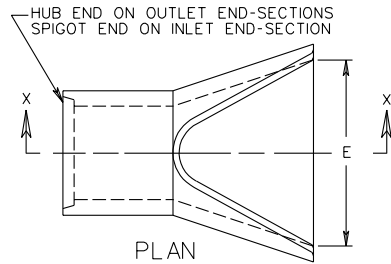
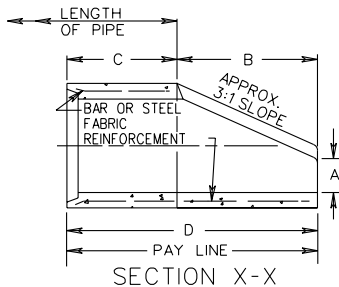


END-SECTION 12" - 60" PIPE

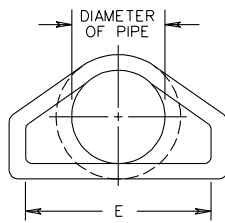


CONCRETE TO BE 4000 PSI MINIMUM

PLAN



SECTION X-X

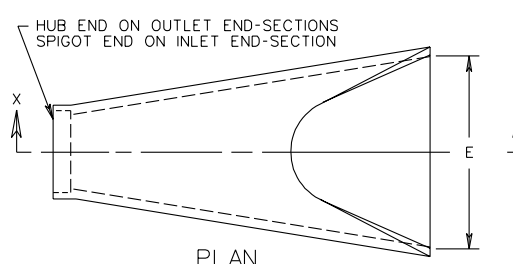


END VIEW

END SECTION DIMENSIONS

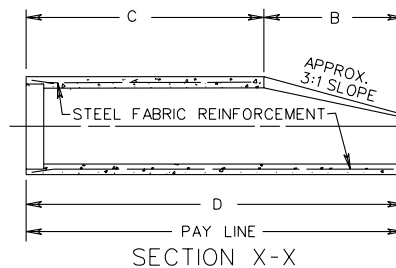
PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	2'-0"	4'-0"	2'-0"
15"	6"	2'-3"	1'-9"	4'-0"	2'-6"
18"	9"	2'-3"	1'-9"	4'-0"	3'-0"
21"	9 1/4"	2'-11"	2'-1"	5'-0"	3'-6"
24"	9 1/2"	3'-7"	2'-6"	6'-1"	4'-0"
27"	10 3/4"	4'-0"	2'-1"	6'-1"	4'-6"
30"	1'-0"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"
33"	1'-1 1/2"	4'-10 1/2"	2'-3 1/4"	7'-1 3/4"	5'-6"
36"	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-9 1/4"	8'-2 1/4"	7'-6"
60"	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"

ALTERNATE END-SECTION 12" - 60" PIPE

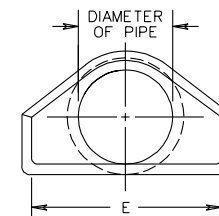


CONCRETE TO BE 4000 PSI MINIMUM

PLAN



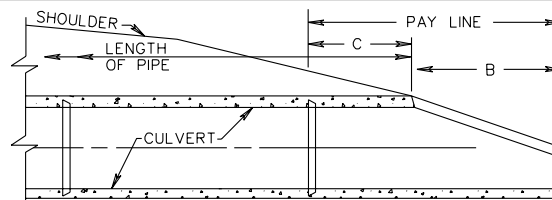
SECTION X-X



END VIEW

END SECTION DIMENSIONS

PIPE DIAMETER	A	B	C	D	E
12"	4"	2'-0"	4'-1"	6'-1"	2'-0"
15"	6"	2'-3"	3'-10"	6'-1"	2'-6"
18"	9"	2'-3"	3'-10"	6'-1"	3'-0"
21"	9"	2'-11"	3'-2"	6'-1"	3'-6"
24"	10"	3'-7"	2'-8"	6'-3"	4'-0"
27"	10 1/2"	4'-0"	2'-1 1/2"	6'-1 1/2"	4'-6"
30"	1'-0"	4'-6"	1'-7 3/4"	6'-1 3/4"	5'-0"
33"	1'-1 1/2"	4'-10 1/2"	3'-3 1/4"	8'-1 3/4"	5'-6"
36"	1'-3"	5'-3"	2'-10 3/4"	8'-1 3/4"	6'-0"
42"	1'-9"	5'-3"	2'-11"	8'-2"	6'-6"
48"	2'-0"	6'-0"	2'-2"	8'-2"	7'-0"
54"	2'-3"	5'-5"	2'-11"	8'-4"	7'-6"
60"	2'-6"	5'-0"	3'-3"	8'-3"	8'-0"



SLOPE DETAIL

NOTES:

PIPE LENGTHS SHOWN ON PLANS ARE BASED ON END-SECTION DESIGN SHOWN ON THE LEFT. IF THE CONTRACTOR ELECTS TO USE THE ALTERNATE DESIGN SHOWN ON THE RIGHT, LENGTHS WILL BE REDUCED BY THE DIFFERENCE IN DIMENSION "D".

SPECIFICATION REFERENCE

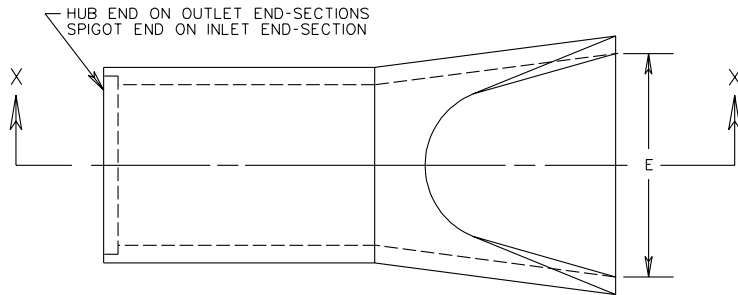
302

FLARED END-SECTION FOR 12"-60" CONCRETE PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

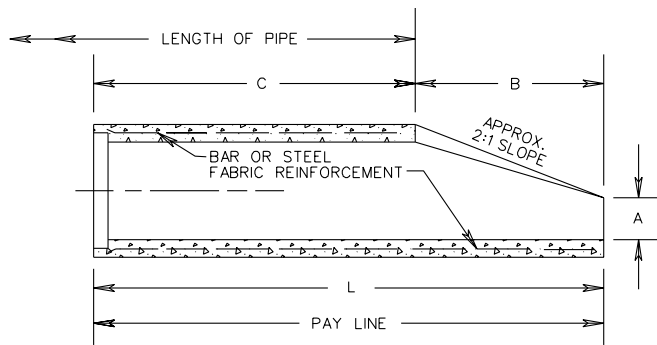
REVISED 7/01

ES-1A

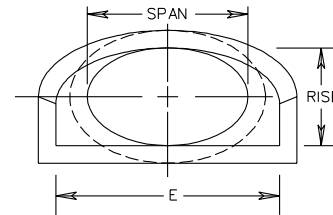


PLAN

END SECTION DIMENSIONS					
SPAN X RISE	A	B	C	L	E
23" X 14"	6"	2'-3"	3'-10"	6'-1"	2'-8"
30" X 19"	9"	2'-11"	3'-2"	6'-1"	3'-6"
38" X 24"	10"	3'-8"	2'-6"	6'-2"	4'-0"
42" X 27"	12"	4'-6"	1'-8"	6'-2"	5'-0"
45" X 29"	13"	4'-11"	3'-3"	8'-2"	5'-6"
53" X 34"	15"	5'-3"	2'-11"	8'-2"	6'-0"

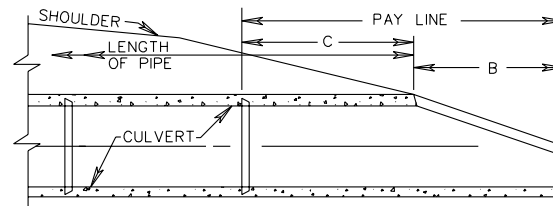


SECTION X-X



END VIEW

CONCRETE TO BE  
4000 PSI MINIMUM



SLOPE DETAIL

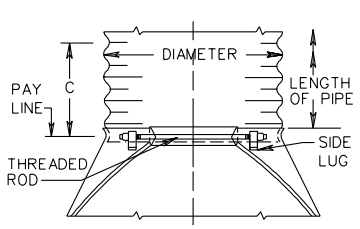
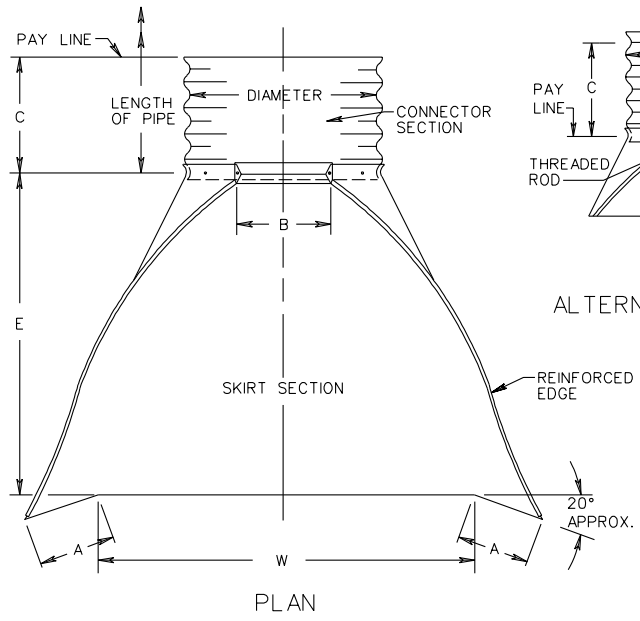
FLARED END-SECTION FOR 23" X 14" TO 53" X 34"  
ELLIPTICAL CONCRETE PIPE CULVERTS

SPECIFICATION  
REFERENCE

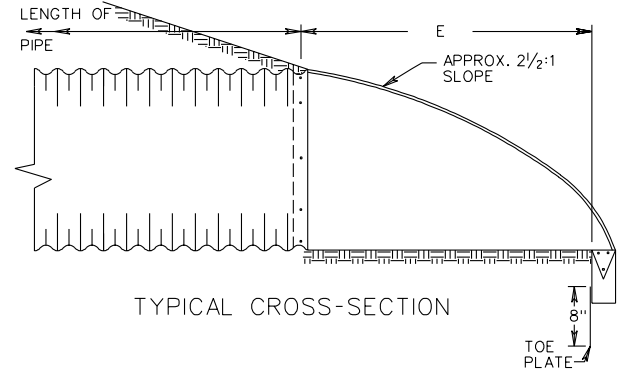
302

REVISED 7/01

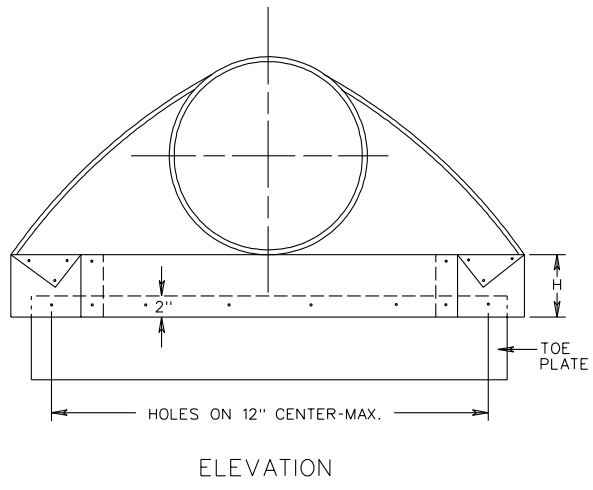
ES-2



ALTERNATE CONNECTION



TYPICAL CROSS-SECTION



ELEVATION

PIPE DIAMETER	SHEET THICKNESS		DIMENSIONS					
	STEEL	ALUMINUM	A 1" TOL.	B MAX.	H 1" TOL.	E 1 1/2" TOL.	W 2" TOL.	C
12"	.064"	.060"	6"	6"	6"	21"	24"	24"
15"	.064"	.060"	7"	8"	6"	26"	30"	24"
18"	.064"	.060"	8"	10"	6"	31"	36"	24"
21"	.064"	.060"	10"	12"	6"	36"	42"	24"
24"	.064"	.060"	10"	13"	6"	41"	48"	24"
27"/30"	.064"	.075"	12"	16"	8"	51"	60"	24"
36"	.064"	.075"	14"	19"	9"	60"	72"	36"
42"	.064"	.105"	16"	22"	11"	69"	84"	36"
48"	.064"	.105"	18"	27"	12"	78"	90"	24"
54"	.064"/.079"	.105"	18"	30"	12"	84"	102"	36"
60"	.064"/.079"	.105"/.135"	18"	33"	12"	87"	114"	36"

NOTES:

1. TOE PLATE TO BE PUNCHED TO MATCH HOLES IN SKIRT LIP. 3/8" GALVANIZED BOLTS TO BE FURNISHED. LENGTH OF TOE PLATE IS W + 10" FOR 12" TO 30" DIAMETER PIPE AND W + 22" FOR 36" TO 60" DIAMETER PIPE.
2. SKIRT SECTION 12" TO 30" DIAMETER PIPE TO BE MADE IN ONE PIECE.
3. SKIRT SECTION FOR 36" TO 54" DIAMETER PIPE MAY BE MADE FROM TWO SHEETS JOINED BY RIVETING OR BOLTING ON CENTER LINE, 60" MAY BE CONSTRUCTED IN 3 PIECES.
4. CONNECTOR SECTION, CORNER PLATE AND TOE PLATE TO BE SAME SHEET THICKNESS AS SKIRT.
5. END-SECTION AND FITTINGS ARE TO BE STEEL FOR USE WITH STEEL PIPE.
6. END-SECTION AND FITTINGS ARE TO BE ALUMINUM ALLOY FOR USE WITH ALUMINUM ALLOY PIPE.
7. EITHER THE STEEL OR ALUMINUM END-SECTION DETAILED MAY BE USED FOR PLASTIC PIPE SIZES SHOWN IN STD.PC-1 OR AN APPROVED PLASTIC END-SECTION MAY BE USED.
8. WHERE FLARED END-SECTION ARE TO BE USED WITH ASPHALT COATED AND PAVED METAL PIPE, END SECTIONS DO NOT NEED TO BE COATED OR PAVED.

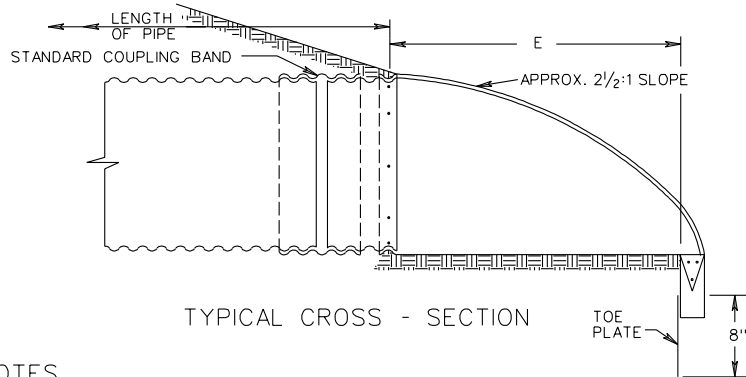
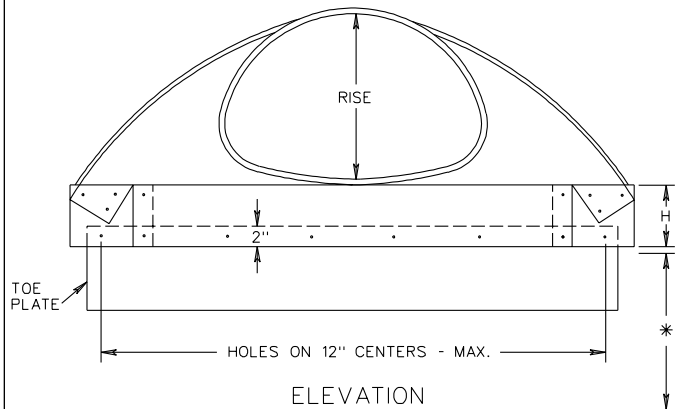
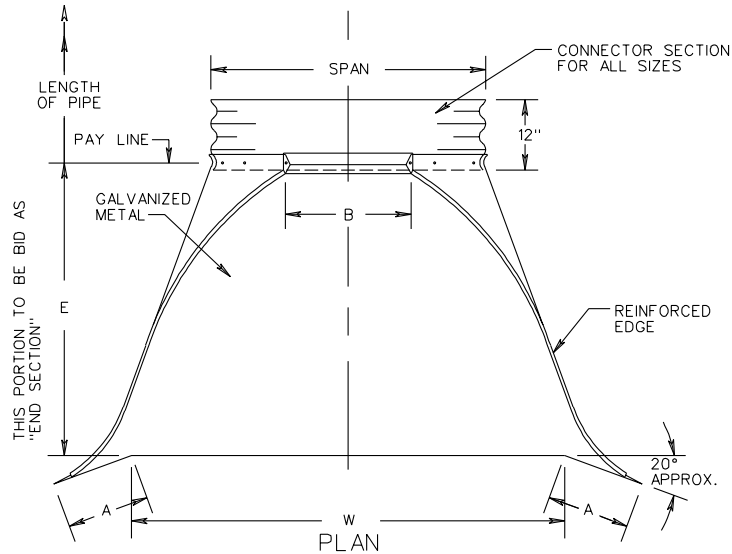
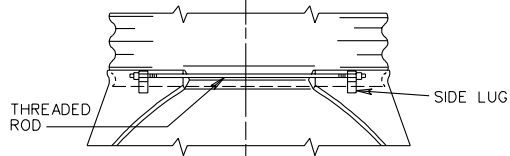
SPECIFICATION REFERENCE  
302

FLARED END-SECTION FOR 12"-60" CORRUGATED PIPE CULVERTS

VIRGINIA DEPARTMENT OF TRANSPORTATION

102.03

ALTERNATE CONNECTION



NOTES

- TOE PLATE TO BE PUNCHED TO MATCH HOLES IN SKIRT LIP.
- 3/8" GALVANIZED BOLTS TO BE FURNISHED, LENGTH OF TOE PLATE IS W + 10" WITH RISE OF 13" TO 29" INCLUDED AND W + 18" MIN. WITH RISE OF 33" TO 47" INCLUDED.
- SKIRT SECTION WITH RISE OF 13" TO 24" INCLUDED TO BE MADE IN ONE PIECE.
- SKIRT SECTION WITH RISE OF 29" TO 38" INCLUDED MAY BE MADE FROM TWO SHEETS JOINED BY RIVETING OR BOLTING ON CENTER LINE.
- SKIRT SECTION WITH RISE OF 43" TO 47" INCLUDED MAY BE MADE FROM THREE SHEETS JOINED BY RIVETING OR BOLTING AT EQUAL DISTANCES FROM CENTER LINE.
- CONNECTOR SECTION, CORNER PLATE AND TOE PLATE TO BE SAME SHEET THICKNESS AS SKIRT AND SAME TYPE OF MATERIAL AS CULVERT.
- WHERE FLARED END - SECTIONS ARE TO BE USED WITH ASPHALT COATED AND PAVED METAL PIPE, END SECTIONS DO NOT NEED TO BE COATED OR PAVED.
- \*INDICATES PIPE ARCHES FOR WHICH DIMENSIONS FOR EITHER CORRUGATION MAY BE USED WITHIN FILL HEIGHT LIMITATIONS.

PIPE-ARCH DIMENSIONS											
3" x 1" and 5" x 1" CORRUGATIONS			2 2/3 x 1/2" CORRUGATIONS				DIMENSIONS				
SPAN	RISE	SHEET THICKNESS	SPAN	RISE	SHEET THICKNESS		A	B	H	E	W
					STEEL	ALUM.	1" TOL.	MAX.	1" TOL.	1/2" TOL.	2" TOL.
			17"	13"	.064"	.060	4 1/2"	9"	6"	19"	30"
			21"	15"	.064"	.060	5 1/4"	10"	6"	23"	36"
			24"	18"	.064"	.060	6 1/4"	11 1/2"	6"	28"	42"
			28"	20"	.064"	.060	7"	14"	6"	31 1/2"	48"
			35"	24"	.064"	.075	8 3/4"	16"	6"	38 1/2"	60"
40"	31"	.079"	42"	29"	.064"	.105	10 3/4"	17 1/2"	7 5/8"	47"	75"
46"	36"	.079"	49"	33"	.109"	.105	12 1/4"	20"	9 1/8"	54"	85"
53"	41"	.079"	57"	38"	.109"	.105	14"	22"	10 5/8"	63"	96"
60"	46"	.079"	64"	43"	.109"	.105	15 3/4"	23"	10 5/8"	70"	112"
66"	51"	.079"	71"	47"	.138"	.135	17 1/4"	24"	12 1/8"	77"	128"

FLARED END-SECTION FOR METAL PIPE-ARCHES  
13" - 47" RISE

SPECIFICATION REFERENCE

302