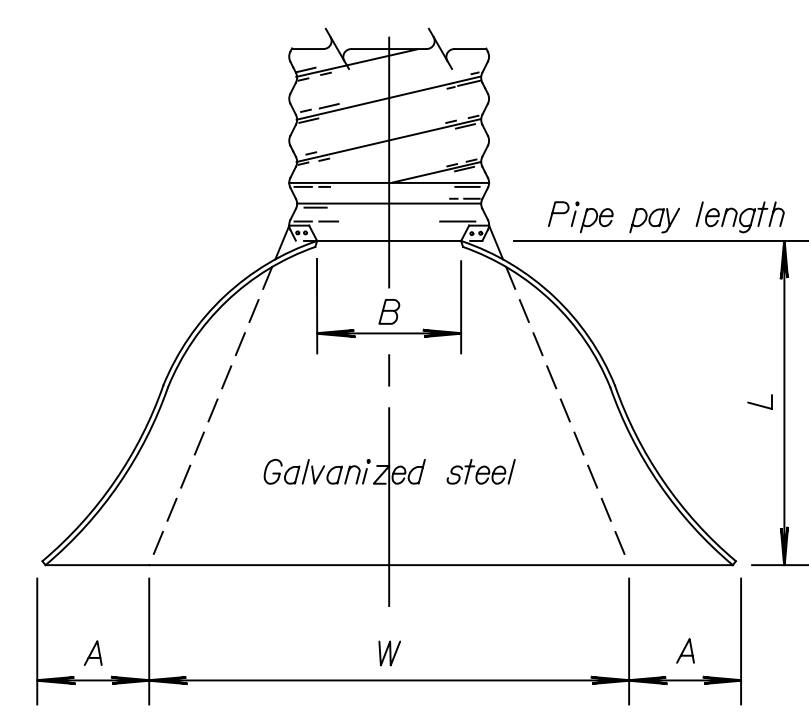
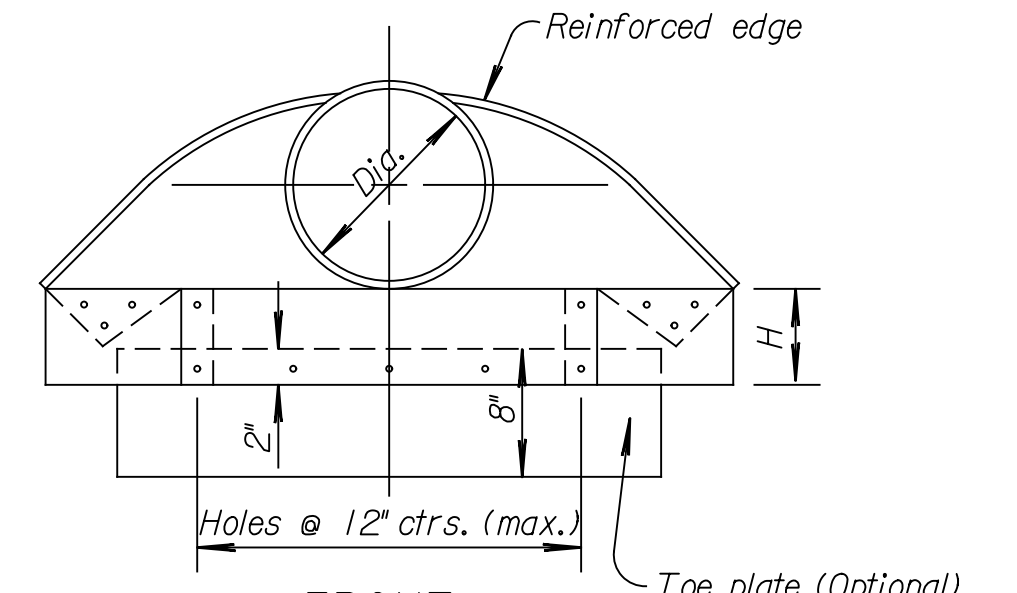


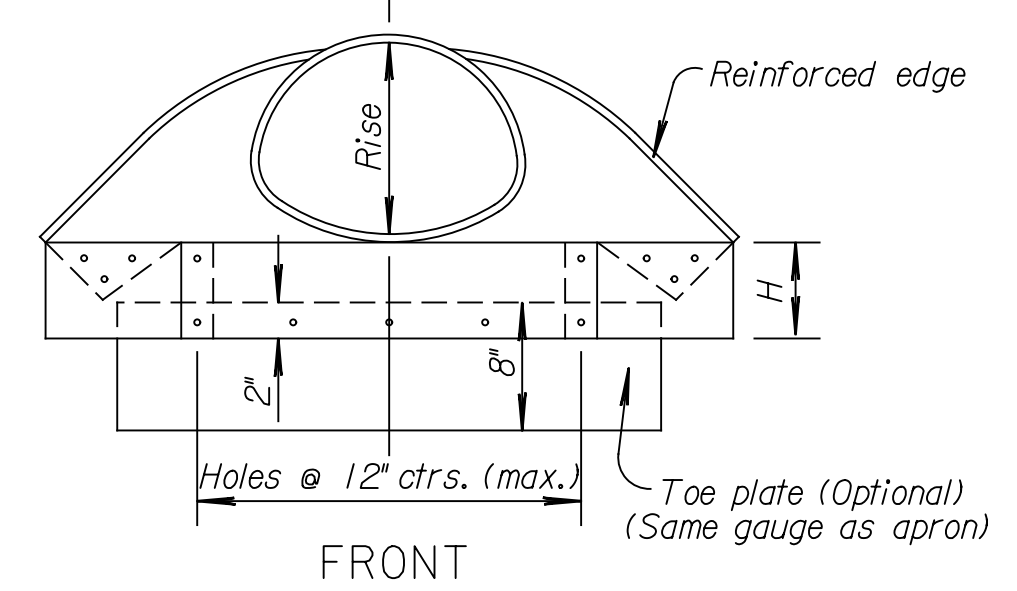
Note to Designer: KDOT Pipe Policy provides guidance in identifying the prohibited and/or restricted uses of CSP, ACSP, PEP, PVCP, CAP & RCP. Provide end sections of the same type and coating as the pipe. Exceptions to this are noted in the Standard Specifications. Refer to the KDOT Design Manual, Volume I (Part C), Road Section, "Elements of Drainage & Culvert Design" for structural pipe design information which includes corrugations, sizes, gauges, maximum/minimum fill heights and classes of pipe.



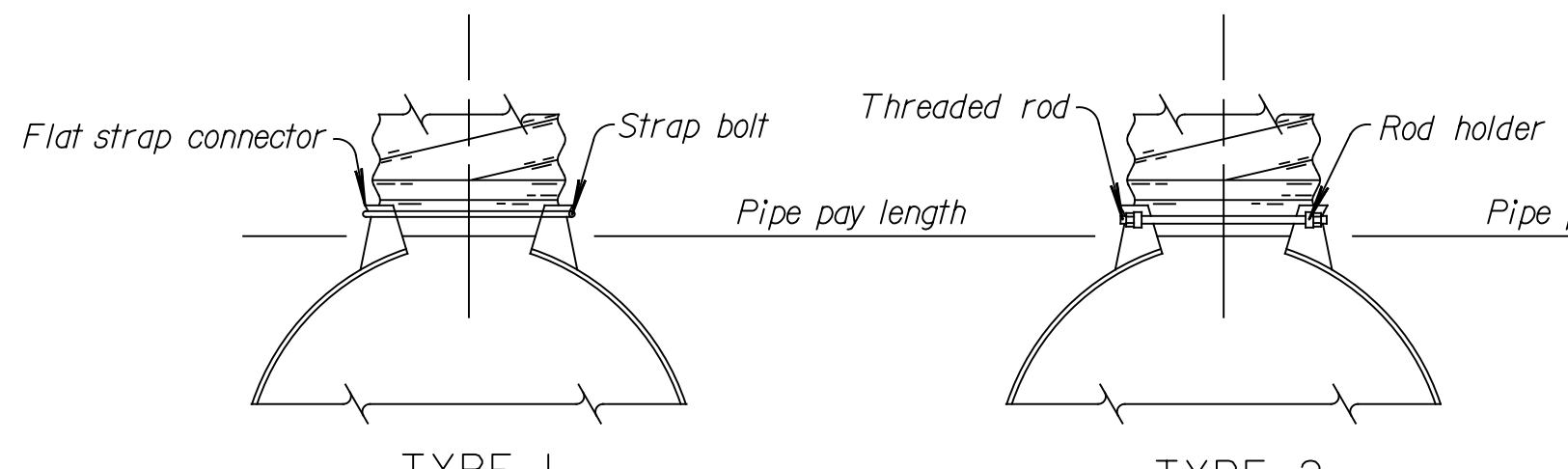
PLAN  
(Illustrated with Type #3 Connection)



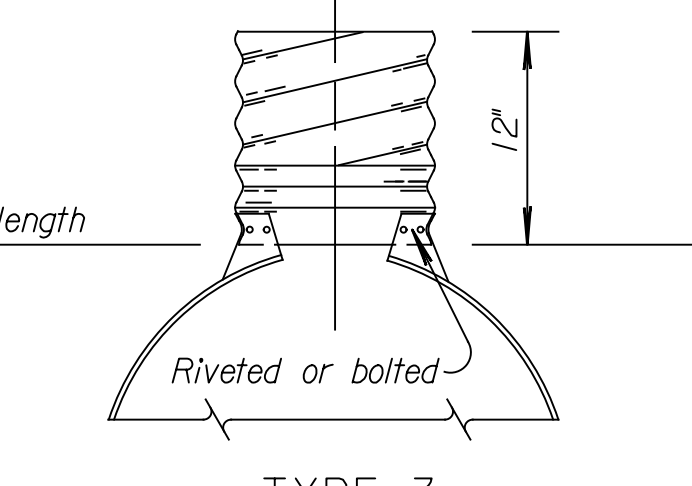
FRONT



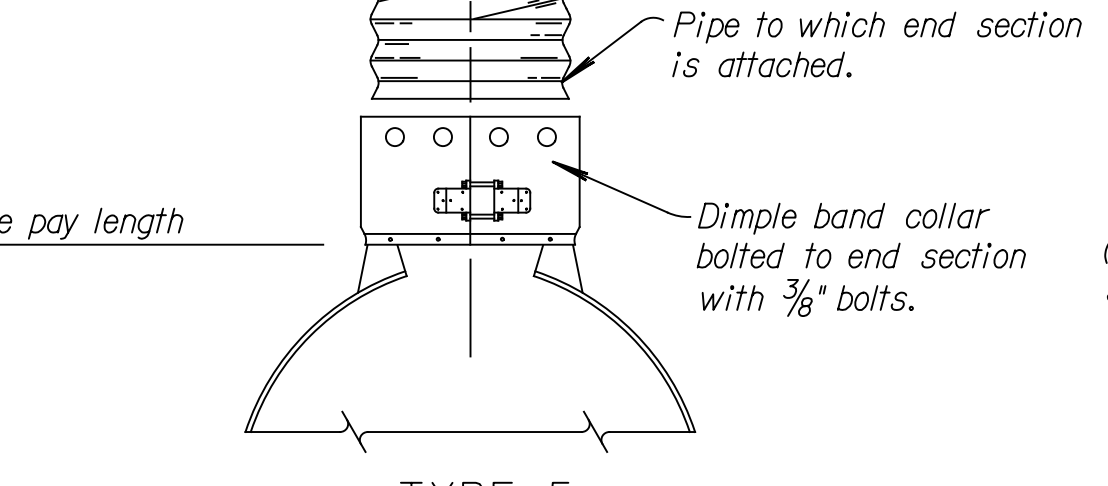
FRONT



TYPE 1 Available in sizes 12" through 24" only.  
TYPE 2 Available in sizes 30" and 36" Round and 17"x13" through 57"x38" Pipe-Arches.

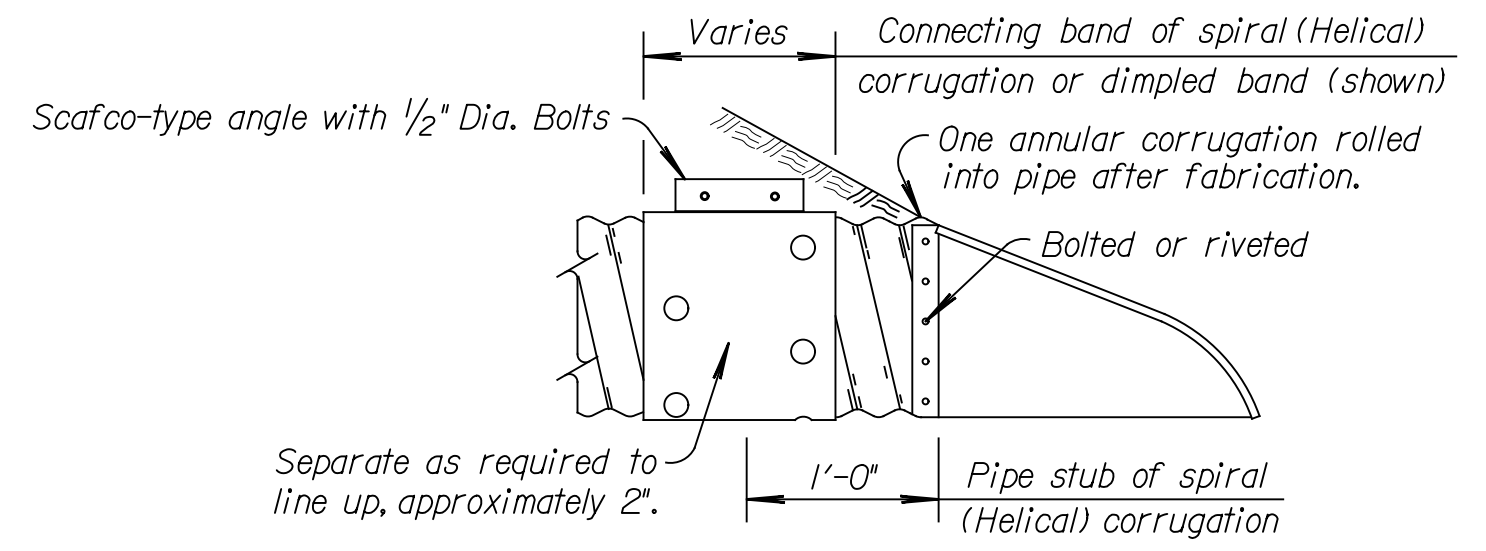


TYPE 3 Available in sizes 42" through 96" Round and 60"x46" through 81"x59" Pipe-Arches.



TYPE 5 Available for all Round and equivalent Pipe-Arch sizes. (Type 1 and Type 2 connections are recommended for the smaller sizes with annular ends.)

Note: Type 3 connection may be furnished instead of Type 1 or Type 2 for smaller round or arch pipe.



SPIRAL (HELICAL) CORRUGATION

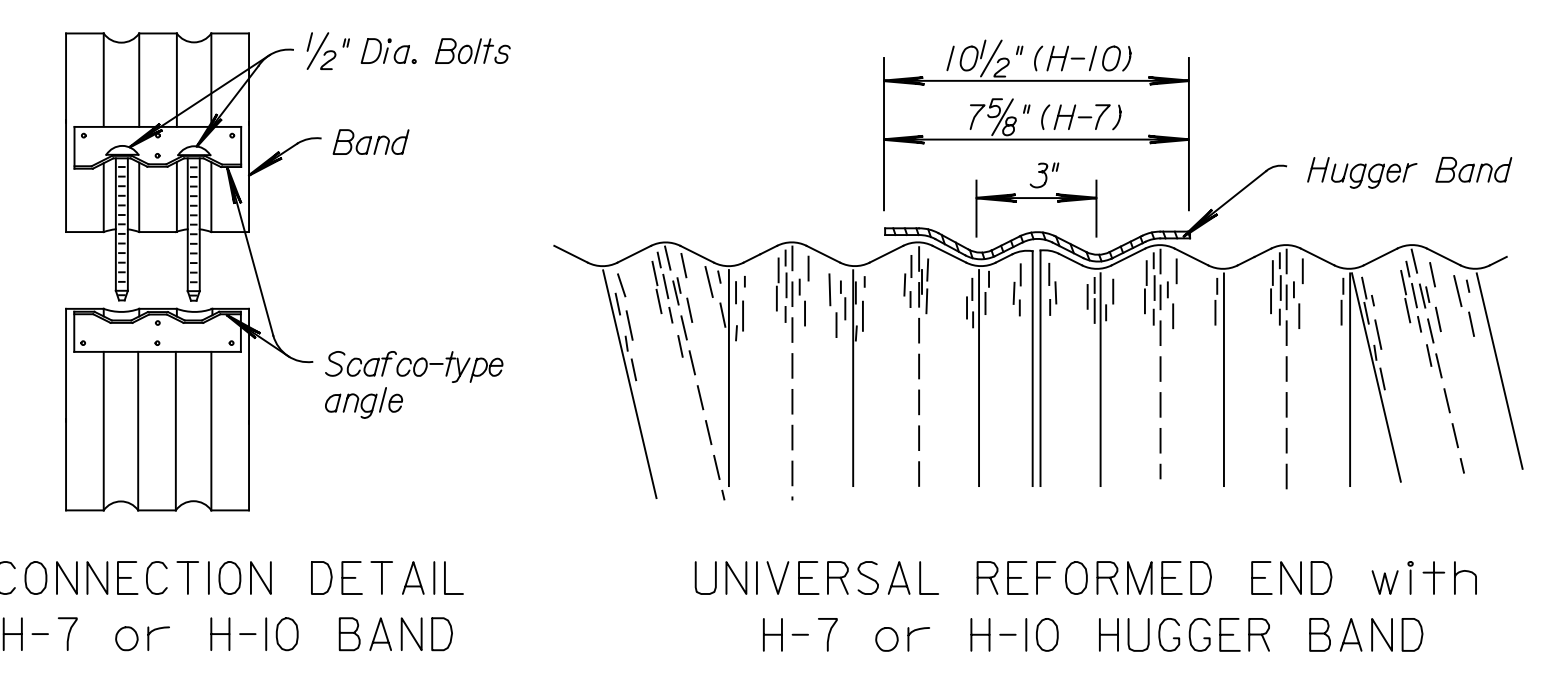
For all sizes of round and arch culvert pipes having Spiral (Helical) corrugations, the end sections and connecting bands shall be as shown above.

Thickness CSP/ACSP	Thickness CAP	Gauge
0.064"	0.060"	16 ga.
0.079"	0.075"	14 ga.
0.109"	0.105"	12 ga.
0.138"	0.135"	10 ga.
0.168"	0.164"	8 ga.

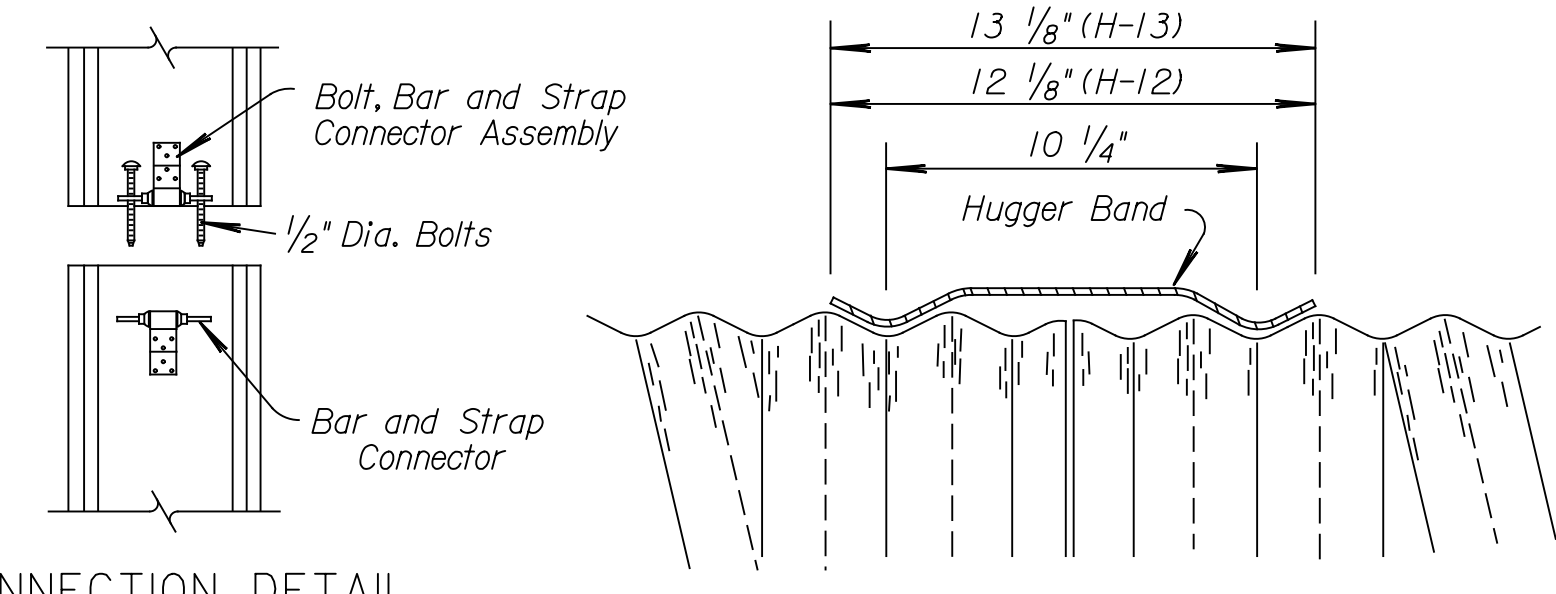
Pipe Dia. (In.)	CS,ACS or CA Gauge	Dimensions in Inches					Approx. Slope
		A (min.)	B (max.)	H (min.)	L (+/-2")	W (min.)	
12"	16	5	7	6	21	22	2 1/2:1
15"	16	6	8	6	26	28	2 1/2:1
18"	16	7	10	6	31	34	2 1/2:1
21"	16	8	12	6	36	40	2 1/2:1
24"	16	9	13	6	41	46	2 1/2:1
30"	14	11	16	8	51	55	2 1/2:1
36"	14	13	19	9	60	70	2 1/2:1
42"	12	15	25	10	69	82	2 1/2:1
48"	12	17	29	12	78	88	2 1/4:1
54"	12	17	33	12	84	100	2 1/4:1
60"	12/10	17	36	12	87	112	2:1
66"	12/10	17	39	12	87	118	2:1
72"	12/10	17	44	12	87	120	2:1
78"	12/10	17	48	12	87	130	1 1/2:1
84"	12/10	17	52	12	87	136	1 1/2:1
90"	12/10	17	58	12	87	142	1 1/2:1
96"	12/10	17	58	12	87	144	1 1/2:1

Bid Designation Sq. Ft.	Nom. W.W. Area Sq. Ft.	Pipe Arch Span & Rise	Dimensions in Inches 2 2/3" x 1/2" Corrugations					Dimensions in Inches 3" x 1" or 5" x 1" Corr.					Approx. Slope		
			CS,ACS or CA Gauge	A (min.)	B (max.)	H (min.)	L (+/-2")	W (min.)	CS,ACS or CA Gauge	A (min.)	B (max.)	H (min.)		L (+/-2")	W (min.)
1.0	1.1	17" x 13"	16	5	9	6	20	28						2 1/2:1	
1.5	1.6	21" x 15"	16	6	11	6	24	34						2 1/2:1	
2.0	2.2	24" x 18"	16	7	12	6	28	40						2 1/2:1	
2.5	2.9	28" x 20"	16	7	16	6	32	46						2 1/2:1	
3.0 or 4.0	4.5	35" x 24"	14	9	16	6	39	58						2 1/2:1	
5.0 or 6.0	6.5	42" x 29"	14	11	18	7	46	73						2 1/2:1	
7.0 or 8.5	8.9	49" x 33"	12	12	21	9	53	82						2 1/2:1	
10.0 or 11.0	11.7	53" x 41"							12	17	26	12	63	88	2:1
10.0 or 11.0	11.6	57" x 38"	12	16	26	12	62	88						2:1	
12.5 or 14.0	15.6	60" x 46"							12	17	36	12	70	100	2:1
12.5 or 14.0	14.7	64" x 43"	12	17	30	12	69	100						2:1	
16.5	19.3	66" x 51"							12/10	17	36	12	70	112	1 1/2:1
16.5	18.1	71" x 47"	12/10	17	36	12	77	112						1 1/2:1	
21.0	23.2	73" x 55"							12/10	17	36	12	77	124	1 1/2:1
21.0	21.9	77" x 52"	12/10	17	36	12	77	124						1 1/2:1	
25.0	27.4	81" x 59"							12/10	17	44	12	77	136	1 1/2:1
25.0	26.0	83" x 57"	12/10	17	44	12	77	130						1 1/2:1	
32.0	32.1	87" x 63"							12/10	17	44	12	77	136	1 1/2:1
36.0	37.0	95" x 67"							12/10	17	44	12	87	160	1 1/2:1
42.0	42.4	103" x 71"							12/10	17	44	12	87	172	1 1/2:1
47.0	48.0	112" x 75"							12/10	17	44	12	87	172	1 1/2:1

(Information listed in these tables are nominal and may vary by manufacturer.)



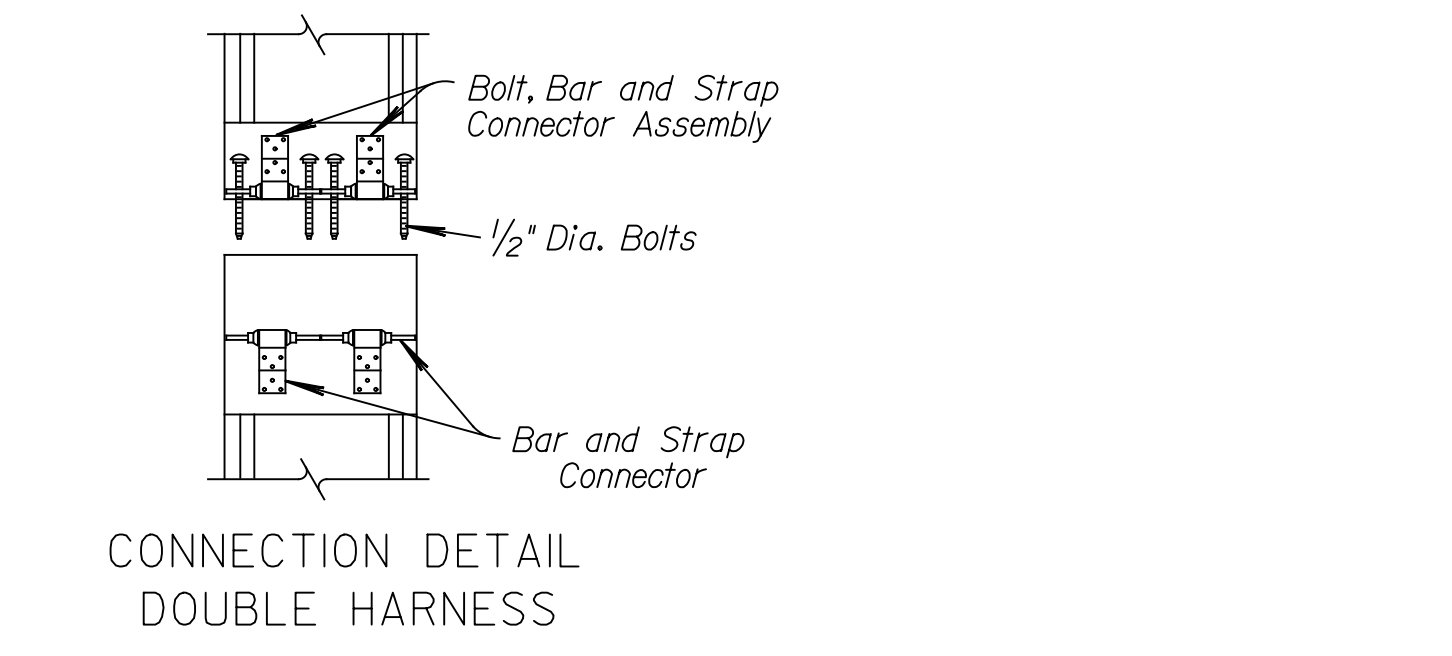
DETAILS FOR H-7 HUGGER BAND (12" thru 36") or H-10 HUGGER BAND (12" thru 120")



DETAILS FOR H-12 or H-13 HUGGER BAND

Pipe Dia. Inches	Minimum Gauge of Round Pipe				
	2 2/3" x 1/2" Corr. CSP or ACSP	3" x 1" Corr. CSP or ACSP	5" x 1" Corr. CSP or ACSP	2 2/3" x 1/2" Corr. CAP	3" x 1" Corr. CAP
12"	14			16	
15"	14			16	
18"	14			16	
21"	14			16	
24"	14			16	
30"	14			16	
36"	14			16	16
42"	14			12	16
48"	12	14	16	14	16
54"	12	14	16	14	16
60"	10	14	16	14	16
66"	10	14	16	14	16
72"	10	14	16	14	16
78"	8	14	14	14	14
84"	8	14	14	14	14
90"	14	14	14	14	14
96"	12	12	12	12	12
102"	12	12	12	12	10
108"	12	12	12	12	10
114"	12	12	12	12	8
120"	10	10	10	10	8

Bid Designation Sq. Ft.	Pipe Dimension Span & Rise	Sq. Ft.	Equiv. Round Pipe Diameter	Minimum Gauge of Arch Pipe				
				2 2/3" x 1/2" Corr. CSP or ACSP	3" x 1" Corr. CSP or ACSP	5" x 1" Corr. CSP or ACSP	2 2/3" x 1/2" Corr. CAP	3" x 1" Corr. CAP
1.0	17" x 13"	1.1	15"	14			16	
1.5	21" x 15"	1.6	18"	14			16	
2.0	24" x 18"	2.2	21"	14			16	
2.5	28" x 20"	2.9	24"	14			14	
3.0 or 4.0	35" x 24"	4.5	30"	14			14	
5.0 or 6.0	42" x 29"	6.5	36"	14			12	
7.0 or 8.5	49" x 33"	8.9	42"	14			12	
10.0 or 11.0	53" x 41"	11.7	48"		14			
10.0 or 11.0	57" x 38"	11.6	48"	12			10	
12.5 or 14.0	60" x 46"	15.6	54"		14			14
12.5 or 14.0	64" x 43"	14.7	54"	12			10	
16.5	66" x 51"	19.3	60"		14			14
16.5	71" x 47"	18.1	60"	10			8	
21.0	73" x 55"	23.2	66"		14			14
21.0	77" x 52"	21.9	66"	8				
25.0	81" x 59"	27.4	72"		14	12		12
25.0	83" x 57"	26.0	72"	8				
32.0	87" x 63"	32.1	78"		12	12		12
36.0	95" x 67"	37.0	84"		12	12		12
42.0	103" x 71"	42.4	90"		12	12		10
47.0	112" x 75"	48.0	96"		12	12		8
54.0	117" x 79"	54.2	102"		10	10		
60.0	128" x 83"	60.5	108"		10	10		
67.0	137" x 87"	67.4	114"		10	10		
74.0	142" x 91"	74.5	120"		8	8		



CONNECTION DETAIL DOUBLE HARNESS

GENERAL NOTE for END SECTIONS

End section material shall follow KDOT Pipe Policy for geographic location. Location shall govern use of CS (Galvanized), ACS (Aluminized) or CA (Aluminum) (Type I) End Section. Pipe material and End Section material shall be the same with no mixing of types per location.  
 Toe plate extension, when specified, is an accessory and shall be the same gauge and metal as end section. Toe plate shall be punched to match holes in apron lip and attached with furnished 3/8" diameter nuts & bolts.  
 W + 10" for 12" to 30" diameter pipes inclusive.  
 W + 20" for 36" to 84" diameter pipes inclusive.  
 W + 10" for pipe-arches with a rise of 13" to 29" inclusive.  
 W + 20" for pipe-arches with a rise of 33" to 59" inclusive.  
 Multiple panel end sections may contain dual gauges of like metal and shall have lap seams which are tightly joined with rivets or bolts. For 60" and larger diameter round pipe end sections and 77"x52" arch pipe end sections, the reinforced edges are supplemented with stiffener angles. The angles are attached with nuts and bolts. Angle reinforcement may be required under the center panel seams of 73"x55" and larger arch pipe end sections depending on manufacturer.  
 Other approved designs may be used in lieu of type shown.  
 Connection of end sections by welding will not be permitted.

GENERAL NOTE for METAL PIPE

Culvert "Type" listed may be CSP, ACSP, CAP, RCP, PVCP & PEP within guidelines of KDOT Pipe Policy for geographic location. More than one pipe "Type" may be acceptable for a design location with allowable types listed for each site.  
 There shall be no payment for gain in pipe length due to fit of pipe at connecting band.  
 When Hugger Bands are used, the H-7 Hugger Band may be used on circular pipes 36" diameter and smaller or pipe arches 42" x 29" and smaller. The H-10 Hugger Band may be used on 12" thru 120" pipe. The H-12 or H-13 Hugger Band are for pipe sizes larger than 36" diameter or 42" x 29" arch pipe.  
 Pipe gauge listed in the tables on this sheet are minimum for E=750 p.s.i. soil. Pipe gauge will be determined for each site based on the Design Manual Volume I- Part C Fill Height Tables and shall be listed in the Pipe Culvert Summary. Gauges shown on this Standard Drawing are KDOT minimum and may not be industry minimum gauge.  
 In geographic areas that allow CSP (24" or smaller arched or round pipe) for entrance and side road installation with less than 3,000 AADT, 16 gauge ACSP may be substituted for 14 gauge CSP.  
 Aluminum or aluminized pipes or end sections shall be coated with an asphaltic paint when in contact with fresh concrete in accordance with the Standard Specifications.

NO.	DATE	REVISIONS	BY	APP'D
4	9-10-09	Rev. Round and Arch tables, add, Alum	S.W.K.	J.O.B.
3	1-20-09	Rev. Round Pipe Gauges	S.W.K.	J.O.B.
2	4-18-08	Rev. layout, details, tables and notes	S.W.K.	J.O.B.
1	4-27-98	Added pipe corrugation option note	R.J.S.	J.O.B.

KANSAS DEPARTMENT OF TRANSPORTATION

METAL END SECTION FOR ROUND & ARCH METAL CULVERTS (TYPE I) & PIPE GAUGE TABLES

RD660

DESIGNED	12-16-09	APP'D. James O. Brewer
DETAIL CK.	DETAIL CK.	QUANTITIES
DESIGN CK.	DESIGN CK.	TRACED Bowser
		TRACE CK. King