

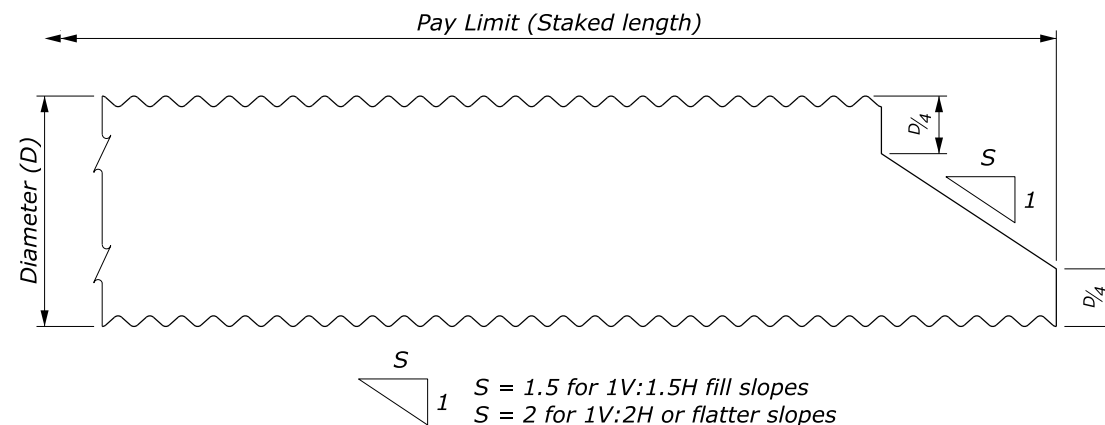
### STRUCTURAL PLATE PIPE CULVERT

#### FILL HEIGHT AND METAL THICKNESS TABLE

STEEL											ALUMINUM								
PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	6" x 2" CORRUGATIONS									PIPE SIZE DIAMETER INCHES	MINIMUM COVER INCHES	9" x 2 1/2" CORRUGATIONS						
		METAL THICKNESS (INCH/GAGE)/BOLTS PER CORRUGATION											METAL THICKNESS (INCH/GAGE)/BOLTS PER CORRUGATION						
		0.111/12/2	0.140/10/2	0.170/8/2	0.188/7/2	0.218/5/2	0.249/3/2	0.280/1/2	0.280/1/3	0.280/1/4			0.100/12/4	0.125/11/4	0.150/9/4	0.175/7/4	0.200/6/4	0.225/4/4	0.250/2/4
MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)											MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (FEET)								
60	12	46	68	90	100	100	100	100	100	100	60	15	31	45	60	70	81	92	100
66	12	42	62	81	93	100	100	100	100	100	66	15	28	41	54	64	74	84	94
72	12	38	57	75	86	100	100	100	100	100	72	18	25	37	50	58	67	77	86
78	12	35	52	69	79	95	100	100	100	100	78	18	23	35	46	54	62	71	79
84	12	33	49	64	73	88	100	100	100	100	84	18	22	32	42	50	58	66	73
90	12	31	45	60	68	82	97	100	100	100	90	21	20	30	40	47	54	61	68
96	12	29	43	56	64	77	91	100	100	100	96	21	19	28	37	44	50	57	64
102	18	27	40	52	60	73	86	94	100	100	102	24	18	26	35	41	47	54	60
108	18	25	38	50	57	69	81	88	100	100	108	24	17	25	33	39	45	51	57
114	18	24	36	47	54	65	77	84	100	100	114	27	16	23	31	37	42	48	54
120	18	23	34	45	51	62	73	80	100	100	120	27	15	22	30	35	40	46	51
126	18	22	32	42	49	59	69	76	95	100	126	30	14	21	28	33	38	44	49
132	18	21	31	40	46	56	66	72	91	97	132	30	14	20	27	32	37	42	47
138	18	20	29	39	44	54	63	69	87	93	138	33	13	19	26	30	35	40	44
144	18	19	28	37	43	51	61	66	83	89	144	33	12	18	25	29	33	38	43
150	24	18	27	36	41	49	58	64	80	86	150	33		18	24	28	32	36	41
156	24	17	26	34	39	47	56	61	76	82	156	33		17	23	27	31	35	39
162	24	17	25	33	38	46	54	59	73	79	162	33			22	26	30	34	38
168	24	16	24	32	36	44	52	57	71	76	168	33			21	25	29	33	36
174	24	16	23	31	35	42	50	55	68	74	174	33			20	24	28	31	35
180	24	15	22	30	34	41	48	53	66	71	180	33				23	27	30	34
186	24	15	22	29	33	40	47	51	64	69	186	33				22	26	29	33
192	24		21	28	32	38	45	50	62	67	192	36					25	28	32
198	30		20	27	31	37	44	48	60	65	198	36					24	28	31
204	30		20	26	30	36	43	47	58	63	204	36					23	27	30
210	30		19	25	29	35	41	45	56	61	210	36						26	29
216	30			25	28	34	40	44	54	59	216	36						25	28
222	30			24	27	33	39	43	53	58	222	36							27
228	30			23	27	32	38	42	51	56	228	36							
234	30			23	26	31	37	41	50	55									
240	30				25	31	36	40	49	53									
246	36				25	30	35	39	48	52									
252	36					29	34	38	46	51									
258	36					28	34	37	45	49									
264	36					28	33	36	44	48									
270	36						32	35	43	47									
276	36						31	34	42	46									
282	36						31	34	41	45									
288	42						30	33	40	44									
294	42							32	40	43									
300	42								32	39	42								
306	42								31	38	41								

**NOTE:**

1. Fabricate the bottom plates one (1) thickness heavier than the side plates but not heavier than 0.375 inch for steel or 0.250 inch for aluminum.
2. Fasten plates with galvanized steel 3/4" bolts and nuts conforming to AASHTO M 167.
3. When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
4. Measure minimum cover from the top of the pipe culvert to the subgrade for flexible pavements, and to the top of the pavement for rigid pavements. Measure maximum fill height from the top of the pipe to the top of the pavement for both flexible and rigid pavement.



**END TREATMENT DIAGRAM**

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION, FHWA  
OFFICE OF FEDERAL LANDS HIGHWAY

FLH STANDARD  
603-1

**STRUCTURAL PLATE  
PIPE CULVERT**

SPECIFICATION  
FP-24, FP-14  
APPROVED FOR USE  
1/2024

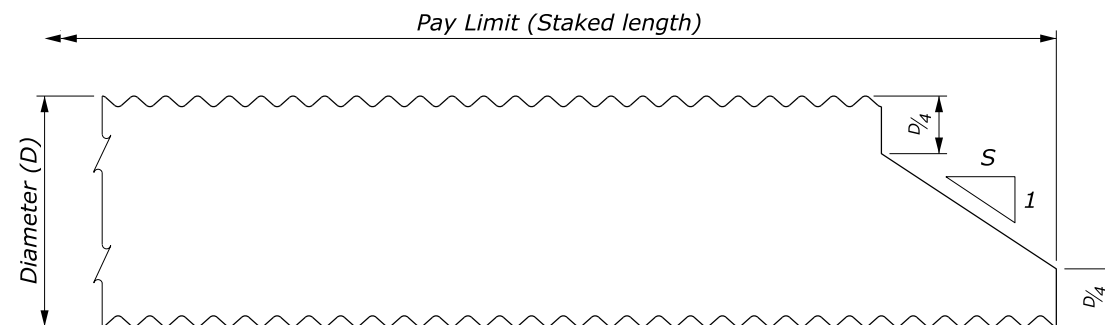
### STRUCTURAL PLATE PIPE CULVERT

#### FILL HEIGHT AND METAL THICKNESS TABLE

STEEL											ALUMINUM								
PIPE SIZE DIAMETER	MINIMUM COVER	152 x 51 CORRUGATIONS									PIPE SIZE DIAMETER	MINIMUM COVER	230 x 64 CORRUGATIONS						
		METAL THICKNESS/BOLTS PER CORRUGATION											METAL THICKNESS/BOLTS PER CORRUGATION						
		2.82/2	3.56/2	4.32/2	4.79/2	5.54/2	6.32/2	7.11/2	7.87/3	9.65/4			2.54/4	3.18/4	3.81/4	4.44/4	5.08/4	5.72/4	6.35/4
MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (METERS)											MAXIMUM FILL HEIGHT ABOVE TOP OF PIPE (METERS)								
1500	300	14.0	20.7	27.4	30.0	30.0	30.0	30.0	30.0	30.0	1500	375	9.5	13.7	18.3	21.3	24.7	28.0	30.0
1655	300	12.8	18.9	24.7	28.4	30.0	30.0	30.0	30.0	30.0	1655	375	8.5	12.5	16.5	19.5	22.6	25.6	28.7
1810	300	11.6	17.4	22.9	26.2	30.0	30.0	30.0	30.0	30.0	1810	450	7.6	11.3	15.2	17.7	20.4	23.5	26.2
1965	300	10.7	15.9	21.0	24.1	29.0	30.0	30.0	30.0	30.0	1965	450	7.0	10.7	14.0	16.5	18.9	21.6	24.1
2120	300	10.1	14.9	19.5	22.3	28.8	30.0	30.0	30.0	30.0	2120	450	6.7	9.8	12.8	15.2	17.7	20.1	22.3
2275	300	9.6	13.7	18.3	25.0	28.6	30.0	30.0	30.0	30.0	2275	525	6.1	9.1	12.2	14.3	16.5	18.6	20.7
2430	300	8.8	13.1	17.1	19.6	23.5	27.7	30.0	30.0	30.0	2430	525	5.8	8.5	11.3	13.4	15.2	17.4	19.5
2585	450	8.2	12.2	15.9	18.3	22.3	26.2	28.7	30.0	30.0	2585	600	5.5	7.9	10.7	12.5	14.3	16.5	18.3
2740	450	7.6	11.6	15.2	17.4	21.0	24.7	26.8	30.0	30.0	2740	600	5.2	7.6	10.1	11.9	13.7	15.5	17.4
2895	450	7.3	11.0	14.3	16.5	19.8	23.5	25.6	30.0	30.0	2895	675	4.9	7.0	9.5	11.3	12.8	14.6	16.5
3050	450	7.0	10.4	13.7	15.5	18.9	22.3	24.4	30.0	30.0	3050	675	4.6	6.7	9.1	10.7	12.2	14.0	15.5
3205	450	6.7	9.8	12.8	14.9	18.0	21.0	23.2	29.0	30.0	3205	750	4.3	6.4	8.5	10.1	11.6	13.4	14.9
3360	450	6.4	9.5	12.2	14.0	17.1	20.1	22.0	27.7	29.6	3360	750	4.3	6.1	8.2	9.8	11.3	12.8	14.3
3515	450	6.1	8.8	11.9	13.4	16.5	19.2	21.0	26.5	28.4	3515	825	4.0	5.8	7.9	9.1	10.7	12.2	13.4
3670	450	5.8	8.5	11.3	13.1	15.5	18.6	20.1	25.3	27.1	3670	825	3.7	5.5	7.6	8.8	10.1	11.6	13.1
3825	600	5.5	8.2	11.0	12.5	14.9	17.7	19.5	24.4	26.2	3825	825		5.5	7.3	8.5	9.8	11.0	12.5
3980	600	5.2	7.9	10.4	11.9	14.3	17.1	18.6	23.2	25.0	3980	825		5.2	7.0	8.2	9.5	10.7	11.9
4135	600	5.2	7.6	10.1	11.6	14.0	16.6	18.0	22.3	24.1	4135	825			6.7	7.9	9.1	10.4	11.6
4290	600	4.9	7.3	9.8	11.0	13.4	15.9	17.4	21.6	23.2	4290	825			6.4	7.6	8.8	10.1	11.0
4445	600	4.9	7.0	9.5	10.7	12.8	15.2	16.8	20.7	22.6	4445	825			6.1	7.3	8.5	9.5	10.7
4600	600	4.6	6.7	9.1	10.4	12.5	14.6	16.2	20.1	21.6	4600	825				7.0	8.2	9.1	10.4
4755	600	4.6	6.7	8.8	10.1	12.2	14.3	15.5	19.5	21.0	4755	825			6.7	7.9	8.8	10.1	
4910	600		6.4	8.5	9.8	11.6	13.7	15.2	18.9	20.4	4910	900				7.6	8.5	9.8	
5065	750		6.1	8.2	9.5	11.3	13.4	14.6	18.3	19.8	5030	900				7.3	8.5	9.5	
5220	750		6.1	7.9	9.1	11.0	13.1	14.3	17.7	19.2	5220	900				7.0	8.2	9.1	
5375	750		5.8	7.5	8.8	10.7	12.5	13.7	17.1	18.6	5385	900					7.9	8.8	
5530	750			7.5	8.5	10.4	12.2	13.4	16.5	18.0	5530	900					7.6	8.5	
5685	750			7.3	8.2	10.0	11.9	13.1	16.2	17.7	5685	900						8.2	
5840	750			7.0	7.9	9.8	11.6	12.8	15.5	17.1	5840	900						8.2	
5995	750			7.0	7.6	9.5	11.3	12.5	15.2	16.8									
6150	750				7.6	9.5	11.0	12.2	14.9	16.2									
6305	900					9.1	10.7	11.9	14.6	15.9									
6460	900					8.8	10.4	11.6	14.0	15.5									
6615	900					8.5	10.4	11.3	13.7	14.9									
6770	900					8.5	10.1	11.0	13.4	11.6									
6925	900					8.2	9.8	10.7	13.1	14.3									
7080	900						9.5	13.4	12.8	14.0									
7235	900						9.5	13.4	12.5	13.7									
7390	1050						9.1	10.1	12.2	13.4									
7545	1050							9.8	12.2	13.1									
7700	1050							9.8	11.9	12.8									
7855	1050							9.5	11.6	12.5									

**NOTE:**

1. Fabricate the bottom plates one (1) thickness heavier than the side plates but not heavier than 9.53 mm for steel or 6.35 mm for aluminum.
2. Fasten plates with galvanized steel M20 bolts and nuts conforming to AASHTO M 167M.
3. When directed, camber pipe culverts upward from a chord through the inlet and outlet inverts an ordinate amount equal to 1% of the pipe length. Develop camber on a parabolic curve. If the midpoint elevation on the parabolic curve as designed exceeds the elevation of the inlet invert, reduce the amount of camber or increase the pipe culvert gradient.
4. Measure minimum cover from the top of the pipe culvert to the subgrade for flexible pavements, and to the top of the pavement for rigid pavements. Measure maximum fill height from the top of the pipe to the top of the pavement for both flexible and rigid pavement.
5. Furnish hardware in the metric sizes shown. Equivalent US Customary sizes may be used when metric sizes are unavailable.



$\begin{matrix} S \\ \triangle \\ 1 \end{matrix}$ 
  
 S = 1.5 for 1V:1.5H fill slopes  
 S = 2 for 1V:2H or flatter slopes

This drawing contains **Metric** units of measure. Dimensions without units are millimeters.

**END TREATMENT DIAGRAM**

NO SCALE

U.S. DEPARTMENT OF TRANSPORTATION, FHWA OFFICE OF FEDERAL LANDS HIGHWAY	FLH STANDARD M603-1
<b>STRUCTURAL PLATE PIPE CULVERT</b>	SPECIFICATION FP-24, FP-14
	APPROVED FOR USE 1/2024