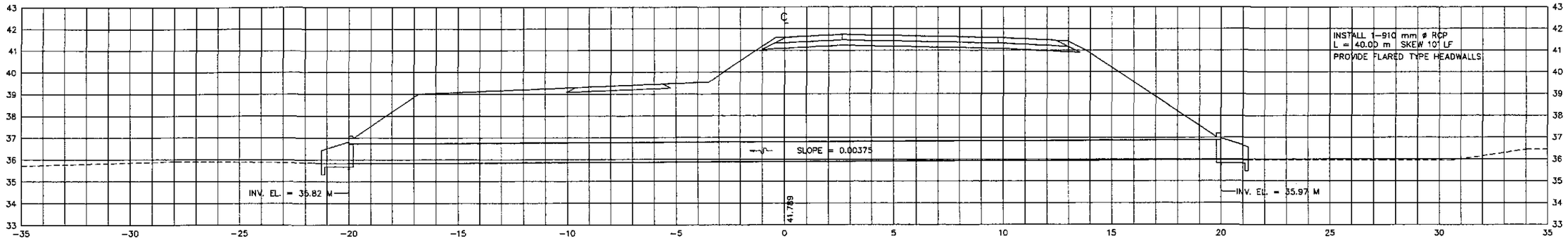
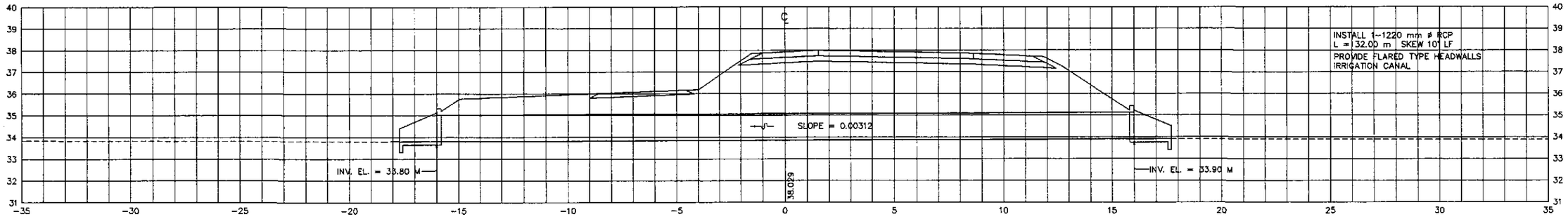
122+340

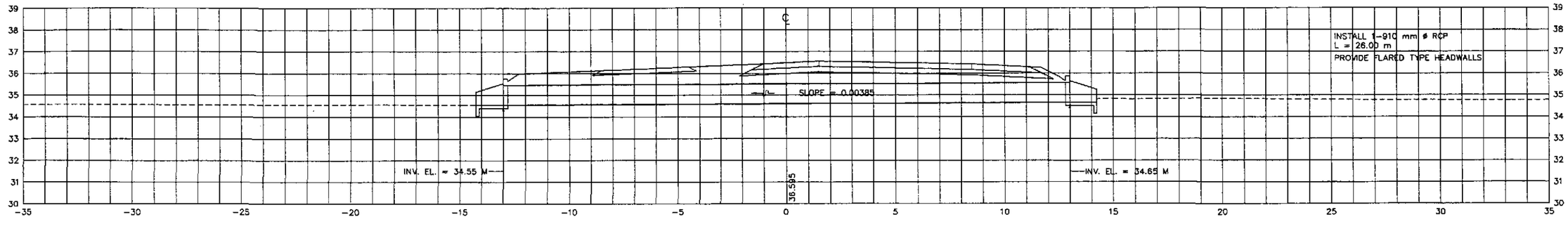


122+061



121+914

121+700



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	10/12/02		Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	10/29/02		DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
SUBMITTED	10/2/02	TEAM LEADER	Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

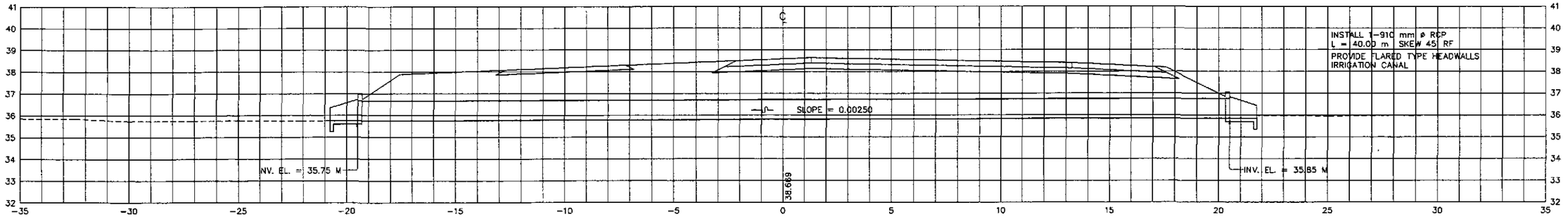
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

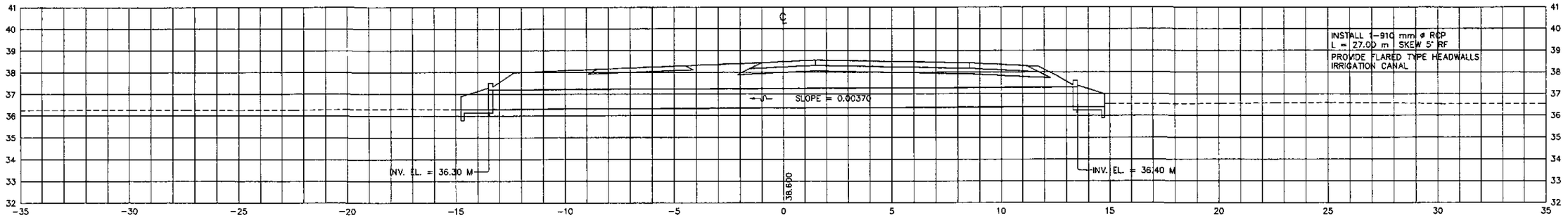
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 121+700 - STA. 122+340

SHEET NO. : **DC-01**

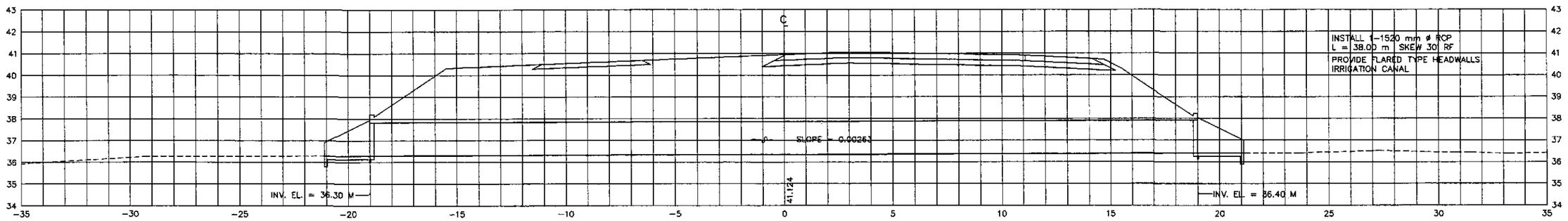
123+364



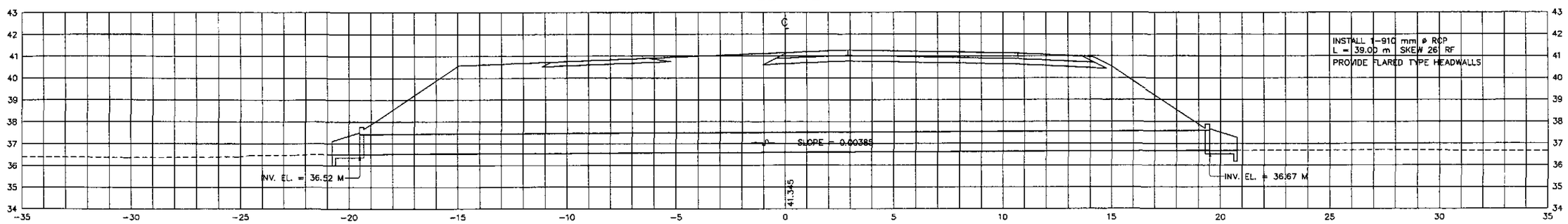
123+260



122+465



122+452



JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/2/02	F. STA. MARIA
CHECKED	10/9/02	R. MAGNO
SUBMITTED	10/2/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

P.H.L. – 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 :

1:100

FULL SIZE A1

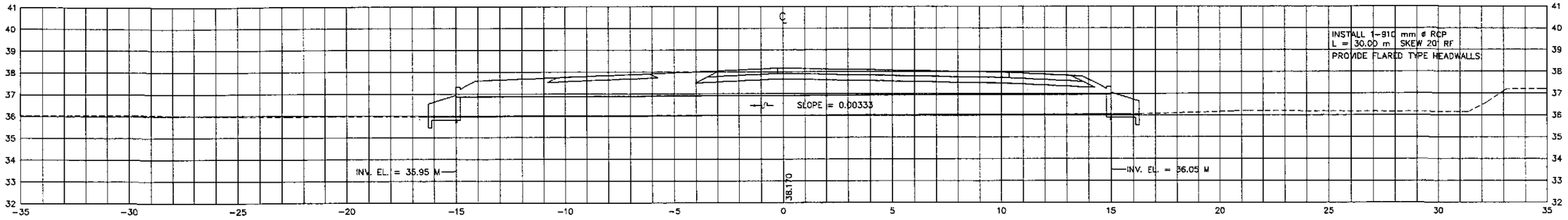
SHEET CONTENTS :

DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 122+452 - STA. 123+364

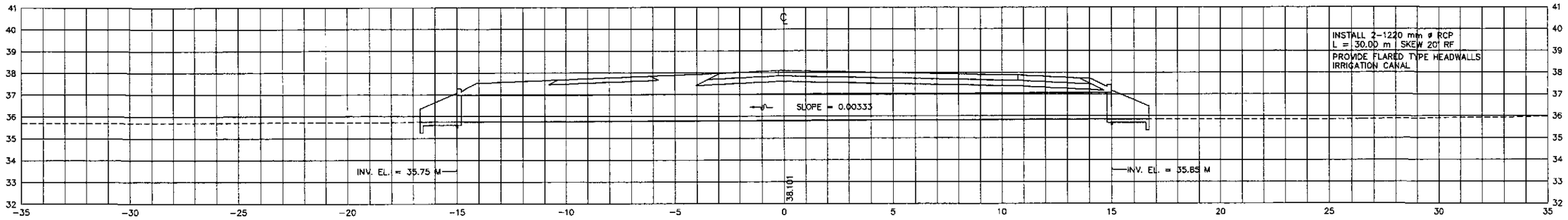
SHEET NO. :

DC-02

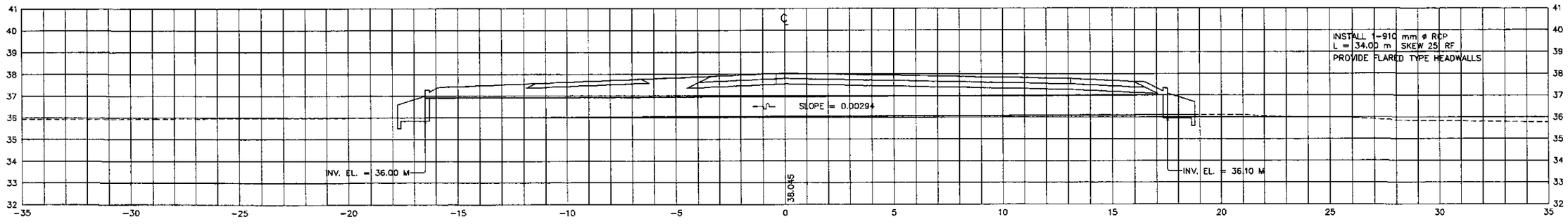
123+574



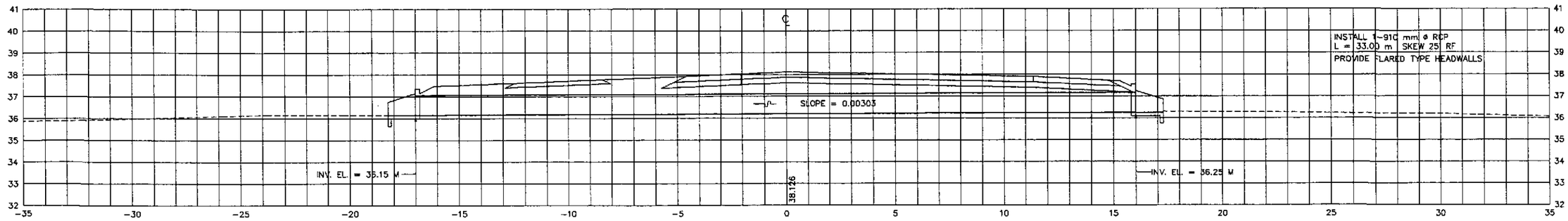
123+564



123+500



123+475



JAPAN INTERNATIONAL COOPERATION AGENCY

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE
DESIGNED	10/12/02	T. STA. MARIA
CHECKED	10/19/02	CAYABYAB
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. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	DIC, Director IV	Undersecretary	Secretary

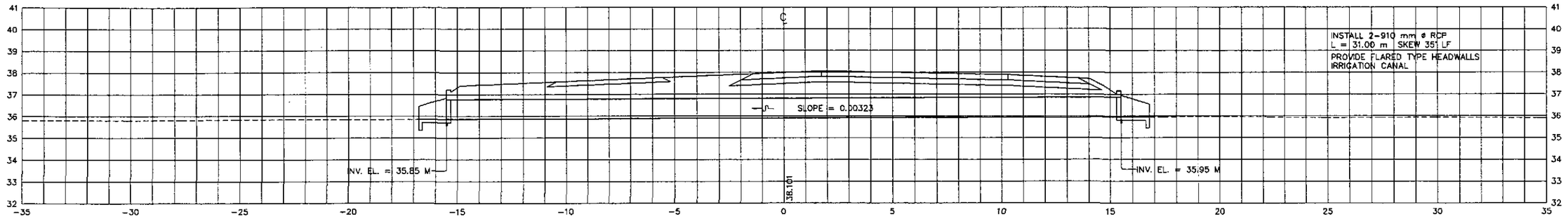
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

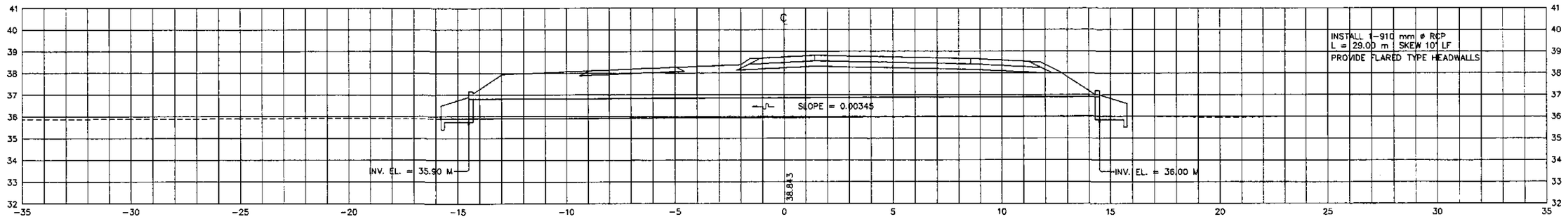
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 123+475 - STA. 123+574

SHEET NO. : **DC-03**

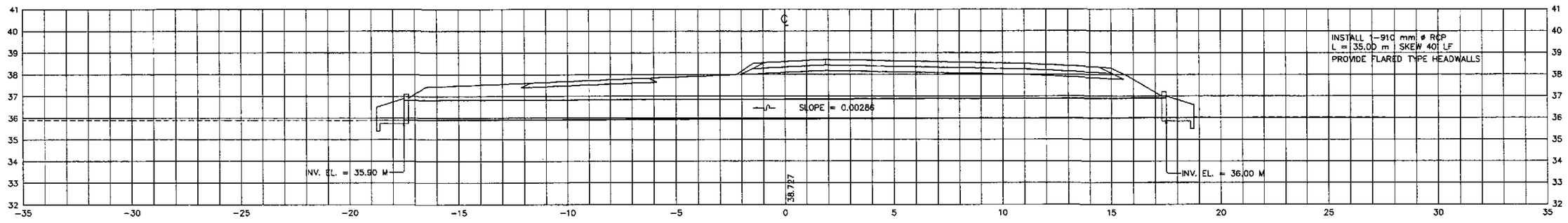
124+360



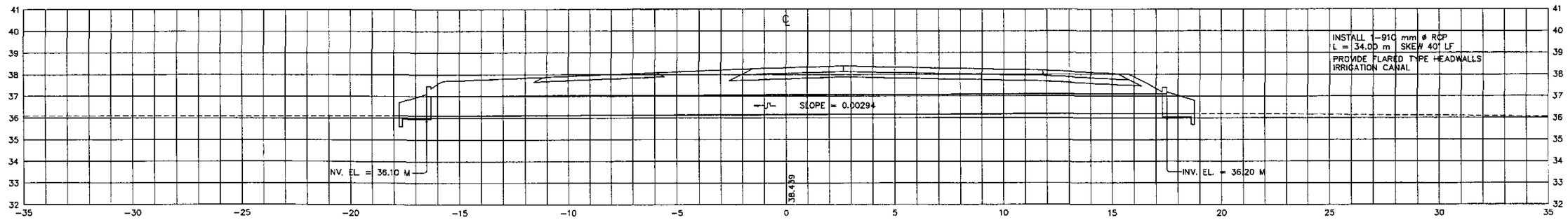
124+134



123+940



123+654



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	
			Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DESIGNED	10/12/02	L. F. STA. MARIA					
CHECKED	10/17/02	H.A. HAKIM					
SUBMITTED	10/21/02	R. KISHI 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

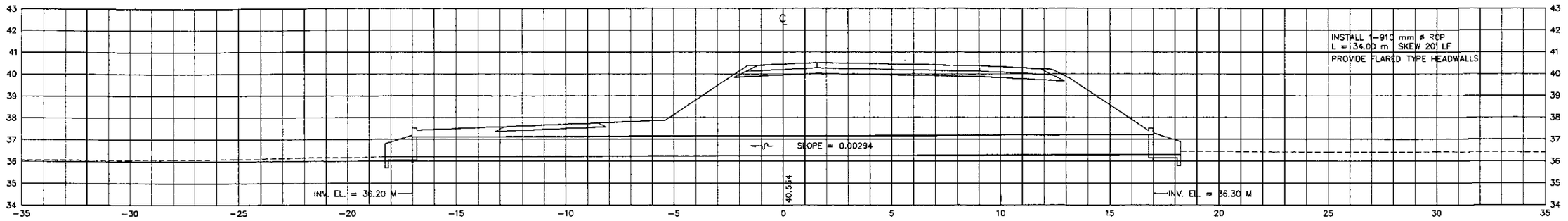
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

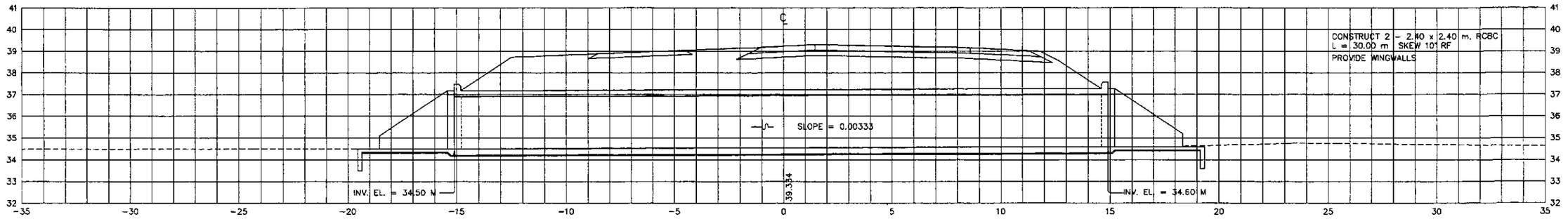
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 123+654 - STA. 124+360

SHEET NO. : DC-04

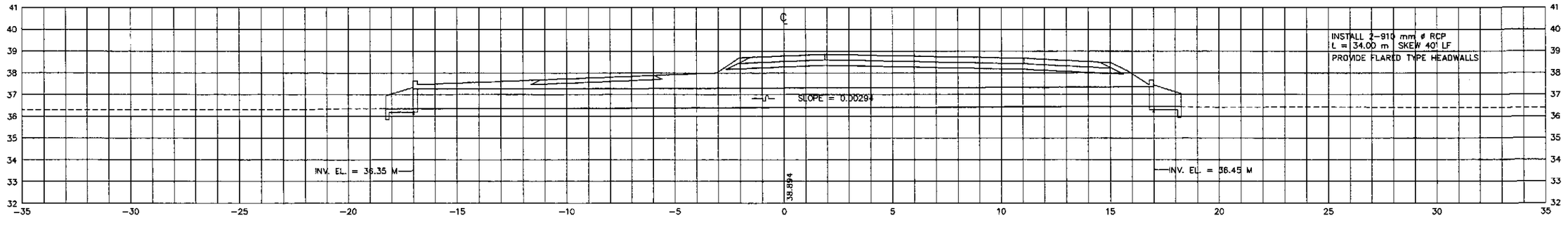
125+014



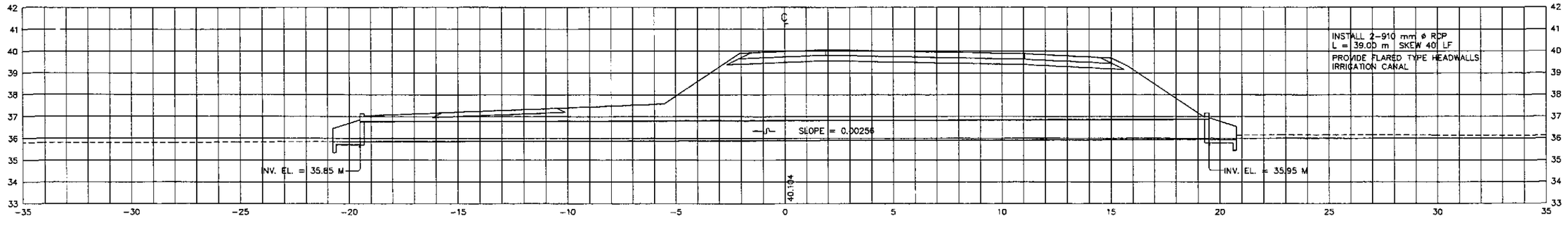
124+924



124+654



124+514



JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	V. STA. MARIA
CHECKED	10/19/02	
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

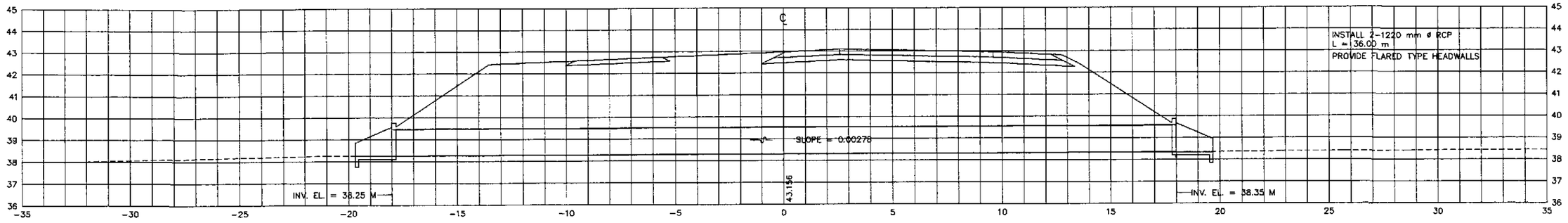
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE :
1:100
FULL SIZE A1

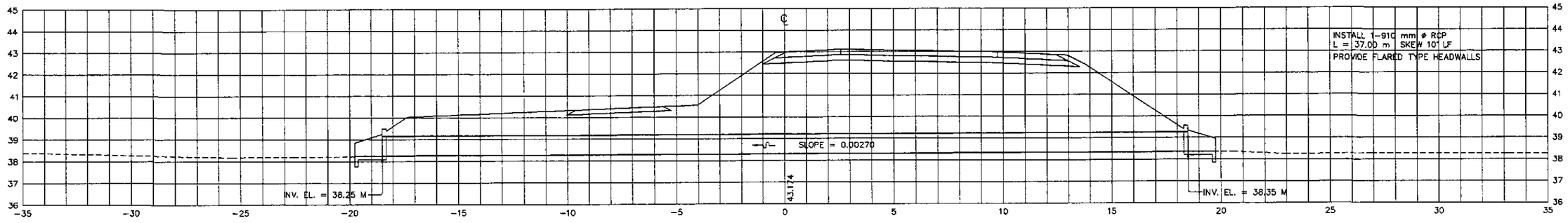
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 124+514 - STA. 125+014

SHEET NO. :
DC-05

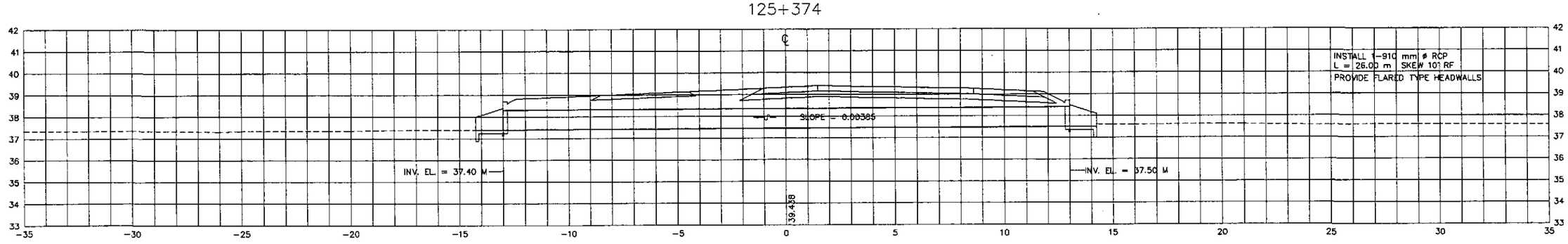
125+655



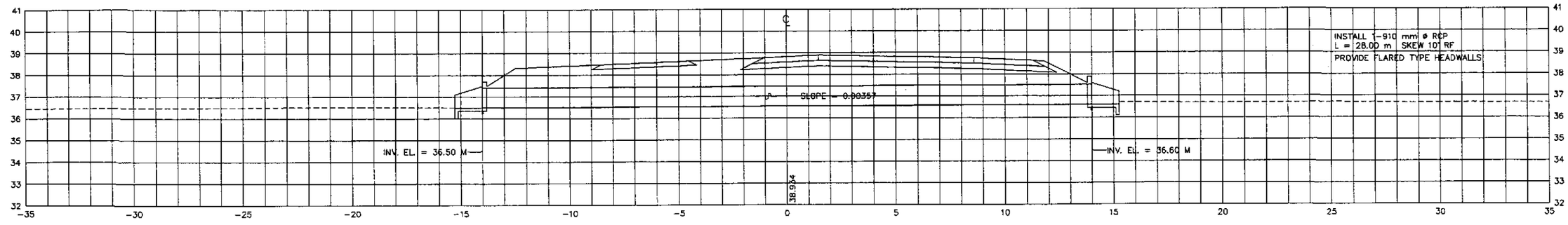
125+600



125+374



125+180



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE *
DESIGNED	10/12/02	F. STELLA MARIA
CHECKED	10/19/02	[illegible]
SUBMITTED	10/21/02	[illegible] 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

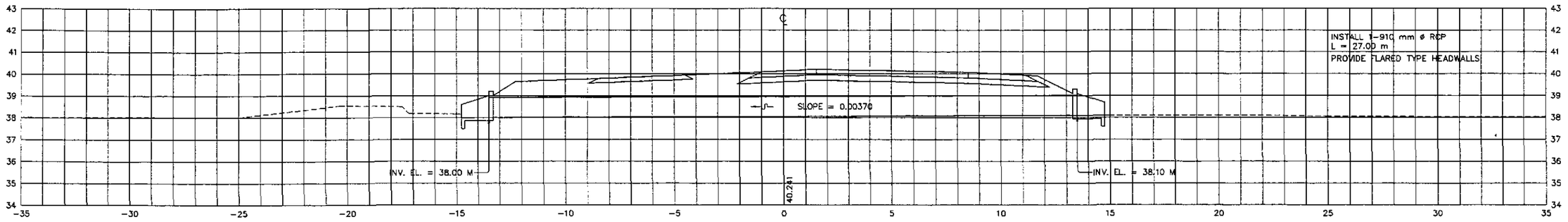
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE :
1:100
FULL SIZE A1

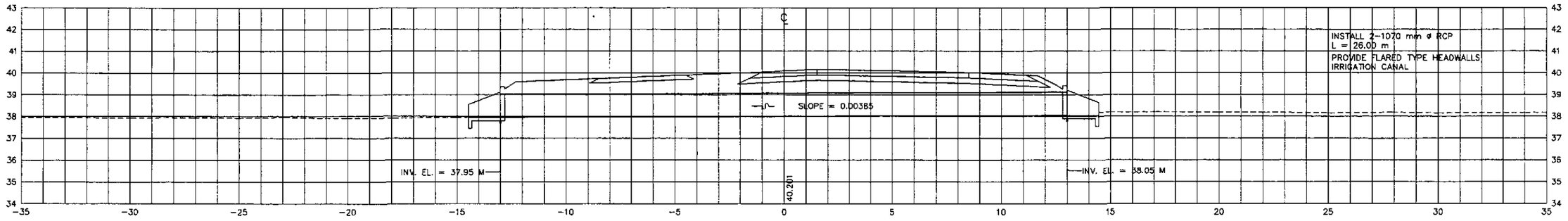
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 125+180 - STA. 125+655

SHEET NO. :
DC-06

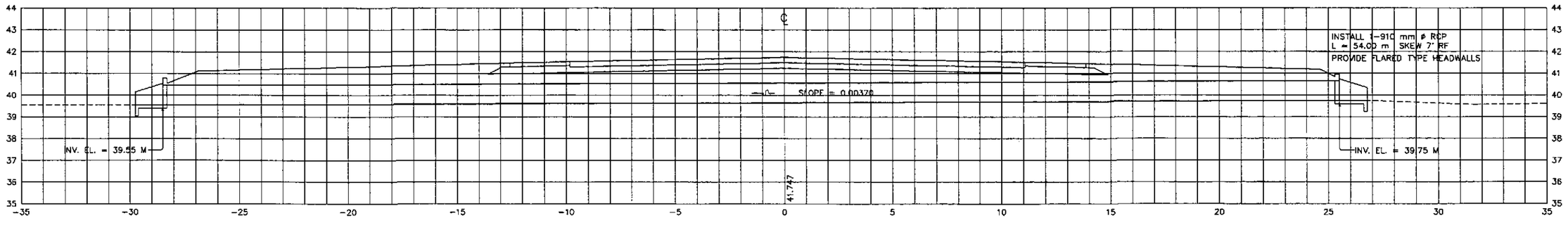
126+434



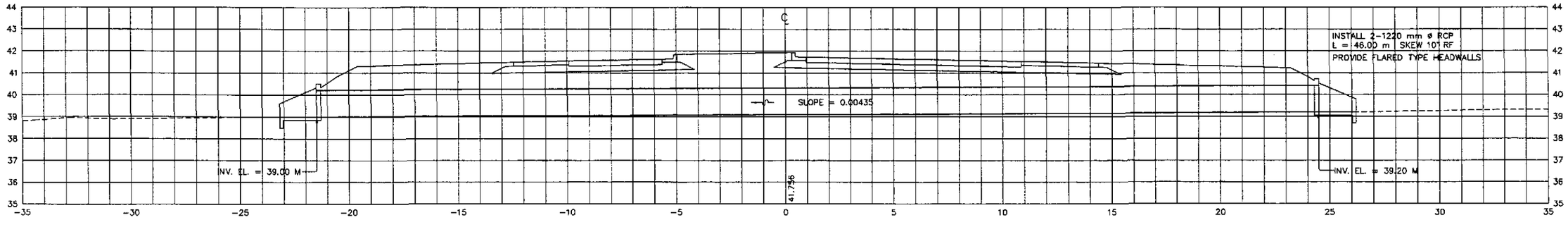
126+214



125+895



125+864



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/29/02	F. STA. MARIA
CHECKED	10/29/02	A. PARUM
SUBMITTED	10/29/02	M. KUSUDA 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

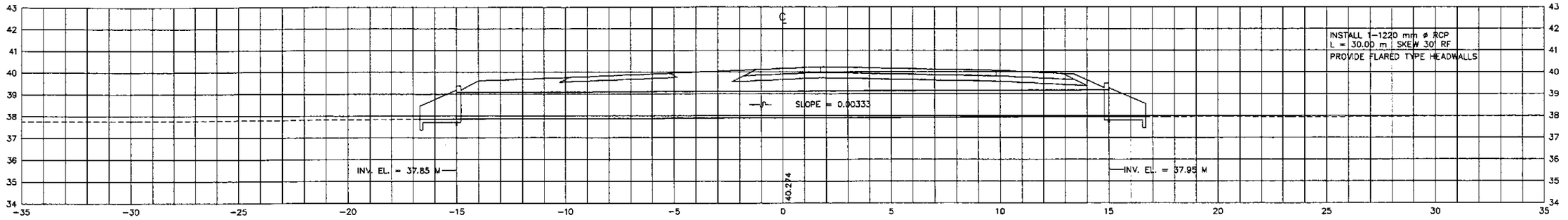
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE :
1:100
FULL SIZE A1

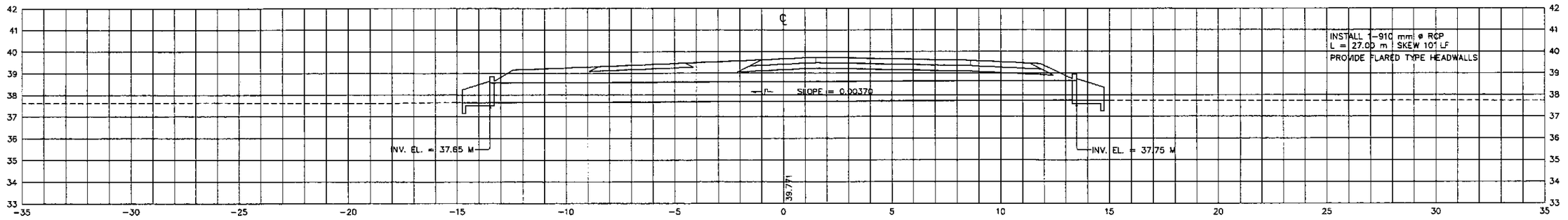
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 125+864 - STA. 126+434

SHEET NO. :
DC-07

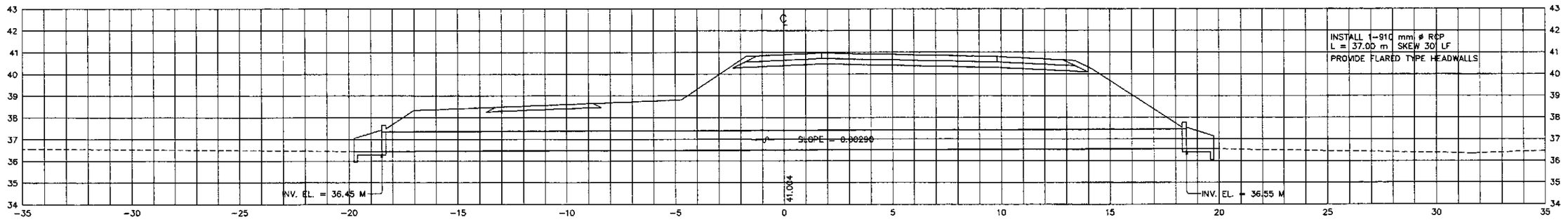
126+994



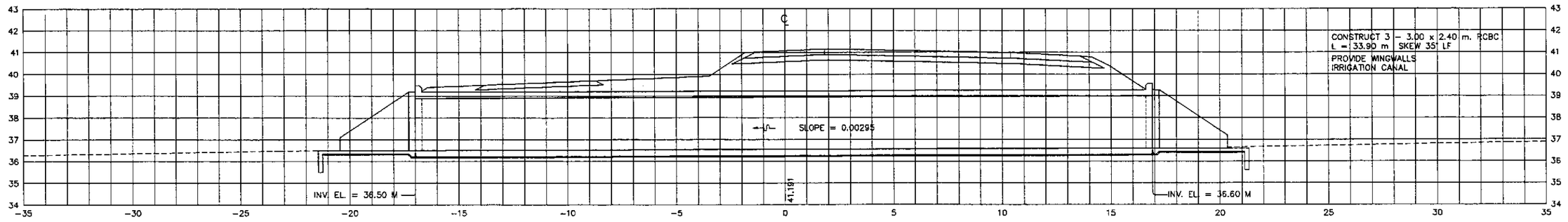
126+874



126+718



126+624



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/2/02	
CHECKED	10/2/02	A. RAKIN
SUBMITTED	10/2/02	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

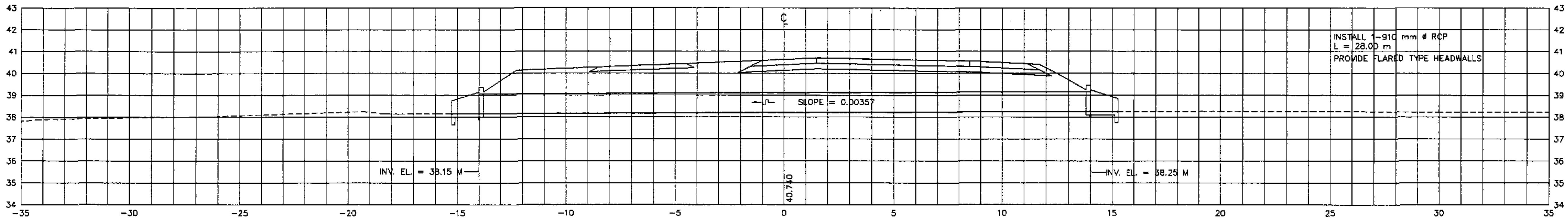
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

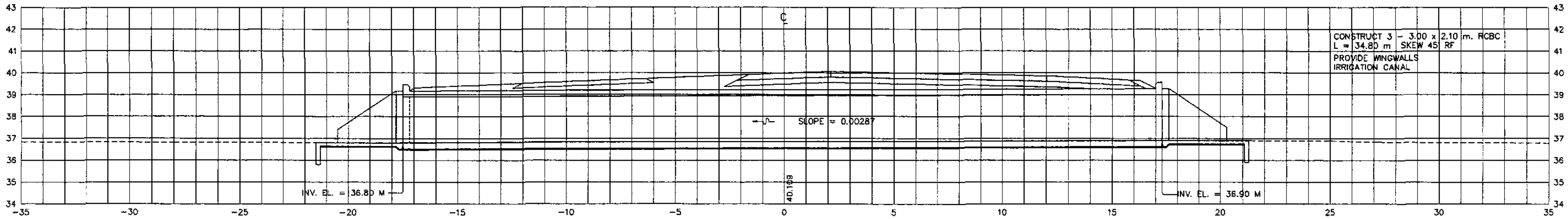
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 126+624 - STA. 126+994

SHEET NO. : **DC-08**

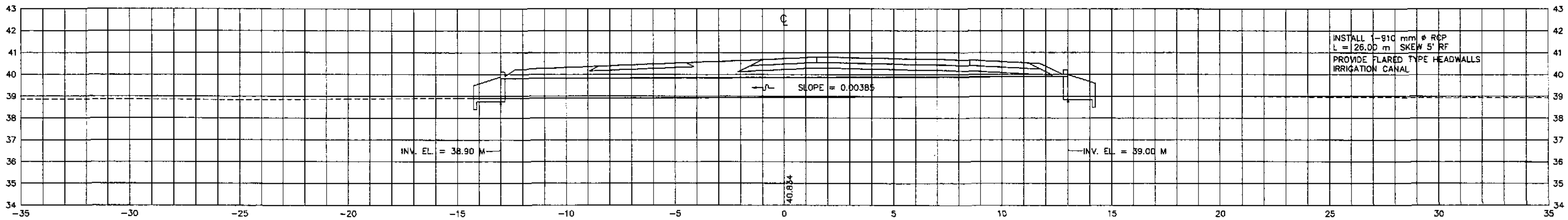
127+692



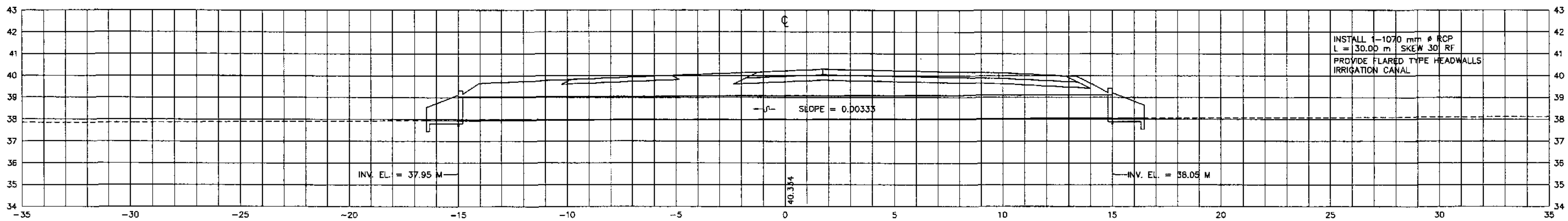
127+480



127+334



127+006



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

	DATE	SIGNATURE	
DESIGNED	10/12/12		F. STA. ANA
CHECKED	10/19/12		A. HAKIM
SUBMITTED	10/21/12		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	JOSEFINA M. ALAGAR, Chief, Highways Division	GILBERTO S. REYES, OIC, Director IV	MANUEL M. BONOAN, Undersecretary	SIMEON A. DATUMANONG, Secretary

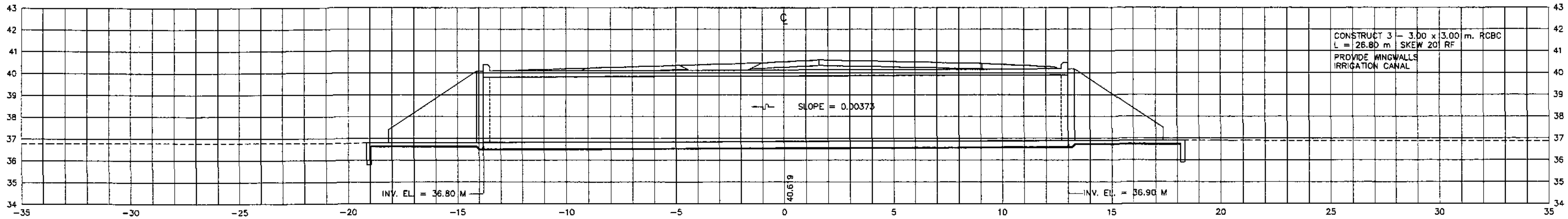
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100
FULL SIZE A1

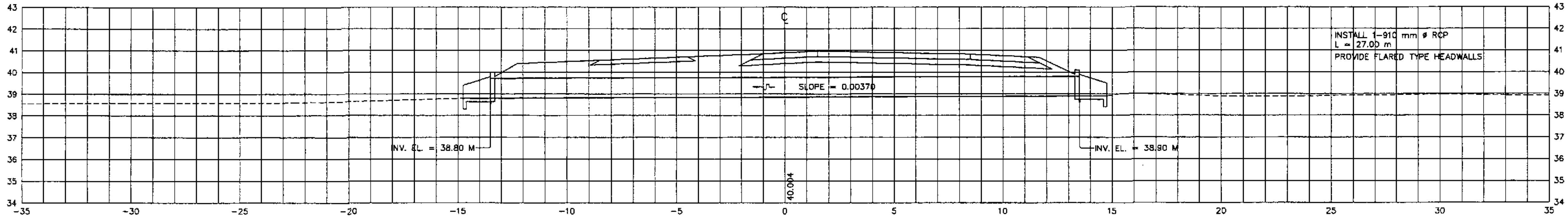
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 127+006 - STA. 127+692

SHEET NO. : **DC-09**

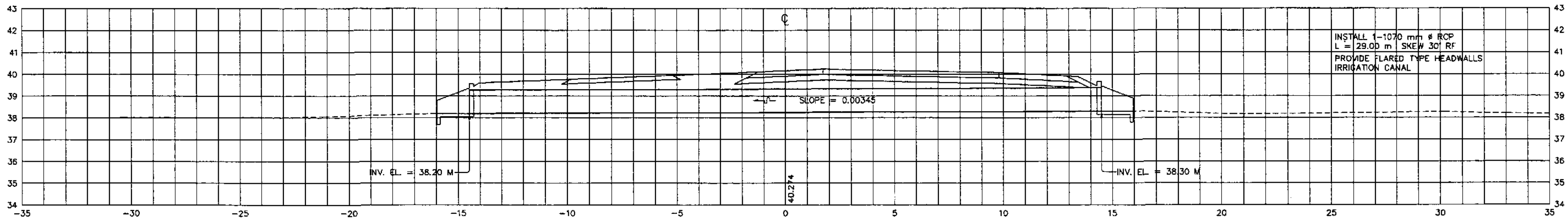
128+297



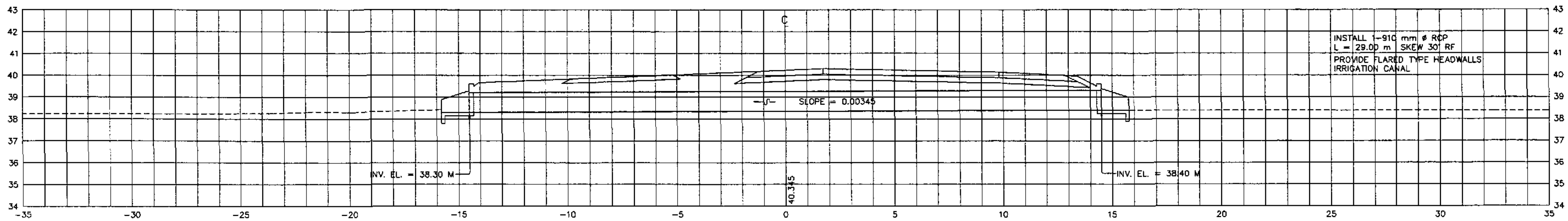
128+060



127+850



127+832



JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	S. STA. MARIA
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	M. KIKUCHI, 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	JOSEFINA M. ALAGAR, Chief, Highways Division	GILBERTO S. REYES, OIC, Director IV	MANUEL M. BONOAN, Undersecretary	SIMEON A. DATUMANONG, Secretary

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

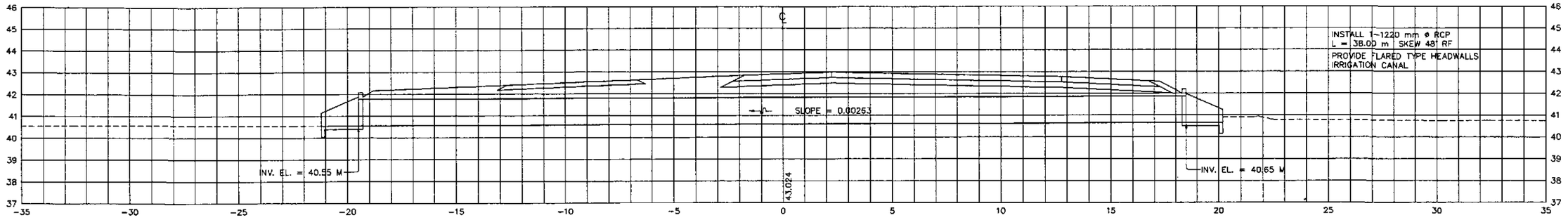
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100
FULL SIZE A1

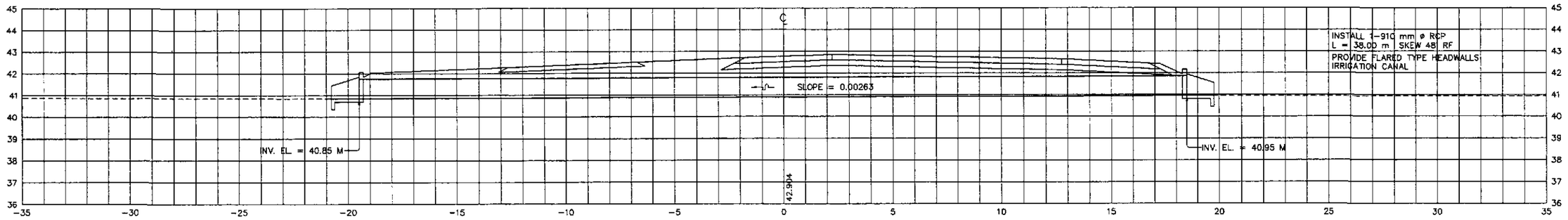
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 127+832 - STA. 128+297

SHEET NO. : DC-10

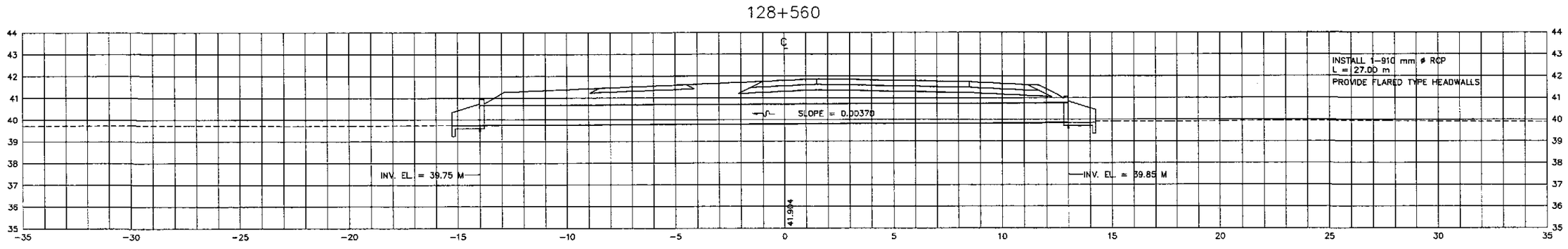
128+784



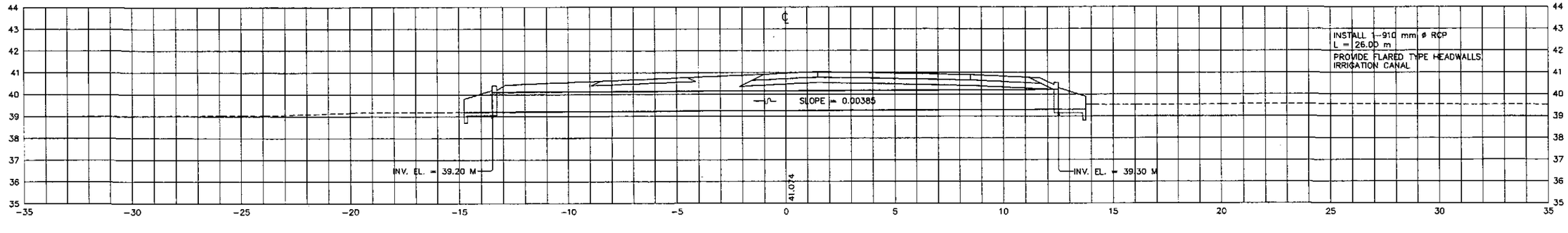
128+760



128+560



128+394



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/12/02	F. STA. MARIA
CHECKED	10/12/02	[illegible]
SUBMITTED	10/12/02	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

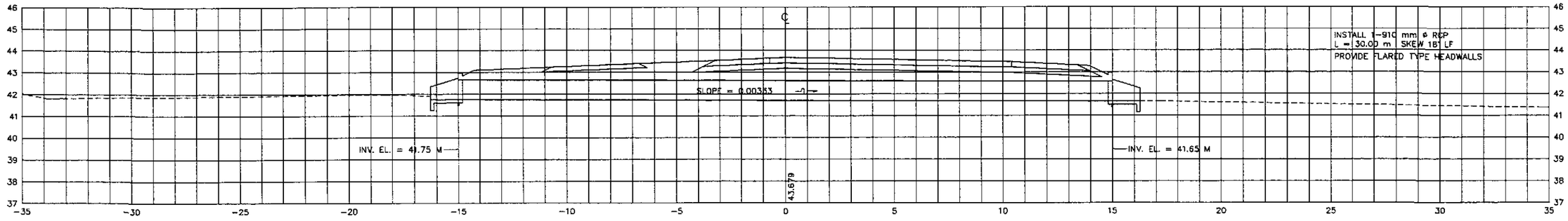
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 128+394 - STA. 128+784

SHEET NO. : DC-11

129+455



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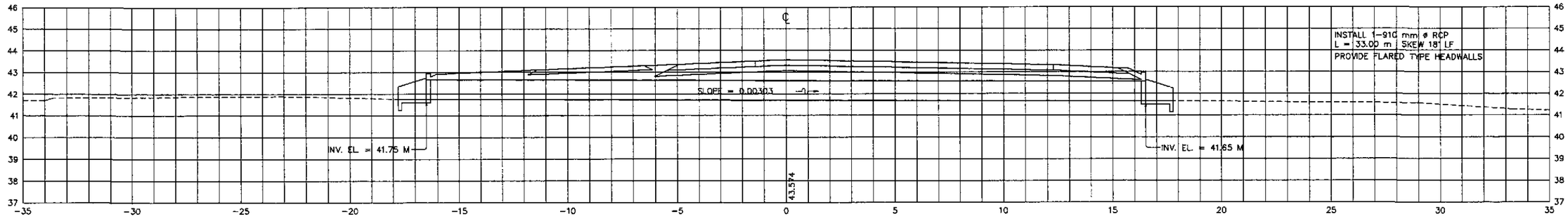
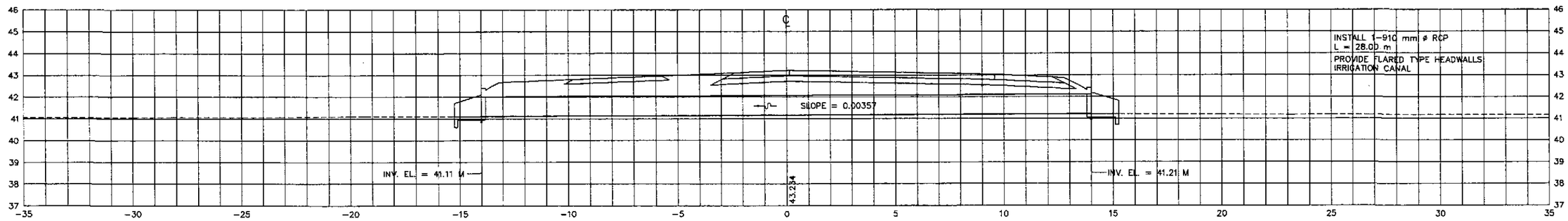
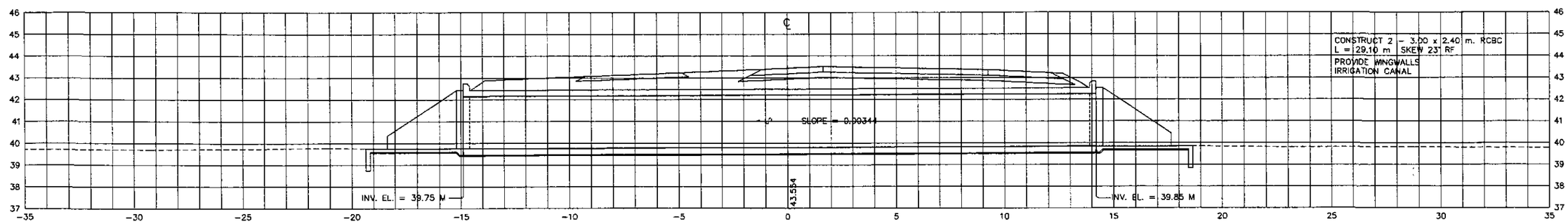


129+366



129+110



JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/26/01	F. STA. MARIA
CHECKED	10/26/01	A. CUNTAI
SUBMITTED	10/26/01	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 :
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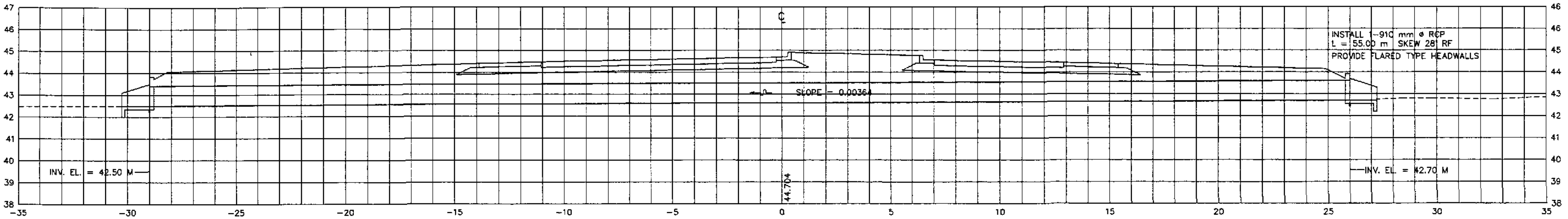
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

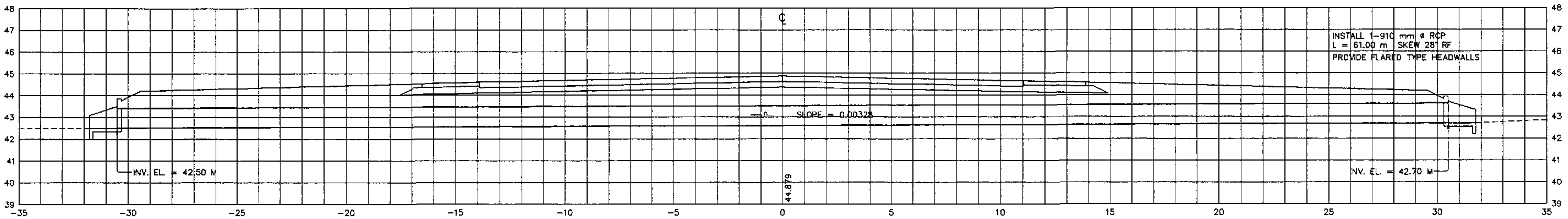
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 129+110 - STA. 129+455

SHEET NO. : **DC-12**

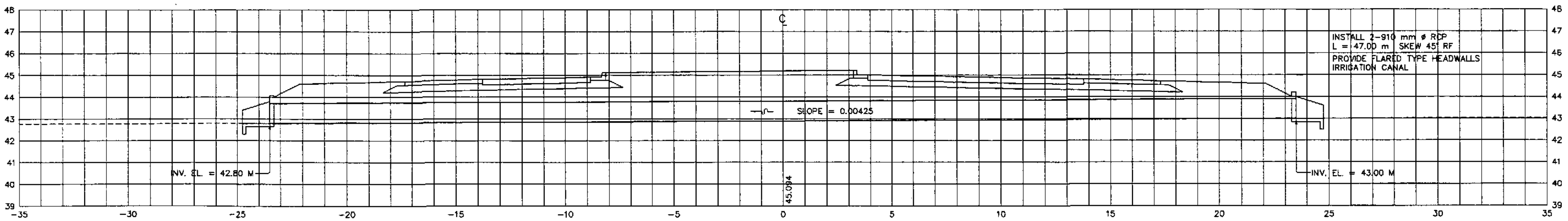
129+940



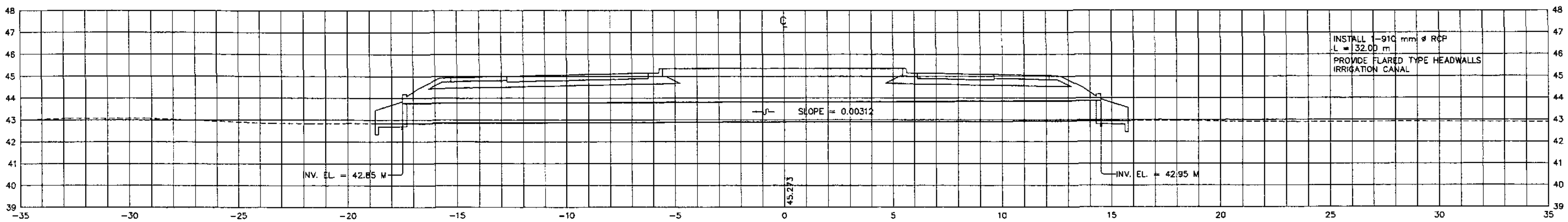
129+905



129+862



129+789



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

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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PROJECT AND LOCATION :
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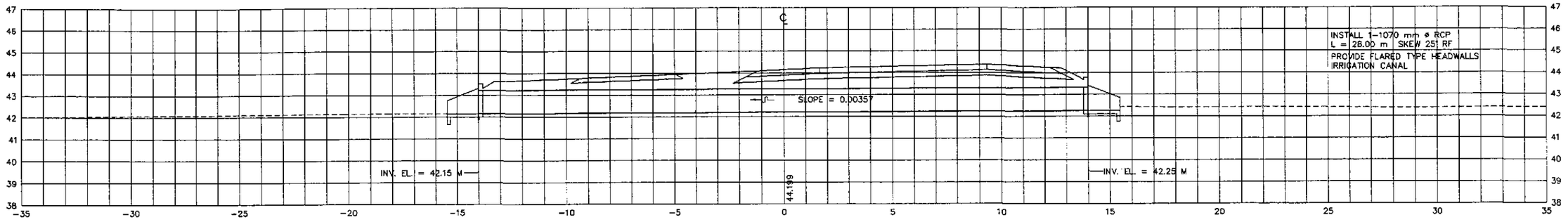
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100
FULL SIZE A1

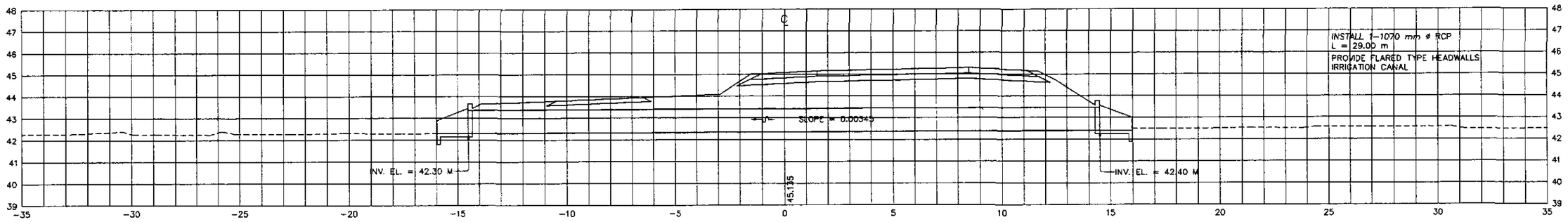
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 129+789 - STA. 129+940

SHEET NO. : **DC-13**

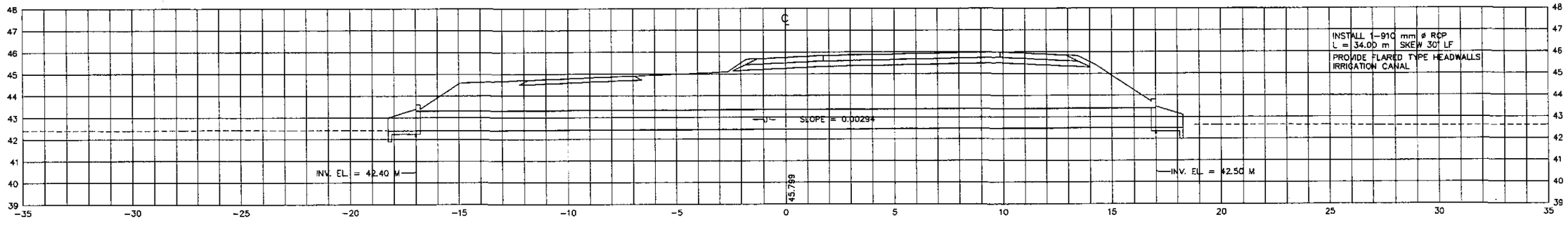
130+654



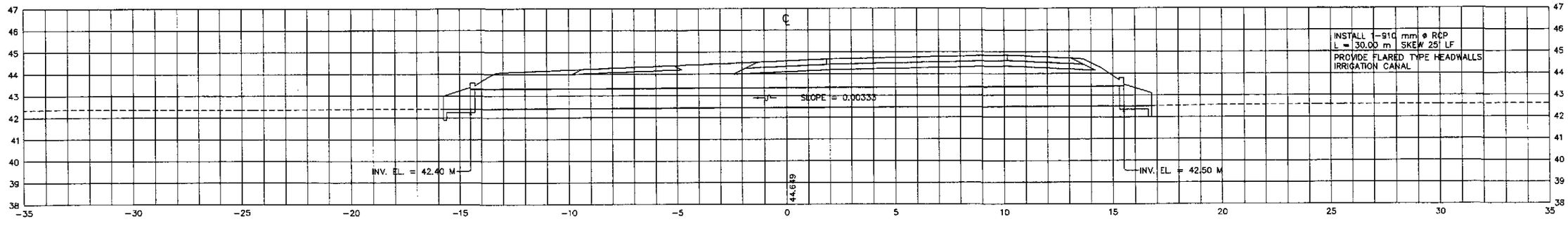
130+509



130+359



130+129



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/19/02	M.F. SITA MARIA
CHECKED	10/19/02	M.A. HARIM
SUBMITTED	10/21/02	M. KUDO TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PMHL - 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 :
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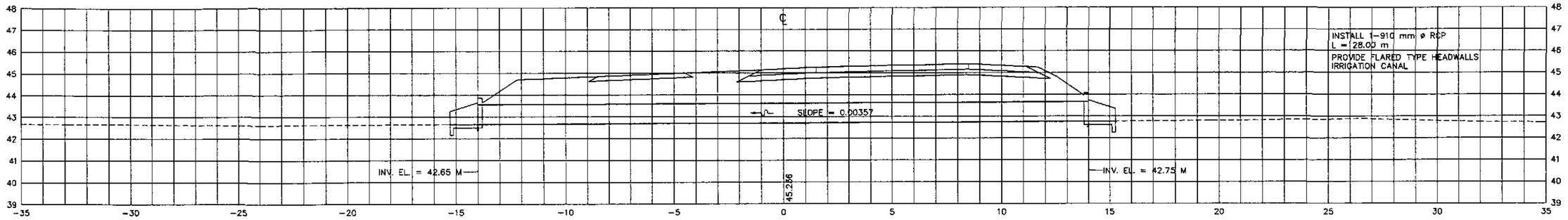
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

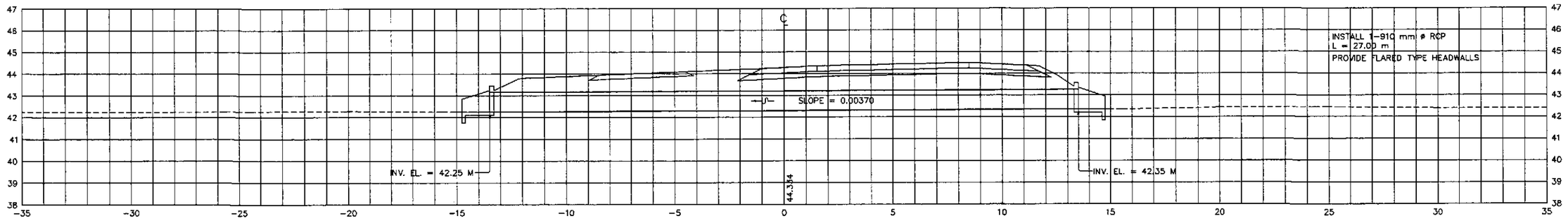
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 130+129 - STA. 130+654

SHEET NO. : DC-14

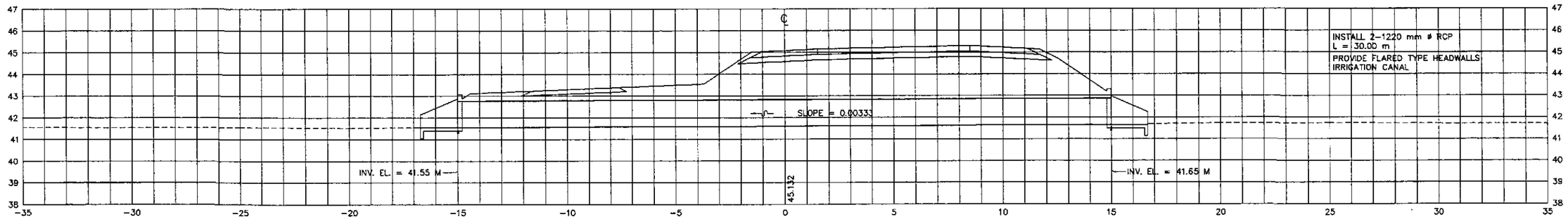
131+594



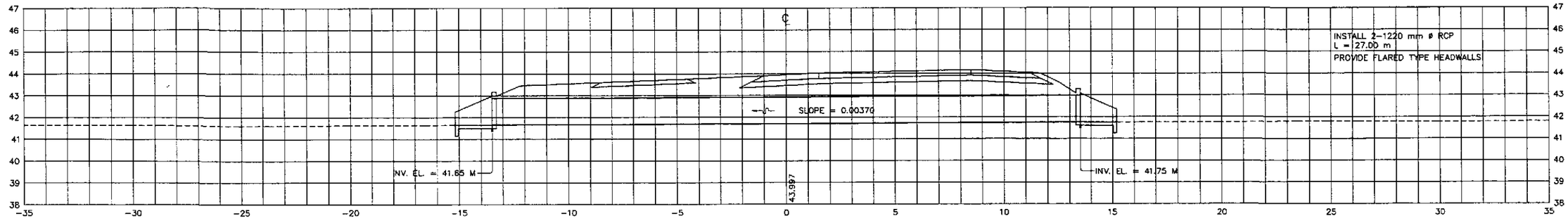
131+340



131+085



130+920



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/12	V. SAN MARIA
CHECKED	10/19/12	A. HAKIM
SUBMITTED	10/21/12	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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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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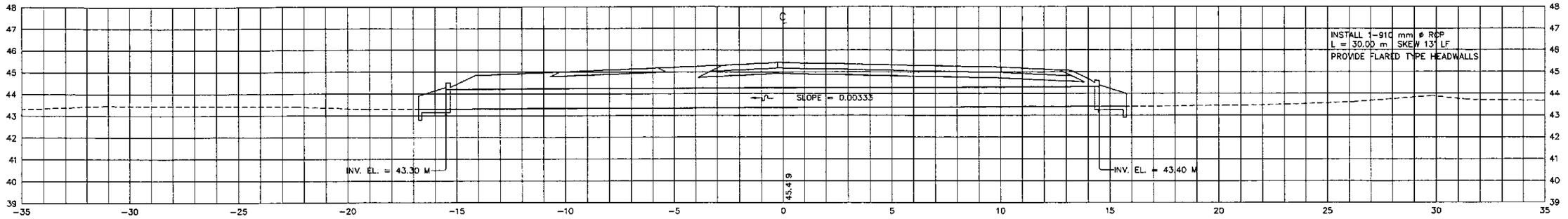
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (*INITIAL* STAGE)
STA. 130+920 - STA. 131+594

SHEET NO. :
DC-15

132+115



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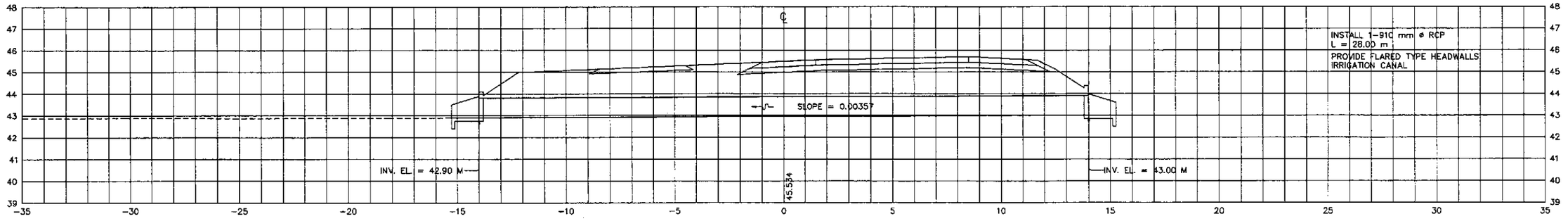
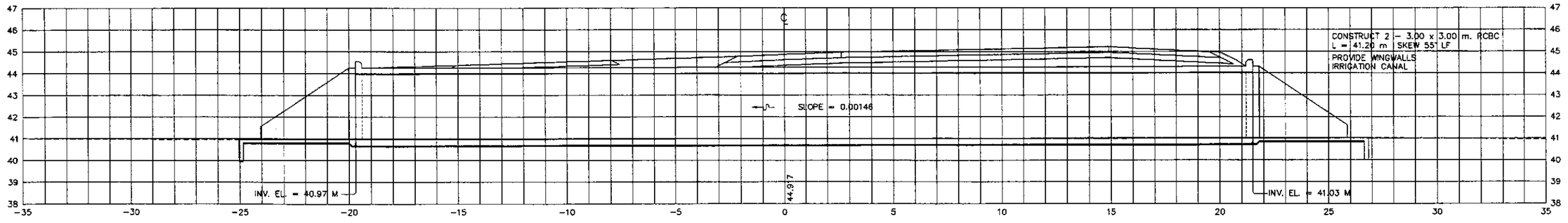
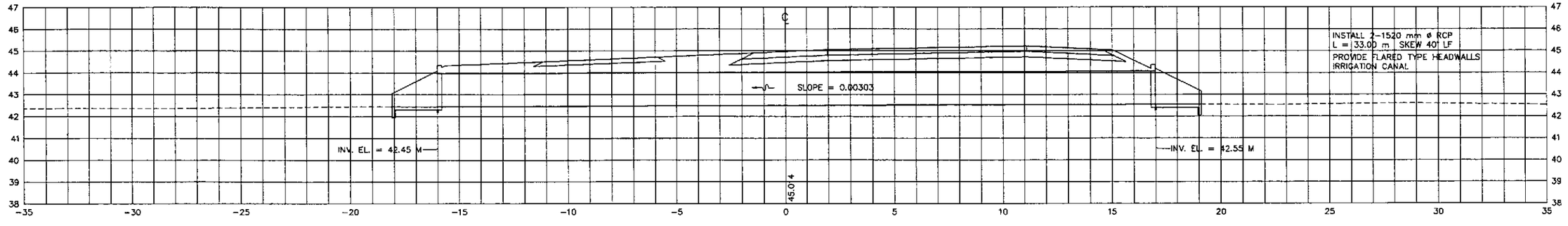


131+734



131+644



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	T. SAKAMOTO
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	KAWAI 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 G. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director	Chief, Highways Division	OIC, Director IV	Undersecretary	Secretary

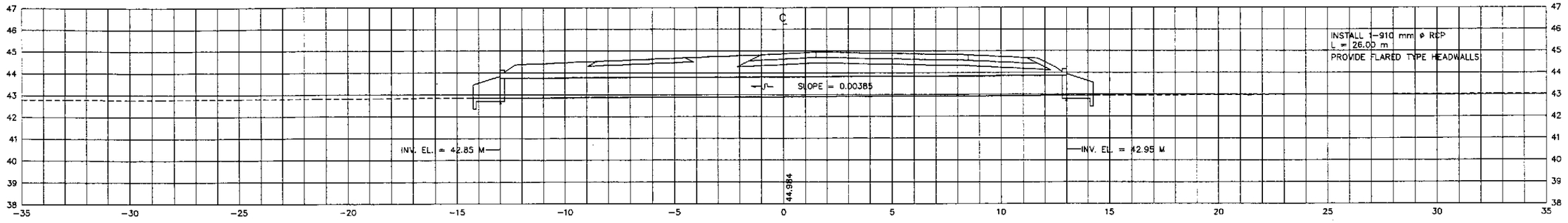
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE :
1:100
FULL SIZE A1

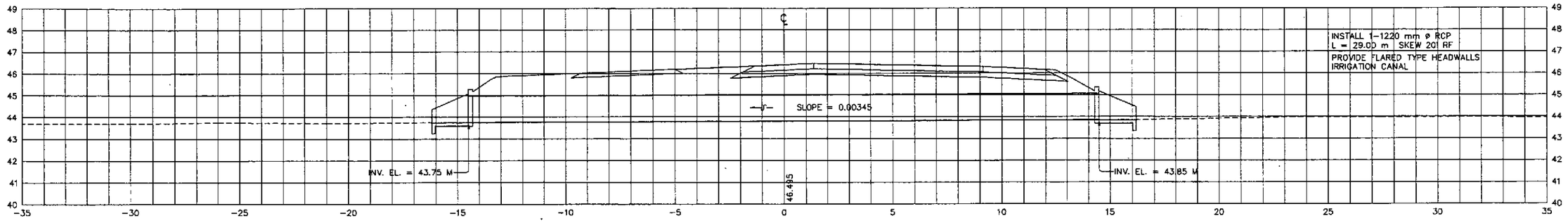
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 131+644 - STA. 132+115

SHEET NO. :
DC-16

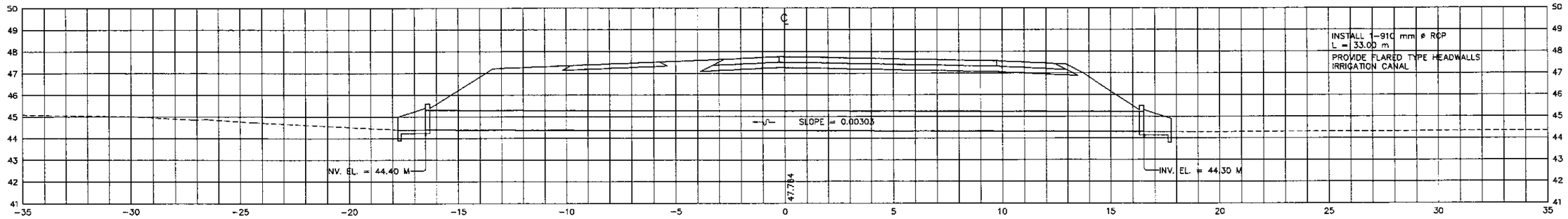
133+620



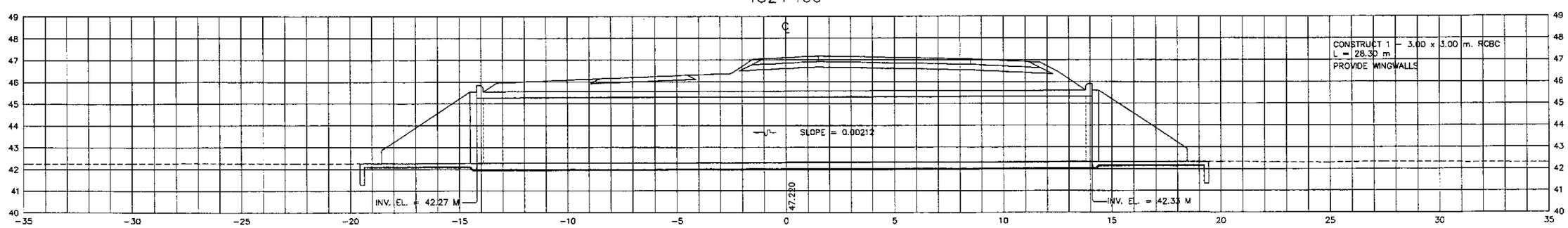
133+254



133+064



132+460



JAPAN INTERNATIONAL COOPERATION AGENCY

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

	DATE	SIGNATURE
DESIGNED	10/12/12	F. STA. MARIA
CHECKED	10/12/12	A. HAKIM
SUBMITTED	10/21/12	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, Project Director	JOSEFINA M. ALAGAR, Chief, Highways Division	GILBERTO S. REYES, OIC, Director IV	MANUEL M. BONOAN, Undersecretary	SIMEON A. DATUMANONG, Secretary

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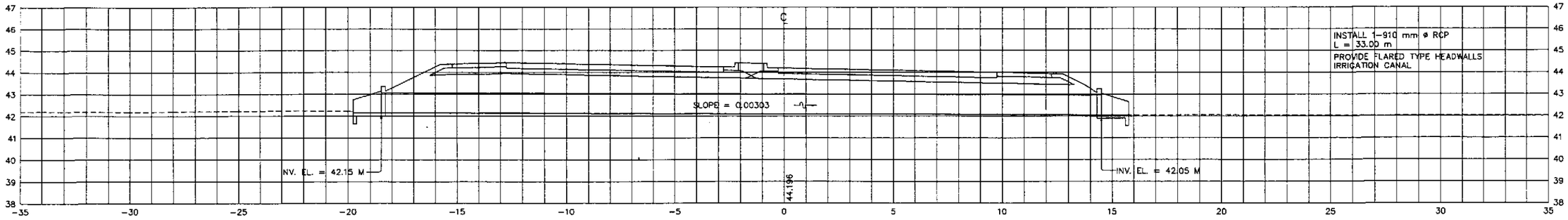
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

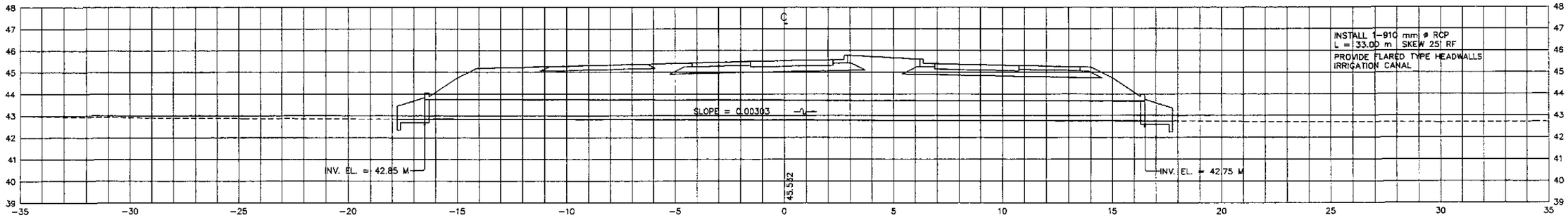
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 132+460 - STA. 133+620

SHEET NO. : DC-17

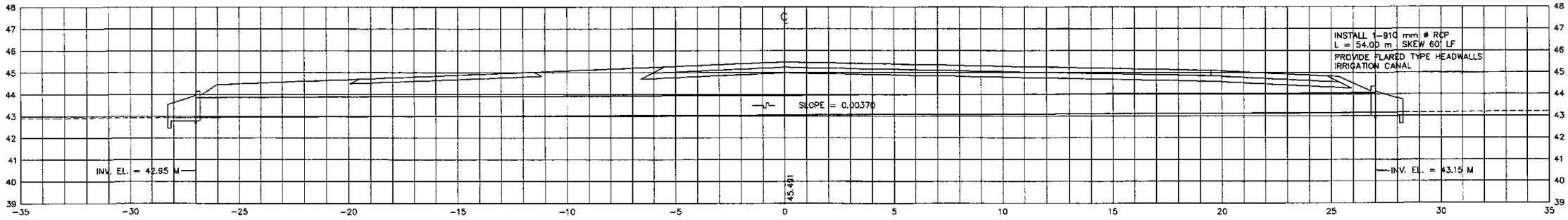
134+200



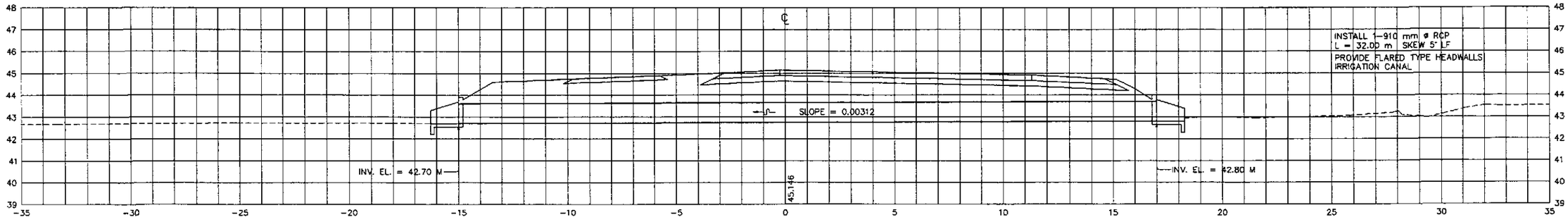
133+928



133+860



133+790



JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/2/02	F. STA. MARIA
CHECKED	10/09/02	A. HARIN
SUBMITTED	10/2/02	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

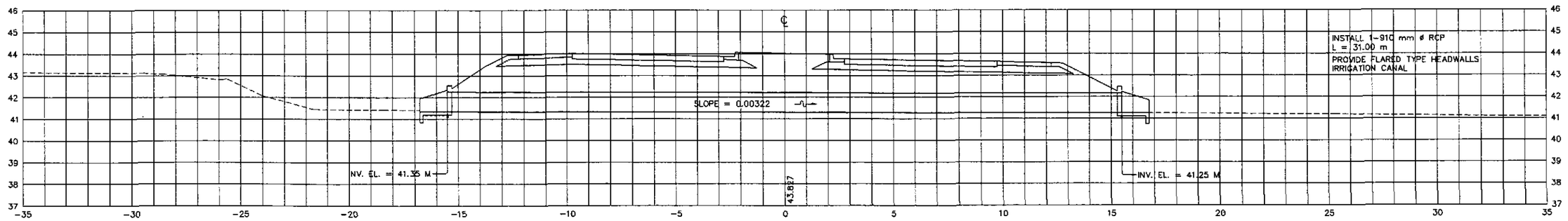
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

SCALE : 1:100 FULL SIZE A1

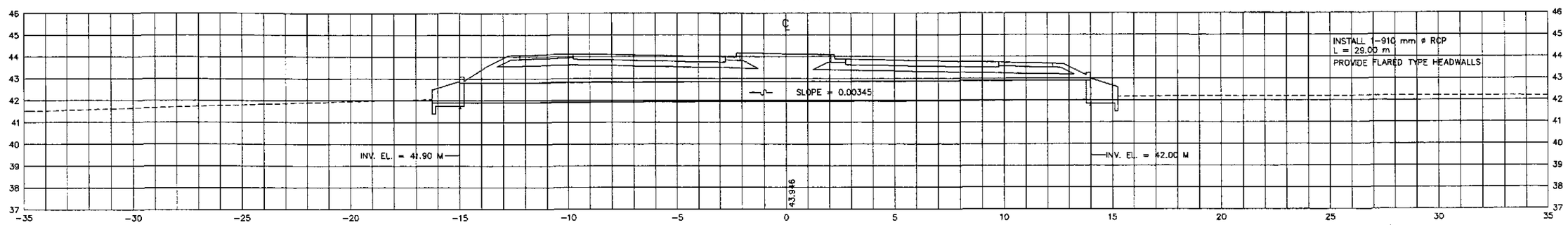
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 133+790 - STA. 134+200

SHEET NO. : DC-18

134+390



134+250



JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL

YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	F. STA. MARIA
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
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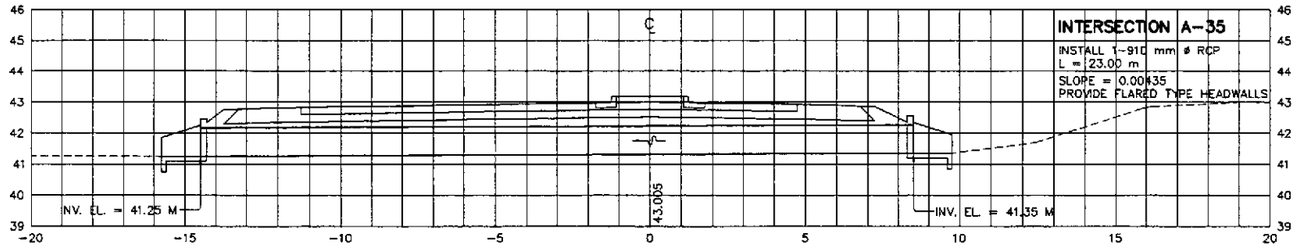
SCALE : 1:100 FULL SIZE A1

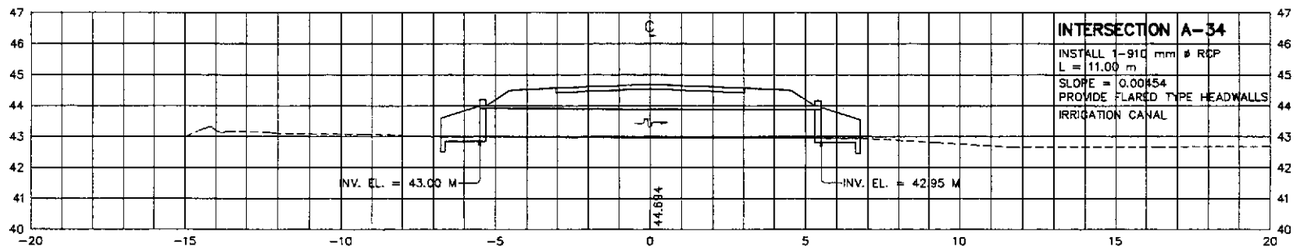
SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG BYPASS (INITIAL STAGE)
STA. 134+250 - STA. 134+390

SHEET NO. : DC-19

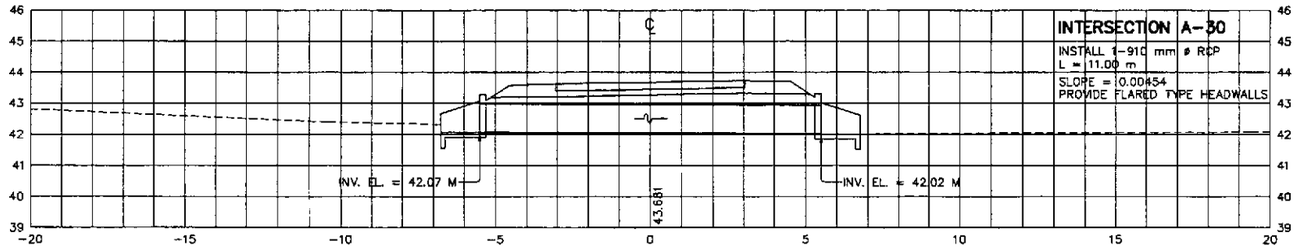
0+070



1+027



0+900



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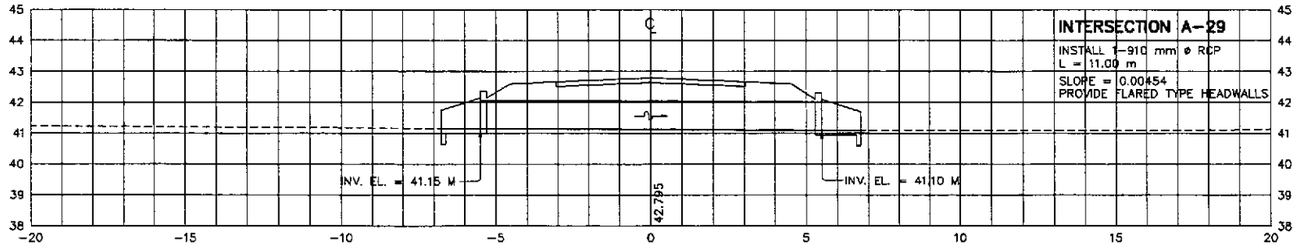

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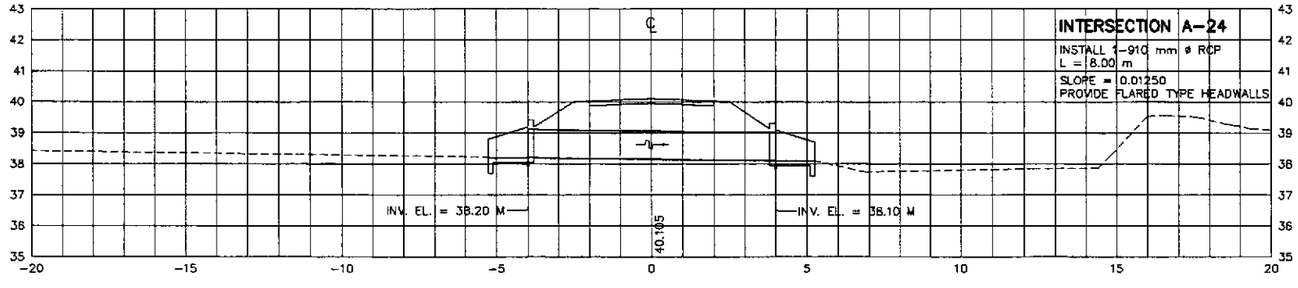

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/12	F. SIA MORA
CHECKED	10/19/12	A. HAKIM
SUBMITTED	10/21/12	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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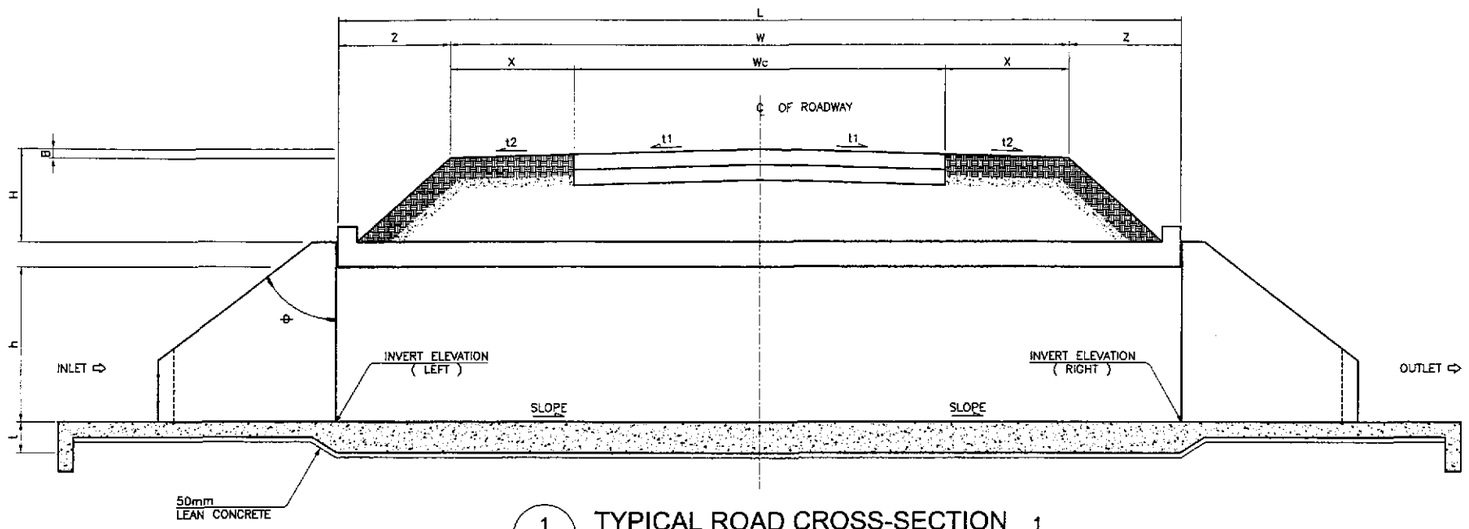
CABANATUAN BYPASS - CONTRACT PACKAGE IV

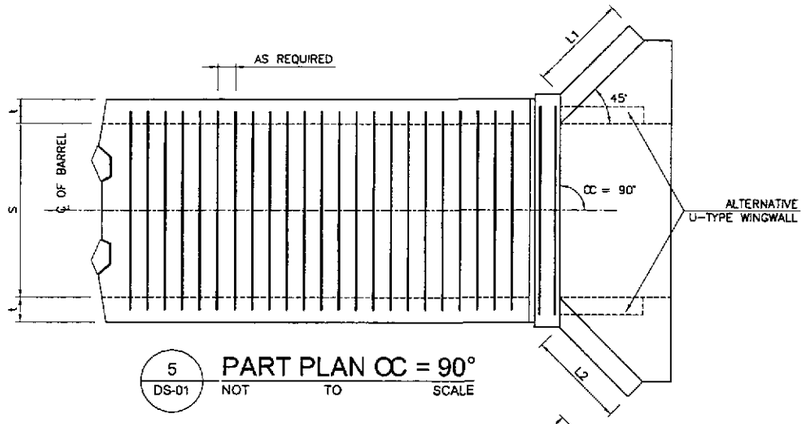
SCALE : 1:100 FULL SIZE A1

SHEET CONTENTS :
DRAINAGE CROSS-SECTION
ALONG ACCESS ROAD
INTERSECTION A-24, A-29, A-30, A-34, A-35

SHEET NO. : DC-20



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



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

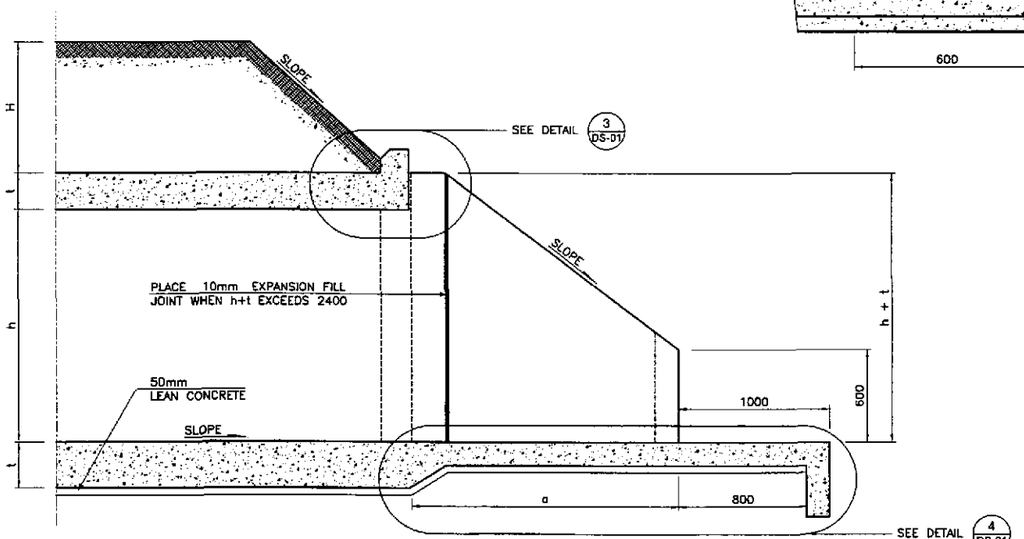
LEGEND :

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	—	$[(H+t) - (B+200)] \tan \theta$
B	—	$xt_2+0.5t_1 Wc$
h	—	HEIGHT OF CULVERT OPENING
t	—	THICKNESS OF CULVERT WALL OR SLAB
θ	—	SLOPE OF EMBANKMENT
CC	—	ANGLE OF SKEW

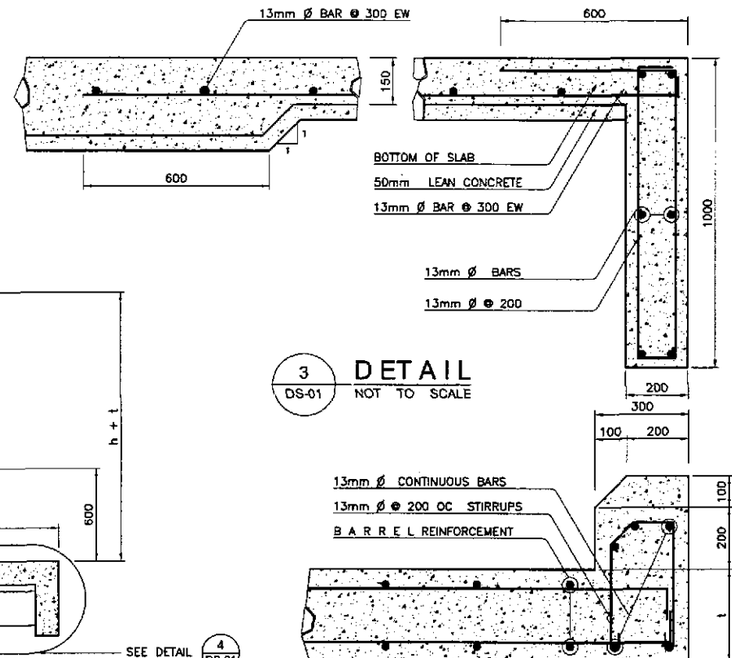
HORIZONTAL SKEW ANGLE CC	L (mm)
90°	W+2tan θ [(H+t) − (B+200)]
60°	1.1547 (W+2tan θ [(H+t)−(B+200)])
45°	1.4142 (W+2tan θ [(H+t)−(B+200)])

NOTES:

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

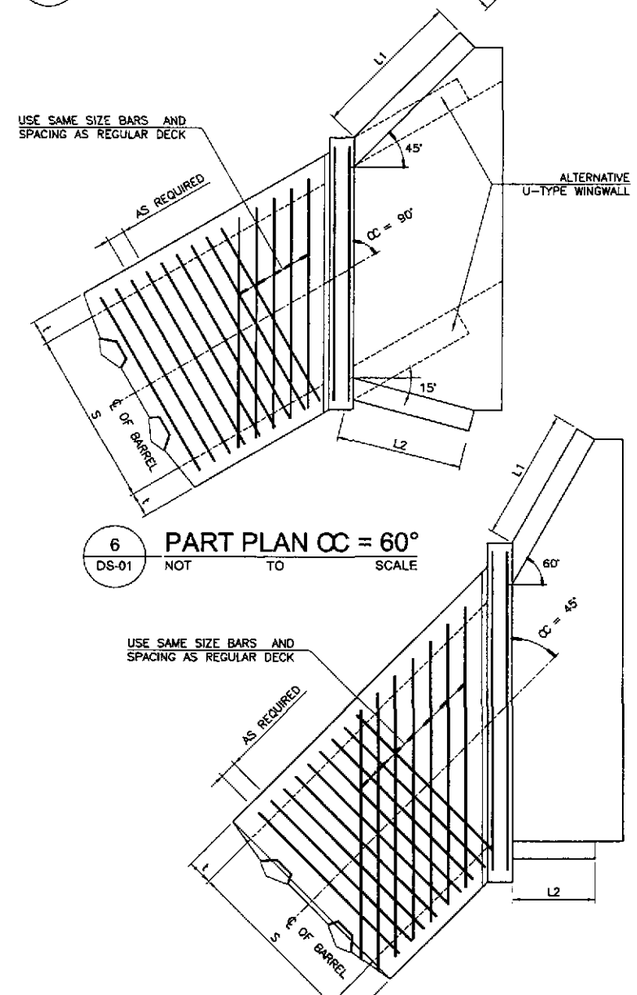


2 DS-01 **PART SECTION ALONG ℄ OF CULVERT** — NOT TO SCALE



3 DS-01 **DETAIL** — NOT TO SCALE

4 DS-01 **DETAIL** — NOT TO SCALE



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

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

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/2/02	A. STA. MARIA
CHECKED	10/9/02	H. HARIM
SUBMITTED	10/21/02	M. RIVERA 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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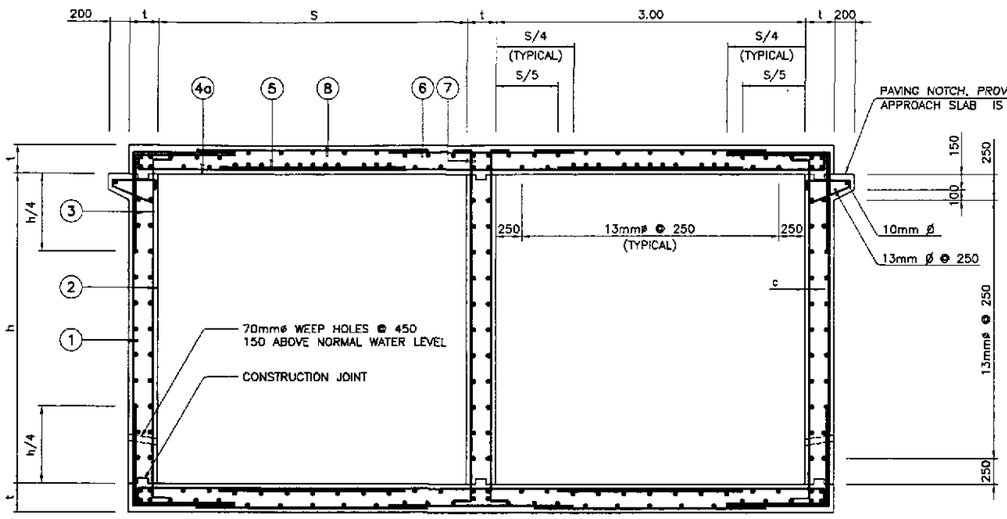
CABANATUAN BYPASS - CONTRACT PACKAGE IV

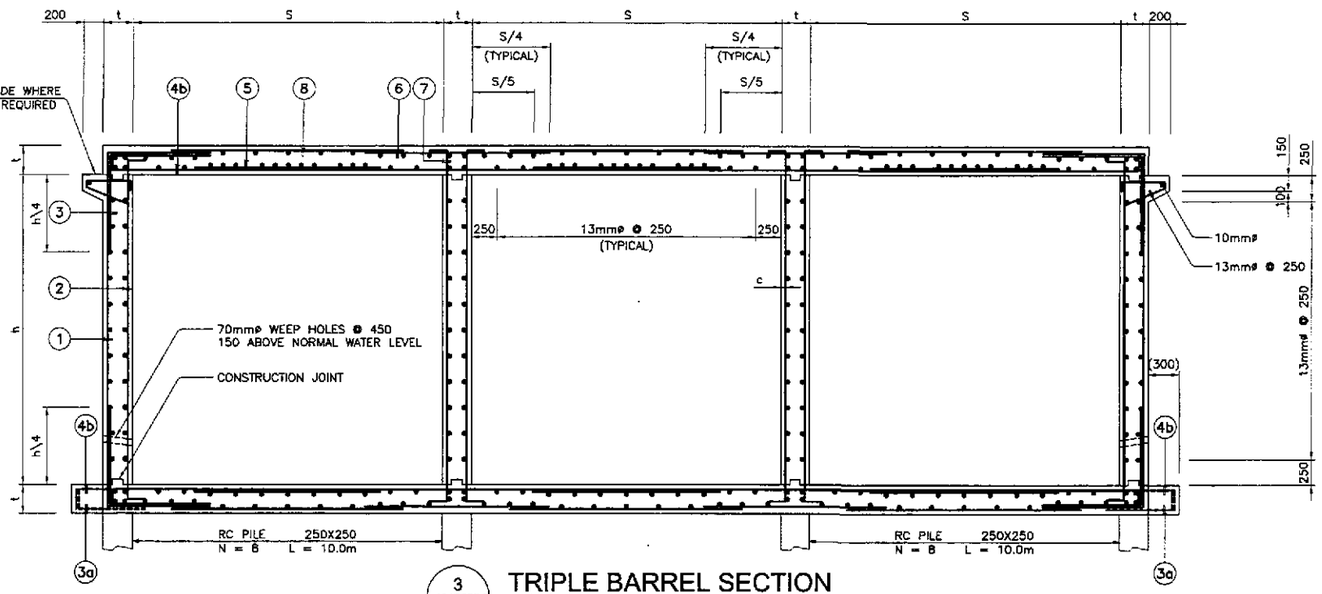
SCALE : 1:100 FULL SIZE A1

SHEET CONTENTS : STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

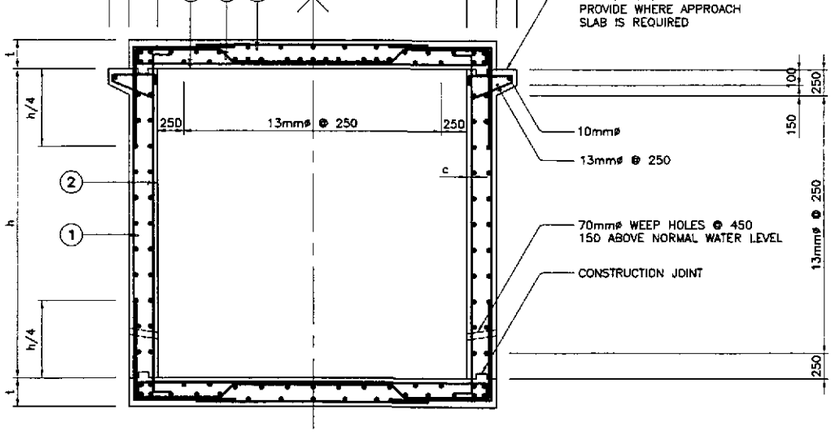
SHEET NO. : DS-01



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:

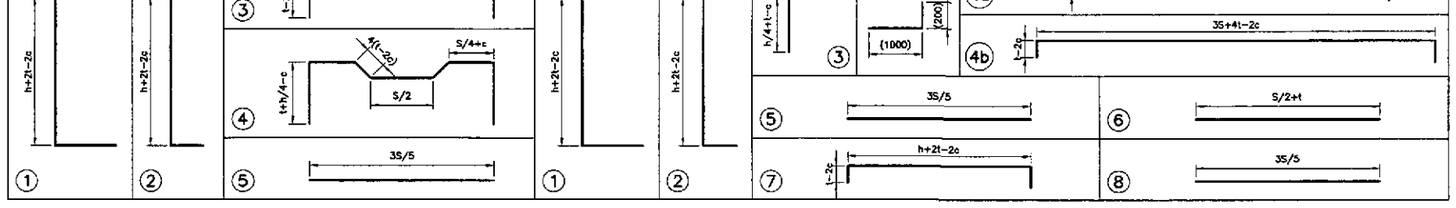
FOR WALL THICKNESS LESS THAN 240, STAGGER HORIZONTAL REINFORCEMENT AS SHOWN.

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

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC) BARRELS

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	10/12/12	STEP KAMIA	Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
CHECKED	10/19/12	H. KAWAI	DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONDAN	SIMEON A. DATUMANONG
SUBMITTED	10/12/12	M. KITAGAWA 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) 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	478.80	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	1.68	2.29	4.78	270	5.73	320	6.56	360
2.57	1.98	2.93	6.35	350	7.42	410	8.37	460
1.78	1.45	1.80	3.81	210	4.98	280	5.90	330
2.15	1.70	2.33	5.03	280	6.33	350	7.36	400
2.60	2.00	2.97	6.48	360	8.09	450	9.26	510
3.05	2.30	3.61	8.37	460	10.00	550	11.31	620
2.63	2.02	3.01	7.08	390	9.14	500	10.71	590
3.08	2.32	3.65	9.28	510	11.61	640	13.37	740
3.53	2.62	4.28	11.42	630	13.98	770	15.92	880
4.06	2.97	5.03	14.17	780	17.90	990	19.15	1050
3.17	2.38	3.78	10.08	560	12.38	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 600mm OF FILL ABOVE TOP SLAB OF CULVERT ADDITIONAL REINFORCEMENT TRANSVERSE TO THE MAIN REINFORCEMENT IS ADDED TO THE BOTTOM OF THE TOP SLAB IN ACCORDANCE WITH AASHTO 1.3.2.E.

HEIGHT OF FILL :

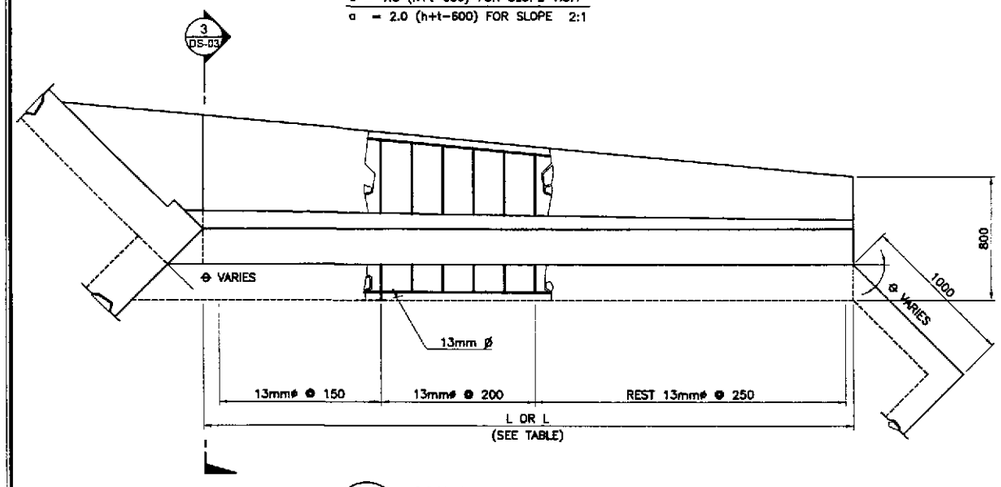
MAXIMUM HEIGHT OF FILL IS 3000mm ABOVE TOP SLAB, FOR HEIGHT OF FILL GREATER THAN 3000mm SPECIAL DESIGN OF BOX CULVERT SHOULD BE DONE.

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

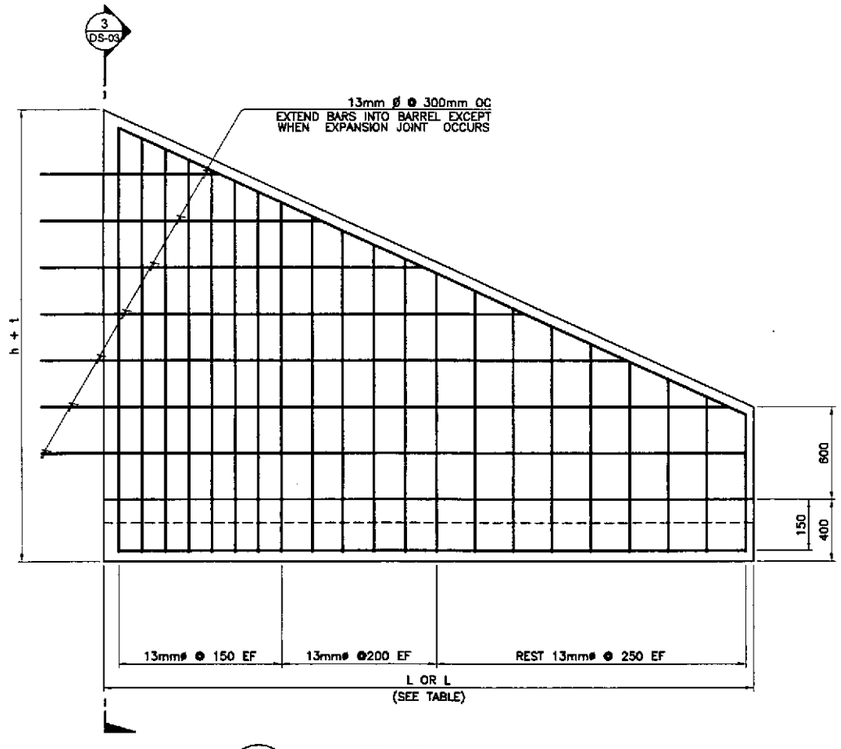
WHERE :

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

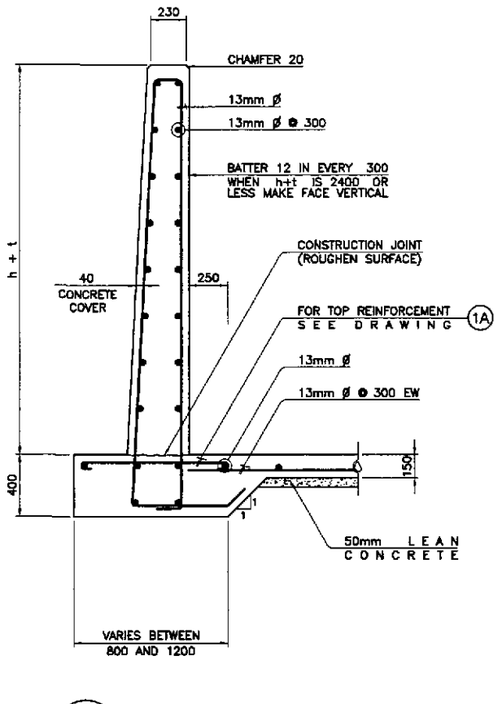
a = 2.0 (h+t-600) FOR SLOPE 2:1



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.

	DATE	SIGNATURE
DESIGNED	10/12/12	F. STA. MARIA
CHECKED	10/19/12	H. HAGIWARA
SUBMITTED	10/31/12	M. KAWACHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

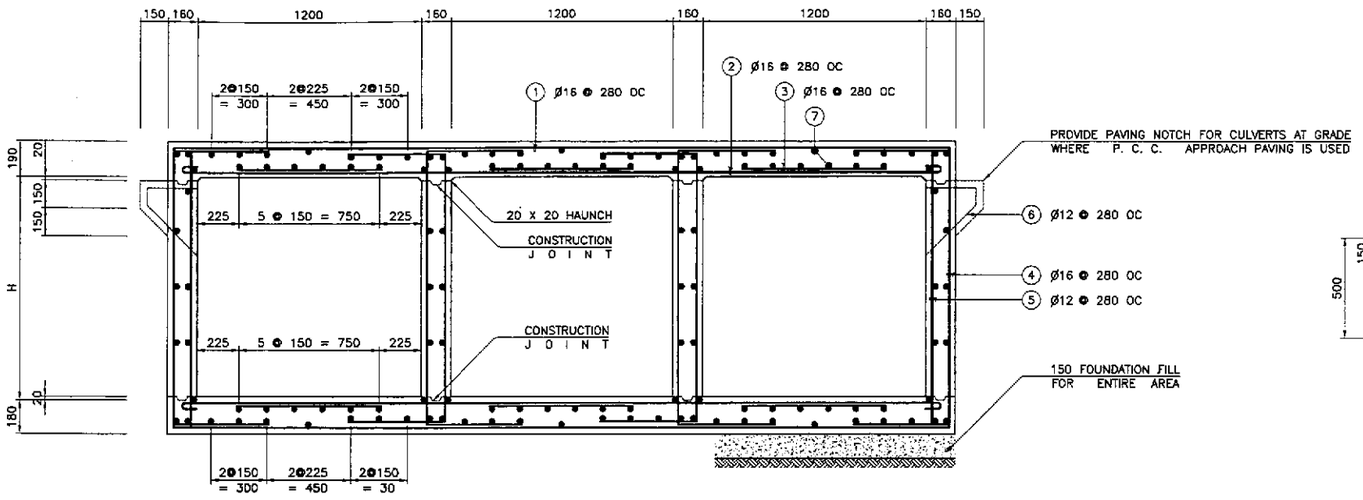
PJHL - PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

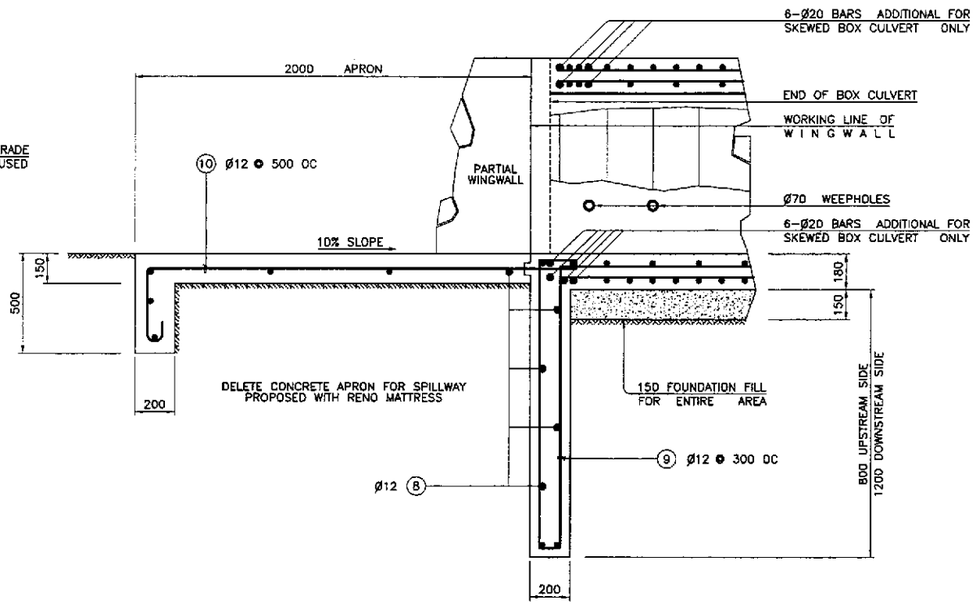
SCALE : 1:40 FULL SIZE A1

SHEET CONTENTS : STANDARD DETAILS OF RCBC WINGWALLS

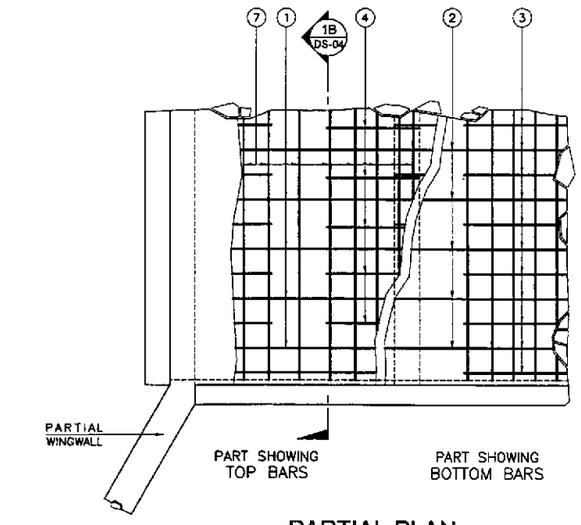
SHEET NO. : DS-03



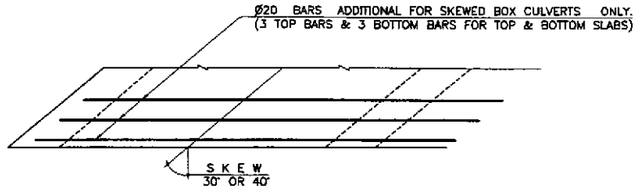
1A DS-04 SECTION ALONG ℄ OF ROADWAY
NOT TO SCALE



1B DS-04 PARTIAL SECTION A
NOT TO SCALE

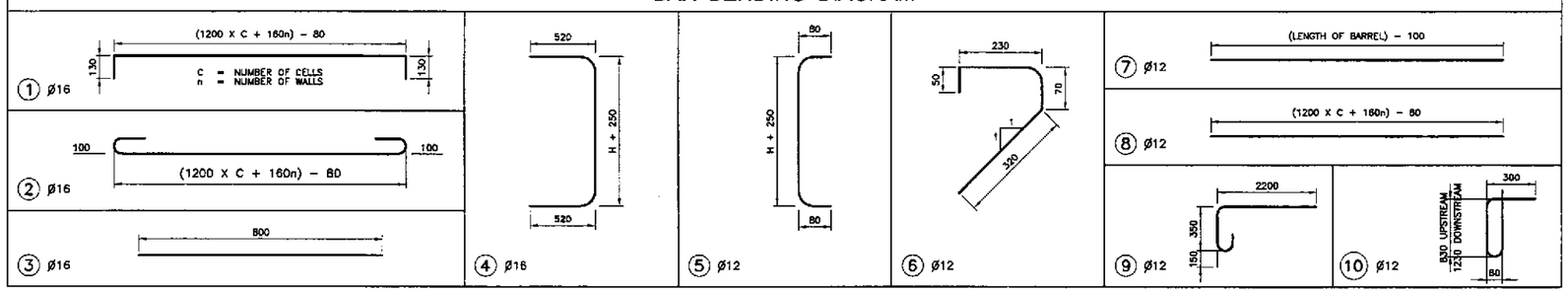


PARTIAL PLAN
NOT TO SCALE



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)

SINGLE BARREL					DOUBLE BARREL				TRIPLE BARREL			
HEIGHT OF CELL "H" (METER)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	FOUNDATION F I L L (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	FOUNDATION F I L L (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	FOUNDATION F I L L (m^3)
1.20	0.95	132.59	0.67	0.27	1.84	217.00	1.12	0.48	2.34	299.62	1.56	0.68
0.90	0.85	127.30	0.67	0.27	1.50	209.08	1.12	0.48	2.14	289.04	1.56	0.68
0.60	0.75	122.01	0.67	0.27	1.35	201.15	1.12	0.48	1.95	278.48	1.56	0.68

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

APRON AND END TOE FOR BOTH ENDS

SINGLE BARREL				DOUBLE BARREL			TRIPLE BARREL		
COMMON TO ALL HEIGHT OF CELL	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)	CONCRETE CLASS "A" (m^3)	REINFORCING STEEL (kg)	EXCAVATION (m^3)
	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

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

	DATE	SIGNATURE
DESIGNED	10/2/02	T. SHIMADA
CHECKED	10/19/02	H. HAKIM
SUBMITTED	10/21/02	M. KINOSHITA TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

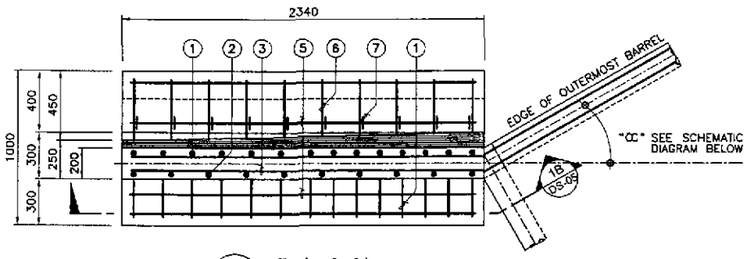
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

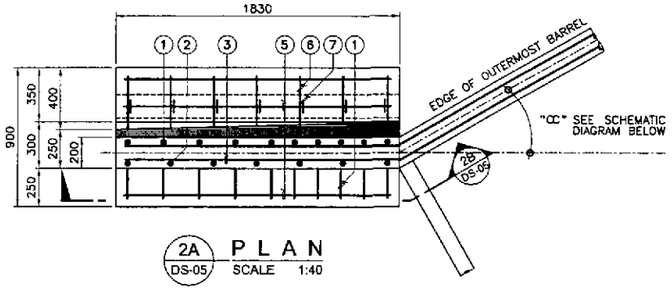
SCALE : NOT TO SCALE FULL SIZE A1

SHEET CONTENTS : STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)

SHEET NO. : DS-04



1A DS-05 PLAN SCALE 1:40



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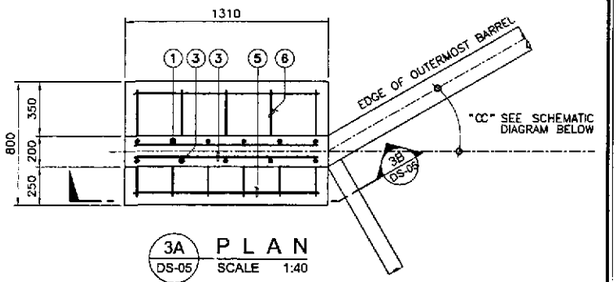
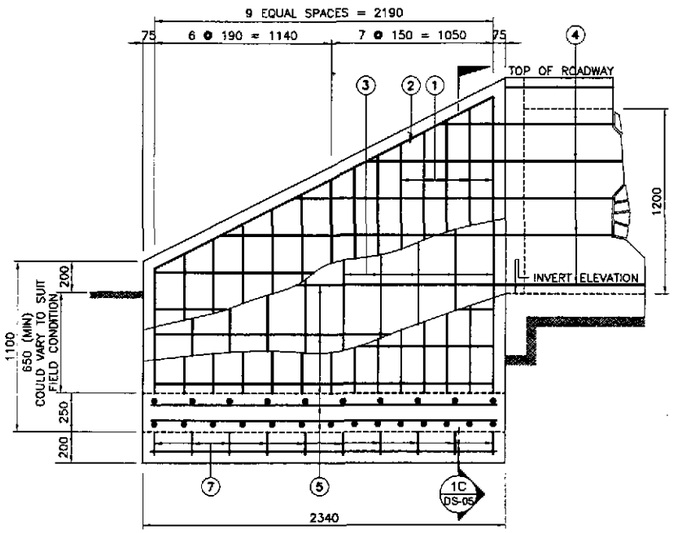
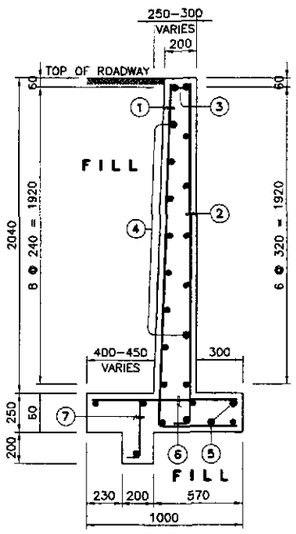


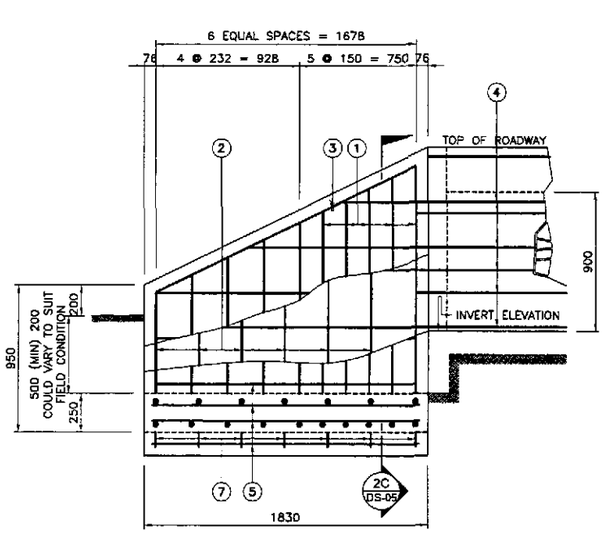
3A DS-05 PLAN SCALE 1:40



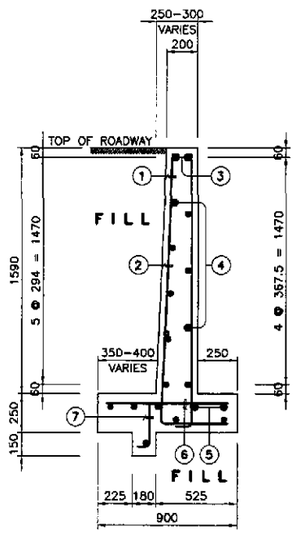
1A DS-05 ELEVATION SCALE 1:40



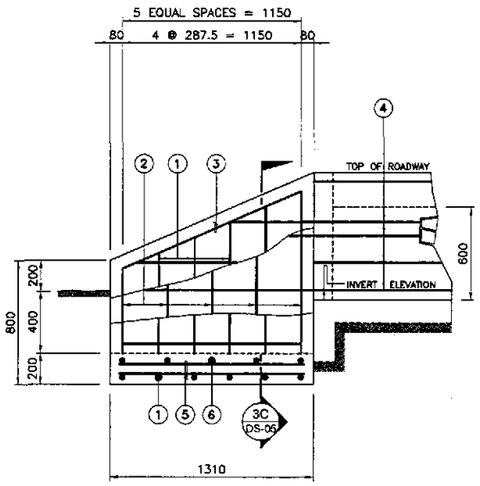
1C DS-05 SECTION SCALE 1:40



2B DS-05 ELEVATION SCALE 1:40



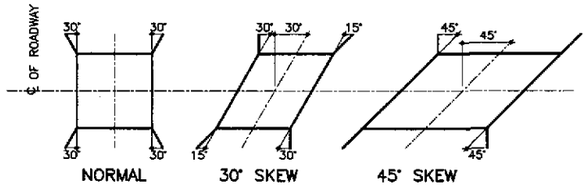
2C DS-05 SECTION SCALE 1:40



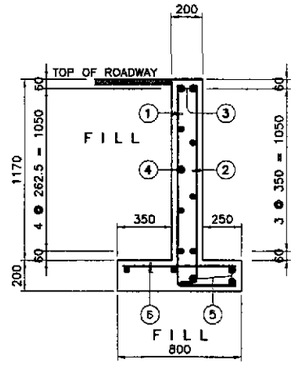
3B DS-05 ELEVATION SCALE 1:40

BAR BENDING DIAGRAM H=1200				BAR BENDING DIAGRAM H=900				BAR BENDING DIAGRAM H=600			
① 14–12mmø	② 10–12mmø	③ 2–12mmø		① 10–12mmø	② 7–12mmø	③ 2–12mmø		① 6–12mmø	② 5–12mmø	③ 2–12mmø	
④ 9–12mmø	⑤ 9–12mmø	⑥ 10–12mmø	⑦ 10–12mmø	④ 6–12mmø	⑤ 10–12mmø	⑥ 7–12mmø	⑦ 7–12mmø	④ 5–12mmø	⑤ 7–12mmø	⑥ 5–12mmø	

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

JAPAN INTERNATIONAL COOPERATION AGENCY

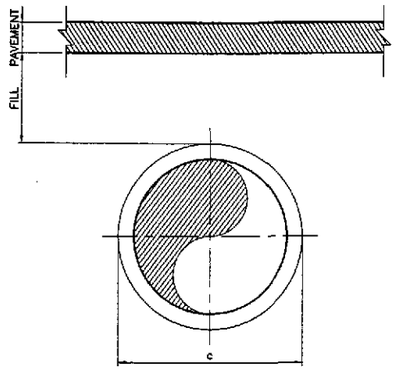
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	F. STA. MARIA
CHECKED	10/19/02	F. HAKIM
SUBMITTED	10/21/02	M. KUCHI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMD	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)	AS SHOWN	STANDARD LOW DEPTH TYPE BOX CULVERT (2 of 2)	DS-05
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



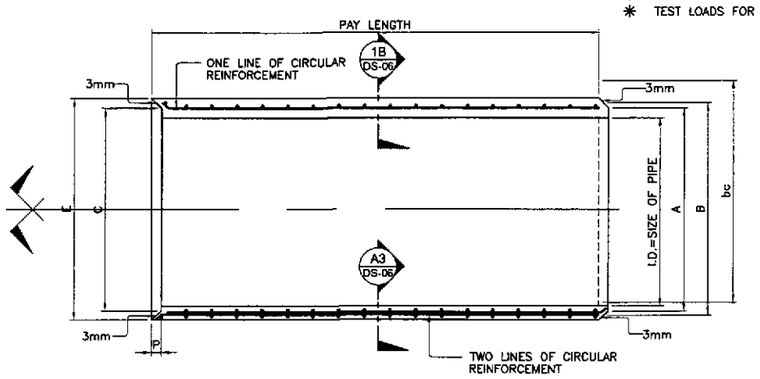
STANDARD STRENGTH PIPES:
FILL 1/2 E.D. FOR FLEXIBLE PAVEMENT OR MIN. OF 0.60 m
0.30 m FOR RIGID PAVEMENT
EXTRA STRENGTH PIPES:
FILL: 0.30 m FOR RIGID AND FLEXIBLE PAVEMENTS

MINIMUM PIPE COVERING

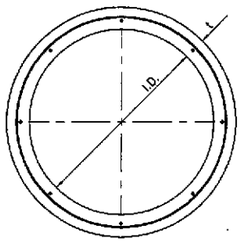
DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT

SIZE OF PIPE (mm)	STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS																STRENGTH TEST REQUIREMENTS kg/m OF PIPE		EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS									STRENGTH TEST REQUIREMENTS kg/m OF PIPE	
	CONCRETE 247 kg/cm² (3,500 lb/in²)									CONCRETE 317 kg/cm² (4,500 lb/in²)											CONCRETE 317 kg/cm² (4,500 lb/in²)										
	WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE			WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ⊛		THREE-EDGE-BEARING METHOD ✳		WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/m OF PIPE ○		THREE-EDGE-BEARING METHOD	
I.D.	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT		t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	ULTIMATE LOAD	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	LOAD ULTIMATE
300	57	344	363	351	370	44	1 LINE 1.48			51	495	514	502	521	44	1 LINE 1.69		3.355	5.218	—	—	—	—	—							
380	57	344	363	351	370	44	1 LINE 1.90			51	495	514	502	521	44	1 LINE 2.33		3.914	6.060	—	—	—	—	—							
460	64	508	527	514	534	44	1 LINE 2.54	1 LINE 2.12		51	495	514	502	521	44	1 LINE 2.96		4.473	6.709	—	—	—	—	—							
610	76	673	692	680	699	44	1 LINE 3.60	1 LINE 2.75		64	660	680	667	686	44	1 LINE 4.23	1 LINE 3.60	4.473	7.454	76	673	692	680	699	44	1 LINE 5.50	1 LINE 4.23	5.964	8.945		
760	89	858	857	845	864	51	1 LINE 4.66	1 LINE 3.60		76	825	845	832	851	51	1 LINE 5.92	1 LINE 4.44	5.032	8.573	89	838	857	845	864	51	1 LINE 6.56	1 LINE 5.08	7.454	11.182		
910	102	1003	1022	1010	1029	64	2 LINES EACH 3.81	1 LINE 3.81		86	988	1007	994	1013	64	2 LINES EACH 4.66	1 LINE 4.66	6.038	9.840	102	1003	1022	1010	1029	64	2 LINES EACH 5.92	1 LINE 5.92	8.945	13.418		
1070	114	1168	1187	1175	1194	64	2 LINES EACH 4.44	1 LINE 4.44		95	1150	1165	1156	1175	64	2 LINES EACH 5.29	1 LINE 5.29	7.045	10.958	114	1168	1187	1175	1194	64	2 LINES EACH 6.98	1 LINE 6.98	10.436	15.655		
1220	127	1334	1353	1340	1359	64	2 LINES EACH 5.29	1 LINE 5.29		108	1315	1334	1321	1340	64	2 LINES EACH 6.56	1 LINE 6.56	8.051	11.927	127	1334	1353	1340	1359	64	2 LINES EACH 8.04	1 LINE 8.04	11.927	17.891		
1520	152	1664	1683	1670	1690	64	2 LINES EACH 6.98	1 LINE 6.98		127	1639	1658	1645	1664	64	2 LINES EACH 8.68	1 LINE 8.68	8.945	14.909	152	1664	1683	1670	1690	64	2 LINES EACH 10.58	1 LINE 10.58	13.418	22.364		

⊛ 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.

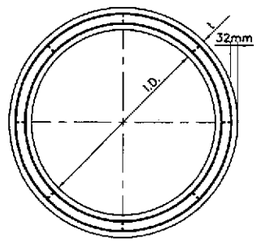


1A DS-06 LONGITUDINAL SECTION NOT TO SCALE



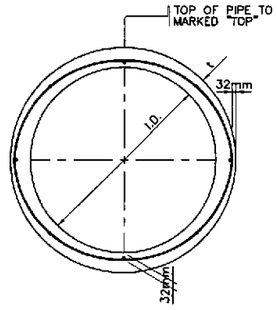
ONE LINE OF CIRCULAR REINFORCEMENT

1B DS-06 SECTION

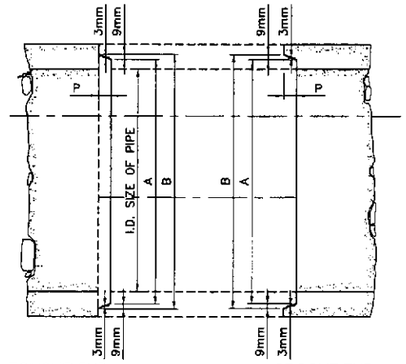


TWO LINES OF CIRCULAR REINFORCEMENT

1C DS-06 SECTION

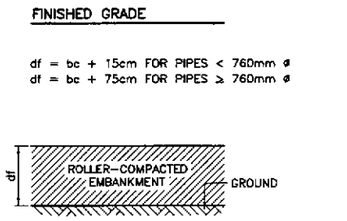


ONE LINE OF ELLIPTICAL REINFORCEMENT

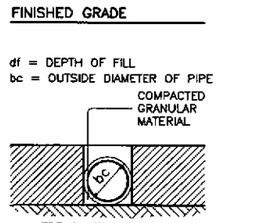


TONGUE END GROOVE END

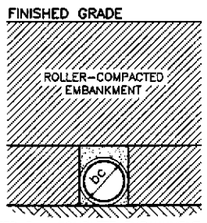
1D DS-06 SECTION



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

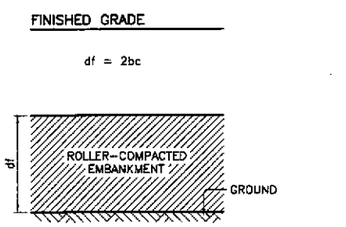


STEP 2 – TRENCH THROUGH THIS COMPACTED EMBANKMENT AND INSTALL PIPE BACKFILL WITH COMPACTED GRANULAR MATERIAL.

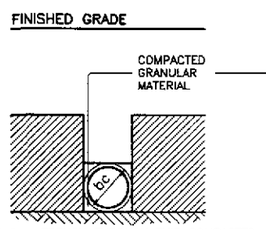


STEP 3 – COMPLETE EMBANKMENT IN USUAL MANNER.

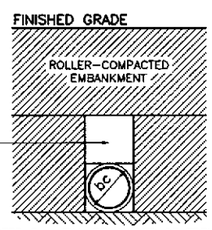
METHOD A



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



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

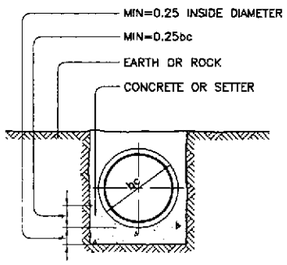


STEP 3 – FILL REMAINDER OF TRENCH WITH BACKFILL PLACE IN LOOSEST POSSIBLE CONDITION.

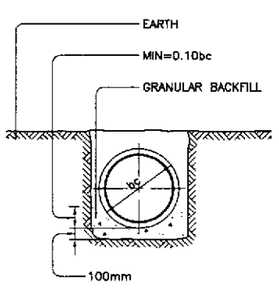
METHOD B

2 DS-06 METHODS OF PIPE INSTALLATION NOT TO SCALE

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

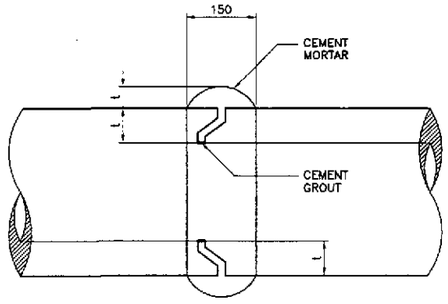


CONCRETE CRADLE BEDDING



ORDINARY BEDDINGS

3 DS-06 TYPICAL BEDDING FOR CONDUITS NOT TO SCALE



4 DS-06 DETAIL OF PIPE COLLAR NOT TO SCALE

JAPAN INTERNATIONAL COOPERATION AGENCY

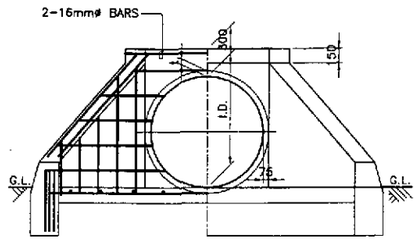
KATAHIRA & ENGINEERS INTERNATIONAL — YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE *
DESIGNED	10/12/12	
CHECKED	10/19/12	
SUBMITTED	10/19/12	TEAM LEADER

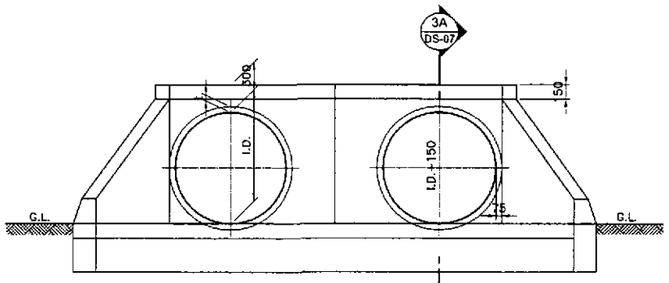
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

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) CABANATUAN BYPASS - CONTRACT PACKAGE IV	AS SHOWN FULL SIZE A1	STANDARD RCPC, METHOD OF PIPE INSTALLATION AND TYPICAL BEDDING FOR CONDUITS	DS-06



1B DS-07 ELEVATION NOT TO SCALE



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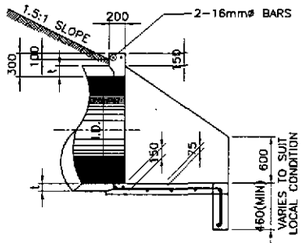

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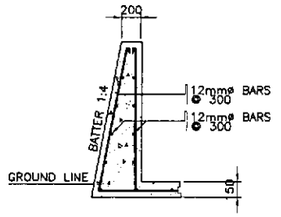

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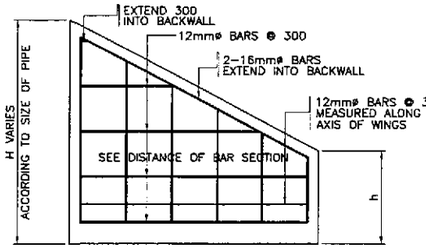
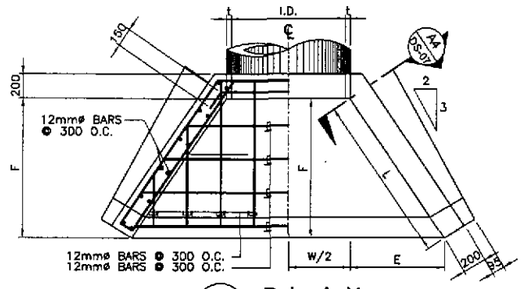
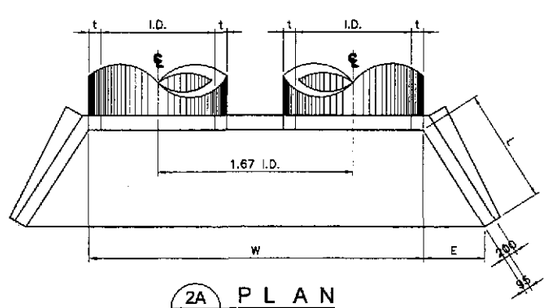


3C DS-07 SECTION NOT TO SCALE



1A DS-07 P L A N N T S



2A DS-07 P L A N 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)

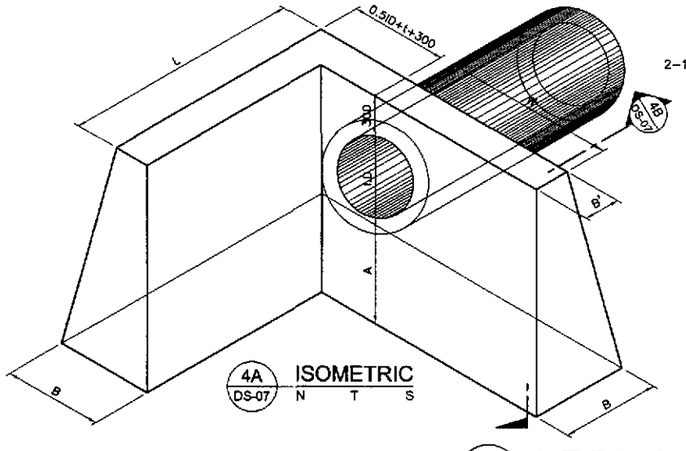
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)				SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE			
INTERNAL DIAMETER (I.D.)	MIN. THICKNESS SHELL (t)	L	E	F	h	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. OF QUANTITIES REINF. STEEL kg.	AREA OF WATERWAY m^2	W (mm)	EST. OF QUANTITIES CONC. m^3	EST. 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	6.75	304.20

TABLE C (ONE L-TYPE HEADWALL)

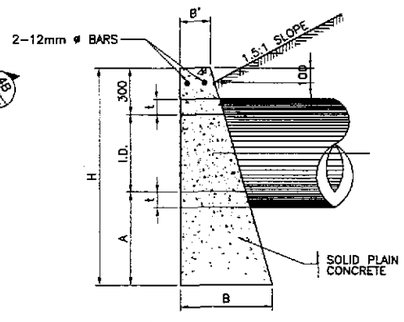
DIA. & THICKNESS (mm)		DIMENSIONS (mm)						SINGLE PIPE	
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	B'	H	W	L	CONCRETE m^3 mm	REINF. STEEL kg.
460	51	310	350	200	1070	1070	1070	0.66	6
610	64	410	430	200	1320	1220	1220	1.06	8
910	86	610	610	200	1820	1820	1820	2.76	11
1070	95	710	780	300	2080	1970	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	6.88	5200	1.30	3.16	9.52	6800	1.95	3.85	12.36
1070	95	710	780	2080	4300	0.90	3.84	7.57	6050	1.80	5.09	10.67	7900	2.70	6.43	13.96
1220	108	810	870	2330	4800	1.17	4.43	8.81	6900	2.34	6.70	12.54	9000	3.51	7.97	16.14
1520	127	1010	980	2830	6000	1.81	8.80	10.94	8600	3.63	11.93	15.58	11200	5.43	15.05	19.82

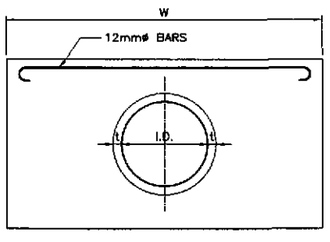


4A DS-07 ISOMETRIC N T S

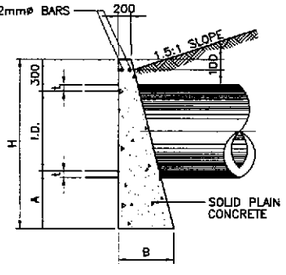


4B DS-07 SECTION NOT TO SCALE

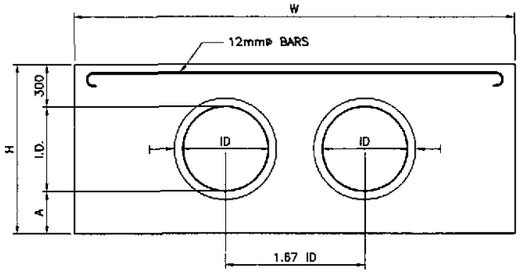
4 DS-07 L-TYPE HEADWALL NOT AS SHOWN



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

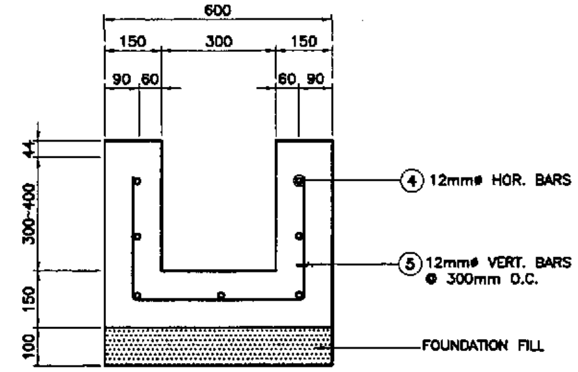
JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

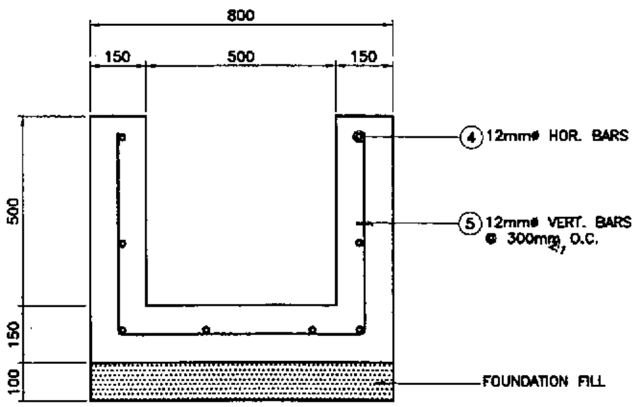
	DATE	SIGNATURE	PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
			Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DESIGNED	10/12/12	F. SIA MARIA					
CHECKED	10/19/12	H. HAKIM					
SUBMITTED	10/19/12	M. KUSOKI 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)	NOT TO SCALE	STANDARD REINFORCED CONCRETE HEADWALL FOR RCPC	DS-07
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



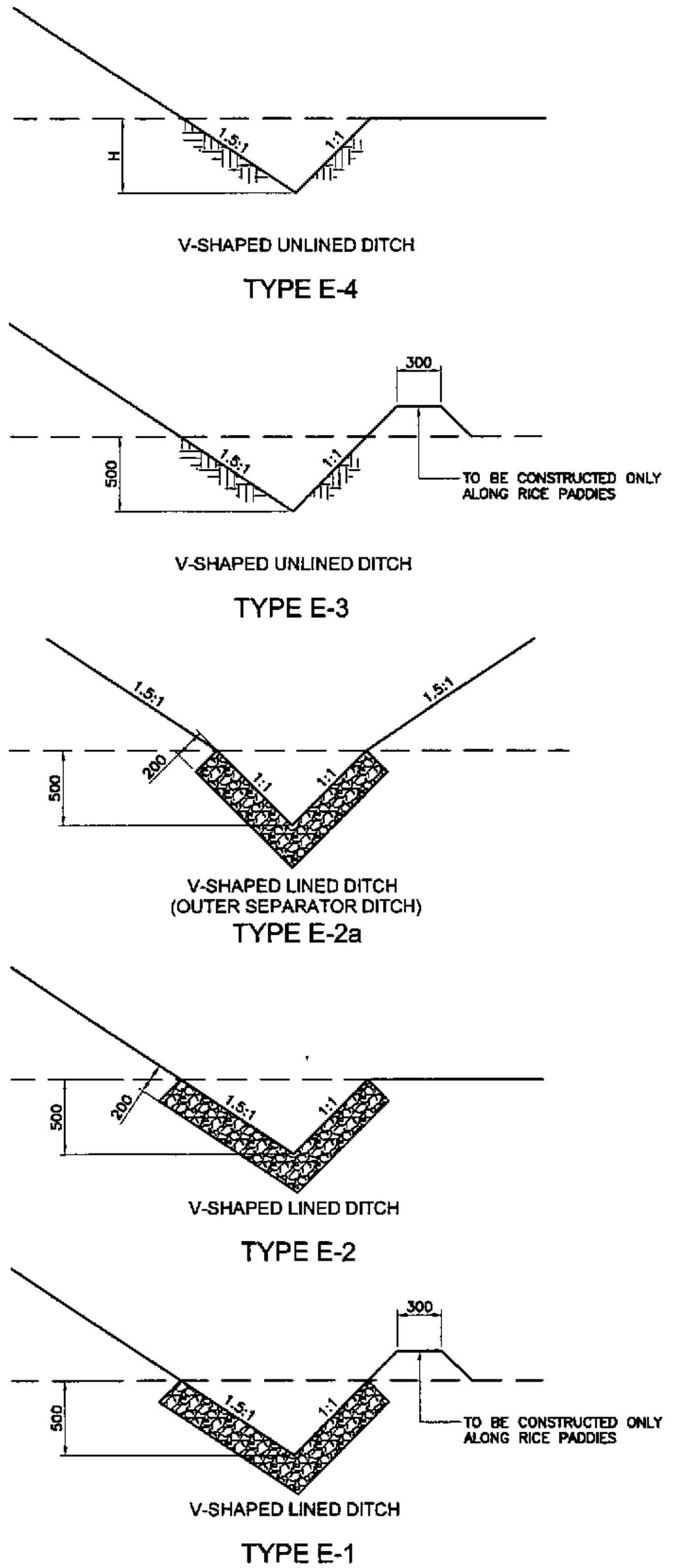
REINFORCED CONCRETE DITCH

① DS-08 TYPE BU
SCALE: 1:10

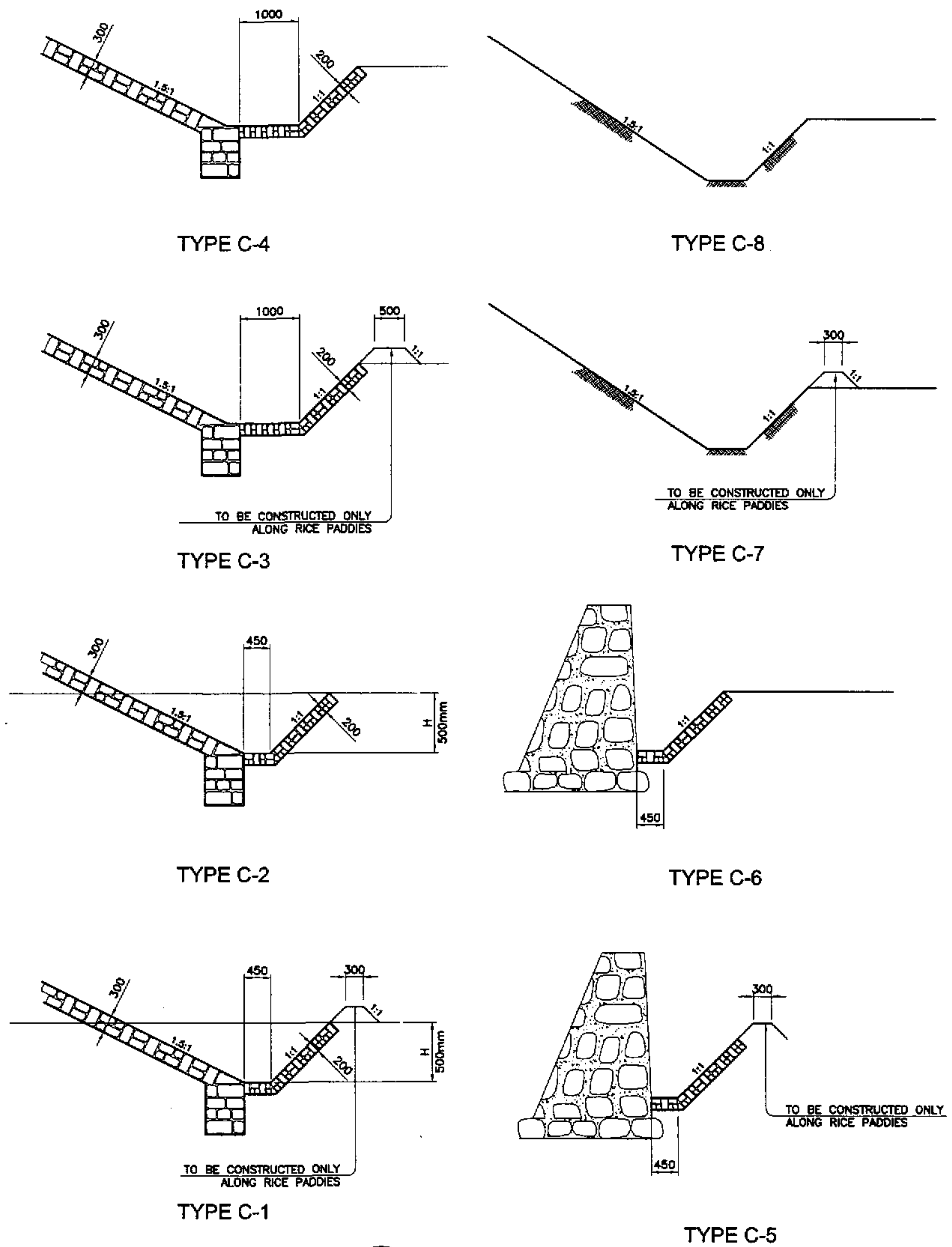


REINFORCED CONCRETE DITCH

② DS-08 TYPE U
SCALE: 1:10



③ DS-08 TYPE E
SCALE: 1:25



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	10/12/02	
	CHECKED	10/19/02	
	SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

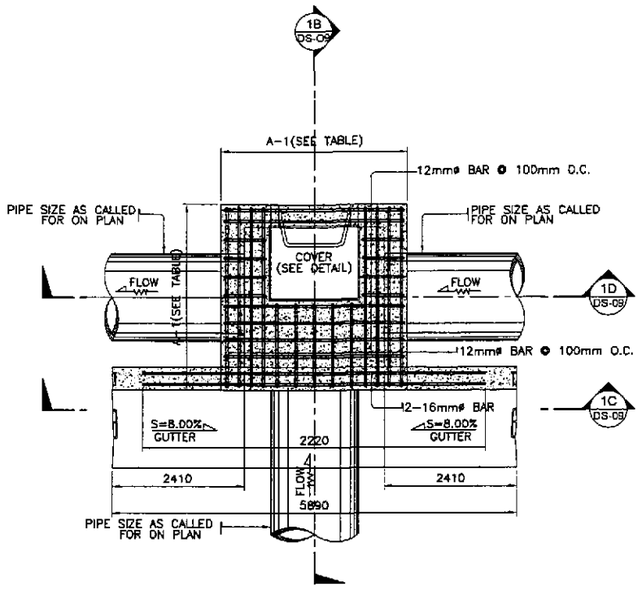
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC,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

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

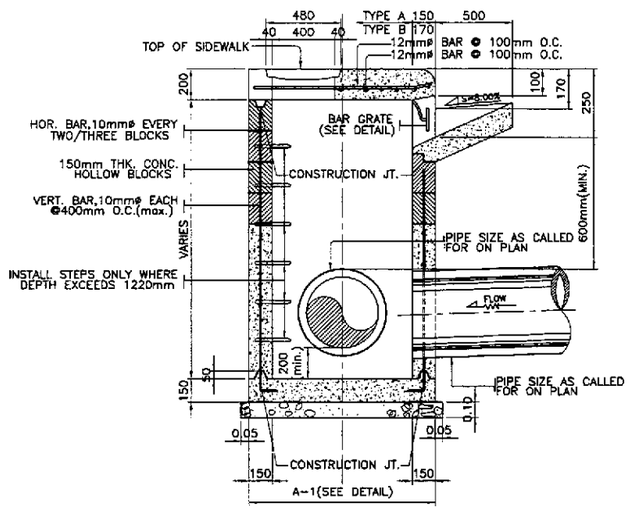
SCALE : NOT TO SCALE
FULL SIZE A1

SHEET CONTENTS : STANDARD DRAINAGE DITCHES

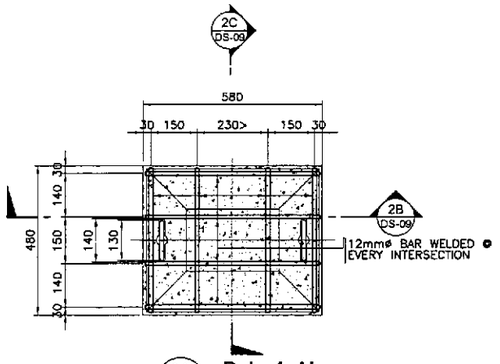
SHEET NO. : DS-08



1A DS-09 PLAN



1B DS-09 SECTION



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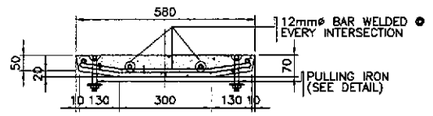

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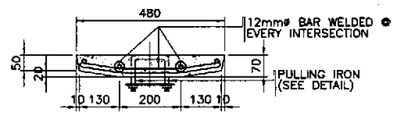
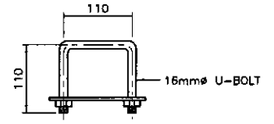
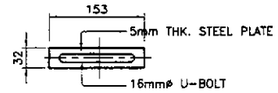


2C DS-09 SECTION

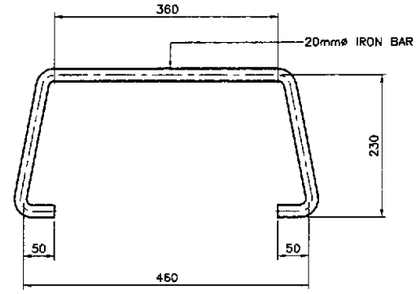


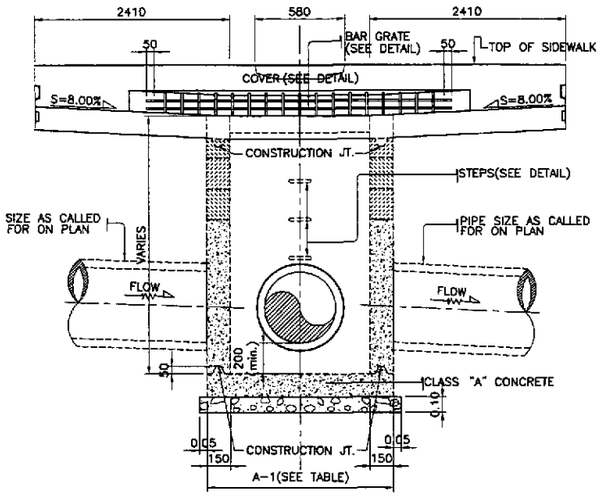
3A DS-09 PLAN



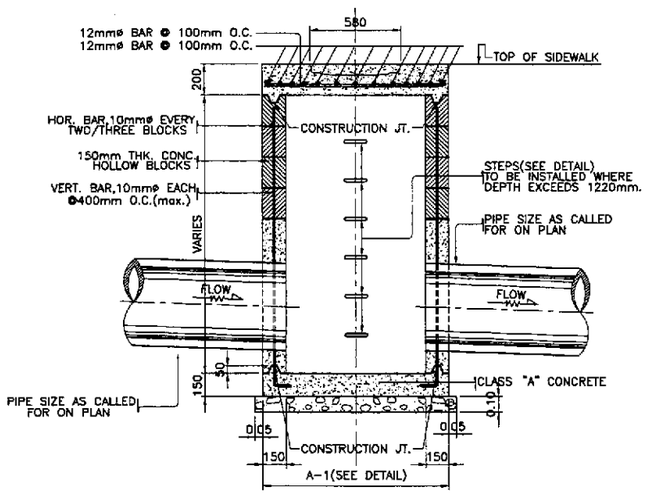
3B DS-09 ELEVATION

3 DS-09 PULLING IRON DETAIL
SCALE 1:5





1C DS-09 SECTION
1:20

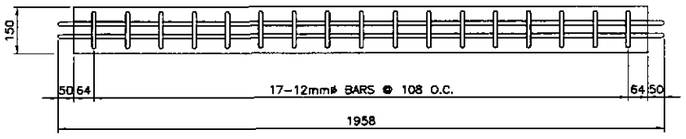


1D DS-09 SECTION

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 5.865MPa.
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

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REPUBLIC OF THE PHILIPPINES
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	DATE	SIGNATURE
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CHECKED	10/19/02	M. RIBOK
SUBMITTED	10/21/02	M. HAKIM TEAM LEADER

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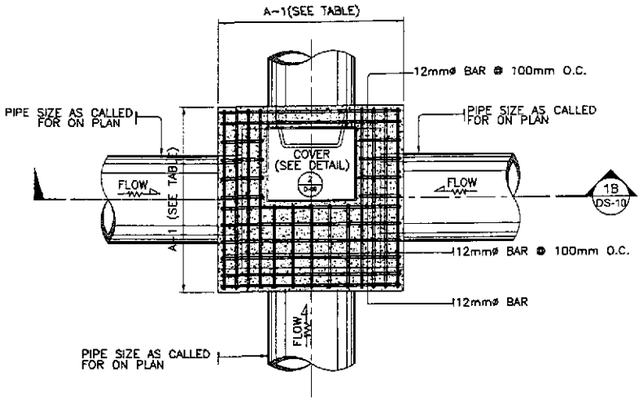
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary

PROJECT AND LOCATION :
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

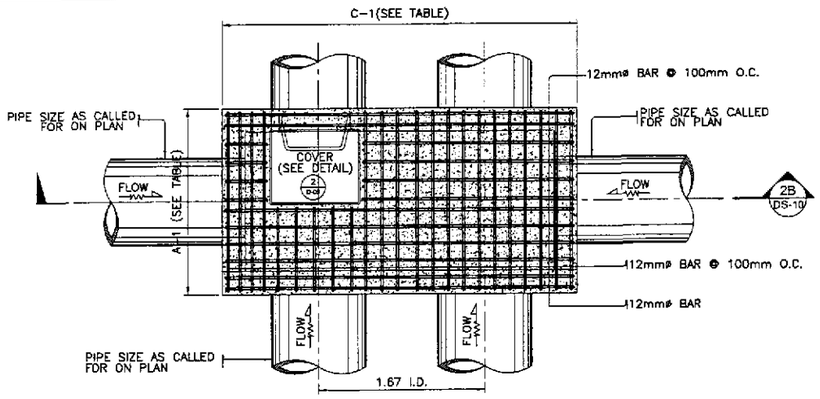
SCALE : AS SHOWN — FULL SIZE A1

SHEET CONTENTS : STANDARD COMBINATION CURB INLET MANHOLE

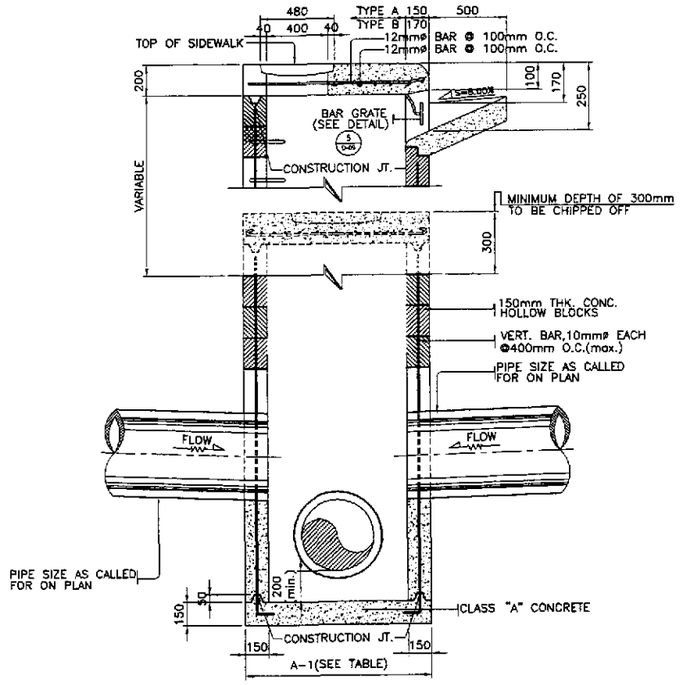
SHEET NO. : DS-09



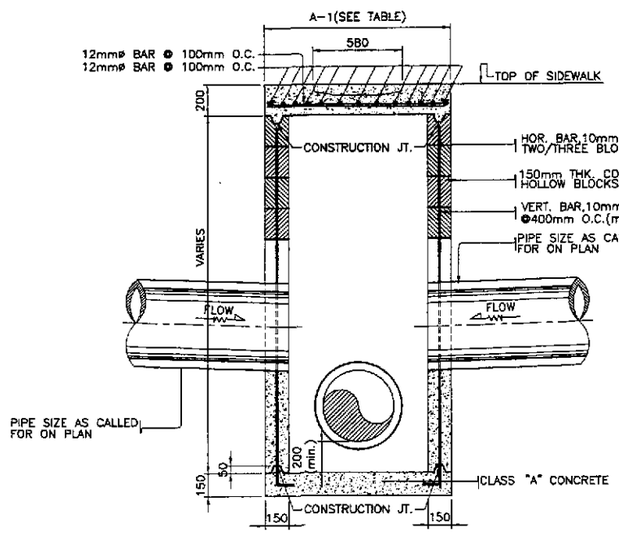
1A DS-10 PLAN BOX-TYPE MANHOLE (SINGLE PIPE)



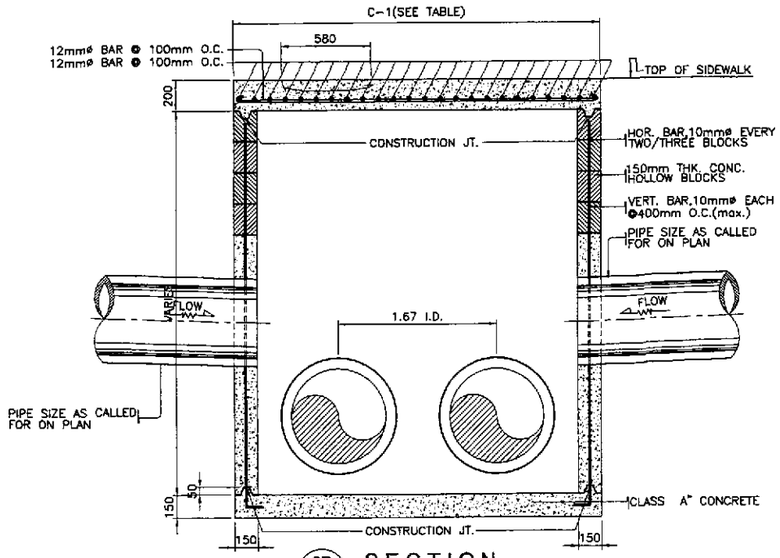
2A DS-10 PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)



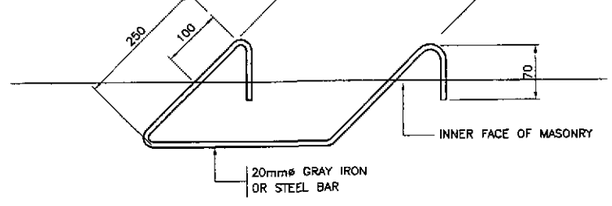
3 DS-10 BOX-TYPE CONVERTED TO CURB INLET MANHOLE



1B DS-10 SECTION



2B DS-10 SECTION



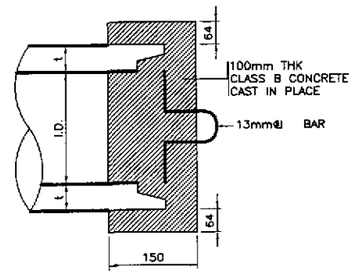
4 DS-10 STD. STEP OR RUNG

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.



CONCRETE BLOCK PLUG @ SUBSURFACE PIPE

5 DS-10

SPECIAL JUNCTION BOX MANHOLE

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

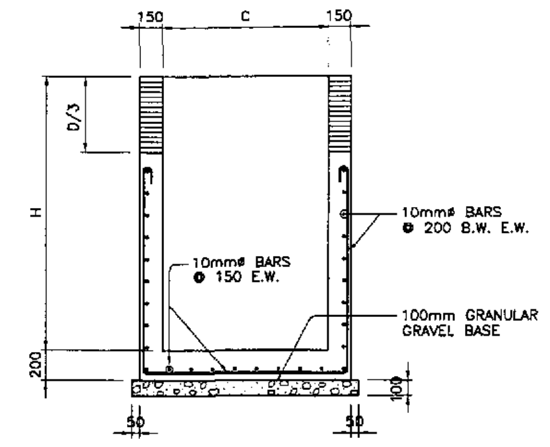
KEI KATAHIRA & ENGINEERS INTERNATIONAL — YEC YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	F. SIA
CHECKED	10/19/02	
SUBMITTED	10/21/02	TEAM LEADER

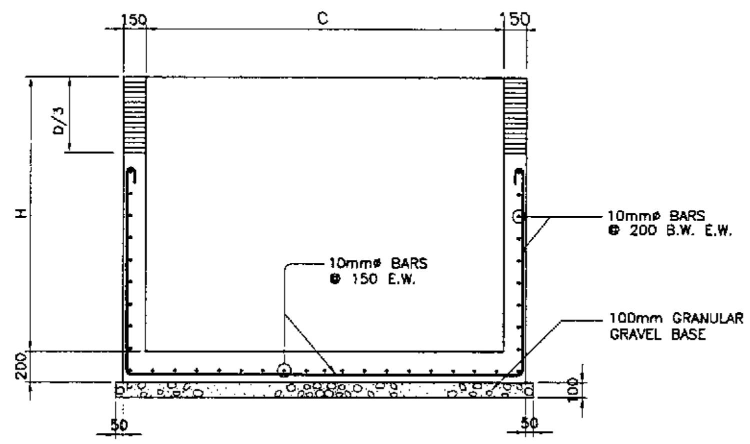
REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
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)	AS SHOWN	SPECIAL JUNCTION BOX MANHOLE	DS-10
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		



1C DS-11 SECTION



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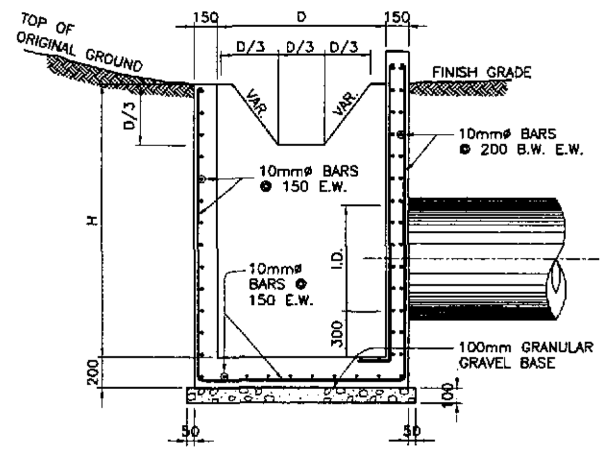
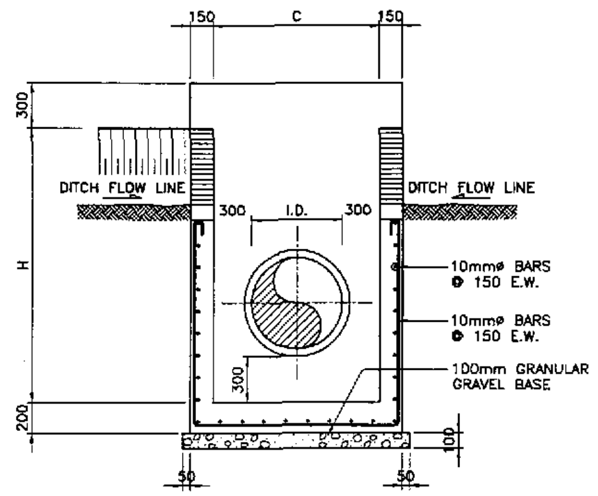
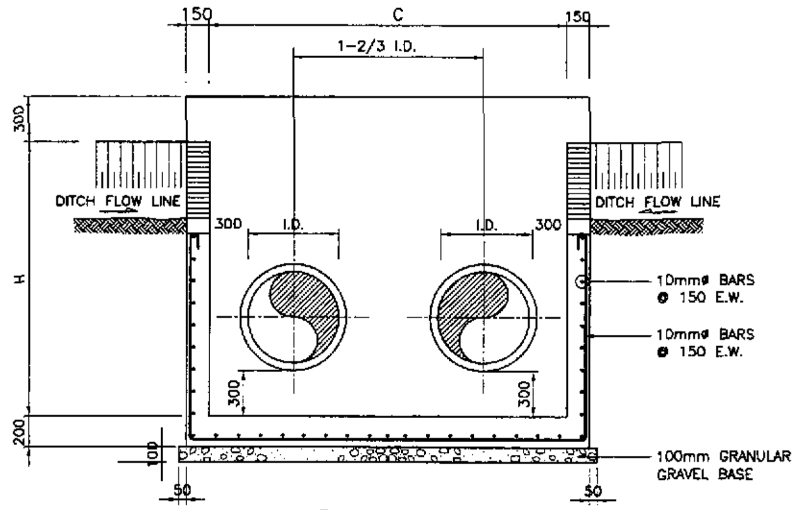


1C DS-11 SECTION



1B DS-11 SECTION



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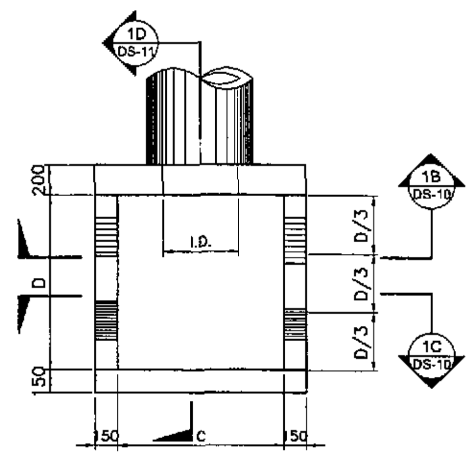
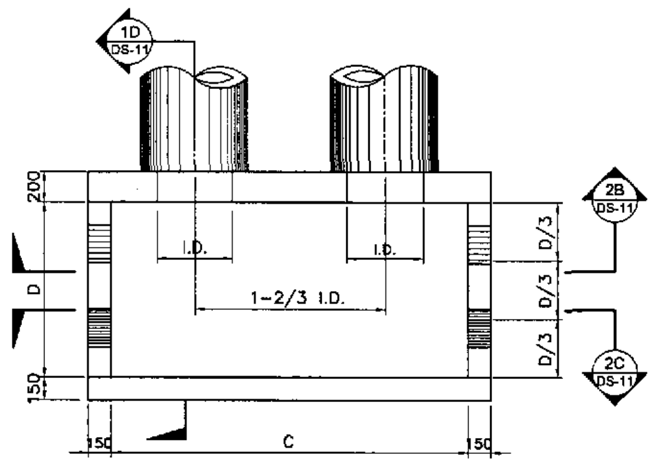


1A DS-11 P L A N



2A DS-11 P L A N

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

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

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

	DATE	SIGNATURE
DESIGNED	10/12/02	
CHECKED	10/19/02	M. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

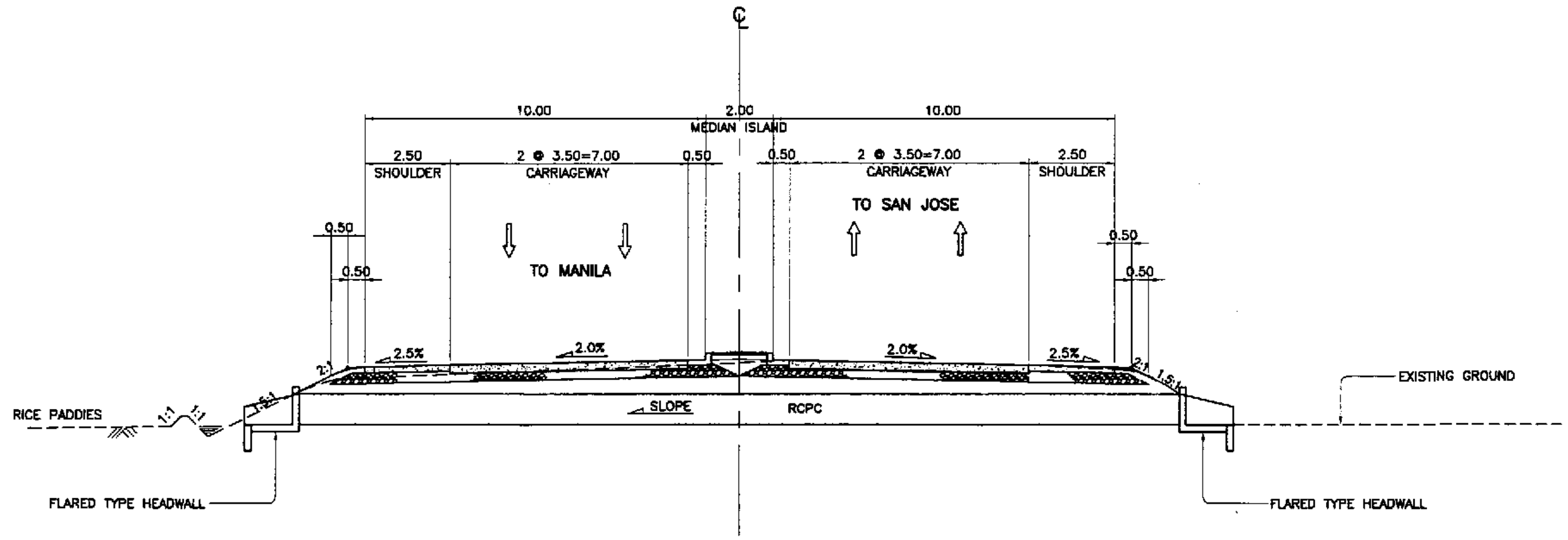
PJHL - PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC,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

PROJECT AND LOCATION :
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 : 1:25
FULL SIZE A1

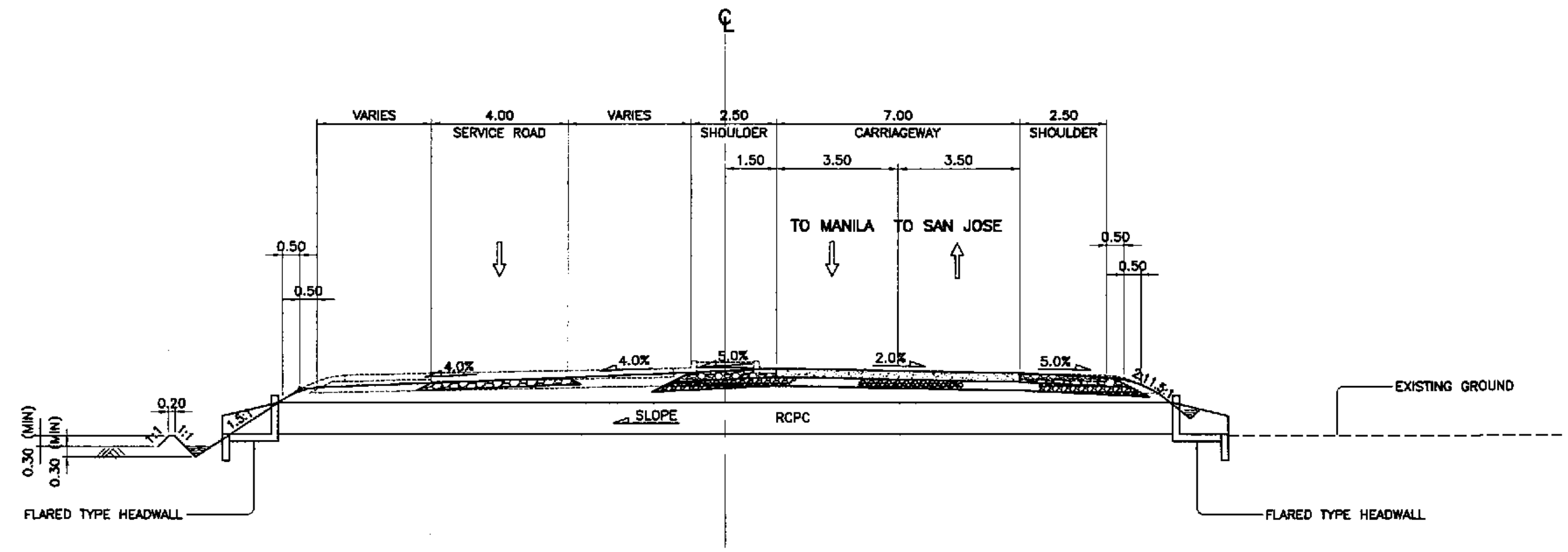
SHEET CONTENTS :
STANDARD REINFORCED CONCRETE CATCH BASIN FOR RCPC

SHEET NO. : DS-11



2 DS-12 TYPICAL DRAINAGE SECTION (ULTIMATE STAGE)

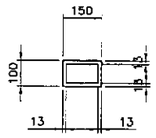
SCALE 1:100



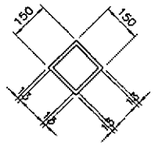
1 DS-12 TYPICAL DRAINAGE SECTION (INITIAL STAGE)

SCALE 1:100

JAPAN INTERNATIONAL COOPERATION AGENCY		DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS					PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
KATAHIRA & ENGINEERS INTERNATIONAL / YACHIYO ENGINEERING CO., LTD.	DESIGNED	10/12/02		PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY		THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	TYPICAL DRAINAGE SECTIONS (INITIAL and ULTIMATE STAGE)	DS-12
	CHECKED	10/19/02	A.	Submitted By: DANILO C. TRAJANO Project Director	Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OIC, Director IV	Recommended By: (See cover sheet for Signature) MANUEL M. BONOAN Undersecretary	Approved By: (See cover sheet for Signature/Approval) SIMEON A. DATUMANONG Secretary	CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		
	SUBMITTED	10/21/02	M. TEAM LEADER									



PLAN (POST)



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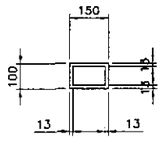

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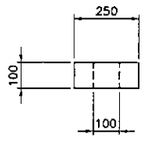

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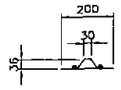
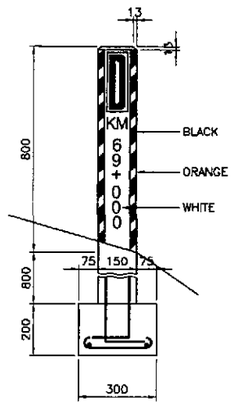
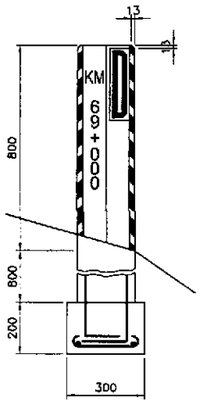
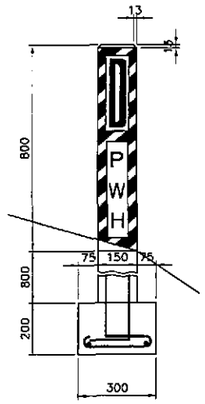




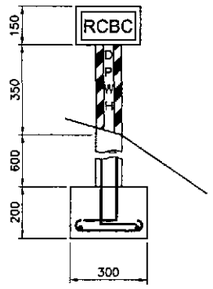
ELEVATION
CONCRETE MARKER
TYPE I-a

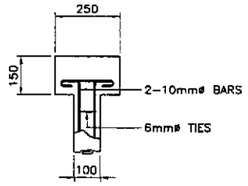


ELEVATION
CONCRETE MARKER
TYPE I-b

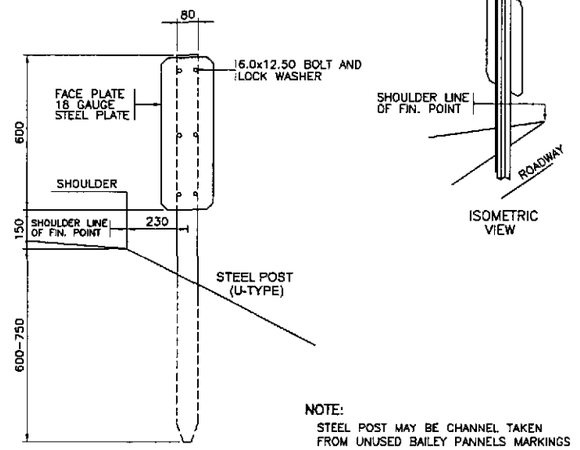


ELEVATION
CONCRETE MARKER
TYPE I-c





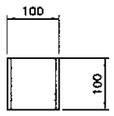
ELEVATION
CONCRETE MARKER
TYPE I-d

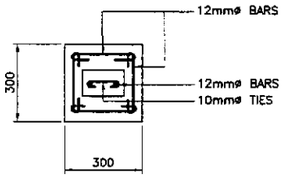


ISOMETRIC VIEW

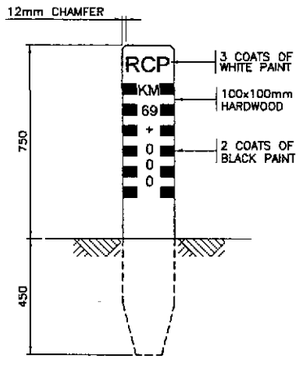
NOTE:
STEEL POST MAY BE CHANNEL TAKEN FROM UNUSED BAILEY PANNELS MARKINGS AND PAINTINGS SAME AS FOR TYPE I AND TYPE II AS SHOWN.

ELEVATION
STEEL MARKER
TYPE II

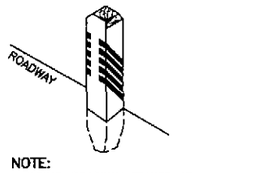




TYPICAL FOOTING DETAIL
CONCRETE MARKER
(TYPE I-a,b,c,d)

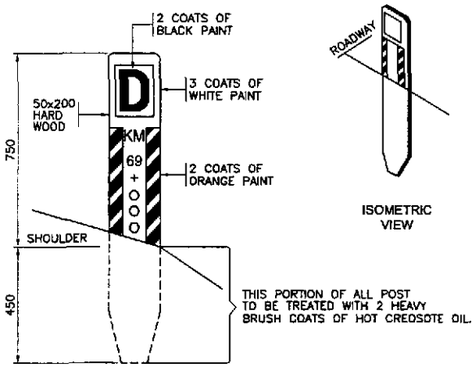


ELEVATION
WOODEN MARKER
TYPE III-a



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

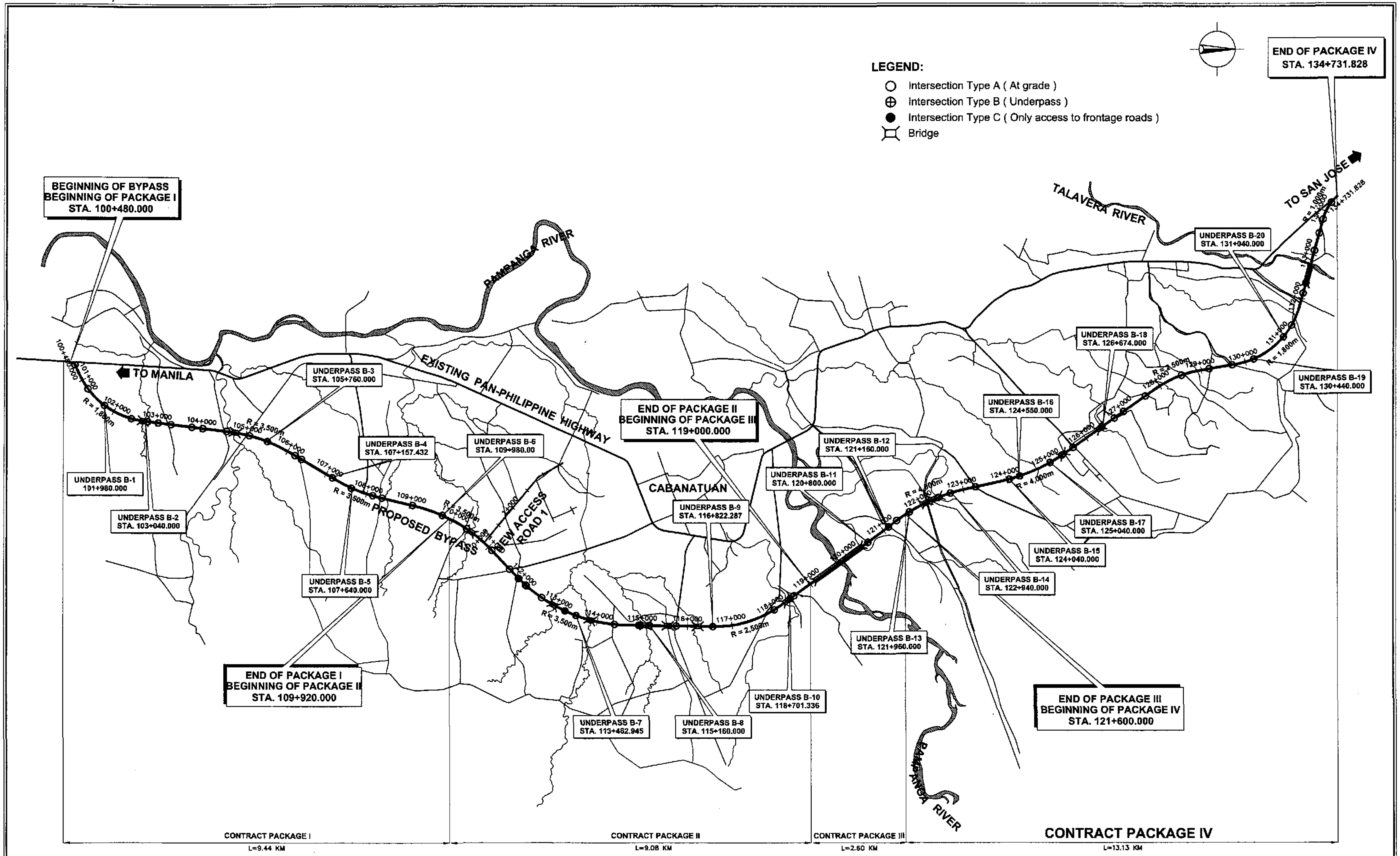
KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	F. SISIO MARIA
CHECKED	10/12/02	A. HAKIM
SUBMITTED	10/12/02	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

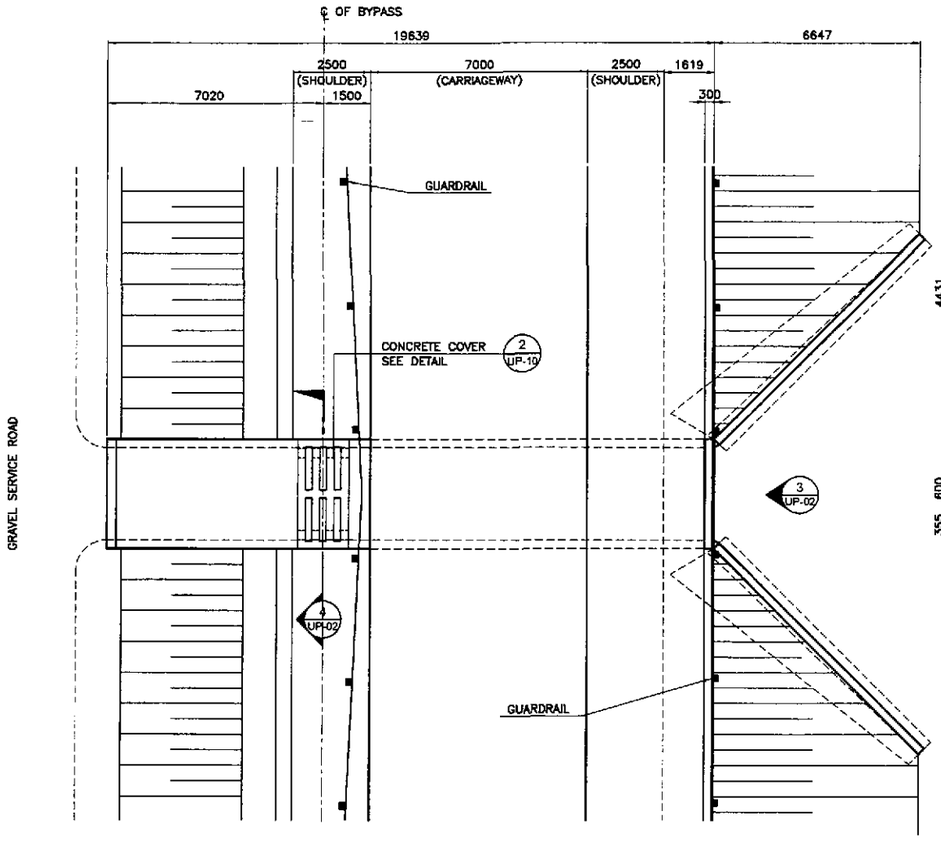
PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD MAINTENANCE MARKERS	DS-13
CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE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



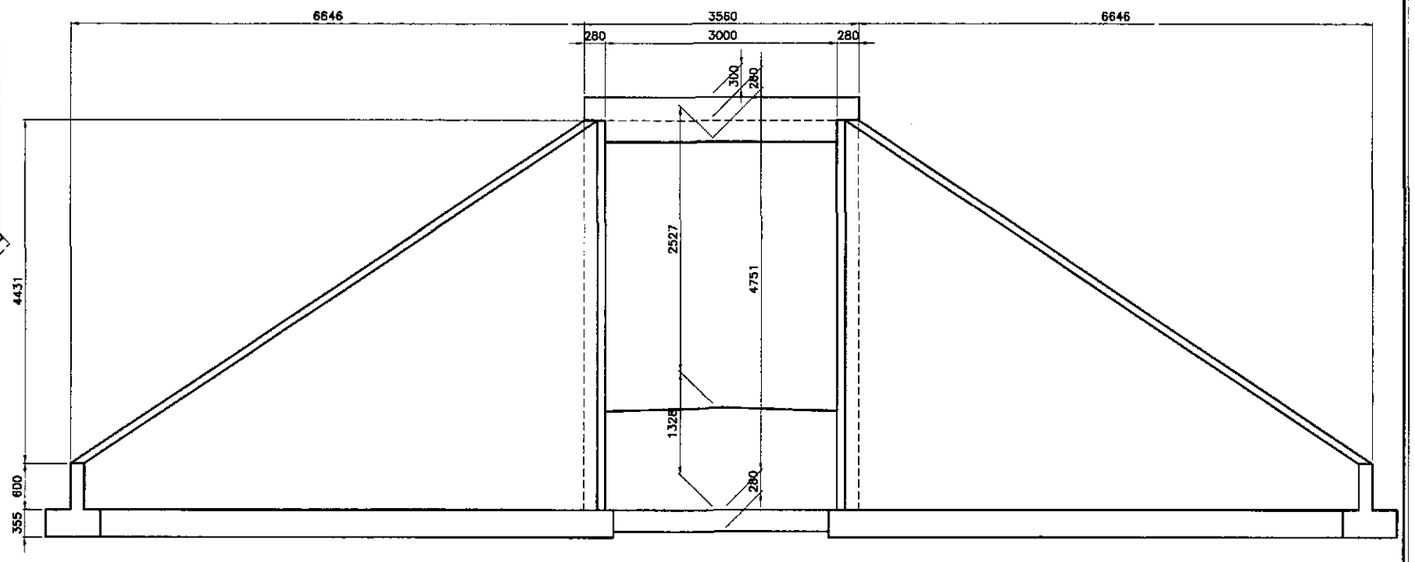
A / UP-01 **SITE DEVELOPMENT PLAN - UNDERPASSES ALONG BYPASS**

SCALE 1:40,000

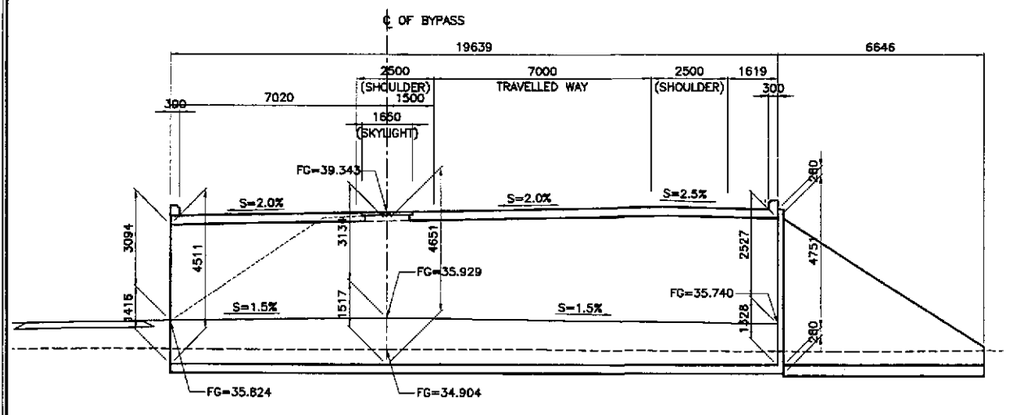
JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YACHIYO ENGINEERING CO., LTD.	DESIGNED 10/12/02 CHECKED 10/19/02 SUBMITTED 10/21/02 TEAM LEADER	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS PJHL – PMO Submitted By: DANILO C. TRAJANO, Project Director BUREAU OF DESIGN Reviewed By: JOSEFINA M. ALAGAR, Chief, Highways Division; Recommended By: GILBERTO S. REYES, OIC, Director IV OFFICE OF THE SECRETARY Recommended By: (See cover sheet for Signature) MANUEL M. BONOAN, Undersecretary; Approved By: (See cover sheet for Signature/Approval) SIMEON A. DATUMANONG, Secretary	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) CABANATUAN BYPASS - CONTRACT PACKAGE IV
SCALE : 1:40,000 FULL SIZE A1	SHEET CONTENTS : SITE DEVELOPMENT PLAN UNDERPASSES ALONG BYPASS	SHEET NO. : UP-01	



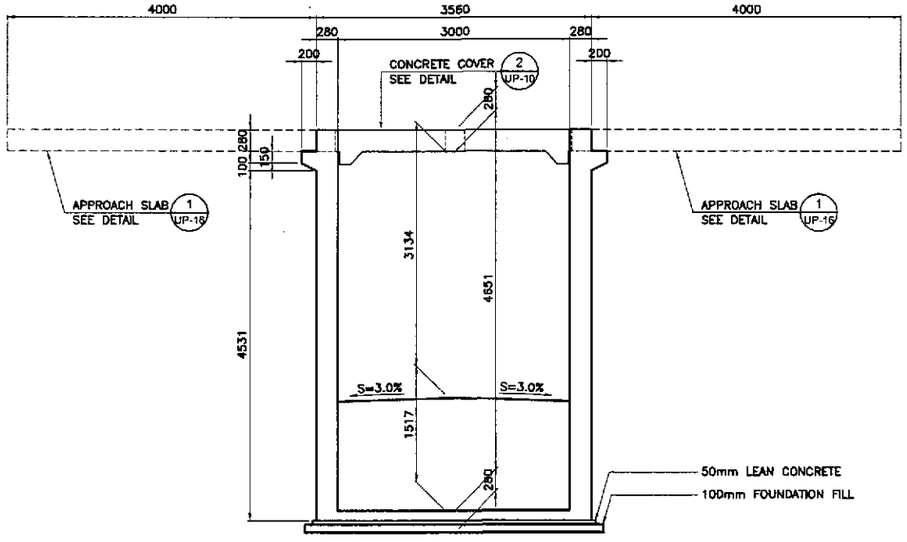
1 UP-02 GENERAL PLAN
SCALE 1:100



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

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

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

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

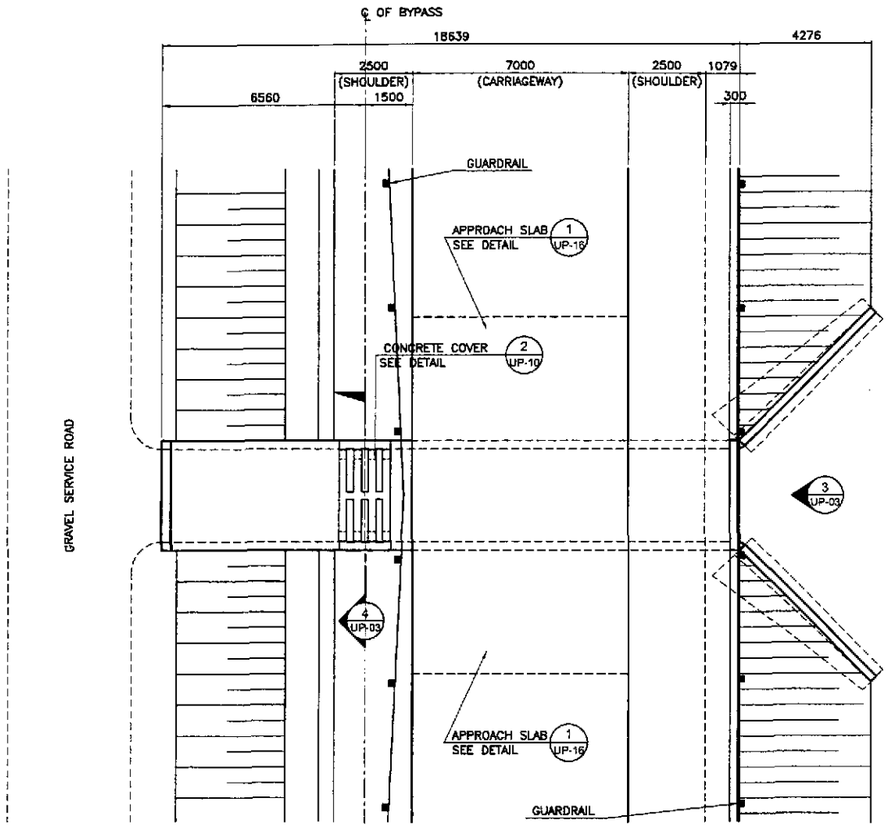
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

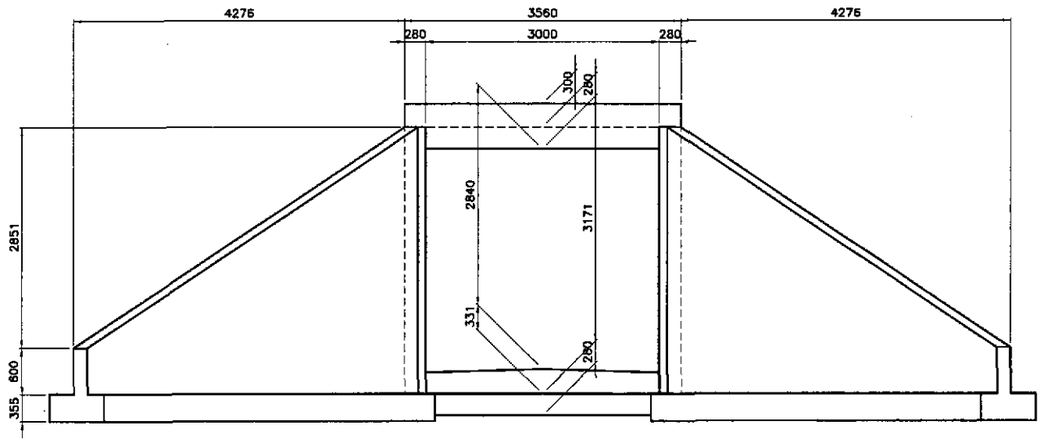
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(INITIAL STAGE)
B-13 (STA. 121+960.00)

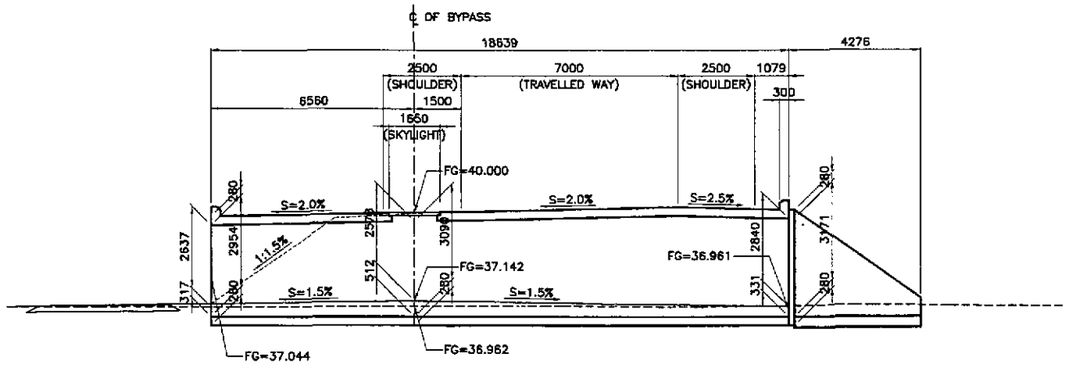
SHEET NO. :
UP-02



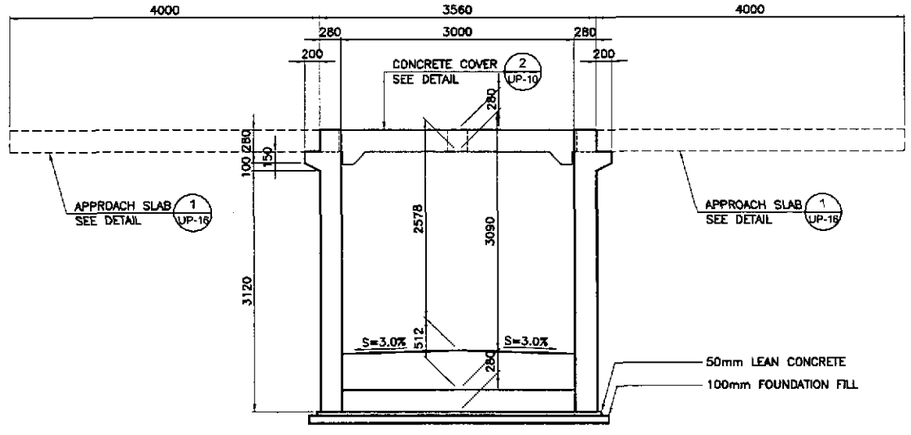
1 UP-03 GENERAL PLAN
SCALE 1:100



3 UP-03 ELEVATION
SCALE 1:40



2 UP-03 GENERAL ELEVATION
SCALE 1:100



4 UP-03 SECTION
SCALE 1:40

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	K. KUSUNOKI TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

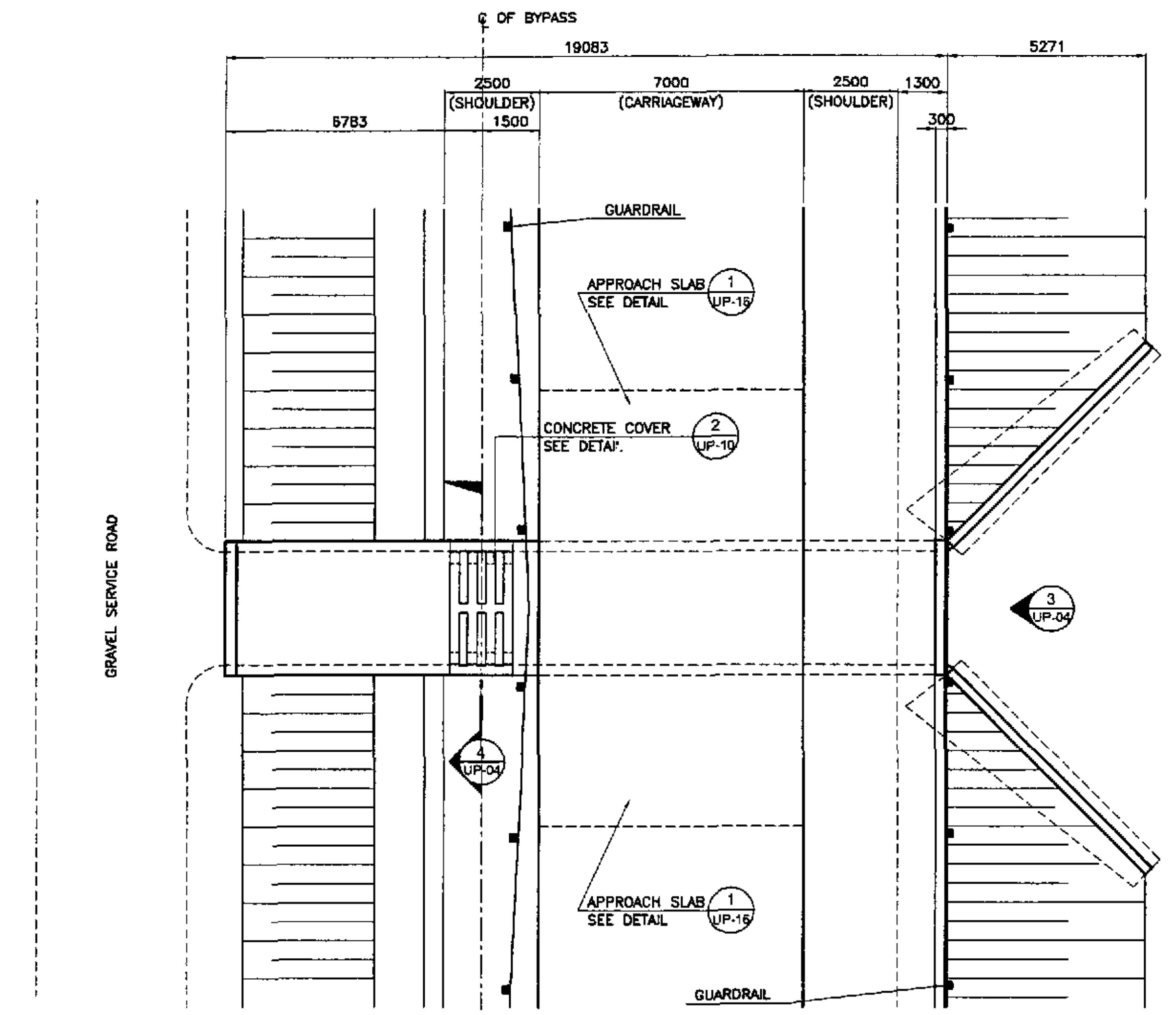
PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

PROJECT AND LOCATION :
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

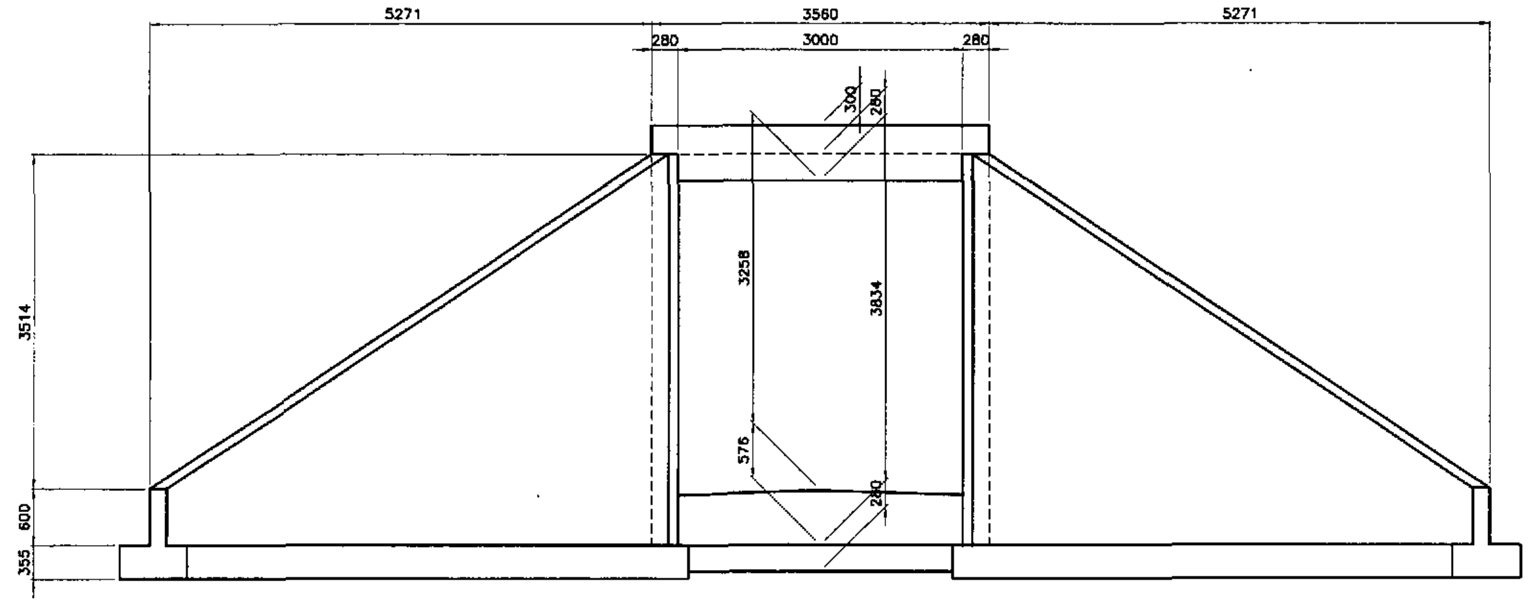
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(INITIAL STAGE)
B-14 (STA. 122+940.00)

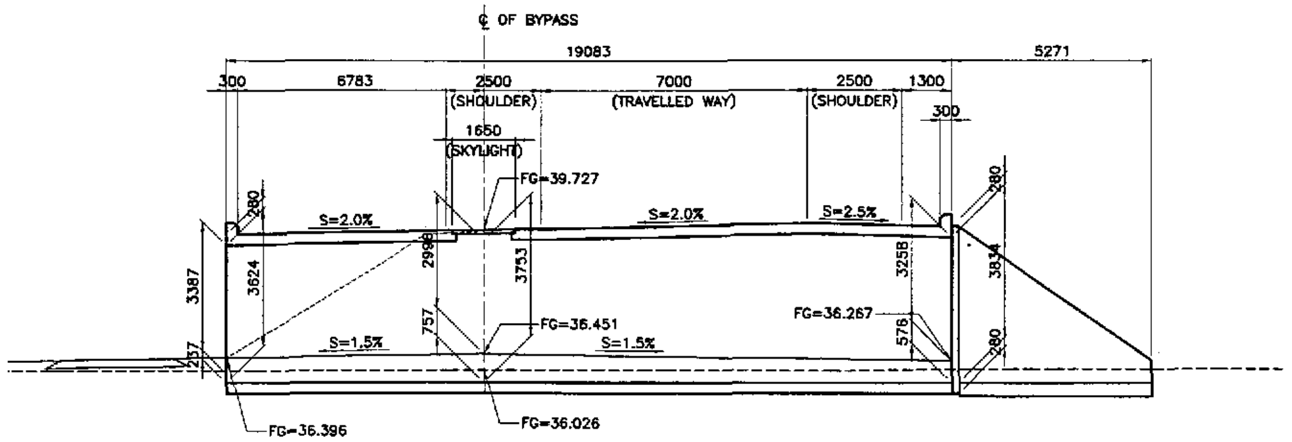
SHEET NO. :
UP-03



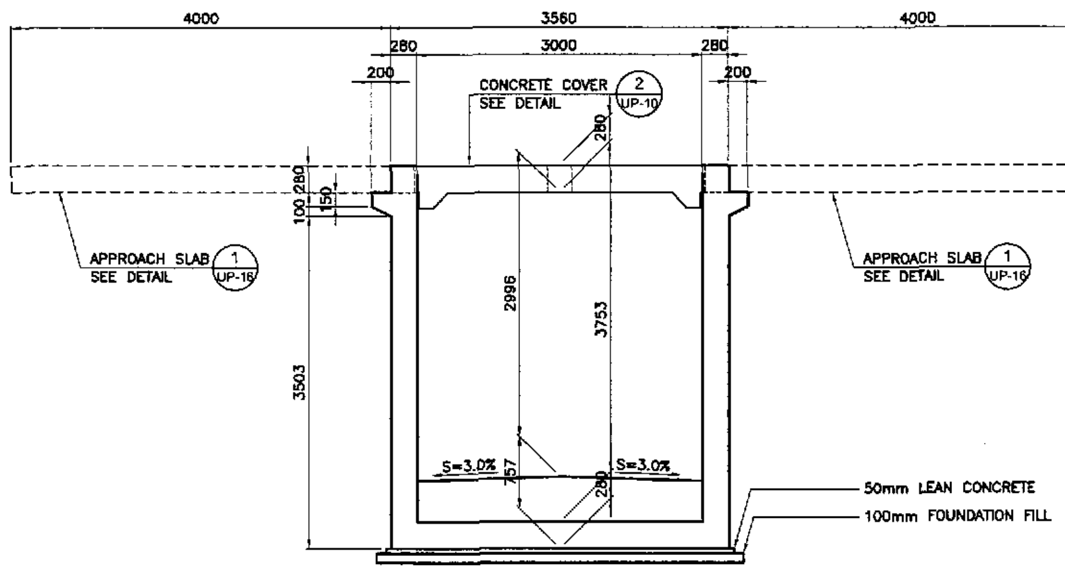
1 UP-04 GENERAL PLAN
SCALE 1:100



3 UP-04 ELEVATION
SCALE 1:40



2 UP-04 GENERAL ELEVATION
SCALE 1:100



4 UP-04 SECTION
SCALE 1:40

JICA JAPAN INTERNATIONAL COOPERATION AGENCY		DATE	SIGNATURE
KATAHIRA & ENGINEERS INTERNATIONAL	DESIGNED	10/2/02	
YACHIYO ENGINEERING CO., LTD.	CHECKED	10/19/02	HAKIM
	SUBMITTED	10/21/02	M. EIICHI 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	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONOAN Undersecretary	SIMEON A. DATUMANONG Secretary

PROJECT AND LOCATION :
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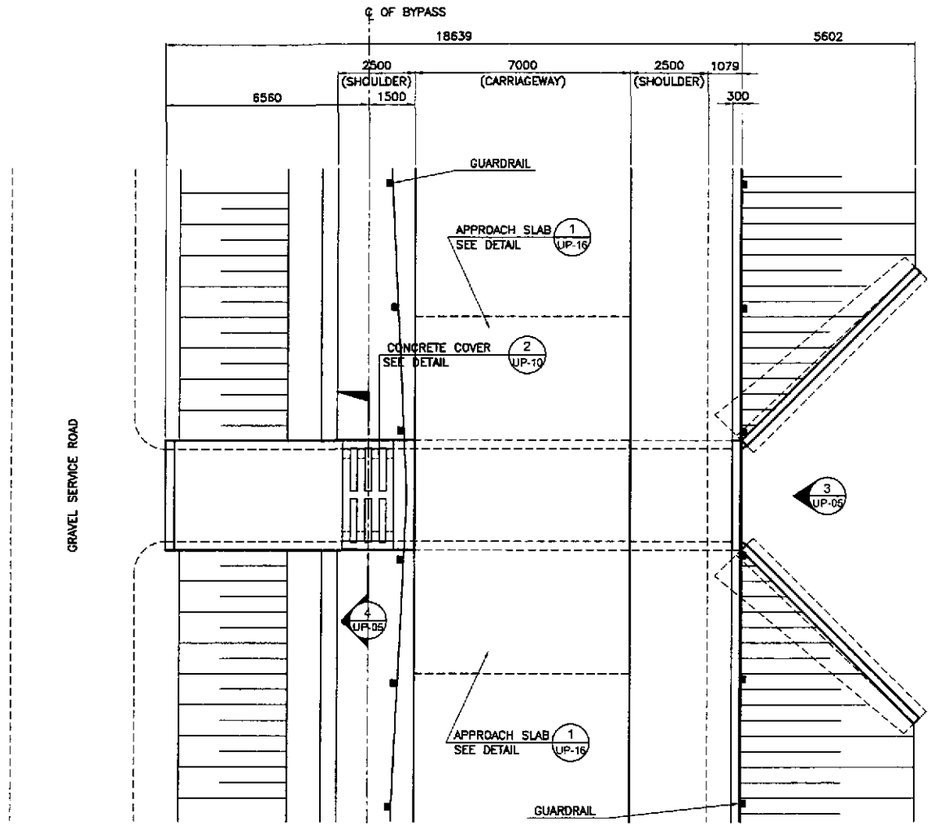
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

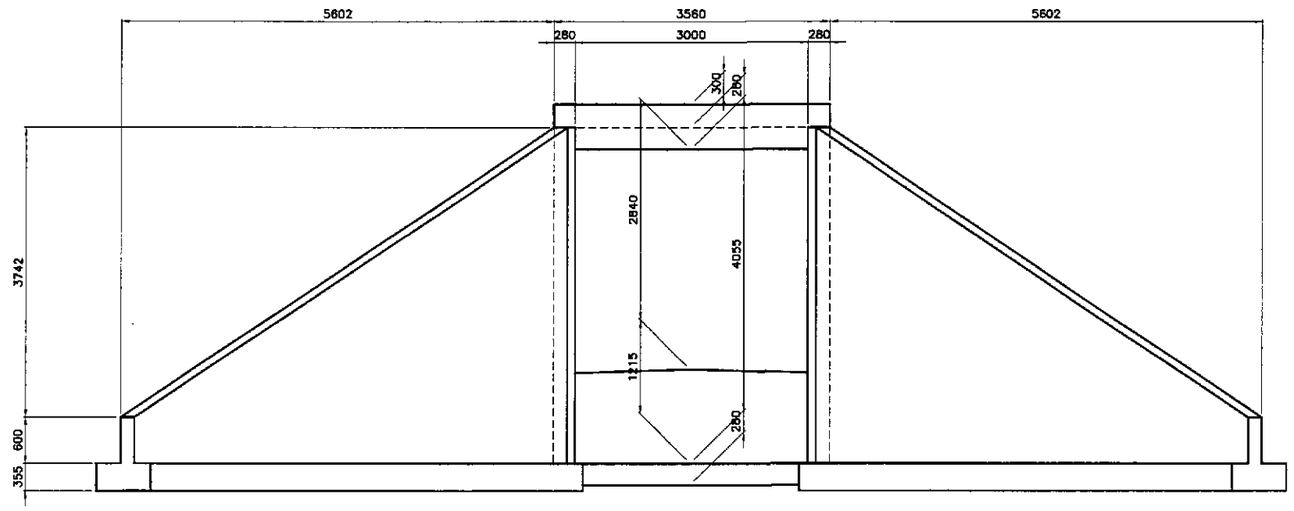
SCALE : AS SHOWN
FULL SIZE A1

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

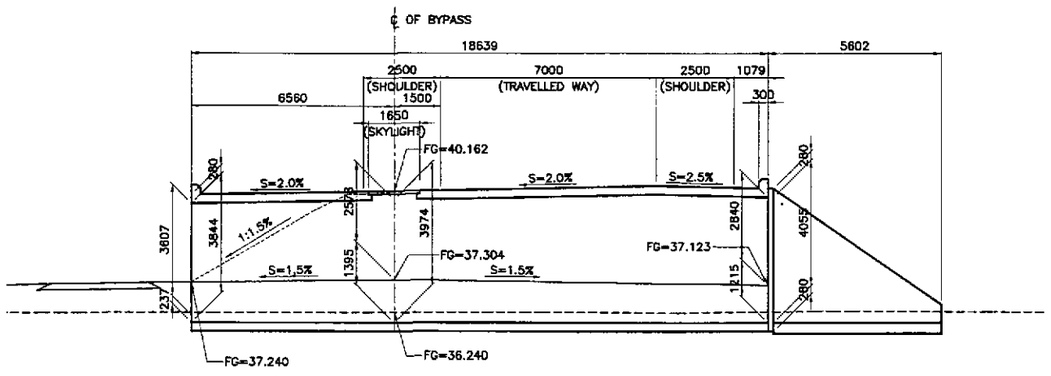
SHEET NO. : UP-04



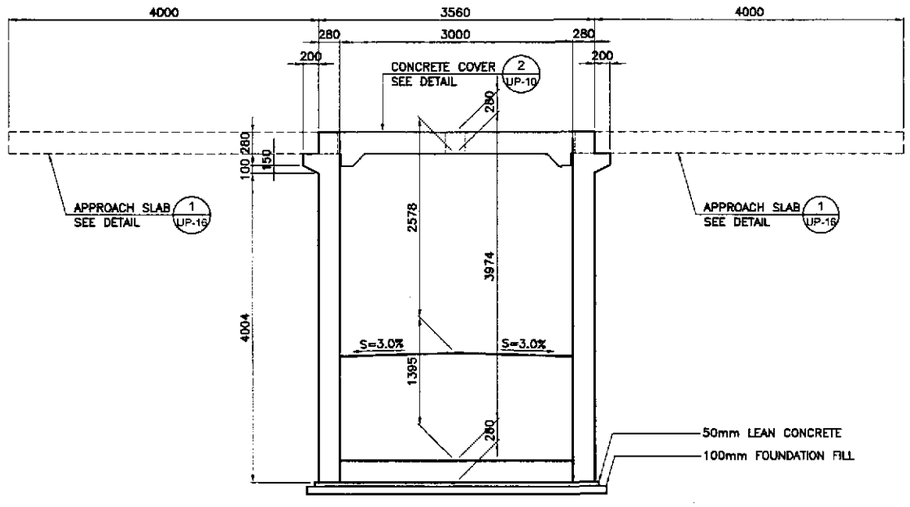
1 UP-05 GENERAL PLAN
SCALE 1:100



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	10/12/02	
CHECKED	10/12/02	A. HAKIM
SUBMITTED	10/12/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

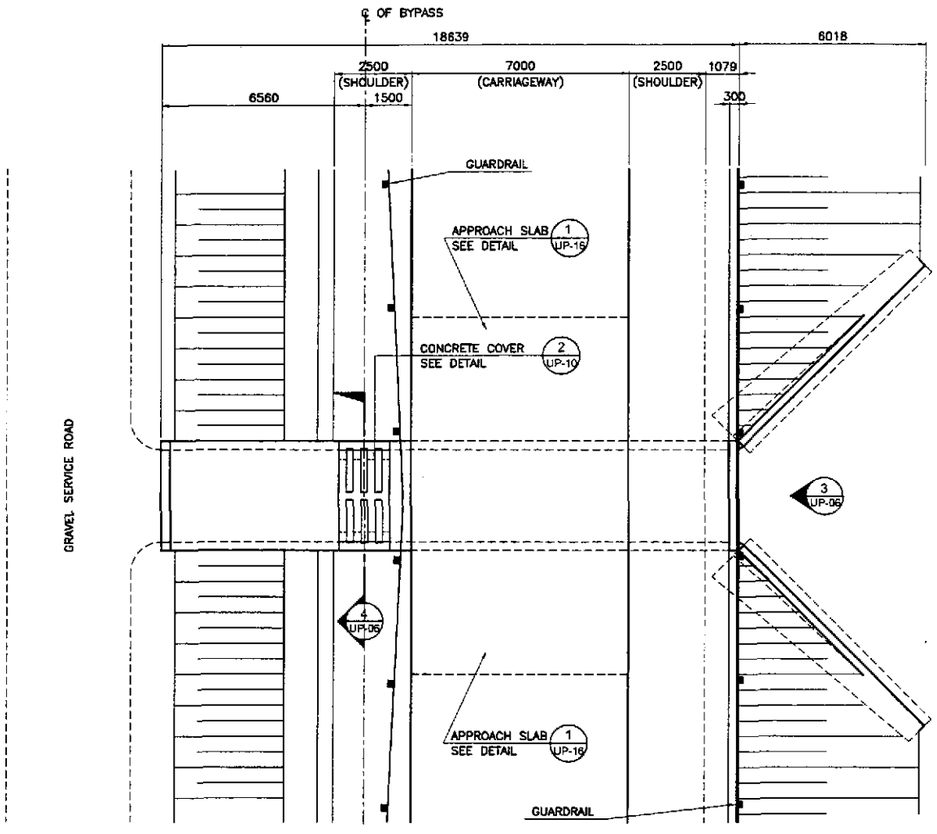
PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

PROJECT AND LOCATION :
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

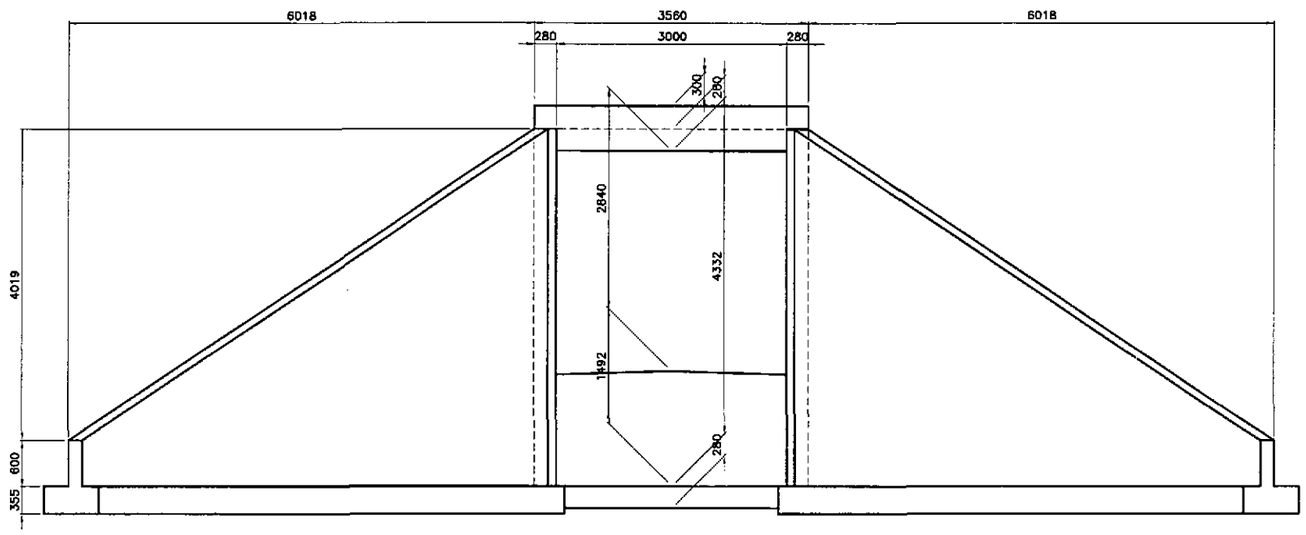
SCALE :
AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
GENERAL PLAN, ELEVATION & SECTION
(INITIAL STAGE)
B-16 (STA. 124+550.00)

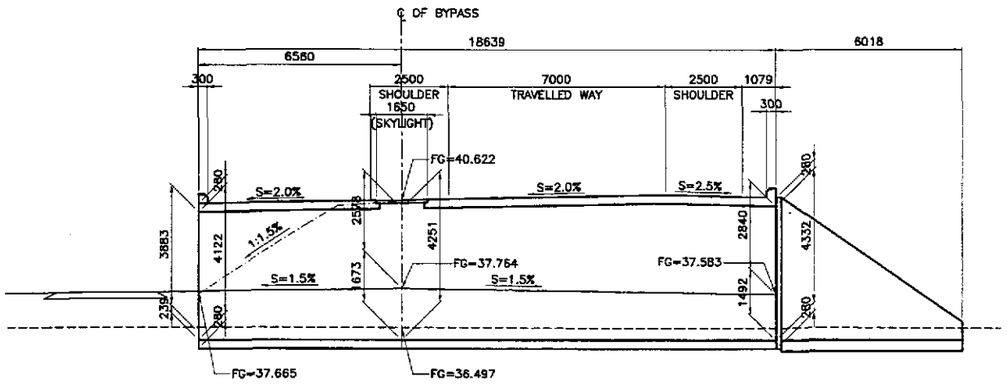
SHEET NO. :
UP-05



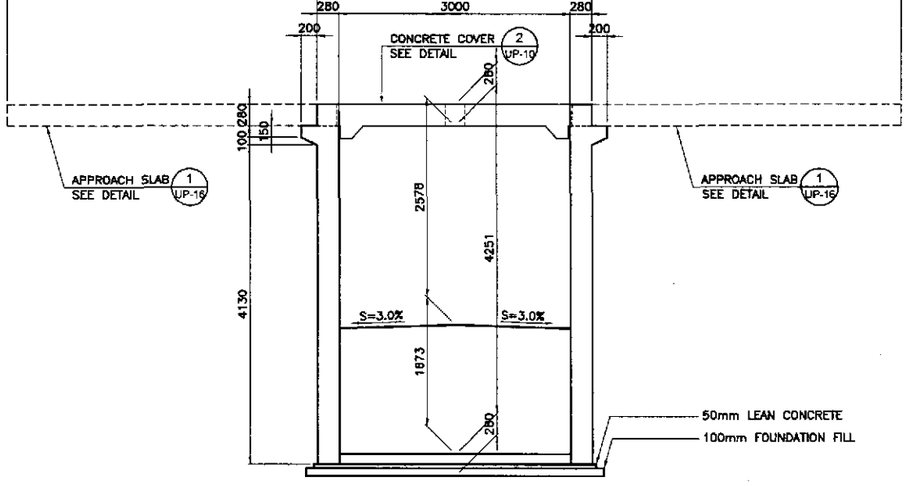
1 UP-06 GENERAL PLAN SCALE 1:100



3 UP-06 ELEVATION SCALE 1:40

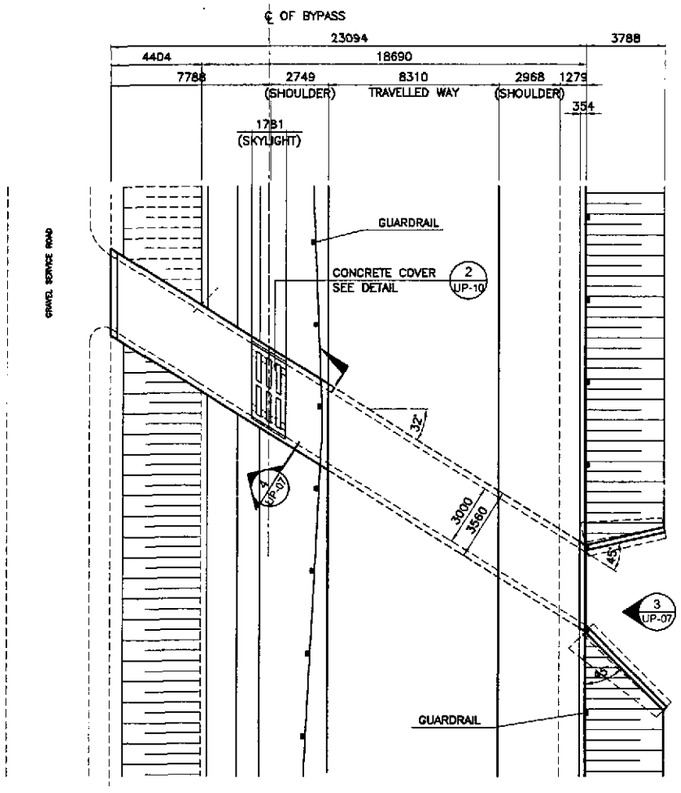


2 UP-06 GENERAL ELEVATION SCALE 1:100

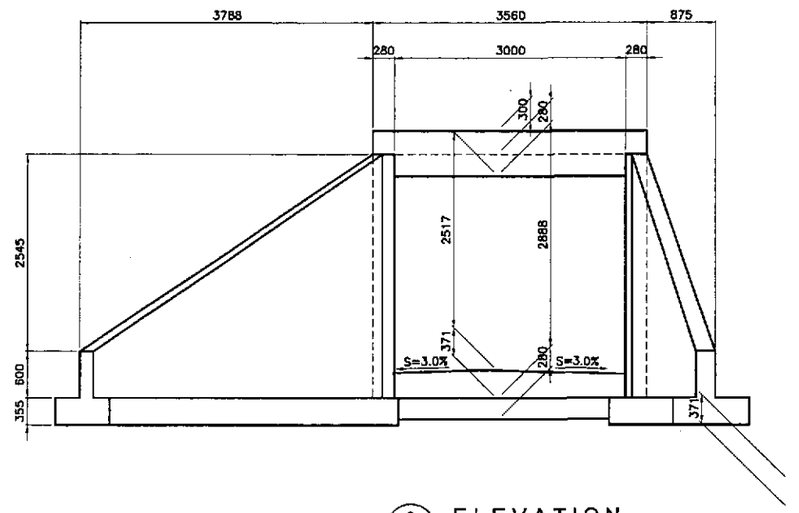


4 UP-06 SECTION SCALE 1:40

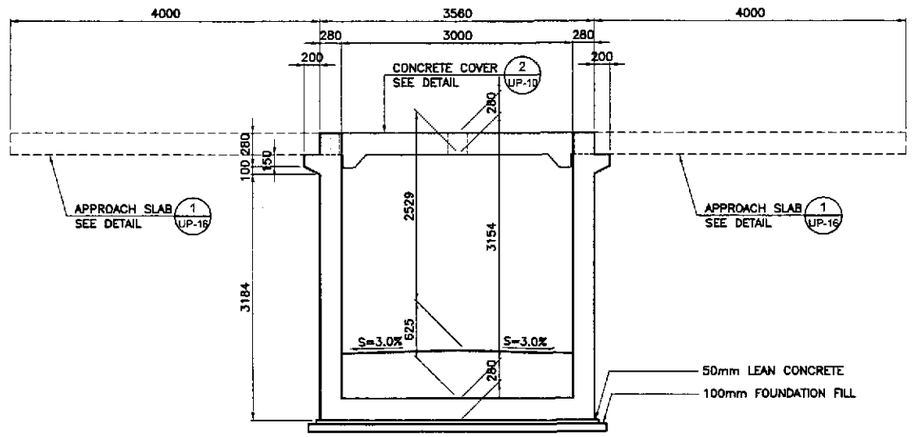
JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL / YACHIYO ENGINEERING CO., LTD.		DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	10/12/02	M. OCHIAI	PJHL – PMO	BUREAU OF DESIGN	OFFICE OF THE SECRETARY	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	BOX CULVERT GENERAL PLAN, ELEVATION & SECTION (INITIAL STAGE) B-17 (STA. 125+040.00)	UP-06
	CHECKED	10/12/02	A. HAKIM	Submitted By:	Reviewed By:	Recommended By: (See cover sheet for Signature) / Approved By: (See cover sheet for Signature/Approval)	CABANATUAN BYPASS - CONTRACT PACKAGE IV	FULL SIZE A1		
	SUBMITTED	10/21/02	M. KAWACHI TEAM LEADER	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV / MANUEL M. BONOAN Undersecretary / SIMEON A. DATUMANONG Secretary				



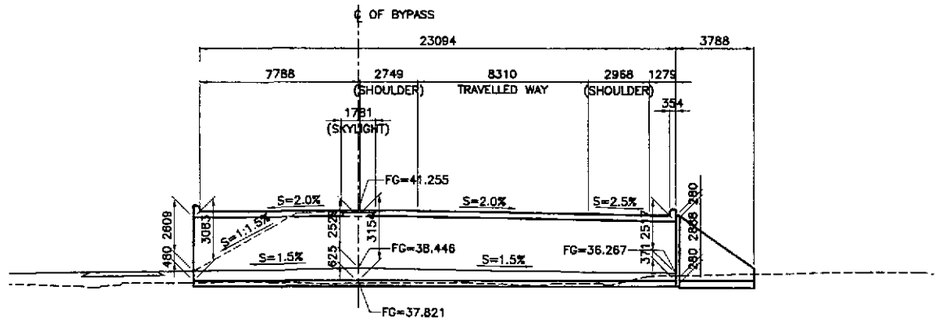
1 UP-07 GENERAL PLAN SCALE 1:150



3 UP-07 ELEVATION SCALE 1:40



4 UP-07 SECTION SCALE 1:40



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

2 UP-07 GENERAL ELEVATION SCALE 1:150

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/12/02	A. SAWAI
CHECKED	10/19/02	A. HAKOI
SUBMITTED	10/12/02	M. KOCHI, TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

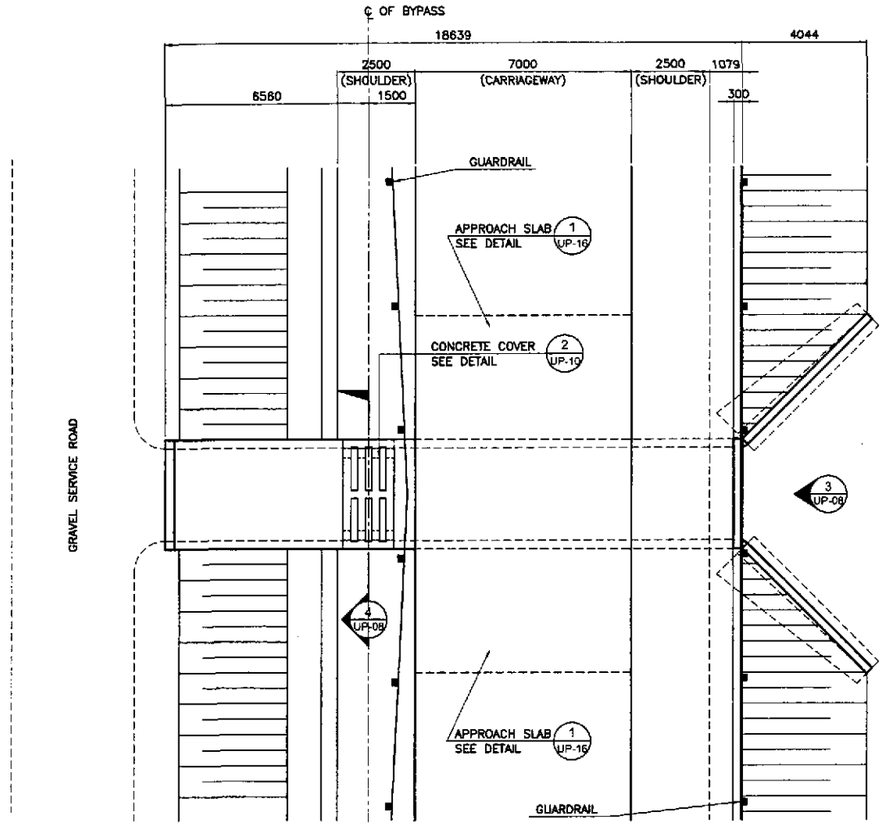
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONGAN	SIMEON A. DATUMANONG
Project Director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

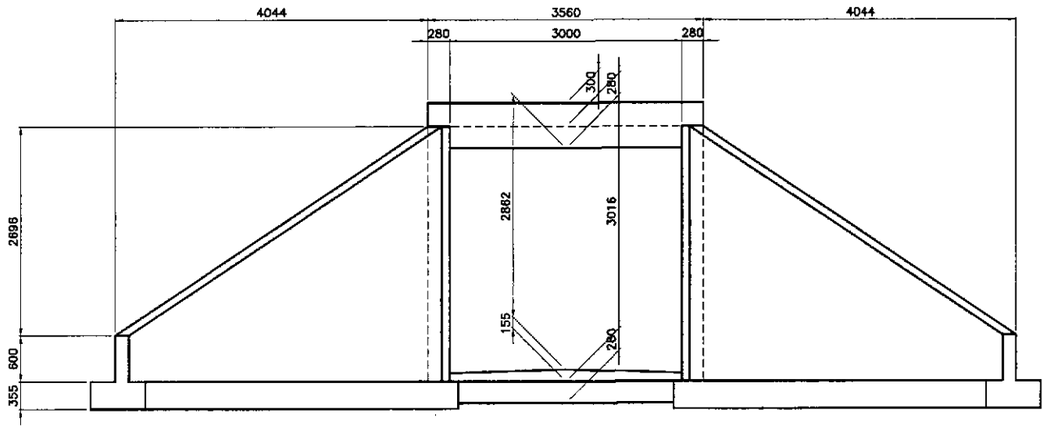
SCALE : AS SHOWN — FULL SIZE A1

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

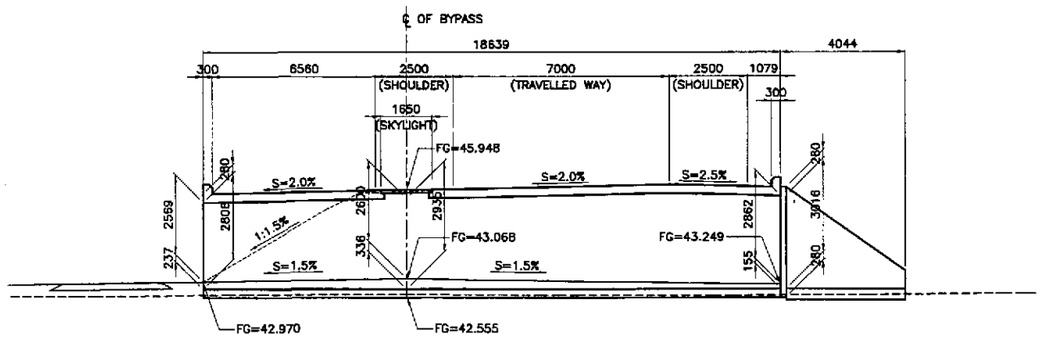
SHEET NO. : UP-07



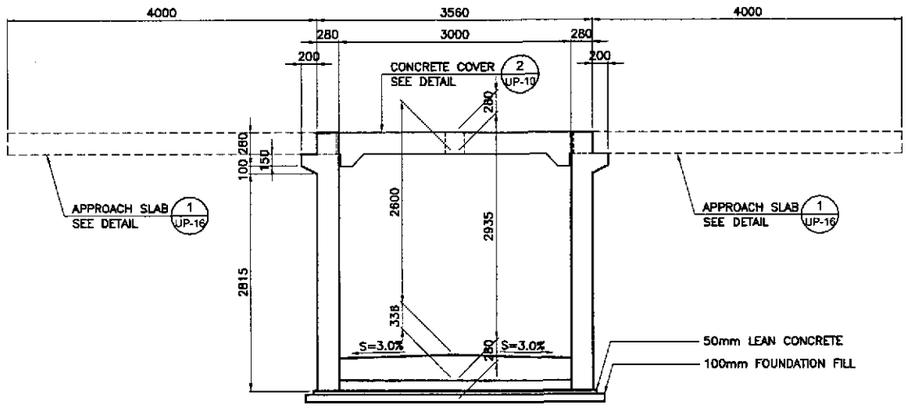
1 UP-08 GENERAL PLAN
SCALE 1:100



3 UP-08 ELEVATION
SCALE 1:40



2 UP-08 GENERAL ELEVATION
SCALE 1:100



4 UP-08 SECTION
SCALE 1:40

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/2/02	
CHECKED	10/9/02	HAKIM
SUBMITTED	10/2/02	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

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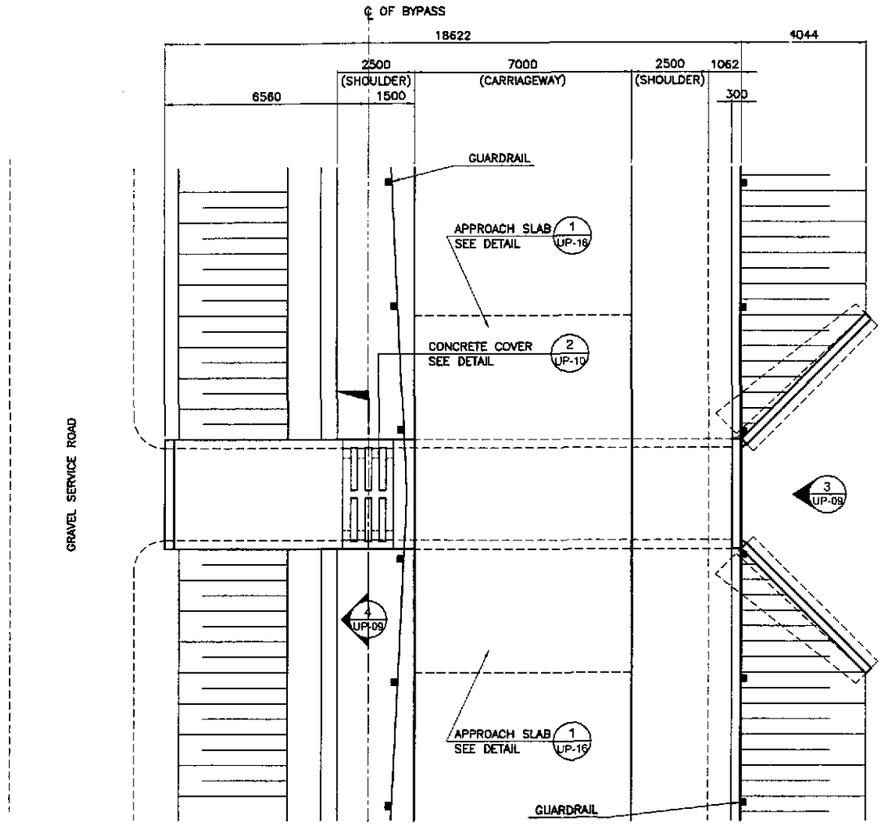
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

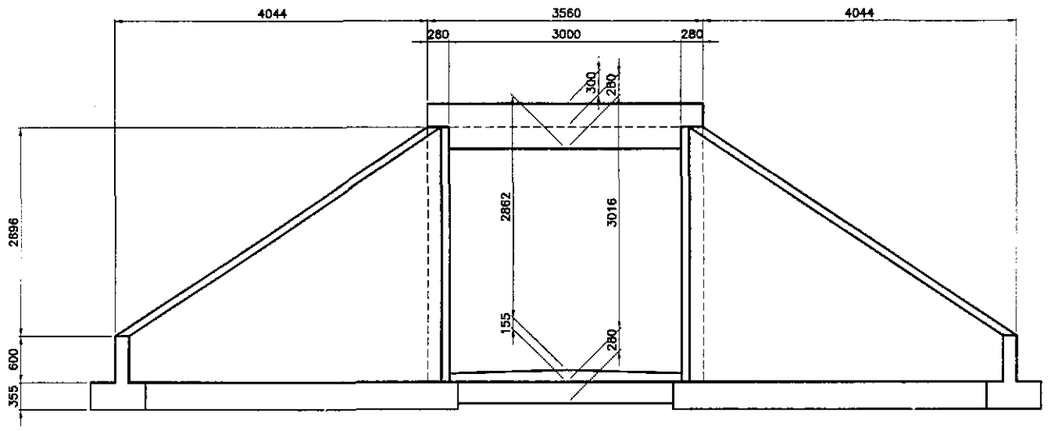
SCALE :
AS SHOWN
FULL SIZE A1

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

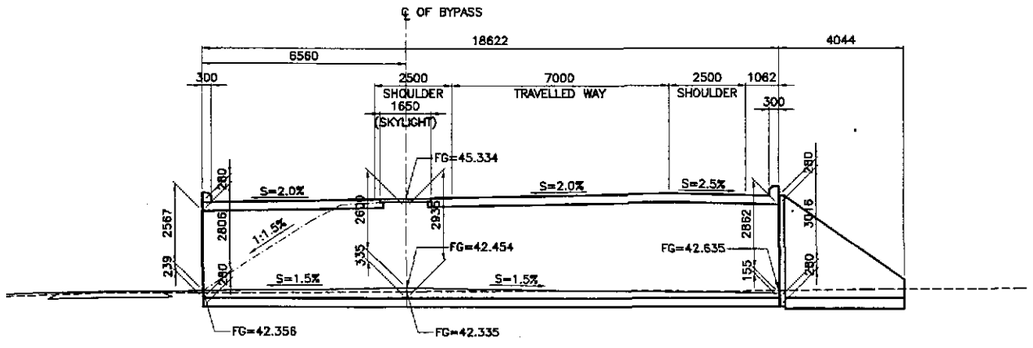
SHEET NO. :
UP-08



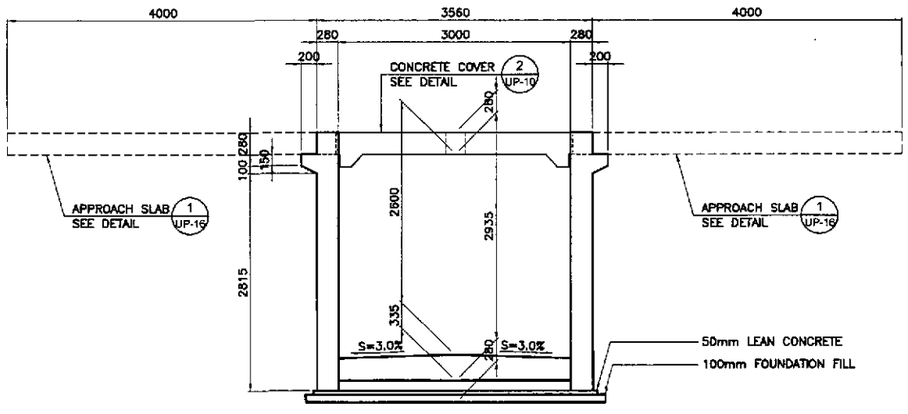
1 UP-09 GENERAL PLAN SCALE 1:100



3 UP-09 ELEVATION SCALE 1:40



2 UP-09 GENERAL ELEVATION SCALE 1:100



4 UP-09 SECTION SCALE 1:40

JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
YACHIYO ENGINEERING CO., LTD.

	DATE	SIGNATURE
DESIGNED	10/12/02	
CHECKED	10/19/02	
SUBMITTED	12/21/02	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
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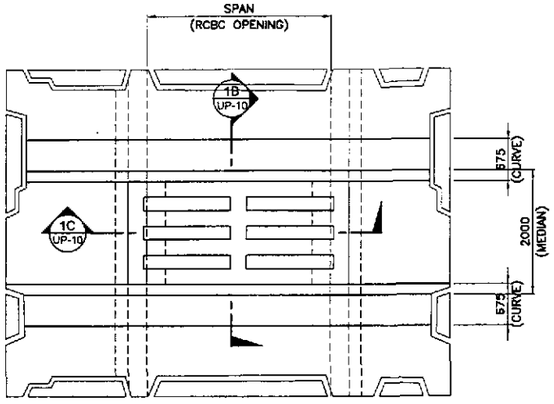
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)
CABANATUAN BYPASS - CONTRACT PACKAGE IV

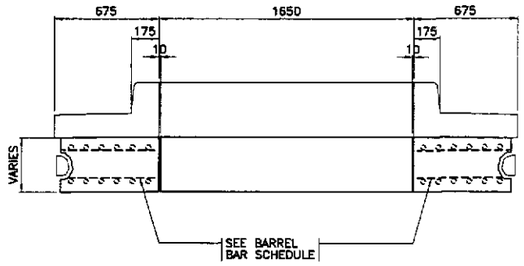
SCALE :
AS SHOWN
FULL SIZE A1

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

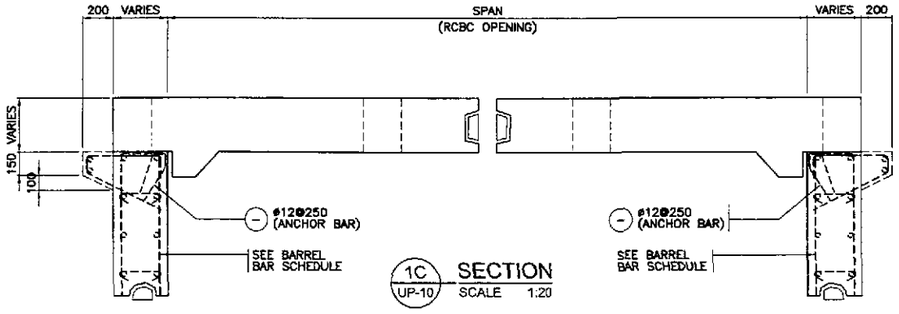
SHEET NO. :
UP-09



1A UP-10 PARTIAL PLAN
SCALE 1:50

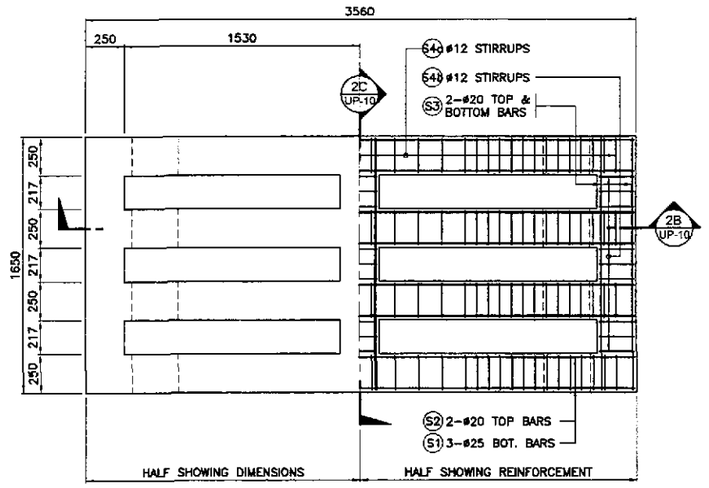


1B UP-10 SECTION
SCALE 1:20

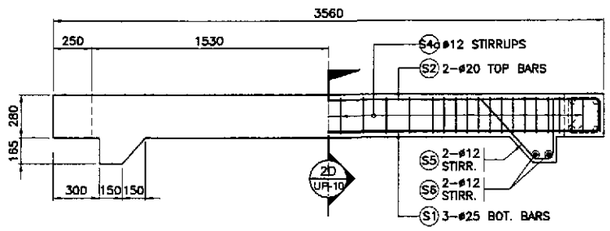


1C UP-10 SECTION
SCALE 1:20

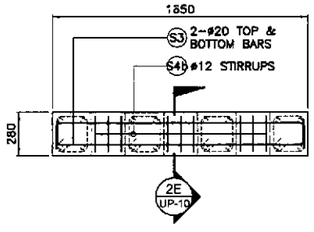
1 UP-10 PARTIAL BOX SUPPORT DETAILS
SCALE AS SHOWN



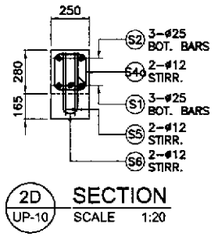
2A UP-10 PLAN DETAIL
SCALE 1:20



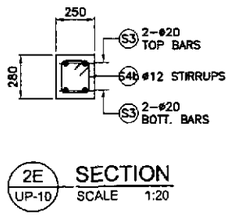
2B UP-10 SECTION
SCALE 1:20



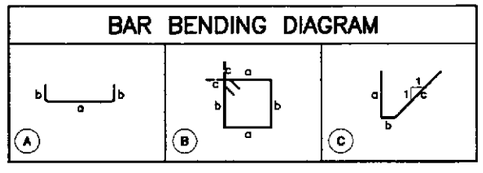
2C UP-10 SECTION
SCALE 1:20



2D UP-10 SECTION
SCALE 1:20



2E UP-10 SECTION
SCALE 1:20



2 UP-10 CONCRETE COVER DETAILS (3.0 M.)
SCALE AS SHOWN

SCHEDULE OF REINFORCEMENTS

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)
3.0 M SPAN	S1	25	12	AS DWG	A	3510	206	–	–	–	–	3922	47.06	3.854	182	1.2
	S2	20	8	AS DWG	A	3510	206	–	–	–	–	3922	31.38	2.466	78	
	S3	20	12	AS DWG	A	1600	206	–	–	–	–	2012	24.14	2.466	60	
	S4a	12	144	AS DWG	B	200	206	115	–	–	–	1042	150.05	0.888	134	
	S4b	12	27	AS DWG	B	200	206	115	–	–	–	1042	28.13	0.888	25	
	S5	12	16	AS DWG	C	395	125	560	–	–	–	1080	17.28	0.888	16	
	S6	12	16	AS DWG	A	100	385	–	–	–	–	870	13.92	0.888	13	
														GRAND TOTAL =	508 KG	1.2

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

	DATE	SIGNATURE
DESIGNED	10/12/02	
CHECKED	10/19/02	M. HAKIM
SUBMITTED	10/21/02	M. HAKIM TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

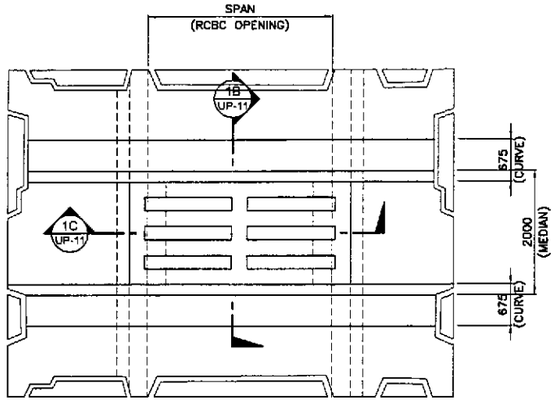
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC,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

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

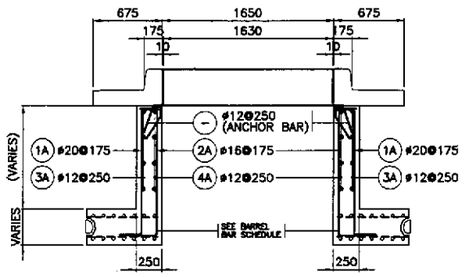
SCALE : AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
CONCRETE COVER DETAILS (3.0 M.)
ON FLUSHED (RCBC OPENING)
(INITIAL STAGE)

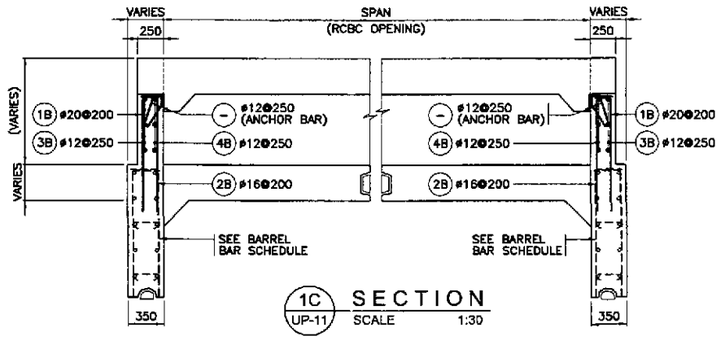
SHEET NO. : UP-10



1A UP-11 PARTIAL PLAN
SCALE 1:50

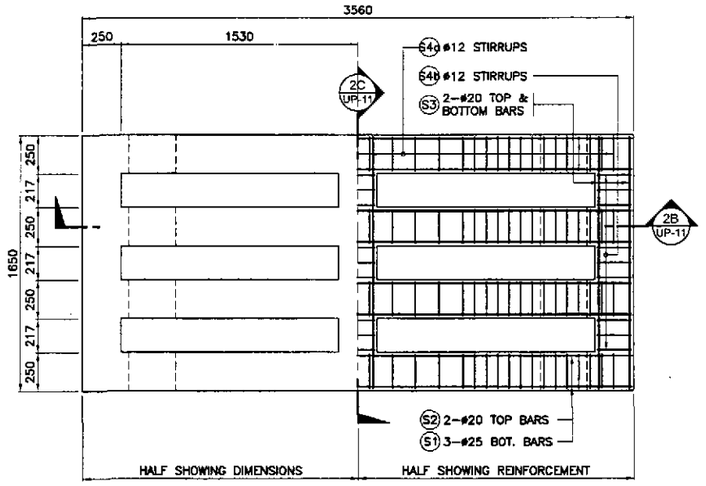


1B UP-11 SECTION
SCALE 1:30

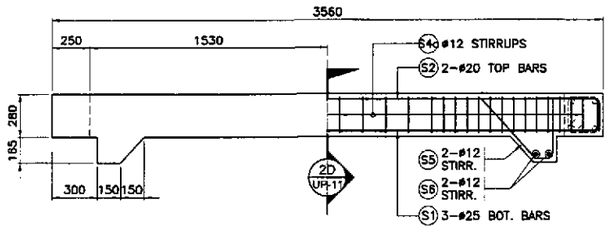


1C UP-11 SECTION
SCALE 1:30

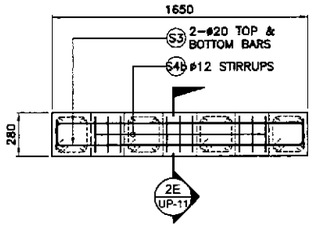
1 UP-11 PARTIAL BOX SUPPORT DETAILS
SCALE AS SHOWN



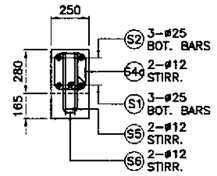
2A UP-11 PLAN DETAIL
SCALE 1:20



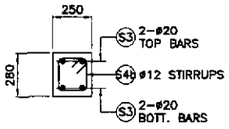
2B UP-11 SECTION
SCALE 1:20



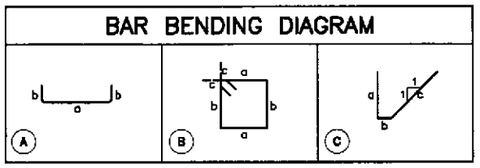
2C UP-11 SECTION
SCALE 1:20



2D UP-11 SECTION
SCALE 1:20



2E UP-11 SECTION
SCALE 1:20



2 UP-11 CONCRETE COVER DETAILS (3.0 M.)
SCALE AS SHOWN

SCHEDULE OF REINFORCEMENTS

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)
3.0 M SPAN	S1	25	12	AS DWG	A	3510	206	–	–	–	–	3922	47.06	3.854	182	1.2
	S2	20	8	AS DWG	A	3510	206	–	–	–	–	3922	31.38	2.466	78	
	S3	20	12	AS DWG	A	1600	206	–	–	–	–	2012	24.14	2.466	60	
	S4a	12	144	AS DWG	B	200	206	115	–	–	–	1042	150.05	0.888	134	
	S4b	12	27	AS DWG	B	200	206	115	–	–	–	1042	28.13	0.888	25	
	S5	12	16	AS DWG	C	395	125	560	–	–	–	1080	17.28	0.888	16	
	S6	12	16	AS DWG	A	100	385	–	–	–	–	870	13.92	0.888	13	
													GRAND TOTAL =		508 KG	1.2

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

	DATE	SIGNATURE
DESIGNED	10/2/02	
CHECKED	10/19/02	
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

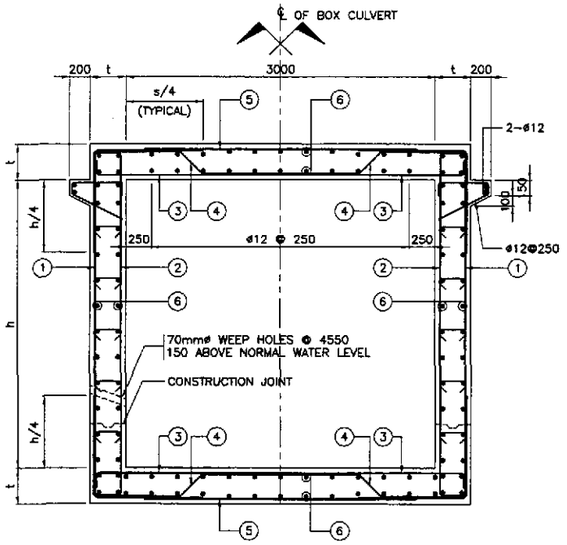
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

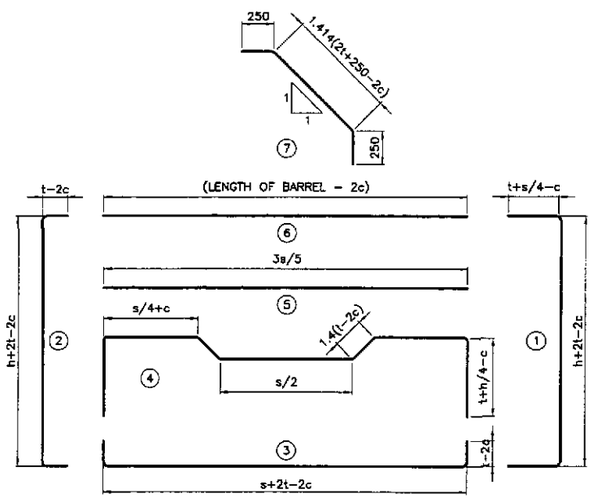
SCALE : AS SHOWN
FULL SIZE A1

SHEET CONTENTS :
BOX CULVERT
CONCRETE COVER DETAILS (3.0 M.) WITH
BOX SUPPORT (RCBC OPENING)
(INITIAL STAGE)

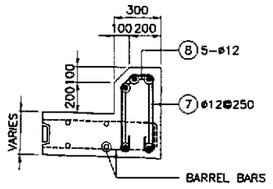
SHEET NO. : UP-11



1 / UP-12 SECTION - SINGLE BARREL
NOT TO SCALE



3 / UP-12 BAR BENDING DIAGRAM - SINGLE BARREL
NOT TO SCALE



2 / UP-12 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, y = $0.16\sqrt{f'c}$ 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	4000	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

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

	DATE	SIGNATURE
DESIGNED	10/19/02	M. CHAN
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/19/02	M. HUSSEIN 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)
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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
SPECIAL RCBC BARREL DETAILS
(INITIAL STAGE)

SHEET NO. :
UP-12

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. (m³)
BARREL	1	16	198	200	A	980	3560	980	–	–	–	5520	1092.96	1.579	1726	
	2	16	178	220	A	180	3560	180	–	–	–	3920	697.76	1.579	1102	
	3	16	198	200	B	180	3460	180	–	–	–	3820	756.36	1.579	1195	
	4	16	196	200	C	1005	800	255	1500	–	–	5619	1101.35	1.579	1740	
	5	12	198	200	D	2000	–	–	–	–	–	2000	396	0.888	352	
	6	12	120	250	D	18539	–	–	–	–	–	19539	2344.68	0.888	2083	74.07
	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	W1	12	4	AS DWG	D	600	7448	–	–	–	–	8048	32.19	0.888	28	
	W2	12	22	300	D	3658	–	–	–	–	–	3658	80.48	0.888	72	
	W3a	25	26	200	I	1195	3031	150	–	–	–	4376	113.77	3.854	439	
	W3b	16	18	250	I	735	1988	150	–	–	–	2873	45.97	1.579	73	
	W3c	12	8	350	I	685	1178	150	–	–	–	2012	16.1	0.888	15	
	W4	12	42	300	I	203	2220	150	–	–	–	2573	108.07	0.888	96	16.55
	W5a	25	12	400	D	1805	–	–	–	–	–	1805	21.66	3.854	84	
	W5b	16	16	250	D	1222	–	–	–	–	–	1222	19.55	1.579	31	
	W5c	12	8	350	D	819	–	–	–	–	–	819	6.55	0.888	6	
	W6	12	14	AS DWG	D	6447	–	–	–	–	–	6447	90.26	0.888	81	
													GRAND TOTAL =		9273 KG	90.8

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. (m³)
BARREL	1	16	188	200	A	980	3510	980	–	–	–	5470	1028.31	1.579	1624	
	2	16	170	220	A	180	3510	180	–	–	–	3870	657.86	1.579	1039	
	3	16	188	200	B	180	3460	180	–	–	–	3820	718.16	1.579	1134	
	4	16	188	200	C	992	800	255	1500	–	–	5594	1040.48	1.579	1843	
	5	12	188	200	D	2000	–	–	–	–	–	2000	376	0.888	334	
	6	12	120	250	D	18539	–	–	–	–	–	18539	2224.68	0.888	1976	69.51
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3480	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	W1	12	4	AS DWG	D	600	6805	–	–	–	–	7406	29.62	0.888	27	
	W2	12	22	300	D	3389	–	–	–	–	–	3399	74.79	0.888	67	
	W3a	20	24	200	I	833	2981	150	–	–	–	3974	95.38	2.466	236	
	W3b	16	14	250	I	733	1987	150	–	–	–	2850	39.91	1.579	64	
	W3c	12	6	350	I	683	1171	150	–	–	–	2004	12.03	0.888	11	
	W4	12	40	300	I	203	2195	150	–	–	–	2548	101.92	0.888	91	14.84
	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 =		8566 KG	84.7

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. (m³)
BARREL	1	16	192	200	A	980	4032	980	–	–	–	5992	1150.56	1.579	1817	
	2	16	174	220	A	180	4032	180	–	–	–	4392	784.3	1.579	1207	
	3	16	192	200	B	180	3460	180	–	–	–	3820	733.44	1.579	1159	
	4	16	190	200	C	1123	800	255	1500	–	–	5855	1112.52	1.579	1757	
	5	12	192	200	D	2000	–	–	–	–	–	2000	384	0.888	341	
	6	12	128	250	D	18983	–	–	–	–	–	18983	2429.82	0.888	2158	77.04
	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	W1	12	4	AS DWG	D	800	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	69	
	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 =		9502 KG	93.9

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. (m³)
BARREL	1	16	188	200	A	980	4397	980	–	–	–	6357	1195.16	1.579	1888	
	2	16	170	220	A	180	4397	180	–	–	–	4757	808.73	1.579	1277	
	3	16	188	200	B	180	3460	180	–	–	–	3820	718.16	1.579	1134	
	4	16	186	200	C	1214	800	255	1500	–	–	6036	1123.02	1.579	1774	
	5	12	188	200	D	2000	–	–	–	–	–	2000	376	0.888	334	
	6	12	136	250	D	18539	–	–	–	–	–	18539	2521.3	0.888	2239	79.08
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3480	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	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	16	375	I	1719	3664	150	–	–	–	5563	100.13	6.313	633	
	W3b	20	24	200	I	869	2337	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	2539	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	910	–	–	–	–	–	910	10.92	0.888	10	
	W6	12	14	AS DWG	D	7818	–	–	–	–	–	7818	109.45	0.888	98	
													GRAND TOTAL =		10244 KG	104.7

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. (m³)
BARREL	1	16	188	200	A	980	4670	980	–	–	–	6830	1285.53	1.579	1968	
	2	16	170	220	A	180	4670	180	–	–	–	5030	855.19	1.579	1351	
	3	16	188	200	B	180	3460	180	–	–	–	3820	718.16	1.579	1134	
	4	16	186	200	C	1283	800	255	1500	–	–	5174	1148.43	1.579	1814	
	5	12	188	200	D	2000	–	–	–	–	–	2000	376	0.888	334	
	6	12	140	250	D	18539	–	–	–	–	–	18539	2585.46	0.888	2305	81.93
	7	12	30	250	E	114	380	71	150	480	114	1309	39.26	0.888	35	
	8	12	10	AS DWG	D	3460	–	–	–	–	–	3480	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	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	25	200	I	880	2451	150	–	–	–	3481	90.51	2.466	224	
	W3c	12	14	275	I	730	1316	150	–	–	–	2198	30.75	0.888	28	
	W4	12	56	300	I	203	2725	150	–	–	–	3128	175.18	0.888	156	28.84
	W5a	25	22	300	D	2073	–	–	–	–	–	2073	45.62	3.854	176	
	W5b	25	12	400	D	1718	–	–	–	–	–	1718	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 =		10876 KG	110.8

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. (m³)
BARREL	1	16	282	200	A	980	3295	980	–	–	–	5255	1376.74	1.579	2174	
	2	16	236	220	A	180	3295	180	–	–	–	3655	862.52	1.579	1362	
	3	16	262	200	B	180	3460	180	–	–	–	3820	1000.84	1.579	1581	
	4	16	260	200	C	939	800	255	1500	–	–	5486	1426.49	1.579	2253	
	5	12	262	200	D	2000	–	–	–	–	–	2000	524	0.888	466	
	6	12	115	250	D	25888	–	–	–	–	–	25888	3003	0.888	2667	84.83
	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	W1	12	2	AS DWG	D	600	6357	–	–	–	–	6957	13.91	0.888	13	
	W2	12	10	300	D	3171	–	–	–	–	–	3171	31.71	0.888	29	
	W3a	20	11	200	I	825	2821	150	–	–	–	3795	41.75	2.466	103	
	W3b	16	4	350	I	725	1878	150	–	–	–	2753	11.01	1.579	18	
	W3c	12	3	350	I	575	1144	150	–	–	–	1969	5.91	0.888	5	
	W4	12	18	300	I	203	2087	150	–	–	–	2440	43.93	0.888	40	6.82
	W5a	25	5	400	D	1722	–	–	–	–	–	1722	8.61	3.854	34	
	W5b	16	4	350	D	1133	–	–	–	–	–	1133	4.53	1.579	8	
	W5c	12	3	350	D	825	–	–	–	–	–	825	2.47	0.888	3	
	W6	12	7	AS DWG	D	5539	–	–	–	–	–	5539	38.78	0.888	35	
WINGWALL	W1	12	2	AS DWG	D	600	4712	–	–	–	–	5312	10.62	0.888	10	
	W2	12	10	300	D	2335	–	–	–	–	–	2335	23.35	0.888	21	
	W3a	20	8	200	I	825	2821	150	–	–	–	3795	30.37	2.466	75	
	W3b	16	3	350	I	725	1878	150	–	–	–	2753	8.26	1.579	14	
	W3c	12	2	350	I	575	1144	150	–	–	–	1969	3.94	0.888	4	
	W4	12	14	300	I	203	2087	150	–	–	–	2440	34.17	0.888	31	4.94
	W5a	25	3	400	D	1722	–	–	–	–	–	1722	5.17	3.854	20	
	W5b	16	3	350	D	1133	–	–	–	–	–	1133	3.4	1.579	6	
	W5c	12	2	350	D	825	–	–	–	–	–	825	1.65	0.888	2	
	W6	12	7	AS DWG	D	4171	–	–	–	–	–	4171	29.2	0.888	26	
													GRAND TOTAL =		11155 KG	108.5

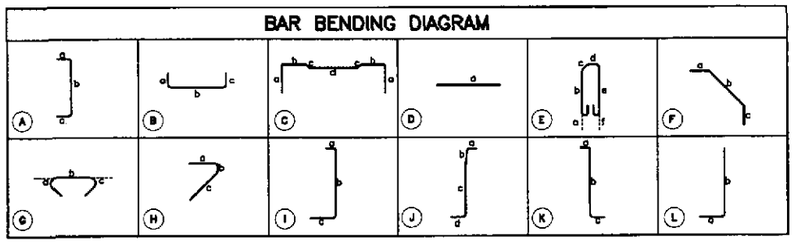
SCHEDULE OF REINFORCEMENTS (B19 – STA. 130+440.00)

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. (m³)
BARREL	1	16	188	200	A	980	3350	980	–	–	–	5310	998.37	1.579	1577	
	2	16	170	220	A	180	3350	180	–	–	–	3710	630.79	1.579	997	
	3	16	188	200	B	180	3460	180	–	–	–	3820	718.16	1.579	1134	
	4	16	186	200	C	953	800	255	1500	–	–	5514	1025.67	1.579	1620	
	5	12	188	200	D	2000	–	–	–	–	–	2000	376	0.888	334	
	6	12	120	250	D	18539	–	–	–	–	–	18539	2224.68	0.888	1976	68.15
	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	W1	12	4	AS DWG	D	600	6367	–	–	–	–	6967	27.87	0.888	25	
	W2	12	22	300	D	3178	–	–	–	–	–	3178	69.88	0.888	63	
	W3a	20	22	200	I	827	2855	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 =		8366 KG	81.5

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. (m³)
BARREL	1	16	188	200	A	980	3350	980	–	–	–	5310	998.37	1.579	1577	
	2	16	170	220	A	180	3350	180	–	–	–	3710	630.79	1.579	997	
	3	16	188	200	B	180	3460	180	–	–	–	3820	718.16	1.579	1134	
	4	16	186	200	C	953	800	255	1500	–	–	5514	1025.67	1.579	1620	
	5	12	188	200	D	2000	–	–	–	–	–	2000	376	0.888	334	
	6	12	120	250	D	18522	–	–	–	–	–	18522	2222.64	0.888	1974	68.09
	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	W1	12	4	AS DWG	D	600	6367	–	–	–	–	6967	27.87	0.888	25	
	W2	12	22	300	D	3178	–	–	–	–	–	3178	69.88	0.888	63	
	W3a	20	22	200	I	827	2855	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 =		8364 KG	81.5

BAR BENDING DIAGRAM



JICA
JAPAN INTERNATIONAL COOPERATION AGENCY

KATAHIRA & ENGINEERS INTERNATIONAL
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	DATE	SIGNATURE
DESIGNED	10/12/12	
CHECKED	10/19/12	
SUBMITTED	10/23/12	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

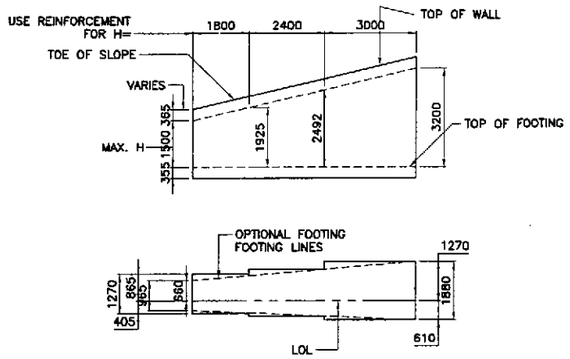
PUHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

PROJECT AND LOCATION :
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

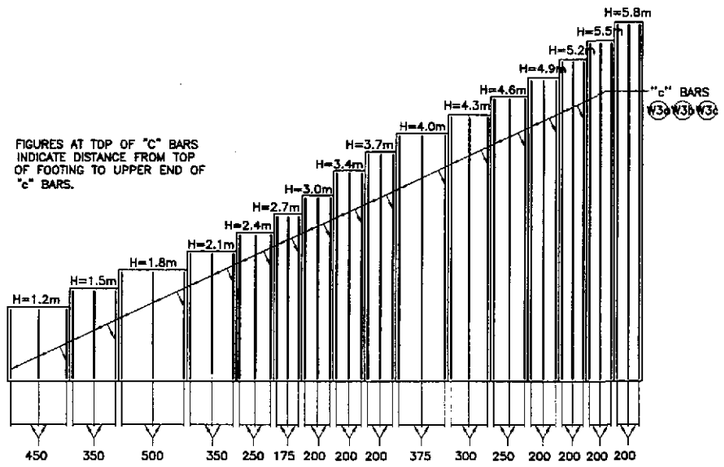
SCALE :
AS SHOWN
FULL SIZE A1

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

SHEET NO. :
UP-13



1 UP-14 **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	15@350	16@250	20@350	25@400	25@400	25@400	25@375	25@300	25@250	25@200	25@175	28@200	28@200

NOTES

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

MAXIMUM TOE PRESSURE = 150 kPa

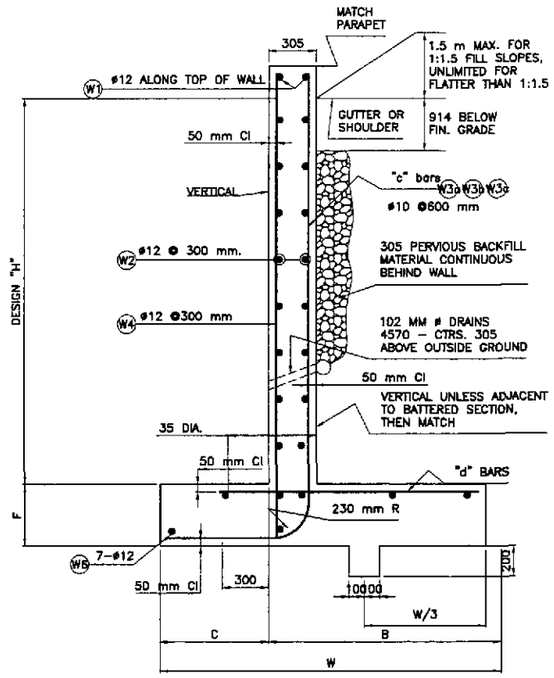
ELEVATIONS, LENGTH AND ANGLE OF FLARE OF WINGS MAY BE VARIED BY THE ENGINEER TO SUIT CONDITIONS ENCOUNTERED IN THE FIELD. WALLS DESIGNED FOR 600 mm LIVELOAD SURCHARGE, 1 : 1.5 SLOPING SURCHARGE NOT TO EXCEED 1.5 m IN ELEVATION PLUS 600 mm LIVELOAD SURCHARGE, OR UNLIMITED 1:2 SURCHARGE

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

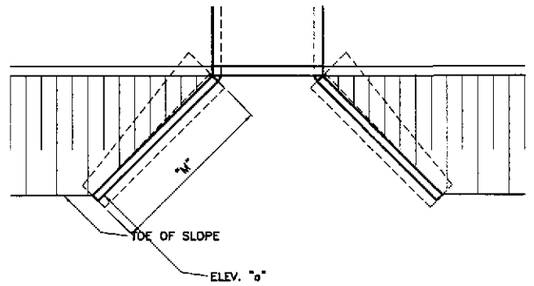
WALL HEIGHT MAY BE EXCEEDED BY 150 mm BEFORE GOING TO NEXT GREATER "H".

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

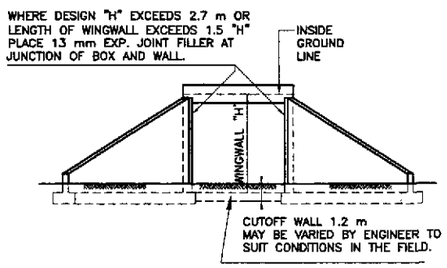
FOR WALL OFFSET VALUES, SEE STANDARD PLAN B3-8



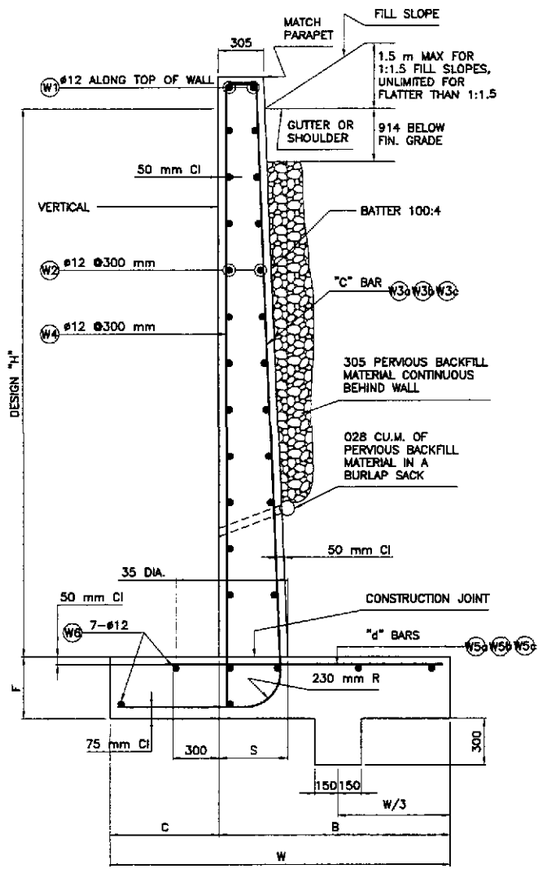
2 UP-14 **TYPICAL SECTION H=1.2 m THRU 3.7 m** SCALE 1:20



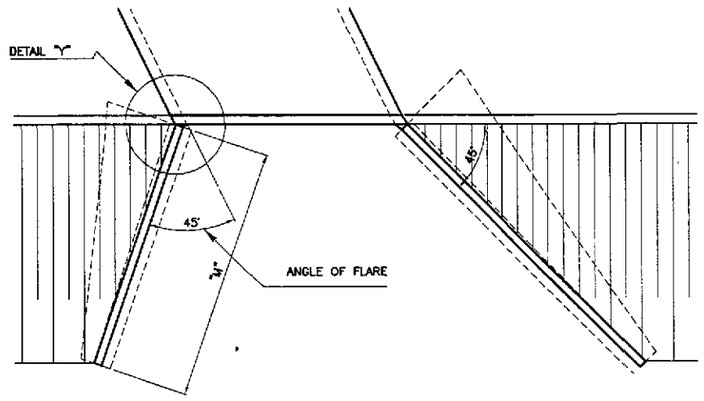
4 UP-14 **PLAN** SCALE 1:100



5 UP-14 **END ELEVATION** SCALE 1:100



3 UP-14 **TYPICAL SECTION H=4.0 m THRU 4.9 m** SCALE 1:20



6 UP-14 **PLAN** SCALE 1:100

JAPAN INTERNATIONAL COOPERATION AGENCY

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

	DATE	SIGNATURE
DESIGNED	10/12/02	
CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

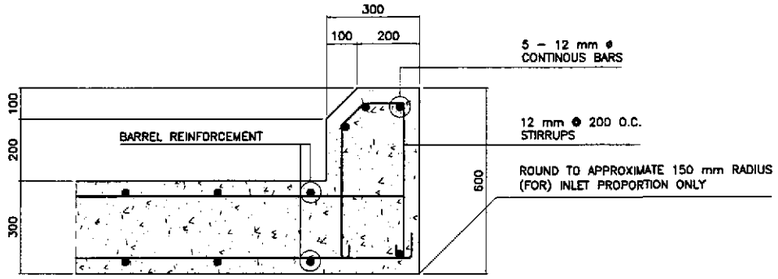
PJHL – PMO	BUREAU OF DESIGN		OFFICE OF THE SECRETARY	
Submitted By:	Reviewed By:	Recommended By:	Recommended By: (See cover sheet for Signature)	Approved By: (See cover sheet for Signature/Approval)
DANILO C. TRAJANO	JOSEFINA M. ALAGAR	GILBERTO S. REYES	MANUEL M. BONOAN	SIMEON A. DATUMANONG
Project Director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

PROJECT AND LOCATION :
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

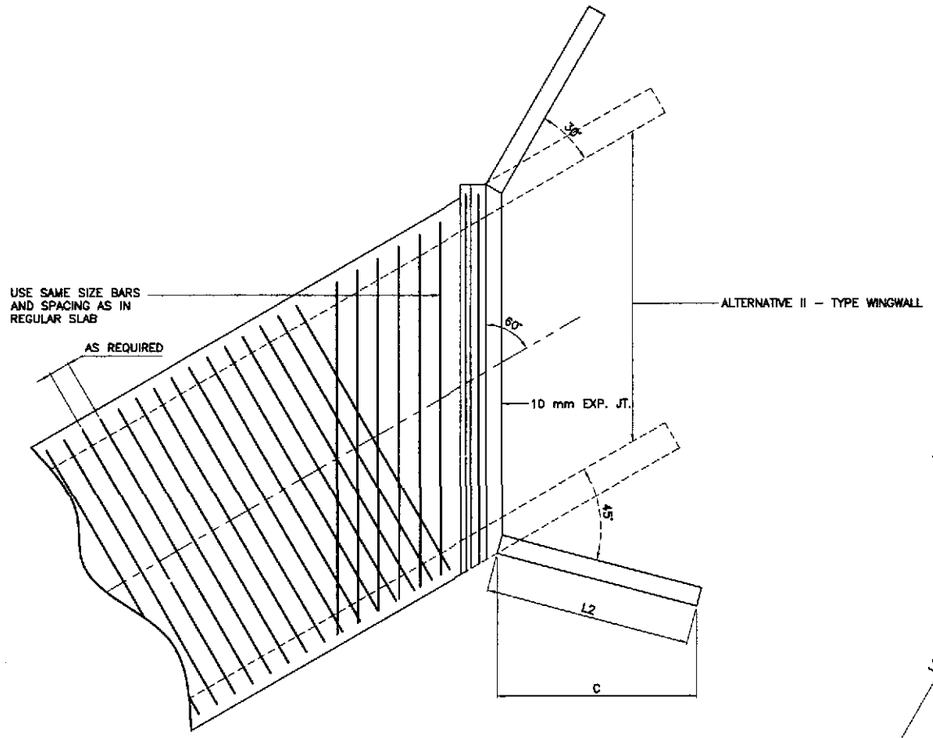
SCALE : AS SHOWN — FULL SIZE A1

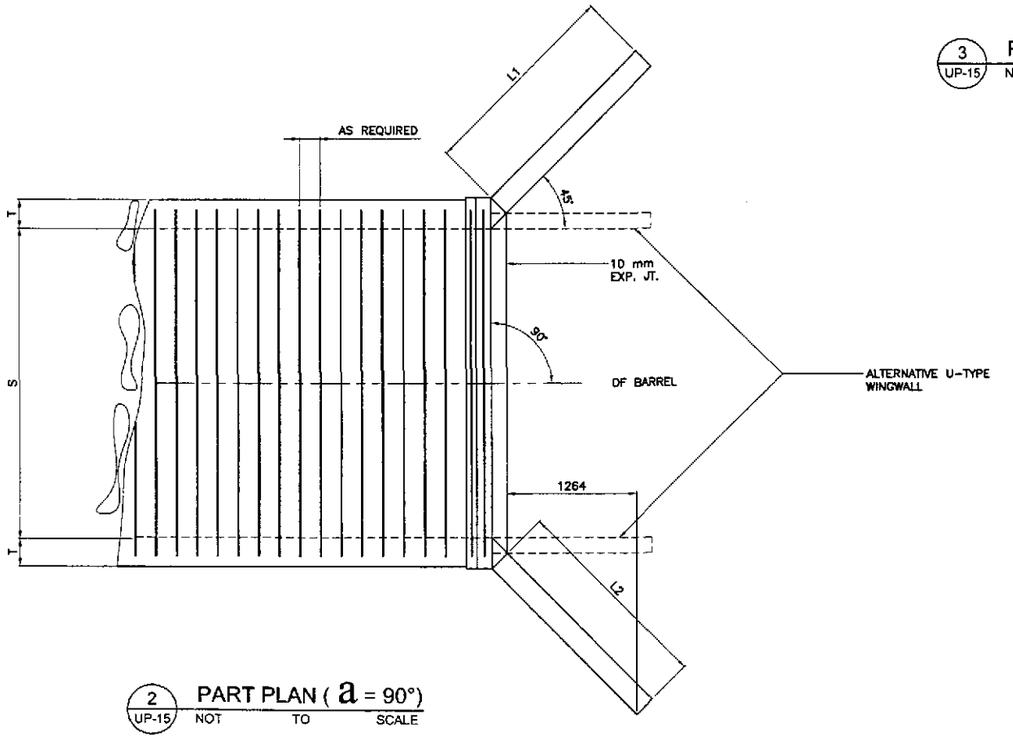
SHEET CONTENTS :
BOX CULVERT
WINGWALL DETAIL
(INITIAL STAGE)

SHEET NO. :
UP-14



1 / UP-15 CURB DETAIL
SCALE 1:10



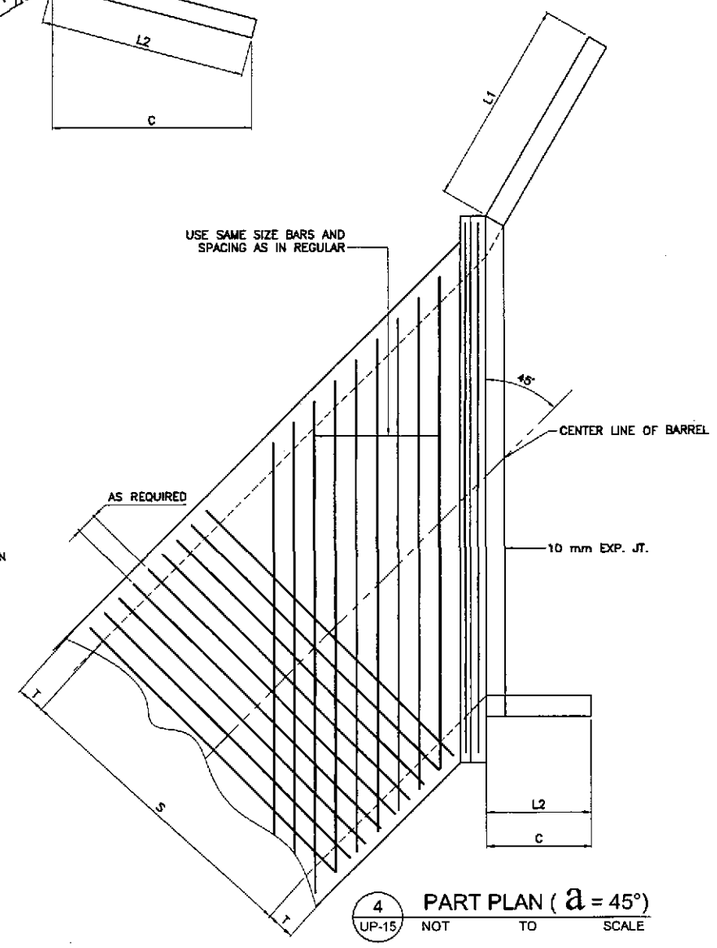


2 / UP-15 PART PLAN (a = 90°)
NOT TO SCALE

3 / UP-15 PART PLAN (a = 60°)
NOT TO SCALE

NOTE

ALL DIMENSIONS ARE IN MILIMETERS UNLESS OTHERWISE SPECIFIED



4 / UP-15 PART PLAN (a = 45°)
NOT TO SCALE

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

	DATE	SIGNATURE
DESIGNED	10/12/02	
CHECKED	10/19/02	M. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

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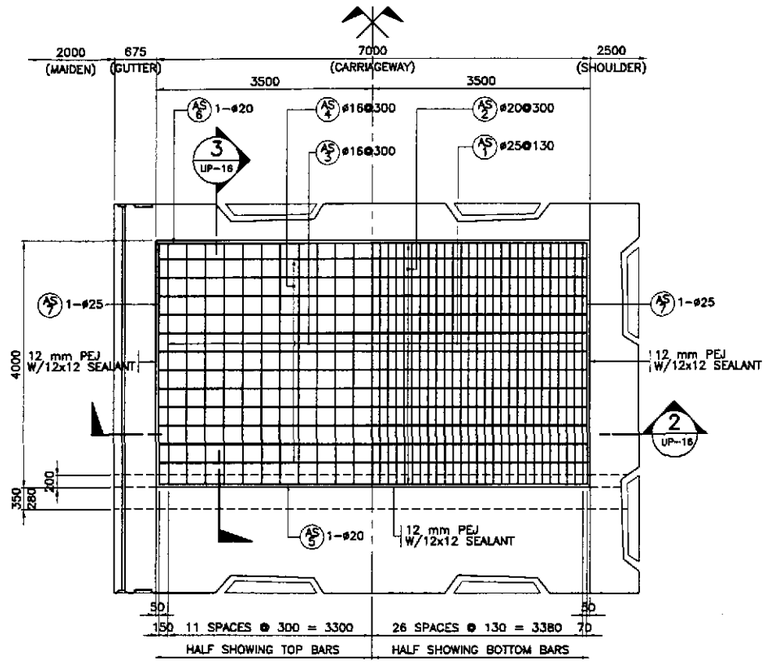
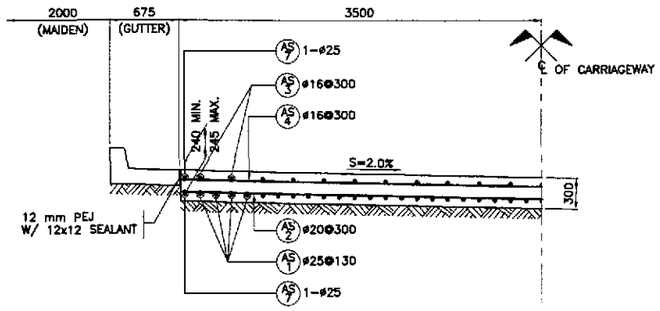
SCALE : AS SHOWN
FULL SIZE A1

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

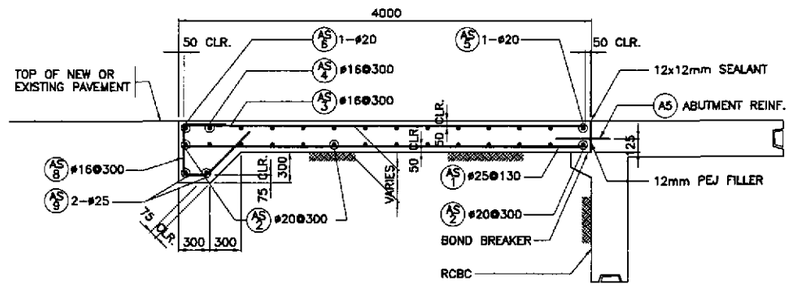
SHEET NO. : UP-15



1 UP-16 PLAN SCALE 1:50



2 UP-16 SECTION SCALE 1:30



3 UP-16 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		1. QUANTITIES ARE FOR ONE (1) APPROACH SLAB
	AS2	20	14	300	A	7900	–	–	7900	55.30	2.466	136		
a b (B)	AS3	16	25	300	B	3900	150	–	4050	101.25	1.578	160		
	AS4	16	12	300	A	7900	–	–	7900	47.40	1.578	75		
400 a c b (C)	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	
	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	

JICA JAPAN INTERNATIONAL COOPERATION AGENCY

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CHECKED	10/19/02	A. HAKIM
SUBMITTED	10/21/02	TEAM LEADER

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

SHEET NO. : UP-16