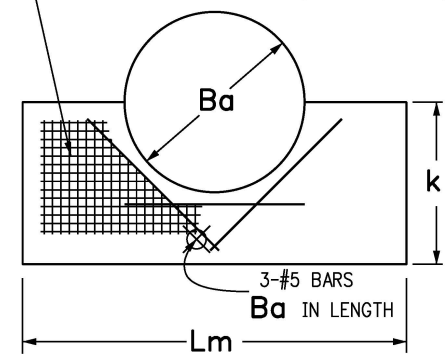
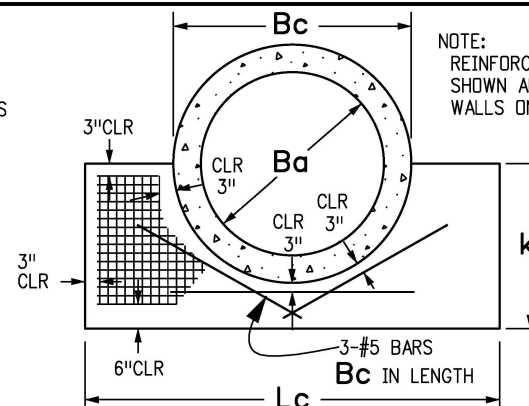
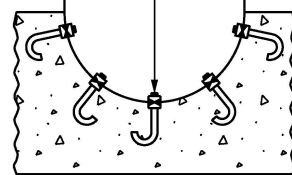


WWF 4 x 4 - W4 x W4 AT 85 LB./100 SQ. FT.
3" CLEARANCE AT TOP AND SIDES OF PIPE,
6" CLEARANCE AT BOTTOM. (TYP. ALL WALLS)



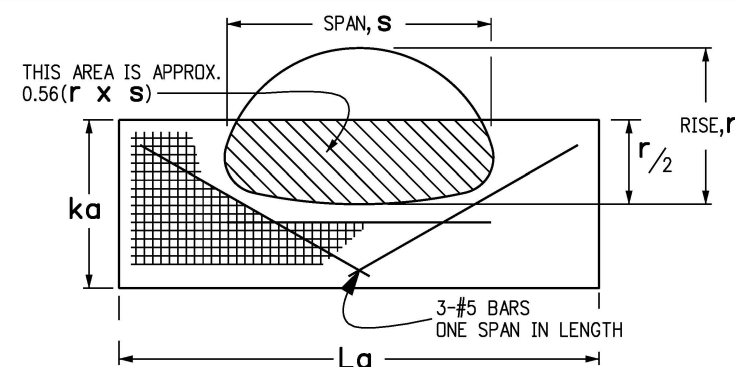
FLEXIBLE SINGLE PIPE

FLEXIBLE PIPE AND MPA SHALL
HAVE 3/4" DIA. GALV. ANCHOR BOLTS
EVENLY SPACED AT 19".



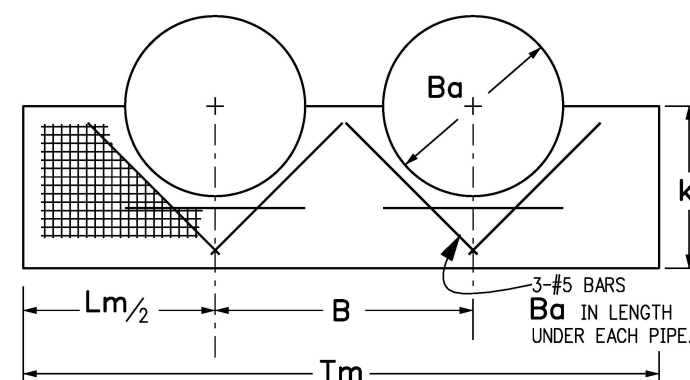
RIGID SINGLE PIPE

NOTE:
REINFORCEMENT CLEARANCES
SHOWN ARE TYPICAL FOR ALL
WALLS ON THIS SHEET.

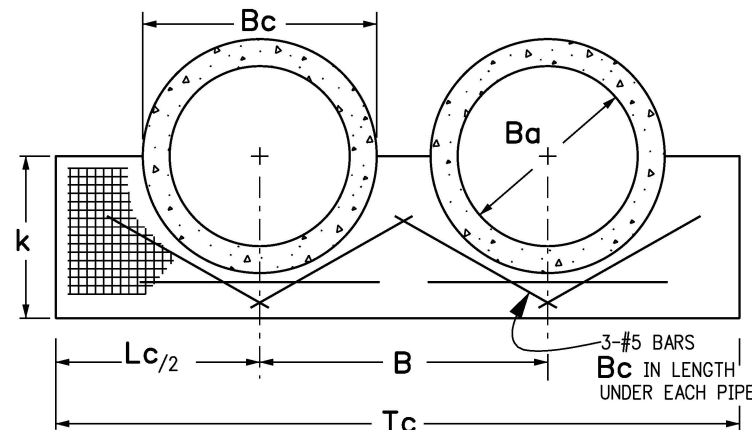


SINGLE MPA

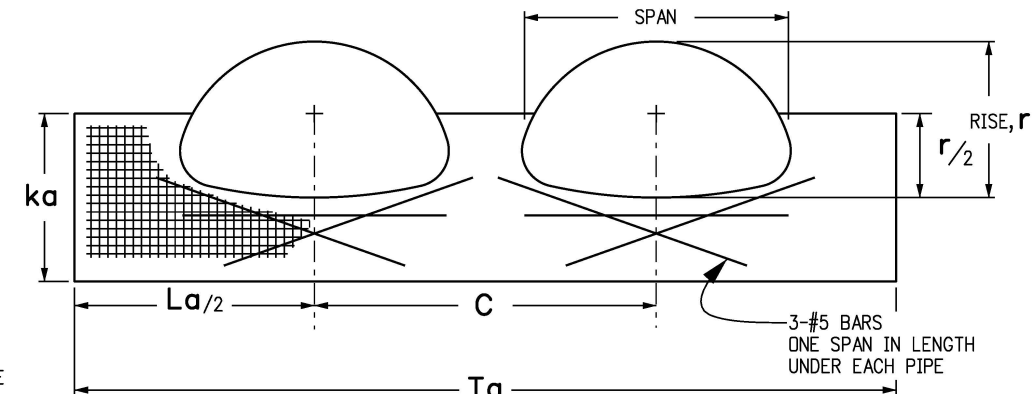
- GENERAL NOTES**
1. CONCRETE SHALL BE CLASS B.
 2. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4 IN.
 3. IF A PRECAST HEADWALL IS USED, A PERMANENT EPOXY BOND, APPROVED BY THE ENGINEER, SHALL BE USED BETWEEN PIPE AND HEADWALL.
 4. HEADWALL SHALL BE PERPENDICULAR TO THE CULVERT CENTERLINE UNLESS OTHERWISE SPECIFIED. TABULATED DIMENSIONS AND QUANTITIES SHALL BE ADJUSTED FOR SKEWED INSTALLATIONS.
 5. HEADWALL ANCHOR BOLTS SHALL CONFORM TO AASHTO M 167 AND SHALL BE INCLUDED IN THE COST OF PIPE.
 6. HEADWALL ANCHOR BOLTS SHALL BE USED ONLY WITH FLEXIBLE PIPE, BOTH ROUND AND ARCH.



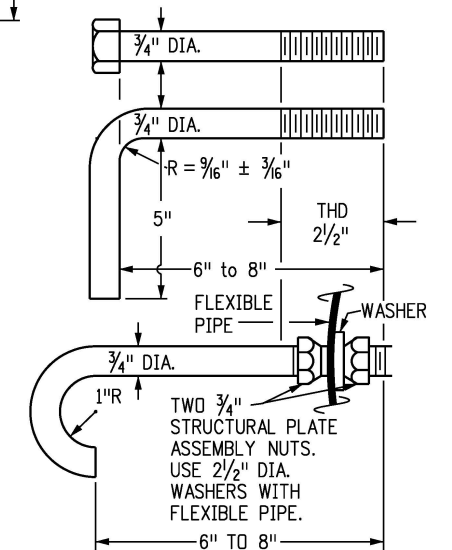
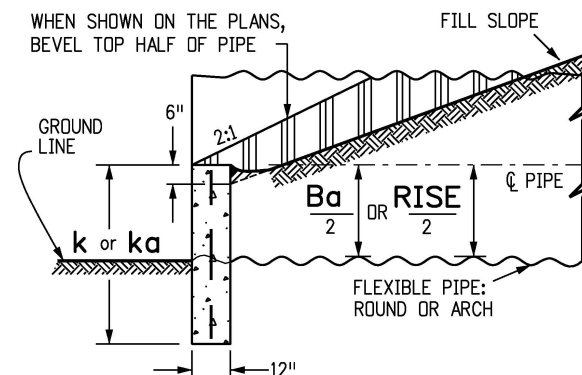
FLEXIBLE DOUBLE PIPE



RIGID DOUBLE PIPE



DOUBLE MPA



TYPICAL GALVANIZED ANCHOR BOLTS

RANGE OF EQUIV. DIAMS.	RANGE OF SPANS s	RANGE OF RISES r	ka	La	C	Ta	SINGLE		DOUBLE	
							CONCRETE	STEEL	CONCRETE	STEEL
							CU. YDS.	LBS.	CU. YDS.	LBS.
IN.										
36-42	39-47	30-36	36	94	71	165	0.72	26.2	1.22	49.8
42-48	48-59	31-41	41	118	89	207	1.04	36.5	1.77	68.7
54-60	60-71	40-51	51	142	107	249	1.53	52.2	2.61	97.2
60-75	72-83	44-69	69	166	119	285	2.49	78.3	4.14	142.0
72-81	84-95	63-72	72	190	131	321	2.93	93.1	4.76	166.5
84-90	96-107	69-76	76	214	143	357	3.42	110.1	5.45	194.6

NOTE: EACH LINE OF THE PIPE ARCH TABLE DESCRIBES A SINGLE HEADWALL THAT WILL ACCOMMODATE SEVERAL SIZES OF PIPE-ARCH. THE CONCRETE QUANTITIES IN THIS TABLE ARE BASED ON DEDUCTION OF CONCRETE FROM THE HEADWALL OF THE MEDIAN SIZE PIPE IN THE RANGE OF EQUIVALENT DIAMETERS SHOWN.

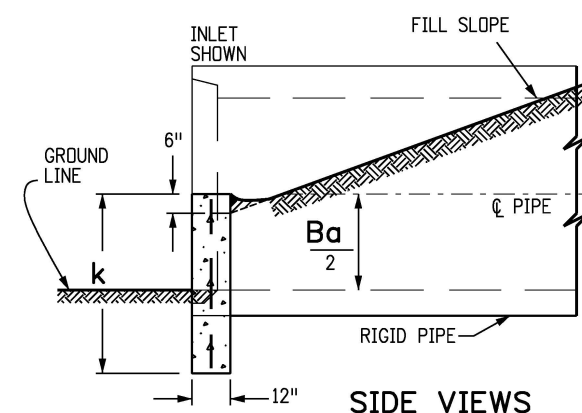
ADJUST L, B, T, C, #5 BAR LENGTH AND QUANTITIES WHEN SKEW IS < 90°

HEADWALL FOR METAL PIPE ARCH (MPA)

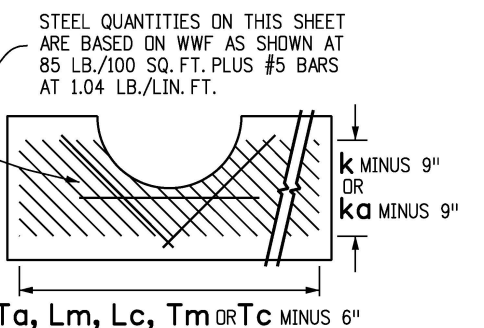
NOM. DIA. Ba	RCP O.D. Bc	k	Lm	Lc	B	Tm	Tc	FLEXIBLE PIPE				RIGID PIPE			
								SINGLE		DOUBLE		SINGLE		DOUBLE	
								CONCRETE	STEEL	CONCRETE	STEEL	CONCRETE	STEEL	CONCRETE	STEEL
								CU. YDS.	LBS.	CU. YDS.	LBS.	CU. YDS.	LBS.	CU. YDS.	LBS.
IN.															
36	44	36	81	99	56	137	155	0.62	21.3	1.01	39.6	0.72	26.3	1.04	46.2
42	51	42	94	114	63	157	177	0.84	28.1	1.34	51.3	0.97	34.3	1.39	59.8
48	58	48	108	130	72	180	202	1.10	36.0	1.76	64.4	1.27	43.6	1.81	75.3
54	65	54	121	146	81	202	227	1.39	44.6	2.22	80.1	1.60	54.1	2.30	92.5
60	72	60	134	161	90	224	251	1.70	54.1	2.73	96.8	1.96	65.7	2.83	111.2
66	79	66	148	177	99	247	276	2.07	64.9	3.31	115.4	2.37	78.1	3.42	131.9
72	86	72	161	193	108	269	301	2.46	76.4	3.93	135.2	2.83	91.9	4.08	154.4
78	93	78	175	208	114	289	322	2.90	89.1	4.57	155.8	3.30	106.5	4.71	177.1
84	100	84	188	224	120	308	344	3.35	102.4	5.23	177.4	3.83	122.5	5.41	201.6
90	107	90	202	240	126	328	366	3.86	117.1	5.96	200.8	4.40	139.7	6.16	227.8
96	114	96	215	255	132	347	387	4.38	132.3	6.71	225.1	4.98	157.5	6.93	254.9

HEADWALL FOR ROUND PIPE

SKEW°	FACTOR
90	1.000
85	1.004
80	1.015
75	1.035
70	1.064
65	1.103
60	1.155
55	1.221
50	1.305
45	1.414
40	1.556
35	1.743
30	2.000



SIDE VIEWS



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Project Development Branch

JBK

TYPE "S" SADDLE HEADWALLS FOR PIPE

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.

M-601-11

Standard Sheet No. 1 of 1

Project Sheet Number: