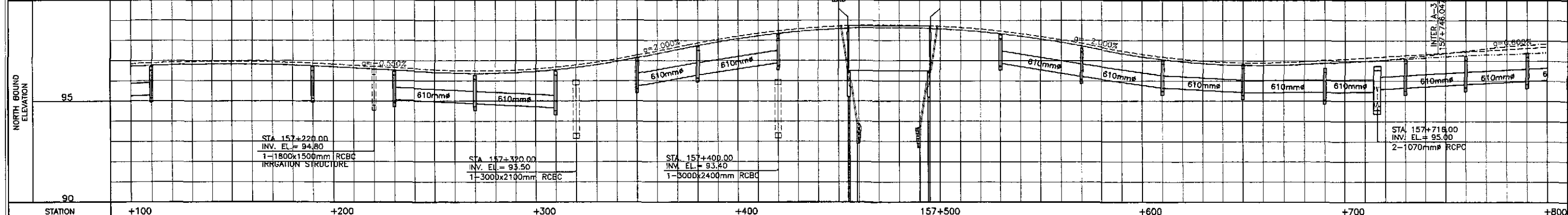
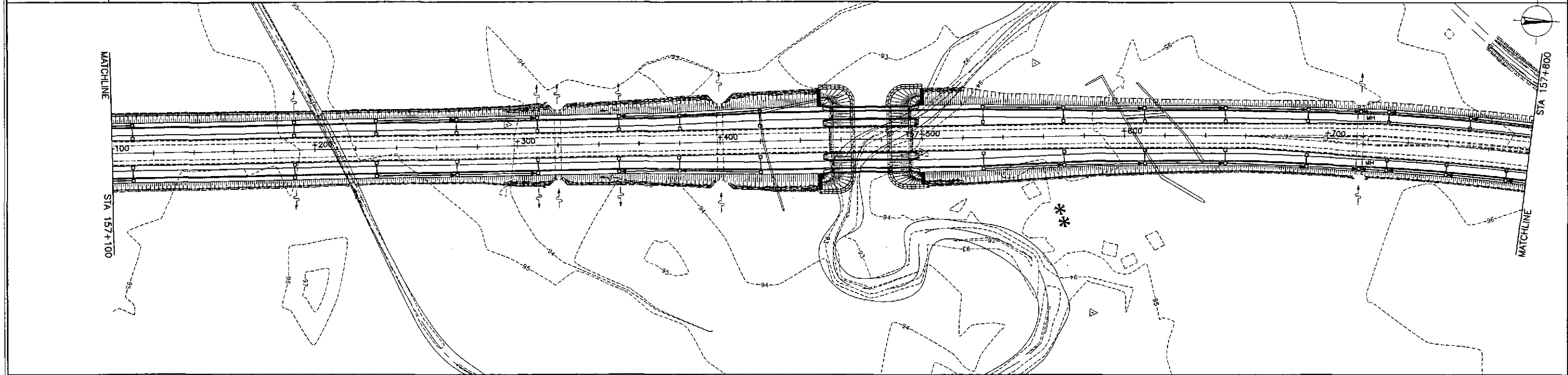
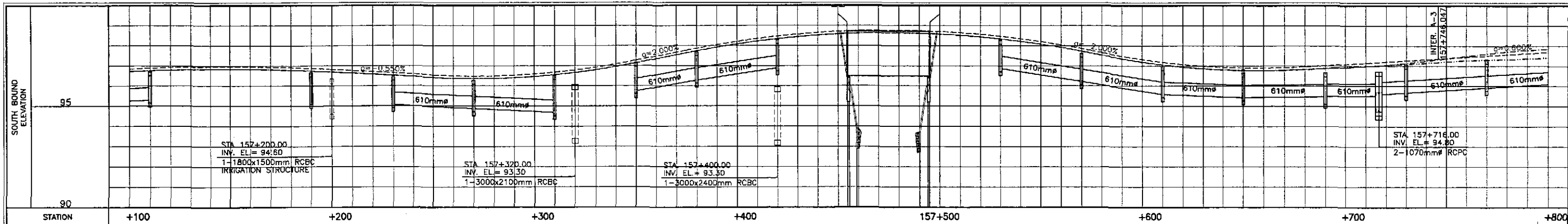


STATION	+400	156+500	+600	+700	+800	+900	157+000	+100
FINISHED GRADE	94.269							96.848
TOP LEVEL OF CIM (MC)								
INVERT LEVEL OF CROSS PIPE (MC)								
TOP LEVEL OF CIM (FR)								
INVERT LEVEL OF CROSS PIPE (FR)								
INVERT LEVEL OF LONGITUDINAL PIPE (SB)								
INVERT LEVEL OF LONGITUDINAL PIPE (NB)								

	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	SCALE : HORIZONTAL 1:1000 VERTICAL 1:100 FULL SIZE A1	SHEET CONTENTS : SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE ALONG BYPASS (ULTIMATE STAGE) STA. 156+400 - STA. 157+100	SHEET NO. : DP-02	
	DESIGNED	9/2/02	[Signature]	BUREAU OF DESIGN							
	CHECKED	9/9/02	[Signature]	Reviewed By:	Recommended By:	Recommended By:					Approved By:
	SUBMITTED	9/10/02	[Signature]	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES D/C, Director IV	MANUEL M. BONONAN Undersecretary	SIMEON A. DATUMANONG Secretary			



STATION	+100	+200	+300	+400	157+500	+600	+700	+800
FINISHED GRADE	96.643	96.927	96.713	96.788	98.210	98.045	97.075	97.688
TOP LEVEL OF CIM (MC)	95.328	96.923	96.903	96.537	98.469	98.899	97.087	97.598
INVERT LEVEL OF CROSS PIPE (MC)	95.328	96.923	96.903	96.537	98.469	98.899	97.087	97.598
TOP LEVEL OF CIM (FR)	95.798	96.927	96.713	96.788	98.210	98.045	97.075	97.688
INVERT LEVEL OF CROSS PIPE (FR)	95.308	96.923	96.903	96.537	98.469	98.899	97.087	97.598
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	95.148	95.148	95.288	95.288	95.540	95.540	95.540	95.540
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	95.148	95.148	95.288	95.288	95.540	95.540	95.540	95.540

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JAPAN INTERNATIONAL COOPERATION AGENCY

KAEI KATAHIRA & ENGINEERS INTERNATIONAL
yec YACHIYO ENGINEERING CO., LTD.

REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DESIGNED: 9/2/02
CHECKED: 9/9/02
SUBMITTED: 9/16/02

DATE: 9/2/02
SIGNATURE: [Signature]

PROJECT DIRECTOR: DANILLO C. TRAJANO
CHIEF, HIGHWAYS DIVISION: JOSEFINA M. ALAGAR
OIC, DIRECTOR IV: GILBERTO S. REYES

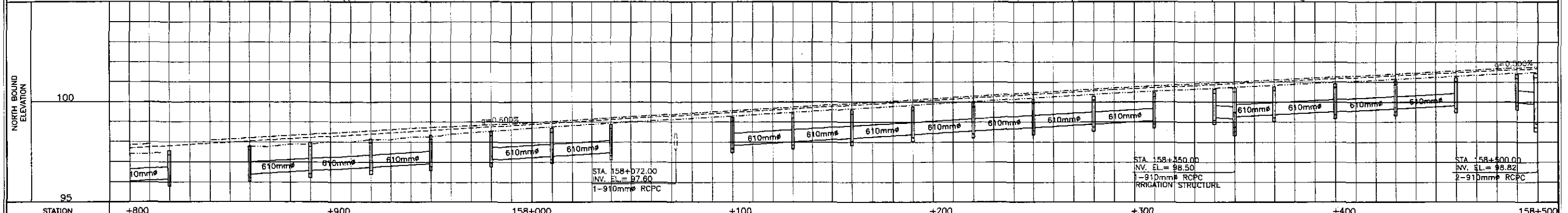
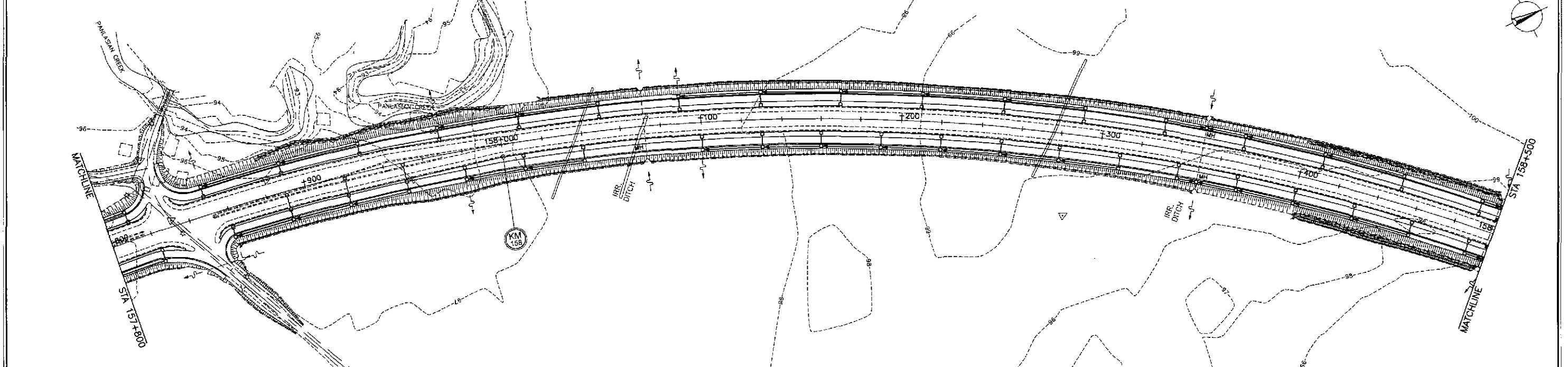
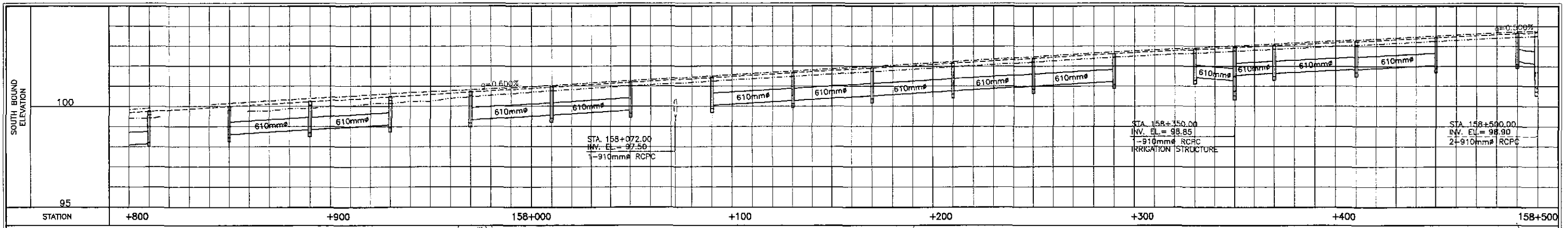
PROJECT AND LOCATION:
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)

SAN JOSE BYPASS

SCALE:
HORIZONTAL 1:1000
VERTICAL 1:100
FULL SIZE A1

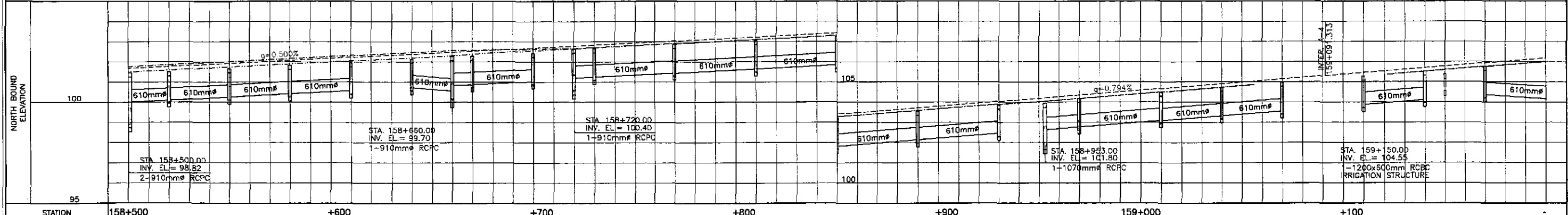
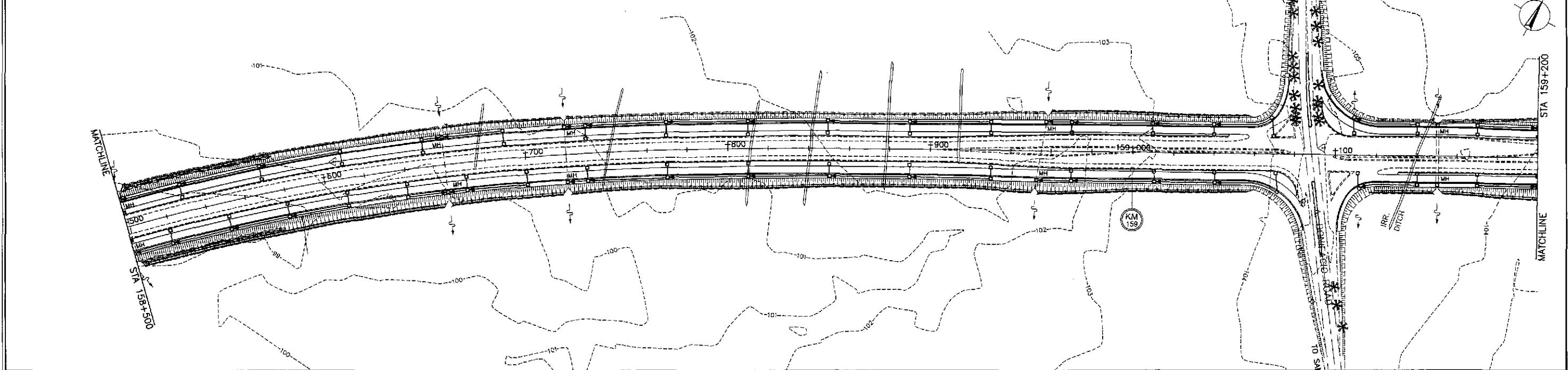
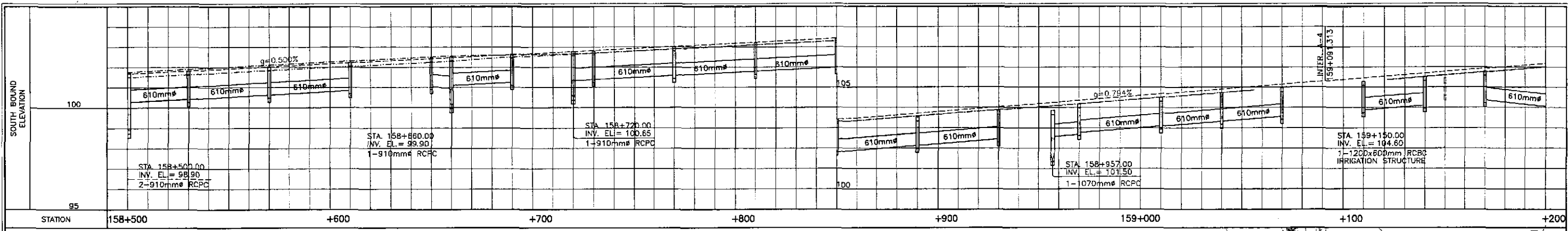
SHEET CONTENTS:
SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE ALONG BYPASS (ULTIMATE STAGE) STA. 157+100 - STA. 157+800

SHEET NO.: **DP-03**



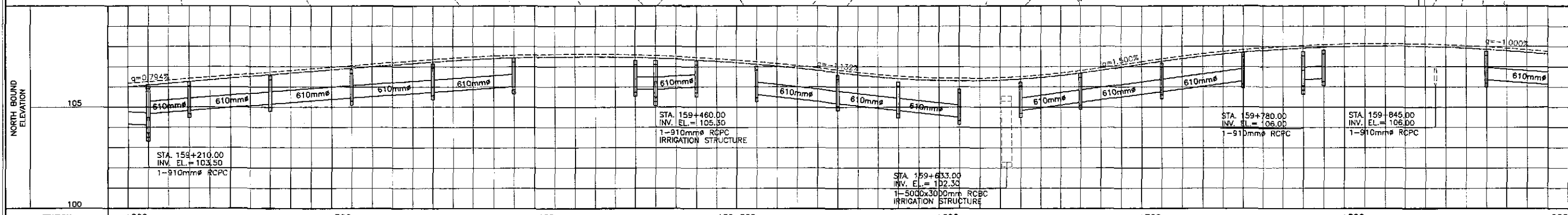
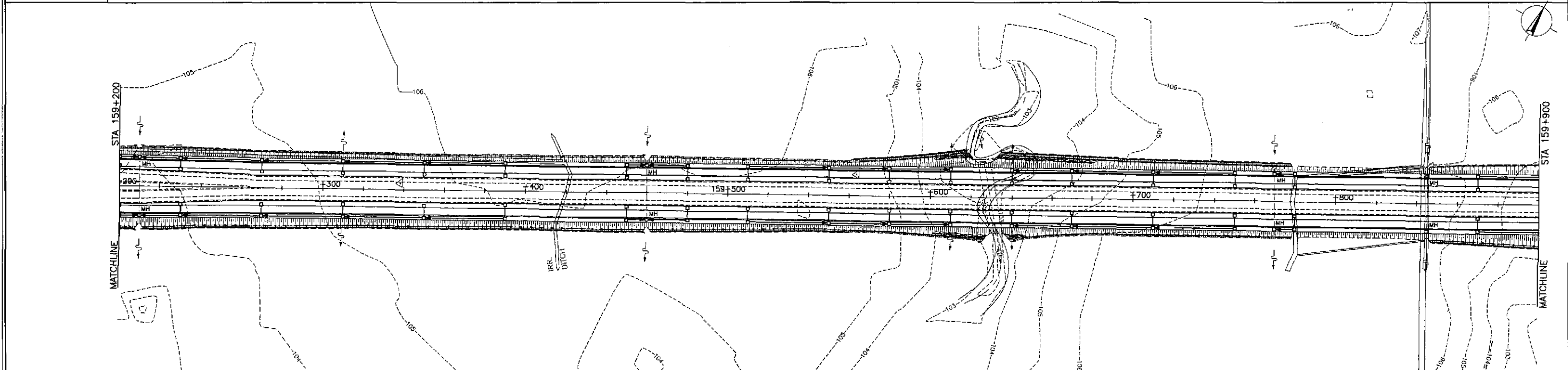
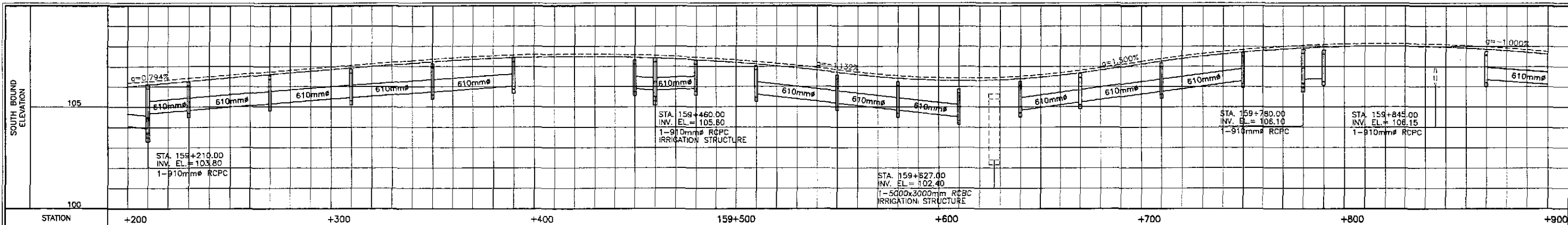
STATION	+800	+900	158+000	+100	+200	+300	+400	158+500
FINISHED GRADE	97.688	97.508	97.828	98.048	98.168	98.288	98.408	98.528
TOP LEVEL OF CIM (MC)	97.688	97.508	97.828	98.048	98.168	98.288	98.408	98.528
INVERT LEVEL OF CROSS PIPE (MC)	96.388	96.188	96.238	96.428	96.548	96.668	96.788	96.908
TOP LEVEL OF CIM (FR)	96.388	96.188	96.238	96.428	96.548	96.668	96.788	96.908
INVERT LEVEL OF CROSS PIPE (FR)	96.228	96.158	96.628	96.398	96.408	96.418	96.428	96.438
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	95.998	96.468	96.238	96.408	96.578	96.748	96.918	97.088
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	95.998	96.468	96.238	96.408	96.578	96.748	96.918	97.088

	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	<i>[Signature]</i>	BUREAU OF DESIGN				THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	HORIZONTAL 1:1000	SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE ALONG BYPASS (ULTIMATE STAGE) STA. 157+800 - STA. 158+500	DP-04
	CHECKED	<i>[Signature]</i>	OFFICE OF THE SECRETARY				VERTICAL 1:100			
	SUBMITTED	<i>[Signature]</i>	Submitted By:	Reviewed By:	Recommended By:	Approved By:	FULL SIZE A1			
TEAM LEADER	DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONCAN Undersecretary	SIMEON A. DATUMANONG Secretary					



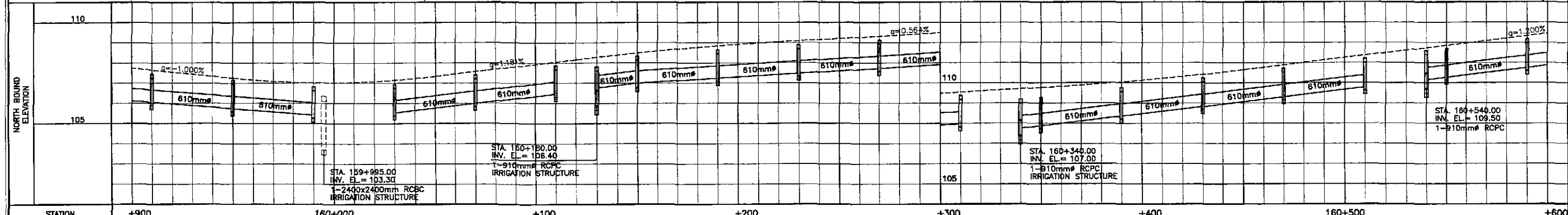
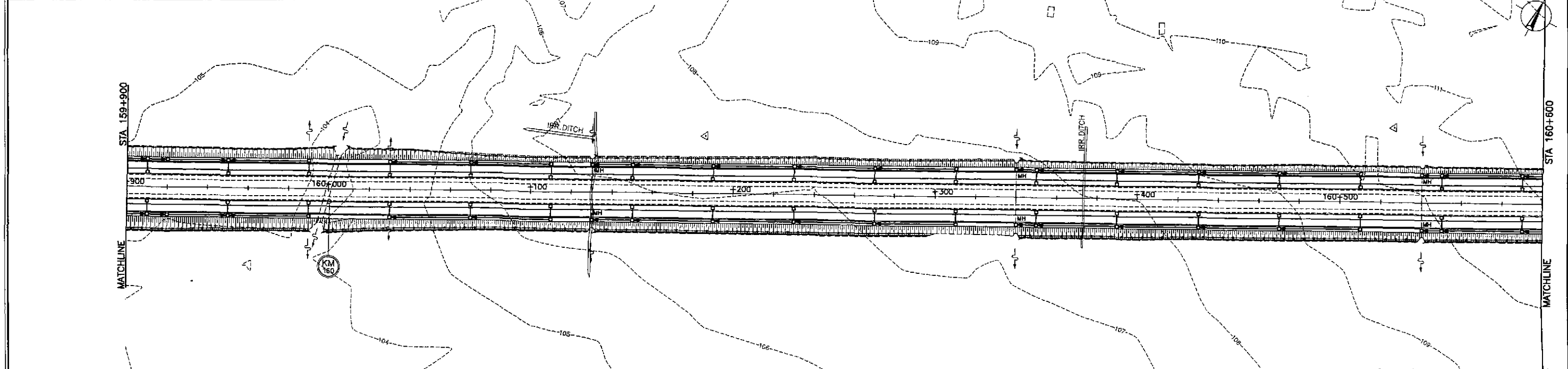
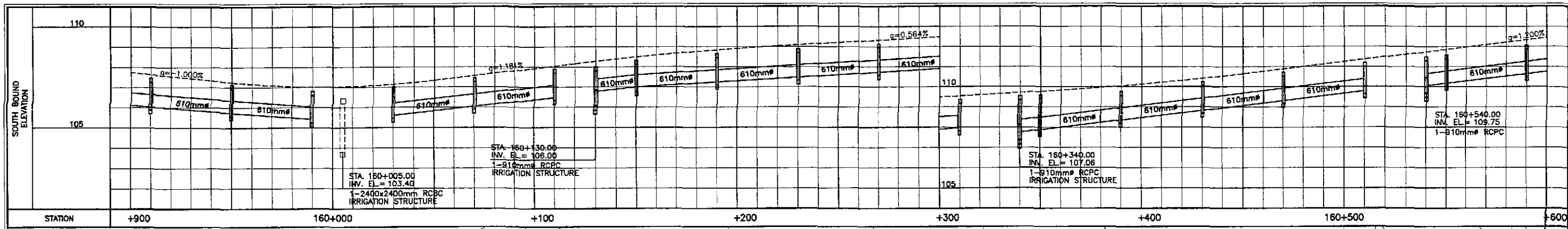
STATION	158+500	+600	+700	+800	+900	159+000	+100
FINISHED GRADE	101.679	101.779	101.979	102.279	103.379	104.479	105.579
TOP LEVEL OF CIM (MC)							
INVERT LEVEL OF CROSS PIPE (MC)							
TOP LEVEL OF CIM (FR)	101.809	101.909	102.109	102.409	103.509	104.609	105.709
INVERT LEVEL OF CROSS PIPE (FR)							
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	99.759	99.859	100.059	100.359	101.459	102.559	103.659
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	99.859	99.959	100.159	100.459	101.559	102.659	103.759

		<p>REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS</p> <p>BUREAU OF DESIGN OFFICE OF THE SECRETARY</p>				<p>PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)</p> <p>SAN JOSE BYPASS</p>		<p>SCALE : HORIZONTAL 1:1000 VERTICAL 1:100 FULL SIZE A1</p>		<p>SHEET CONTENTS : SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE ALONG BYPASS (ULTIMATE STAGE) STA. 158+500 - STA. 159+200</p>		<p>SHEET NO. : DP-05</p>
DESIGNED	9/3/02	DATE	SIGNATURE	PJHL - PMO	Reviewed By:	Recommended By:	Recommended By:	Approved By:				
CHECKED	9/9/02	DATE	SIGNATURE	Submitted By:	Reviewed By:	Recommended By:	Recommended By:	Approved By:				
SUBMITTED	9/10/02	DATE	SIGNATURE	Submitted By:	Reviewed By:	Recommended By:	Recommended By:	Approved By:				
				DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highway Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary				



STATION	+200	+300	+400	159+500	+600	+700	+800	+900
FINISHED GRADE	106.178							
TOP LEVEL OF CIM (MC)	106.293							
INVERT LEVEL OF CROSS PIPE (MC)	106.337							
TOP LEVEL OF CIM (FR)	106.496							
INVERT LEVEL OF CROSS PIPE (FR)	106.655							
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	106.814							
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	106.972							

	DESIGNED DATE: 9/7/02 SIGNATURE: [Signature] P.J.M. - P.M.D.	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN	PROJECT AND LOCATION: THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	SCALE: HORIZONTAL: 1:1000 VERTICAL: 1:100 FULL SIZE A1	SHEET CONTENTS: SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE ALONG BYPASS (ULTIMATE STAGE) STA. 159+200 - STA. 159+900	SHEET NO.: DP-06
	CHECKED DATE: 9/9/02 SIGNATURE: [Signature]	REVIEWED BY: JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: MANUEL M. BONGCAN Undersecretary	APPROVED BY: (See cover sheet for Signature/Approval) SIMEON A. DATUMANONG Secretary		
	SUBMITTED DATE: 9/12/02 SIGNATURE: [Signature]	PROJECT DIRECTOR: DANLO C. TRAJANO Project Director	DIC, DIRECTOR IV: GILBERTO S. REYES			



STATION	+900	160+000	+100	+200	+300	+400	160+500	+600
FINISHED GRADE	107.746							
TOP LEVEL OF CIM (MC)	107.548							
INVERT LEVEL OF CROSS PIPE (MC)	107.346							
TOP LEVEL OF CIM (FR)	107.197							
INVERT LEVEL OF CROSS PIPE (FR)	107.044							
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	107.019							
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	107.080							

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KATAHIRA & ENGINEERS
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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

BUREAU OF DESIGN
OFFICE OF THE SECRETARY

Submitted By: **DANILLO C. TRAJANO** (Project Director)
Reviewed By: **JOSEFINA M. ALAGAR** (Chief, Highways Division)
Recommended By: **GILBERTO S. REYES** (DIC, Director IV)
Approved By: **MANUEL M. BONON** (Undersecretary)
SIMEDON A. DATUMANONG (Secretary)

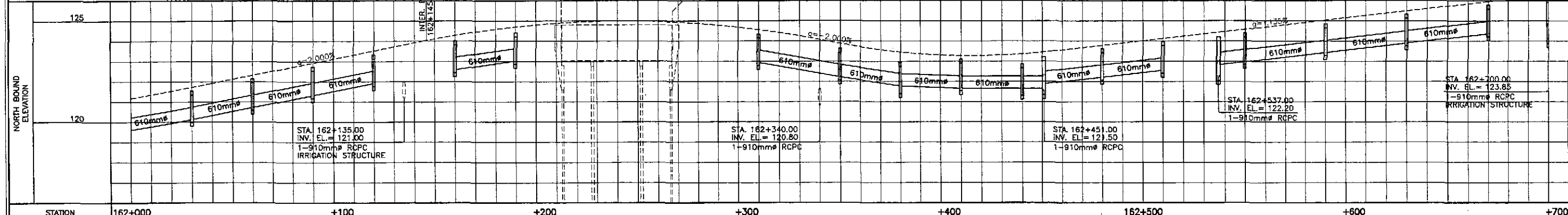
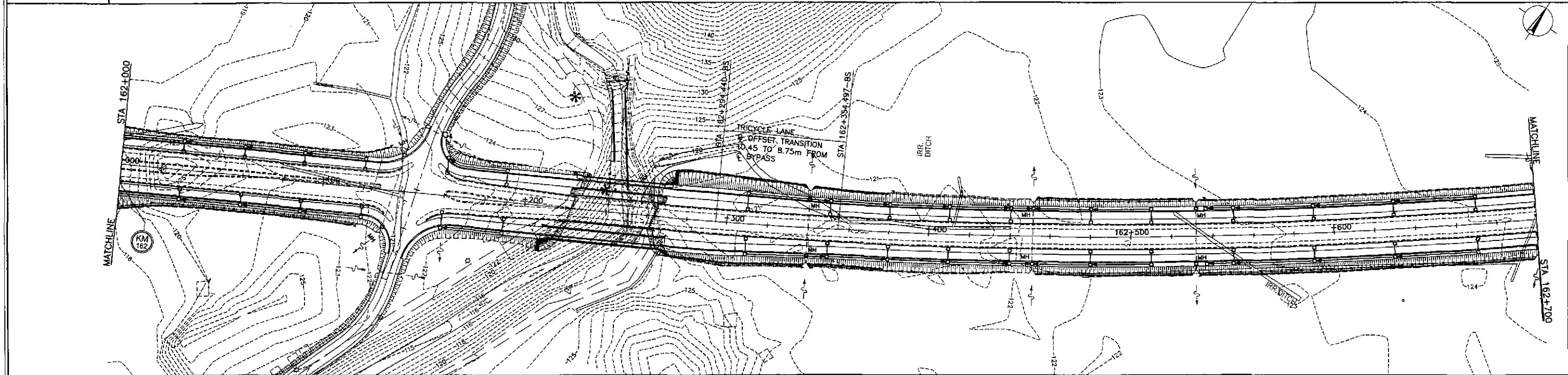
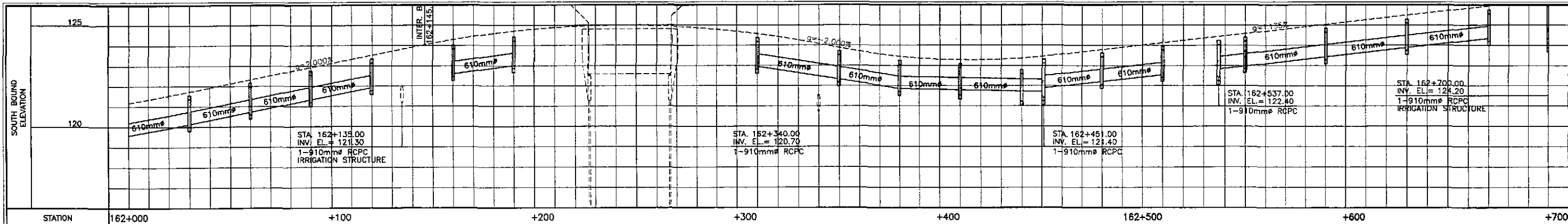
PROJECT AND LOCATION :
THE DETAILED DESIGN STUDY ON
UPGRADING INTER-URBAN HIGHWAY SYSTEM
ALONG THE PAN-PHILIPPINE HIGHWAY
(Plaridel, Cabanatuan and San Jose Bypasses)

SAN JOSE BYPASS

SCALE :
HORIZONTAL 1:1000
VERTICAL 1:100
FULL SIZE A1

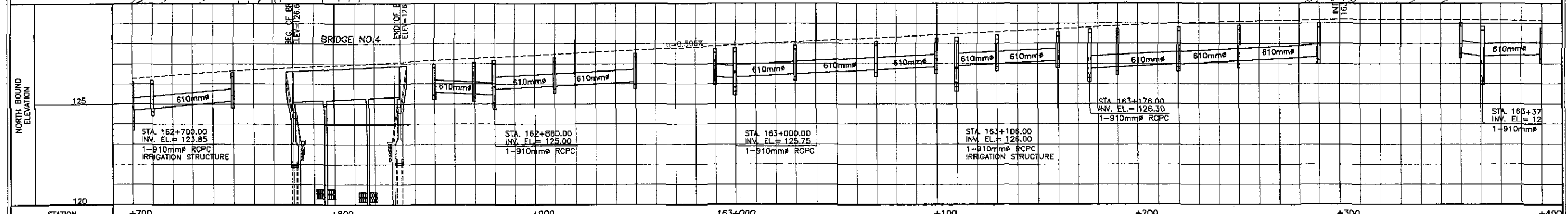
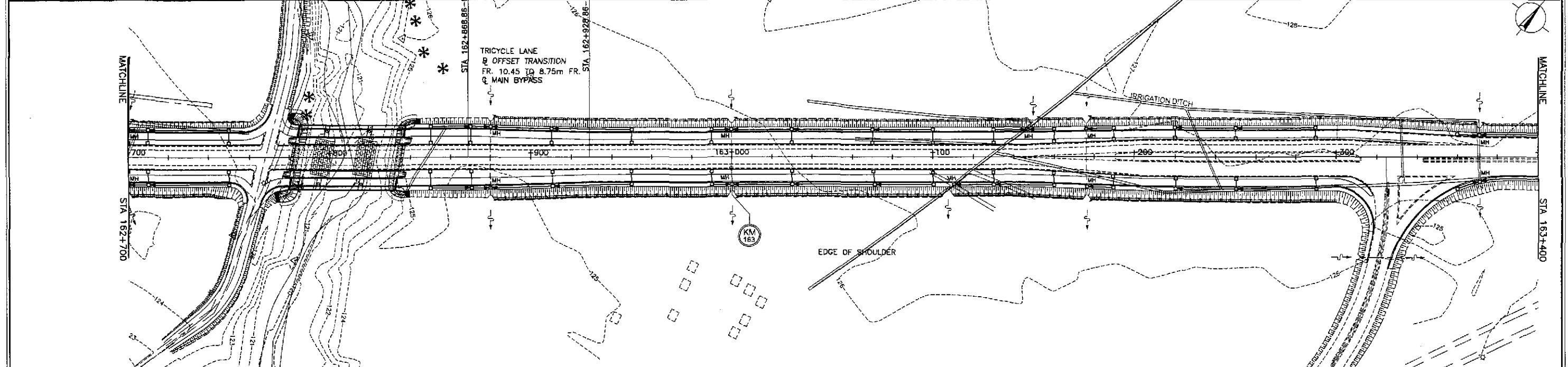
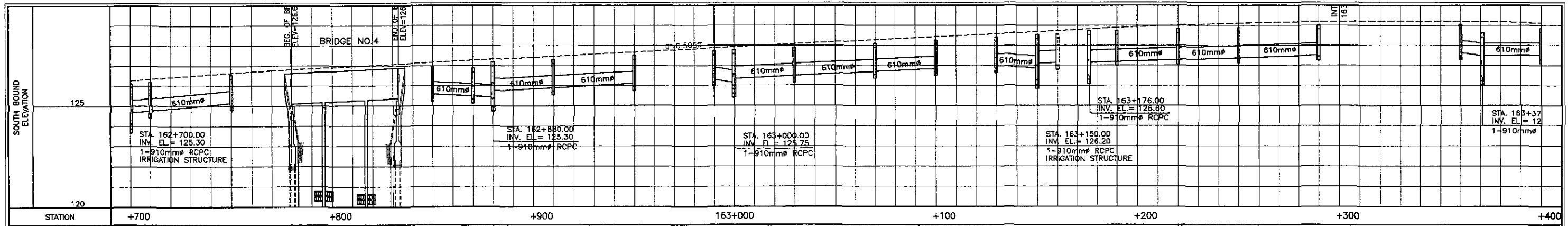
SHEET CONTENTS :
**SAN JOSE BYPASS
DRAINAGE PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)**
STA. 159+900 - STA. 160+600

SHEET NO. : **DP-07**



STATION	162+000	+100	+200	+300	+400	162+500	+600	+700
FINISHED GRADE	121.533							126.258
TOP LEVEL OF CIM (MC)	119.976, 119.976, 120.148, 121.638, 120.166, 123.761, 119.988, 119.988, 120.148, 121.638, 120.166, 121.75							126.056
INVERT LEVEL OF CROSS PIPE (MC)	120.570, 120.570, 120.740, 122.230, 120.760, 122.555, 122.570, 120.580, 120.580, 120.740, 122.230, 120.760, 122.555							125.832
TOP LEVEL OF CIM (FR)	121.170, 121.170, 121.340, 122.830, 121.360, 122.955, 123.120, 121.180, 121.180, 121.340, 122.830, 121.360, 122.955							126.168
INVERT LEVEL OF CROSS PIPE (FR)	121.770, 121.770, 121.940, 123.430, 121.960, 123.555, 123.570, 121.780, 121.780, 121.940, 123.430, 121.960, 123.555							126.056
INVERT LEVEL OF LONGITUDINAL PIPE (SB)								
INVERT LEVEL OF LONGITUDINAL PIPE (NB)								

	DATE: 9/9/02 DESIGNED: [Signature] CHECKED: [Signature] SUBMITTED: 9/11/02	P.H.L. - P.M.D. Submitted By: [Signature] DANILO C. TRAJANO Project Director	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN Reviewed By: [Signature] JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: [Signature] GILBERTO S. REYES OIC, Director IV	(See cover sheet for Signature/Approval) Approved By: [Signature] MANUEL M. BONDAN Undersecretary	Approved By: [Signature] 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) SAN JOSE BYPASS	SCALE: HORIZONTAL: 1:1000 VERTICAL: 1:100 FULL SIZE A1	SHEET CONTENTS: SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE ALONG BYPASS (ULTIMATE STAGE) STA. 162+000 - STA. 162+700	SHEET NO.: DP-10
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STATION	+700	+800	+900	163+000	+100	+200	+300	+400
FINISHED GRADE	126.252	126.168	127.119	127.825	128.532	128.929	129.172	129.131
TOP LEVEL OF CIM (MC)	124.518	124.599	125.329	126.135	126.832	127.260	127.408	127.408
INVERT LEVEL OF CROSS PIPE (MC)	124.609	124.609	125.429	126.293	126.842	127.270	127.365	127.365
TOP LEVEL OF CIM (FR)	126.168	126.168	127.119	127.825	128.532	128.929	129.172	129.131
INVERT LEVEL OF CROSS PIPE (FR)	124.518	124.599	125.329	126.135	126.832	127.260	127.408	127.408
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	124.609	124.609	125.429	126.293	126.842	127.270	127.365	127.365
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	124.518	124.599	125.329	126.135	126.832	127.260	127.408	127.408

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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS

DESIGNED: 9/5/02
CHECKED: 9/9/02
SUBMITTED: 9/10/02

DATE: 9/5/02
SIGNATURE: [Signature]

PROJECT DIRECTOR: DANILLO C. TRAJANO
CHIEF, HIGHWAYS DIVISION: JOSEFINA M. ALAGAR
DIRECTOR IV: GILBERTO S. REYES

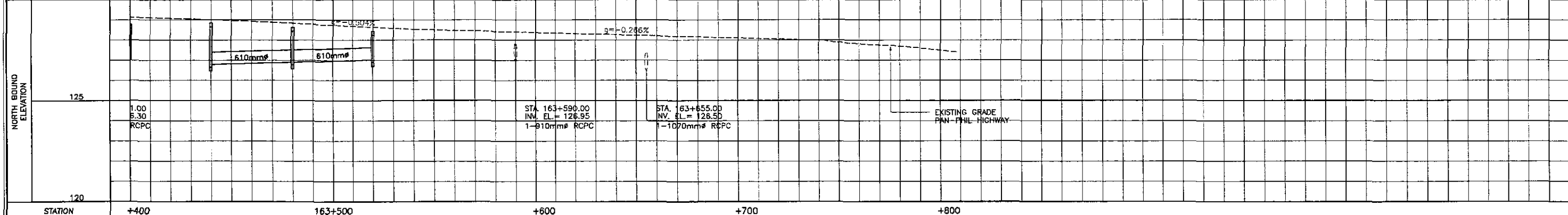
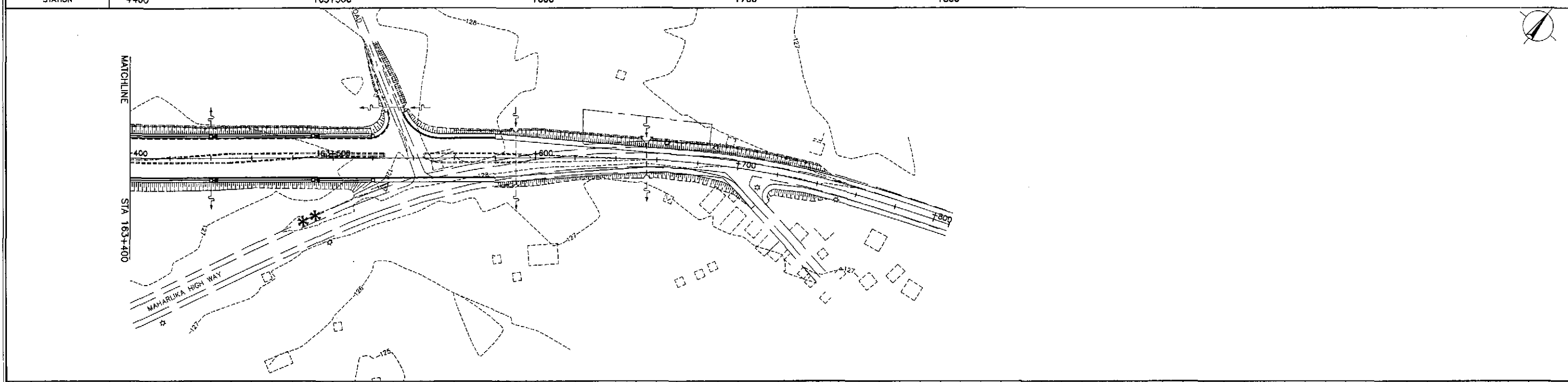
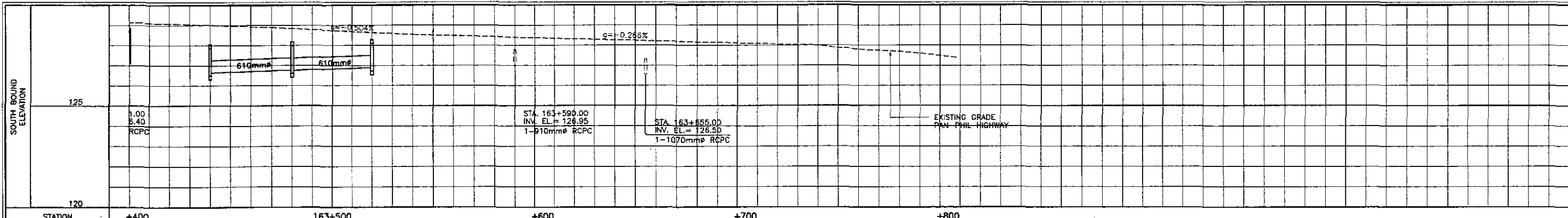
PROJECT AND LOCATION:
THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)

OFFICE OF THE SECRETARY
RECOMMENDED BY: MANUEL M. BONDAN
APPROVED BY: SIMEON A. DATUMANONG

SCALE:
HORIZONTAL: 1:1000
VERTICAL: 1:100
FULL SIZE A1

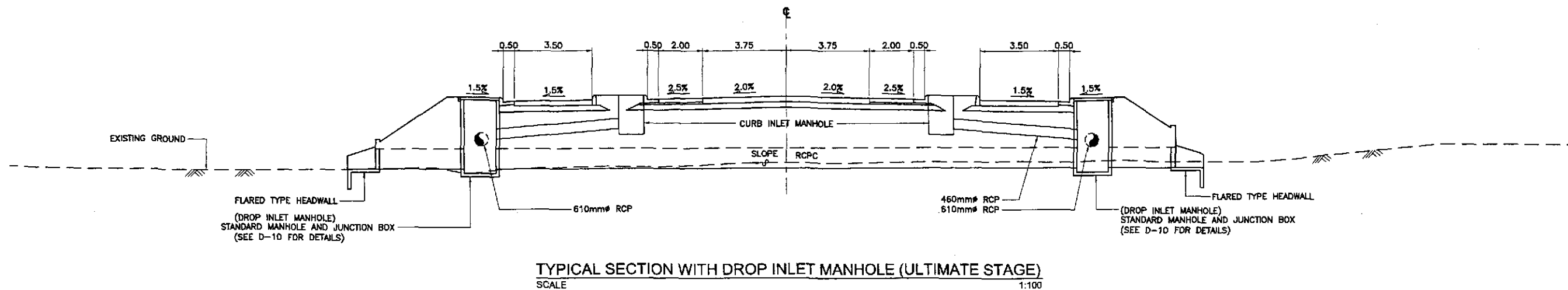
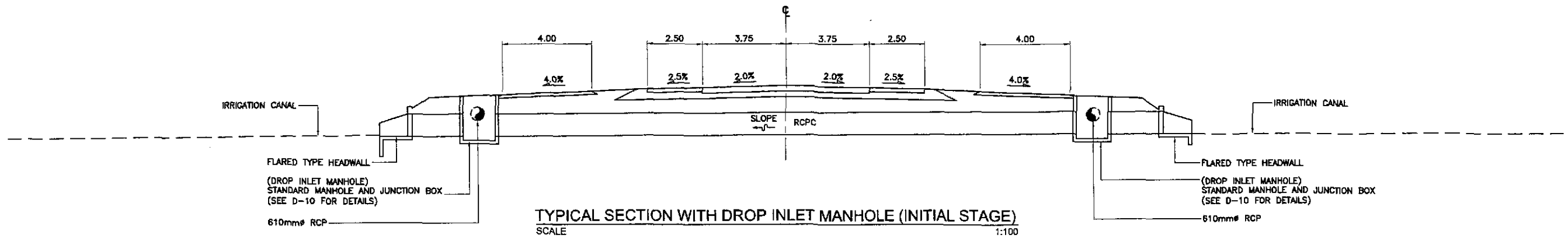
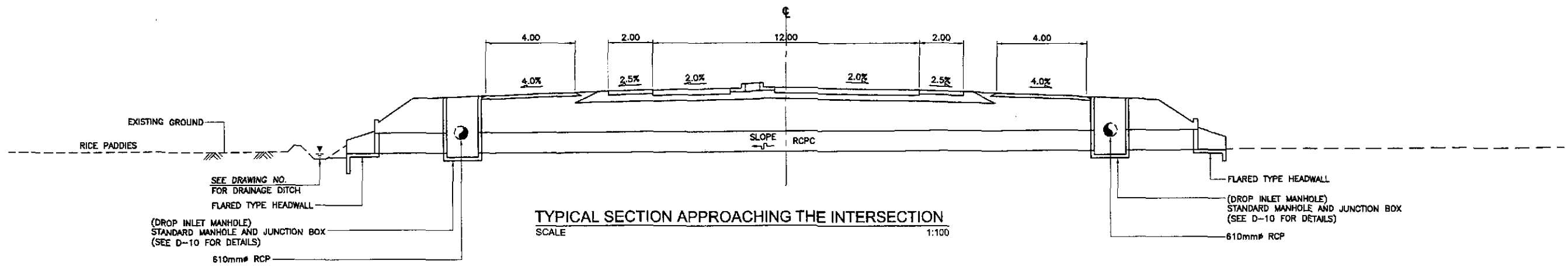
SHEET CONTENTS:
SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE
ALONG BYPASS (ULTIMATE STAGE)
STA. 162+700 - STA. 163+400

SHEET NO.: **DP-11**

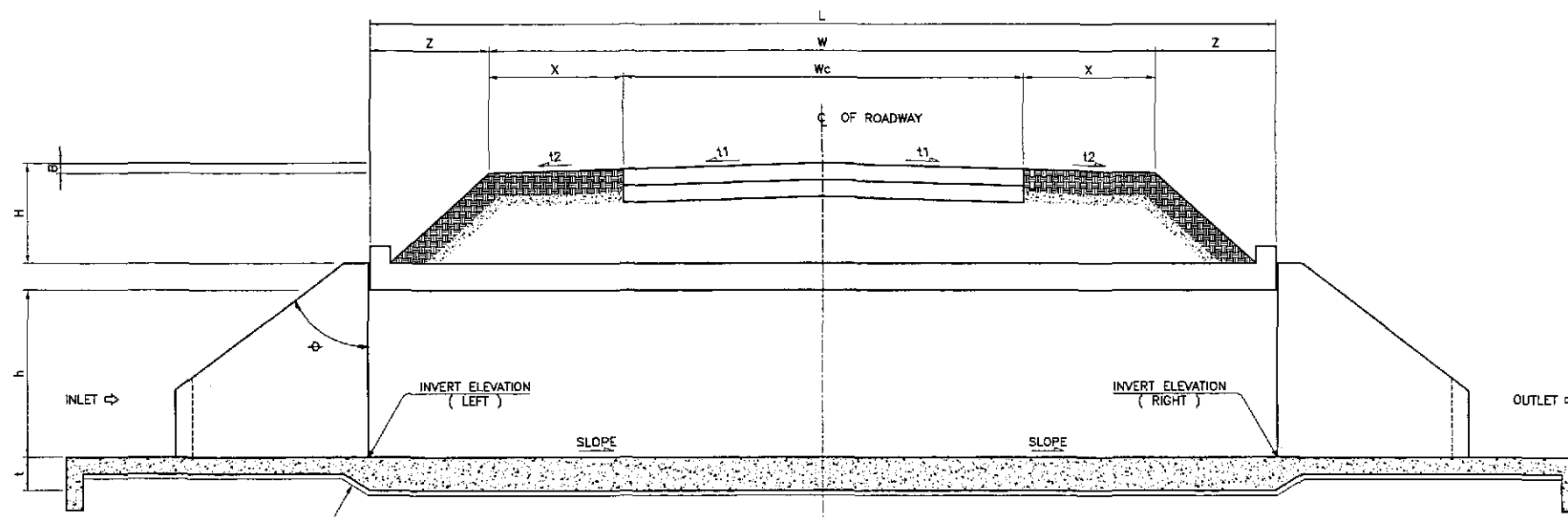


STATION	+400	163+500	+600	+700	+800
FINISHED GRADE	129.131	129.078	128.910	128.930	128.836
TOP LEVEL OF CIM (MC)					
INVERT LEVEL OF CROSS PIPE (MC)					
TOP LEVEL OF CIM (FR)	129.166	129.967	128.793	128.591	128.591
INVERT LEVEL OF CROSS PIPE (FR)					
INVERT LEVEL OF LONGITUDINAL PIPE (SB)	127.391	126.701	126.901	127.111	
INVERT LEVEL OF LONGITUDINAL PIPE (NB)	127.391	126.701	126.911	127.111	

	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	9/18/02	[Signature]	BUREAU OF DESIGN			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	HORIZONTAL 1:1000 VERTICAL 1:100 FULL SIZE A1	SAN JOSE BYPASS DRAINAGE PLAN AND PROFILE ALONG BYPASS (ULTIMATE STAGE) STA. 163+400 - STA. 163+750	DP-12
	CHECKED	9/18/02	[Signature]	Submitted By:	Reviewed By:	Recommended By:				
	SUBMITTED	9/18/02	[Signature]	DANILO C. TRAJANO Project Director	JOSEFINA M. ALACAR Chief, Highways Division	DILBERTO S. REYES OIC, Director IV				
			MANUEL M. BONDAN Undersecretary	SIMEON A. DATUMANONG Secretary						



	DATE	SIGNATURE					PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	<i>[Signature]</i>	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	1:100	TYPICAL DRAINAGE CROSS-SECTIONS (INITIAL & ULTIMATE STAGE)	DP-13
	CHECKED	<i>[Signature]</i>	BUREAU OF DESIGN							
	SUBMITTED	<i>[Signature]</i>	OFFICE OF THE SECRETARY							
Submitted By: DANILO C. TRAJANO Project Director		Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division		Recommended By: GILBERTO S. REYES Dir. Director IV		Recommended By: MANUEL M. BONDAN Undersecretary				
FULL SIZE A1										

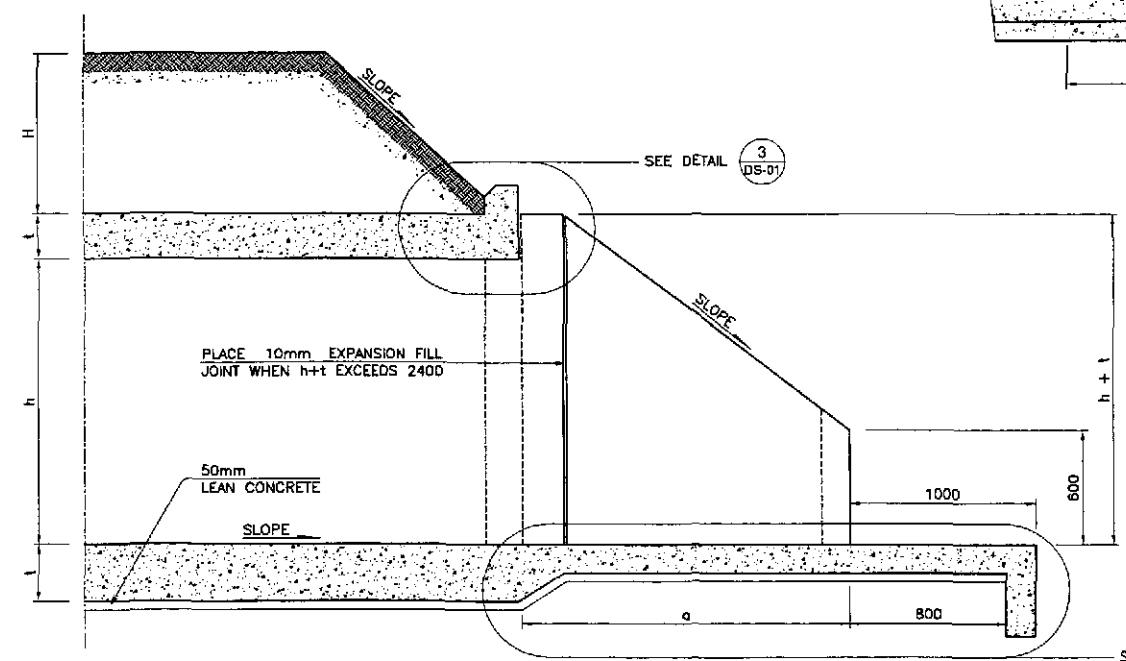


1 TYPICAL ROAD CROSS-SECTION 1
DS-01 NOT TO SCALE

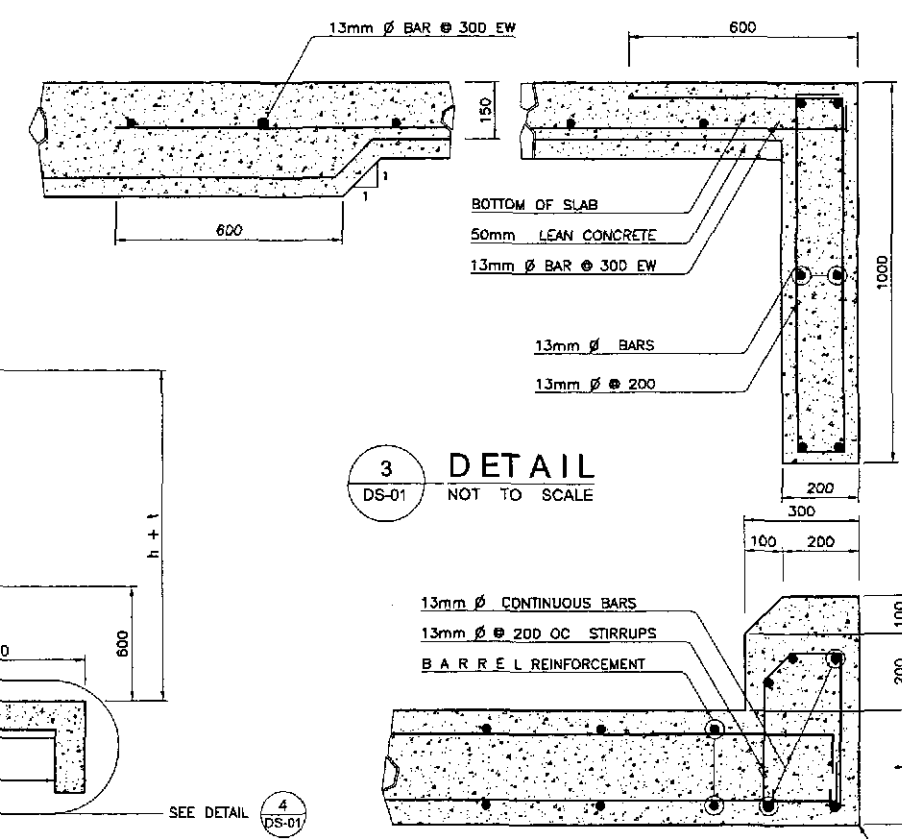
- LEGEND:
- W — WIDTH OF ROADWAY FORMATION
 - X — WIDTH OF SHOULDER
 - Wc — WIDTH OF CARRIAGEWAY
 - H — COVER ABOVE THE CULVERT
 - L — TOTAL LENGTH OF BARREL
 - t1 — SLOPE OF CARRIAGEWAY
 - t2 — SLOPE OF SHOULDER
 - Z — $[(H+t) - (B+200)] \tan \phi$
 - B — $xt_2 + 0.5t_1 Wc$
 - h — HEIGHT OF CULVERT OPENING
 - t — THICKNESS OF CULVERT WALL OR SLAB
 - ϕ — SLOPE OF EMBANKMENT
 - CC — ANGLE OF SKEW

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

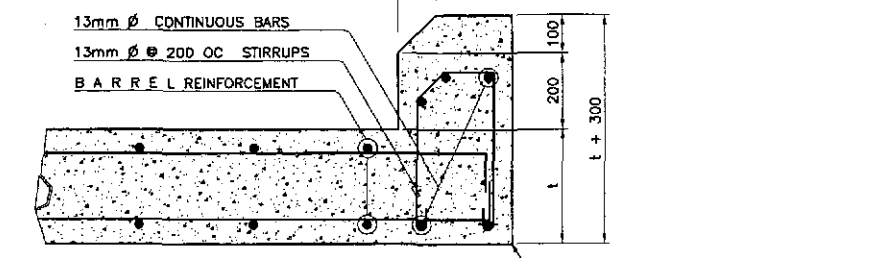
- NOTES:
- ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED.
 - MINIMUM CONCRETE COVER SHALL BE 40 CLEAR. WHEN HEIGHT OF FILL $H=0$ INCREASE COVER BY 30.



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

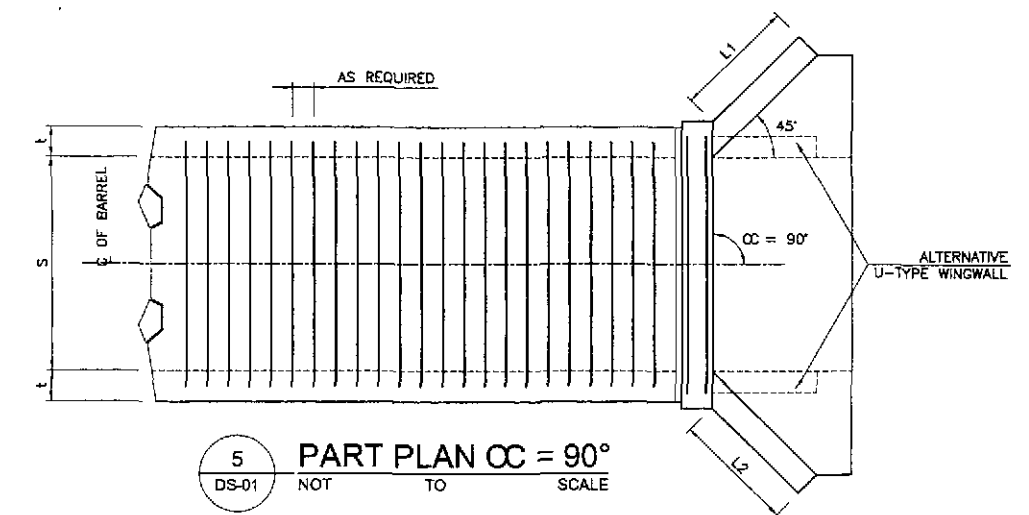


3 DETAIL
DS-01 NOT TO SCALE

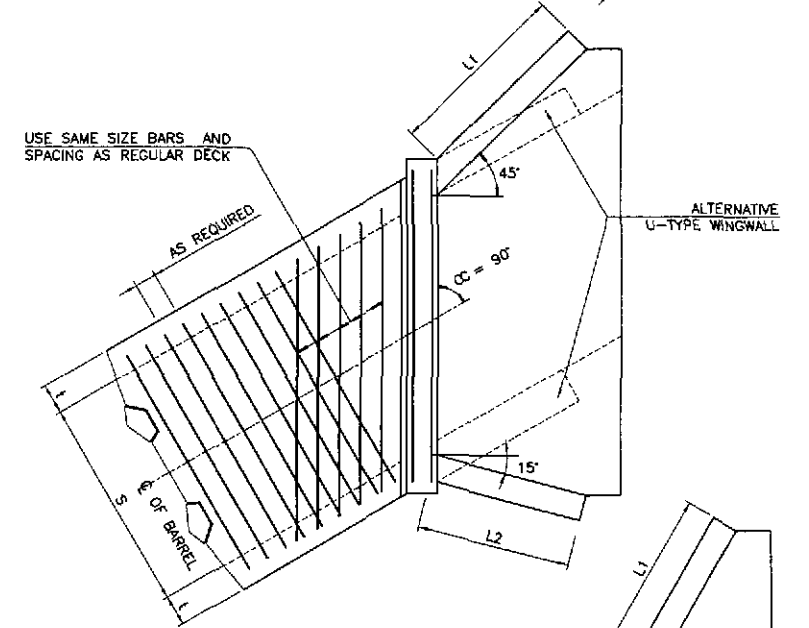


4 DETAIL
DS-01 NOT TO SCALE

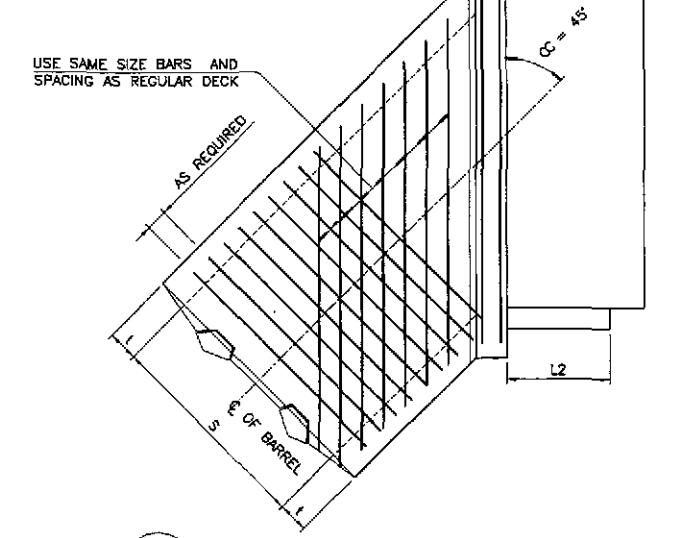
ROUND TO APPROXIMATE 150mm RADIUS (FOR INLET PORTION ONLY)



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



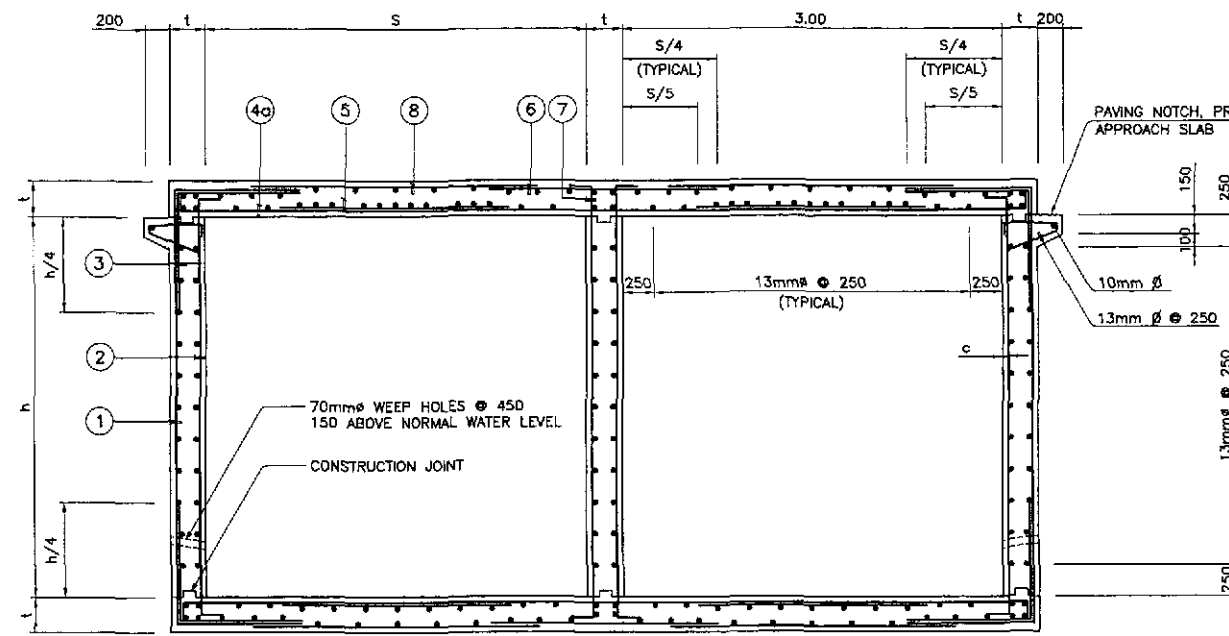
6 PART PLAN CC = 60°
DS-01 NOT TO SCALE



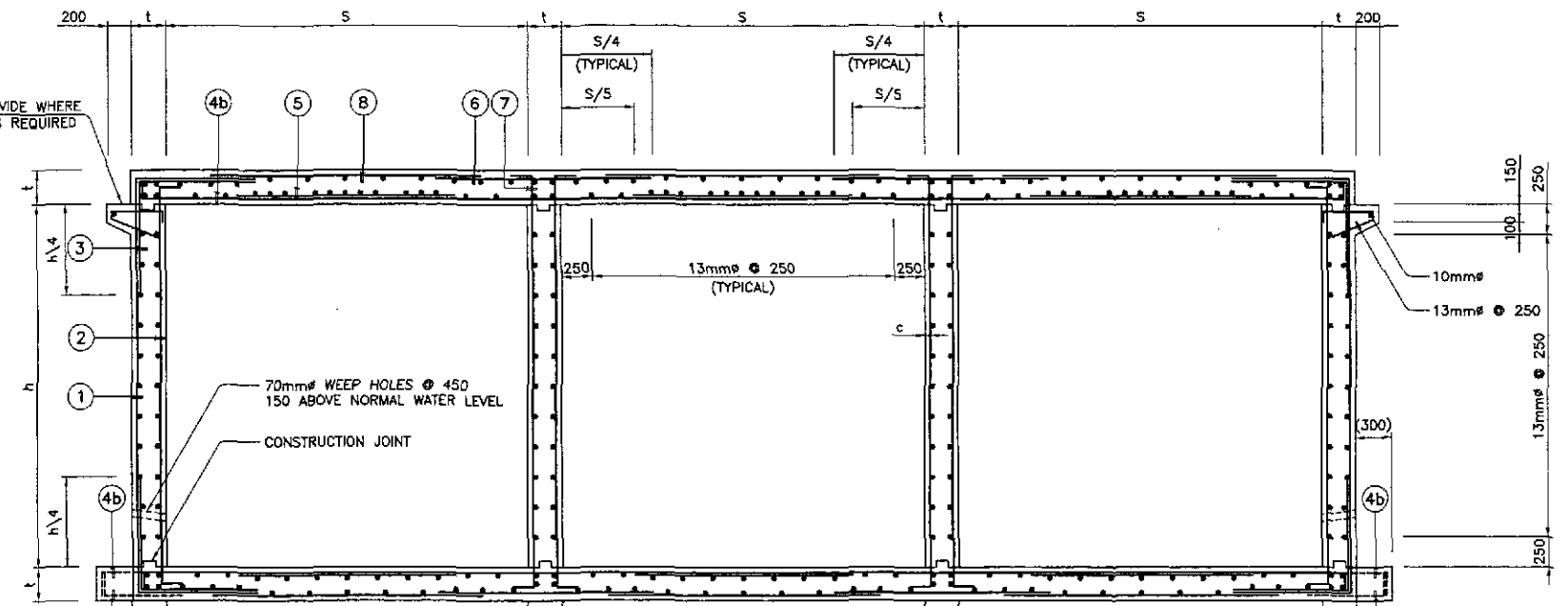
7 PART PLAN CC = 45°
DS-01 NOT TO SCALE

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)

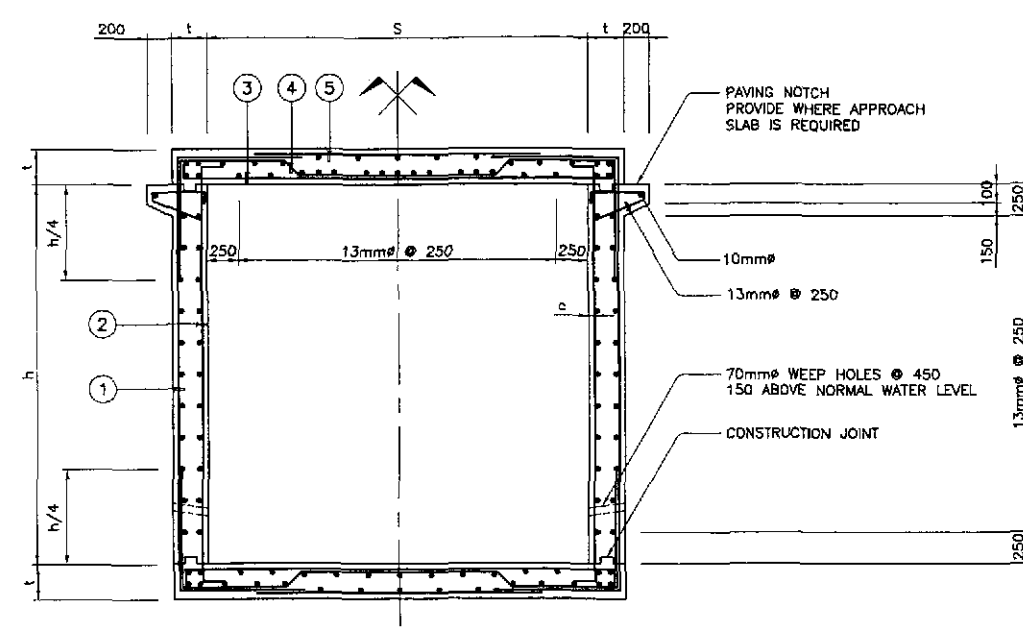
	DESIGNED	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	CHECKED	9/10/02	[Signature]		Submitted By:	Reviewed By:	Recommended By:	Approved By:	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	1:100	STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC)	DS-01
	SUBMITTED	9/10/02	[Signature]		DANILO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary				
								SAN JOSE BYPASS				



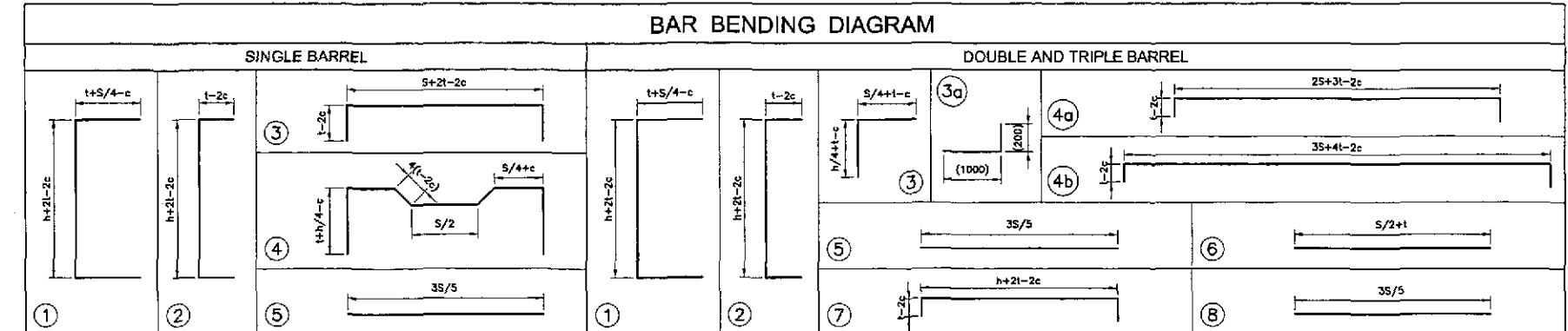
2 DOUBLE BARREL SECTION
DS-02 SCALE 1:30



3 TRIPLE BARREL SECTION
DS-02 SCALE 1:30



1 SINGLE BARREL SECTION
DS-02 SCALE 1:30



CLEAR SPAN S	HEIGHT h	SINGLE BARREL BOX CULVERT										DOUBLE AND TRIPLE BARREL BOX CULVERT															
		t	BAR 1	BAR 2	BAR 3	BAR 4	BAR 5	t	BAR 1	BAR 2	BAR 3	BAR 4	BAR 5	BAR 6	BAR 7	BAR 8											
		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	13	300	13	300
	1250	180	13	300	13	300	13	300	13	300	180	13	300	16	300	13	300	13	300	13	300	13	300	13	300	13	300
	1500	180	13	300	13	280	13	300	13	300	180	13	300	16	280	13	300	13	300	13	300	13	300	13	300	13	300
	1800	180	13	300	13	260	13	300	13	300	180	13	300	16	260	13	300	13	300	13	300	13	300	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	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	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	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	20	200	13	300	13	280
1800	1250	200	16	260	16	300	16	260	16	250	13	280	250	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	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	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	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	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	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	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	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	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	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	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	25	170	16	300	13	200

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

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

STANDARD DETAILS OF REINFORCED CONCRETE BOX CULVERT (RCBC) BARRELS

	DATE	SIGNATURE		PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	DESIGNED	<i>[Signature]</i>		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Piradel, Cabanatuan and San Jose Bypasses)	1:30	STANDARD DETAILS OF RCBC BARRELS	DS-02
	CHECKED	<i>[Signature]</i>		BUREAU OF DESIGN	SAN JOSE BYPASS	FULL SIZE A1		
SUBMITTED	<i>[Signature]</i>	TEAM LEADER	PUHL - PMO Submitted By: DANILO C. TRAJANO Project Director Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division Recommended By: GILBERTO S. REYES D.C., Director IV Recommended By: MANUEL M. BONOAN Undersecretary Approved By: SIMEDON A. DATUMANONG Secretary					

QUANTITIES FOR STANDARD BOX CULVERTS							
CLEAR		QUANTITY PER METER OF BARREL					
SPAN S	HEIGHT h	SINGLE		DOUBLE		TRIPLE	
		CONCRETE (m ³)	REINFORCEMENT (kg)	CONCRETE (m ³)	REINFORCEMENT (kg)	CONCRETE (m ³)	REINFORCEMENT (kg)
1250	1000	0.94	113.32	1.63	209.22	2.33	296.18
	1250	1.03	121.63	1.77	216.22	2.51	312.39
	1500	1.12	130.98	1.90	232.07	2.69	330.39
1500	1800	1.23	141.71	2.07	249.50	2.91	352.09
	1000	1.03	165.90	2.04	253.90	2.92	354.80
	1250	1.12	177.10	2.19	256.00	3.12	370.20
1800	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
	2100	1.38	189.20	3.11	312.30	4.45	437.00
2400	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
3000	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
3000	2750	2.45	356.70	5.90	478.60	8.34	677.70
	2100	3.17	308.70	6.03	635.70	8.64	899.70
	2400	3.34	321.30	6.30	652.00	9.00	919.60
	2750	3.53	374.40	6.62	705.60	9.42	895.00
	3000	3.67	413.50	6.84	721.60	9.72	1015.40

QUANTITIES FOR STANDARD WINGWALLS									
CLEAR			QUANTITY PER WINGWALL AND APRON SLAB						
m (meter)	h+t (meter)	L (meter)	SINGLE		DOUBLE		TRIPLE		
			CONCRETE (m ³)	REINFORCEMENT (kg)	CONCRETE (m ³)	REINFORCEMENT (kg)	CONCRETE (m ³)	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	11.51	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	980	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 $f'_c = 20.7 \text{ MPa}$ (3000psi). ALL EXPOSED CORNERS TO BE CHAMFERED 20 MINIMUM. NO CONSTRUCTION JOINT ARE TO BE MADE EXCEPT WHERE SHOWN. WHEN BOTTOM SLAB IS SUBJECT TO ABRASION ADD 25mm TO BOTTOM SLAB TO INCREASE COVERAGE ON STEEL.

STEEL REINFORCEMENT :

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

GENERAL :

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

LIVE LOAD DISTRIBUTION REINFORCEMENT :

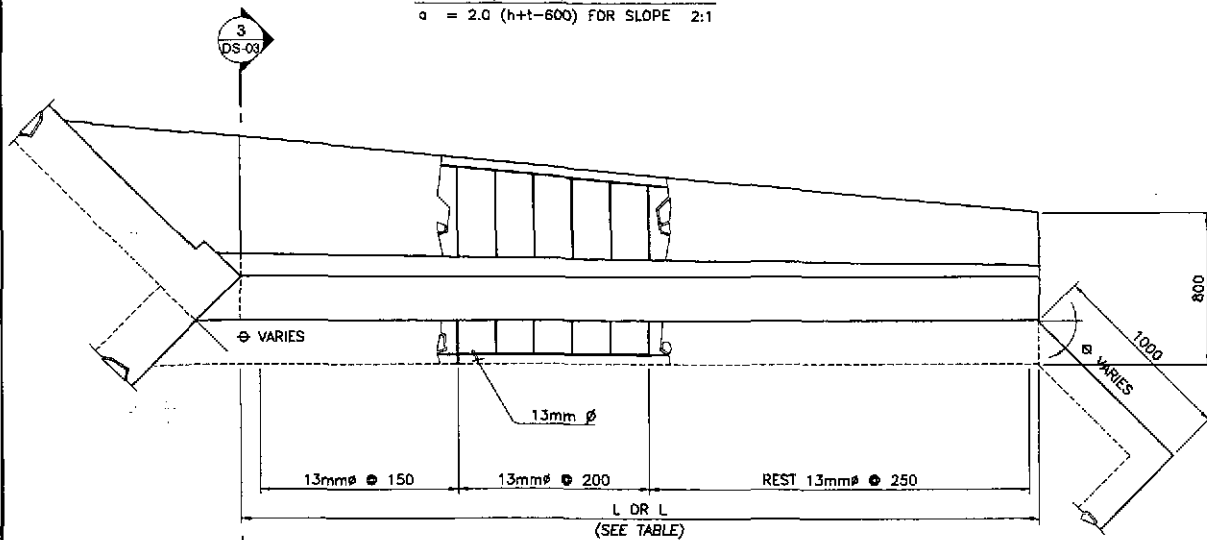
WHEN THERE IS LESS THAN 600mm OF FILL ABOVE TOP SLAB OF CULVERT ADDITIONAL REINFORCEMENT TRANSVERSE TO THE MAIN REINFORCEMENT IS ADDED TO THE BOTTOM OF THE TOP SLAB IN ACCORDANCE WITH AASHTO 1.3.2.E.

HEIGHT OF FILL :

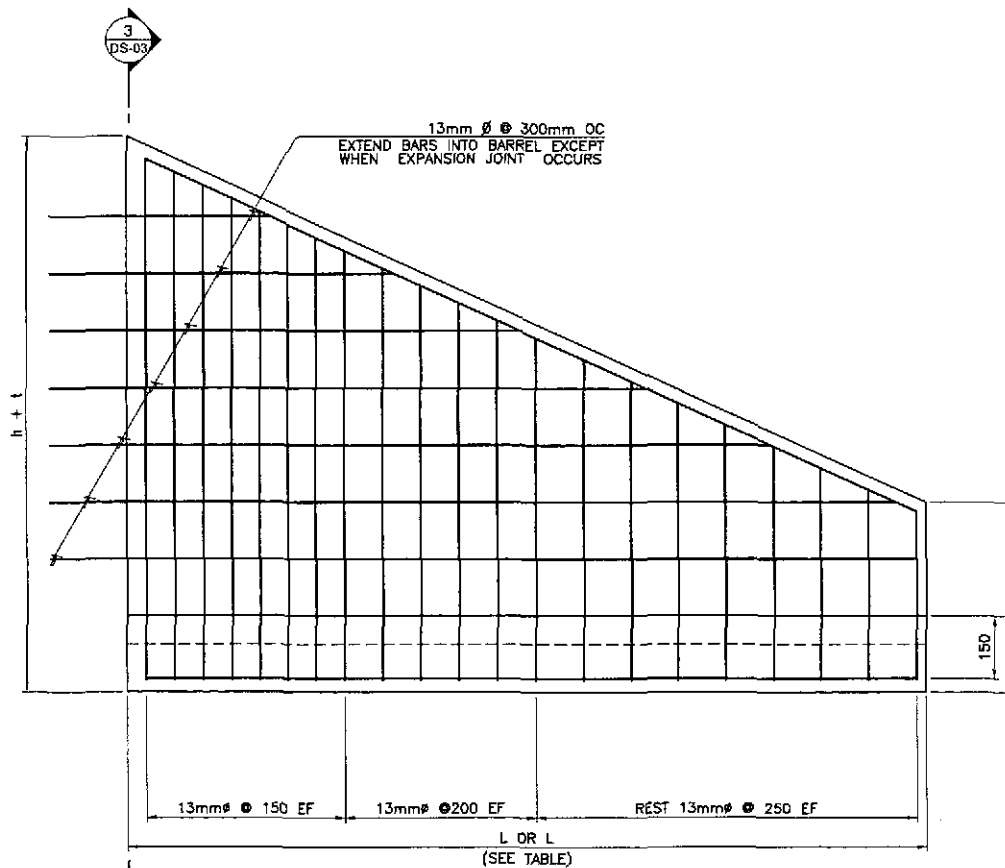
MAXIMUM HEIGHT OF FILL IS 3000mm ABOVE TOP SLAB, FOR HEIGHT OF FILL GREATER THAN 3000mm SPECIAL DESIGN OF BOX CULVERT SHOULD BE DONE.

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

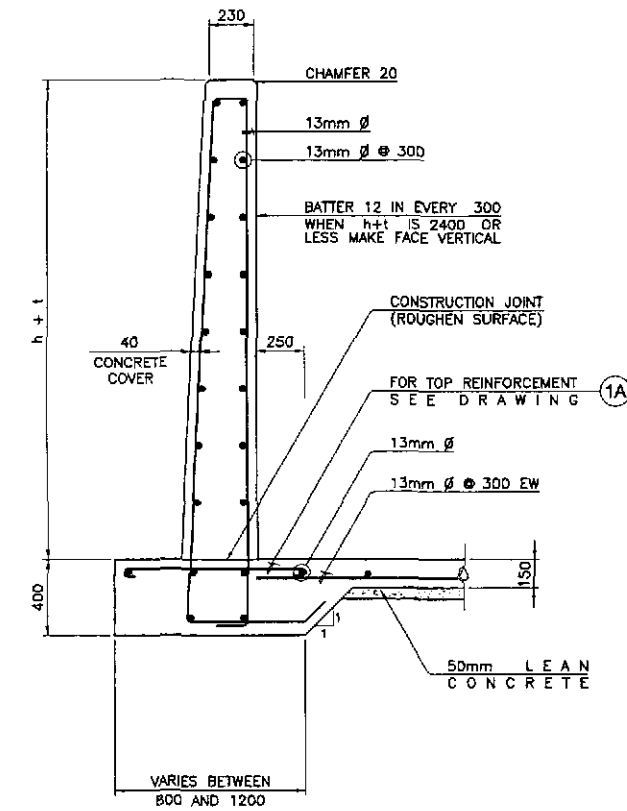
WHERE :
 $a = 1.5 (h+t-600)$ FOR SLOPE 1.5:1
 $a = 2.0 (h+t-600)$ FOR SLOPE 2:1



1 WINGWALL PLAN
 DS-03 SCALE 1:40



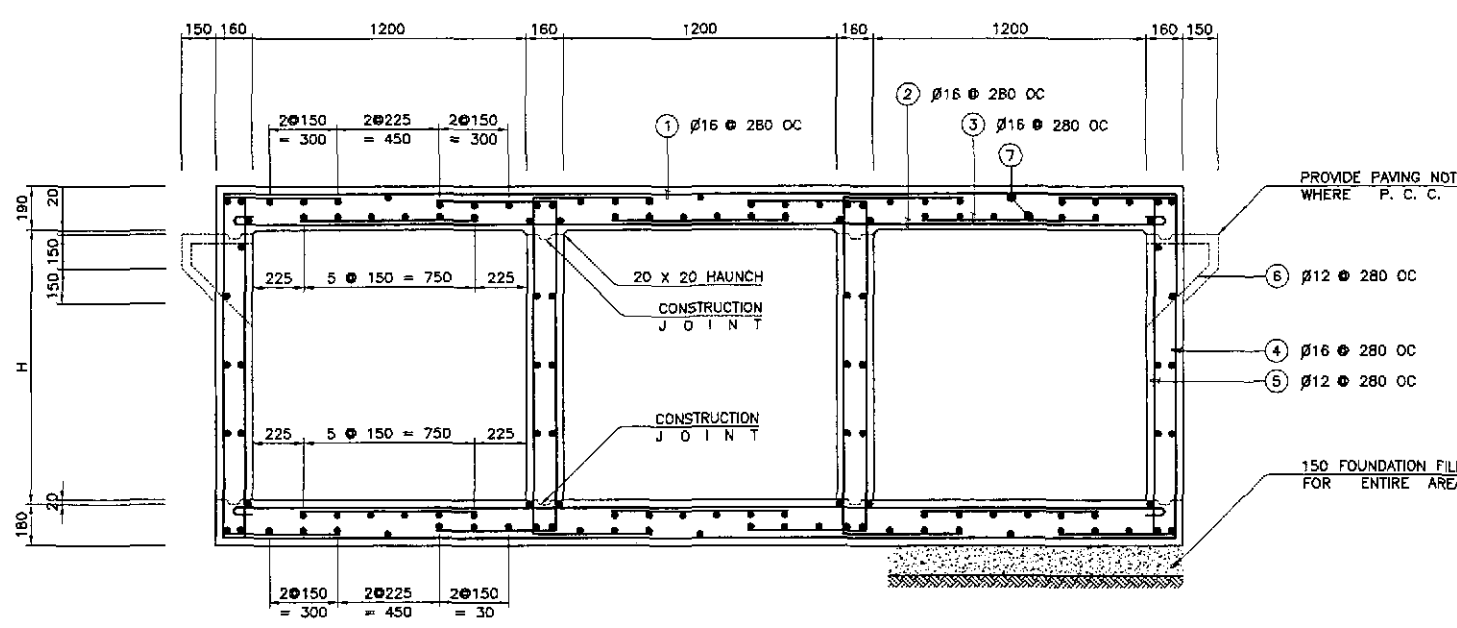
2 WINGWALL ELEVATION
 DS-03 SCALE 1:40



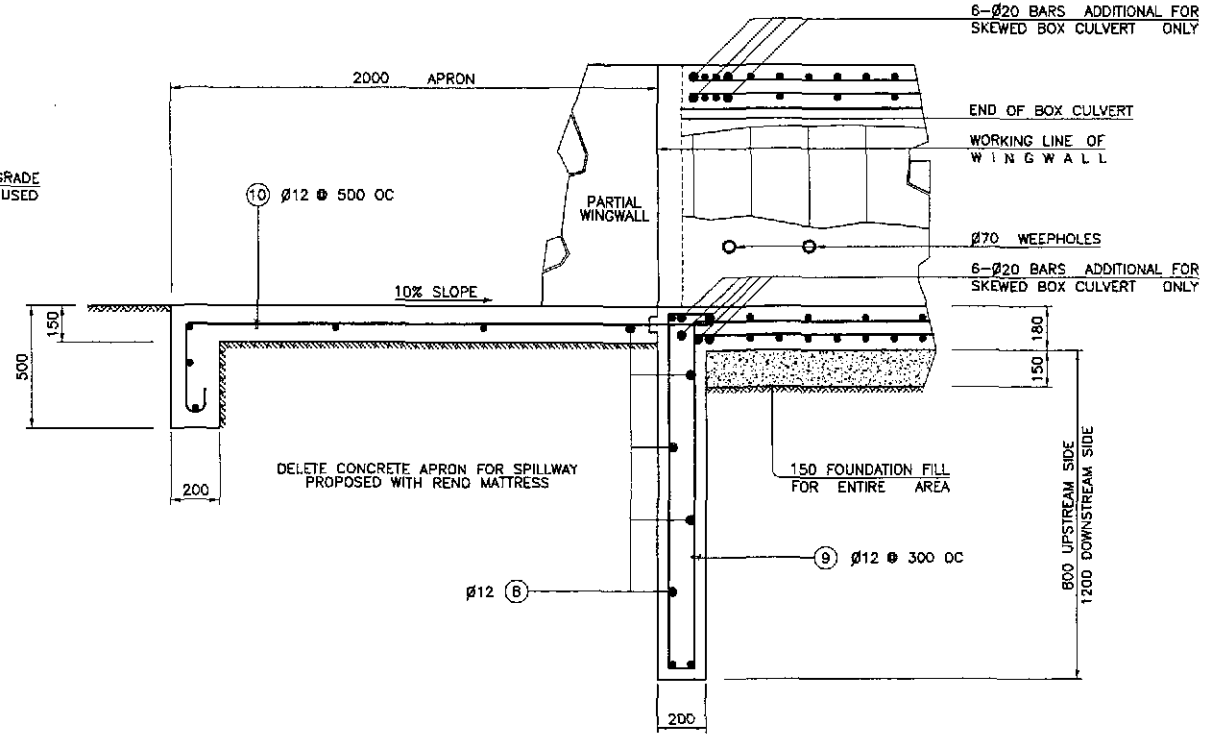
3 SECTION
 DS-03 SCALE 1:40

RCBC WINGWALL DETAILS

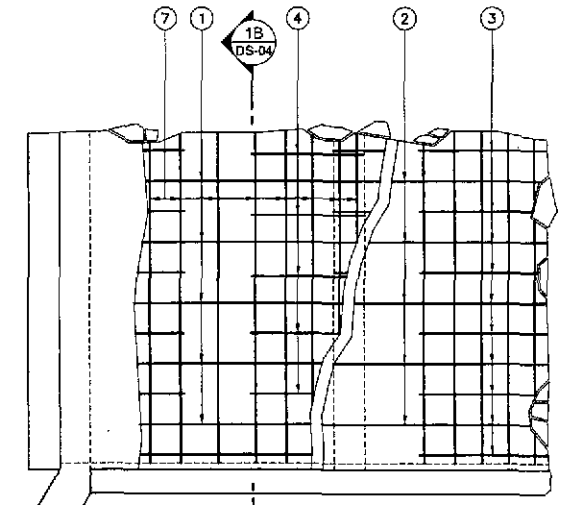
	DESIGNED: 9/2/02 CHECKED: 9/9/02 SUBMITTED: 9/10/02	DATE: 9/2/02 SIGNATURE: [Signature] TEAM LEADER		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Piaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	SCALE : 1:40 FULL SIZE A1	SHEET CONTENTS : STANDARD DETAILS OF RCBC WINGWALLS	SHEET NO. : DS-03
	PUHL - PMO Submitted By: [Signature] DANIL C. TRAJANO Project Director	Reviewed By: [Signature] JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: [Signature] GILBERTO S. REYES OIC, Director IV	Office of the Secretary Approved By: [Signature] MANUEL M. BONDAN Undersecretary	Approved By: [Signature] SIMION A. DATUMANONG Secretary			



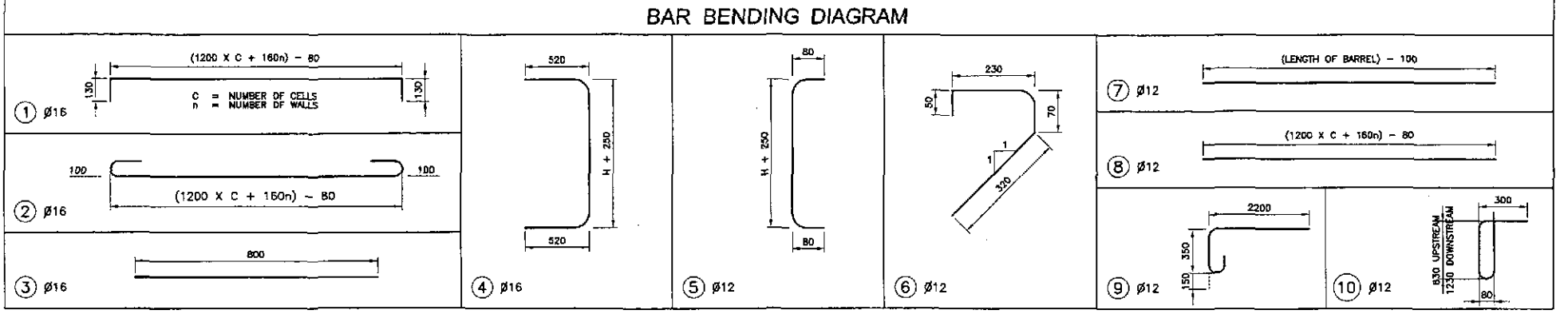
1A SECTION ALONG C OF ROADWAY
DS-04 NOT TO SCALE



1B PARTIAL SECTION A
DS-04 NOT TO SCALE



PARTIAL PLAN
NOT TO SCALE



ESTIMATE OF QUANTITIES (PER LINEAR METER OF LENGTH)

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

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

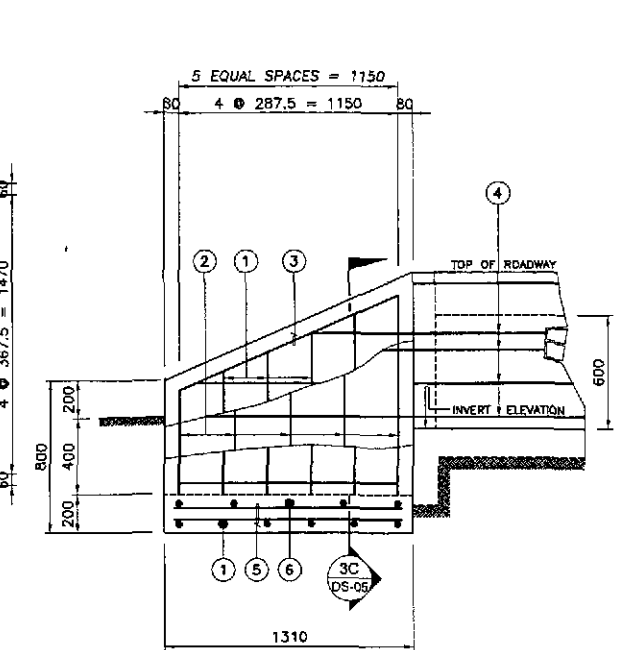
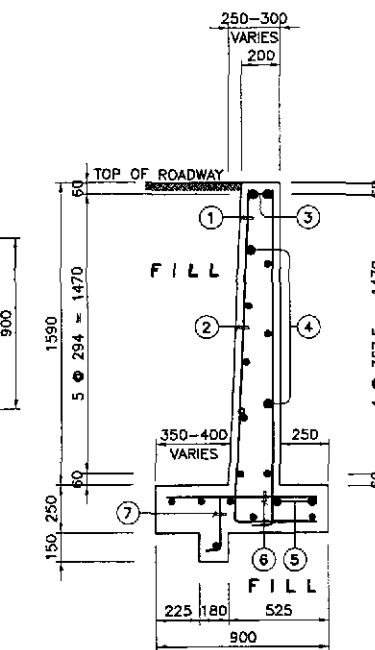
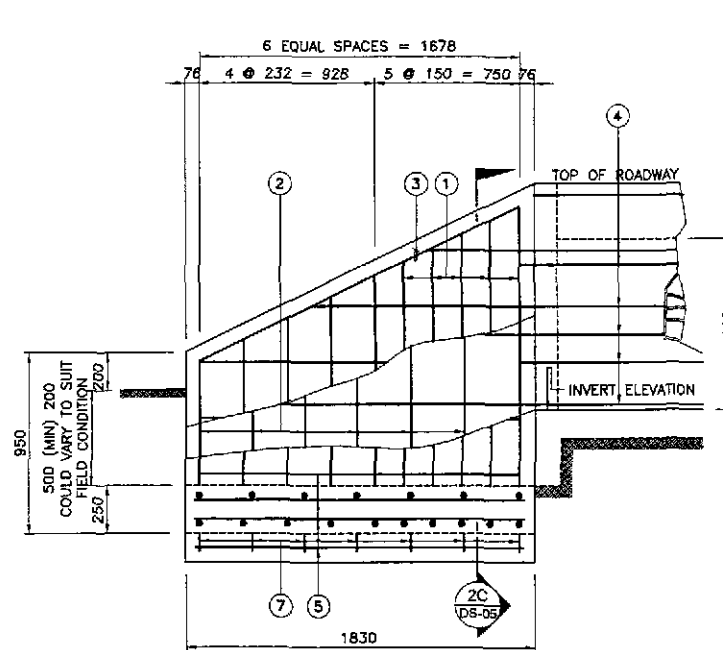
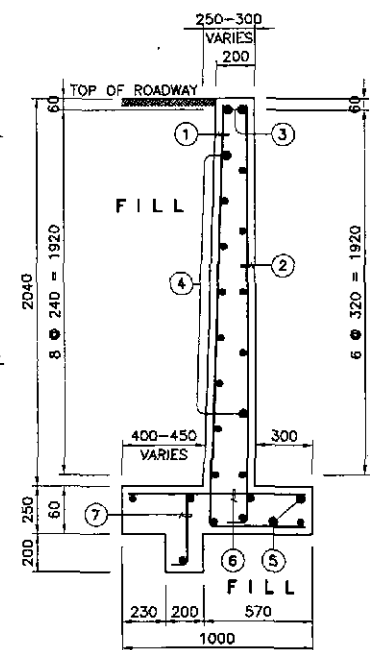
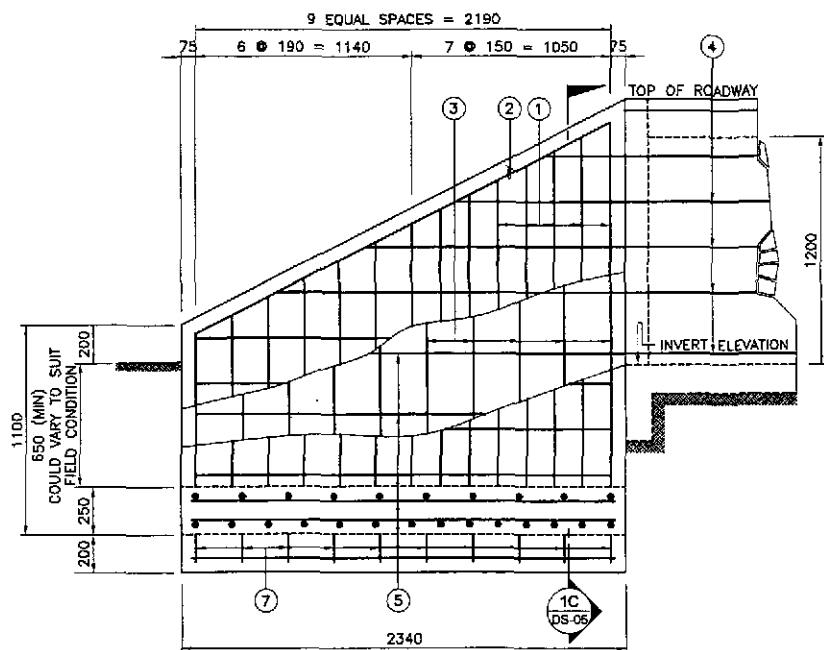
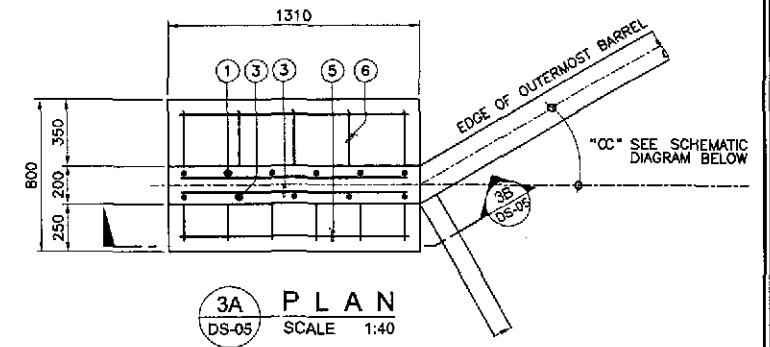
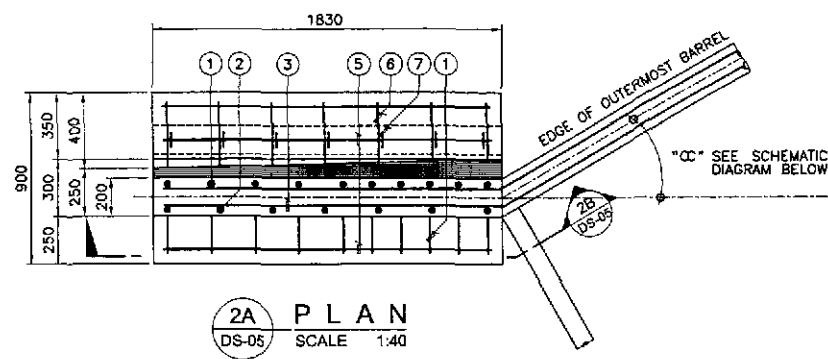
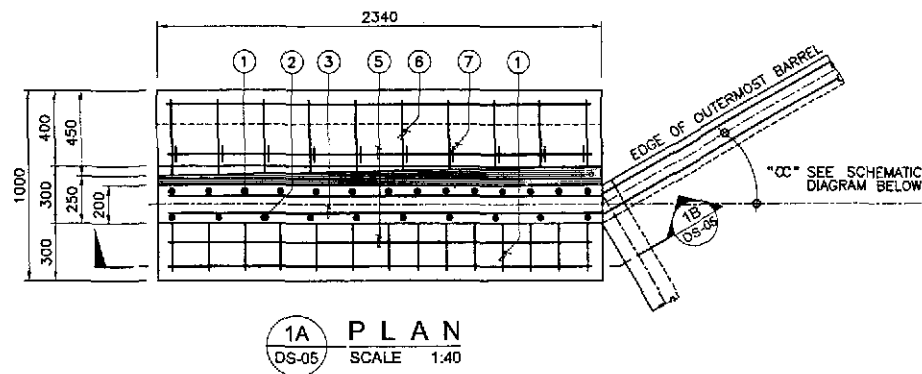
APRON AND END TOE FOR BOTH ENDS

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

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

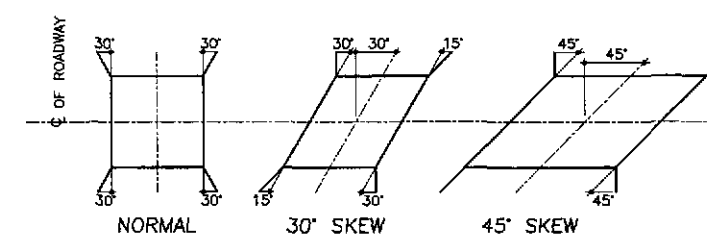
1 LOW DEPTH TYPE BOX CULVERT
DS-04 NOT TO SCALE

	DATE	SIGNATURE		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS			PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	9/6/02		[Signature]	BUREAU OF DESIGN			THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses)	NOT TO SCALE	STANDARD LOW DEPTH TYPE BOX CULVERT (1 of 2)
CHECKED	9/9/02	[Signature]	OFFICE OF THE SECRETARY			San Jose Bypass	FULL SIZE A1			
SUBMITTED	9/11/02	[Signature]	Submitted By: DANILLO C. TRAJANO, Project Director Reviewed By: JOSEFINA M. ALAGAR, Chief, Highways Division Recommended By: GILBERTO S. REYES, OIC, Director IV Approved By: MANUEL M. BONDAN, Undersecretary SIMEDON A. DATUMANONG, Secretary							

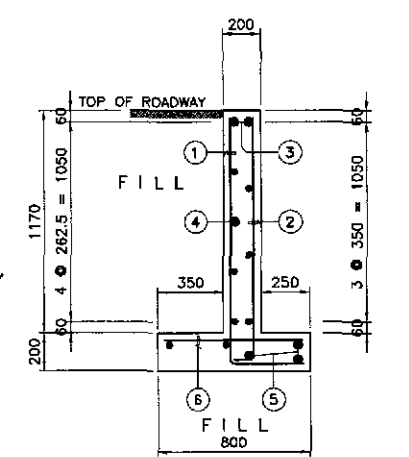


BAR BENDING DIAGRAM H=1200			BAR BENDING DIAGRAM H=900			BAR BENDING DIAGRAM H=600		
① 14-12mm ϕ	② 10-12mm ϕ	③ 2-12mm ϕ	① 10-12mm ϕ	② 7-12mm ϕ	③ 2-12mm ϕ	① 6-12mm ϕ	② 5-12mm ϕ	③ 2-12mm ϕ
④ 9-12mm ϕ	⑤ 9-12mm ϕ	⑥ 10-12mm ϕ	④ 6-12mm ϕ	⑤ 10-12mm ϕ	⑥ 7-12mm ϕ	④ 5-12mm ϕ	⑤ 7-12mm ϕ	⑥ 5-12mm ϕ
⑦ 10-12mm ϕ	⑦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

HEIGHT (m)	CONCRETE CLASS "A" (m ³)	REINFORCEMENT (kg)	EXCAVATION (m ³)	FOUNDATION FILL (m ³)
1.20	2.95	102.89	5.78	0.30
0.90	1.90	57.68	3.53	0.22
0.60	0.88	31.43	1.97	0.15

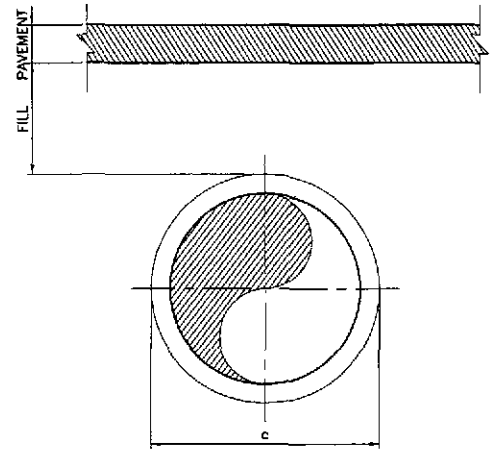


4 DS-05 NOT TO SCALE



LOW DEPTH TYPE BOX CULVERT

DESIGN REQUIREMENT OF REINFORCED CONCRETE PIPE CULVERT

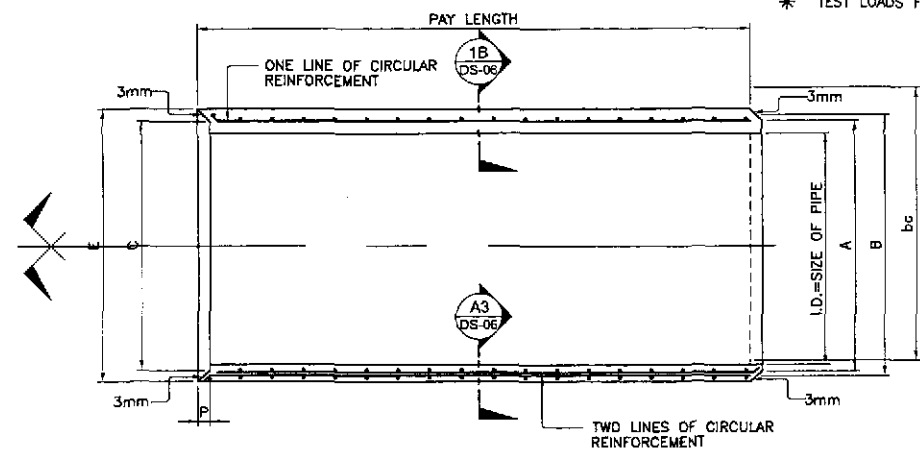


STANDARD STRENGTH PIPES:
 FILL: 1/2 E.D. FOR FLEXIBLE PAVEMENT OR MIN. OF 0.60 m
 0.30 m FOR RIGID PAVEMENT
 EXTRA STRENGTH PIPES:
 FILL: 0.30 m FOR RIGID AND FLEXIBLE PAVEMENTS

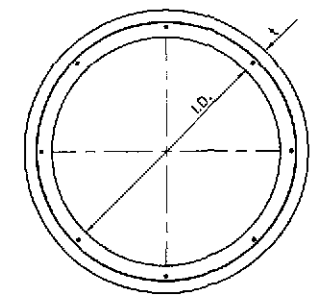
MINIMUM PIPE COVERING

SIZE OF PIPE (mm)		STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERTS														EXTRA STRENGTH REINFORCED CONCRETE PIPE CULVERTS													
		CONCRETE 247 kg/cm ² (3,500 lb/in ²)							CONCRETE 317 kg/cm ² (4,500 lb/in ²)							STRENGTH TEST REQUIREMENTS kg/m OF PIPE				CONCRETE 317 kg/cm ² (4,500 lb/in ²)				STRENGTH TEST REQUIREMENTS kg/m OF PIPE					
		WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		THREE-EDGE-BEARING METHOD *		WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /m OF PIPE		THREE-EDGE-BEARING METHOD	
I.D.	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	ULTIMATE LOAD	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	0.00025mCRACK LOAD	LOAD ULTIMATE	
300	57	344	363	351	370	44	1 LINE 1.48		51	495	514	502	521	44	1 LINE 1.89		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	

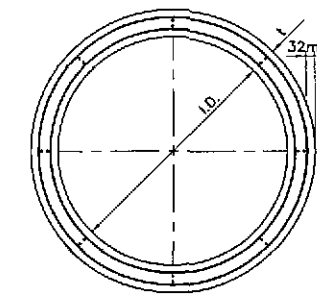
⊙ THE DISTANCE FROM CENTERLINE OF THE REINFORCEMENT TO THE NEAREST SURFACE OF THE CONCRETE HAS BEEN ASSUMED AS 32mm FOR PIPES WITH A SHELL THICKNESS OF 64mm OR MORE.
 * TEST LOADS FOR SAND-BEARING TEST SHALL BE ONE AND ONE - HALF TIMES THOSE SPECIFIED IN THIS TABLE FOR THE THREE - EDGE BEARING TEST.



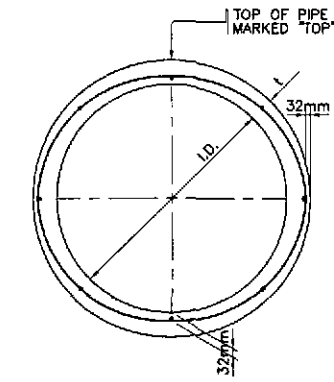
1A LONGITUDINAL SECTION
 DS-06 NOT TO SCALE



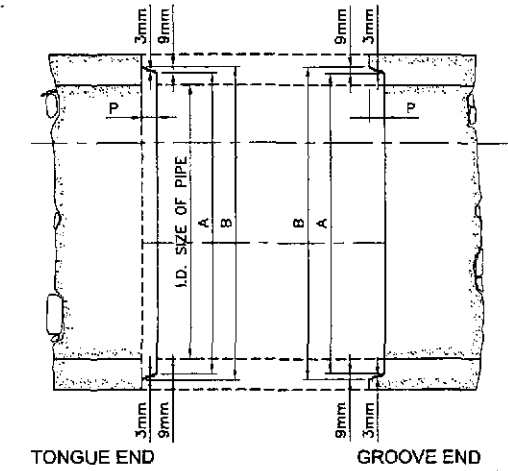
1B SECTION
 DS-06



1C SECTION
 DS-06



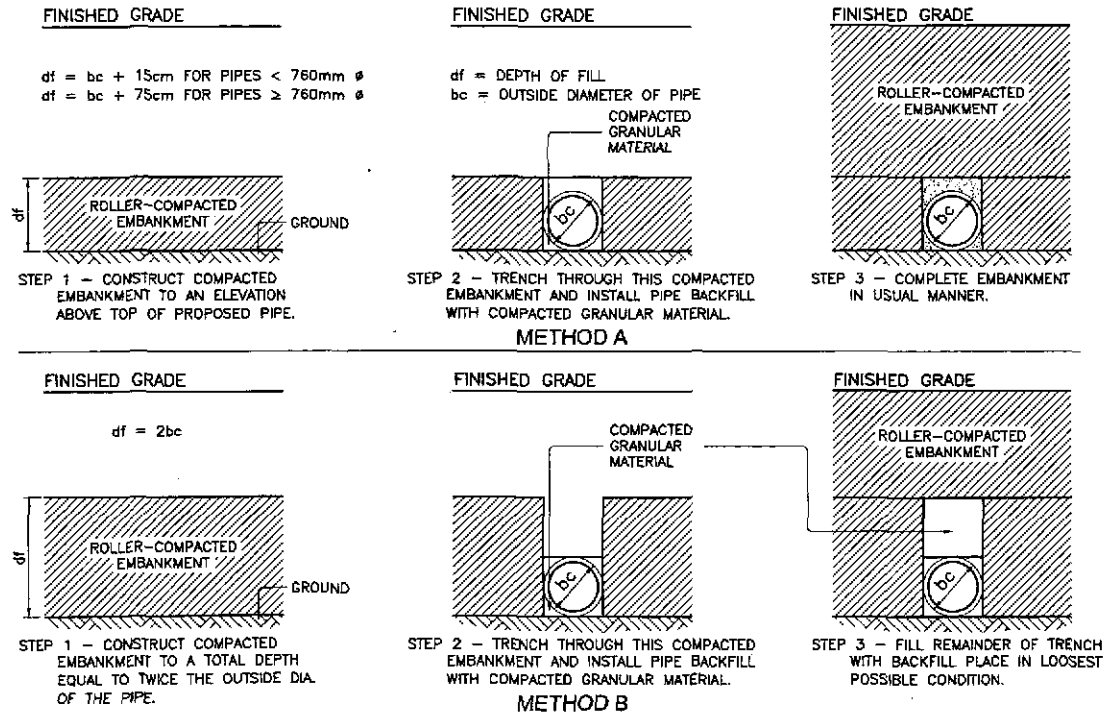
1D SECTION
 DS-06



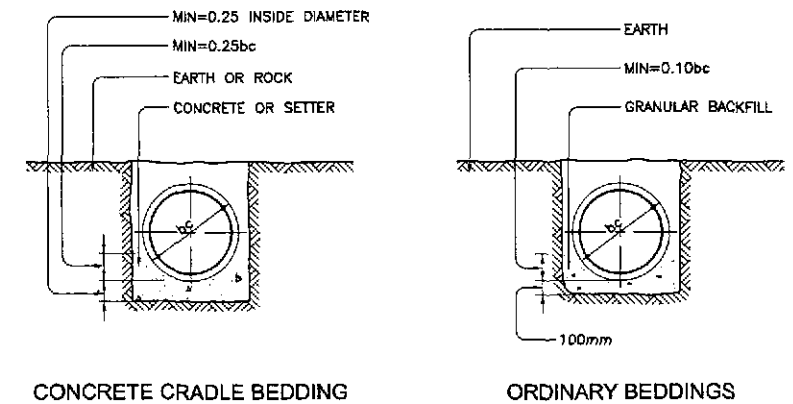
1E SECTION
 DS-06

1 STANDARD REINFORCED CONCRETE PIPE CULVERTS

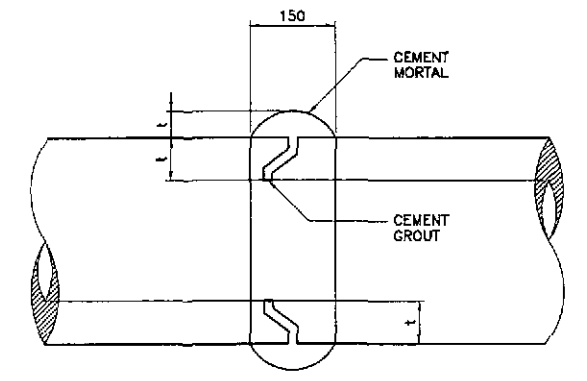
DS-06 SCALE AS SHOWN



2 METHODS OF PIPE INSTALLATION
 DS-06 NOT TO SCALE



3 TYPICAL BEDDING FOR CONDUITS
 DS-06 NOT TO SCALE



4 DETAIL OF PIPE COLLAR
 DS-06 NOT TO SCALE

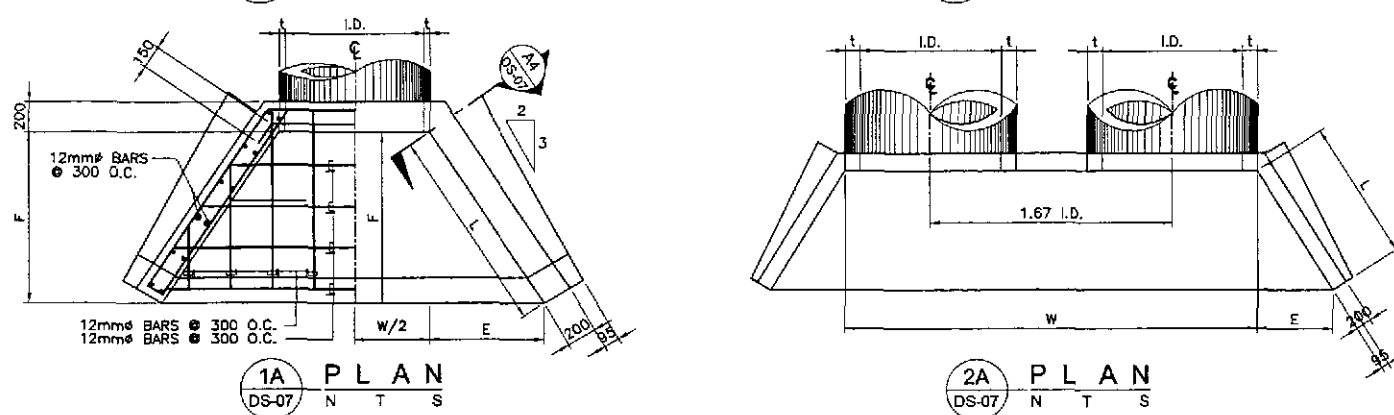
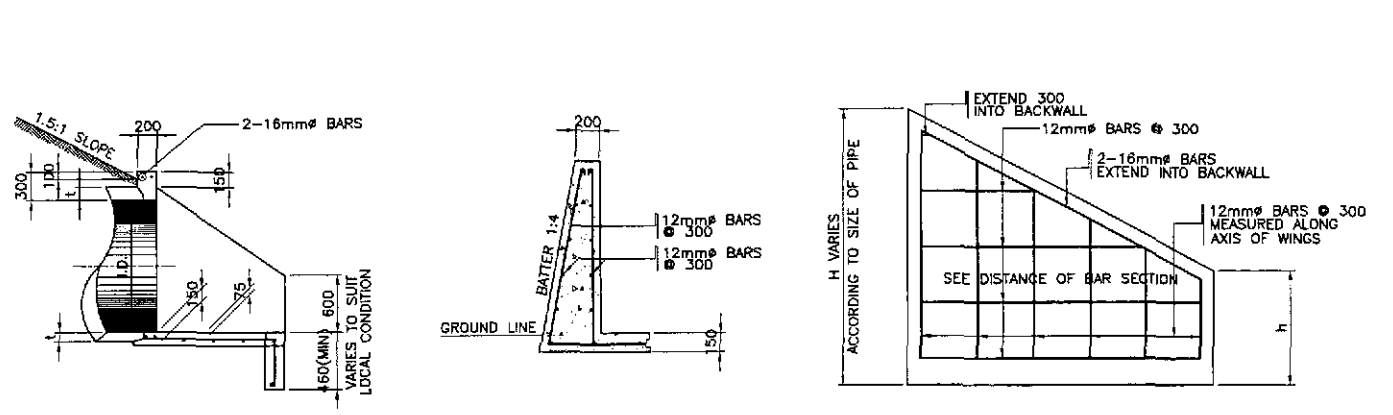
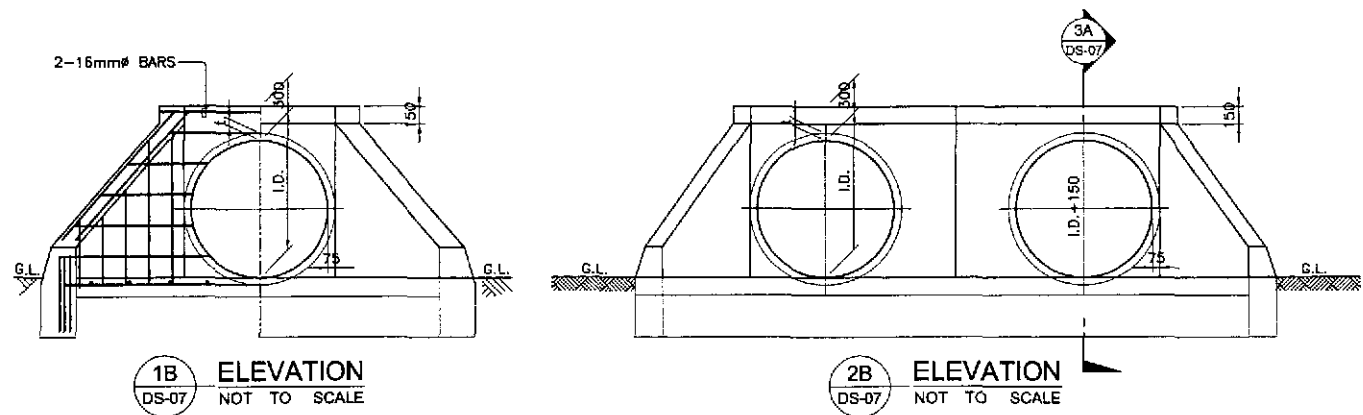


TABLE A (ONE FLARED TYPE HEADWALL 1.5:1)

DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)		SINGLE PIPE				DOUBLE PIPE				TRIPLE PIPE					
INTERNAL DIAMETER (I.D.)	MIN. THICKNESS SHELL (t)	L	E	F	h	AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES		AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES		AREA OF WATERWAY m ²	W (mm)	EST. OF QUANTITIES	
								CONC. m ³	REINF. STEEL kg.			CONC. m ³	REINF. STEEL kg.			CONC. m ³	REINF. STEEL kg.
460	51	710	390	590	0	0.17	610	0.57	25.65	0.32	1380	0.83	37.35	0.51	2150	1.27	\$7.15
610	64	980	530	800	0	0.29	760	0.82	38.46	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	6.76	304.20

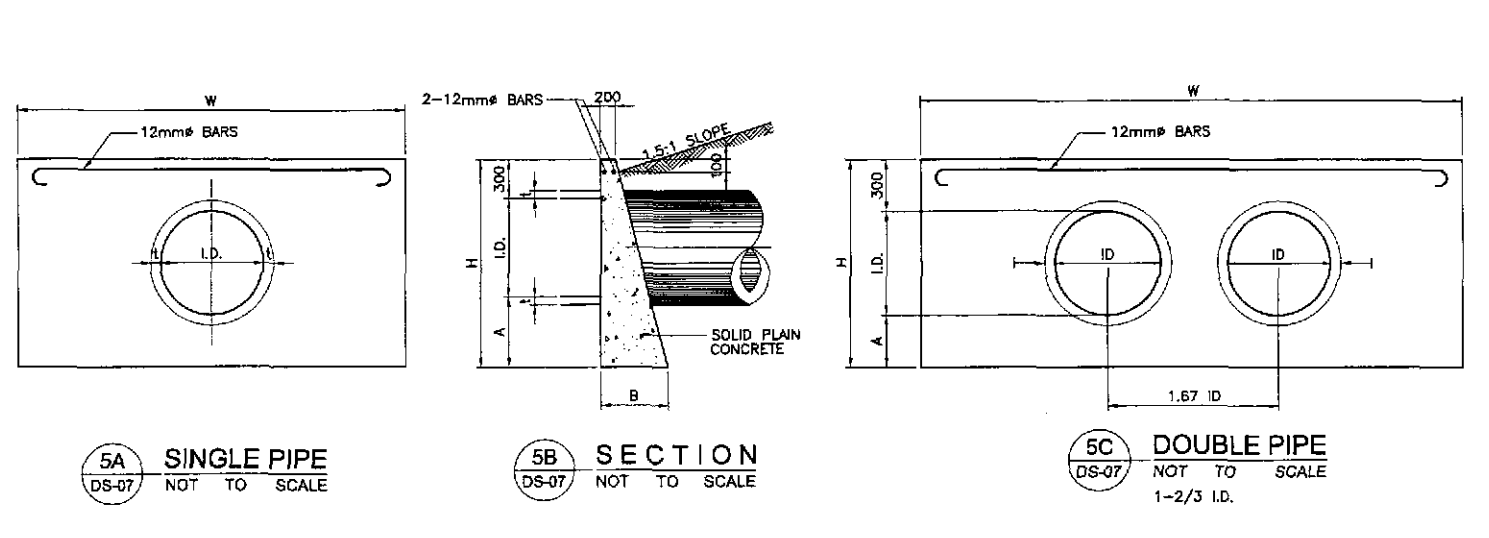
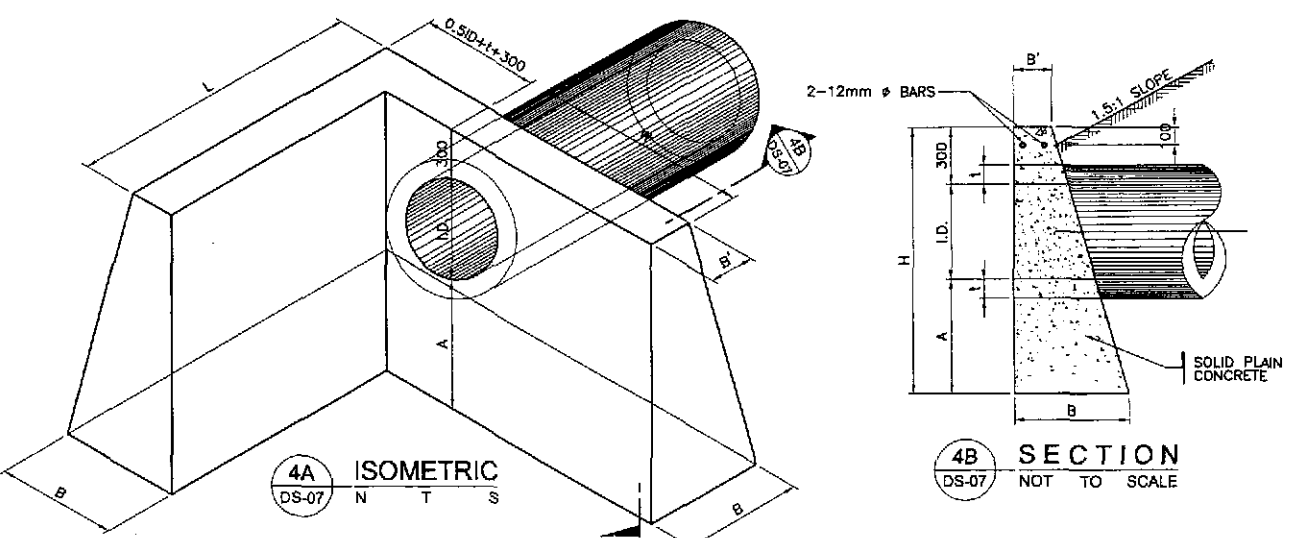
1 FLARED TYPE HEADWALL (SINGLE PIPE) SCALE AS SHOWN
2 FLARED TYPE HEADWALL (DOUBLE PIPE) SCALE AS SHOWN

TABLE C (ONE L-TYPE HEADWALL)

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

TABLE C (ONE STRAIGHT TYPE HEADWALL)

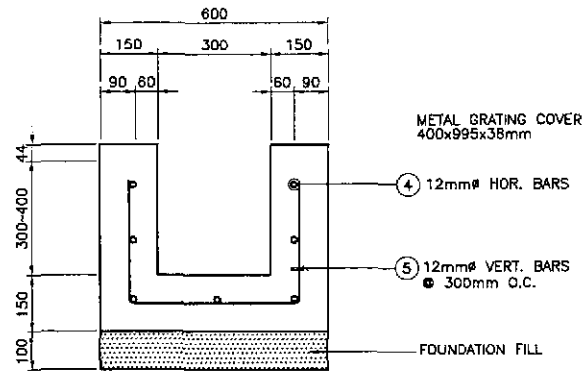
DIAMETER & THICKNESS (mm)		DIMENSIONS (mm)				SINGLE PIPE			DOUBLE PIPE			TRIPLE PIPE				
INTERNAL DIAMETER (I.D.)	MIN. THK. SHELL (t)	A	B	H	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.	W (mm)	AREA OF WATERWAY m ²	CONCRETE m ³	REINF. STEEL kg.
610	64	410	430	1320	2400	0.29	0.87	4.55	3500	0.58	1.20	6.50	4600	0.87	1.51	8.45
910	86	610	600	1820	3800	0.65	2.28	6.68	5200	1.30	3.16	9.52	6800	1.95	3.85	12.36
1070	95	710	780	2080	4300	0.90	3.84	7.57	6050	1.80	5.09	10.67	7900	2.70	6.43	13.95
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	3.53	11.93	15.56	11200	5.43	15.05	19.82



4 L-TYPE HEADWALL NOT AS SHOWN
5 STRAIGHT TYPE HEADWALL NOT AS SHOWN

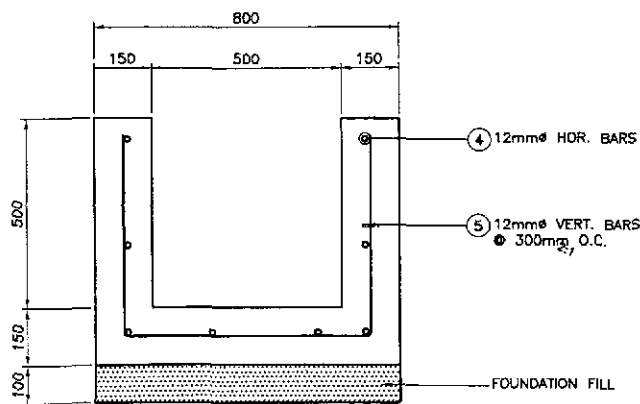
STANDARD REINFORCED CONCRETE HEADWALL FOR RPCC

	DESIGNED: 9/5/02 [Signature] CHECKED: 9/9/02 [Signature] SUBMITTED: 9/16/02 [Signature]	DATE: 9/5/02 SIGNATURE: [Signature] TEAM LEADER: [Signature]		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN OFFICE OF THE SECRETARY	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	SCALE : NOT TO SCALE FULL SIZE A1	SHEET CONTENTS : STANDARD REINFORCED CONCRETE HEADWALL FOR RPCC	SHEET NO. : DS-07
	Submitted By: DANILO C. TRAJANO, Project Director Reviewed By: JOSEFINA M. ALAGAR, Chief, Highways Division Recommended By: GILBERTO S. REYES, OIC, Director IV Recommended By: MANUEL M. BONGAN, Undersecretary Approved By: SIMEDON A. DATUMANONG, Secretary							
	JICA JAPAN INTERNATIONAL COOPERATION AGENCY KATAHIRA & ENGINEERS INTERNATIONAL YEO YACHIYO ENGINEERING CO., LTD.							



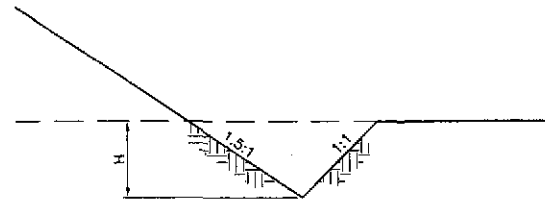
REINFORCED CONCRETE DITCH W/ COVER

1 TYPE BU
DS-08 SCALE: 1:10

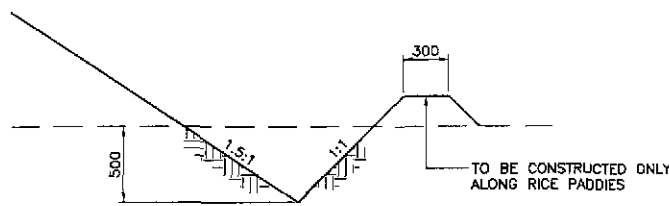


REINFORCED CONCRETE DITCH

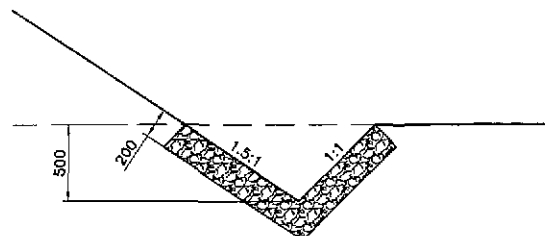
2 TYPE U
DS-08 SCALE: 1:10



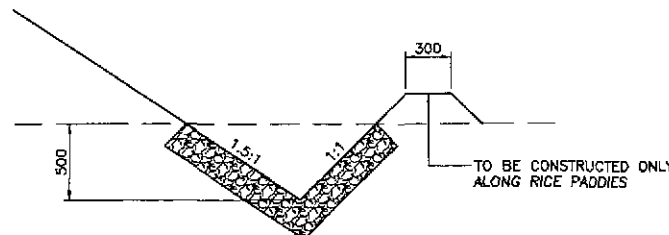
V-SHAPED UNLINED DITCH
TYPE E-4



V-SHAPED UNLINED DITCH
TYPE E-3

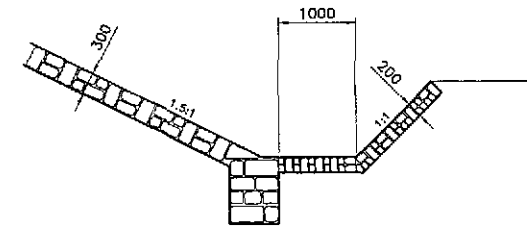


V-SHAPED LINED DITCH
TYPE E-2

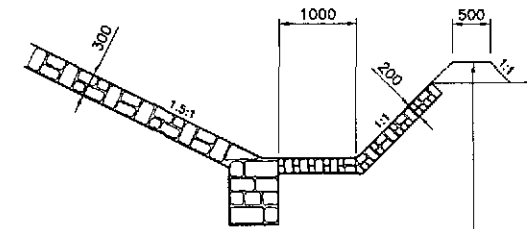


V-SHAPED LINED DITCH
TYPE E-1

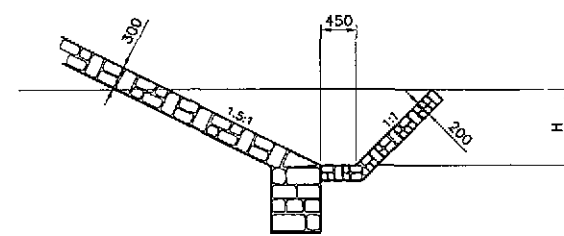
3 TYPE E
DS-08 SCALE: 1:25



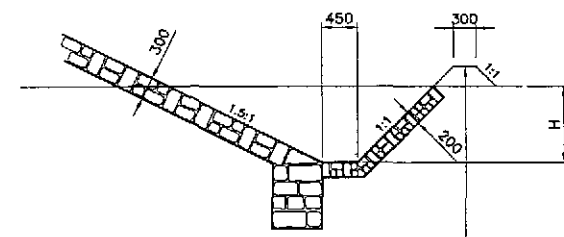
TYPE C-4



TYPE C-3

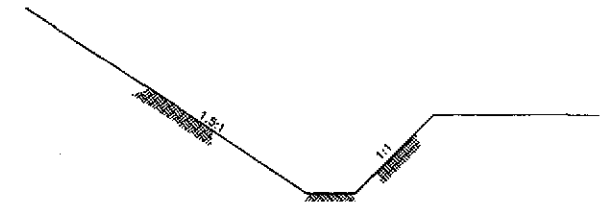


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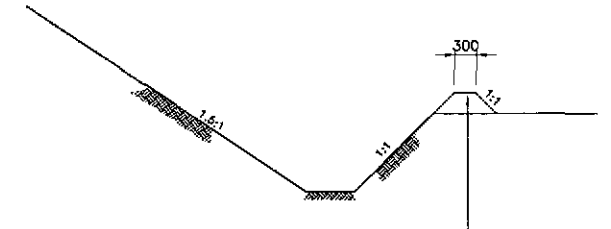


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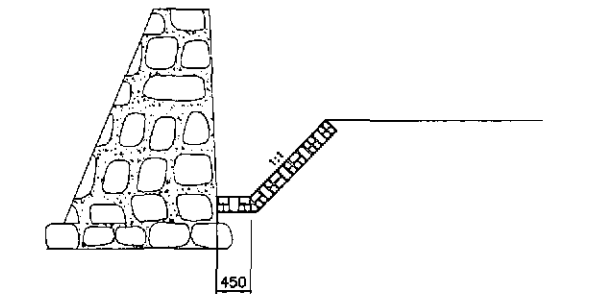
4 TYPE C
DS-08 NOT TO SCALE



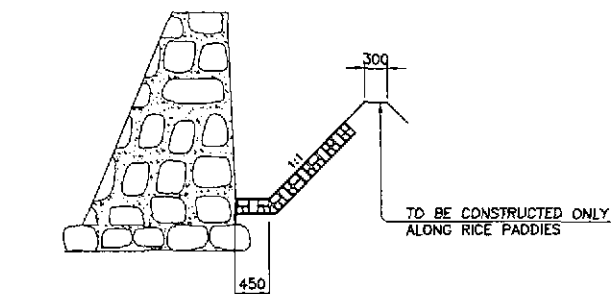
TYPE C-8



TYPE C-7



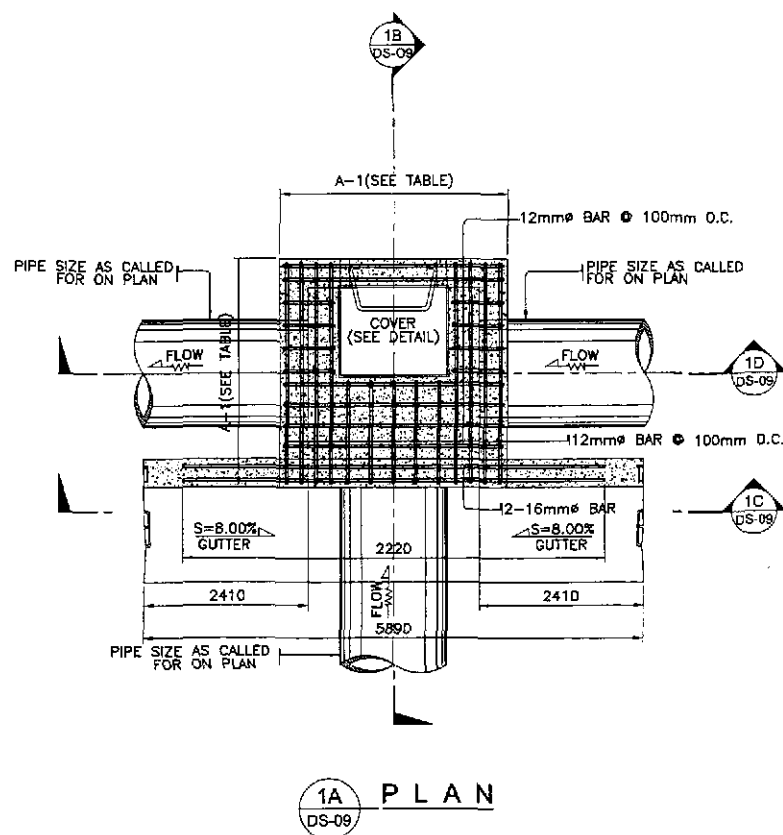
TYPE C-6



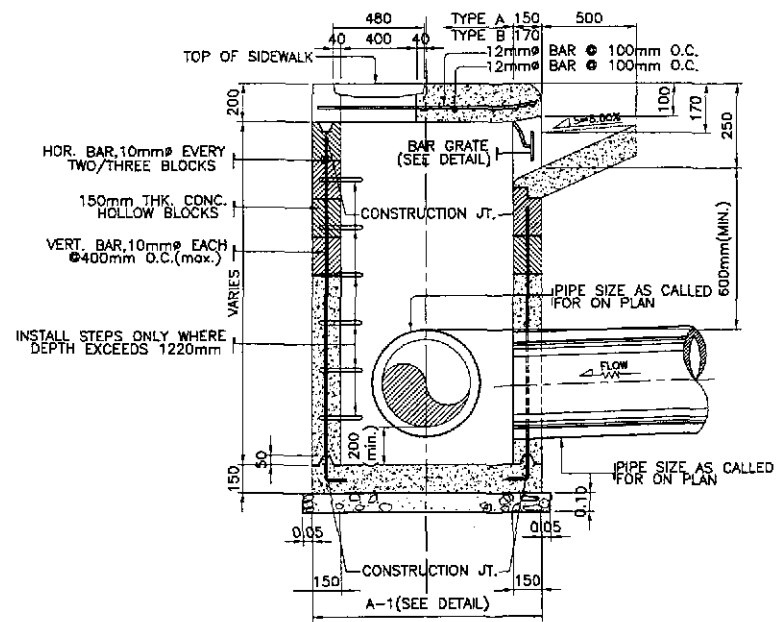
TYPE C-5

STANDARD DRAINAGE DITCHES

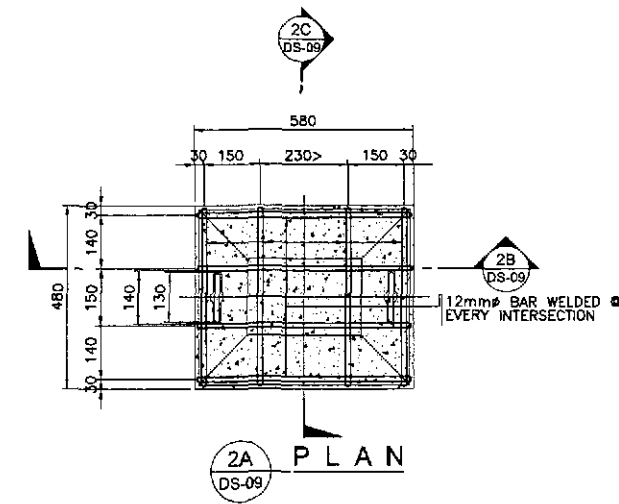
	DATE	SIGNATURE	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :
	DESIGNED	<i>[Signature]</i>	Submitted By:	Reviewed By:	Recommended By:	Approved By:	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG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



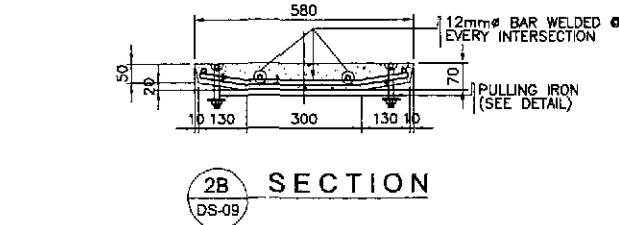
1A PLAN
DS-09



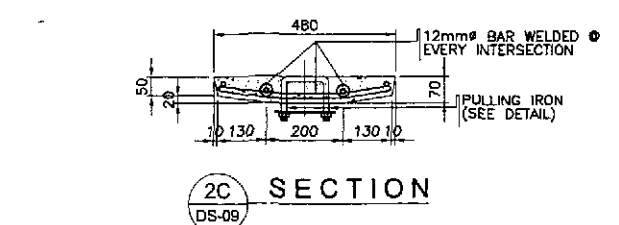
1B SECTION
DS-09



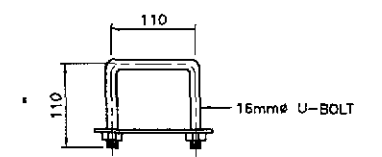
2A PLAN
DS-09



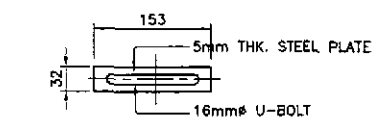
2B SECTION
DS-09



2C SECTION
DS-09

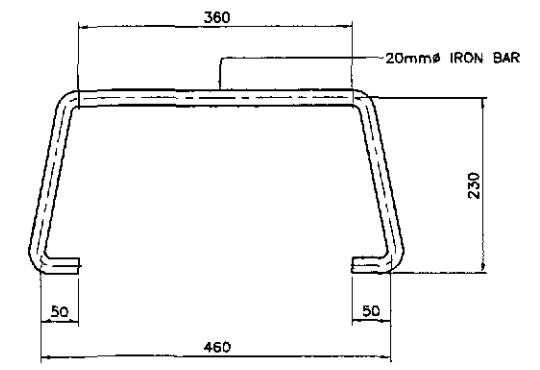


3A PLAN
DS-09



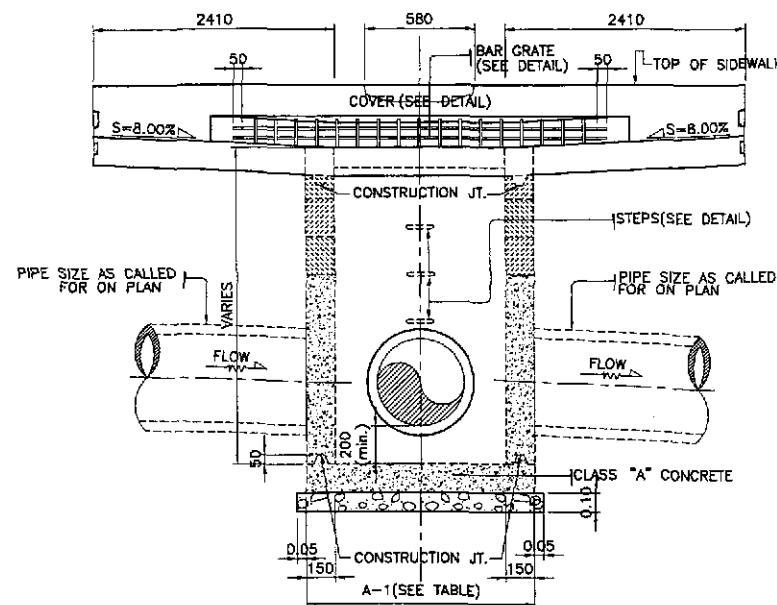
3B ELEVATION
DS-09

3 PULLING IRON DETAIL
SCALE 1:5

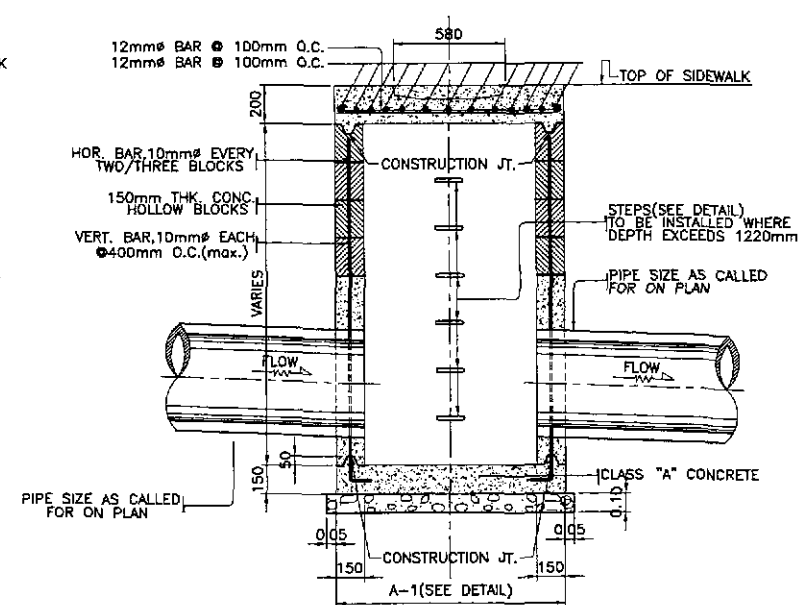


4 STEP
SCALE 1:5

2 CONCRETE COVER DETAIL
SCALE 1:10

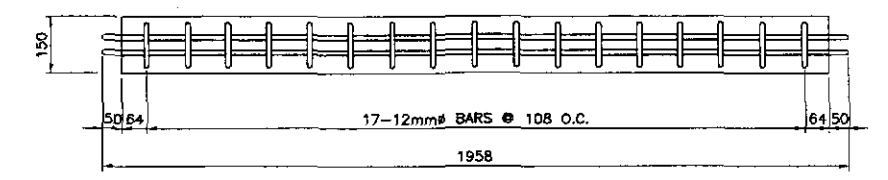


1C SECTION
DS-09 1:20



1D SECTION
DS-09

1 CURB INLET MANHOLE
SCALE 1:20



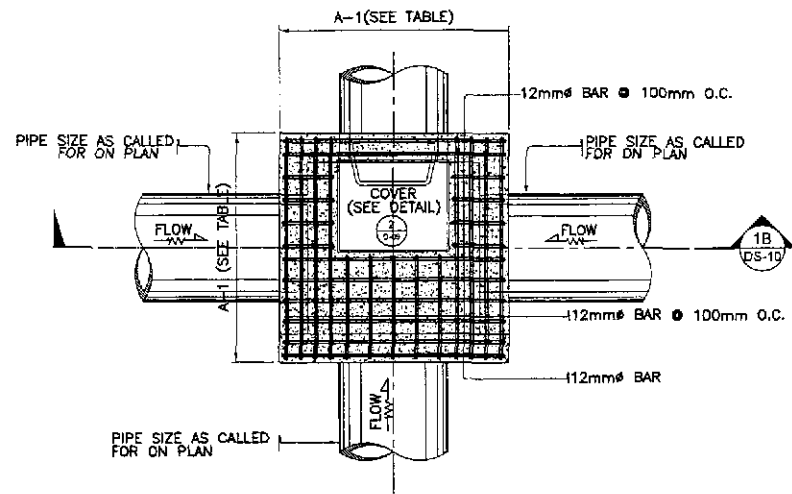
5 DETAIL OF BAR GRATE FOR OPENING OF CURB INLET
SCALE 1:20

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.

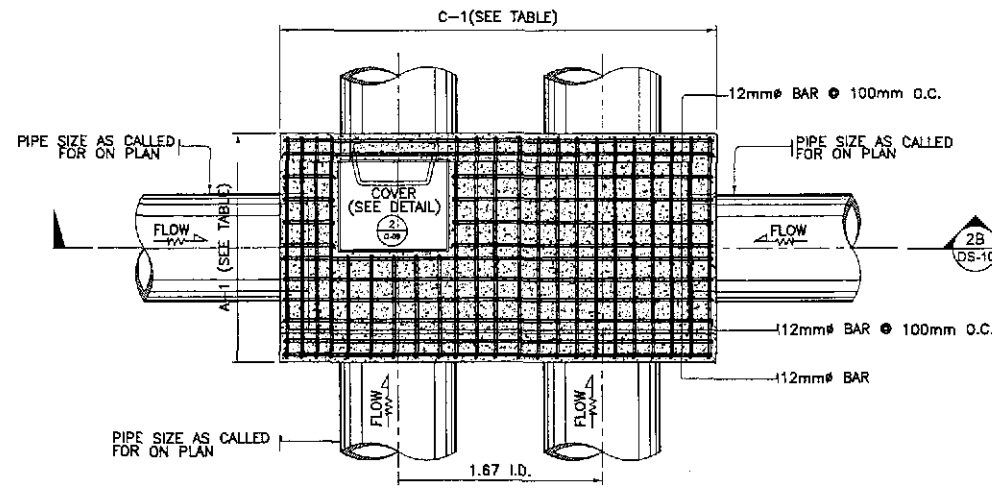
- NOTES:
- ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
 - PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
 - CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
 - CONCRETE HOLLOW BLOCKS OR DRESSED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

DETAILS OF COMBINATION CURB INLET MANHOLE

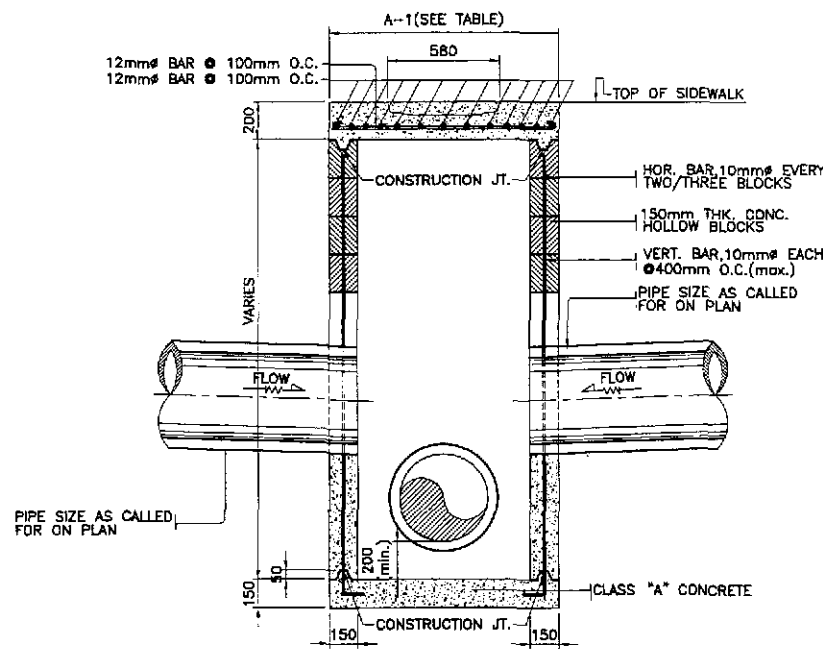
	DATE: 9/10/12 DESIGNED: [Signature] CHECKED: [Signature] SUBMITTED: 9/11/12	SIGNATURE: [Signature] P.J.H. - P.W.D. DANILLO C. TRAJANO Project Director	REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN JOSEFINA M. ALAGAR Chief, Highways Division	OFFICE OF THE SECRETARY Recommended By: GILBERTO S. REYES O.C. Director IV Approved By: SIMEON A. DATUMANONG Secretary	PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	SCALE : AS SHOWN FULL SIZE A1	SHEET CONTENTS : STANDARD COMBINATION CURB INLET MANHOLE	SHEET NO. : DS-09
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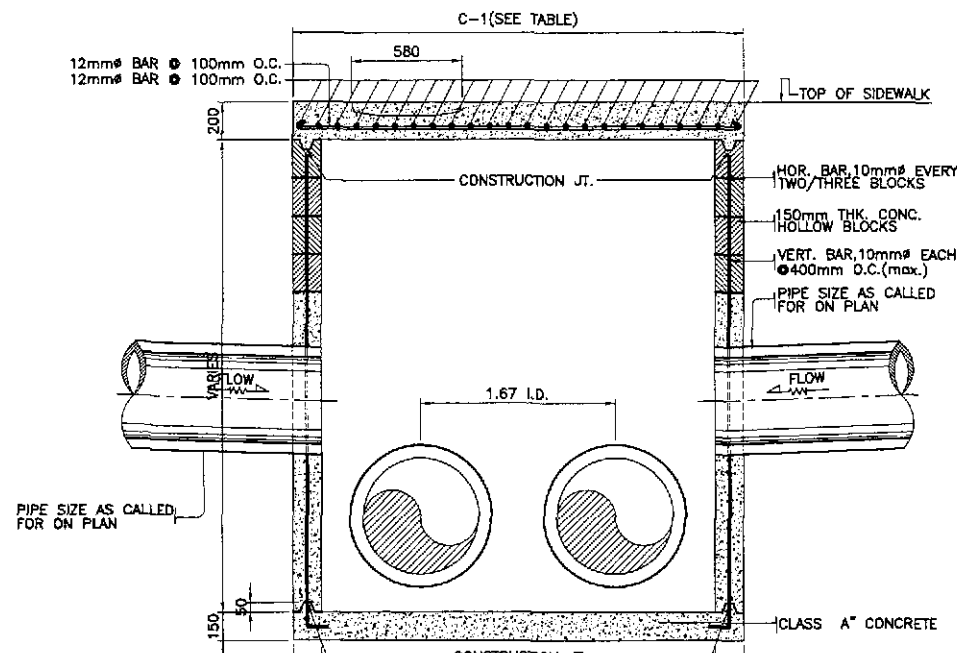
1A PLAN BOX-TYPE MANHOLE (SINGLE PIPE)
DS-10



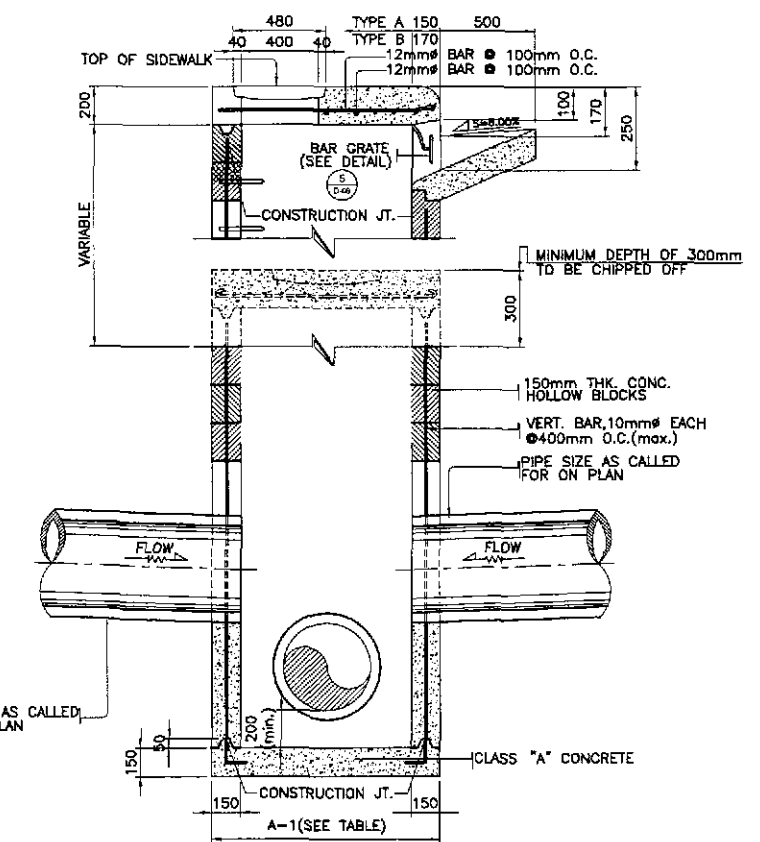
2A PLAN BOX-TYPE MANHOLE (DOUBLE PIPE)
DS-10



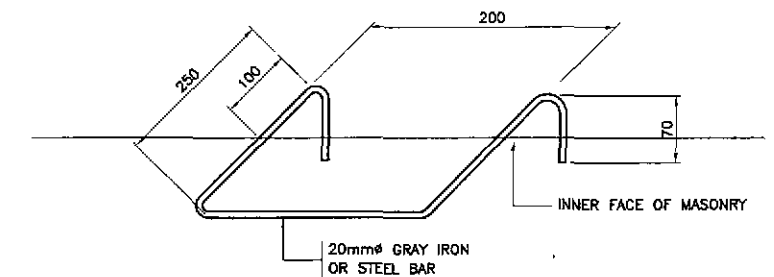
1B SECTION
DS-10



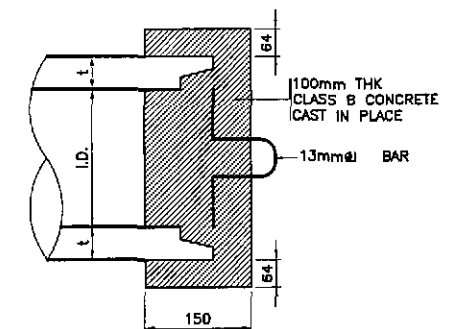
2B SECTION
DS-10



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



4 STD. STEP OR RUNG
DS-10



5 CONCRETE BLOCK PLUG @ SUBSURFACE PIPE
DS-10

NOTES:

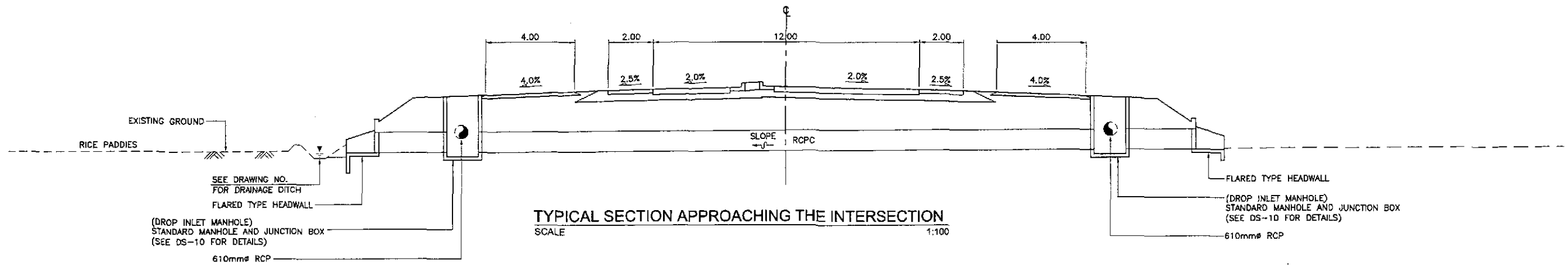
- ALL CONCRETE SHALL BE CLASS "A". EXPOSED EDGES SHALL BE FINISHED WITH SUITABLE EDGER.
- PULLING IRON, STEPS AND BAR GRATE SHALL BE PAINTED WITH ONE COAT OF ZINC CHROMATE.
- CONSTRUCTION JOINTS SHALL CONFORM WITH THE GROOVES OF CONCRETE HOLLOW BLOCKS.
- CONCRETE HOLLOW BLOCKS OR DRESSED ADOBE BLOCKS SHALL HAVE AN AVERAGE COMPRESSIVE STRENGTH OF 6.885MPa.
- IN CONCRETE HOLLOW BLOCKS STRUCTURE, ALL HOLES SHALL BE FILLED WITH CEMENT MORTAR.
- WHERE CONCRETE HOLLOW BLOCKS STRUCTURES ATTAIN A HEIGHT OF 1.20 METER, IT SHALL BE REINFORCED STEEL BARS SPACE AT NOT MORE THAN 0.80 M. O.C. BOTHWAYS.
- INSTALL STEPS ONLY WHERE DEPTH EXCEEDS 1.22 METERS.
- 150 mm BOTTOM SLAB THICKNESS FOR HEIGHT OF 1000 TO 4000mm. AND 200mm. FOR 5000 TO 8000mm IN HEIGHT.
- FROM THE HEIGHT OF 3000 TO 8000mm, THE FIRST 2000mm, FROM THE TOP IS CHB WITH DETAILS FOR 2000mm HEIGHT.
- REINFORCEMENT FOR BOTTOM SLAB ARE ALL 10mm# @ 400 B.W.
- VERTICAL BARS ARE CUT AT HALF POINT FOR EVERY OTHER BAR AT SOLID WALL.
- INSIDE SURFACES AND OUTSIDE SURFACES OF ALL MASONRY SHALL HAVE A PLASTER COAT 1/2" THICK.
- BOX TYPE MANHOLE SHALL NOT BE CONSTRUCTED WITHIN THE RIDING SURFACE.

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

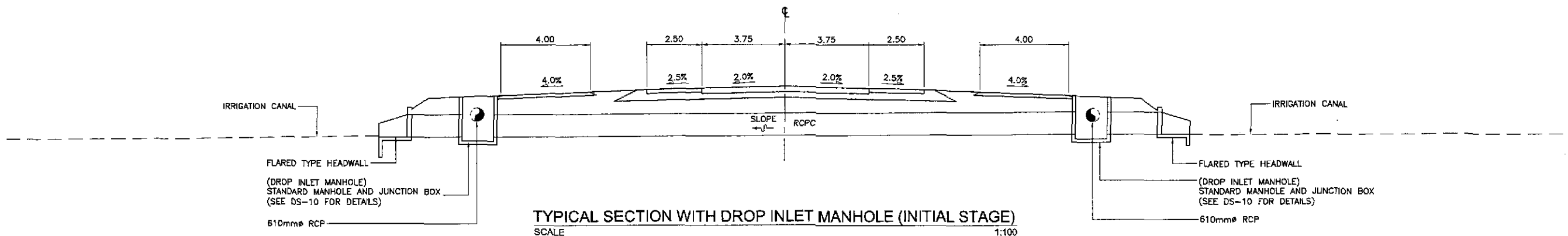
TABLE OF DIMENSION				
TYPE OF CIM	SIZE OF PIPE (mm)	A-1 (m)	C-1 (m)	
T-1	300	1.12	1.92	
T-2	480	1.19	2.26	
T-3	610	1.37	2.69	
T-4	760	1.54	3.11	
T-5	910	1.73	3.55	
T-6	1070	1.90	3.98	
T-7	1220	2.08	4.42	
T-8	1520	2.43	5.27	

SPECIAL JUNCTION BOX MANHOLE

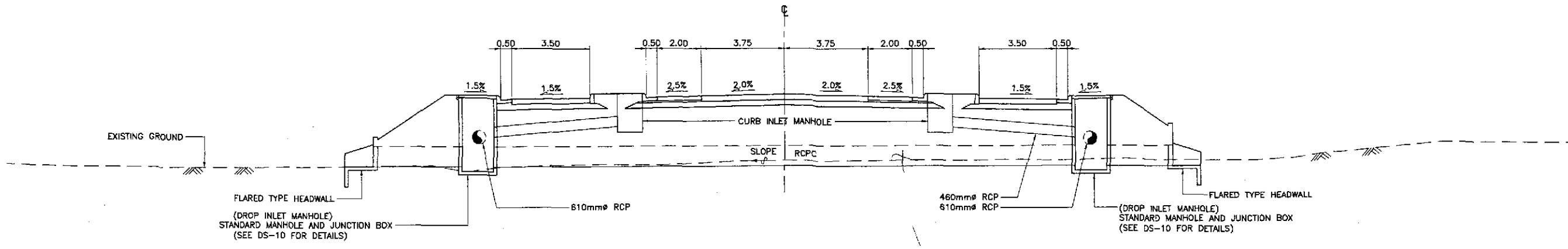
	DESIGNED	DATE	SIGNATURE		PROJECT AND LOCATION :	SCALE :	SHEET CONTENTS :	SHEET NO. :	
	CHECKED	9/19/01	[Signature]		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS	THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Paridel, Cabanatuan and San Jose Bypasses)	AS SHOWN	SPECIAL JUNCTION BOX MANHOLE	DS-10
	SUBMITTED	9/18/01	[Signature]		BUREAU OF DESIGN OFFICE OF THE SECRETARY	SAN JOSE BYPASS	FULL SIZE A1		



TYPICAL SECTION APPROACHING THE INTERSECTION
SCALE 1:100



TYPICAL SECTION WITH DROP INLET MANHOLE (INITIAL STAGE)
SCALE 1:100



TYPICAL SECTION WITH DROP INLET MANHOLE (ULTIMATE STAGE)
SCALE 1:100

		REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS				PROJECT AND LOCATION : THE DETAILED DESIGN STUDY ON UPGRADING INTER-URBAN HIGHWAY SYSTEM ALONG THE PAN-PHILIPPINE HIGHWAY (Plaridel, Cabanatuan and San Jose Bypasses) SAN JOSE BYPASS	SCALE : 1:100 FULL SIZE A1	SHEET CONTENTS : TYPICAL DRAINAGE CROSS-SECTIONS (INITIAL & ULTIMATE STAGE)	SHEET NO. : DS-12	
	DESIGNED: <i>[Signature]</i> 9/7/02 STA. MARIA	Submitted By: P.J.M. - PMD	Reviewed By: JOSEFINA M. ALAGAR Chief, Highways Division	Recommended By: GILBERTO S. REYES OIC, Director IV	Recommended By: (See cover sheet for Signatures) MANUEL M. BONDAN Undersecretary					Approved By: (See cover sheet for Signatures/Approval) SIMEON A. DATUMANONG Secretary
	CHECKED: <i>[Signature]</i> 7/19/02 KINCHIK	DANILLO C. TRAJANO Project Director	JOSEFINA M. ALAGAR Chief, Highways Division	GILBERTO S. REYES OIC, Director IV	MANUEL M. BONDAN Undersecretary					SIMEON A. DATUMANONG Secretary