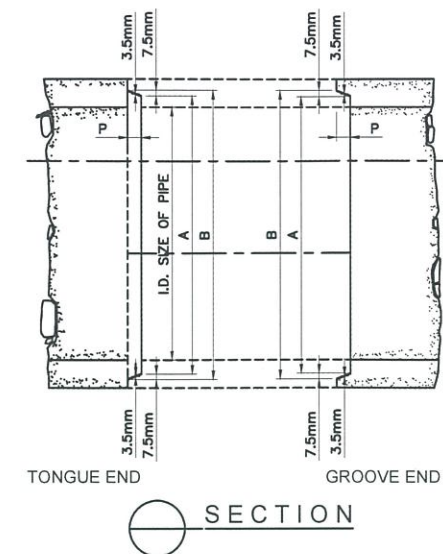
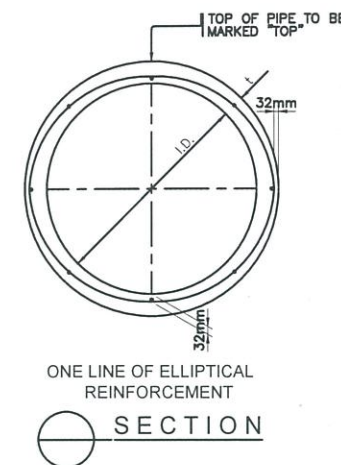
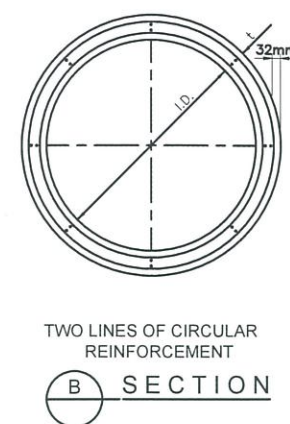
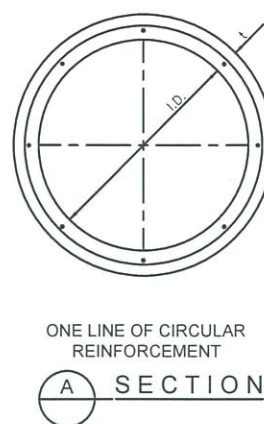
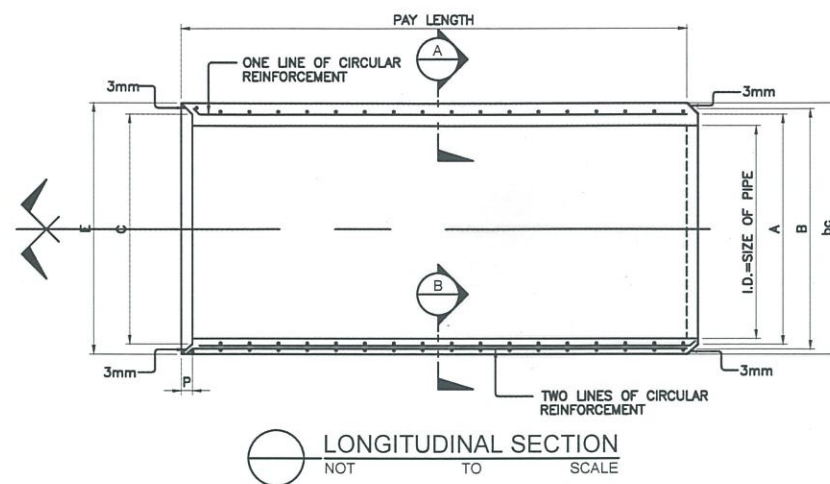




REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BUREAU OF DESIGN, WATER PROJECTS DIVISION
BONIFACIO DRIVE, PORT AREA, MANILA

STANDARD TWO (2) METER REINFORCED CONCRETE PIPE CULVERT



PERMISSIBLE VARIATION :

- INTERNAL DIAMETER (I.D.) OF PIPE SHALL VARY NOT MORE THAN + 1% OR 9.50mm WHICHEVER IS GREATER FROM THE DESIGN DIAMETER.
- WALL THICKNESS - THE WALL THICKNESS SHALL NOT BE LESS THAN THAT SHOWN IN THE DESIGN BY MORE THAN 5% OR 4.80mm WHICHEVER IS GREATER.
- LENGTH OF TWO OPPOSITE SIDES - VARIATION IN LAYING LENGTHS OF TWO OPPOSITE SIDES OF PIPE SHALL NOT EXCEED OF 16mm IN ANY LENGTH OF PIPE.
- LENGTH OF PIPE - THE UNDERRUN IN LENGTH OF A SECTION OF PIPE SHALL NOT BE MORE THAN 10.40mm/m WITH A MAXIMUM OF 13mm IN ANY LENGTH OF PIPE.

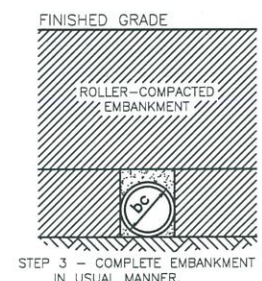
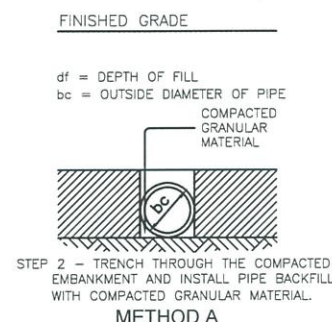
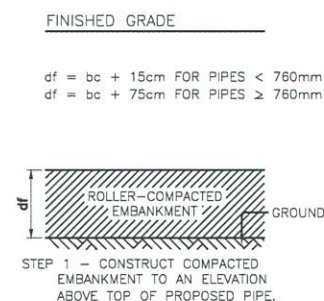
NOTE:

- THE SPACING (CENTER TO CENTER) OF ADJACENT RINGS OF CIRCUMFERENTIAL REINFORCEMENT IN A CAGE SHALL NOT EXCEED 101mm.
- FOR 910mm OR MORE, WALL THICKNESS, THE BELL OR THE SPIGOT OF THE JOINT SHALL CONTAIN AT LEAST ONE CIRCUMFERENTIAL REINFORCEMENT.

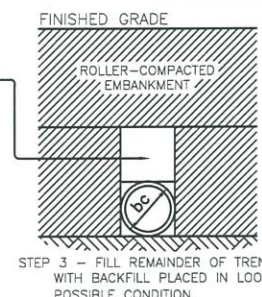
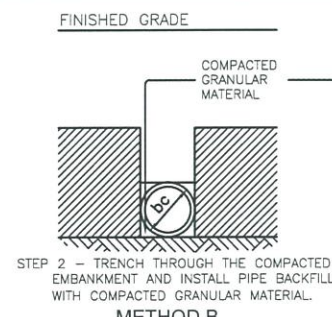
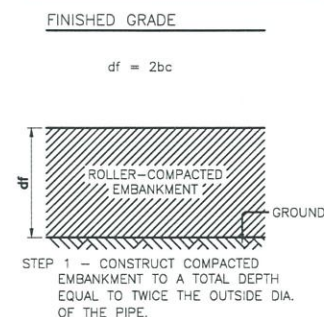
NOTE:

- FOR 63mm OR LESS, WALL THICKNESS PROTECTIVE COVERING SHALL BE 18mm.
- FOR 63mm OR GREATER, WALL THICKNESS CIRCULAR REINFORCEMENT SHALL BE PLACED 35% TO 50% OF WALL THICKNESS FROM THE INNER SURFACE.

REINFORCED CONCRETE PIPE CULVERT DETAILS

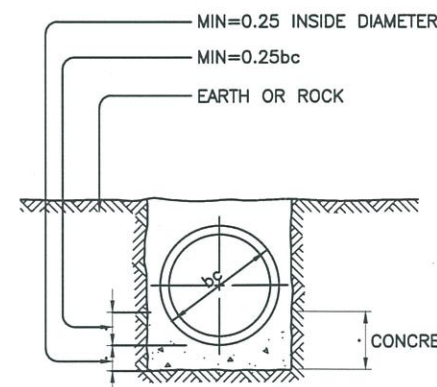


METHOD A

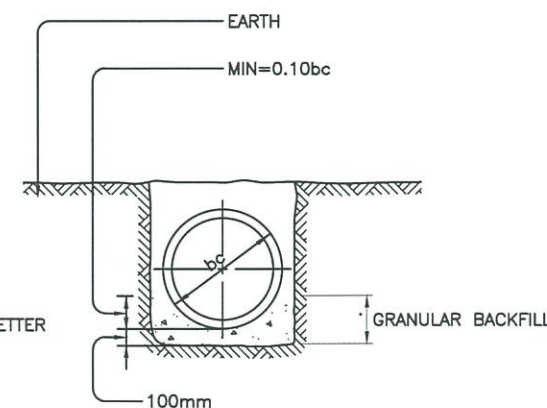


METHOD B

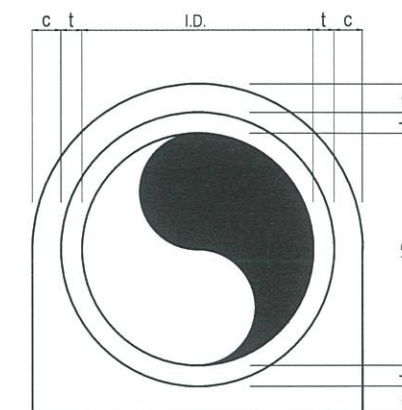
METHODS OF INSTALLATION



CONCRETE CRADLE BEDDING



ORDINARY BEDDING



I.D.	t	C
	MACHINE MADE	HAND MADE
910	86	114
1220	110	150
1520	127	150

COLLARING DETAILS



REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
BUREAU OF DESIGN
WATER PROJECTS DIVISION
BONIFACIO DRIVE, PORT AREA, MANILA

SHEET TITLE:
STANDARD TWO (2) METER
REINFORCED CONCRETE PIPE
CULVERT

SHEET CONTENTS:
REINFORCED CONCRETE PIPE CULVERT
DETAILS, METHODS OF INSTALLATION,
TYPICAL BEDDING FOR CONDUITS
AND COLLARING DETAILS

PREPARED BY:
DESIGN: MARK GERSON P. BARIL
ENGINEER II
CRISSA RICA V. ESPRITU
ENGINEER II
DRAWN: JAN CHRISTOPHER A. TUASON
ENGINEERING ASSISTANT
CHECKED: RICHELIEU FELIPE I. LIM
ENGINEER IV

DATE:

SIGNATURE:

REVIEWED BY:

LEONARDO L. LINGAN
CHIEF, WATER PROJECTS DIVISION
BUREAU OF DESIGN

RECOMMENDING APPROVAL:

LEA N. DELFINADO
OFFICER-IN-CHARGE
BUREAU OF DESIGN

APPROVED BY:

GILBERTO S. REYES
ASSISTANT SECRETARY
FOR TECHNICAL SERVICES

EMIL K. SADRIN, CESO I
UNDERSECRETARY FOR UPMO OPERATIONS
AND TECHNICAL SERVICES

SET NO:

STD

SHEET NO:

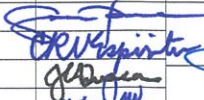
1
2

STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERT (CLASS II)																								
SIZE OF PIPE (mm)		CONCRETE 281 kg/cm ² (4,000 lb/in ²)																						
	M	WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm ² /2m OF PIPE		VERTICAL REINFORCEMENT		MINIMUM REINFORCEMENT cm ² /2m OF PIPE		VERTICAL REINFORCEMENT		MINIMUM REINFORCEMENT cm ² /2m OF PIPE		VERTICAL REINFORCEMENT		STRENGTH TEST REQUIREMENTS kg/m				
								WALL A				WALL B				WALL C								
								CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	INNER CAGE	OUTER CAGE	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	INNER CAGE	OUTER CAGE	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	INNER CAGE	OUTER CAGE					
I.D.	t	A	B	C	E	P	INNER LINE													OUTER LINE	INNER LINE	OUTER LINE	INNER LINE	OUTER LINE
900	0.90	10.20	1003	1022	1010	1029	0.64	6	2.6	6.4	6-8mmø	6-8mmø	5.0	3.0	5.6	6-8mmø	6-8mmø	3.0	3.0	3.4	6-8mmø	6-8mmø	4587	6881
1050	1.05	11.40	1168	1187	1175	1194	0.64	6.8	4	7.6	6-8mmø	6-8mmø	6.4	3.8	7.2	6-8mmø	6-8mmø	4.2	3.0	4.6	6-8mmø	6-8mmø	5352	8028
1200	1.20	12.70	1334	1353	1340	1359	0.64	9	5.4	9.8	6-8mmø	6-8mmø	7.6	4.6	8.4	6-8mmø	6-8mmø	6.0	3.6	6.4	6-8mmø	6-8mmø	6116	9174
1500	1.50	15.20	1664	1683	1670	1690	0.64	12.8	7.6	14	6-8mmø	6-8mmø	10.6	6.4	11.8	6-8mmø	6-8mmø	9.4	5.6	10.2	6-8mmø	6-8mmø	7645	11468

STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERT (CLASS IV)																									
SIZE OF PIPE (mm)		CONCRETE 281 kg/cm² (4,000 lb/in²)																							
	M	WALL THICKNESS (mm)	TONGUE (mm)		GROOVE (mm)		DEPTH (mm)	MINIMUM REINFORCEMENT cm²/2m OF PIPE		VERTICAL REINFORCEMENT		MINIMUM REINFORCEMENT cm²/2m OF PIPE		VERTICAL REINFORCEMENT		MINIMUM REINFORCEMENT cm²/2m OF PIPE		VERTICAL REINFORCEMENT		STRENGTH TEST REQUIREMENTS kg/m					
								WALL A				WALL B				WALL C									
	I.D.	t	A	B	C	E	P	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	INNER CAGE	OUTER CAGE	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	INNER CAGE	OUTER CAGE	CIRCULAR REINFORCEMENT	ELLIPTICAL REINFORCEMENT	INNER CAGE	OUTER CAGE	THREE EDGE BEARING METHOD					
								INNER LINE	OUTER LINE			INNER LINE	OUTER LINE			INNER LINE	OUTER LINE			LOAD TO PROVIDE 0.30MM CRACK	ULTIMATE LOAD				
900	0.90	100	1003	1022	1010	1029	0.64	—	—	—	—	12.6	7.6	14.0	6—8mmø	6—8mmø	6.0	3.6	6.4	6—8mmø	6—8mmø	9174	13761		
1050	1.05	113	1168	1187	1175	1194	0.64	—	—	—	—	14.8	8.8	16.6	6—8mmø	6—8mmø	8.4	5.0	9.4	6—8mmø	6—8mmø	10703	16055		
1200	1.20	125	1334	1353	1340	1359	0.64	—	—	—	—	17.8	10.6	19.8	6—8mmø	6—8mmø	11.0	6.6	12.2	6—8mmø	6—8mmø	12232	18349		
1500	1.50	150	1664	1683	1670	1690	0.64	—	—	—	—	5000 PSI=352 kg/cm²		25.0	15.0	28.0	6—8mmø	6—8mmø	17.4	10.4	19.4	6—8mmø	6—8mmø	15291	22936

NOTE:

THE CLASS OF PIPE REPRESENT THE MINIMUM D-LOAD NEEDED TO PRODUCE A 0.30 MILLIMETER CRACK ON A THREE EDGE BEARING TEST W/C IS DESIGNATED IN ASTM-C76 OR AASHTO M170 STRENGTH TEST REQUIREMENTS PER CLASS.

 REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS BUREAU OF DESIGN WATER PROJECTS DIVISION BONIFACIO DRIVE, PORT AREA, MANILA	SHEET TITLE:	SHEET CONTENTS:	PREPARED BY:	DATE:	SIGNATURE:	REVIEWED BY:	RECOMMENDING APPROVAL:	APPROVED BY:	SET NO:	SHEET NO:		
	STANDARD TWO (2) METER REINFORCED CONCRETE PIPE CULVERT	STANDARD STRENGTH REINFORCED CONCRETE PIPE CULVERT DIMENSIONS, REBAR SCHEDULE, CONCRETE STRENGTH AND TEST REQUIREMENTS (CLASS II AND IV)	DESIGN: MARK GERSON P. BARIL ENGINEER II CRISSA RICA V. ESPRITU ENGINEER II				LEONARDO L. LINGAN CHIEF, WATER PROJECTS DIVISION BUREAU OF DESIGN	LEA N. DELEINADO OFFICER-IN-CHARGE BUREAU OF DESIGN	GILBERTO S. REYES ASSISTANT SECRETARY FOR TECHNICAL SERVICES	EMIL K. SADAN, CESO I UNDERSECRETARY FOR UPMO OPERATIONS AND TECHNICAL SERVICES	STD	2
			DRAWN: JAN CHRISTOPHER A. TUASON ENGINEERING ASSISTANT CHECKED: RICHIELEU FELIPE I. LIM ENGINEER IV									