

NORMAL EARTH FOUNDATION

Culverts less than d = 900 mm x = D + 600 mm

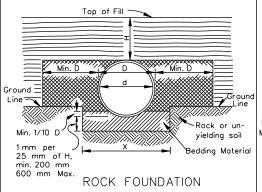
Culverts where d = 900 mm and over x = D + 900 mm

Method "A" Pipe Bedding shall be used as follows unless otherwise noted on plans:

To determine "D" for Elliptical Concrete Pipe, use the larger dimension in the "Span-Rise" designation.

RIGID PIPE

When H is less than or equal to 9.0 meters (No projection of pipe above ground line.)



Bedding. Material Min. 1/10 Firm Bearing Soil or depth FOUNDATION SOFT, YIELDING, OR

OTHERWISE UNSUITABLE MATERIAL

When H is less than or equal to 9.0 meters (Pipe projection above ground line.)

FLEXIBLE PIPE

As shown on tables

H = Height of cover measured from top of drainage structure to finished grade.

Bedding material in accordance with Section 302 of the Road and Bridge Specifications Backfill material in accordance with Section 302 of the Road and Bridge Specifications

Embankment

Sheet 1 of 3

INSTALLATION OF PIPE CULVERTS AND STORM SEWERS

PIPE BEDDING - METHOD "A"

SPECIFICATION REFERENCE 302 303

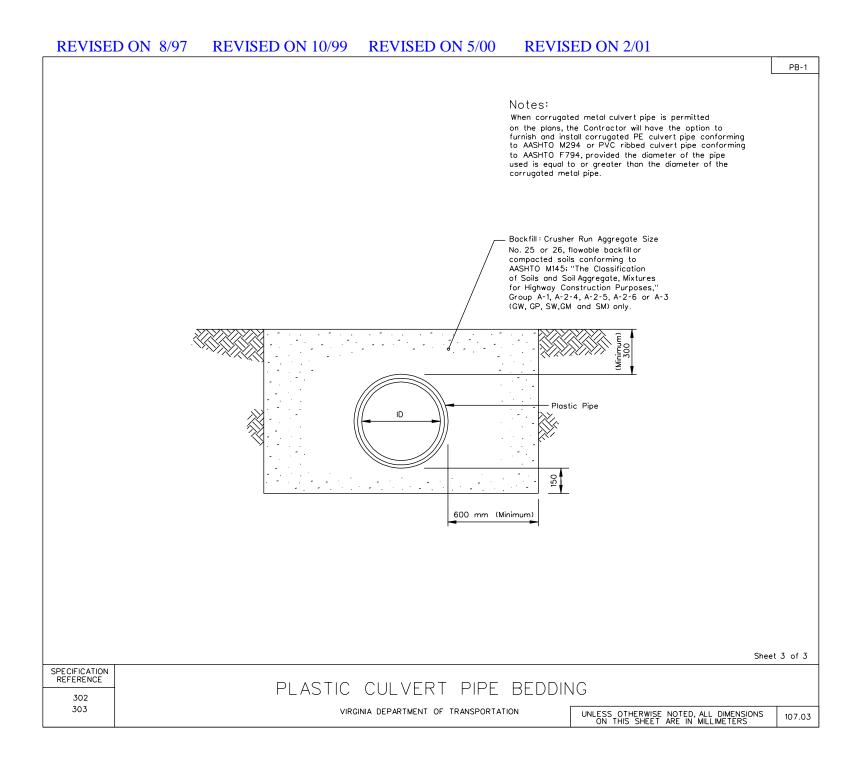
107.01

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

VIRGINIA DEPARTMENT OF TRANSPORTATION

REVISED ON 5/00 REVISED ON 10/99 REVISED ON 2/01

NO PROJECTION OF PIPE ARCH ABOVE GROUND LINE Top of fill ∰ Min.S \Earth Bedding Material -Beddina Material Min. B/4 Firm bear-Min. B/4 100 mm Bedding ing soil or depth shown Material yielding soil on plans * 200 mm FOUNDATION SOFT, YIELDING, OR NORMAL EARTH FOUNDATION ROCK FOUNDATION OTHERWISE UNSUITABLE MATERIAL PIPE ARCH PROJECTION ABOVE GROUND LINE Top of fill Top of fill Min.S Min.S Ground Earth Min. Bedding Material Min. B/4 Min. B/4 Rock or un Bedding yielding soil 100 mm Bedding Material Material * 200 mm Firm bearing soil or depth shown on plans. * 200 mm FOUNDATION SOFT, YIELDING, OR NORMAL EARTH FOUNDATION ROCK FOUNDATION, OTHERWISE UNSUITABLE MATERIAL Bedding material in accordance with Section 302 of the Road and Bridge Specifications Backfill material in accordance with Section 302 of the Road and Bridge Specifications - Embankment X = S + 900 mm for S greater than 875 mm X = S + 600 mm for S less than 875 mm H - Height of cover measured from top of drainage structure to finished grade. Sheet 2 of 3 SPECIFICATION REFERENCE INSTALLATION OF PIPE CULVERTS AND STORM SEWERS PIPE ARCH BEDDING 302 303 UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS VIRGINIA DEPARTMENT OF TRANSPORTATION 107.02



REVISED ON 2/01

PC - 1	CONCRETE PIPE CULVERT CRUSHING STRENGTH (KN PER METER ULTIMATE STRENGTH, OR CLASS)							
DIAMETER	AREA			METHOD	A BEDDING			
		MAXIMUM HEIGHT OF COVER IN METERS						
(mm)	(m ²)	STRENGTH OR CLASS						
		NON REINF.	III	IV	V			
300	0.07	4.2 (26.5)	4.2	5.8	8.8			
375	0.11	4.2 (31.0)	4.2	5.8	8.8			
450	0.1 6	4.2 (35.0)	4.2	6.1	8.8			
525	0.22	4.0 (39.5)	4.2	6.1	8.8			
600	0.29	4.0 (44.0)	4.2	6.1	8.8			
675	0.37		4.2	6.1	8.8			
750	0.46		4.2	6.1	8.8			
825	0.55		4.2	6.1	8.8			
900	0.66		4.2	6.1	9.1			
1050	0.89		4.2	6.4	9.1			
1200	1,1 7		4.2	6.4	9.1			
1350	1.48		4.2	6.4	9.1			
1500	1.82		4.2	6.4	9.1			
1650	2.21		4.2	6.4	9.1			
1800	2.63		4.2	6.4	9.1			
1950	3.08		4.2	6.4	9.1			
2100	3.57		4.2	6.4	9.1			
2250	4.10		4.2	6.4	9.1			
2400	4.67		4.2	6.4	9.1			
2550	5.27		4.2	6.4	9.1			
2700	5.91		4.2	6.4	9.1			

Heights of cover shown in table are for finished construction.

To protect pipe during construction, minimum heights of cover prior to allowing construction traffic to cross installation are to be 2 or 900 mm whichever is greater. This cover shall extend the full length of the pipe culvert. The approach fill ramp is to extend a minimum of 10(Dia.+900 mm) on each side of the culvert, or to the intersection with a cut.

Minimum finished height of cover to be Dio or 600 mm whichever is greater, except pipe under entrances and median crossovers where a 230 mm min. will be permitted.

For Height of Cover greater than 9.0 meters, a special design concrete pipe using Method A bedding and in accordance with section 105 of the specifications is to be utilized.

Sheet 1 of 17 CONCRETE PIPE CLASS TABLE FOR H-18 LIVE LOAD SPECIFICATION REFERENCE

302 232

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN METERS

VIRGINIA DEPARTMENT OF TRANSPORTATION

	HORIZONTAL INS	TALLATION	FSPANH RISE			
EQUIVALENT		MAX. HEIGHT OF COVER IN METERS				
ROUND SIZE	SPAN X RISE	0.3 - 3.9	4.00 - 6.4			
(mm)	(mm)	HE - III	HE - IV			
450	575 X 365	1	1			
600	770 X 490					
675	865 X 550					
750	960 X 610					
825	1055 X 670					
900	1150 X 730	ا ا	 ဗ			
975	1250 X 795	BEDDING	BEDDING			
1050	1345 X 855		 			
1200	1535 X 975	l I				
1350	1730 X 1095	WE THOD				
1500	1920 X 1220					
1650	2110 X 1340					
1800	2305 X 1465					
1950	2495 X 1585					
2100	2690 X 1705	<u> </u>	↓			

1								
VERTICAL	L INSTALLATION	SPAN F	RISE	PC 1				
	MAX. HEIGHT OF COVER IN METERS							
SPAN X RISE	0.3 - 3.9	4.0 - 6.4	6.5 - 8.8	8.9 - 12.2				
(mm)	VE - III	VE - IV	VE - V	VE - V				
	1	1	1	1				
730 X 1150	()	(2)	(2	· · ·				
795 X 1250	BEDDING	BEDDING	BEDDING —	BEDDING				
855 X 1345	BE							
975 X 1535								
1095 X 1730		METHOD	METHOD	ME THOD				
1220 X 1920								
1340 X 2110								
1465 X 2305								
1585 X 2495								
1705 X 2690								

Heights of cover shown in table are for finished construction.

To protect pipe during construction, minimum heights of cover prior to allowing construction traffic to cross installation are to be 2 or 900 mm whichever is greater.

This cover shall extend the full length of the pipe culvert. The approach fill ramp is to extend a minimum of 10(Span • 900 mm) on each side of the culvert or to the intersection with a cut. Minimum finished height of cover to be Span or 600 mm whichever is greater, except pipe under entrances and median crossovers where a 230 mm minimum will be permitted.

Sheet 2 of 17

SPECIFICATION REFERENCE	ELLIPTICAL CONCRETE PIPE		
302 232	TABLE FOR H-18 LIVE LOAD		
232	VIRGINIA DEPARTMENT OF TRANSPORTATION	UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN METERS	107.05

- 5		С	ORRUGA				mm x 1 Er limits in		CORRUG	ATIONS		MINIMUM SHEET THICKNESS FOR ENTRANCES WITH LESS THAN 0.3 METER COVER.		PC-1		
DIAMETER (mm)	(m ²)				SHEET TH	HICKNESS IN	MILLIMETERS	3				SS SES AN				
PIPE D (m	AREA	1.	63	2.	.01	2	.77	3.	.51	4.	27	IMUM CKNE TRAN SS TI	Notes:			
Ē	₹	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	NE ERS 등	Cover he	ights indicated in		
300	0.07	28.0		30.8								1.63	tables ar construc	e for finished		
375	0.11	21.0	22.5	24.4		31.7		32.9				1.63		ct pipe during		
450	0.16	14.3	18.6	16.7	20.4	21.6	26.2	27.1	27.4	28.6		1.63	construct	tion, minimum heig		
525	0.22	10.9	16.1	12.5	17.3	15.5	22.5	18.9	23.4	22.5	24.7	2.01		to be as follows allowing construct		
600	0.29	8.8	14.0	10.0	15.2	12.2	19.8	14.3	20.7	16.7	21.6	2.77	traffic to	cross installatio		
675	0.37	7.9	12.5	8.5	13.4	10.0	17.3	11.6	18.3	13.4	19.2			Min Cover Height		
750	0.46	7.0	11.3	7.6	12.2	8.5	15.8	9.7	16.4	10.9	17.0	Pipe Dia	meter	Min. Cover Height During Construction		
825	0.55	6.4	10.0	7.0	10.9	7.6	14.3	8.5	14.9	9.4	15.5					
900	0.66	6.1 5.8	9.1	6.4	10.0	7.0 6.4	13.1 12.8	7.9 6.7	13.7 13.7	8.5 7.3	14.3	300 mm t	o /50 mm	450 mm		
1200	1.17	5.5	10.3 9. 1	5.8	12.2 11.6	5.8	11.9	6.1	12.5	6.4	13. 1	900 mm a	ınd above	<u>Diameter</u> 2		
1350	1.48	3.3	9. 1	5.5	9.7	5.8	11.6	5.8	11.9	6.1	12.2	L				
1500	1.82			3.3	9.7	5.5	10.3	5.8	11.6	5.8	11.9	Minimum finished height of cover to be 1/8 Dia or 300 mm, whichever is greater, except pipe under entrances and median crossovers where a 230 mm minimum will be permitted for pipe up to 600 mm diameter in which case the tabulated minimum sheet thickness for				
1650	2.21					5.5	10.5	5.5	10.3	5.5	11.3					
1800	2.63							5.5	7.9	5.5	10.0					
1950	3.08							0.0	7.3	5.5	7.9					
2100	3.58									5.2	6. 1					
CORRU	JGATEC	STEEL	PIPE -	75 mm	x 25	mm an	d 125 m	m x 2	5 mm (CORRUG	ATIONS	cover shall	l be used.	nan 300 mm		
<u>e</u>	_			MAXIMUM	HEIGHT OF	COVER LIM	TS IN METER	!S		MAXIMUM HEIGHT OF COVER LIMITS IN METERS *The cover shall extend full length of the pipe. The						
Ξ.	\ \(\hat{\chi} \)											approach fill is to extend a				
ய] `E			SHEE	T THICKNESS	S IN MILLIME	TERS					approach t		end a		
JAME.	4 (m ²)			SHEE	T THICKNESS	IN MILLIME	TERS					approach (minimum (of (15) Diam	end a eters on		
E DIAMETER (mm)	REA (m.	1.	63		T THICKNESS		TERS .77	3	.51	4.	27	approach t minimum d each side	of (15) Diam	end a eters on cture, or to		
PIPE DIAME'	AREA (m		63 ELONGATED	2		2			.51		27	approach t minimum d each side the interse	of (15) Diam of the stru ection with	end a neters on cture, or to a cut.		
PIPE DIAME	99.0 98.0			2	.01	2	.77					approach t minimum o each side the interso Allowable in the table	of (15) Diam of the stru ection with cover heigles to the le	end a seters on cture, or to a cut. nt, as indicated oft, in excess		
PIPE	AREA	CIRCULAR	ELONGATED	2 CIRCULAR	.01	2 CIRCUL AR	.77 ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	approach to minimum of each side the intersection Allowable in the table of 30 meters.	of (15) Diam of the stru ection with cover heigles to the le ers are to	end a leters on cture, or to a cut. nt, as indicated		
900 BE	99.0 ARE A	CIRCULAR 10.3	ELONGATED 16.1	2 CIRCUL AR 11.6	.01 ELONGATED 20.1	2 CIRCUL AR 14.3	.77 ELONGATED 28.9	CIRCULAR 17.3	ELONGATED 34.7	CIRCUL AR 20. 1	ELONGATED 39.6	approach to minimum of each side the intersormal of the table of 30 mete special desidetalled for the table of table o	of (15) Diam of the stru ection with cover heigl es to the le ers are to ign installati undation de	end a leters on cture, or to a cut. nt, as indicated lft, in excess be considered as ons and will requitermination.		
900 1050	0.89 0.89	10.3 8.2	ELONGATED 16.1 13.7	2 CIRCUL AR 11.6 9.1	.01 ELONGATED 20.1 17.0	2 CIRCUL AR 14.3 10.9	.77 ELONGATED 28.9 21.9	CIRCUL AR 17.3 12.8	ELONGATED 34.7 25.6	CIRCUL AR 20. 1 14.6	39.6 29.5	approach to minimum of each side the intersormal formal table of 30 meters apecial desided for the formal f	of (15) Diam of the stru ection with cover heiglest to the lears are to ign installation details of elongo	end a neters on cture, or to a cut. nt, as indicated ift, in excess be considered as ons and will requi		
900 1050 1200	0.66 0.89 1.17	CIRCUL AR 10.3 8.2 7.3	16.1 13.7 11.9	2 CIRCUL AR 11.6 9.1 7.9	.01 ELONGATED 20.1 17.0 14.9	2 CIRCUL AR 14.3 10.9 9.1	.77 ELONGATED 28.9 21.9 18.3	17.3 12.8 10.3	34.7 25.6 20.7	20. 1 14.6 11.6	ELONGATED 39.6 29.5 23.1	approach to minimum of each side the intersort Allowable in the table of 30 mete special desidetailed for For details sheet 17 of	of (15) Diam of the stru ection with cover height es to the lears are to ign installation details of elongo f 17.	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as lons and will requi termination. leted pipe see		
900 1050 1200 1350	0.66 0.89 1.17 1.48	CIRCUL AR 10.3 8.2 7.3 6.7	16.1 13.7 11.9 10.6	21 CIRCUL AR 11.6 9.1 7.9 7.0	.01 ELONGATED 20.1 17.0 14.9 13.4	2 CIRCUL AR 14.3 10.9 9.1 7.9	.77 ELONGATED 28.9 21.9 18.3 15.8	17.3 12.8 10.3 8.5	25.6 20.7 17.3	20. 1 14.6 11.6 9.4	39.6 29.5 23.1 19.2	approach to minimum of each side the intersort Allowable in the table of 30 mete special desidetailed for For details sheet 17 of	of (15) Diam of the stru ection with cover heights to the lears are to ign installation defined for 17.	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as ons and will requi termination. Inted pipe see tables shown		
900 1050 1200 1350 1500	0.66 0.89 1.17 1.48	CIRCUL AR 10.3 8.2 7.3 6.7 6.1	16.1 13.7 11.9 10.6 9.4	2 CIRCUL AR 11.6 9.1 7.9 7.0 6.4	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9	2 CIRCULAR 14.3 10.9 9.1 7.9 7.0	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3	17.3 12.8 10.3 8.5 7.6	34.7 25.6 20.7 17.3	20. 1 14.6 11.6 9.4 8.2	ELONGATED 39.6 29.5 23.1 19.2 16.7	approach to minimum of each side the intersort Allowable in the table of 30 meters apecial designed for the allow ore based of 4.8 MPa. Alloware based of 4.8 MPa. Alloware based of the minimum of the alloware based on th	of (15) Diam of the stru ection with cover heights to the learns are to ign installation derills of elongo fit?	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as ons and will requi letermination. ated pipe see tables shown adulus of light		
900 1050 1200 1350 1500	0.66 0.89 1.17 1.48 1.82 2.21	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8	16.1 13.7 11.9 10.6 9.4 8.5	2 CIRCUL AR 11.6 9.1 7.9 7.0 6.4 6.1	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9	2 CIRCULAR 14.3 10.9 9.1 7.9 7.0 6.7	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3	17.3 12.8 10.3 8.5 7.6 7.0	34.7 25.6 20.7 17.3 15.5 14.3	20. 1 14.6 11.6 9.4 8.2 7.6	39.6 29.5 23.1 19.2 16.7 15.2	approach to minimum of each side the intersort Allowable in the table of 30 meters apecial desided for the allow ore based of 4.8 MPa. A criteria are	of (15) Diam of the stru ection with cover heigles to the lears are to ign installating of 17. able cover on a soil mill other desin accorda	end a neters on cture, or to a cut. Int, as indicated left, in excess be considered as ons and will requi termination. ated pipe see tables shown addulus of ign nce with the		
900 1050 1200 1350 1500 1650 1800 1950 2100	0.66 0.89 1.17 1.48 1.82 2.21 2.63	CIRCUL AR 10.3 8.2 7.3 6.7 6.1 5.8 5.8	16.1 13.7 11.9 10.6 9.4 8.5 7.9	22 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 11.0	2 CIRCUL AR 14.3 10.9 9.1 7.9 7.0 6.7 6.1	28.9 21.9 18.3 15.8 14.3 13.4	17.3 12.8 10.3 8.5 7.6 7.0 6.7	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2	20. 1 14.6 11.6 9.4 8.2 7.6 7.0	39.6 29.5 23.1 19.2 16.7 15.2 14.0	approach in minimum deach side the intersum Allowable in the table of 30 mete special desidetailed for For detail sheet 17 of The alloware based 4.8 MPa. A criteria are AASHTO Sp	of (15) Diam of the stru ection with cover heigi es to the lears are to ign installation defined as of the cover on a soil mill other desi in accorda ecifications	end a leters on cture, or to a cut. Int, as indicated lett, in excess be considered as ons and will requ termination. Inted pipe see tables shown adulus of letting with the and VDOT		
900 1050 1200 1350 1500 1650 1800 1950 2100 2250	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10	CIRCUL AR 10.3 8.2 7.3 6.7 6.1 5.8 5.8	16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 11.0 10.0 9.1 8.5 7.9	2 CIRCULAR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 12.2 11.9 11.6	17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.4 6.1	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2	approach i minimum (each side each side the interst Allowable in the table of 30 mete special desi detailed for For detai sheet 17 oil The allow are based (4.8 MPa. Al criteria AASHTO Sp Modification	of (15) Diam of the stru ection with cover heigles to the lears are to ign installation de ils of elongo f 17. Il other desi in accorda ecifications s for Soil (end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as be considered as be considered os cons and will requ lermination. Ited pipe see tables shown adulus of ggn and VDOT Corrugated		
900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	ELONGATED 16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3 6.7	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 10.0 9.1 8.5 7.9 7.3	2 CIRCULAR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8 5.8	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 12.2 11.9 11.6 10.9	17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9 11.6	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.4 6.1 5.8	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2 11.9	approach to minimum of each side the interst Allowable in the table of 30 mete special desidetailed for For detailed for The alloware based of 4.8 MPa. Al criteria are AASHTO Sp Modification Metal Struct	of (15) Diam of the stru ection with cover heigh est to the lears are to ign installation derivation of the cover on a soil mill other design in accorda ecifications for Soil (ture Interactions)	end a leters on cture, or to a cut. Int, as indicated left, in excess beconsidered as ons and will requi termination. Ited pipe see Itables shown adulus of legr gr and VDOT Corrugated tion Systems.		
900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400 2550	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67 5.27	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	ELONGATED 16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3 6.7	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 11.0 10.0 9.1 8.5 7.9	2 CIRCULAR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8 5.8 5.5	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 12.2 11.9 11.6 10.9 9.4	CIRCULAR 17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8 5.8	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9 11.6 11.3	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.4 6.1 5.8	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2 11.9 11.6	approach to minimum of each side the interst Allowable in the table of 30 mete special desidetailed for For detailed for The alloware based of 4.8 MPa. Al criteria are AASHTO Sp Modification Metal Struct	of (15) Diam of the stru ection with cover heigh est to the lears are to ign installation derivation of the cover on a soil mill other design in accorda ecifications for Soil (ture Interactions)	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as ons and will requi termination. Leted pipe see tables shown addlus of ligh nce with the and VDOT Corrugated tion Systems. CORRUGATED		
900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400 2550 2700	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67 5.27 5.91	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	ELONGATED 16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3 6.7	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 10.0 9.1 8.5 7.9 7.3	2 CIRCUL AR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8 5.8 5.5 5.5	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 12.2 11.9 11.6 10.9 9.4 7.9	CIRCULAR 17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8 5.8 5.5	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9 11.6 11.3 10.3	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.4 6.1 5.8 5.8	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2 11.9 11.6 11.3	approach of minimum deach side the intersus Allowable in the table of 30 mete special desided for For detail sheet 17 of The allow are bosed of 4.8 MPa. A Criteria are AASHTO Sp Modification Metal Struci	of (15) Diam of the stru ection with cover heigi est to the lears are to ign installation der list of elonger filt. able cover on a soil min accorda ecifications in accorda ecifications (RETE-LINED) STEEL height of co	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as ons and will requi letermination. Leted pipe see tables shown lodulus of liggin lince with the light and VDOT Corrugated lition Systems. CORRUGATED PIPE Diver to be		
900 1050 1200 1350 1500 1650 1650 1950 2100 2250 2400 2550 2700 2850	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67 5.27 5.91 6.59	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	ELONGATED 16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3 6.7	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 10.0 9.1 8.5 7.9 7.3	2 CIRCUL AR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8 5.8 5.5 5.5	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 11.9 11.6 10.9 9.4 7.9 6.7	CIRCULAR 17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8 5.8 5.5 5.5	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9 11.6 11.3 10.3 8.8	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.4 6.1 5.8 5.5	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2 11.9 11.6 11.3 10.9	approach if minimum deach side the intersuch allowable in the table of 30 mete special desidetailed for For detailed for The allow are based of 4.8 MPa. Al criterio are AASHTO Sp Modification Metal Struct	of (15) Diam of the stru ection with cover heigh state to the lears are to ign installating the state of the	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as ons and will requ termination. Inted pipe see tables shown adulus of light		
900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400 2550 2700 2850 3000	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67 5.27 5.91 6.59 7.30	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	ELONGATED 16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3 6.7	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 10.0 9.1 8.5 7.9 7.3	2 CIRCUL AR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8 5.8 5.5 5.5	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 12.2 11.9 11.6 10.9 9.4 7.9	CIRCULAR 17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8 5.5 5.5 5.5	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9 11.6 11.3 10.3 8.8 7.6	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.1 5.8 5.5	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2 11.9 11.6 11.3 10.9 9.4	approach in minimum (each side the intersum Allowable in the table of 30 mete special desided and the table of 30 meters of the table of tabl	of (15) Diam of the stru ection with cover heigles to the lears are to ign installation deiting on a soil multiple cover on a soil multiple cover in accorda ecifications as for Soil (ture Interaction of the cover the cover on a soil multiple cover on a soil multiple cover in accorda ecifications as for Soil (ture Interaction of the cover of the covered of the cove	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as ons and will requ termination. Inted pipe see tables shown adulus of light		
900 1050 1200 1350 1500 1650 1950 2100 2250 2400 2550 2700 2850 3000 3300	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67 5.27 5.91 6.59 7.30 8.83	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	ELONGATED 16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3 6.7	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 10.0 9.1 8.5 7.9 7.3	2 CIRCUL AR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8 5.8 5.5 5.5	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 11.9 11.6 10.9 9.4 7.9 6.7	CIRCULAR 17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8 5.8 5.5 5.5	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9 11.6 11.3 10.3 8.8	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.1 5.8 5.8 5.5 5.5	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2 11.9 11.6 11.3 10.9 9.4 7.0	approach to minimum to each side the intersurable of 30 mete special desidetailed for For detailed for the allow ore based of 4.8 MPa. A criteria are AASHTO Sp Modification Metal Struci	of (15) Diam of the stru ection with cover heigles to the lears are to ign installation deiting on a soil multiple cover on a soil multiple cover in accorda ecifications as for Soil (ture Interaction of the cover the cover on a soil multiple cover on a soil multiple cover in accorda ecifications as for Soil (ture Interaction of the cover of the covered of the cove	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as one sond will require termination. Sted pipe see tables shown adulus of legal nee with the and VDOT corrugated tion Systems. CORRUGATED PIPE over to be e tables 9.1 meters.		
900 1050 1200 1350 1500 1650 1800 2100 2250 2400 2550 2700 2850 3000	0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67 5.27 5.91 6.59 7.30	CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	ELONGATED 16.1 13.7 11.9 10.6 9.4 8.5 7.9 7.3 6.7	2 CIRCULAR 11.6 9.1 7.9 7.0 6.4 6.1 5.8 5.8 5.5 5.5	.01 ELONGATED 20.1 17.0 14.9 13.4 11.9 10.0 9.1 8.5 7.9 7.3	2 CIRCUL AR 14.3 10.9 9.1 7.9 7.0 6.7 6.1 6.1 5.8 5.8 5.5 5.5	.77 ELONGATED 28.9 21.9 18.3 15.8 14.3 13.4 12.5 11.9 11.6 10.9 9.4 7.9 6.7	CIRCULAR 17.3 12.8 10.3 8.5 7.6 7.0 6.7 6.4 6.1 5.8 5.5 5.5 5.5	ELONGATED 34.7 25.6 20.7 17.3 15.5 14.3 13.4 12.8 12.2 11.9 11.6 11.3 10.3 8.8 7.6	20. 1 14.6 11.6 9.4 8.2 7.6 7.0 6.4 6.1 5.8 5.5	ELONGATED 39.6 29.5 23.1 19.2 16.7 15.2 14.0 13.1 12.8 12.2 11.9 11.6 11.3 10.9 9.4	approach to minimum to each side the intersurable of 30 mete special desidetailed for For detailed for the allow ore based of 4.8 MPa. A criteria are AASHTO Sp Modification Metal Struci	of (15) Diam of the stru ection with cover heigles to the lears are to ign installation of the cover on a soil multiple of the cover of t	end a leters on cture, or to a cut. Int, as indicated left, in excess be considered as one sand will require termination. Integrated pipe see tables shown adulus of legal nee with the and VDOT corrugated tion Systems. CORRUGATED PIPE let tables 9.1 meters. In the tables of legal nee with the legal nee of legal nee legal nee tables 9.1 meters.		

VIRGINIA DEPARTMENT OF TRANSPORTATION

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UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

		THICKNESS S WITH METER		TIONS	ORRUGA	mm C	m X 13	- 68 m	Y PIPE	M ALLO	ALUMINU	GATED /	CORRU	(
	MINIMUM SHEET T FOR ENTRANCES LESS THAN 0.3 N COVER			RS	IN METER	VER LIMITS	HT OF CO	IMUM HEIGI	MAX			2)	DIAMETER (mm)	
		A SH STRA STRA STRA				TERS	IN MILLIME	HICKNESS	SHEET T				Ę	DIAMI (mm)
		MUN SS 1	17	4.	.43	3.	67	2.	90	1.	53	1.	AREA	PIPE
		Mg 230	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	∢	₫
]	1.53		28.3		27.4	26.2	24.4		15.2		15.2	0.07	300
		2.67	22.5	21.6	21.6	18.3	21.0	14.9	12.2	11.9	12.2	10.6	0.11	375
		3.43	18.9	14.6	18.3	12.5	17.4	10.6	10.0	9.1	10.0	8.2	0.16	450
əc.	Not		16.1	11.0	15.5	9.7	14.9	8.5	8.5	7.6	8.5	7.0	0.22	525
			14.0	9.1	13.7	8.2	13.1	7.6	7.6	6.7	7.6	6.4	0.29	600
licated in tab Instruction.	heights inc finished co	Cove are fo	12.5	7.9	12.2	7.3	11.6	6.7	6.7	6.1	6.7	6.1	0.37	675 750
	rotect pipe		11.3	7.0 6.7	11.0 9.7	6.7	10.3 9.4	6.1 5.8	6.1	5.8 5.5	6.1	5.8 5.5	0.46	825
um height of lows prior to			9.4	6.4	9.7	6.1	8.5	5.8		4.9		4.9	0.66	900
on traffic to	construction	allowing	11.9	5.8	11.6	5.8	10.3	5.5	7.3	5.5	5.5	5.2	0.89	1050
	nstallation.	cross	11.3	5.5	9.1	5.5	7.0	5.5	7.5	3.3	3.3	3.2	1.17	1200
Min. Cover 1 During)iameter	Pipe I	8.2	5.5	6.4	5.5	.,,	4.9					1.48	1350
Construct			5.8	5.2		4.5							1.82	1500
450 mi	to 600 mm	300 mm		4.3									2.21	1650
F 11 5:														
Equal to Dia	and over	750 mm		3.3									2.63	1800
height of co 00 mm, which under dian crossove	um <u>finished</u> Dia./8 or 3 except pip es and me	Minim to be greater entrand			CORRUGA		m X 25 VER LIMITS				LUMINUN	ATED A	2.63 ORRUG	С
height of co one mm, which output under dian crossove minimum wil up to 450	um <u>finished</u> Dia./8 or 3 except pip es and med a 230 mm ed for pipe	Minim to be greater entrand where permit				IN METER		HT OF CO	IMUM HEIGI		LUMINUN	ATED A	2.63 ORRUG 2 E	
height of co 00 mm, which e under dian crossove minimum wil up to 450 case the thickness fo	um <u>finishec</u> Dia./8 or 3 except pip es and met a 230 mm ed for pipe er in which	Minim to be greater entrand where permit diametr tabulat	.17	TIONS		IN METER	VER LIMITS	HT OF CO	IMUM HEIGI	MAX	LUMINUN		2.63 ORRUG 2 E	DIAMETER (mm)
height of co 50 mm, which e under dian crossove minimum wil up to 450 case the thickness fo s than 300 r	um finished Dia./8 or 3 except pip es and mer a 230 mm ed for pipe er in which ed minimum es with les	Minim to be greater entrand where permit diamete tabulat entrand	.17 ELONGATED	TIONS	२ऽ	IN METER TERS 3.	VER LIMITS	HT OF CO	IMUM HEIGI SHEET T	MAX		1.	2.63 ORRUG	С
height of co 50 mm, which e under dian crossove minimum wil up to 450 cose the thickness fo s than 300 r	um finished Dia./8 or 3 except pip ea 230 mm ed for pipe er in which ed minimum ces with les shall be use	Minim to be greater entrane permit diamete tabulat entrane cover	1	TIONS	43	IN METER TERS 3.	VER LIMITS IN MILLIME	HT OF CO	IMUM HEIGI SHEET T 90	MAX	53	1.	2.63 ORRUG 2 E	DIAMETER (mm)
height of co 50 mm, which e under dian crossove minimum wil up to 450 l case the thickness fo s than 300 r d.	um finished Dia./8 or 3 except pip es and me a 230 mm ed for pipe er in which ed minimum es with les shall be use	Minim to be greatei entrani where permit diameti tabulat entrani cover	ELONGATED	TIONS 4. CIRCULAR	RS 43 ELONGATED	TERS 3. CIRCULAR	VER LIMITS IN MILLIME .67 ELONGATED	HT OF CO HICKNESS 2 CIRCULAR	MUM HEIGI SHEET T 90 ELONGATED	MAX 1 CIRCULAR	53 ELONGATED	1. CIRCUL AR	AREA (m ²)	PIPE DIAMETER (mm)
height of co 50 mm, which e under dian crossove minimum wil up to 450 cose the thickness fo s than 300 r d. extend the f culvert. The is to extend	um finished Dia./8 or 3 except pip es and me a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe en fill ramp	Minim to be greater entrane where permit diameter tabulat entrane cover *The length approae	ELONGATED 20.7	TIONS 4. CIRCULAR 10.3	43 ELONGATED 18.6	TERS 3. CIRCULAR 9.1	VER LIMITS IN MILLIME .67 ELONGATED 15.5	HT OF CO HICKNESS 2 CIRCULAR 8.2	SHEET T 90 ELONGATED 11.3	MAX 1 CIRCULAR 7.3	53 ELONGATED 9.1	1. CIRCUL AR 7.0	2.63 ORRUG (3 0.66	6 PIPE DIAMETER (mm)
height of co mm, which e under dian crossove minimum wil up to 450 cose the thickness fo s than 300 r d. extend the to culvert. The is to extend ameters on e	um finished Dia./8 or 3 except pip es and mer a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe h fill ramp	Minim to be greater entrane where permit diamete tabulat entrane cover *The length approae	20.7 16.7 14.6 13.4	4. CIRCULAR 10.3 8.2 7.3 6.7	43 ELONGATED 18.6 15.5 13.7 12.8	3. CIRCULAR 9.1 7.6 6.7 6.4	VER LIMITS IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3	HIT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6	1 CIRCULAR 7.3 6.4 6.1 5.8	53 ELONGATED 9.1 7.9	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG CE V 324 V 0.66 0.89 1.17 1.48	900 1050 1200 1350
height of co 50 mm, which e under dian crossove minimum will up to 450 case the thickness for s than 300 r d. extend the fi culvert. The is to extend ameters on e , or to the	um finished Dia./8 or 3 except pip es and me a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe en fill ramp	Minim to be greater entrane where permit diamete tobulat entrane cover *The length approad minimue side of	20.7 16.7 14.6 13.4 12.5	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1	43 ELONGATED 18.6 15.5 13.7 12.8 12.2	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1	IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4	HIT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8	2.63 ORRUG (2 E Y 2 2 Y 0.66 0.89 1.17 1.48 1.82	900 1050 1200 1350
height of co mm, which e under dian crossove minimum wil up to 450 cose the thickness fo s than 300 r d. extend the to culvert. The is to extend ameters on e , or to the cut.	um finished. Dia./8 or 3 except pip es and mer a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe in of (20)Di the culvert etion with a	Minim to be greater entrane where permit diamet tabulat entrane cover *The length approae minimus side of interse	20.7 16.7 14.6 13.4 12.5	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8	IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5	HIT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG E Y 0.66 0.89 1.17 1.48 1.82 2.21	900 1050 1200 1350 1500 1650
height of co 50 mm, which e under dian crossove minimum will up to 450 case the thickness for s than 300 r d. extend the fi culvert. The is to extend ameters on e , or to the	um finished Dia./8 or 3 except pip es and me a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe th fill ramp on of (20)Di the culvert ction with a details of el	Minim to be greater entrand where permit diamet tabulat entrand cover *The length approad minimum side of interse	20.7 16.7 14.6 13.4 12.5 11.9	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6 11.3	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8 5.5	IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5 7.6	HIT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5 5.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG Ç E Y W 0.66 0.89 1.17 1.48 1.82 2.21 2.63	900 1050 1200 1350 1500 1650 1800
height of co mm, which e under dian crossove minimum wil up to 450 cose the thickness fo s than 300 r d. extend the to culvert. The is to extend ameters on e , or to the cut.	um finished. Dia./8 or 3 except pip es and mer a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe in of (20)Di the culvert etion with a	Minim to be greater entrand where permit diamet tabulat entrand cover *The length approad minimum side of interse	20.7 16.7 14.6 13.4 12.5 11.9 11.6	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6 11.3 9.4	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8 5.5 5.5	VER LIMITS IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5 7.6 7.0	HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5 5.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG 2.63 0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08	900 1050 1200 1350 1500 1650 1800 1950
height of co mm, which e under dian crossove minimum will up to 450 cose the thickness fo s than 300 r d. extend the culvert. The is to extend ameters on e , or to the cut.	um finished. Dia./8 or 3 except pip es and mer a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe in of (20)Di the culvert ction with a details of el 7 of 17.	Minim to be greater entrance where epermit diamet tabulat entrancover *The length approacminimus side of interse	ELONGATED 20.7 16.7 14.6 13.4 12.5 11.9 11.6 11.3 9.4	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6 11.3 9.4 7.6	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8 5.5 5.5	IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5 7.6	HT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5 5.5 5.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG 0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58	900 1050 1200 1350 1500 1650 1800 1950 2100
height of co 50 mm, which e under dian crossove minimum will up to 450 cose the thickness for s than 300 r d. extend the culvert. The is to extend ameters on a , or to the cut.	um finishee Dia./8 or 3 except pip es and me- a 230 mm ed for pipe er in which es with les shall be use cover shall of the pipe h of (20)Di the culvert ction with a details of el 7 of 17.	Minim to be greater entrane where permit diamete tobulat entrane cover *The length approad minimus side of interse For sheet The are bas	ELONGATED 20.7 16.7 14.6 13.4 12.5 11.9 11.6 11.3 9.4 7.6	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5 5.5	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6 11.3 9.4	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8 5.5 5.5 5.5	VER LIMITS IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5 7.6 7.0	HT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5 5.5 5.5 5.2 4.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG 0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10	900 1050 1200 1500 1650 1800 1950 2100 2250
height of co 50 mm, which e under dian crossove minimum will up to 450 cose the thickness for s than 300 r d. extend the culvert. The is to extend ameters on a , or to the cut.	um finished. Dia./8 or 3 except pip es and me es 230 mm ed for pipe er in which es with les shall be use cover shall of the pipe th fill ramp n of (20)Di the culvert ction with a details of el 7 of 17. allowable co	Minim to be greater entrance where permit diamet tobulat entrancover *The length approaminimus side of interse For sheet The are bo: 4.8 MP	ELONGATED 20.7 16.7 14.6 13.4 12.5 11.9 11.6 11.3 9.4	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5 5.5	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6 11.3 9.4 7.6	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8 5.5 5.5 5.2 4.9	VER LIMITS IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5 7.6 7.0	HT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5 5.5 5.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG 2.63 0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67	900 1050 1200 1350 1650 1800 1950 2100 2250 2400
height of co mm, which ounder own, which ounder own minimum will up to 450 loose the thickness for so than 300 r d. extend the culvert. The is to extend ameters on a , or to the cut.	um finished. Dia./8 or 3 except pip es and me a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe th fill ramp n of (20)Di the culvert ction with a details of el 7 of 17. Illowable co- ed an of occ- in. All other are in acco-	Minim to be greater entrance where permit diametro tobulot entrancover *The length approaminimus side of interse for sheet d.8 MP criteria	ELONGATED 20.7 16.7 14.6 13.4 12.5 11.9 11.6 11.3 9.4 7.6	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5 5.5 5.5	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6 11.3 9.4 7.6	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8 5.5 5.5 5.2 4.9 4.2	VER LIMITS IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5 7.6 7.0	HT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5 5.5 5.5 5.2 4.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG QE 43 0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67 5.27	900 1050 1200 1350 1500 1650 1800 1950 2100 2250 2400 2550
height of cood on mm, which on mm, which on the color of	um finished. Dia./8 or 3 except pip es and mer a 230 mm ed for pipe er in which ed minimum es with les shall be use cover shall of the pipe n of (20)Di the culvert etion with a details of el 7 of 17. Dillowable co led on a sc a. All other are in acc. Specificat	Minim to be greater entrander where permit diamet tabulat entrander en	ELONGATED 20.7 16.7 14.6 13.4 12.5 11.9 11.6 11.3 9.4 7.6	4. CIRCULAR 10.3 8.2 7.3 6.7 6.1 5.8 5.8 5.5 5.5	43 ELONGATED 18.6 15.5 13.7 12.8 12.2 11.6 11.3 9.4 7.6	3. CIRCULAR 9.1 7.6 6.7 6.4 6.1 5.8 5.5 5.5 5.2 4.9	VER LIMITS IN MILLIME .67 ELONGATED 15.5 13.4 11.6 10.3 9.4 8.5 7.6 7.0	HT OF CO HICKNESS 2 CIRCULAR 8.2 7.0 6.4 6.1 5.8 5.5 5.5 5.5 5.2 4.5	SHEET T 90 ELONGATED 11.3 9.7 8.5 7.6 6.7	1 CIRCULAR 7.3 6.4 6.1 5.8 5.5 5.5	53 ELONGATED 9.1 7.9 6.7	1. CIRCULAR 7.0 6.1 5.8 5.5	2.63 ORRUG 2.63 0.66 0.89 1.17 1.48 1.82 2.21 2.63 3.08 3.58 4.10 4.67	900 1050 1200 1350 1650 1800 1950 2100 2250 2400

SPECIFICATION REFERENCE	CORRUGATEI) ALUMINUM ALLOY	PIPE
302 232	HEIGHT OF COVE	R TABLE FOR H-18	LIVE LOAD

232 VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN METERS

PC-1											
	CORRUGATED ALUMINUM ALLOY PIPE - 150 mm X 25 mm CORRUGATIONS										
rer		MAXIMUM HEIGHT OF COVER LIMITS IN METERS									
DIAMETER (mm)	(m ²)				SHE	ET THICKNES	SS IN MILLIME	ETERS			
PIPE D	AREA	1.	53	1.1	90	2.	.67	3	.43	4.	17
	₹	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED
900	0.66	6.7	8.8	7.3	10.9	7.9	15.5	9.1	18.3	10.0	20.1
1050	0.89	6.1	7.6	6.4	9.4	7.0	13.4	7.6	15.2	8.2	16.4
1200	1.17	5.8	6.7	6.1	8.2	6.4	11.6	6.7	13.7	7.0	14.3
1350	1.48	5.5	5.8	5.8	7.3	6.1	10.3	6.4	12.8	6.4	13.1
1500	1.82	5.2		5.5	6.7	5.8	9.4	5.8	11.9	6.1	12.5
1650	2.21	4.9		5.5	6.1	5.5	8.5	5.8	10.9	5.8	11.9
1800	2.63			5.5		5.5	7.6	5.8	10.0	5.8	11.6
1950	3.08			4.9		5.5	7.0	5.5	9.1	5.5	11.3
2100	3.58					5.2	5.5	5.5	7.3	5.5	8.8
2250	4.10					4.5		5.2	5.8	5.5	7.3
2400	4.67							4.9		5.2	5.8
2550	5.27							3.9		4.9	
2700	5.91			·		·				4.2	
2850	6.59			•		•				3.3	

Cover heights indicated in tables are for finished construction.

To protect pipe <u>during</u> <u>construction</u>, minimum height of cover to be as follows prior to allowing construction traffic to cross installation.

Pipe Diameter	Min. Cover Height * During Construction		
750 mm and over	Equal to Diameter		

Minimum finished height of cover to be $\frac{1}{8}$ Dia. or 0.3 meter, whichever is greater.

*The cover shall extend the full length of the pipe culvert. The approach fill ramp is to extend a minimum of (20)Diameters on each side of the culvert, or to the intersection with a cut.

For details of elongated pipe see sheet 17 of 17.

The allowable cover tables shown ore based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

Sheet 5 of 17

CORRUGATED ALUMINUM ALLOY PIPE HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD

SPECIFICATION REFERENCE

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	PII	PE ARCH DIMEI	MINIMUM	MAXIMUM COVER I	HEIGHT (METERS)		
NOMINAL SIZE	EQUIVALENT PIPE			Rc	SHEET -	MAXIMUM CORN	ER PRESSURE
SPAN - RISE	DIAMETER				REQUIRED	190	* 290
(mm)	(mm)	(m ²)	(mm)	(mm)	(mm)	kPa	kPa
			68 mm	X 12 mm	CORRUGATIONS		
430 X 330	375	0.10	105	90	1.63	3.3	5.2
530 X 380	450	0.15	125	105	1.63	2.7	4.2
610 X 460	525	0.20	145	125	1.63	2.4	3.6
710 X 510	600	0.26	165	140	1.63	2.1	3.0
885 X 610	750	0.41	205	175	1.63	1.5	2.4
1060 X 740 T	900	0.59	250	210	1.63	1.5	2.4
1240 X 840 T	1050	0.81	290	245	2.01	1.5	2.4
1440 X 970 T	1200	1.06	330	280	2.77	1.5	2.4
1620 X 1100 T	1350	1.33	370	315	2.77	1.8	2.7
1800 X 1200 T	1500	1.64	415	350	3.51	1.8	2.7
1950 X 1320 T	1650	1.98	455	385	4.27	1.8	3.0
2100 X 1450 T	1800	2.35	495	420	4.27	2.1	3.0
		75 mm	X 25 mm A	ND 125 mr	n X 25 mm C0	ORRUGATIONS	
1010 X 790 T	900	0.59	330	300	2.77	2.4	3.6
1160 X 920 T	1050	0.81	395	360	2.77	2.4	3.6
1340 X 1050 T	1200	1.06	385	360	2.77	2.4	3.9
1520 X 1170 T	1350	1.33	520	475	2.77	2.4	3.9
1670 X 1300 T	1500	1.64	580	525	2.77	2.7	3.9
1850 X 1400 T	1650	2.04	640	580	2.77	3.3	4.9
2050 X 1500 T	1800	2.42	605	530	2.77	3.3	5.2
2200 X 1620	1950	2.88	655	575	2.77	3.0	4.9
2400 X 1720	2100	3.25	705	620	2.77	3.3	4.9
2600 X 1820	2250	3.72	755	665	2.77	3.0	4.5
2840 X 1920	2400	4.27	805	705	2.77	3.0	4.9
2970 X 2020	2550	4.83	855	750	2.77	3.0	4.5
3240 X 2120	2700	5.39	905	795	3.50	2.8	4.3
3470 X 2200	2850	5.95	955	840	3.50	2.4	3.9
3600 X 2320	3000	6.60	1005	885	4.27	2.4	3.6

Cover heights indicated in tables are for finished construction.

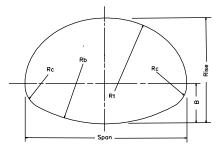
To protect pipe <u>during construction</u>, minimum height of cover to be as follows prior to allowing construction traffic to cross installation.

Pipe Arch Span	Min. Cover Height During Construction
425 mm to 875 mm	450 mm
1050 mm and above	Span 2

Minimum finished height of cover to be 1/8 Span or 0.3 meter, whichever is greater.

- ** The cover shall extend the full length of the pipe arch. The approach fill ramp is to extend a minimum of (10)(Height \cdot $\frac{1}{2}$ Span) on each side of the structure, or the intersection with a cut.
- When design height of cover falls within this category, foundation and backfill must be approved by the engineer.
- † Indicates pipe arches for which dimensions for either corrugation may be used within fill height limitations.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.



Sheet 6 of 17

REFERENCE

302

CORRUGATED STEEL PIPE ARCH

HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD

VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

MINIMUM SHEET THICKNESS AND DESIGN DATA

	PIPE ARCH DIME	VSION		MINIMUM	MAXIMUM COVER	HEIGHT METERS
NOMINAL SIZE	EQUIVALENT			SHEET		UED DDESCUDE
	PIPE	AREA	Rc	THICKNESS	MAXIMUM CORI	NER PRESSURE
SPAN - RISE	DIAMETER			REQUIRED	190	* 290
(mm)	(mm)	(m ²)	(mm)	(mm)	kPa	kPa
		68 mm	X 12 mm	CORRUGATIONS		
430 X 330	375	0.10	75	1.52	3.3	5.2
530 X 380	450	0.15	75	1.52	2.7	4.2
610 X 460	525	0.20	75	1.52	2.4	3.6
710 X 510	600	0.26	75	1.91	2.1	3.0
885 X 610	750	0.41	75	1.91	1.5	2.4
1060 X 740	900	0.59	90	2.67	1.5	2.4
1240 X 840	1050	0.81	100	2.67	1.5	2.4
1440 X 920	1200	1.06	130	3.43	1.5	2.4
1620 X 1100	1350	1.33	155	3.43	1.8	2.7
1800 X 1200	1500	1.64	180	4.17	1.8	2.7
		75 mm	X 25 mm	CORRUGATIONS	3	
1010 X 790	900	0.59	125	1.52	2.4	3.6
1160 X 920	1050	0.81	150	1.52	2.4	3.6
1340 X 1050	1200	1.06	175	1.52	2.4	3.9
1520 X 1170	1350	1.33	200	1.91	2.4	3.9
1670 X 1300	1500	1.64	300	1.91	2.7	3.9
1850 X 1400	1650	2.04	350	2.67	3.3	4.9
2050 X 1500	1800	2.42	350	2.67	3.3	5.2
2200 X 1620	1950	2.88	400	3.43	3.0	4.9
2400 X 1720	2100	3.25	450	3.43	3.3	4.9
2600 X 1820	2250	3.72	450	4.17	3.0	4.5
2840 X 1920	2400	4.27	450	4.17	3.0	3.9
2970 X 2020	2550	4.83	450	4.17	3.0	3.3

Notes:

Cover heights indicated in tables are for finished construction.

To protect pipe during construction, minimum height of cover to be as follows prior to allowing construction traffic to cross

Pipe Arch Span	Min. Cover Height During Construction
425 mm to 875 mm	450 mm
1050 mm and above	Span 2

Minimum <u>finished</u> height of cover to be $\frac{1}{8}$ Span or 0.3 meter, whichever is greater.

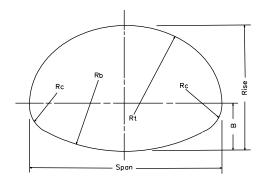
 ** The cover shall extend the full length of the pipe arch. The approach fill ramp is to extend a minimum of (10)(Height \cdot $\frac{1}{2}$ Span) on each side of the structure, or the intersection

Lapped longitudinal seams shall be staggered so as to alternate on each side of the center of arch top by approximately 15 percent of the periphery.

A tolerance of plus, or minus, 25 mm is permissible for dimensions of span, rise, and corner radius.

* When design height of cover falls within this category, foundation and backfill must be approved by the engineer.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.



Sheet 7 of 17

CORRUGATED ALUMINUM ALLOY PIPE ARCH HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

232 302

PC-1

STRUCTURAL PLATE STEEL PIPE - 150 mm X 50 mm CORRUGATIONS

ER							MAXIMUM H	EIGHT OF C	OVER LIMITS	IN METERS					
DIAMETER (mm)	(m ²)						SHEE	T THICKNES	S IN MILLIME	TERS					
/ <u>G</u> <u>u</u>	AREA (2.77		3.	.50	4.27		4.76		5.54		6.33		7.11	
PIPE	AR	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED
1500	1.82	13.0	14.3	15.2	20.7	17.7	27.4	19.2	31.4	21.6	37.8	24.1	44.5	26.8	48.8
1650	2.21	11.0	13.1	12.8	18.9	14.6	24.7	15.5	28.3	17.7	34.4	19.5	39.0	21.3	43.0
1800	2.63	9.7	11.9	11.0	17.4	12.2	22.8	13.1	26.2	14.6	29.6	16.1	32.3	17.7	35.3
1950	3.08	8.5	11.0	9.7	15.8	10.7	21.0	11.6	23.1	12.5	25.3	13.7	27.7	14.9	30.2
2100	3.58	7.9	10.3	8.8	14.9	9.7	19.5	10.0	20.4	11.0	22.2	11.9	24.1	13.1	26.2
2250	4.10	7.3	9.4	8.2	13.7	8.8	17.7	9.1	18.6	10.0	20.1	10.7	21.6	11.6	23.1
2400	4.67	7.0	8.8	7.6	13.1	8.2	16.4	8.5	17.1	9.1	18.3	9.7	19.5	10.3	20.7
2550	5.27	6.7	8.5	7.0	12.2	7.6	15.2	7.9	16.1	8.5	17.0	8.8	18.0	9.4	19.2
2700	5.91	6.4	7.9	6.7	11.6	7.3	14.6	7.6	15.2	7.9	15.8	8.2	16.7	8.8	17.7
2850	6.59	6.1	7.6	6.4	11.0	7.0	14.0	7.0	14.3	7.6	15.2	7.9	15.8	8.2	16.4
3000	7.30	6.1	7.0	6.4	10.3	6.7	13.4	6.7	13.7	7.0	14.3	7.3	14.9	7.6	15.5
3300	8.83	5.8	6.4	6.1	9.4	6.1	12.2	6.4	12.8	6.7	13.4	6.7	13.7	7.0	14.3
3600	10.51	5.5	5.8	5.8	8.5	6.1	11.3	6.1	12.2	6.4	12.8	6.4	13.1	6.7	13.4
3900	12.33	5.5		5.5	7.9	5.8	10.3	5.8	11.9	6.1	12.2	6.1	12.5	6.4	12.8
4200	14.30	5.2		5.5	7.3	5.5	9.7	5.8	11.0	5.8	11.9	5.8	11.9	6.1	12.2
4500	16.42	4.6		5.5	6.7	5.5	9.1	5.5	10.3	5.8	11.6	5.8	11.6	5.8	11.9
4800	18.68			5.5	6.4	5.5	8.5	5.5	9.7	5.5	11.3	5.8	11.3	5.8	11.6
5100	21.09			5.2	5.8	5.5	7.3	5.5	8.2	5.5	9.7	5.5	11.3	5.5	11.3
5400	23.65					5.2	6.1	5.5	7.0	5.5	8.2	5.5	9.4	5.5	10.7
5700	26.34					5.2		5.2	5.8	5.5	7.0	5.5	7.9	5.5	9.1
6000	29.20							4.9		5.2	5.8	5.5	6.7	5.5	7.6

Notes:

Cover heights indicated in the table are for finished construction.

To protect pipe during construction minimum height of cover prior to allowing construction traffic to cross installation is to be Dia./2 This cover shall extend the full length of the pipe.

Structural Plate Pipe dimensions are to inside crest and are subject to manufacturing tolerances.

The approach fill ramp is to extend a minimum of $10(Dia. \cdot 900 \text{ mm})$ on each side of the culvert, or to the intersection with a cut.

Minimum finished height of cover to be Dia./8 or 300 mm whichever is greater. For details of elongated pipe see sheet 17 of 17.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa.

All other design criteria are in accordance with AASHTO Specifications and

VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

Sheet 8 of 17

SPECIFICATION REFERENCE	STRUCTURAL PLATE STEEL PIPE	
232 302	HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD	
302	VIRGINIA DEPARTMENT OF TRANSPORTATION UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN METERS	107.11

STRUCTURAL PLATE ALUMINUM PIPE - 230 mm X 64 mm CORRUGATIONS

R.							MAXIMUM HE	EIGHT OF C	OVER LIMITS	IN METERS					
WET C	(m ²)						SHEE	T THICKNES	S IN MILLIME	TERS					
DIAMETER (mm)		2.54		3	.18	3	.81	4.44		5.08		5.72		6.35	
PIPE	AREA	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED
1500	1.82	8.8	9.4	9.7	13.7	10.6	18.2	11.5	21.3	12.5	24.6	13.7	27.1	14.6	29.2
1650	2.21	7.9	8.5	8.5	12.5	9.4	16.4	10.0	19.5	10.6	21.6	11.6	23.1	12.1	24.3
1800	2.63	7.3	7.6	7.6	11.2	8.2	15.2	8.8	17.9	9.4	18.9	10.0	20.1	10.6	21.3
1950	3.08	6.7	7.0	7.3	10.3	7.6	14.0	7.9	16.1	8.5	17.0	8.8	17.9	9.4	18.9
2100	3.58	6.4	6.7	6.7	9.7	7.0	12.8	7.6	14.9	7.9	15.8	8.2	16.4	8.5	17.0
2250	4.10	6.1		6.4	9.1	6.7	12.1	7.0	14.0	7.3	14.6	7.6	15.2	7.9	15.8
2400	4.67	5.8		6.1	8.5	6.4	11.2	6.7	13.4	7.0	14.0	7.0	14.3	7.3	14.9
2550	5.27	5.5		6.1	7.9	6.1	10.6	6.4	12.5	6.7	13.4	6.7	13.7	7.0	14.0
2700	5.91	5.2		5.8	7.6	6.1	10.0	6.1	11.8	6.4	12.8	6.4	13.1	6.7	13.4
2850	6.59	4.9		5.8	7.3	5.7	9.4	6.1	11.2	6.1	12.1	6.4	12.8	6.4	13.1
3000	7.30	4.6		5.5	6.7	5.7	9.1	5.7	10.6	6.1	12.2	6.1	12.5	6.1	12.5
3300	8.83	4.3		5.5	6.1	5.4	8.2	5.7	9.7	5.7	11.3	5.7	11.8	5.7	11.8
3600	10.51	3.6		5.5	5.7	5.4	7.6	5.4	8.8	5.4	10.0	5.7	11.5	5.7	11.5
3900	12.33			5.2		5.4	7.0	5.4	8.2	5.4	9.4	5.4	10.6	5.4	11.2
4200	14.30					5.1	5.7	5.4	6.7	5.4	7.9	5.4	8.8	5.4	9.7
4500	16.42							5.1	5.4	5.4	6.4	5.4	7.0	5.4	7.9
4800	18.68									5.1		5.1	5.7	5.1	6.4
5100	21.09									4.2		4.8		5.1	5.4
5400	23.64											3.9		4.5	
5700	26.34													3.9	

Notes:

To protect pipe <u>during construction</u> minimum height of cover prior to allowing construction traffic to cross installation is to be Dia./2. This cover shall extend the full length of the pipe

The approach fill ramp is to extend a minimum of $10(Dia. \cdot 900 \text{ mm})$ on each side of the structure, or to the intersection with a cut.

Steel bolts only to be used.

Bolts are 20 mm diameter, high strength to meet current A.S.T.M. designation A-325M and galvanized to meet current A.S.T.M. designation A-153M. Bolts are to be located in the valley and crest of each corrugation in double rows spaced 45 mm apart.

Cover heights indicated in table are for finished construction.

Minimum finished height of cover to be Dia./8 or 300 mm whichever is greater.

For details of elongated pipe see sheet 17 of 17.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

Sheet 9 of 17

STRUCTURAL PLATE ALUMINUM ALLOY PIPE HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD

107.12 UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN METERS

VIRGINIA DEPARTMENT OF TRANSPORTATION

SPECIFICATION REFERENCE

> 232 302

MINIMUM	THICKNESS-STRUCTURAL	PLATE STEEL	PIPE ARCHES	150 mm	X 50 mm	CORRUGATIONS

	PIPE ARCH	DIMENSION	1		MINIMUM		ALLLOWABLE
IIMON	NAL SIZE		махімим		SHEET	COVER	HEIGHT (m)
		AREA	"B"	Rc	THICKNESS	MAXIMUM CC	RNER PRESSURE
SPAN	RISE		(mm)		REQUIRED	190	* 290
m	m	(m ²)		(mm)	(mm)	MPa	MPa
1.85	1.40	2.04	533	458	2.77	4.8	7.3
1.95	1.45	2.23	521	458	2.77	4.5	7.0
2.05	1.50	2.42	559	458	2.77	4.2	6.7
2.15	1.55	2.60	544	458	2.77	4.2	6.4
2.20	1.60	2.88	528	458	2.77	3.9	6. 1
2.35	1.65	3.07	569	458	2.77	3.6	5.7
2.40	1.70	3.25	551	458	2.77	3.6	5.4
2.50	1.75	3.53	531	458	2.77	3.6	5.4
2.60	1.80	3.72	577	458	2.77	3.3	5. 1
2.70	1.85	3.99	554	458	2.77	3.3	4.8
2.85	1.90	4.27	605	458	2.77	3.0	4.8
2.90	1.95	4.55	582	458	2.77	3.0	4.5
2.95	2.00	4.83	556	458	2.77	3.0	4.5
3.10	2.05	5.11	607	458	2.77	2.7	4.2
3.25	2.10	5.39	663	458	2.77	2.7	4.2
3.30	2.15	5.67	638	458	2.77	2.7	3.9
3.45	2.20	5.95	696	458	2.77	2.4	3.9
3.50	2.25	6.22	668	458	2.77	2.4	3.6
3.60	2.30	6.60	640	458	2.77	2.4	3.6
3.75	2.35	6.87	699	458	2.77	2.4	3.6
3.80	2.40	7.25	671	458	2.77	2.4	3.6
3.85	2.45	7.52	640	458	2.77	2.1	3.3
3.90	2.50	7.90	610	458	2.77	2.1	3.3
4.10	2.55	8.27	668	458	2.77	2.1	3.3
4.25	2.60	8.64	734	458	2.77	2.1	3.0
4.30	2.65	9.01	701	458	2.77	2.1	3.0
4.35	2.70	9.38	668	458	2.77	1.8	3.0
4.50	2.75	9.75	734	458	2.77	1.8	3.0
4.65	2.80	10.13	803	458	2.77	1.8	2.7
4.70	2.85	10.50	767	458	2.77	1.8	2.7
4.75	2.90	10.96	732	458	2.77	1.8	2.7
4.80	3.00	11.33	696	458	2.77	1.8	2.7
5.00	3.00	11.71	765	458	2.77	1.8	2.7
5.05	3.05	12.17	729	458	2.77	1.8	2.7

NOTES

* When design height of cover falls within this category, foundation and backfill must be approved by the Engineer.

Cover heights indicated in table are for finished construction.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

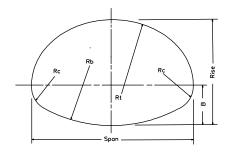
Structural Plate Pipe-Arch dimensions are to inside of crest and are subject to manufacturing tolerances.

Minimum finished height of cover shall be $\frac{1}{8}$ Span or 300 mm, whichever is greater.

To protect pipe <u>during construction</u> minimum height of cover prior to allowing construction traffic to cross installation shall be <u>Span.</u>

This cover shall extend the full length of the pipe arch. The approach fill ramp is to extend a minimum of (10)(Height + <u>Span</u>) on each

side of the structure, or to the intersection with a cut.



Sheet 10 of 17

SPECIFICATION REFERENCE
232
302

STRUCTURAL PLATE STEEL PIPE ARCH HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD

VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN METERS

REVISED ON 8/97

	PIF	PE ARCH DIMEN	ISION		MINIMUM	M.A	XXIMUM ALLLOWABLE
			MAXIMUM		SHEET		OVER HEIGHT (m)
SPAN	RISE	AREA	"B"	Rc	THICKNESS	MAXIM	JM CORNER PRESSURE
m	m	(m ²)	(mm)	(mm)	(mm)	190 MPa	290 MPa ★
4.05	2.85	9.01	978	788	2.80	3.6	5.4 ×
4.10	2.90	9.48	958	788	2.80	3.6	5.1 x
4.25	2.95	9.75	1006	788	2.80	3.6	5.1 ×
4.30	3.00	10.13	986	788	2.80	3.6	4.8 ×
4.40	3.05	10.59	963	788	2.80	3.3	4.8 *
4.55	3.10	10.96	1011	788	2.80	3.3	4.8 *
4.65	3.15	11.43	1062	788	2.80	3.3	4.5 ×
4.75	3.20	11.80	1039	788	2.80	3.3	4.5 ×
4.80	3.25	12.26	1016	788	2.80	3.0	4.2 ×
4.95	3.30	12.73	1069	788	2.80	3.0	4.2 ×
5.00	3.35	13.19	1044	788	2.80	3.0	4.2 ×
5.20	3.40	13.56	1100	788	2.80	3.0	4.2 ×
5.25	3.45	14.03	1074	788	2.80	3.0	3.9 ×
5.30	3.50	14.59	1049	788	2.80	2.7	3.9 ×
5.45	3.55	14.96	1105	788	2.80	2.7	3.9 ×
5.50	3.60	15.51	1072	788	2.80	2.7	3.9 ×
5.65	3.65	15.98	1135	788	2.80	2.7	3.6 *
5.70	3.70	16.44	1107	788	2.80	2.7	3.6 *
5.85	3.75	16.91	1166	788	3.50	2.4	3.9
5.95	3.80	17.47	1138	788	3.50	2.4	3.9
6.00	3.85	18.02	1110	788	3.50	2.4	3.9
6.05	3.90	18.58	1080	788	3.50	2.4	3.6
6.20	3.95	19.04	1040	788	3.50	2.4	3.6
6.25	4.00	19.60	1110	788	3.50	2.4	3.6

★ When design height of cover falls within this category, foundation and backfill must be approved by the Engineer.

Cover heights indicated in table are for finished construction.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

Structural Plate Pipe-Arch dimensions are to inside of crest and are subject to manufacturing tolerances.

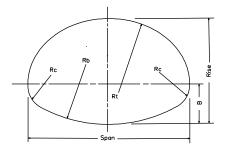
Minimum <u>finished</u> height of cover shall be <u>Span</u> or 0.3 meter, whichever <u>is greater</u>.

To protect pipe <u>during construction</u> minimum height of cover prior to allowing construction traffic to cross installation shall be <u>Span</u>.

This cover shall extend the full length of the pipe arch. The approach fill ramp is to extend a minimum of (10)(Height + $\frac{\text{Span}}{2}$) on each

side of the structure, or to the intersection with a cut.

* Maximum cover heights shown may be increased by a maximum of 0.3 meter if a sheet thickness greater than 2.80 mm is used.



Sheet 11 of 17

STRUCTURAL PLATE STEEL PIPE ARCH HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD SPECIFICATION REFERENCE

> 232 302

						IUM COVER					
		CORNER			MINIMUM	SHEET TI	HICKNESS	IN (mm)			
SPAN	RISE	RADIUS	MAXIMUM CORNER PRESSURE IN (MPa)								ARE
			2.55 n	nm	3.20 mm		3.80 mm		4.45		
m	m	(mm)	190		190	290	190	290	190	290	(m ²
1.90	1.50	808	7.6		8.5	10.9	8.5	12.8	8.5	12.8	2.29
2.00	1.50	808	7.0		7.9	10.3	7.9	12.1	7.9	12.1	2.4
2.00	1.70	808	7.0		7.9	10.3	7.9	12.1	7.9	12.1	2.75
2.10	1.75	808	6.7		7.6	9.7	7.6	11.5	7.6	11.5	2.90
2.20	1.80	808	6.4		7.3	9.4	7.3	10.9	7.3	10.9	3.19
2.35	1.80	808	6.1		6.7	8.8	6.7	10.3	6.7	10.3	3.4
2.45	1.85	808	5.8		6.4	8.5	6.4	9.7	6.4	9.7	3.6
2.55	1.90	808	5.5		6.1	8.2	6.1	9.4	6.1	9.4	3.89
2.70	1.90	808	5.1		6.1	7.6	6.1	9.1	6.1	9.1	4.13
2.80	1.95	808	4.8		5.7	7.3	5.7	8.5	5.7	8.5	4.19
2.90	2.00	808	4.8		5.4	7.0	5.4	8.2	5.4	8.2	4.6
3.00	2.00	808	4.5		5.1	6.7	5.1	7.9	5.1	7.9	4.90
3.10	2.05	808	4.5		5.1	6.7	5.1	7.6	5.1	7.6	5.16
3.30	2.10	808	4.2		4.8	6.4	4.8	7.3	4.8	7.3	5.4
3.40	2.15	808	4.2		4.5	6.1	4.5	7.0	4.5	7.0	5.70
3.50	2.15	808	3.9		4.5	5.7	4.5	7.0	4.5	7.0	5.98
3.60	2.20	808	3.9		4.5	5.7	4.5	6.7	4.5	6.7	6.2
3.70	2.20	808	3.6		4.2	5.4	4.2	6.4	4.2	6.4	6.55
3.80	2.25	808	3.6		4.2	5.4	4.2	6.4	4.2	6.4	6.8
3.95	2.30	808	3.6		3.9	5.1	3.9	6.1	3.9	6.1	7.15
4.00	2.50	808	3.3		3.9	5.1	3.9	6.1	3.9	6.1	7.7
4.00	2.55	808	3.3		3.9	5.1	3.9	6.1	3.9	6.1	8.06
4.25	2.55	808	3.3		3.6	4.8	3.6	5.7	3.6	5.7	8.3
4.25	2.60	808	3.3		3.6	4.8	3.6	5.4	3.6	5.4	8.7
4.25	2.85	808	3.3		3.6	4.8	3.6	5.7	3.6	5.7	9.4
4.35	2.90	808	3.0		3.6	4.5	3.6	5.4	3.6	5.4	9.82
4.45	2.95	808			3.6	4.2	3.6	5.1	3.6	5.4	10.2
4.55	3.00	808			3.3	3.9	3.3	4.8	3.3	5.1	10.6
4.65	3.05	808			3.3	3.6	3.3	4.2	3.3	5.1	11.02
4.75	3.10	808			3.3	3.3	3.3	4.2	3.3	4.8	11.44
4.90	3.15	808			3.0		3.0	3.6	3.0	4.5	11.85
5.00	3.20	808					3.0	3.6	3.0	4.2	12.29
5.10	3.25	808					3.0	3.3	3.0	3.9	12.72
5.20	3.30	808					3.0		3.0	3.6	13.17
5.25	3.35	808					3.0		3.0	3.6	
5.50	3.45	808							2.7	3.0	

Cover heights indicated in table are for <u>finished</u> construction.

Structural Plate Pipe-Arch dimensions are to inside crest and are subject to manufacturing tolerances.

To protect pipe <u>during construction</u>, minimum height of cover prior to allowing construction traffic to cross installation to be $\frac{1}{2}$ Span. This cover shall extend the full length of the pipe arch. The approach fill ramp is to extend a minimum of (10)(Height + $\frac{1}{2}$ Span) on each side of the structure, or to the intersection with a cut.

Steel bolts only to be used.

Minimum $\underline{\rm finished}$ height of cover to be $1/\!\!/_{8}$ Span or 0.3 meter whichever is $\underline{\rm greater}.$

Bolts are M20 diameter, high strength to meet current AASHTO designation M-164M and galvanized to meet current A.S.T.M. designation A-194M. Bolts are to be located in the valley and crest of each corrugation in double rows spaced 44 mm apart.

★ When design height of cover falls within this category, foundation and backfill must be approved by the Engineer.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

Sheet 12 of 17

SPECIFICATION REFERENCE	STRUCTURAL PLATE ALUMINUM ALLOY PIPE ARCH	
232 302	HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD	
302	VIRGINIA DEPARTMENT OF TRANSPORTATION UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN METERS	107.15

	PC-1									
ALUMINUM SPIRAL RIB PIPE 19 mm WIDE x 19 mm DEEP RIBS SPACED @ 190 mm										
				MAXIM	UM HEIGHT C	F COVER LIM	IITS IN METER	RS		
	PIPE DIAMETER	AREA			SHEET THICK	KNESS IN MILL	IMETERS			
	(mm)	(m ²)	1	.63	2	2.01	2	.77	3.	.43
			CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED
	300	0.07	23.1	46.3	28.9		41.4			
	375	0.11	14.3	28.6	17.4	34.7	23.8		30.5	
	450	0.16	10.3	21.0	12.2	24.4	15.8	32.0	19.8	39.6
	525	0.22	8.5	17.1	9.4	19.2	11.9	23.8	14.3	28.6
	600	0.29	7.3	14.9	7.9	16.1	9.7	19.5	11.3	22.5
	675	0.37	6.7	13.4	7.3	14.6	8.2	16.7	9.4	18.9
	750	0.46	6.1	12.5	6.7	13.4	7.3	14.9	8.2	16.4
	900	0.66	5.8	11.6	6.1	12.2	6.4	12.8	7.0	14.0
	1050	0.89	5.5	11.0	5.5	11.3	5.8	11.9	6.1	12.5
	1200	1.17			5.5	11.0	5.5	11.3	5.8	11.9
	1350	1.48					5.5	11.0	5.5	11.3
	1500	1.82					5.5	11.0	5.5	11.0
	1650	2.21							5.5	11.0
	1800	2.63							5.2	

MINIMUM SHEET THICKNESS FOR ENTRANCES WITH LESS THAN 0.3 METER COVER

1.53 2.67 3.43

Cover heights indicated in tables are for finished construction.

To protect pipe <u>during construction</u>, minimum height of cover to be as follows prior to allowing construction traffic to cross installation.

Pipe Diameter	Min. Cover Height = During Construction
300 mm to 600 mm	450 mm
750 mm and over	Equal to Diameter

Minimum <u>finished</u> height of cover to be <u>Dia. or 300</u> mm, whichever is

greater, except pipe under entrances and median crossovers where a 230 mm minimum will be permitted for pipe up to 450 mm diameter in which case the tabulated minimum sheet thickness for entrances with less than 300 mm cover shall be used.

•The cover shall extend the full length of the pipe culvert. The approach fill ramp is to extend a minimum of (20)Diam, on each side of the culvert, or to the intersection with a cut.

For details of elongated pipe see sheet 17 of 17.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

Sheet 13 of 17

107.16

ALUMINUM SPIRAL RIB PIPE HEIGHT OF COVER TABLE FOR H-18 LIVE LOAD

232 302

SPECIFICATION REFERENCE

	STEEL S	PIRAL RIB PIPE	19 mm WIDE X	19 mm DEEP	RIBS SPACED	© 190 mm		THICKNESS S WITH METER
			MAXII	MUM HEIGHT O	F COVER LIMITS	IN METERS		T T S
PIPE DIAMETER	AREA		S	HEET THICKNE	SS IN MILLIMETE	:RS		MINIMUM SHEET T FOR ENTRANCES
(mm)	(m ²)	1.	63	2.	01	2.	77	ENT (
		CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	CIRCULAR	ELONGATED	MININ FIOR
300	0.07	48.4						1.63
375	0.11	35.0						1.63
450	0.16	22.5		28.0		39.6		1.63
525	0.22	16.1	32.3	19.5	39.3	26.8		2.0
600	0.29	12.5	25.0	14.6	29.6	19.8	39.6	2.77
675	0.37	10.3	20.7	11.9	23.8	15.2	30.8	
750	0.46	8.8	17.7	10.0	20.1	12.5	25.3	
900	0.66	7.3	14.6	7.9	15.8	9.4	18.9	
1050	0.89	6.4	13.1	7.0	14.0	7.9	15.8	
1200	1,17	6.1	12.2	6.4	12.8	7.0	14.0	
1350	1.48	5.8	11.6	5.8	11.9	6.4	12.8	
1500	1.82	5.5	11.3	5.8	11.6	6.1	12.2	
1650	2.21			5.5	11.3	5.8	11.6	
1800	2.63			5.5	11.0	5.5	11.3	
1950	3.08			_		5.5	11.0	
2100	3.57					5.5	11.0	

A Maximum Height of Cover Table for Steel Spiral Rib Pipe with 19 mm wide X 25 mm deep ribs spaced at 292 mm is available upon request.

PC-1

Notes:

Cover heights indicated in tables are for finished construction.

To protect pipe during construction, minimum height of cover to be as follows prior to allowing construction traffic to cross installation.

	Pipe Diameter	Min. Cover Height * During Construction
-1	300 mm to 750 mm	450 mm
	900 mm and above	Dia. 2

Minimum finished height of cover to be Dia. or 300 mm, whichever is greater except pipe under entrances and median crossovers where a 230 mm minimum will be permitted for pipe up to 600 mm diameter in which case the tabulated minimum sheet thickness for entrances with less than 300 mm cover shall be used.

*The cover shall extend the full length of the pipe. The approach fill is to extend a minimum of (15)Diameter on each side of the structure, or to the intersection with a cut.

Allowable cover heights, as indicated in the table to the left, in excess of 30 meters are to be considered as special design installations and will require detailed foundation determination.

For details of elongated pipe see sheet 17 of 17.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Corrugated Metal Structure Interaction Systems.

Sheet 14 of 17

SPECIFICATION REFERENCE	STEEL SPIRAL RIB PIPE	
232 302	HEIGHT OF COVER TABLE FOR H-18 LIVE	LOAD
302	VIRGINIA DEPARTMENT OF TRANSPORTATION	UNLESS OTHERWISE NOTED, ALL DIMENSIONS 107.17

CAST IRON PIPE CULVERT DESIGNATION(5)

Diameter	Area (m²)	MAXIMUM HEIGHT OF COVER IN METERS				
(mm)		0.30 - 3.9	4.0 - 6.4	6.5 - 10.6	10.2 - 18.2	18.3 - 25.9
300	0.07					Extra Heavy Pipe Method "B2" Bedding
375	0.11				Extra Heavy Pipe Method "B1" Bedding	
410	0.13	Standard Pipe Method "A" Bedding	وَ	- 6·		
450	0.17		Pipe ' Beddi	/ Pipe		
600	0.29		> ₹ 2 •	Extra Heavy Pipe Method "A" Bedding		
750	0.46		Hec			
900	0.66		ΣΨ			Me
1050	0.89					
1200	1.17					

Notes:

- (1) Pipe may be smooth cast iron, corrugated cast iron, or ribbed cast iron.
- (2) Pipe to be smooth cast iron only.
- (3) Pipe to be corrugated cast iron or ribbed cast iron.
- (4) May be substituted for 375 mm pipe culvert at no increase in price bid for 375 mm pipe, where approved by the Engineer.
- (5) Crushing strength (kN/m)

Standard pipe 29.2 kN/m Heavy pipe 43.8 kN/m Extra heavy pipe 58.4 kN/m

Maximum height of cover shown in table is for finished construction.

To protect pipe <u>during construction</u>, minimum height of cover prior to allowing construction traffic to cross installation is to be 600 mm. This cover is to extend the full length of the pipe culvert. The approach fill ramp is to extend a minimum of 10 (Diameter + 900 mm) on each side of the culvert, or to the intersection with a cut. Minimum finished height of cover to be 600 mm, except pipe under entrances and median crossovers where a 230 mm minimum will be permitted.

Sheet 15 of 17

CAST IRON PIPE STRENGTH TABLE FOR H-18 LIVE LOAD

SPECIFICATION REFERENCE

> 232 302

UNLESS OTHERWISE NOTED, ALL DIMENSIONS
ON THIS SHEET ARE IN MILLIMETERS

VIRGINIA DEPARTMENT OF TRANSPORTATION

EXTRA S	CLAY PIPE	
Diameter (mm)	Area (m²)	Allowable Maximum Cover (m)
300	0.07	4.57
375	0.11	4.57
450	0.17	4.57
525	0.22	4.57
600	0.29	4.57
750	0.46	3.96
900	0.66	3.96

All Vitrified Clay Pipe is to be Extra Strength.

Maximum heights of cover shown in table are for finished construction.

To protect pipe <u>during construction</u> minimum height of cover prior to allowing construction traffic to cross installation is to be 900 mm. This cover is to extend the full length of the pipe culvert. The approach fill ramp is to extend a minimum of 10 (Dia. * 900 mm) on each side of the culvert, or to the intersection with a cut.

Minimum <u>finished</u> height of cover to be 600 mm, except pipe under entrances and median crossovers where a 230 mm minimum will be permitted.

Method "A" bedding is to be used for all installations unless otherwise designated on plans.

POLYETHYLEN	E DOL	JBLE	WALL
CORRUGATED	PIPE	CUL,	VERT

Diameter (mm)	Area (m²)	Allowable Maximum Cover (m)
300	0.07	6.3
375	0.11	6.3
450	0.17	6.0
600	0.22	6.0
750	0.45	5.7
900	0.65	5.4

Note: For details of bedding for Polyethylene Pipe Culvert see Standard PB-1.

POLYVINYLCHLORIDE RIBBED PIPE CULVERT					
Diameter (mm)	Area (m²)	Allowable Maximum Cover (m)			
450	0.16	6.0			
525	0.21	5.7			
600	0.28	5.7			
750	0.44	5.4			
900	0.64	5.4			
1200	1.14	5.4			

Notes:

Cover heights indicated in tables are for finished construction.

To protect pipe <u>during construction</u>, minimum height of cover to be as follows prior to allowing construction traffic to cross installation.

Pipe Diameter	** Minimum cover Height During Construction
300 to 750	450 mm
900 and above	<u>Diameter</u> 2

Minimum finished height of cover to be $\frac{1}{8}$ Diameter or 300 mm whichever is greater, except pipe under entrances and median crossovers where a 230 mm minimum will be permitted for pipe up to 600 mm diameter.

** The cover shall extend the full length of the pipe. The approach fill is to extend a minimum of (15)(Diameter • ½ Diameter) on each side of the structure, or to the intersection with a cut.

The allowable cover tables shown are based on a soil modulus of 4.8 MPa. All other design criteria are in accordance with the AASHTO Specifications and VDOT Modifications for Soil Thermoplastic Pipe Interaction Systems.

PLASTIC PIPE

Sheet 16 of 17

VITRIFIED CLAY

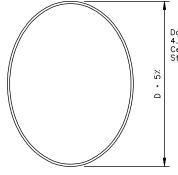
SPECIFICATION REFERENCE
232

302

VITRIFIED CLAY AND PLASTIC PIPE MAXIMUM COVER TABLE FOR H-18 LIVE LOAD

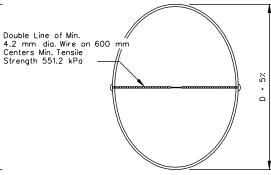
VIRGINIA DEPARTMENT OF TRANSPORTATION

UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS



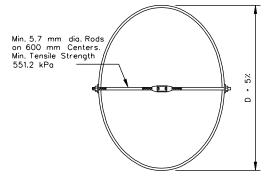
ELLIPTICAL FACTORY SHAPE (SHOP ELONGATED)

TYPF 1



ELONGATED WITH WIRE

TYPE 2



ELLIPTICAL WITH ROD AND TURNBUCKLE

TYPE 3

Note:

Wire or rod to be removed when fill reaches height specified for allowing construction traffic.

D = Diameter of round pipe

Methods shown apply to corrugated steel or corrugated aluminum alloy pipe.

Pipe size and cover height combinations requiring elongation are to be as tabulated on the applicable PC-1 tables or as shown on plans.

Any of above types of elongation may be used, unless otherwise noted on plans, special provisions, or directed by the Engineer.

Field elongation will not be permitted without the approval of the Engineer, or unless indicated on plans.

Elongation is to be performed prior to any required bituminous coating and paving of the invert.

Wire and rods to be attached to side of pipe in accordance with manufacturer's standard methods, meeting the approval of the Engineer.

Sheet 17 of 17

SHOP ELONGATION OF CORRUGATED METAL PIPE AND STRUCTURAL PLATE PIPE

VIRGINIA DEPARTMENT OF TRANSPORTATION

107.20 UNLESS OTHERWISE NOTED, ALL DIMENSIONS ON THIS SHEET ARE IN MILLIMETERS

SPECIFICATION REFERENCE

REVISED ON 8/97

