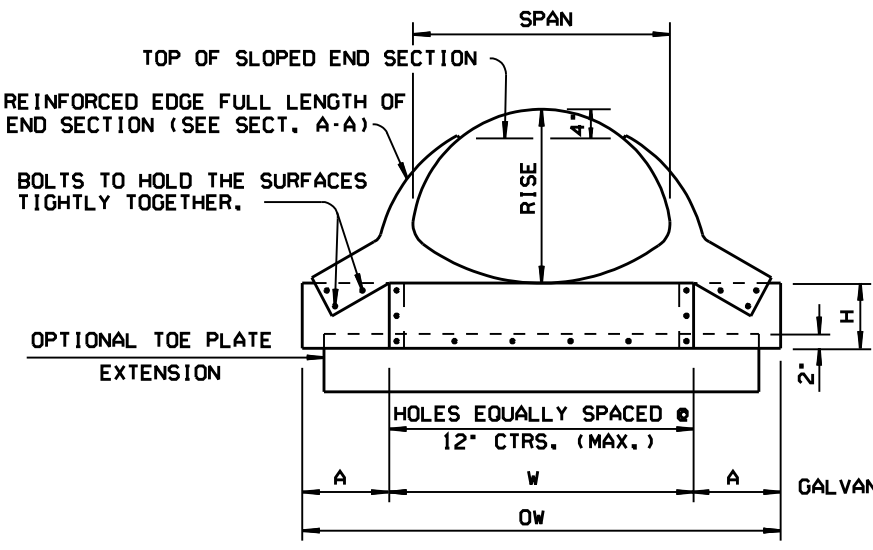
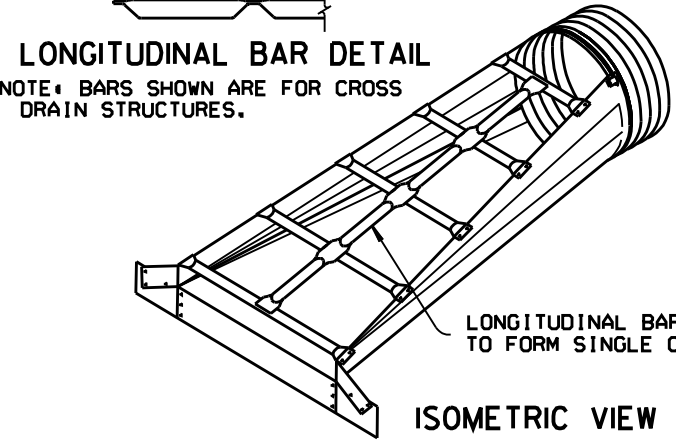


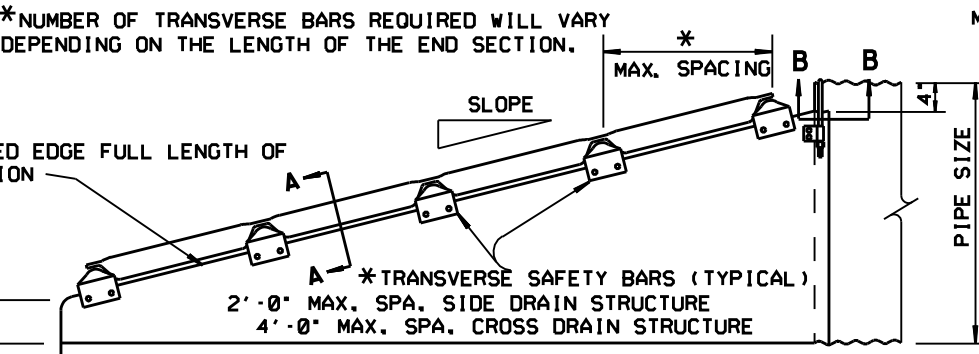
FRONT VIEW CIRCULAR PIPE



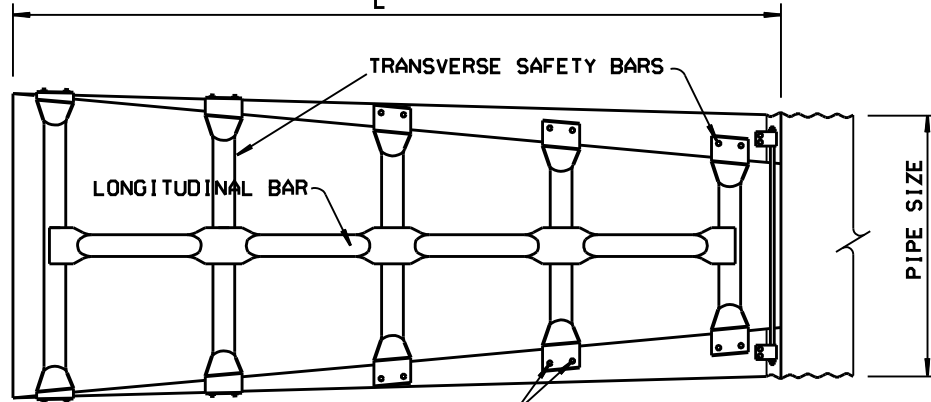
FRONT VIEW ARCH PIPE



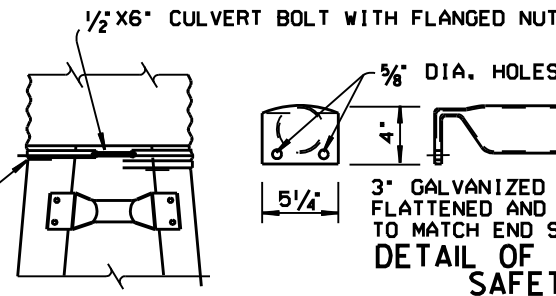
ISOMETRIC VIEW



SIDE ELEVATION CIRCULAR OR ARCH SECTION

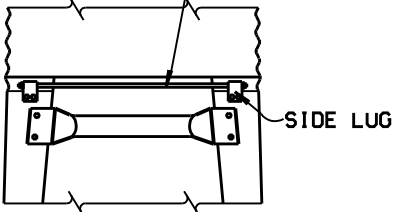


TOP VIEW CIRCULAR OR ARCH SECTION



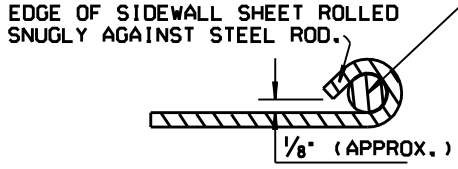
TYPE #1 CONNECTOR DETAIL FOR 15" THRU 24" PIPE

1/2" THREADED ROD WITH FLANGED NUTS. FORM OVER TOP OF END SECTION. SIDE LUGS TO BE BOLTED TO END SECTION.

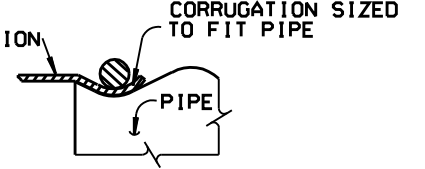


TYPE #2 CONNECTOR DETAIL FOR 30" AND LARGER ROUND PIPES & 21" X 15" THRU 64" X 43" ARCH PIPES

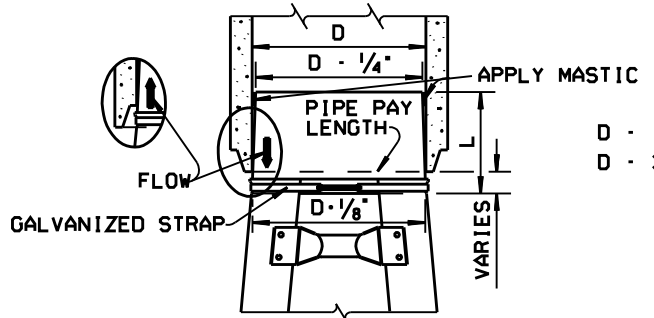
MINIMUM 1/8" DIA. GALVANIZED STEEL ROD OR NO. 4 GALVANIZED REINFORCING BAR.



SECTION A-A



SECTION B-B



NOTE: METAL END SECTION TO BE FIRMLY WEDGED INTO PIPE END BEFORE BACKFILLING PIPE. (TAPERED SLEEVE TO BE 12 GA. SMOOTH GALVANIZED STEEL IN ACCORDANCE WITH AASHTO M 218.)

STEEL END SECTION FOR CONCRETE PIPE (Alternate for Concrete End Section)

GENERAL NOTES

END SECTIONS SHALL BE FABRICATED FROM GALVANIZED STEEL MEETING THE REQUIREMENTS OF SUBSECTION 606.02(c)(ii) OF THE STANDARD SPECIFICATIONS. WHEN SPECIFIED OPTIONAL TOE PLATE EXTENSION SHALL BE PUNCHED AND BOLTED TO END SECTION APRON LIP WITH 1/2" DIAMETER GALVANIZED BOLTS. STEEL FOR TOE PLATE EXTENSION SHALL BE SAME GAUGE AS END SECTION. DIMENSIONS SHALL BE OVERALL WIDTH LESS 6" BY 8" HIGH. ATTACHMENT TO CIRCULAR PIPES 15" THROUGH 24" DIAMETER SHALL BE MADE WITH TYPE #1 STRAPS. ALL OTHER SIZES SHALL BE ATTACHED WITH TYPE #2 RODS AND LUGS. SAFETY BARS SHALL BE FABRICATED FROM STEEL PIPE MEETING THE REQUIREMENTS OF ASTM A-53 SCHEDULE 40 SPECIFICATIONS. SAFETY BARS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION. ALL WORK AND MATERIALS REQUIRED FOR CONSTRUCTION AND INSTALLATION OF SAFETY END SECTION SHALL BE INCLUDED IN PRICE BID EACH FOR SAFETY END SECTIONS FOR PIPE CULVERTS. LONGITUDINAL AND TRANSVERSE BARS WILL BE REQUIRED FOR CROSS DRAIN STRUCTURES WHEN SPAN IS GREATER THAN 30". NO SAFETY BARS WILL BE REQUIRED FOR 30" SPAN OR LESS WHEN USED ON CROSS DRAIN STRUCTURES. TRANSVERSE BARS WILL BE REQUIRED FOR ALL SIZES OF SIDE DRAIN STRUCTURES. CLASS 1 SAFETY END SECTIONS SHALL BE END SECTIONS WITH A 4:1 SLOPE. CLASS 2 SAFETY END SECTIONS SHALL BE END SECTIONS WITH A 6:1 SLOPE.

SAFETY END SECTIONS FOR ARCH PIPES										SAFETY END SECTIONS FOR CIRCULAR PIPES												
EQUIV. DIA.	NOM. W.W. AREA SQ FT	PIPE SPAN (IN.)	ARCH RISE (IN.)	MIN. GAUGE END SECT.	DIMENSIONS IN INCHES				SLOPE	L (IN.)	SLOPE	L (IN.)	PIPE DIA.	MIN. GAUGE ENDS	DIMENSIONS IN INCHES				L DIMENSIONS IN INCHES			
					A	H	W	OW							A	H	W	OW	SLOPE	L	SLOPE	L
18"	1.6	21	15	16	8	6	27	43	4:1	20	6:1	30	15"	16	8	6	21	37	4:1	20	6:1	30
21"	2.2	24	18	16	8	6	30	46	4:1	32	6:1	48	18"	16	8	6	24	40	4:1	32	6:1	48
24"	2.9	28	20	16	8	6	34	50	4:1	40	6:1	60	21"	16	8	6	27	43	4:1	44	6:1	66
30"	4.5	35	24	14	12	9	41	65	4:1	56	6:1	84	24"	16	8	6	30	46	4:1	56	6:1	84
36"	6.5	42	29	12	12	9	48	72	4:1	76	6:1	114	30"	12	12	9	36	60	4:1	80	6:1	120
42"	8.9	49	33	12	16	12	55	87	4:1	92	6:1	138	36"	12	12	9	42	66	4:1	104	6:1	156
48"	11.6	57	38	12	16	12	63	95	4:1	112	6:1	168	42"	12	16	12	48	80	4:1	128	6:1	192
54"	14.7	64	43	12	16	12	70	102	4:1	132	6:1	198	48"	12	16	12	54	86	4:1	152	6:1	228
60"	18.1	71	47	12	16	12	77	109	4:1	148	6:1	222	54"	12	16	12	60	92	4:1	176	6:1	264
72"	26.0	83	57	12	16	12	89	121	4:1	188	6:1	282	60"	12	16	12	66	98	4:1	200	6:1	300

10-18-90	REVISED ASTM REF. TO AASHTO	
8-15-91	DRAWN & ISSUED	
DATE	REVISION	DATE FILMED

ARKANSAS STATE HIGHWAY COMMISSION
SAFETY END SECTION FOR CIRCULAR AND ARCH PIPES
 STANDARD DRAWING SES-1