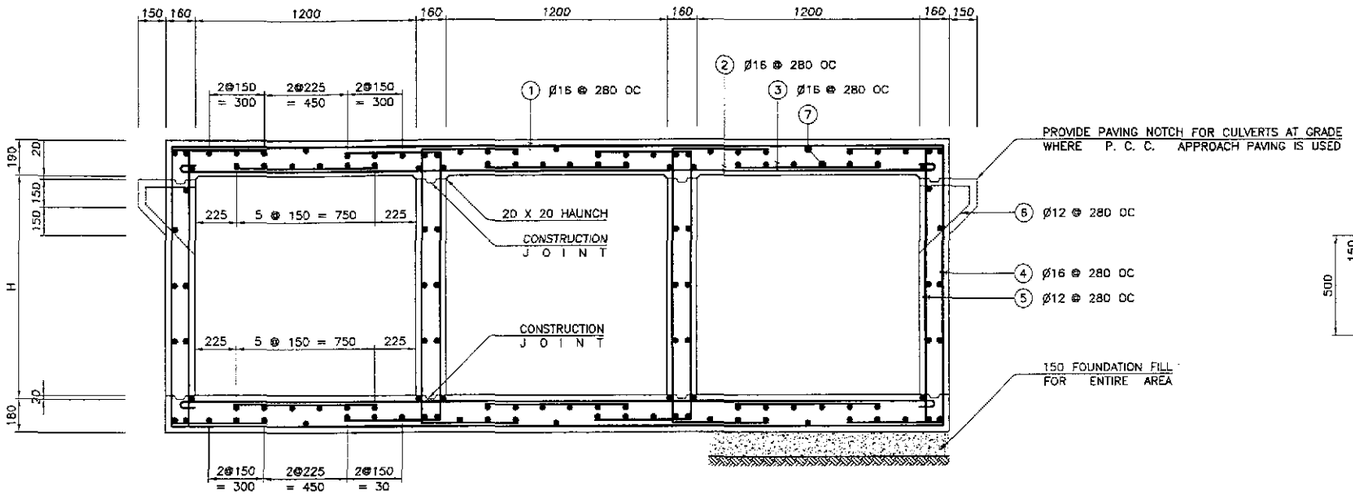
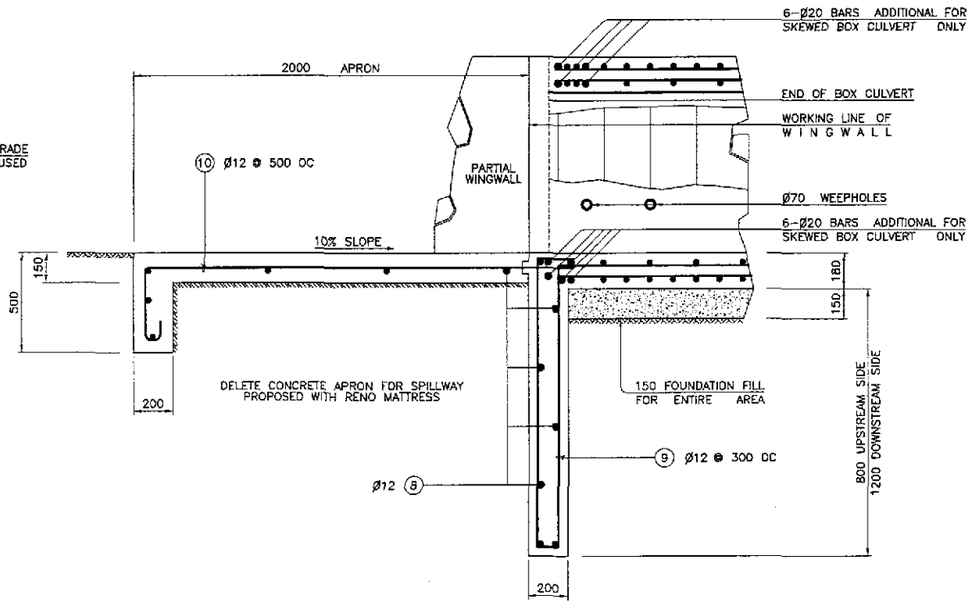
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



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



1B DS-04 PARTIAL SECTION A
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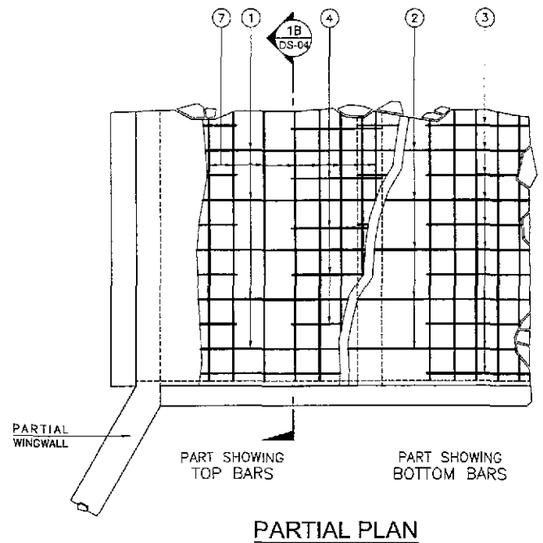
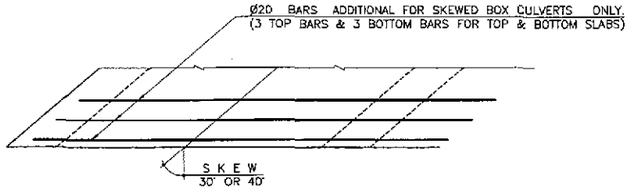
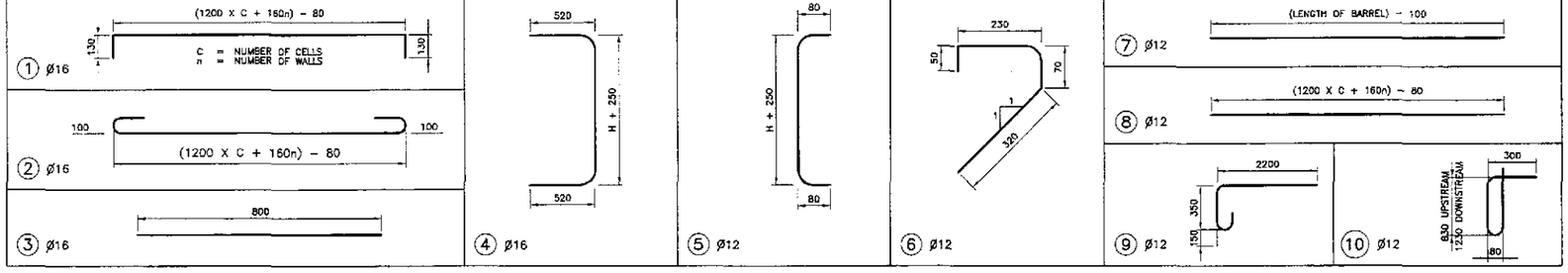


PARTIAL PLAN
NOT TO SCALE



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

BAR BENDING DIAGRAM



ESTIMATE OF QUANTITIES (PER LINEAR METER OF LENGTH)

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

ADDITIONAL WEIGHT OF REINFORCEMENT PER END OF BOX CULVERT
30° SKEW = 98.5 kgs. 30° SKEW = 45.5 kgs.
45° SKEW = 120.5 kgs. 45° SKEW = 57.0 kgs.

APRON AND END TOE FOR BOTH ENDS

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

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

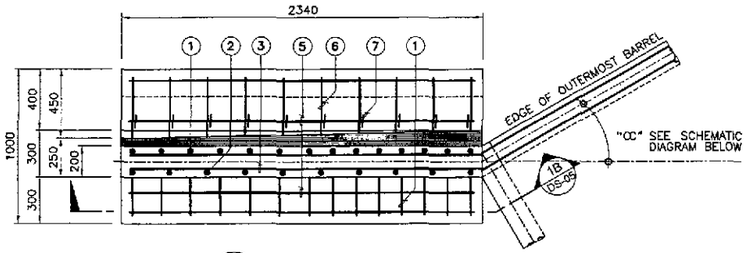
JICA JAPAN INTERNATIONAL COOPERATION AGENCY
KEI KATAHIRA & ENGINEERS INTERNATIONAL
YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/17/02	
CHECKED	10/29/02	
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)	DS-04
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



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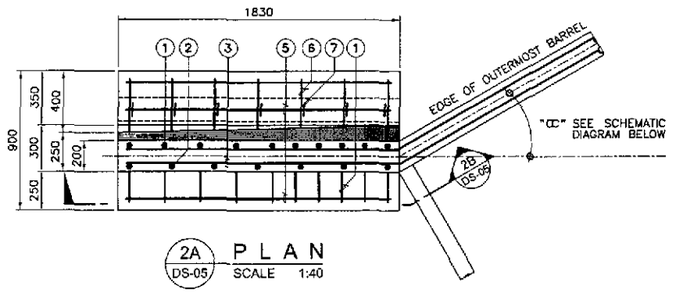

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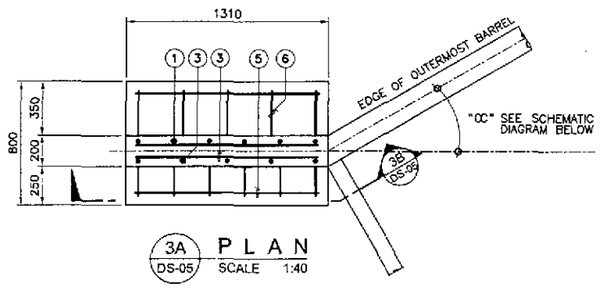

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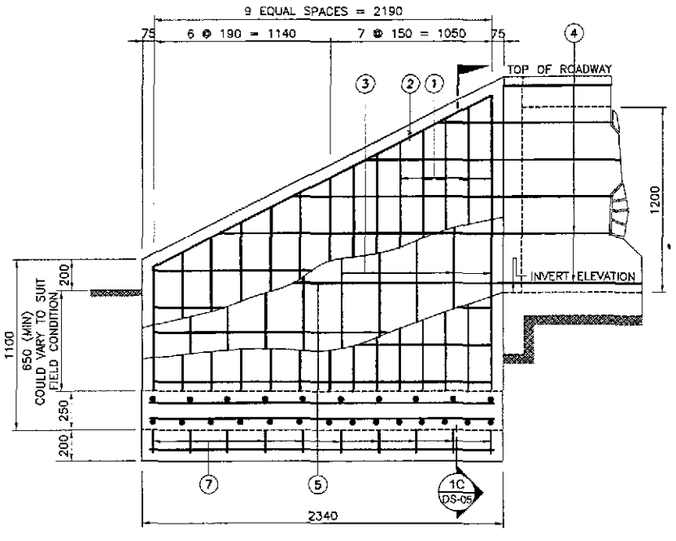

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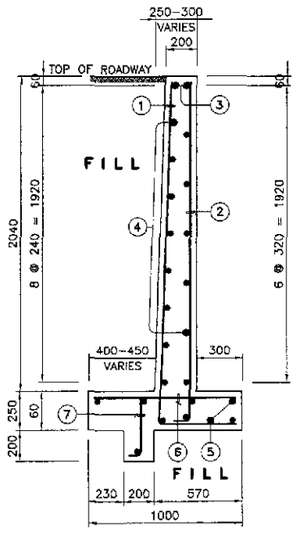

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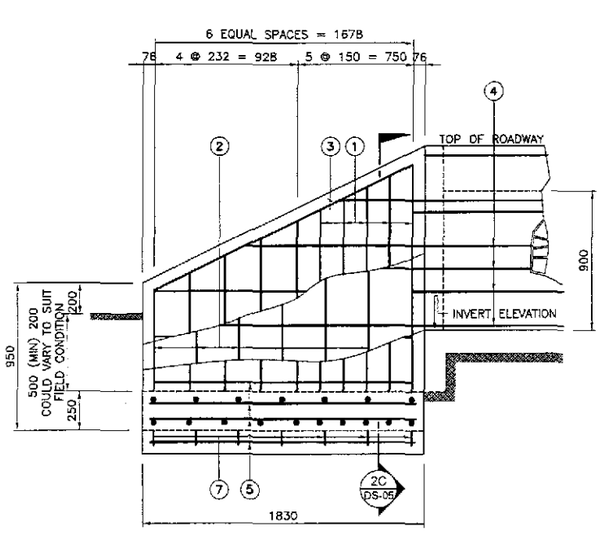

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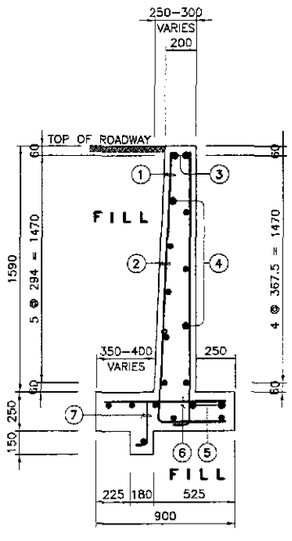

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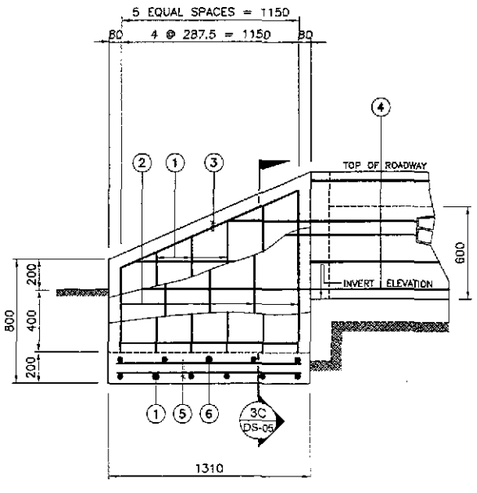
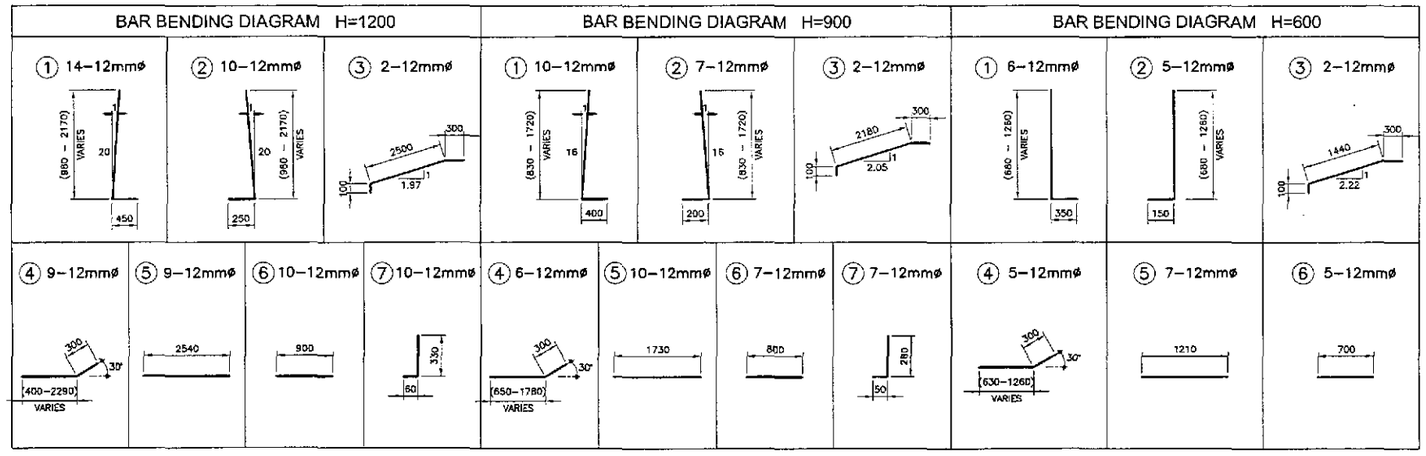


3B DS-05 ELEVATION SCALE 1:40

BAR BENDING DIAGRAM H=1200

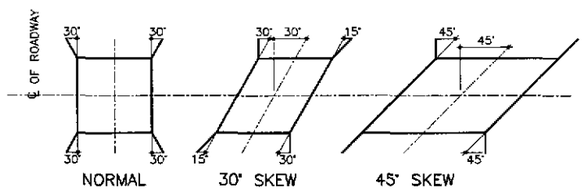


BAR BENDING DIAGRAM H=900

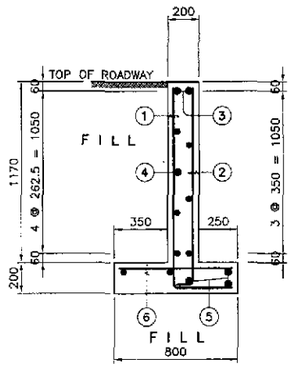
BAR BENDING DIAGRAM H=600

ESTIMATE OF QUANTITIES PER WINGWALL

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



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



3C DS-05 SECTION SCALE 1:40

LOW DEPTH TYPE BOX CULVERT

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/17/02	TEAM LEADER
CHECKED	10/19/02	H. TEAM
SUBMITTED	10/21/02	

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
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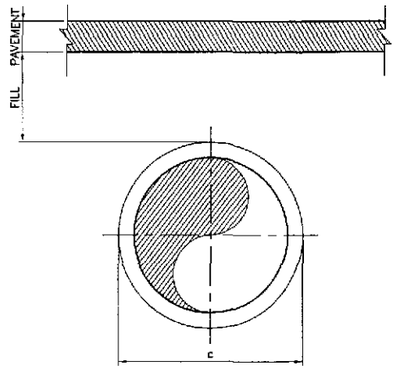


STANDARD STRENGTH PIPES:
FILL 1/2 E.D. FOR FLEXIBLE PAVEMENT OR MIN. OF 0.60 m
0.30 m FOR RIGID PAVEMENT
EXTRA STRENGTH PIPES:
FILL: 0.30 m FOR RIGID AND FLEXIBLE PAVEMENTS

MINIMUM PIPE COVERING

DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT

STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS

CONCRETE 247 kg/cm² (3,500 lb/in²)

SIZE OF PIPE (mm)	WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE	
I.D.	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT
300	57	344	363	351	370	44	1 LINE 1.48	
380	57	344	363	351	370	44	1 LINE 1.90	
460	64	508	527	514	534	44	1 LINE 2.54	1 LINE 2.12
610	76	673	692	680	699	44	1 LINE 3.60	1 LINE 2.75
760	89	858	857	845	864	51	1 LINE 4.66	1 LINE 3.60
910	102	1003	1022	1010	1029	64	2 LINES EACH 3.81	1 LINE 3.81
1070	114	1168	1187	1175	1194	64	2 LINES EACH 4.44	1 LINE 4.44
1220	127	1334	1353	1340	1359	64	2 LINES EACH 5.29	1 LINE 5.29
1520	152	1664	1683	1670	1690	64	2 LINES EACH 6.98	1 LINE 6.98

CONCRETE 317 kg/cm² (4,500 lb/in²)

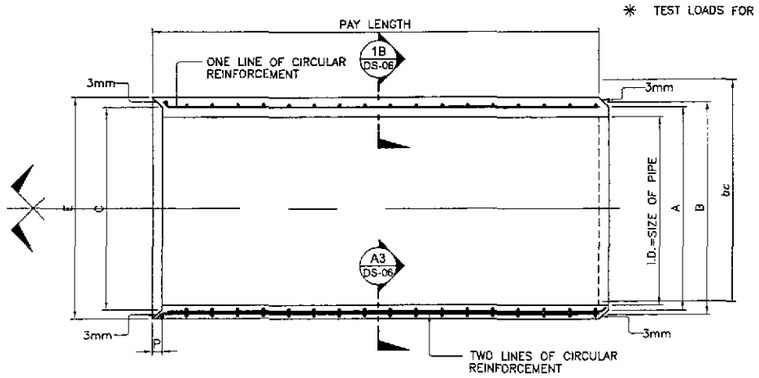
WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ❁		STRENGTH TEST REQUIREMENTS kg/m OF PIPE THREE-EDGE-BEARING METHOD ✳	
t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	ULTIMATE LOAD
51	495	514	502	521	44	1 LINE 1.69		3.355	5.218
51	495	514	502	521	44	1 LINE 2.33		3.914	6.060
51	495	514	502	521	44	1 LINE 2.96		4.473	6.709
64	660	680	667	686	44	1 LINE 4.23	1 LINE 3.60	4.473	7.454
76	825	845	832	851	51	1 LINE 5.92	1 LINE 4.44	5.032	8.573
86	988	1007	994	1013	64	2 LINES EACH 4.66	1 LINE 4.66	6.038	9.840
95	1150	1165	1156	1175	64	2 LINES EACH 5.29	1 LINE 5.29	7.045	10.958
108	1315	1334	1321	1340	64	2 LINES EACH 5.56	1 LINE 6.56	8.051	11.927
127	1639	1658	1645	1664	64	2 LINES EACH 8.68	1 LINE 8.68	8.945	14.909

EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS

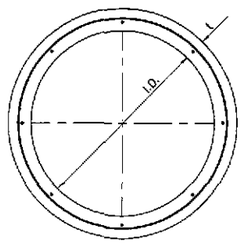
CONCRETE 317 kg/cm² (4,500 lb/in²)

WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ○		STRENGTH TEST REQUIREMENTS kg/m OF PIPE THREE-EDGE-BEARING METHOD	
t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	LOAD ULTIMATE
—	—	—	—	—					
—	—	—	—	—					
—	—	—	—	—					
76	673	692	680	699	44	1 LINE 5.50	1 LINE 4.23	5.964	8.945
89	838	857	845	864	51	1 LINE 6.56	1 LINE 5.08	7.454	11.182
102	1003	1022	1010	1029	64	2 LINES EACH 5.92	1 LINE 5.92	8.945	13.418
114	1168	1187	1175	1194	64	2 LINES EACH 6.98	1 LINE 6.98	10.436	15.655
127	1334	1353	1340	1359	64	2 LINES EACH 8.04	1 LINE 8.04	11.927	17.891
152	1664	1683	1670	1690	64	2 LINES EACH 10.56	1 LINE 10.56	13.418	22.364

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

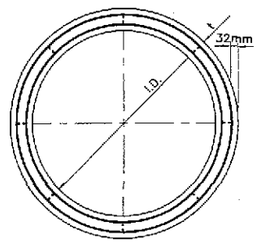


1A DS-06 LONGITUDINAL SECTION NOT TO SCALE



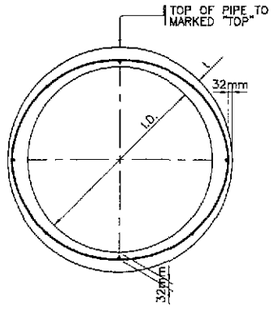
ONE LINE OF CIRCULAR REINFORCEMENT

1B DS-06 SECTION

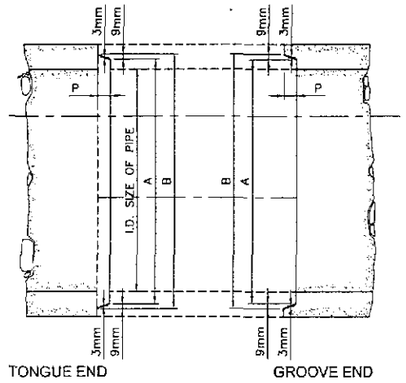


TWO LINES OF CIRCULAR REINFORCEMENT

1C DS-06 SECTION

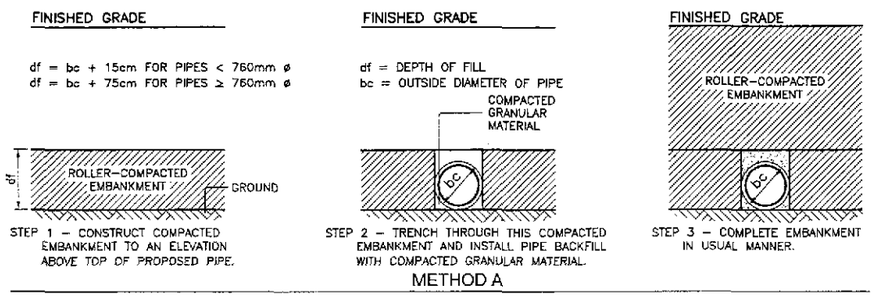


ONE LINE OF ELLIPTICAL REINFORCEMENT

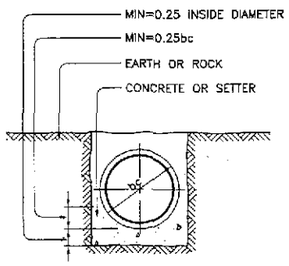


1D DS-06 SECTION

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

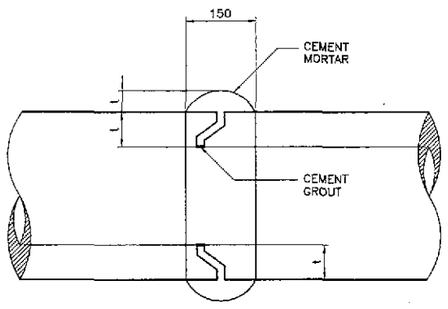


2 DS-06 METHODS OF PIPE INSTALLATION NOT TO SCALE



CONCRETE CRADLE BEDDING ORDINARY BEDDINGS

3 DS-06 TYPICAL BEDDING FOR CONDUITS NOT TO SCALE



4 DS-06 DETAIL OF PIPE COLLAR NOT TO SCALE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/17/02	F. STA. MARIA
CHECKED	10/19/02	H. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

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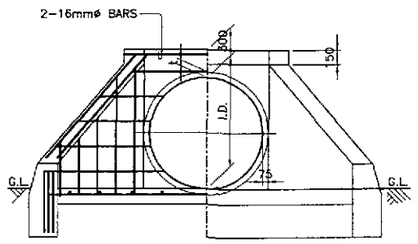
CABANATUAN BYPASS - CONTRACT PACKAGE IV

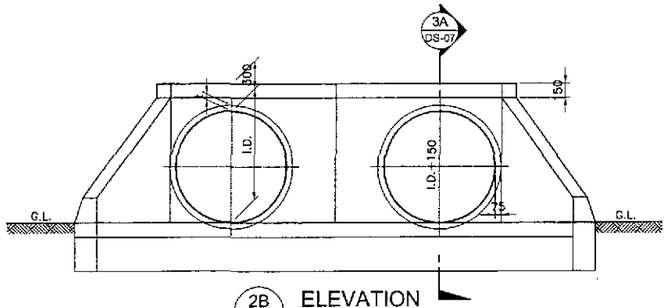
SCALE : AS SHOWN FULL SIZE A1

SHEET CONTENTS :
STANDARD RCPC, METHOD OF PIPE INSTALLATION AND TYPICAL BEDDING FOR CONDUITS

SHEET NO. :
DS-06



1B DS-07 ELEVATION NOT TO SCALE



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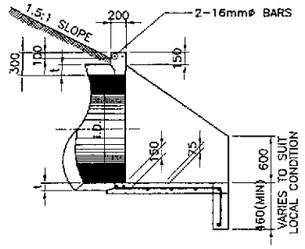

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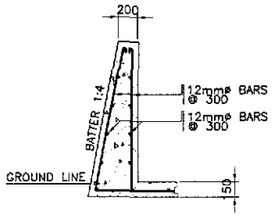
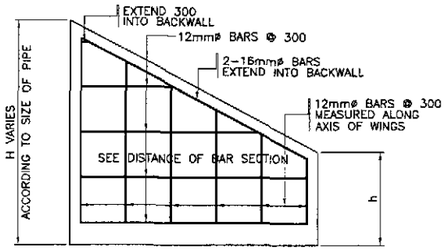


3B DS-07 SECTION NOT TO SCALE



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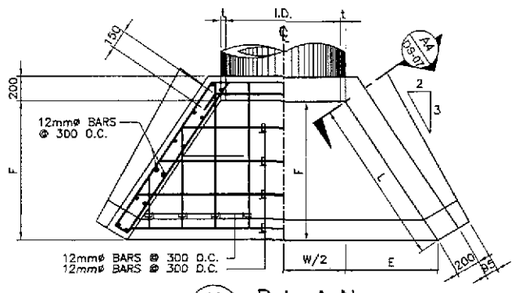

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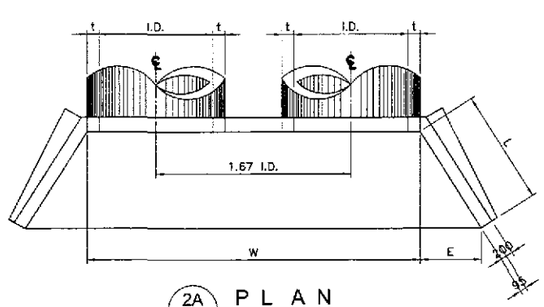


2A DS-07 PLAN N T S

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

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

TABLE A (ONE FLARED TYPE HEADWALL 1.5:1)

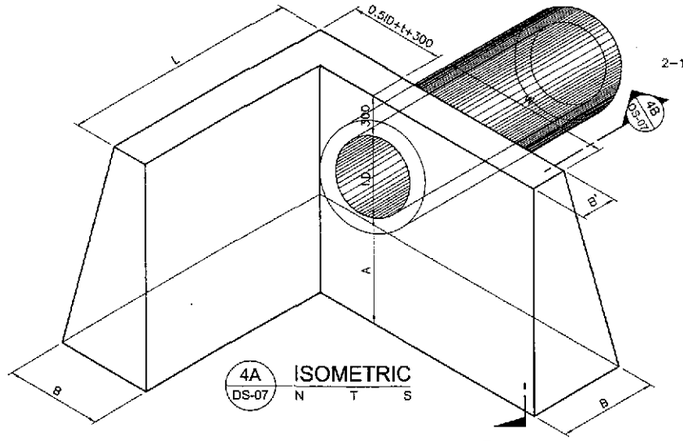
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)				SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THICKNESS SHELL (t)	L	E	F	h	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.
460	51	710	390	590	0	0.17	610	0.57	25.65	0.32	1380	0.83	37.35	0.51	2150	1.27	57.15
610	64	960	530	800	0	0.29	760	0.82	36.46	0.58	1780	1.16	48.39	0.87	2800	1.75	78.75
910	86	1510	840	1260	600	0.65	1070	1.55	68.92	1.30	2590	2.22	92.61	1.95	4100	3.36	150.98
1070	95	1770	980	1470	600	0.90	1230	2.38	107.10	1.80	3020	3.05	137.25	2.70	4800	3.96	178.20
1220	108	2040	1130	1690	600	1.17	1370	2.66	110.27	2.34	3400	3.71	154.77	3.51	5360	5.36	241.34
1520	127	2540	1410	2110	600	1.81	1680	3.93	174.74	3.63	4229	5.47	228.18	5.43	6760	6.78	304.20

TABLE C (ONE L-TYPE HEADWALL)

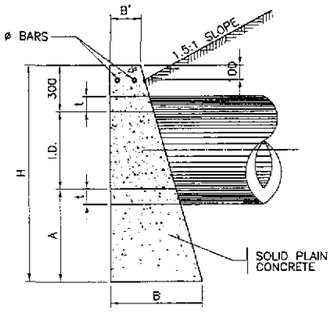
DIA. & THICKNESS (mm)		DIMENSIONS (mm)						SINGLE PIPE	
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	B'	H	W	L	CONCRETE m^3 mm	REINF. STEEL kg.
460	51	310	350	200	1070	1070	1070	0.66	6
610	64	410	430	200	1320	1220	1220	1.06	8
910	86	610	610	200	1820	1820	1820	2.76	11
1070	95	710	780	300	2080	1970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

TABLE C (ONE STRAIGHT TYPE HEADWALL)

DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)			SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m^2	CONCRETE m^3 mm	REINF. STEEL kg.
460	51	310	350	1070	1500	0.15	0.46	3.48	2600	0.33	0.63	4.90	3400	0.45	0.80	5.97
610	64	410	430	1320	2400	0.29	0.87	4.55	3500	0.58	1.20	6.50	4600	0.87	1.51	8.45
910	86	610	600	1820	3800	0.65	2.28	6.68	5200	1.30	3.16	9.52	6800	1.95	3.85	12.36
1070	95	710	780	2080	4300	0.90	3.84	7.57	6050	1.80	5.09	10.67	7900	2.70	6.43	13.96
1220	108	810	870	2330	4800	1.17	4.43	8.81	6900	2.34	5.70	12.54	9000	3.51	7.97	16.14
1520	127	1010	980	2830	6000	1.81	8.80	10.94	8600	3.63	11.93	15.56	11200	5.43	15.05	19.82

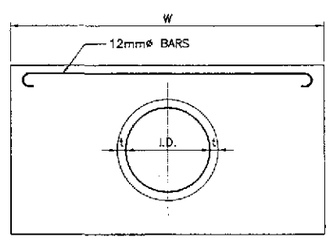


4A DS-07 ISOMETRIC N T S

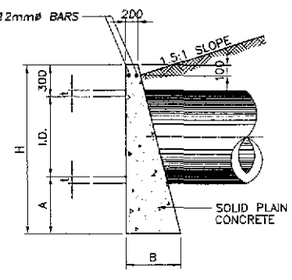


4B DS-07 SECTION NOT TO SCALE

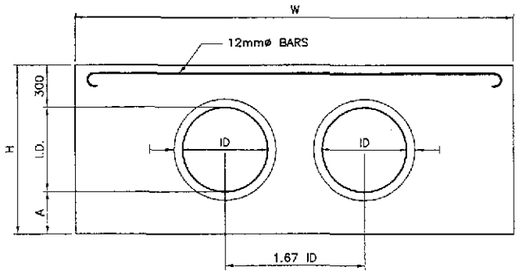
4 DS-07 L-TYPE HEADWALL NOT AS SHOWN



5A DS-07 SINGLE PIPE NOT TO SCALE



5B DS-07 SECTION NOT TO SCALE



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

5 DS-07 STRAIGHT TYPE HEADWALL NOT AS SHOWN

STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC

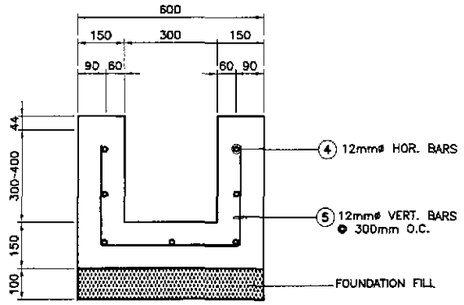
JAPAN INTERNATIONAL COOPERATION AGENCY

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

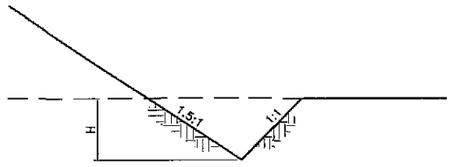
	DATE	SIGNATURE	PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	10/17/02	F. STA. MARIA	Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	10/19/02	H. HAKIM					
SUBMITTED	10/21/02	M. KUNITO TEAM LEADER	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

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE IV	NOT TO SCALE FULL SIZE A1	STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC	DS-07



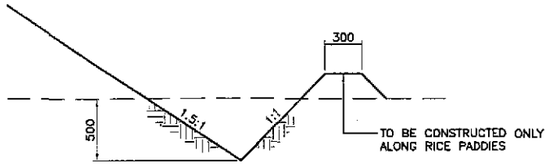
REINFORCED CONCRETE DITCH

1 DS-08 **TYPE BU** SCALE: 1:10



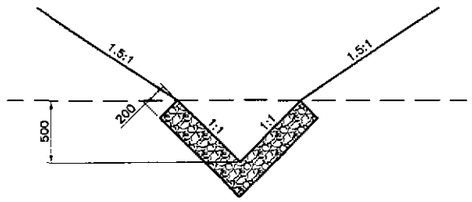
V-SHAPED UNLINED DITCH

TYPE E-4



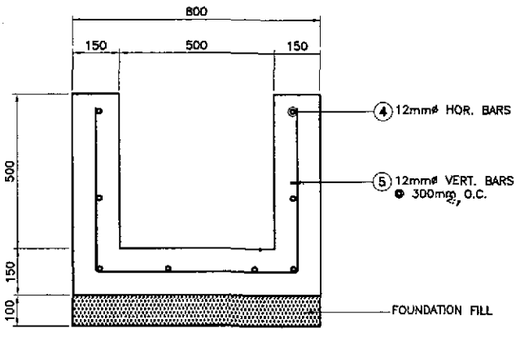
V-SHAPED UNLINED DITCH

TYPE E-3



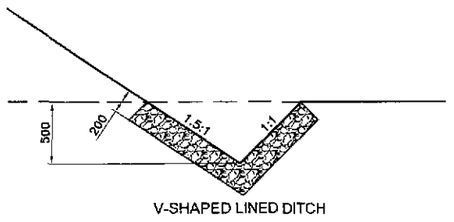
V-SHAPED LINED DITCH
(OUTER SEPARATOR DITCH)

TYPE E-2a



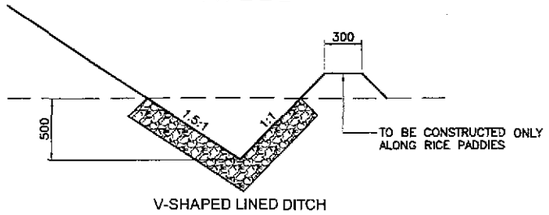
REINFORCED CONCRETE DITCH

2 DS-08 **TYPE U** SCALE: 1:10



V-SHAPED LINED DITCH

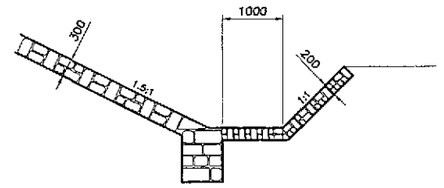
TYPE E-2



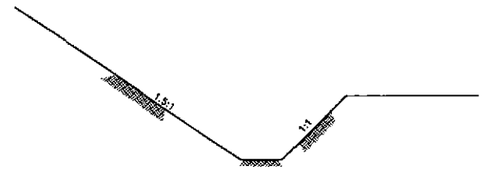
V-SHAPED LINED DITCH

TYPE E-1

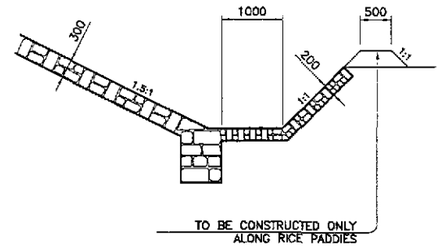
3 DS-08 **TYPE E** SCALE: 1:25



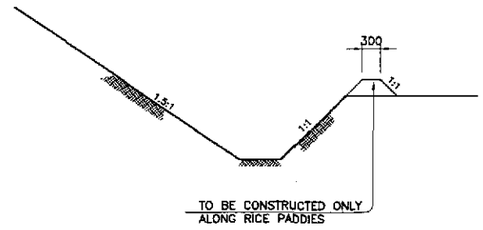
TYPE C-4



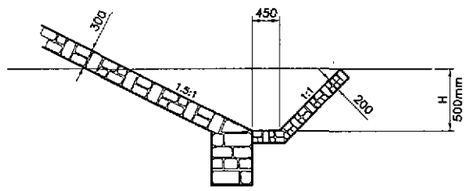
TYPE C-8



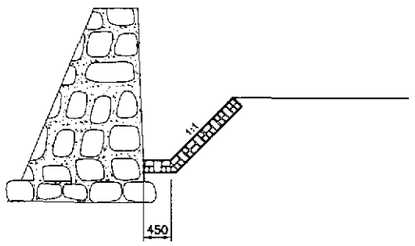
TYPE C-3



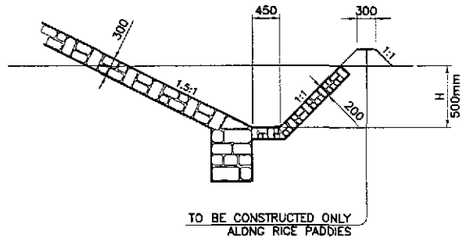
TYPE C-7



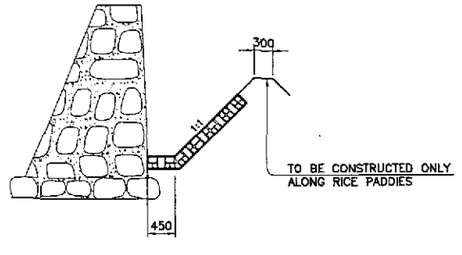
TYPE C-2



TYPE C-6



TYPE C-1



TYPE C-5

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

STANDARD DRAINAGE DITCHES

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

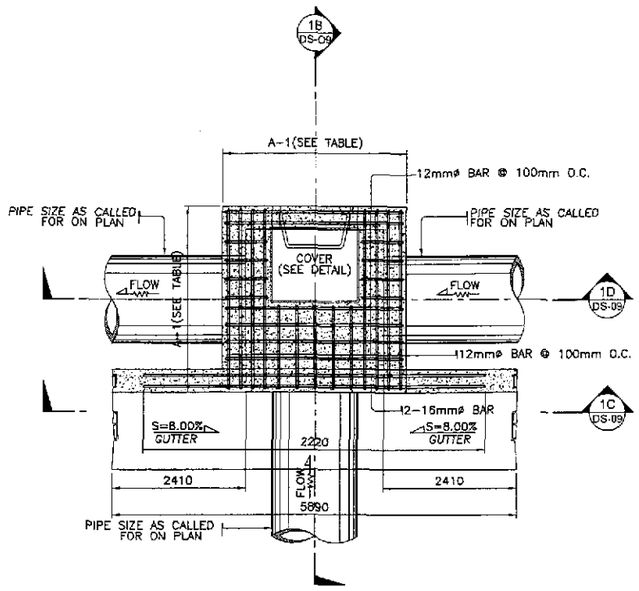
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/17/02	F. STA. MARIA
CHECKED	10/19/02	A. HARIMA
SUBMITTED	10/21/02	TEAM LEADER

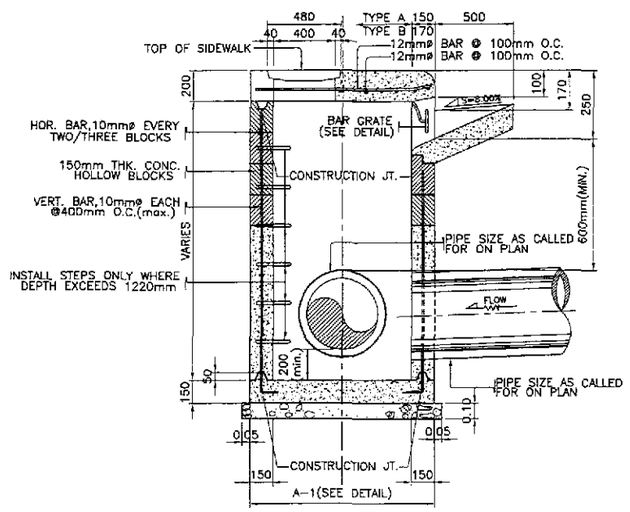
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

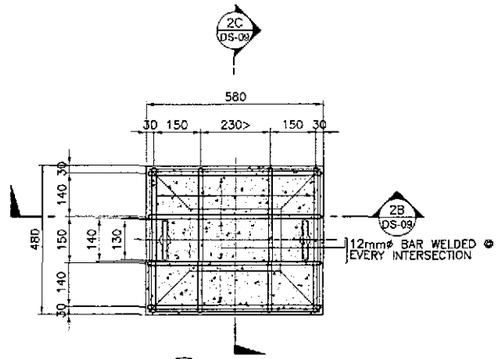
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM *ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel,* Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD DRAINAGE DITCHES	DS-08
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE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



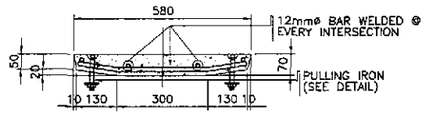
1A DS-09 PLAN



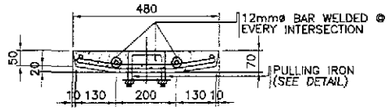
1B DS-09 SECTION



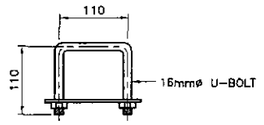
2A DS-09 PLAN



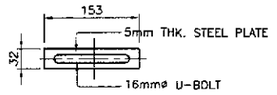
2B DS-09 SECTION



2C DS-09 SECTION

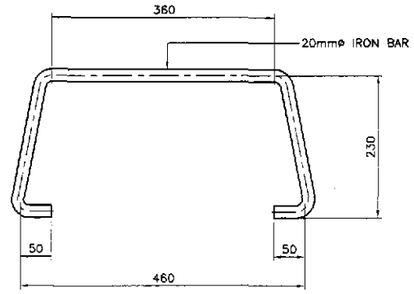


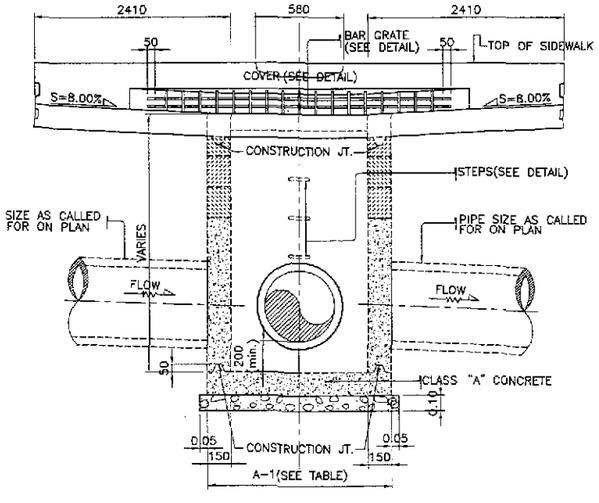
3A DS-09 PLAN



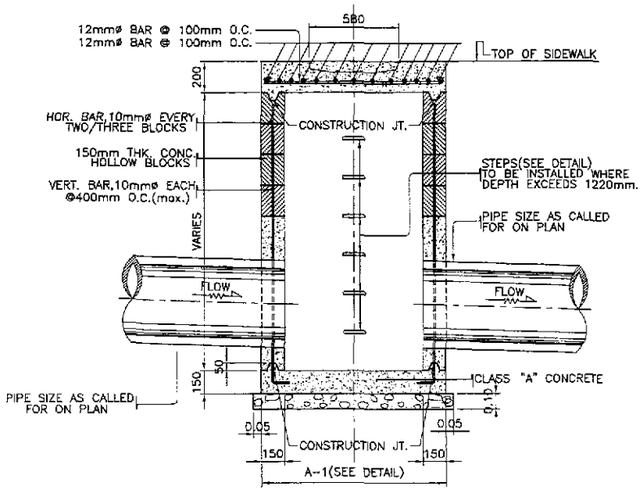
3B DS-09 ELEVATION

3 DS-09 PULLING IRON DETAIL
SCALE 1:5





1C DS-09 SECTION
1:20

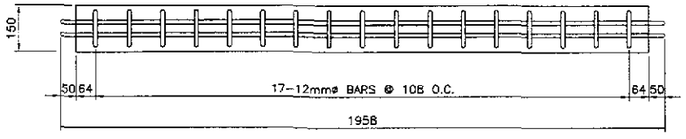


1D DS-09 SECTION

1 DS-09 CURB INLET MANHOLE
SCALE 1:20

2 DS-09 CONCRETE COVER DETAIL
SCALE 1:10

4 DS-09 S T E P
SCALE 1:5



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

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

NOTES:
1. ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
2. PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
3. CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
4. CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS SHALL HAVE AN AVERAGE COMPRESSIVE STRENGTH OF 6.865MPa.
5. IN CONCRETE HOLLOW BLOCKS STRUCTURE, ALL HOLES SHALL BE FILLED WITH CEMENT MORTAR.
6. WHERE CONCRETE HOLLOW BLOCKS STRUCTURES ATTAIN A HEIGHT OF 1.20 METER, IT SHALL BE REINFORCED STEEL BARS SPACE AT NOT MORE THAN 0.60 M. O.C. BOTHWAYS.
7. INSTALL STEPS ONLY WHERE DEPTH EXCEEDS 1.22 METERS.

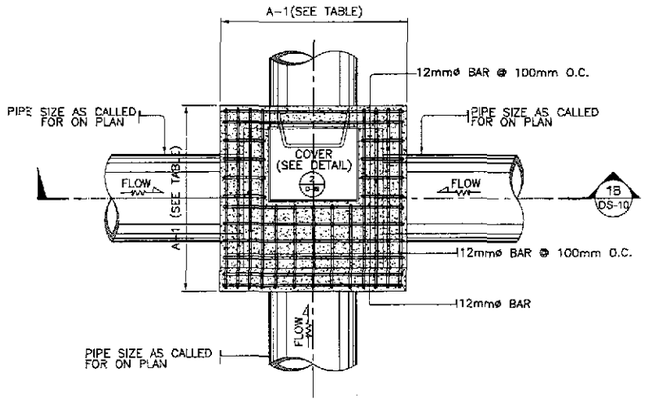
DETAILS OF COMBINATION CURB INLET MANHOLE

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

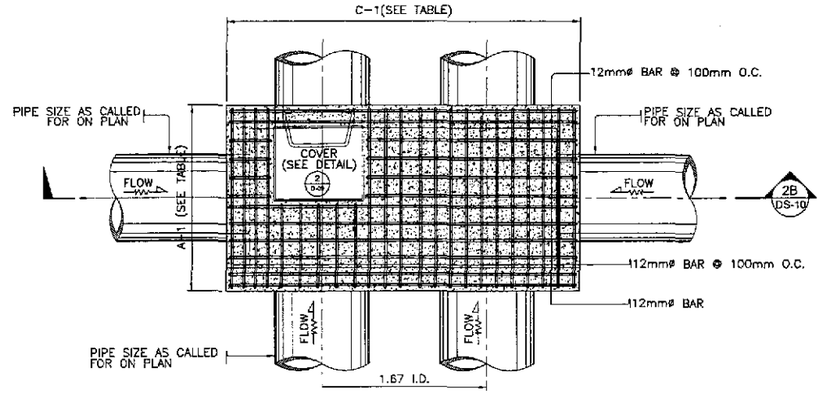
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	10/17/02	STEPHEN DAVIS					
CHECKED	10/19/02	A. PARIN	Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
SUBMITTED	10/21/02	TEAM LEADER	DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONDAN	SIMEON A. DATUMANONG
			Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

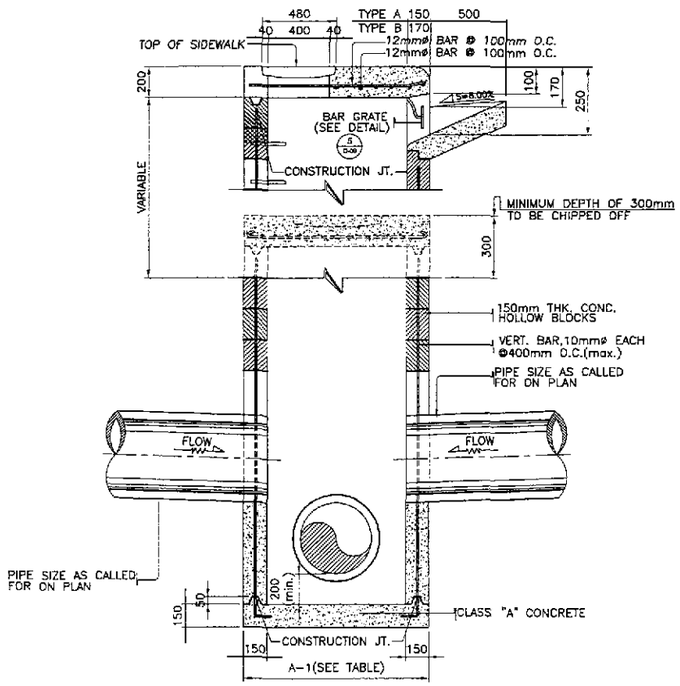
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	STANDARD COMBINATION CURB INLET MANHOLE	DS-09
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



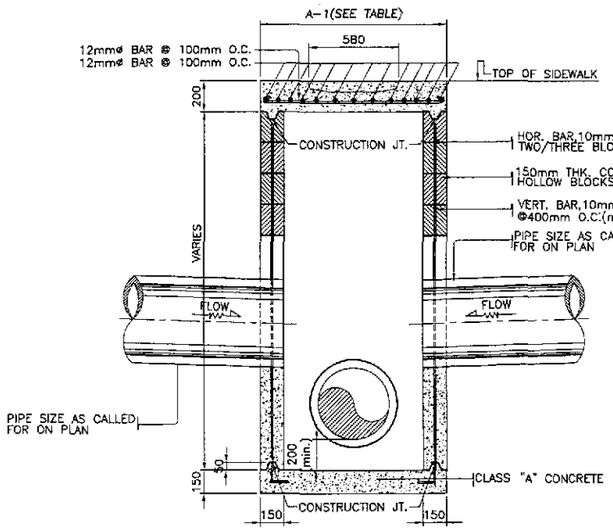
1A DS-10 PLAN BOX-TYPE MANHOLE (SINGLE PIPE)



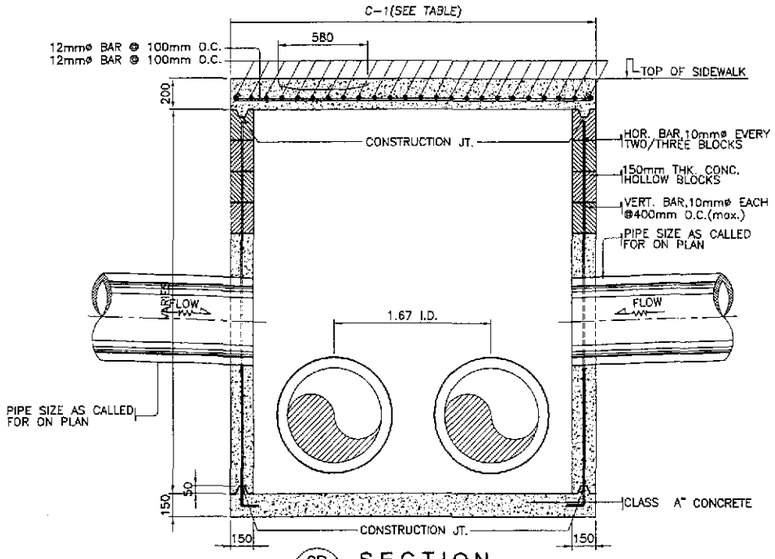
2A DS-10 PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)



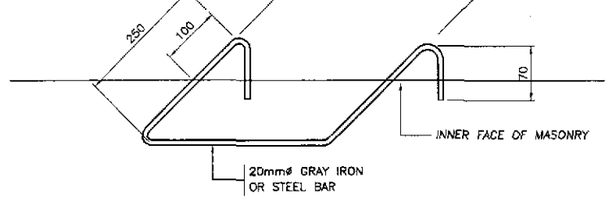
3 DS-10 BOX-TYPE CONVERTED TO CURB INLET MANHOLE



1B DS-10 SECTION



2B DS-10 SECTION



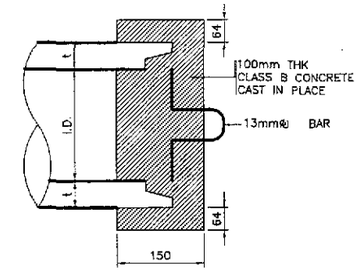
4 DS-10 STD. STEP OR RUNG

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

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

NOTES:

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



5 DS-10 CONCRETE BLOCK PLUG @ SUBSURFACE PIPE

SPECIAL JUNCTION BOX MANHOLE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE	PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
DESIGNED	10/17/02	F. STA MARIA	Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	10/19/02	S. JOSE	DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONDAN	SIMEON A. DATUMANONG
SUBMITTED	10/21/02	TEAM LEADER	Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
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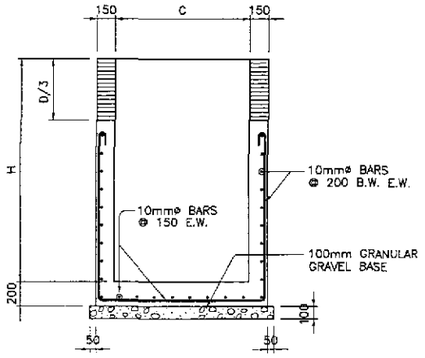
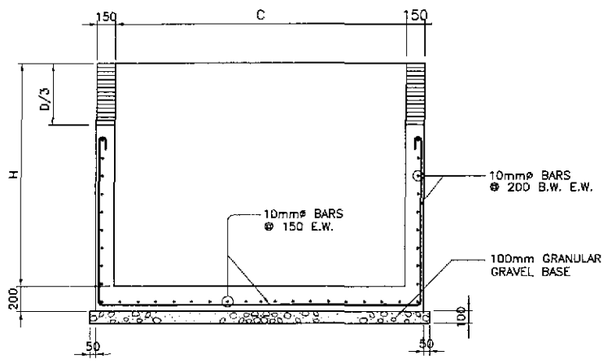
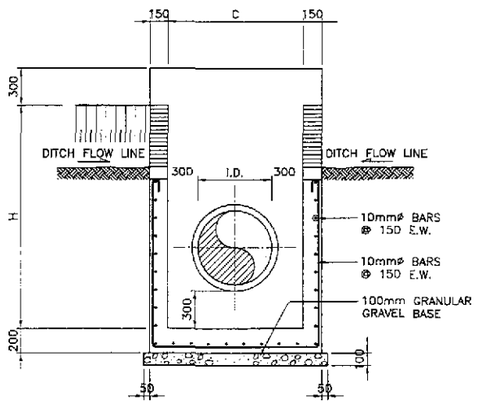
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



1C DS-11 SECTION



2C DS-11 SECTION



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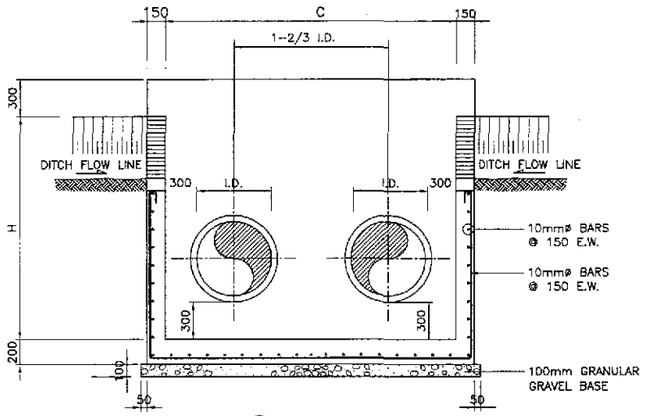
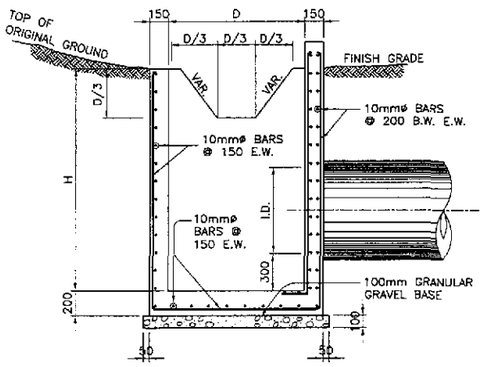


2B DS-11 SECTION



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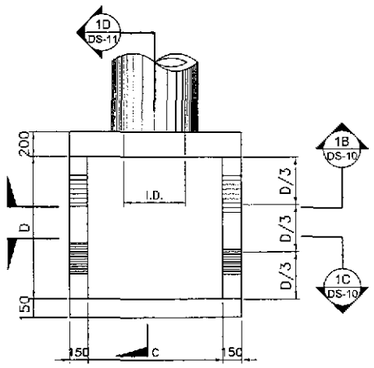
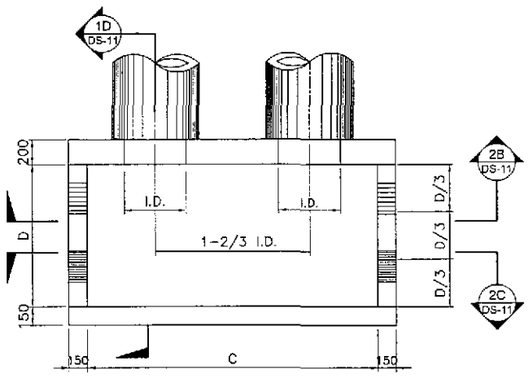


1A DS-11 PLAN

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



2A DS-11 PLAN

2 DS-11 CONCRETE CATCH BASIN (DOUBLE PIPE)
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

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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DESIGNED	10/17/02		Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	10/19/02		DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
SUBMITTED	10/21/02	TEAM LEADER	Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

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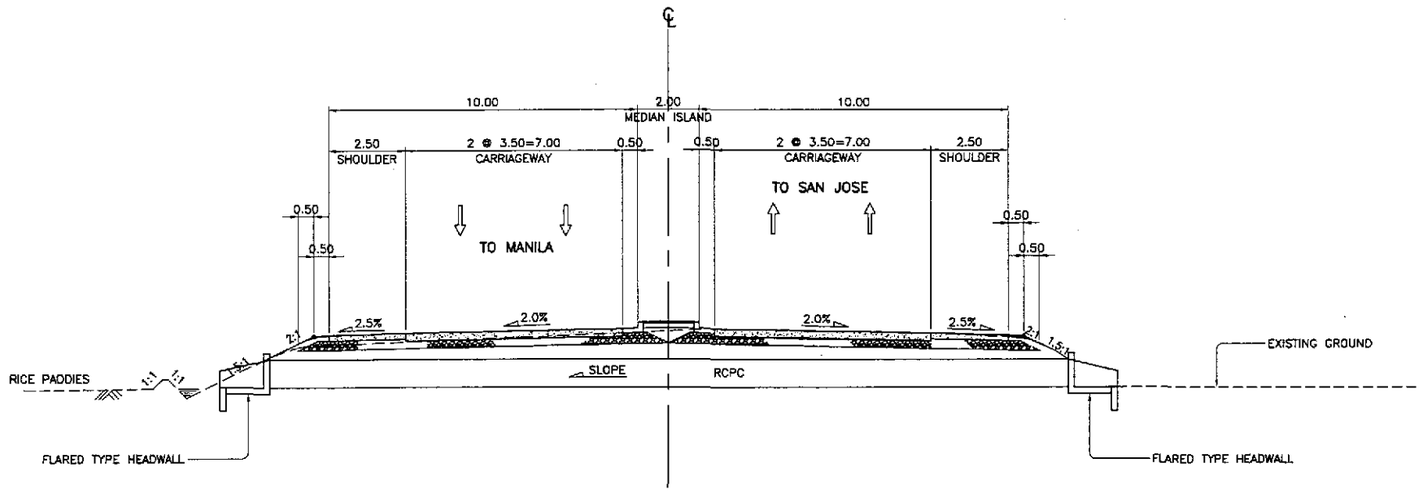
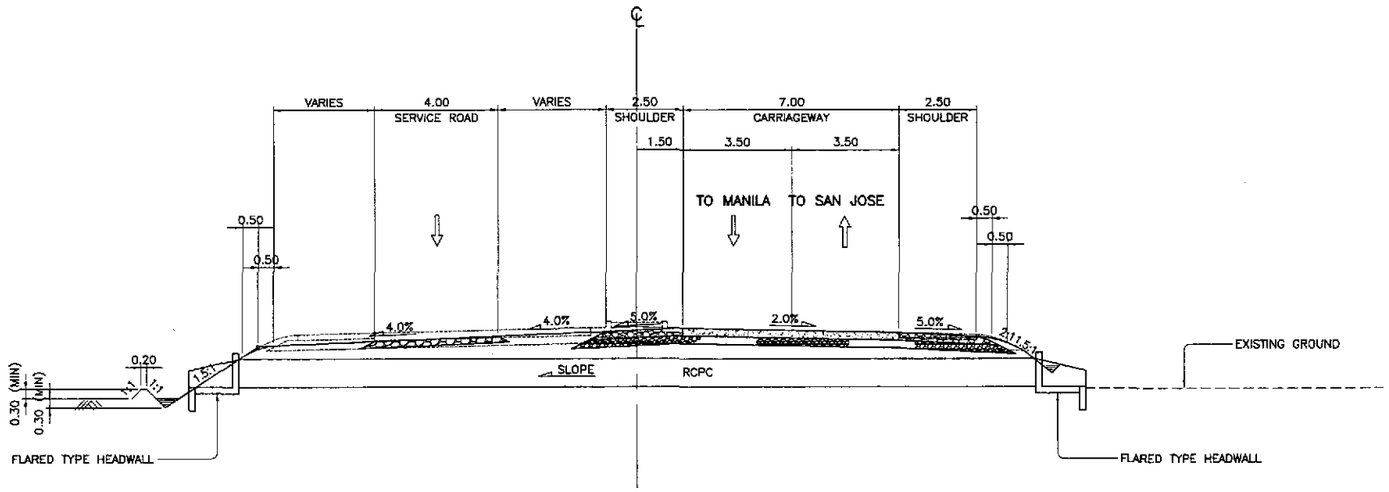


2 / DS-12 SCALE 1:100

TYPICAL DRAINAGE SECTION (ULTIMATE STAGE)



1 / DS-12 SCALE 1:100

TYPICAL DRAINAGE SECTION (INITIAL STAGE)

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	9/7/07	
CHECKED	10/9/07	
SUBMITTED	9/21/07	TEAM LEADER

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

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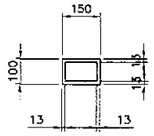
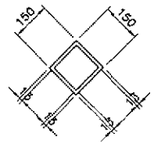


PLAN (POST)



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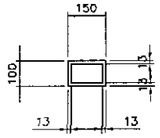

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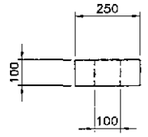

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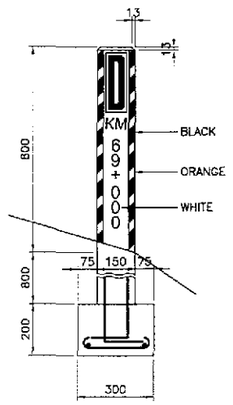
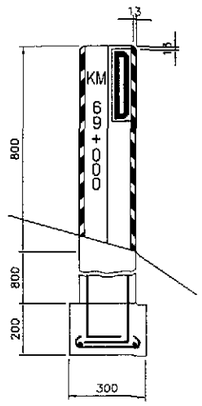
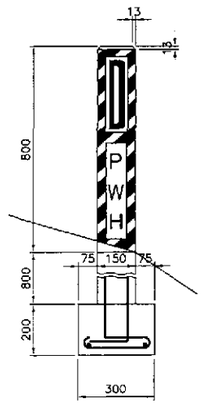


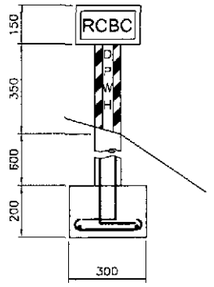
ELEVATION
CONCRETE MARKER
TYPE I-a



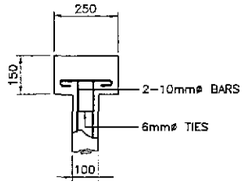
ELEVATION
CONCRETE MARKER
TYPE I-b

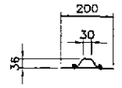


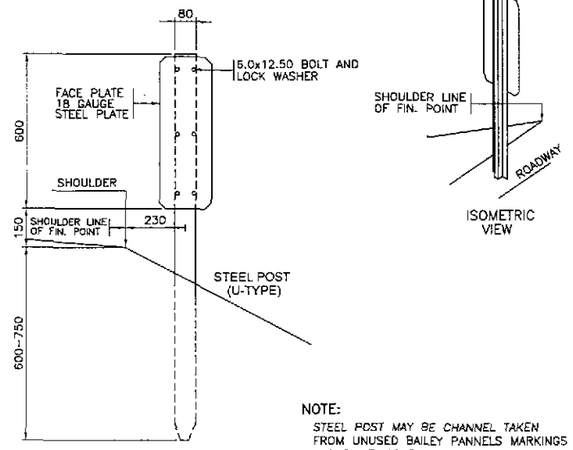
ELEVATION
CONCRETE MARKER
TYPE I-c



ELEVATION
CONCRETE MARKER
TYPE I-d

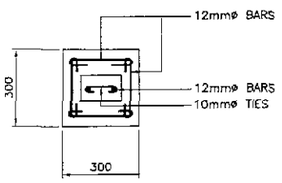




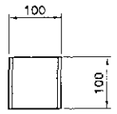


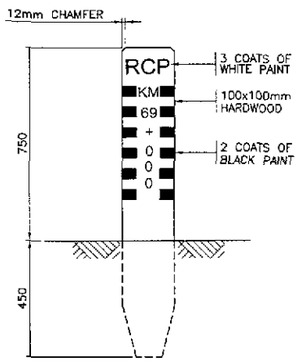
NOTE:
STEEL POST MAY BE CHANNEL TAKEN FROM UNUSED BAILEY PANNELS MARKINGS AND PAINTINGS SAME AS FOR TYPE I AND TYPE II AS SHOWN.

ELEVATION
STEEL MARKER
TYPE II

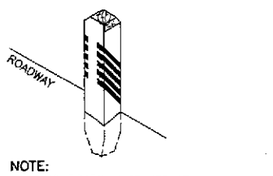


TYPICAL FOOTING DETAIL
CONCRETE MARKER
(TYPE I-a,b,c,d)



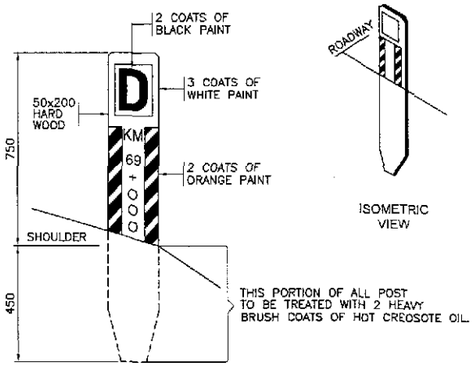


ELEVATION
WOODEN MARKER
TYPE III-a



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 BACKGOUND 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 DS-13 STANDARD MAINTENANCE MARKERS NOT TO SCALE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/17/02	
CHECKED	10/19/02	
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
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DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	DIC, Director IV	Undersecretary	Secretary

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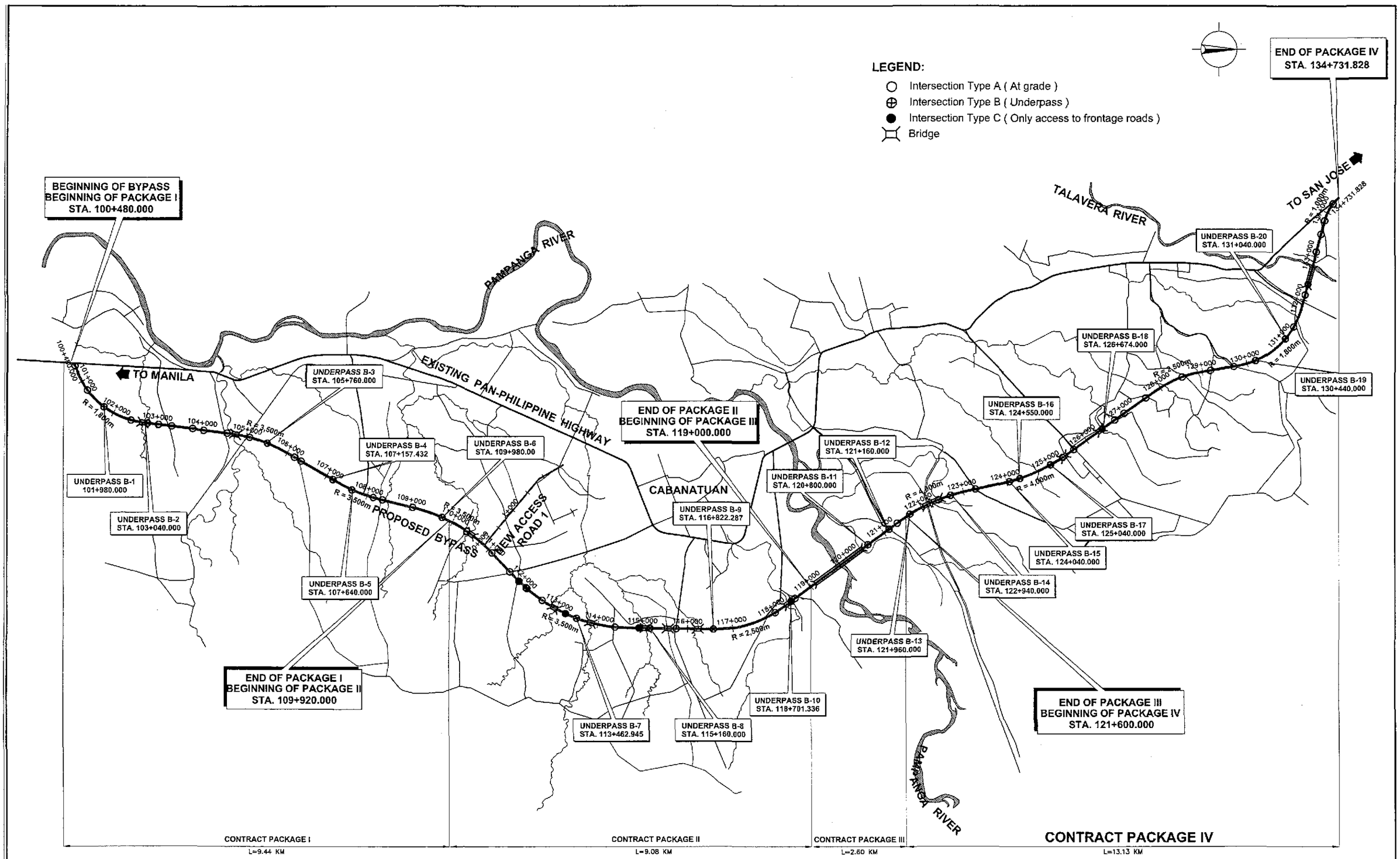
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		

UNDERPASS CROSSING (BOX CULVERT)



A / UP-01 SITE DEVELOPMENT PLAN - UNDERPASSES ALONG BYPASS

SCALE 1:40,000

JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/17/02	CHAN
CHECKED	10/19/02	TEAM LEADER
SUBMITTED	10/21/02	TEAM LEADER

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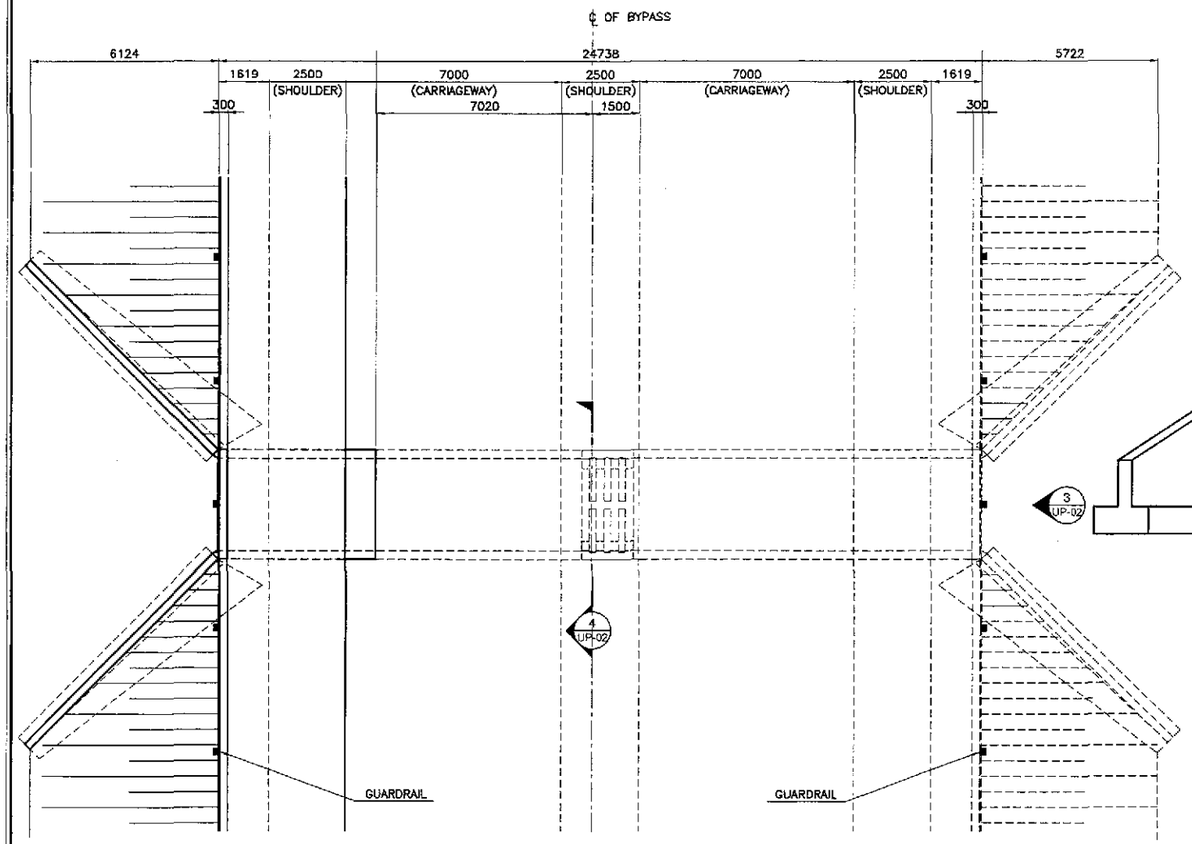
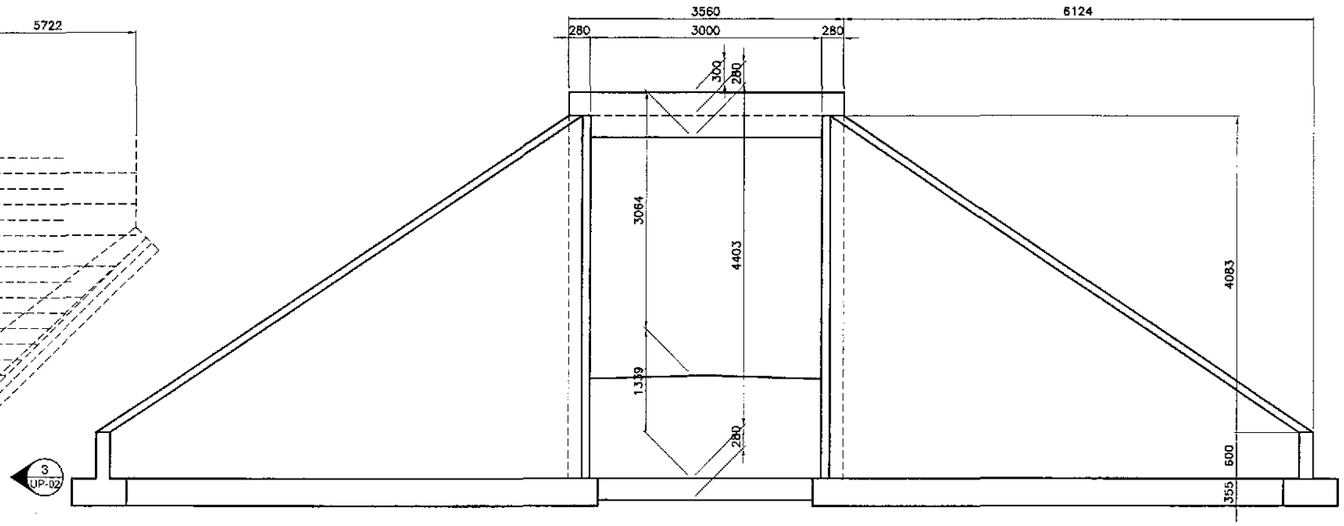
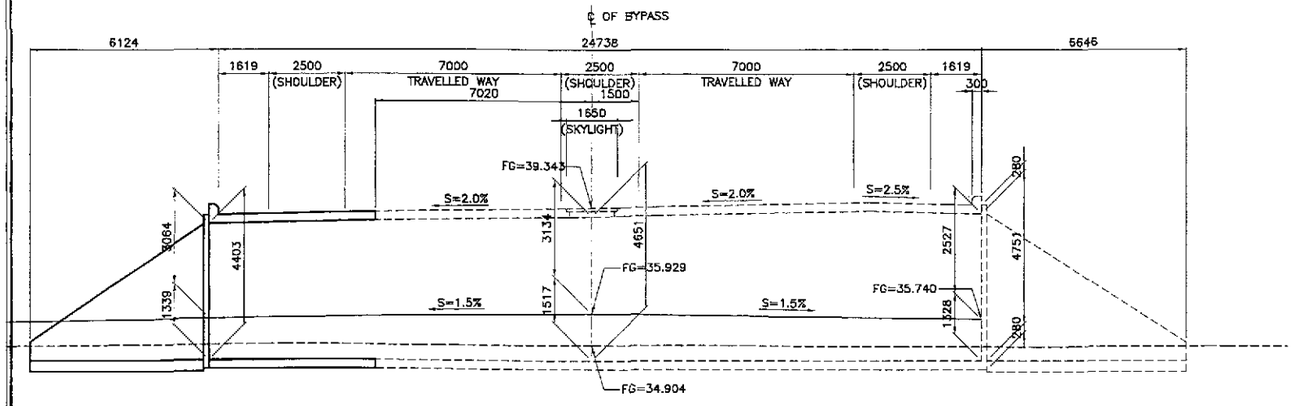


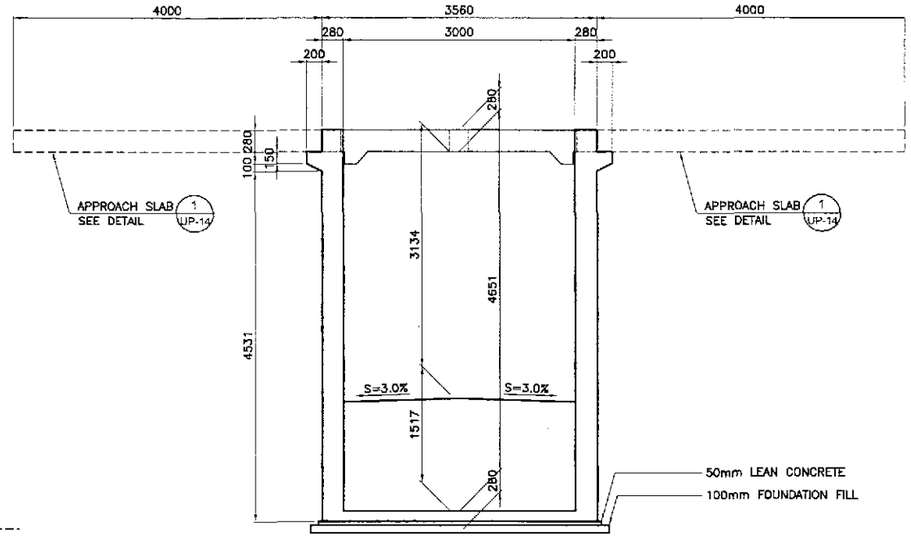
1 UP-02 GENERAL PLAN
SCALE 1:100



3 UP-02 ELEVATION
SCALE 1:40



2 UP-02 GENERAL ELEVATION
SCALE 1:100



4 UP-02 SECTION
SCALE 1:40

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/17/02	TEAM LEADER
CHECKED	10/19/02	HAKIM
SUBMITTED	10/21/02	

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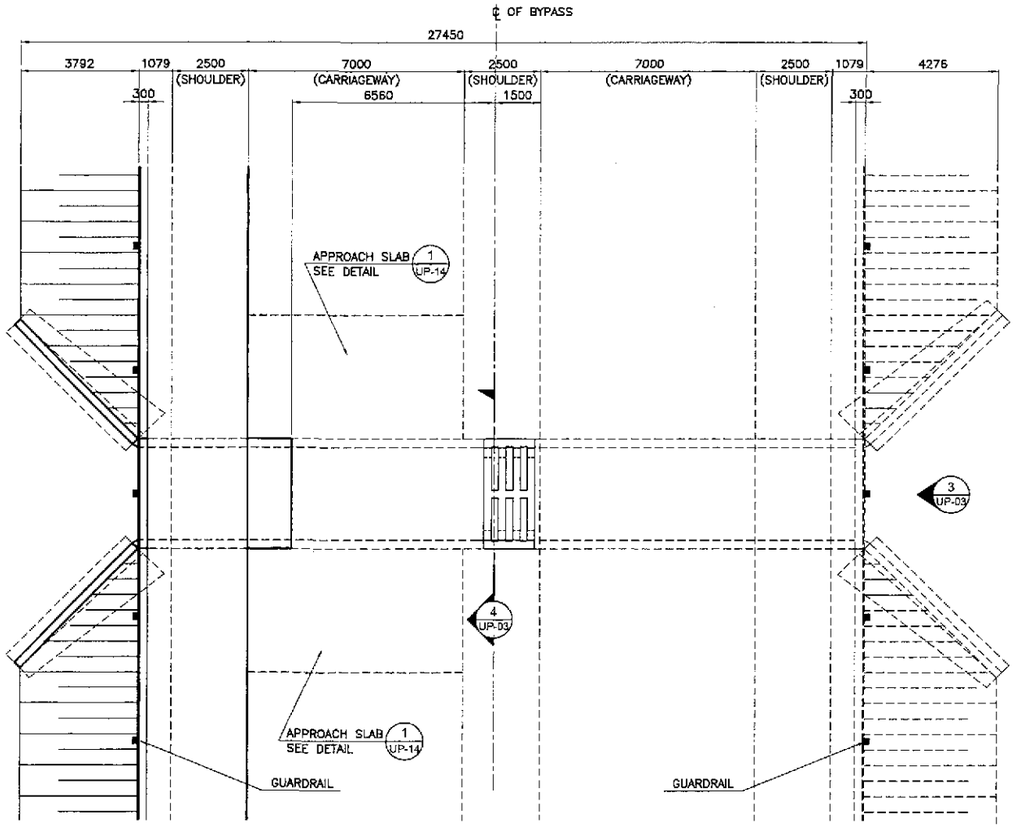
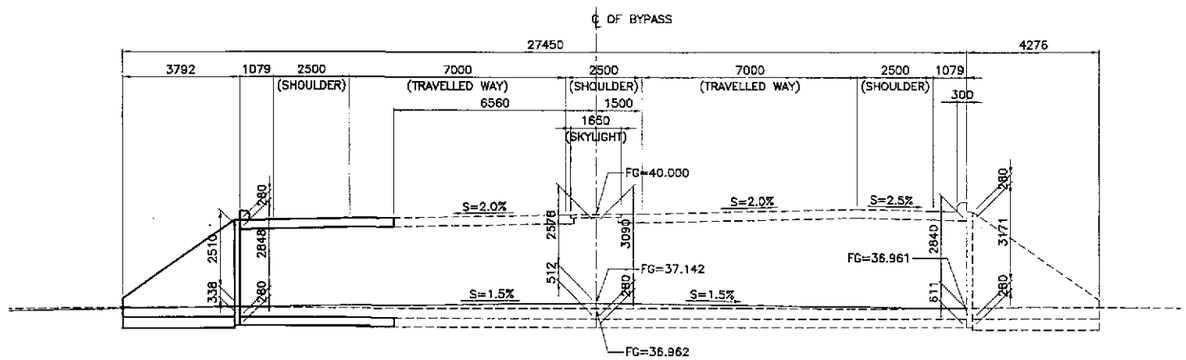
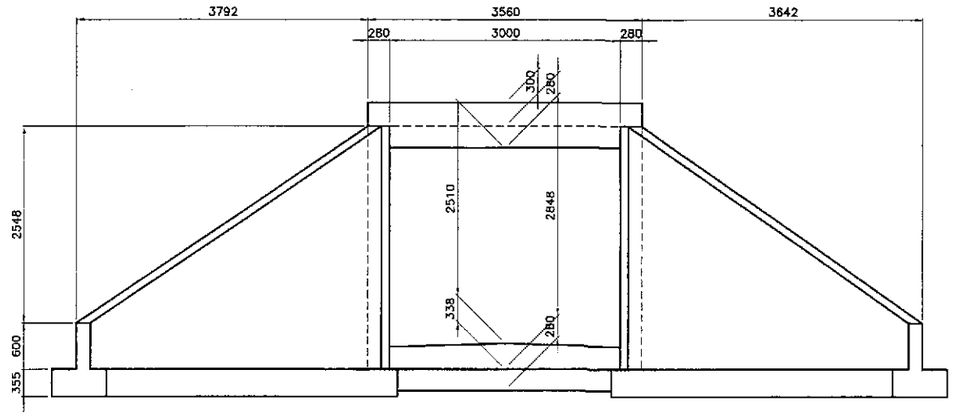


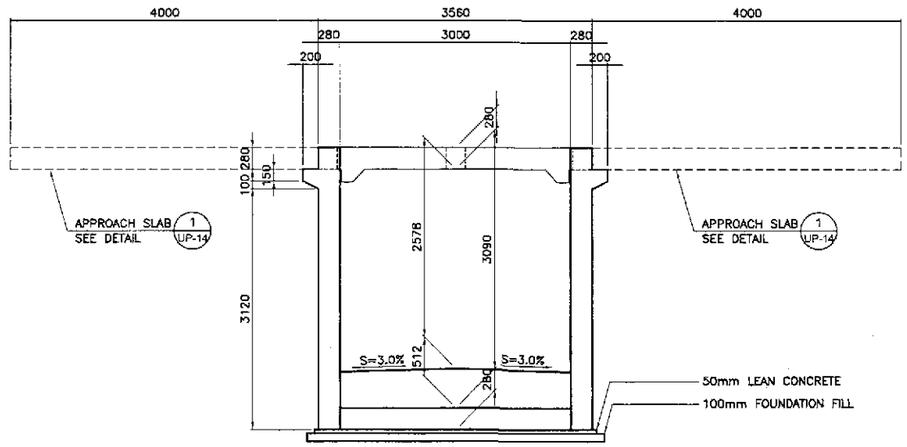
1 UP-03 GENERAL PLAN
SCALE 1:100



2 UP-03 GENERAL ELEVATION
SCALE 1:100



3 UP-03 ELEVATION
SCALE 1:40



BOX CULVERT
(ULTIMATE STAGE)
GENERAL PLAN, ELEVATION & SECTION
B-14 (STA. 122+940.00)

4 UP-03 SECTION
SCALE 1:40

JAPAN INTERNATIONAL COOPERATION AGENCY

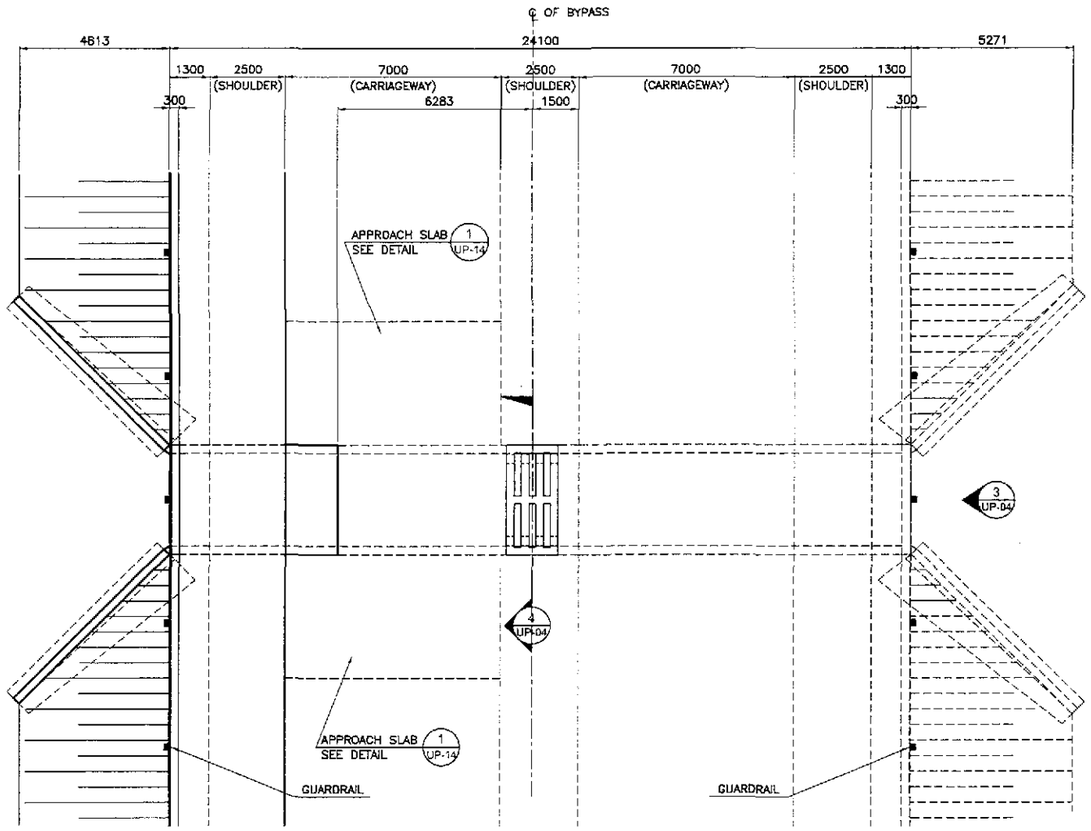
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/17/02	M. CHAN
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

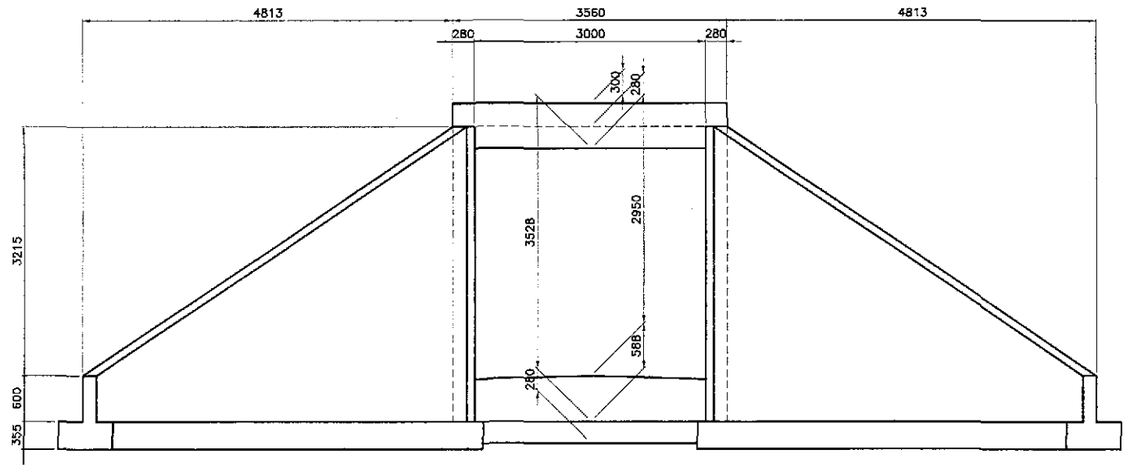
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

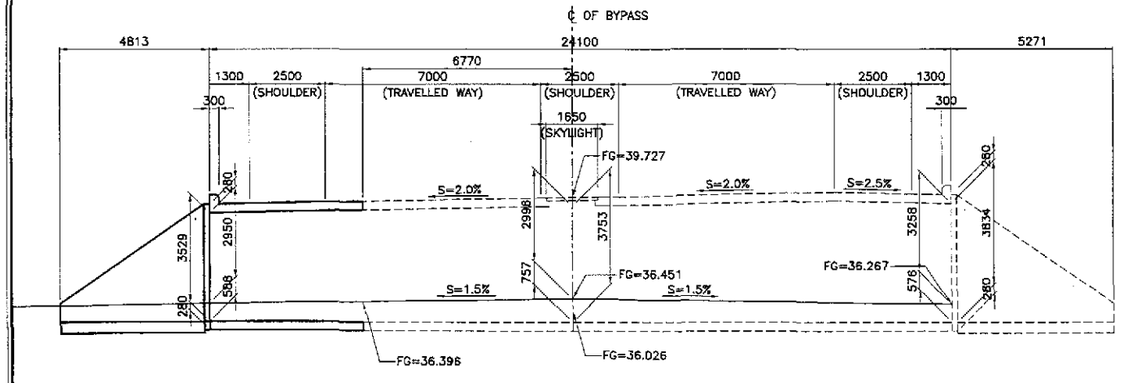
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE IV	AS SHOWN FULL SIZE A1	**BOX CULVERT** GENERAL PLAN, ELEVATION & SECTION (ULTIMATE STAGE) B-14 (STA. 122+940.00)	**UP-03**



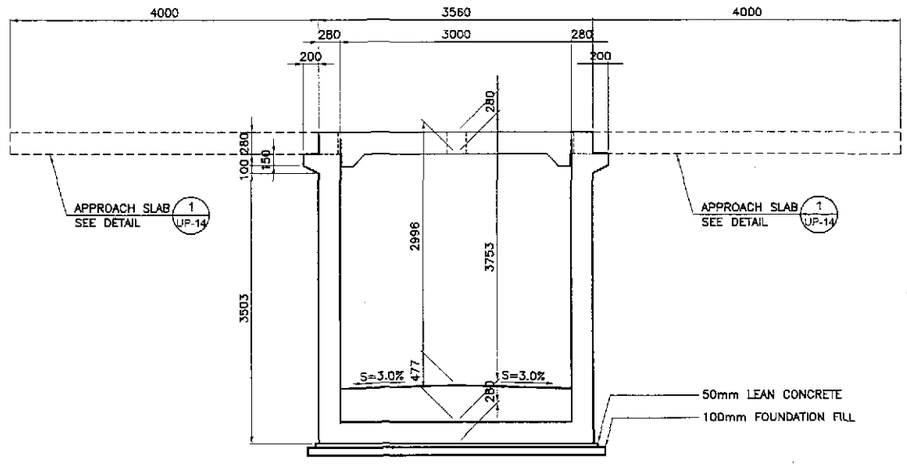
1 UP-04 GENERAL PLAN
SCALE 1:100



3 UP-04 ELEVATION
SCALE 1:40



2 UP-04 GENERAL ELEVATION
SCALE 1:100



4 UP-04 SECTION
SCALE 1:40

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/17/02	A. CHAN
CHECKED	10/19/02	A. FUKUM
SUBMITTED	10/21/02	M. KUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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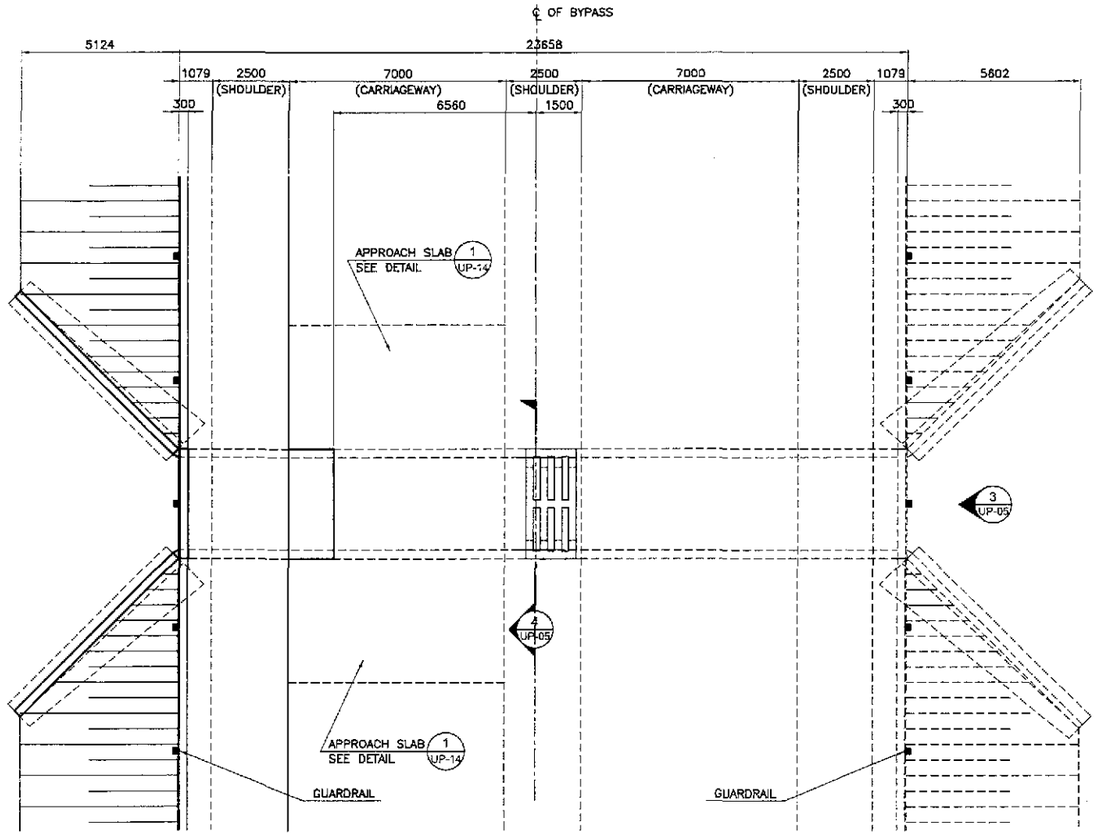
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

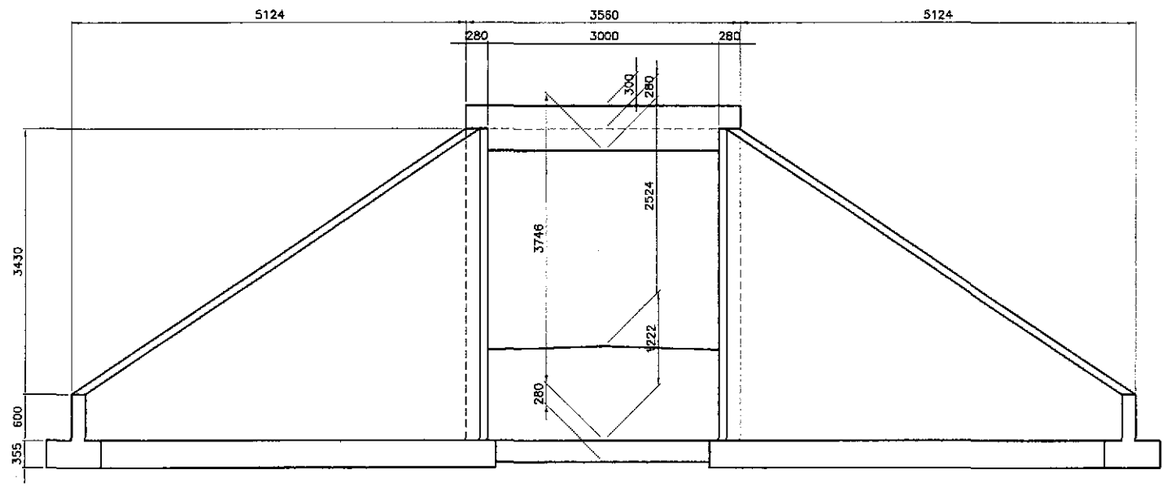
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(ULTIMATE STAGE)
B-15 (STA. 124+040.00)

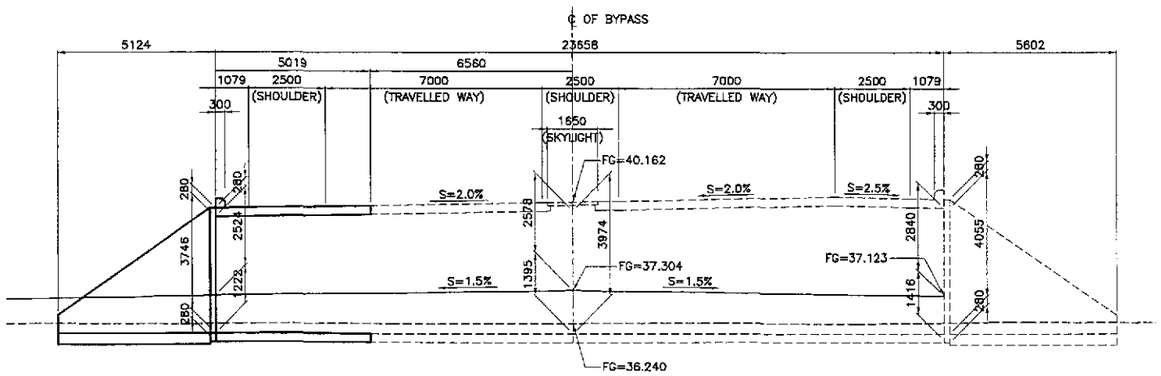
SHEET NO. :
UP-04



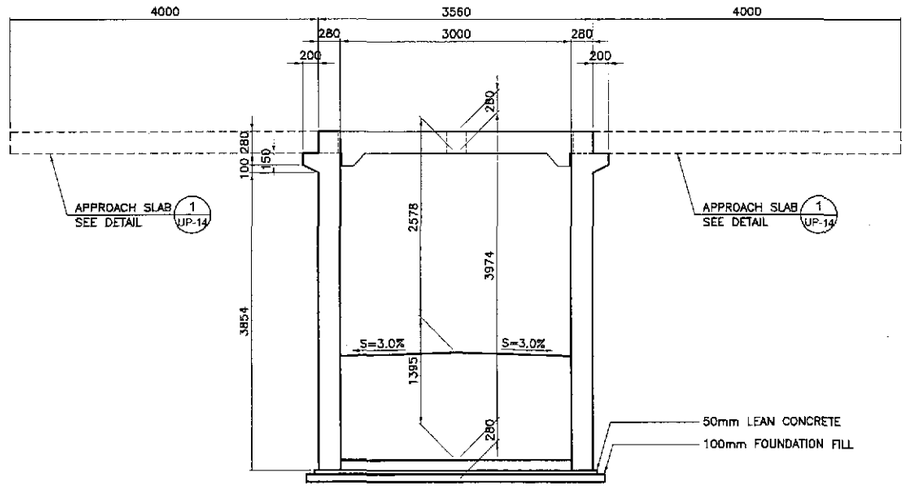
1 UP-05 GENERAL PLAN SCALE 1:100



3 UP-05 ELEVATION SCALE 1:40



2 UP-05 GENERAL ELEVATION SCALE 1:100



4 UP-05 SECTION SCALE 1:40

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/17/02	
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
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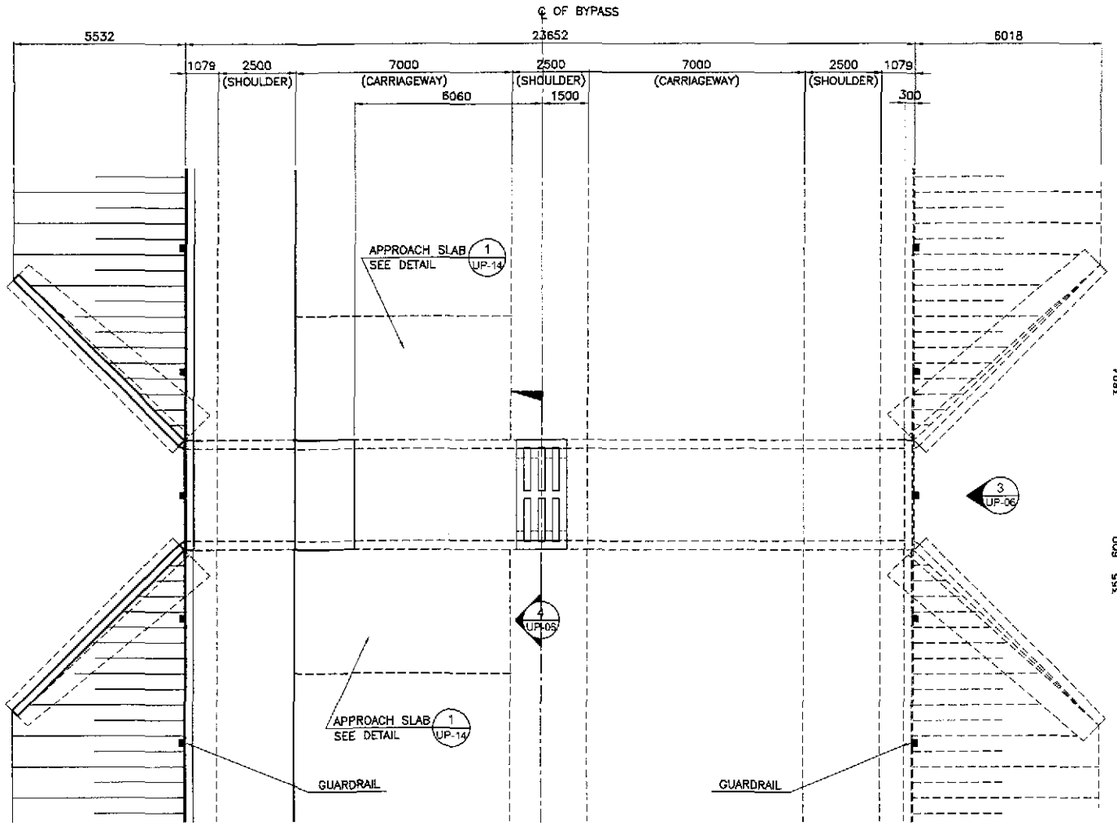
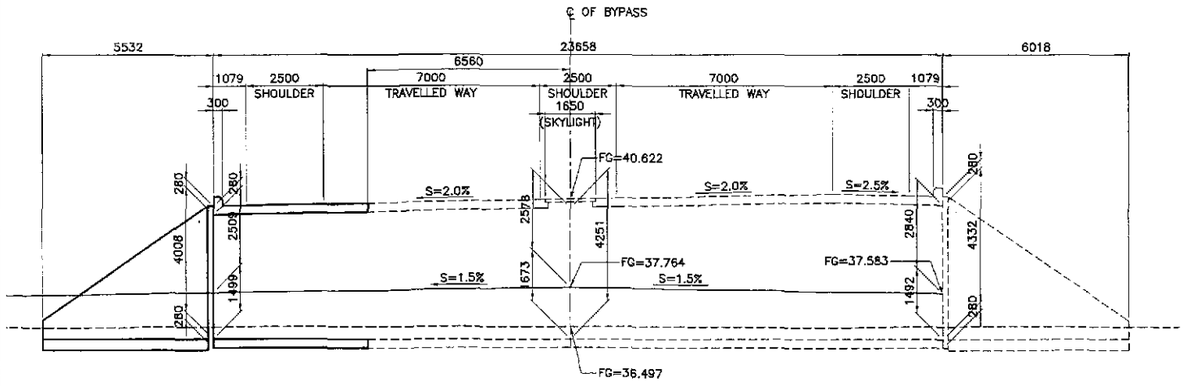
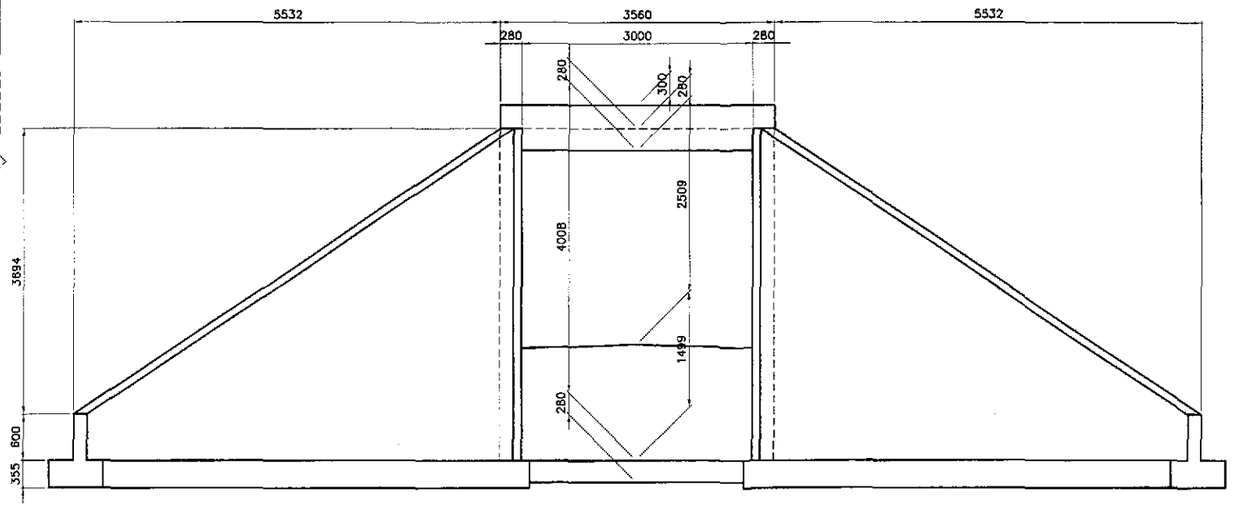


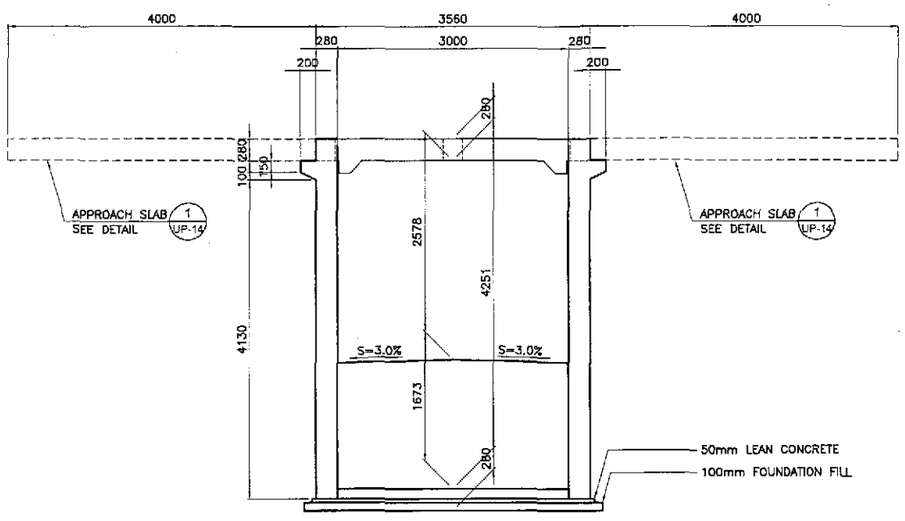
1 / UP-06 GENERAL PLAN
SCALE 1:100



2 / UP-06 GENERAL ELEVATION
SCALE 1:100



3 / UP-06 ELEVATION
SCALE 1:40



4 / UP-06 SECTION
SCALE 1:40

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/17/02	[signature] CHIEF
CHECKED	10/19/02	[signature] T.C. KARIM
SUBMITTED	10/21/02	[signature] M. KUCHIKI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
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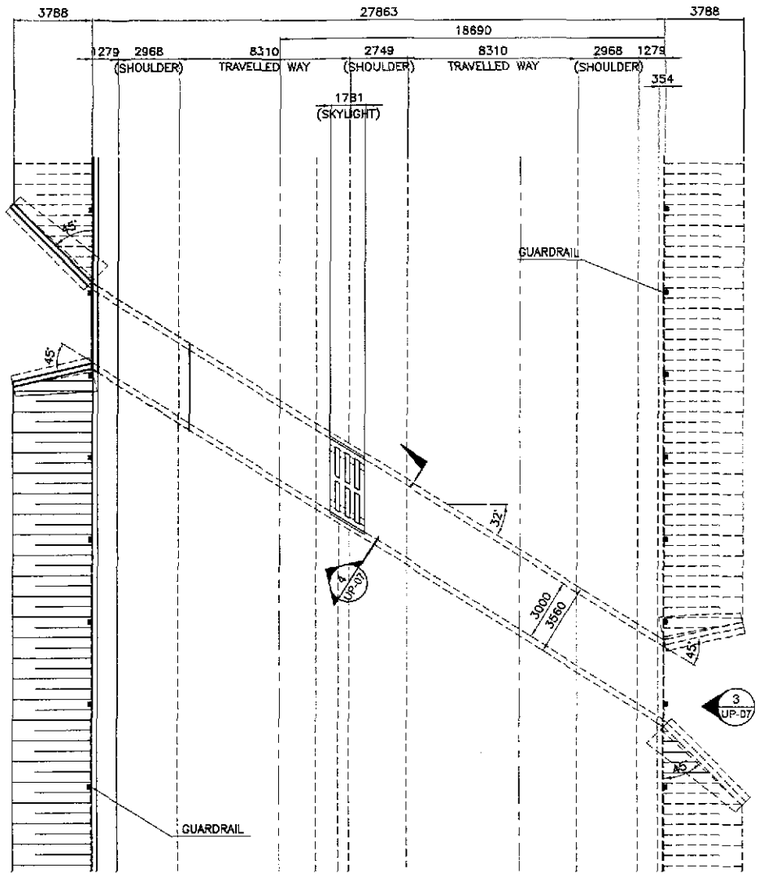
CABANATUAN BYPASS - CONTRACT PACKAGE IV

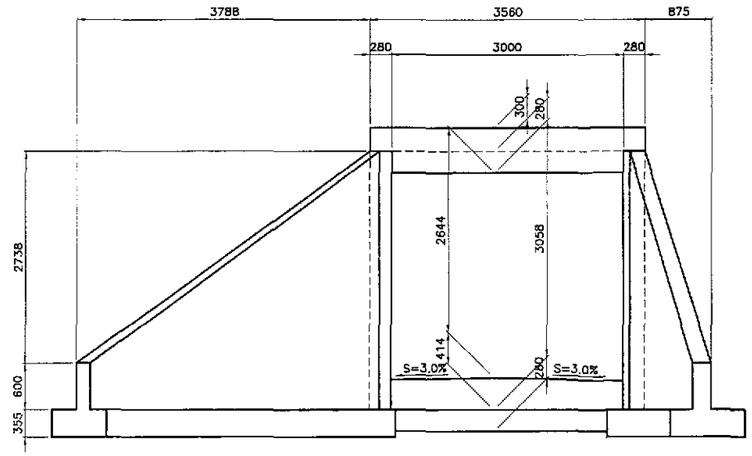
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(ULTIMATE STAGE)
B-17 (STA. 125+040.00)

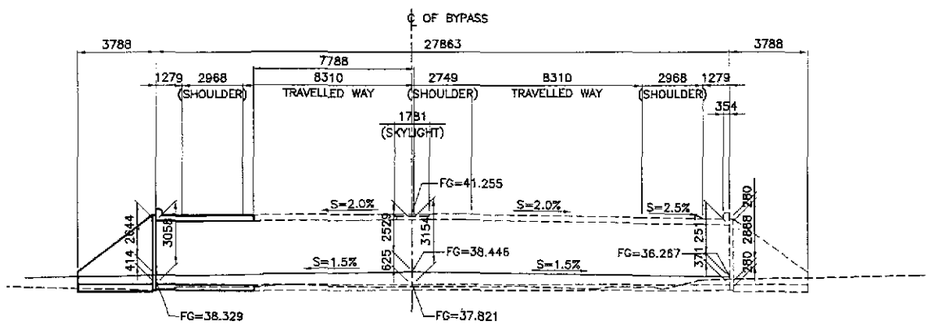
SHEET NO. :
UP-06



1 UP-07 GENERAL PLAN
SCALE 1:150

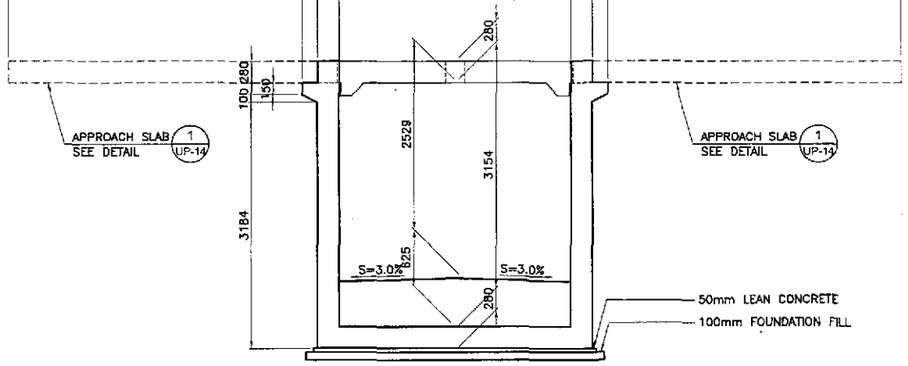


3 UP-07 ELEVATION
SCALE 1:40



NOTE:
THE HORIZONTAL DIMENSIONS INDICATED IN THIS ELEVATION ARE SKEWED LENGTH.

2 UP-07 GENERAL ELEVATION
SCALE 1:150



4 UP-07 SECTION
SCALE 1:40

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/17/02	CHAN
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

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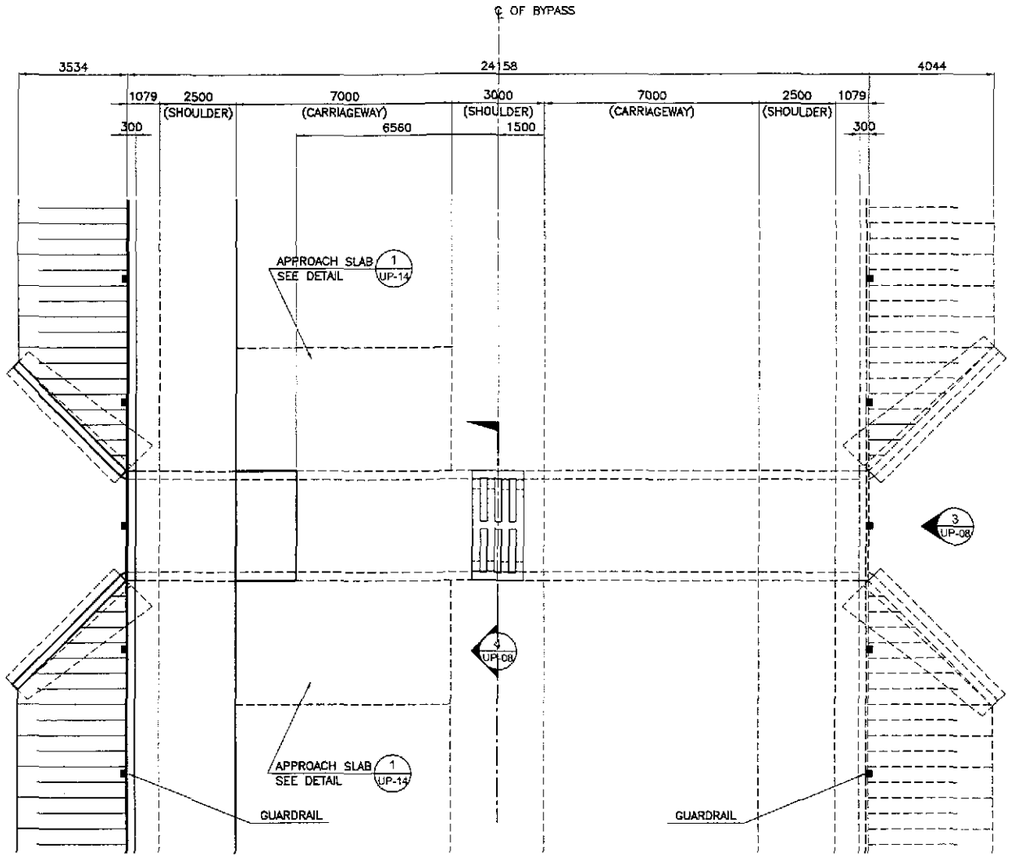
CABANATUAN BYPASS - CONTRACT PACKAGE IV

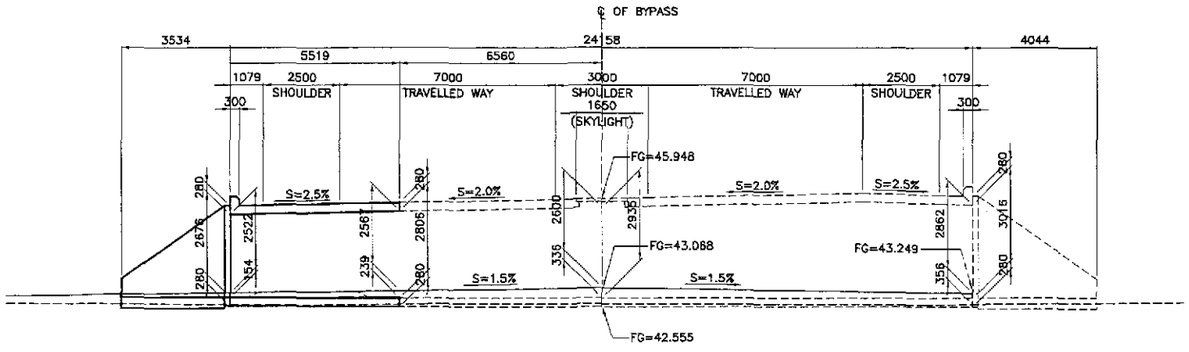
SCALE : AS SHOWN — FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(ULTIMATE STAGE)
B-18 (STA. 126+674.00)

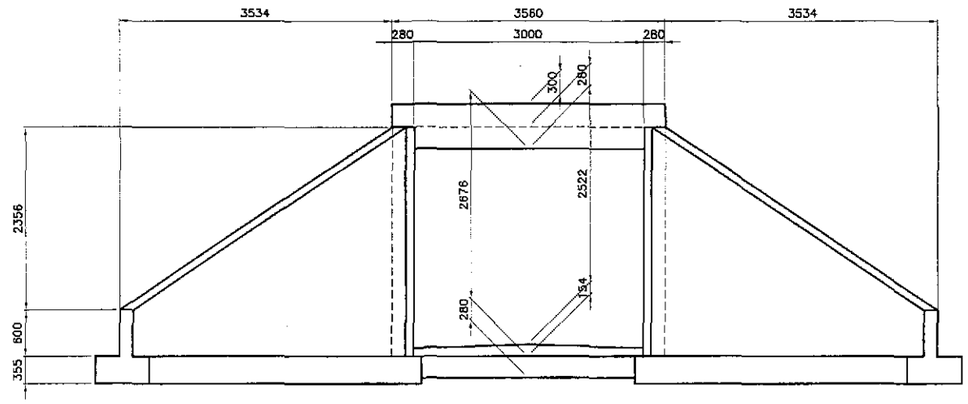
SHEET NO. : UP-07



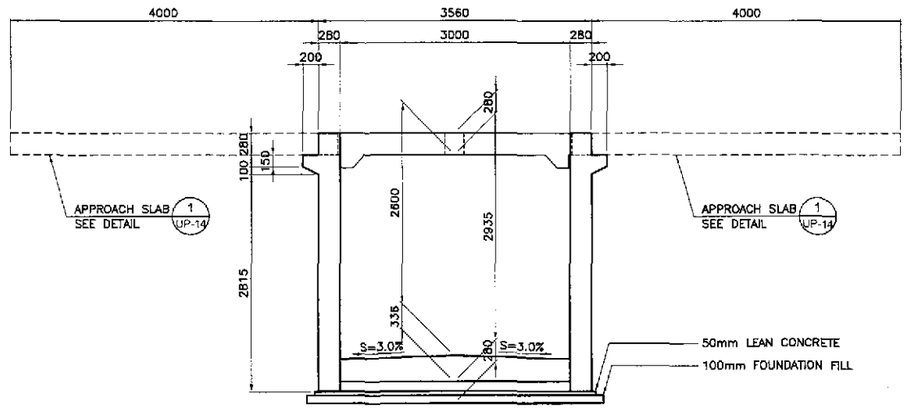
1 UP-08 GENERAL PLAN
SCALE 1:100



2 UP-08 GENERAL ELEVATION
SCALE 1:100



3 UP-08 ELEVATION
SCALE 1:40



4 UP-08 SECTION
SCALE 1:40

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/17/02	M. CHAN
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
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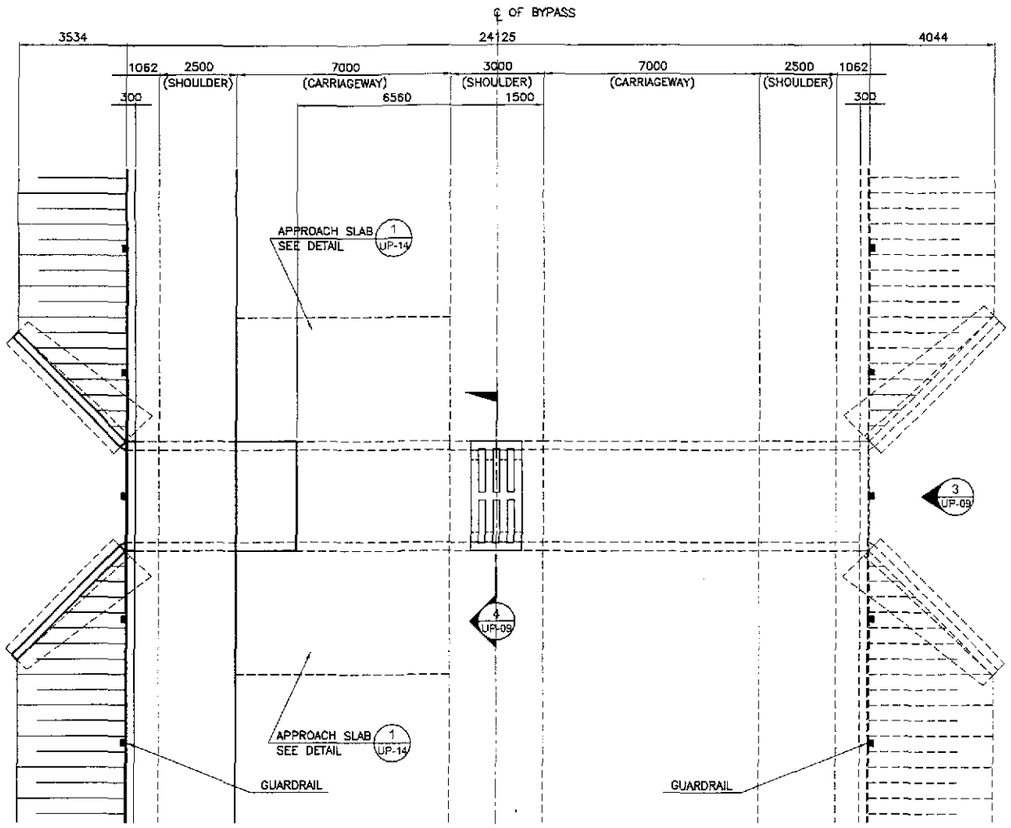
CABANATUAN BYPASS - CONTRACT PACKAGE IV

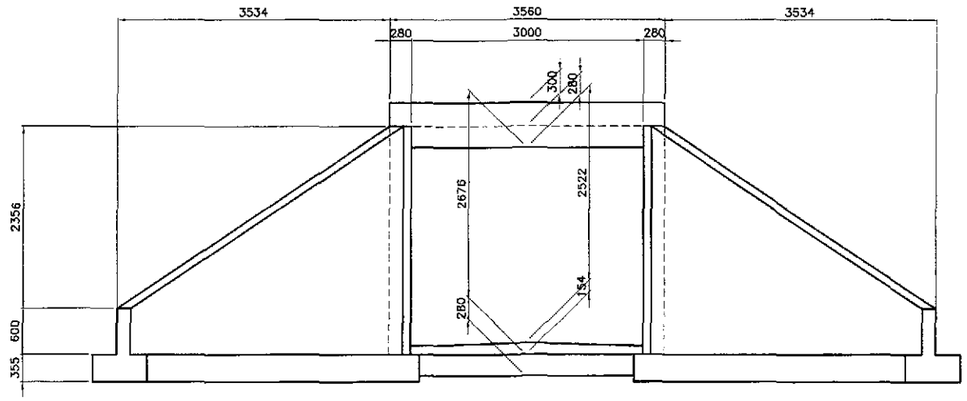
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(ULTIMATE STAGE)
B-19 (STA. 130+440.00)

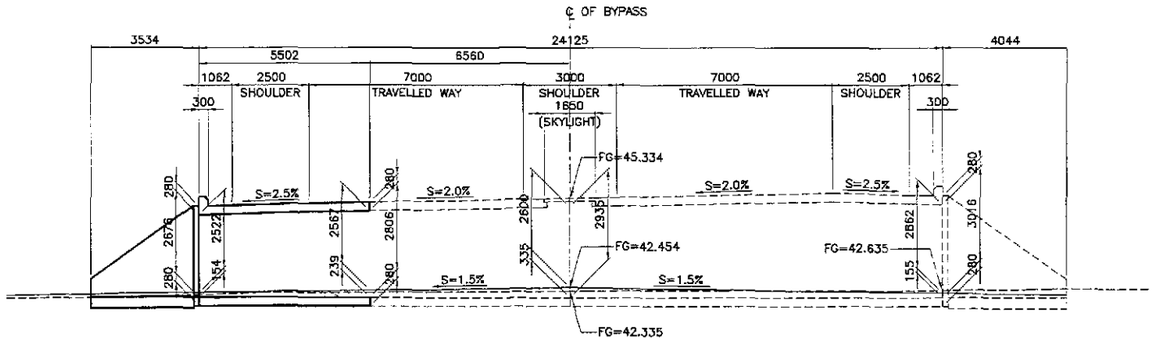
SHEET NO. :
UP-08



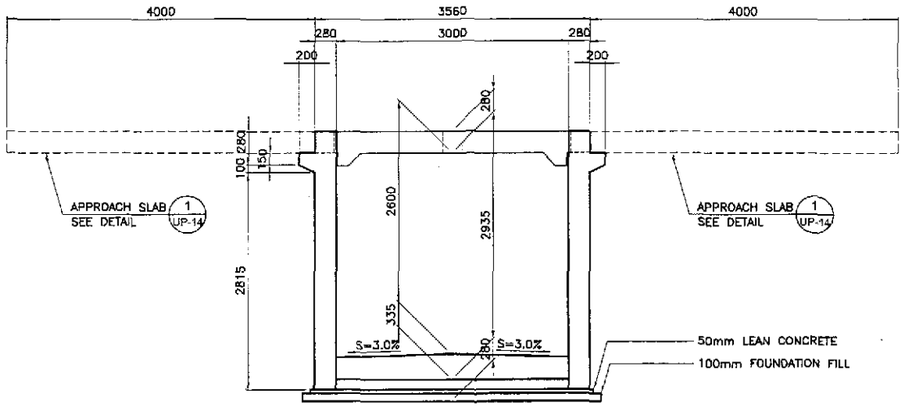
1 UP-09 GENERAL PLAN
SCALE 1:100



3 UP-09 ELEVATION
SCALE 1:40



2 UP-09 GENERAL ELEVATION
SCALE 1:100



4 UP-09 SECTION
SCALE 1:40

JAPAN INTERNATIONAL COOPERATION AGENCY

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

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SUBMITTED	10/21/02	TEAM LEADER

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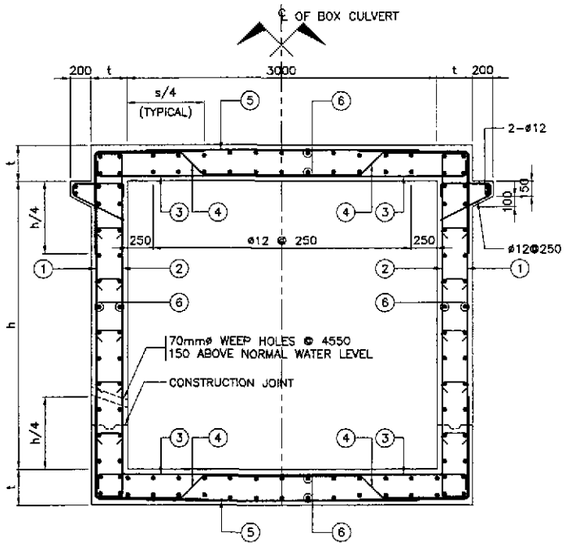
(Plaridel, Cabanatuan and San Jose Bypasses)

CABANATUAN BYPASS - CONTRACT PACKAGE IV

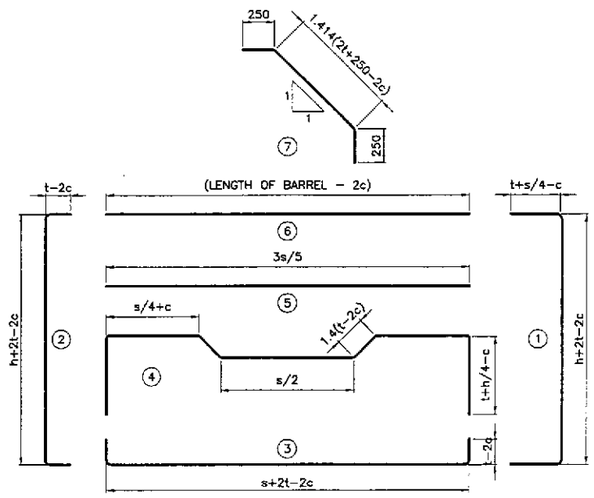
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(ULTIMATE STAGE)
B-20 (STA. 131+040.00)

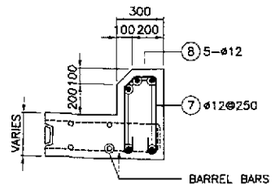
SHEET NO. :
UP-09



1 / UP-10 SECTION - SINGLE BARREL
NOT TO SCALE



3 / UP-10 BAR BENDING DIAGRAM - SINGLE BARREL
NOT TO SCALE



2 / UP-10 PARAPET DETAIL
SCALE 1:20

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 MPa
fy = 276 MPa

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

OVER 3.0 COVER
#12 @ 450 mm MAXIMUM.

SHEAR:
ULTIMATE SHEAR, $v = 0.16\sqrt{f'c}$ MPa

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

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
	SPAN	HEIGHT	THICKNESS	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	ø	SPACING	
B-13	3000	4700	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY
B-14	3000	3100	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY
B-15	3000	3800	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY
B-16	3000	4000	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY
B-17	3000	4300	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY
B-18	3000	3200	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY (SKEW 32° LF)
B-19	3000	2900	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY
B-20	3000	2900	280	16	200	16	180	16	200	16	200	12	200	12	250	–	–	FLUSHED TO ROADWAY

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

	DATE	SIGNATURE
DESIGNED	10/17/07	M. CHAN
CHECKED	10/19/07	A. HAKIM
SUBMITTED	10/21/07	M. KIOSHIMA TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

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

SCALE : AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
SPECIAL RCBC BARREL DETAILS
(ULTIMATE STAGE)

SHEET NO. :
UP-10

SCHEDULE OF REINFORCEMENTS (B13 – STA. 121+940.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.309m.	1	16	56	200	A	960	5057	980	–	–	–	7017	392.94	1.579	621	
	2	16	60	180	A	180	5057	180	–	–	–	5417	325	1.579	514	
	3	16	56	200	B	180	3460	180	–	–	–	3820	213.92	1.579	338	
	4	16	54	200	C	1379	800	255	1500	–	–	6367	343.84	1.579	543	
	5	12	56	200	D	2000	–	–	–	–	–	2000	112	0.888	100	
	6	12	144	250	D	5299	–	–	–	–	–	5299	763.06	0.888	678	25.48
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3460	34.6	0.888	31	
	9	12	58	250	H	430	70	608	–	–	–	1108	64.27	0.888	58	
	10	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
WINGWALLS (h+t)=4.877m.	W1	12	4	AS DWG	D	600	11657	–	–	–	–	12257	49.03	0.888	44	
	W2	12	32	300	D	5485	–	–	–	–	–	5485	175.54	0.888	156	
	W3a	32	40	200	I	1745	4216	150	–	–	–	6111	244.43	6.313	1544	
	W3b	25	30	200	I	1255	2612	150	–	–	–	4017	120.51	3.854	465	
	W3c	16	12	350	I	785	1365	150	–	–	–	2310	27.72	1.579	44	
	W4	12	66	300	I	203	2968	150	–	–	–	3321	219.21	0.888	195	37.41
	W5a	25	38	200	D	2249	–	–	–	–	–	2249	85.45	3.854	330	
	W5b	25	14	400	D	1903	–	–	–	–	–	1903	26.64	3.854	103	
	W5c	16	12	350	D	1137	–	–	–	–	–	1137	13.64	1.579	22	
	W6	12	14	AS DWG	D	9950	–	–	–	–	–	9950	139.29	0.888	124	
													GRAND TOTAL =		5070 KG	62.9

SCHEDULE OF REINFORCEMENTS (B14 – STA. 122+940.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.319m.	1	16	56	200	A	980	3514	980	–	–	–	5474	306.56	1.579	485	
	2	16	60	180	A	180	3514	180	–	–	–	3874	232.46	1.579	368	
	3	16	56	200	B	180	3460	180	–	–	–	3820	213.92	1.579	338	
	4	16	54	200	C	994	800	255	1500	–	–	5596	302.2	1.579	478	
	5	12	56	200	D	2000	–	–	–	–	–	2000	112	0.888	100	
	6	12	120	250	D	5219	–	–	–	–	–	5219	626.28	0.888	557	20.52
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3460	34.6	0.888	31	
	9	12	58	250	H	430	70	608	–	–	–	1108	64.27	0.888	58	
	10	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
WINGWALLS (h+t)=3.334m.	W1	12	4	AS DWG	D	600	6806	–	–	–	–	7406	29.62	0.888	27	
	W2	12	22	300	D	3399	–	–	–	–	–	3399	74.79	0.888	67	
	W3a	20	24	200	I	833	2985	150	–	–	–	3978	95.46	2.466	236	
	W3b	16	14	250	I	733	1969	150	–	–	–	2852	39.93	1.579	64	
	W3c	12	6	350	I	683	1172	150	–	–	–	2005	12.03	0.888	11	
	W4	12	40	300	I	203	2197	150	–	–	–	2550	102.01	0.888	91	14.85
	W5a	25	10	400	D	1715	–	–	–	–	–	1715	17.15	3.854	67	
	W5b	16	14	250	D	1229	–	–	–	–	–	1229	17.2	1.579	28	
	W5c	12	6	350	D	822	–	–	–	–	–	822	4.93	0.888	5	
	W6	12	14	AS DWG	D	5913	–	–	–	–	–	5913	82.78	0.888	74	
													GRAND TOTAL =		3145 KG	35.4

SCHEDULE OF REINFORCEMENTS (B15 – STA. 124+040.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.317m.	1	16	56	200	A	980	4032	980	–	–	–	5992	335.58	1.579	530	
	2	16	60	180	A	180	4032	180	–	–	–	4392	263.55	1.579	417	
	3	16	56	200	B	180	3460	180	–	–	–	3820	213.92	1.579	338	
	4	16	54	200	C	1123	800	255	1500	–	–	5855	316.19	1.579	500	
	5	12	56	200	D	2000	–	–	–	–	–	2000	112	0.888	100	
	6	12	128	250	D	5217	–	–	–	–	–	5217	667.78	0.888	593	22.06
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3460	34.6	0.888	31	
	9	12	58	250	H	430	70	608	–	–	–	1108	64.27	0.888	58	
	10	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
WINGWALLS (h+t)=3.853m.	W1	12	4	AS DWG	D	600	7066	–	–	–	–	7666	30.66	0.888	28	
	W2	12	26	300	D	3415	–	–	–	–	–	3415	88.79	0.888	79	
	W3a	25	24	200	I	1214	3405	150	–	–	–	4769	114.45	3.854	442	
	W3b	16	14	250	I	754	2185	150	–	–	–	3089	43.25	1.579	68	
	W3c	12	8	350	I	704	1237	150	–	–	–	2091	16.72	0.888	15	
	W4	12	40	300	I	203	2456	150	–	–	–	2809	112.37	0.888	100	16.85
	W5a	25	10	400	D	1811	–	–	–	–	–	1811	18.11	3.854	70	
	W5b	16	14	250	D	1226	–	–	–	–	–	1226	17.16	1.579	28	
	W5c	12	8	350	D	821	–	–	–	–	–	821	6.57	0.888	6	
	W6	12	14	AS DWG	D	6129	–	–	–	–	–	6129	85.81	0.888	77	
													GRAND TOTAL =		3541 KG	38.91

SCHEDULE OF REINFORCEMENTS (B16 – STA. 124+540.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.319m.	1	16	56	200	A	980	4397	980	–	–	–	6357	356.01	1.579	563	
	2	16	60	180	A	180	4397	180	–	–	–	4757	285.44	1.579	451	
	3	16	56	200	B	180	3460	180	–	–	–	3820	213.92	1.579	338	
	4	16	54	200	C	1214	800	255	1500	–	–	6038	326.04	1.579	515	
	5	12	56	200	D	2000	–	–	–	–	–	2000	112	0.888	100	
	6	12	136	250	D	5219	–	–	–	–	–	5219	709.78	0.888	631	23.15
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3460	34.6	0.888	31	
	9	12	58	250	H	430	70	608	–	–	–	1108	64.27	0.888	58	
	10	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
WINGWALLS (h+t)=4.217m.	W1	12	4	AS DWG	D	600	9095	–	–	–	–	9695	38.78	0.888	35	
	W2	12	28	300	D	4356	–	–	–	–	–	4356	121.97	0.888	109	
	W3a	32	18	375	I	1719	3894	150	–	–	–	5563	100.13	6.313	633	
	W3b	20	24	200	I	869	2237	150	–	–	–	3356	80.55	2.466	199	
	W3c	12	12	275	I	719	1282	150	–	–	–	2151	25.81	0.888	23	
	W4	12	52	300	I	203	2639	150	–	–	–	2992	155.56	0.888	139	25.58
	W5a	25	16	375	D	1984	–	–	–	–	–	1984	31.74	3.854	123	
	W5b	25	12	400	D	1725	–	–	–	–	–	1725	20.7	3.854	80	
	W5c	12	12	275	D	810	–	–	–	–	–	910	10.92	0.888	10	
	W6	12	14	AS DWG	D	7818	–	–	–	–	–	7818	109.45	0.888	98	
													GRAND TOTAL =		4196 KG	48.73

SCHEDULE OF REINFORCEMENTS (B17 – STA. 125+040.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.319m.	1	16	56	200	A	980	4670	980	–	–	–	6630	371.31	1.579	587	
	2	16	60	180	A	180	4670	180	–	–	–	5030	301.83	1.579	477	
	3	16	56	200	B	180	3460	180	–	–	–	3820	213.92	1.579	338	
	4	16	54	200	C	1283	800	255	1500	–	–	6174	333.42	1.579	527	
	5	12	56	200	D	2000	–	–	–	–	–	2000	112	0.888	100	
	6	12	140	250	D	5215	–	–	–	–	–	5215	730.1	0.888	649	23.95
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3460	34.6	0.888	31	
	9	12	58	250	H	430	70	608	–	–	–	1108	64.27	0.888	58	
	10	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
WINGWALLS (h+t)=4.401m.	W1	12	4	AS DWG	D	600	9763	–	–	–	–	10363	41.45	0.888	37	
	W2	12	30	300	D	4629	–	–	–	–	–	4629	138.87	0.888	124	
	W3a	32	24	300	I	1730	3910	150	–	–	–	5790	138.96	6.313	878	
	W3b	20	26	200	I	880	2451	150	–	–	–	3481	90.51	2.466	224	
	W3c	12	14	275	I	730	1316	150	–	–	–	2196	30.75	0.888	28	
	W4	12	56	300	I	203	2775	150	–	–	–	3128	175.18	0.888	156	28.64
	W5a	25	22	300	D	2073	–	–	–	–	–	2073	45.62	3.854	176	
	W5b	25	12	400	D	1716	–	–	–	–	–	1716	20.61	3.854	80	
	W5c	12	14	275	D	907	–	–	–	–	–	907	12.7	0.888	12	
	W6	12	14	AS DWG	D	8373	–	–	–	–	–	8373	117.23	0.888	105	
													GRAND TOTAL =		4647 KG	52.6

SCHEDULE OF REINFORCEMENTS (B18 – STA. 126+674.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.977m.	1	16	62	200	A	980	3524	980	–	–	–	5484	339.98	1.579	537	
	2	16	66	180	A	180	3524	180	–	–	–	3884	256.31	1.579	405	
	3	16	62	200	B	180	3460	180	–	–	–	3820	236.84	1.579	374	
	4	16	60	200	C	996	800	255	1500	–	–	5601	336.05	1.579	531	
	5	12	62	200	D	2000	–	–	–	–	–	2000	124	0.888	111	
	6	12	120	250	D	5877	–	–	–	–	–	5877	705.27	0.888	627	24.04
	7	12	34	250	E	114	380	71	150	480	114	1309	44.5	0.888	40	
	8	12	10	AS DWG	D	3442	–	–	–	–	–	3442	34.42	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+t)=3.344m. L=5.748m.	W1	12	2	AS DWG	D	600	6908	–	–	–	–	7508	15.02	0.888	14	
	W2	12	11	300	D	3451	–	–	–	–	–	3451	37.96	0.888	34	
	W3a	25	12	200	I	1194	3002	150	–	–	–	4346	52.15	3.854	201	
	W3b	16	7	250	I	734	1973	150	–	–	–	2857	20	1.579	32	
	W3c	12	3	350	I	684	1173	150	–	–	–	2007	6.02	0.888	6	
	W4	12	20	300	I	203	2202	150	–	–	–	2555	51.1	0.888	48	7.65
	W5a	25	5	400	D	1813	–	–	–	–	–	1813	9.07	3.854	35	
	W5b	16	7	250	D	1228	–	–	–	–	–	1228	8.59	1.579	14	
	W5c	12	3	350	D	822	–	–	–	–	–	822	2.47	0.888	3	
	W6	12	7	AS DWG	D	5998	–	–	–	–	–	5998	41.98	0.888	38	
WINGWALL (h+t)=3.344m. L=4.523m.	W1	12	2	AS DWG	D	600	5436	–	–	–	–	6036	12.07	0.888	11	
	W2	12	11	300	D	2703	–	–	–	–	–	2703	29.73	0.888	27	
	W3a	25	10	200	I	1194	3002	150	–	–	–	4346	43.46	3.854	168	
	W3b	16	5	250	I	734	1973	150	–	–	–	2857	14.29	1.579	23	
	W3c	12	3	350	I	684	1173	150	–	–	–	2007	6.02	0.888	6	
	W4	12	16	300	I	203	2202	150	–	–	–	2555	40.88	0.888	37	6.05
	W5a	25	4	400	D	1813	–	–	–	–	–	1813	7.25	3.854	28	
	W5b	16	5	250	D	1228	–	–	–	–	–	1228	6.14	1.579	10	
	W5c	12	3	350	D	822	–	–	–	–	–	822	2.47	0.888	3	
	W6	12	7	AS DWG	D	4773	–	–	–	–	–	4773	33.41	0.888	30	
													GRAND TOTAL =		3505 KG	37.74

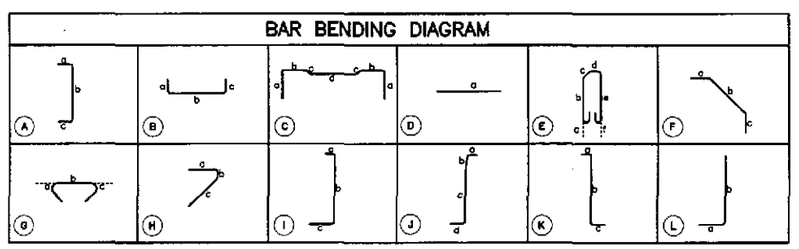
SCHEDULE OF REINFORCEMENTS (B19 – STA. 130+440.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.819m.	1	16	60	200	A	980	3350	980	–	–	–	5310	318.63	1.579	504	
	2	16	64	180	A	180	3350	180	–	–	–	3710	237.47	1.579	375	
	3	16	60	200	B	180	3460	180	–	–	–	3820	229.2	1.579	362	
	4	16	58	200	C	953	800	255	1500	–	–	5514	319.83	1.579	506	
	5	12	60	200	D	2000	–	–	–	–	–	2000	120	0.888	107	
	6	12	120	250	D	5719	–	–	–	–	–	5719	686.28	0.888	610	21.84
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3460	34.6	0.888	31	
	9	12	58	250	H	430	70	608	–	–	–	1108	64.27	0.888	58	
	10	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
WINGWALLS (h+t)=3.171m.	W1	12	4	AS DWG	D	600	6367	–	–	–	–	6967	27.87	0.888	25	
	W2	12	22	300	D	3176	–	–	–	–	–	3176	69.88	0.888	63	
	W3a	20	22	200	I	827	2865	150	–	–	–	3842	84.52	2.466	209	
	W3b	16	8	350	I	727	1901	150	–	–	–	2778	22.22	1.579	36	
	W3c	12	6	350	I	677	1151	150	–	–	–	1978	11.87	0.888	11	
	W4	12	36	300	I	203	2115	150	–	–	–	2468	88.86	0.888	79	13.37
	W5a	25	10	400	D	1722	–	–	–	–	–	1722	17.22	3.854	67	
	W5b	16	8	350	D	1133	–	–	–	–	–	1133	9.07	1.579	15	
	W5c	12	6	350	D	825	–	–	–	–	–	825	4.95	0.888	5	
	W6	12	14	AS DWG	D	5548	–	–	–	–	–	5548	77.67	0.888	69	
													GRAND TOTAL =		3192 KG	35.21

SCHEDULE OF REINFORCEMENTS (B20 – STA. 131+040.00)

STRUCTURE COMMENT	BAR MARK	BAR SIZE	QTY.	SPACING	BAR SHAPE	DIMENSIONS (mm) a	b	c	d	e	f	LENGTH EA. BAR	TOTAL LENGTH	UNIT WT. (KG/M)	WEIGHT IN (KG)	VOLUME OF CONC. (m^3)
BARREL L=5.803m.	1	16	60	200	A	980	3350	980	–	–	–	5310	318.63	1.579	504	
	2	16	64	180	A	180	3350	180	–	–	–	3710	237.47	1.579	375	
	3	16	60	200	B	180	3460	180	–	–	–	3820	229.2	1.579	362	
	4	16	58	200	C	953	800	255	1500	–	–	5514	319.83	1.579	506	
	5	12	60	200	D	2000	–	–	–	–	–	2000	120	0.888	107	
	6	12	120	250	D	5703	–	–	–	–	–	5703	684.36	0.888	608	21.78
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3460	34.6	0.888	31	
	9	12	58	250	H	430	70	608	–	–	–	1108	64.27	0.888	58	
	10	12	4	AS DWG	D	6900	–	–	–	–	–	6900	27.6	0.888	25	
WINGWALLS (h+t)=3.171m.	W1	12	4	AS DWG	D	600	6367	–	–	–	–	6967	27.87	0.888	25	
	W2	12	22	300	D	3176	–	–	–	–	–	3176	69.88	0.888	63	
	W3a	20	22	200	I	827	2865	150	–	–	–	3842	84.52	2.466	209	
	W3b	16	8	350	I	727	1901	150	–	–	–	2778	22.22	1.579	36	
	W3c	12	6	350	I	677	1151	150	–	–	–	1978	11.87	0.888	11	
	W4	12	36	300	I	203	2115	150	–	–	–	2468	88.86	0.888	79	13.37
	W5c	25	10	400	D	1722	–	–	–	–	–	1722	17.22	3.854	67	
	W5b	16	8	350	D	1133	–	–	–	–	–	1133	9.07	1.579	15	
	W5c	12	6	350	D	825	–	–	–	–	–	825	4.95	0.888	5	
	W6	12	14	AS DWG	D	5548	–	–	–	–	–	5548	77.67	0.888	69	
													GRAND TOTAL =		3190 KG	35.15

BAR BENDING DIAGRAM



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

	DATE	SIGNATURE
DESIGNED	10/17/07	
CHECKED	10/19/07	
SUBMITTED	10/21/07	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

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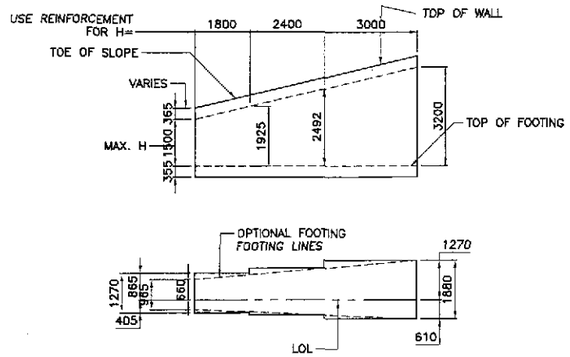
CABANATUAN BYPASS - CONTRACT PACKAGE IV

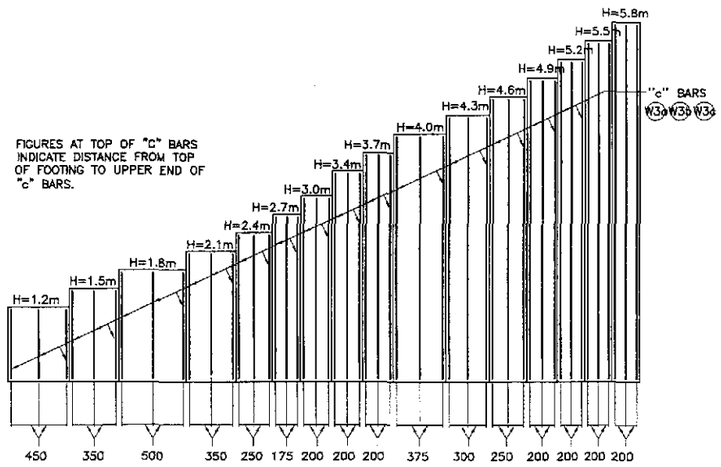
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
BOX CULVERT BARREL BAR SCHEDULE
(ULTIMATE STAGE)

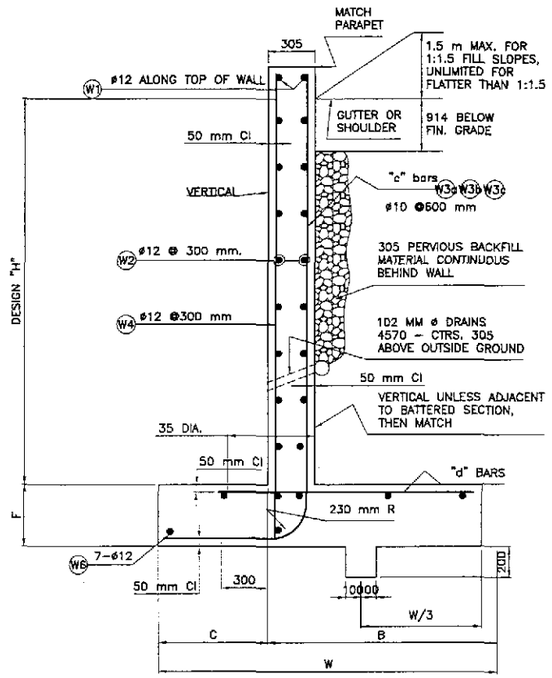
SHEET NO. :
UP-11



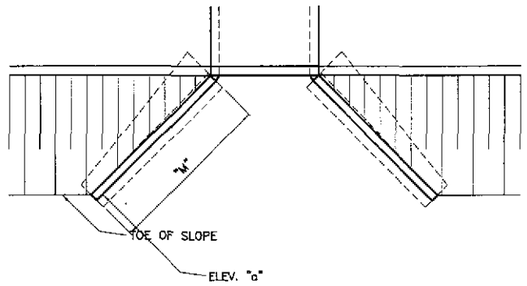
1 UP-12 TYPICAL LAYOUT EXAMPLE
SCALE 1:100



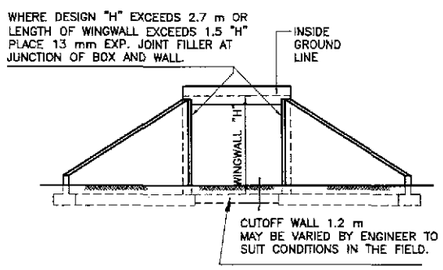
REINFORCED CONCRETE WINGWALLS																
H	1200	1500	1800	2100	2400	2700	3000	3400	3700	4000	4300	4600	4900	5200	5500	5800
W	965	1120	1270	1420	1575	1730	1880	2030	2185	2335	2490	2640	2795	2945	3050	3150
C	305	355	405	455	510	560	610	660	710	760	815	865	915	965	1015	1065
B	660	765	865	965	1065	1170	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	16@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



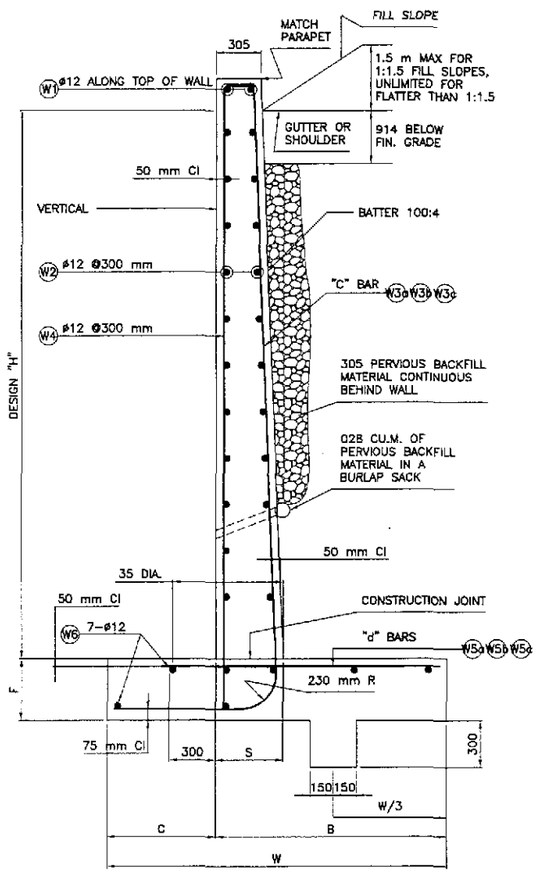
2 UP-12 TYPICAL SECTION
H=1.2 m THRU 3.7 m
SCALE 1:20



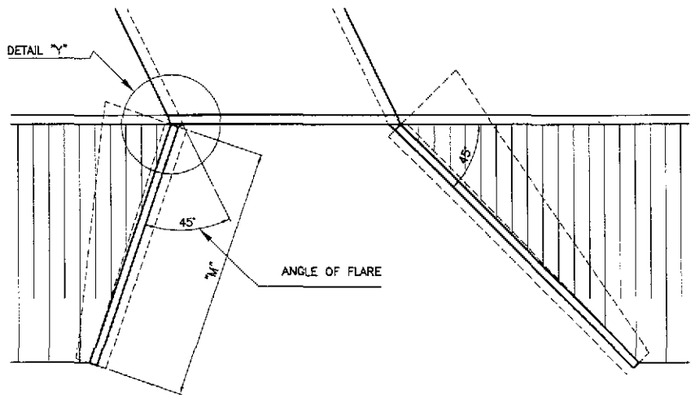
4 UP-12 P L A N
SCALE 1:100



5 UP-12 END ELEVATION
SCALE 1:100



3 UP-12 TYPICAL SECTION
H=4.0 m THRU 4.9 m
SCALE 1:20



6 UP-12 P L A N
SCALE 1:100

NOTES

UNIT STRESSES: f_s =165 MPa, f_c =9 MPa, n=10

MAXIMUM TOE PRESSURE = 160 kPa

ELEVATIONS, LENGTH AND ANGLE OF FLARE OF WINGS MAY BE VARIED BY THE ENGINEER TO SUIT CONDITIONS ENCOUNTERED IN THE FIELD. WALLS DESIGNED FOR 600 mm LIVELOAD SURCHARGE, 1 : 1.5 SLOPING SURCHARGE NOT TO EXCEED 1.5 m IN ELEVATION PLUS 600 mm LIVELOAD SURCHARGE, OR UNLIMITED 1:2 SURCHARGE

DIMENSIONS "H", "L","M","N", ELEVATION "a" AND "ANGLE OF FLARES" (AS APPLY) ARE SHOWN ON THE PLANS

WALL HEIGHT MAY BE EXCEEDED BY 150 mm BEFORE GOING TO NEXT GREATER "H".

ELIMINATE CUTOFF WALL IF ADJACENT CHANNEL IS PAVED AND SKEW IS 20°MAXIMUM

FOR WALL OFFSET VALUES, SEE STANDARD PLAN B3-8

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	DATE	SIGNATURE
DESIGNED	10/17/02	
CHECKED	10/19/02	
SUBMITTED	12/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
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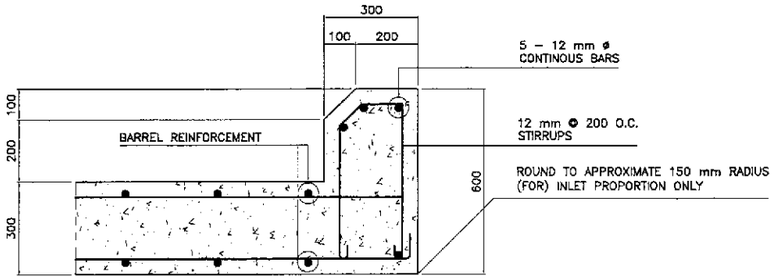
CABANATUAN BYPASS - CONTRACT PACKAGE IV

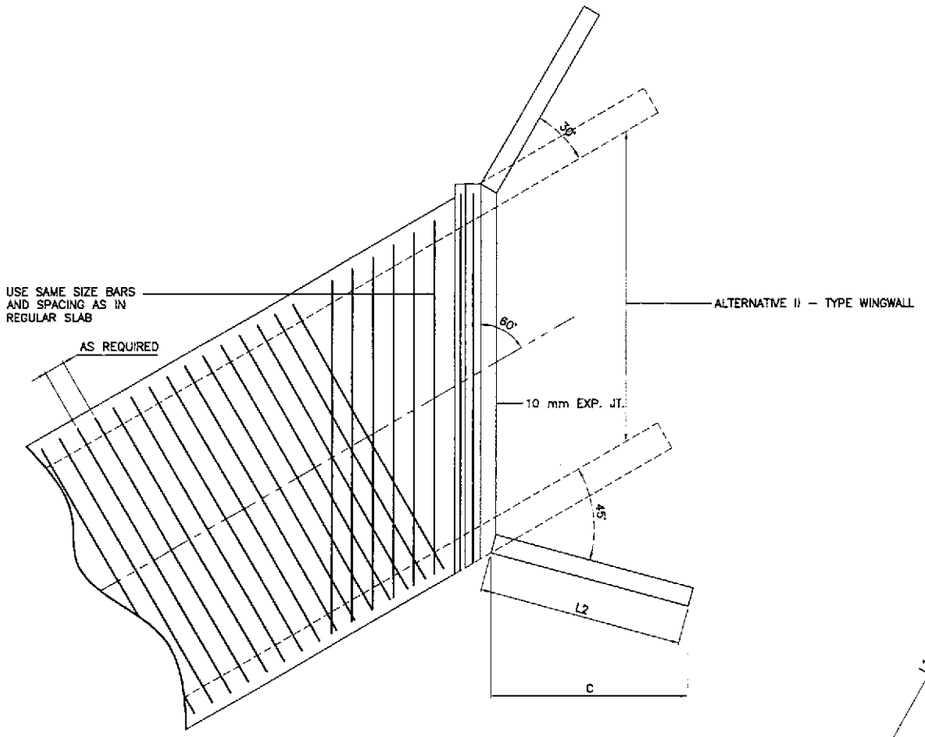
SCALE : AS SHOWN FULL SIZE A1

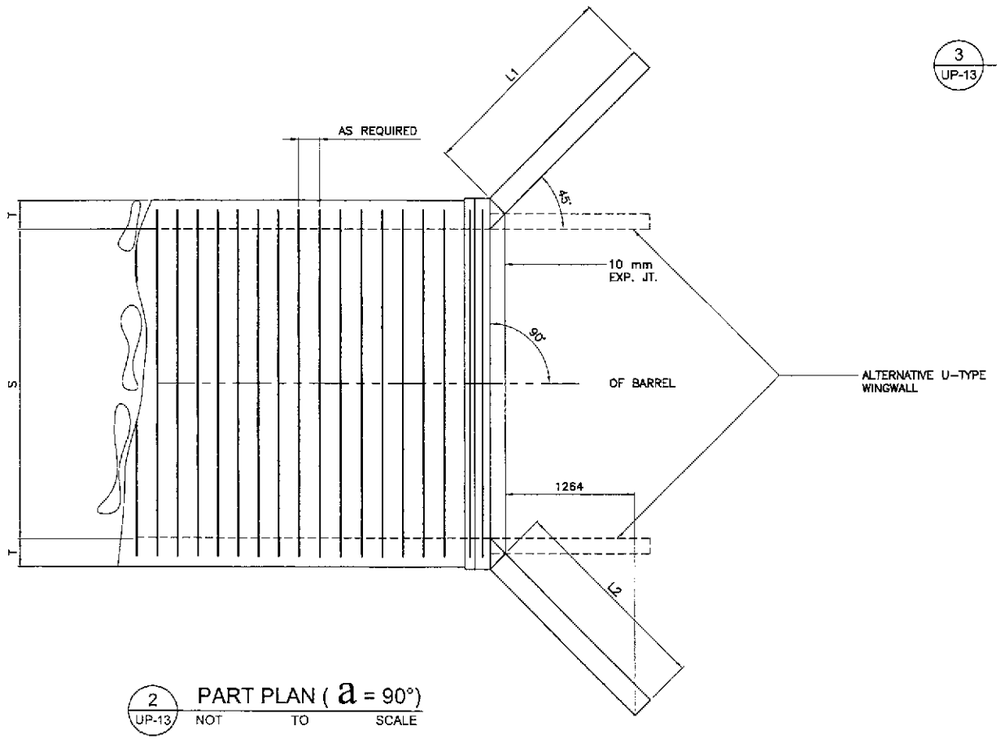
SHEET CONTENTS :
BOX CULVERT
WINGWALL DETAIL
(ULTIMATE STAGE)

SHEET NO. :
UP-12



1 / UP-13 CURB DETAIL
SCALE 1:10



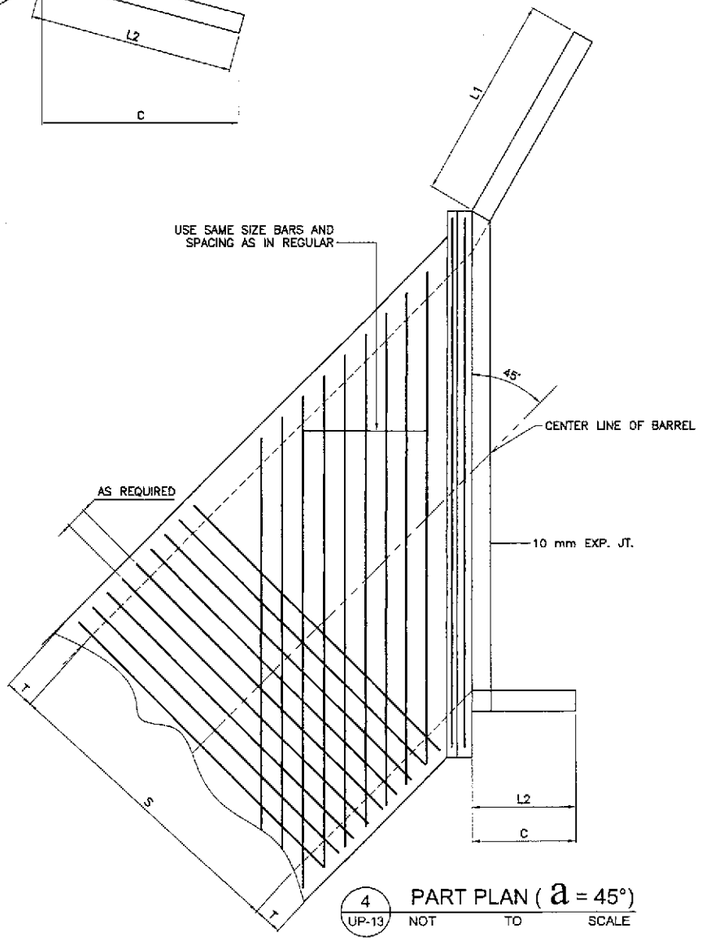


2 / UP-13 PART PLAN (a = 90°)
NOT TO SCALE

3 / UP-13 PART PLAN (a = 60°)
NOT TO SCALE

NOTE

ALL DIMENSIONS ARE IN MILIMETERS UNLESS OTHERWISE SPECIFIED



4 / UP-13 PART PLAN (a = 45°)
NOT TO SCALE

JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

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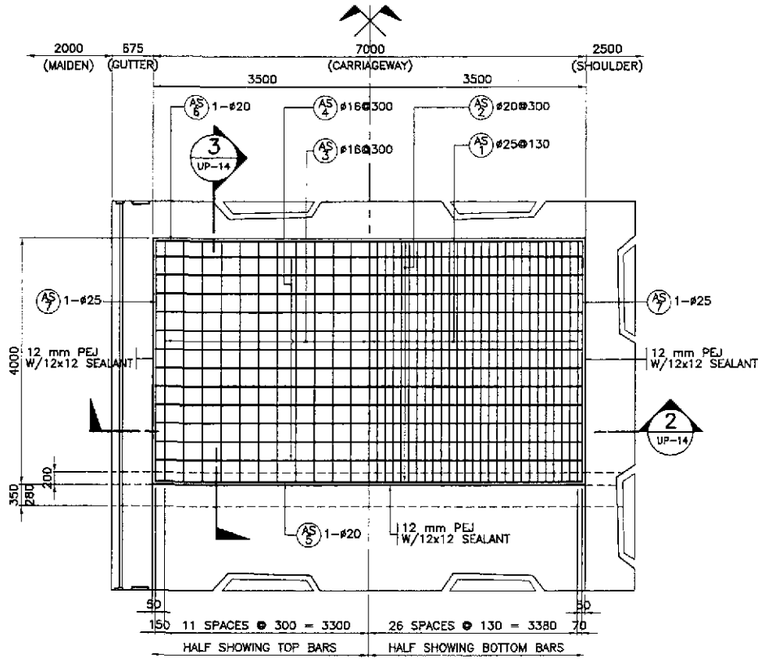
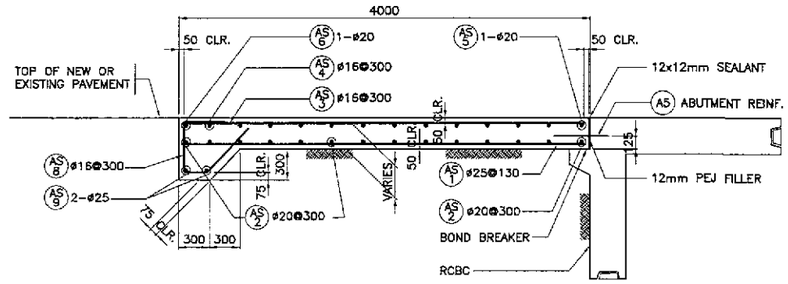
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
TYPICAL PLAN REINFORCED CONCRETE AT
END BOX CULVERT AND CURB DETAIL
(ULTIMATE STAGE)

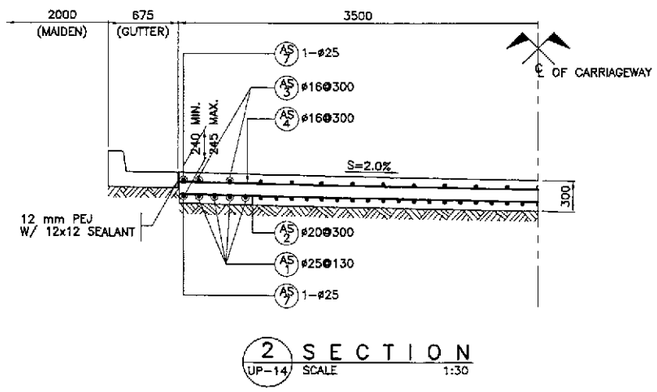
SHEET NO. :
UP-13



1 UP-14 PLAN SCALE 1:50



3 UP-14 SECTION SCALE 1:30



2 UP-14 SECTION SCALE 1:30

REINFORCEMENT SCHEDULE & ESTIMATED QUANTITIES FOR TWO LANES APPROACH SLABS

BENDING DIAGRAM (DIMENSIONS ARE OUT TO OUT OF REBARS)	REINFORCEMENT												CONCRETE VOLUME (m^3)	REMARKS
	MARK	SIZE (mm)	QUANTITY	SPACING (mm)	SHAPE	BAR DIMENSIONS (mm) a	b	c	LENGTH PER BAR (mm)	TOTAL LENGTH (m)	UNIT WEIGHT (kg/m)	TOTAL WEIGHT (kg)		
a (A)	AS1	25	69	130	B	3900	150	–	4050	226.80	3.853	874		
	AS2	20	14	300	A	7900	–	–	7900	55.30	2.466	136		1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB
	AS3	16	25	300	B	3900	150	–	4050	101.25	1.578	160		
a b (B)	AS4	16	12	300	A	7900	–	–	7900	47.40	1.578	75		
	AS5	20	1	AS SHOWN	A	7200	–	–	7200	7.20	2.466	18		
	AS6	20	1	AS SHOWN	A	7900	–	–	4050	53.20	1.578	84	9.58	
400 a c b (C)	AS7	25	4	AS SHOWN	A	1965	1965	–	3930	15.72	3.853	61		
	AS8	16	27	300	C	415 MIN. 475 MAX.	250	650	1745	47.11	1.578	74		
	AS9	25	2	AS SHOWN	A	7900	–	–	7900	15.80	3.853	61		
											GRAND TOTAL =	1543	9.58	

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/12/07	
CHECKED	10/19/07	A. FAROM
SUBMITTED	10/25/07	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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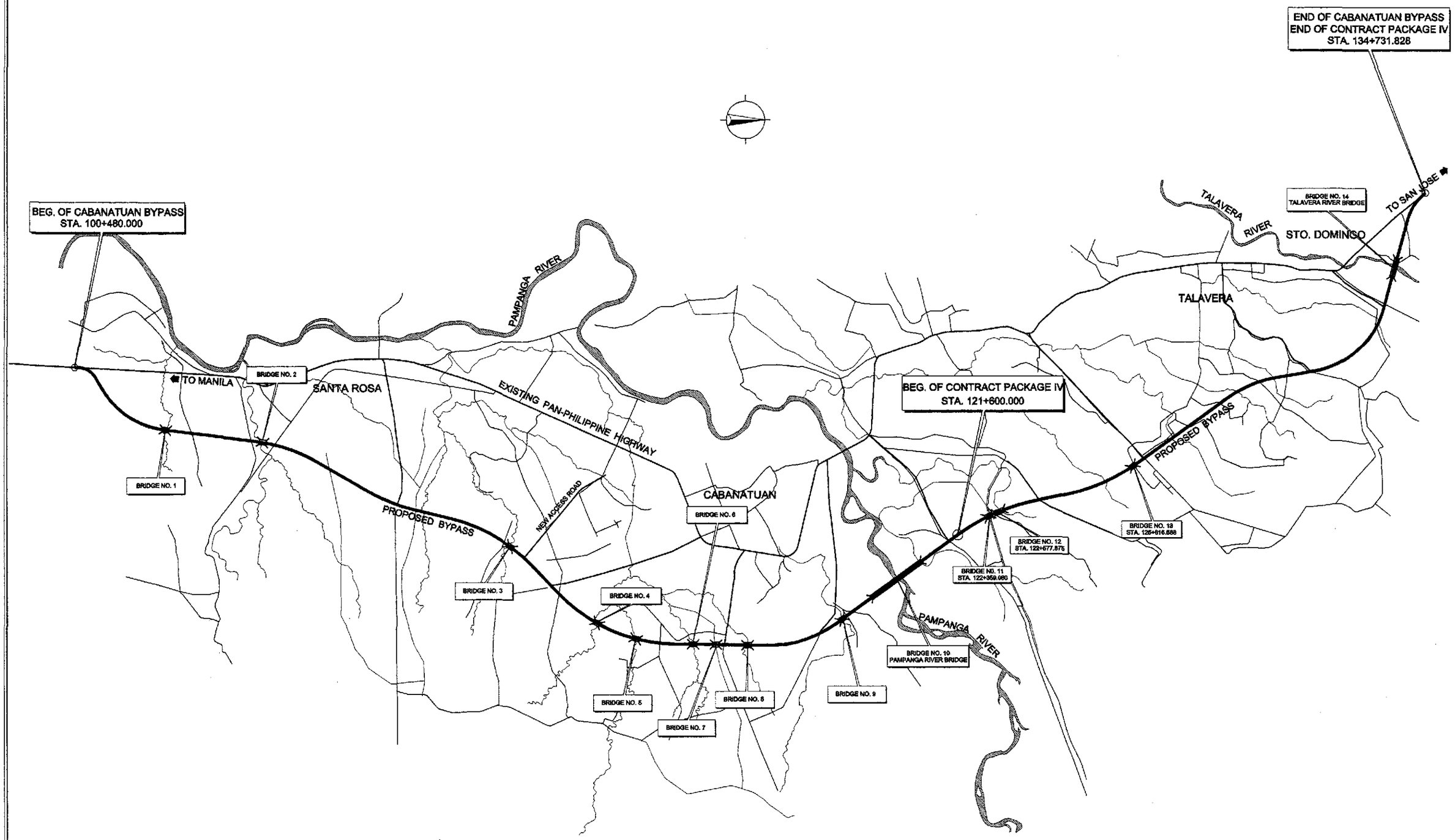
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : AS SHOWN — FULL SIZE A1

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

SHEET NO. : UP-14

BRIDGES



A
* CABANATUAN BYPASS BRIDGE LOCATION MAP

NOT TO SCALE

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	DATE	SIGNATURE
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CHECKED	10/19/02	K. HIDAYASHI
SUBMITTED	10/21/02	TEAM LEADER

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SCALE : AS SHOWN
FULL SIZE A1

SHEET CONTENTS : BRIDGE LOCATION MAP (ULTIMATE STAGE)

SHEET NO. : **BG-01**

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)

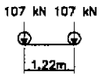
3. LOADING

3.1 DEAD LOADS

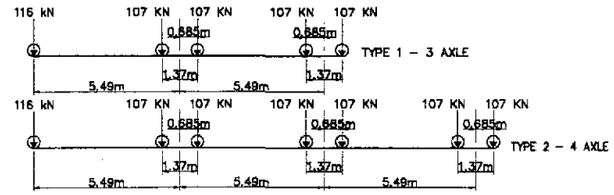
	WEIGHT
A. CONCRETE	24.00 kN/m^3
B. STEEL	77.00 kN/m^3
C. EARTH	19.00 kN/m^3
D. WEARING SURFACE	1.10 kN/m^2

3.2 LIVE LOADS

A. AASHTO HS20 (MS18) TRUCK AND EQUIVALENT LANE LOADING.
B. SIDEWALK LOAD 4.07 kN/m^2
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 1 = 1.3 [1.0 D + 1.67(L+1)n + 1.0 SF]
B. GROUP 1B = 1.3 [1.0 D + 1.0(L+1)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)	① TRANSFER
		41	5946	20 (3/4)	② 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 (16mmø AND SMALLER)
Fy = 276 MPa (40,000 psi)
GRADE 60 (20mmø 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.

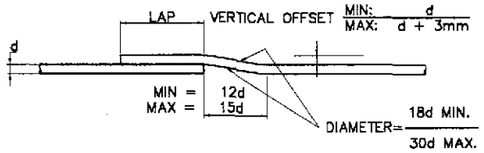
(3) BAR SPLICING NOT INDICATED ON DRAWINGS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.

(4) WELDED SPLICES, IF APPROVED BY THE ENGINEER, SHALL DEVELOP IN TENSION AT LEST 125% OF THE SPECIFIED YIELD STRENGTH OF THE BARS.

(5) NOT MORE THAN 50% OF THE BARS AT ANY ONE SECTION SHALL BE SPLICED.

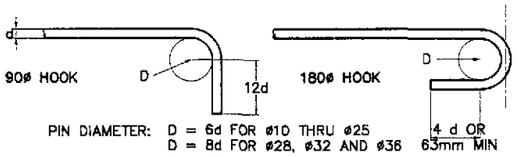
(6) UNLESS OTHERWISE SHOWN ON DRAWINGS, THE CLEAR DISTANCE BETWEEN PARALLEL BARS IN A LAYER SHALL NOT BE LESS THAN 1.5 TIMES THE NOMINAL DIAMETER OF THE BAR NOR LESS THAN 1.5 TIMES THE MAXIMUM SIZE OF COARSE AGGREGATE. THE CLEAR DISTANCE BETWEEN LAYERS SHALL NOT LESS THAN 25mm NOR ONE BAR DIAMETER. THE BARS IN THE UPPER LAYER SHALL BE PLACED DIRECTLY ABOVE THOSE IN THE BOTTOM LAYER.

(7) CRANKED SPLICES



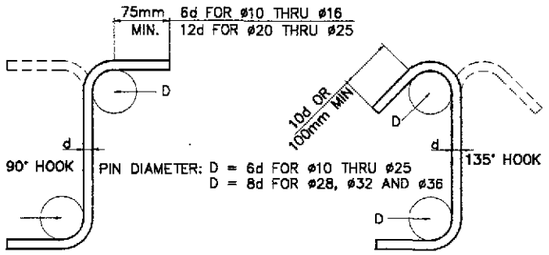
(8) HOOKS AND BENDS

DIMENSIONS OF 90–DEGREE AND 180–DEGREE HOOKS



PIN DIAMETER: D = 6d FOR ø10 THRU ø25
D = 8d FOR ø28, ø32 AND ø36

DIMENSIONS FOR STIRRUPS AND TIE HOOKS



PIN DIAMETER: D = 6d FOR ø10 THRU ø25
D = 8d FOR ø28, ø32 AND ø36

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

	DATE	SIGNATURE
DESIGNED	10/17/02	E.N. SALLAN
CHECKED	10/19/02	K. OBERYASHI
SUBMITTED	10/21/02	H. MIGITA, TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE IV	AS SHOWN FULL SIZE A1	GENERAL NOTES FOR BRIDGES (SHEET 1 OF 2) (ULTIMATE STAGE)	BG-02

GENERAL NOTES FOR BRIDGES
(SHEET 2 OF 2)

8. STRUCTURAL STEEL

THE CONTRACTOR SHALL PREPARE AND SUBMIT SHOP DRAWINGS FOR ALL STRUCTURAL STEEL WORK. THESE SHOP DRAWINGS SHALL BE APPROVED BY THE ENGINEER BEFORE ANY FABRICATION COMMENCES.

9. SHORING

(a) CAMBER FOR REINFOCED 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 APPROXIMARE 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/mm? (6,000 PSI) AT THE AGE OF 28 DAYS.

c.) CONCRETE FOR CAST–IN–PLACE SLAB HAVE A MINIMUM STRENGTH 21 N/mm? (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 ø12 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.

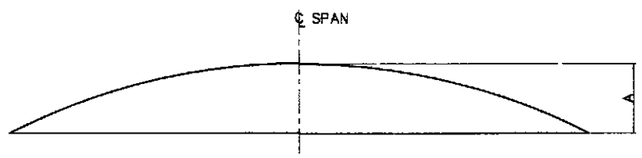
g.) CONTRACTOR SHALL SUBMIT FOR APPROVAL BY THE ENGINEER THE CALCULATED ELONGATION OF THE PRESTRESSING TENDONS CORRESPONDING TO THE REQUIRED JACKING FORCES.

h.) SHOP DRAWING SHALL SUBMIT FOR APPROVAL PRIOR TO FABRICATION.

14. DRAWINGS

a.) ALL ELEVATIONS, STATIONING AND DIMENSIONS SHALL BE VERIFIED PRIOR TO CONSTRUCTION.

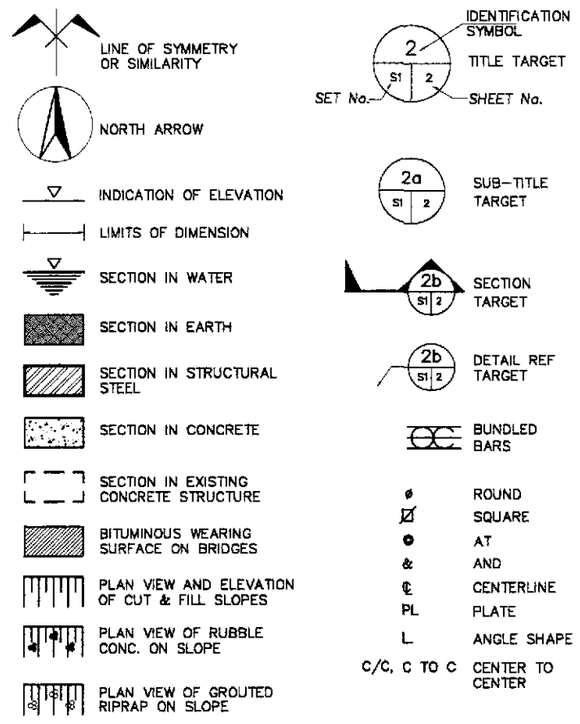
b.) ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION.



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

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/17/02	E. N. SALLAN
CHECKED	10/19/02	M. KOBAYASHI
SUBMITTED	10/21/02	M. KUSUNOKI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	GENERAL NOTES FOR BRIDGES (SHEET 2 OF 2) (ULTIMATE STAGE)	BG-03
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		

BRIDGE NAME : BRIDGE NO. 11 (ULTIMATE STAGE)
BRIDGE LENGTH : 35.00 m
SPECIFICATION : 1 - 35.00 m SPAN TYPE VI 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.	29.00	24.00		53.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	122.00	105.00		227.00
104(3)	Embankment from Borrow Pit	cu.m.	185.00	145.00		330.00
104(4)	Embankment for Bridge Approach	cu.m.	261.00	191.00		452.00
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.	267.00	236.00		503.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	234.00	207.00		441.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	12.25	12.25		24.50
400(19)b	Pile Shoes for 450 mm x 450 mm Piles	each	27.00	24.00		51.00
401(1)a	Concrete Post and Railing	l.m.			70.00	70.00
404(1)	Reinforcing Steel, Grade 40	kg	3,697.00	3,539.00	16,915.00	24,151.00
404(2)	Reinforcing Steel, Grade 60	kg	7,396.00	6,851.00	1,546.00	15,793.00
405(1)b	Structural Concrete Class "A" (fc'= 21MPa)	cu.m.	128.00	112.00		240.00
405(1)d	Structural Concrete Class "A1" (fc'= 21MPa)	cu.m.			118.00	118.00
405(3)a	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	5.00	5.00	15.00	25.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc'= 17MPa	cu.m.	7.00	6.00		13.00
406(1)j	Prestressed Concrete Girder Type VI L=35.00m	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, 30 mm 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.	58.00	48.00		106.00

BRIDGE NAME : BRIDGE NO. 13 (ULTIMATE STAGE)
BRIDGE LENGTH : 20.00 m
SPECIFICATION : 1 - 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.	26.00	26.00		52.00
103(2)a	Bridge Excavation, Common, Above O.W.L.	cu.m.	94.00	94.00		188.00
104(3)	Embankment from Borrow Pit	cu.m.	171.00	171.00		342.00
104(4)	Embankment for Bridge Approach	cu.m.	214.00	214.00		428.00
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.	445.00	445.00		890.00
400(13)b	RC Piles (450 mm x 450 mm) Driven	l.m.	420.00	420.00		840.00
400(15)b	Test Piles (450 mm x450 mm)	l.m.	24.50	24.50		48.50
400(19)b	Pile Shoes for 450 mm x 450 mm Piles	each	21.00	21.00		42.00
401(1)a	Concrete Post and Railing	l.m.			40.00	40.00
404(1)	Reinforcing Steel, Grade 40	kg	2,948.00	2,948.00	10,624.00	16,520.00
404(2)	Reinforcing Steel, Grade 60	kg	6,550.00	6,550.00	1,124.00	14,224.00
405(1)b	Structural Concrete Class "A" (fc'= 21MPa)	cu.m.	108.00	108.00		216.00
405(1)d	Structural Concrete Class "A1" (fc'= 21MPa)	cu.m.			67.00	67.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	4.00	4.00	9.00	17.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc'= 17MPa	cu.m.	6.00	6.00		12.00
406(1)a	Prestressed Concrete Girder Type IV L=20.00m	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, 30 mm 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.	52.00	52.00		104.00

BRIDGE NAME : BRIDGE NO. 12 (ULTIMATE STAGE)
BRIDGE LENGTH : 100.00 m
SPECIFICATION : 4 - 25.00 m SPAN TYPE IV PSCG ON SEAT TYPE ABUTMENT

SUMMARY OF QUANTITIES

PAY ITEM NO.	DESCRIPTION	UNIT	ABUTMENT		PIER			SUPER-STRUCTURE	TOTAL
			" A1 "	" A2 "	" P1 "	" P2 "	" P3 "		
101(7)	Removal of Existing Slope Protection	cu.m.	13.00	36.00					49.00
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.	181.00	104.00					285.00
103(2)c	Bridge Excavation, Common, Below O.W.L.	cu.m.			149.00	201.00	276.00		626.00
104(3)	Embankment from Borrow Pit	cu.m.	111.00	251.00					362.00
104(4)	Embankment for Bridge Approach	cu.m.	120.00	249.00					369.00
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.	60.00	60.00					120.00
400(3)a	BH – Steel Piles (450 mm x 260) Furnished	l.m.	176.00	161.00	145.00	145.00	145.00		772.00
400(10)a	BH – Steel Piles (450 mm x 260) Driven	l.m.	176.00	161.00	145.00	145.00	145.00		772.00
400(15)c	Test Piles (BH – Steel Pile, 450 mm x260)	l.m.	10.00	9.00	7.00	7.00	7.00		40.00
401(1)c	Concrete Post and Railing	l.m.						204.00	204.00
404(1)	Reinforcing Steel, Grade 40	kg	3,479.00	3,644.00	3,408.00	3,408.00	3,408.00	51,616.00	68,963.00
404(2)	Reinforcing Steel, Grade 60	kg	8,020.00	8,525.00	18,181.00	18,024.00	17,787.00	10,985.00	81,522.00
405(1)b	Structural Concrete Class "A" (fc'= 21MPa)	cu.m.	118.00	128.00	127.00	127.00	126.00		626.00
405(1)d	Structural Concrete Class "A1" (fc'= 21MPa)	cu.m.						334.00	334.00
405(3)	Structural Concrete Class "C" (fc' = 21MPa)	cu.m.	4.00	4.00				44.00	52.00
405(6)	Structural Concrete Class "B" (Lean Concrete) fc'= 17MPa	cu.m.	18.00	20.00	7.00	7.00	7.00		59.00
406(1)d	Prestressed Concrete Girder Type IV L=25.00m	each						20.00	20.00
407(1)c	Elastomeric Bearing Pad (600x350x50, Duro 60)	each	5.00	5.00	10.00	10.00	10.00		40.00
407(2)a	Expansion Joint, (±40mm Movement)	l.m.	10.00	10.00					20.00
407(2)g	Expansion Joint, 30 mm for Bridge Sidewalk	l.m.	2.00	2.00					4.00
407(4)	Metal Drain (150 mm ø G.I. Drain Pipe)	l.m.						9.00	9.00
504(1)	Grouted Riprap, Class "A"	cu.m.	11.00	17.00					28.00
510(1)	Rubble Concrete	cu.m.	28.00	43.00					71.00
507(2)b	Steel Sheet Pile (85x400x8mm Thk.), Furnished and Driven	l.m.	261.00	299.00					560.00
509(1)	Gabions	cu.m.			73.00	73.00			146.00

NOTE: ALL QUANTITIES SHALL BE VERIFIED DURING CONSTRUCTION

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

	DATE	SIGNATURE
DESIGNED	10/17/02	[signature] JEAN S. SALLAN, TEAM LEADER
CHECKED	10/19/02	[signature]
SUBMITTED	10/31/02	[signature]

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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

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

SCALE : N. T. S. FULL SIZE A1

SHEET CONTENTS :
BRIDGE NO. 11, 12 AND 13
SUMMARY OF QUANTITIES
(ULTIMATE STAGE)

SHEET NO. : BG-04