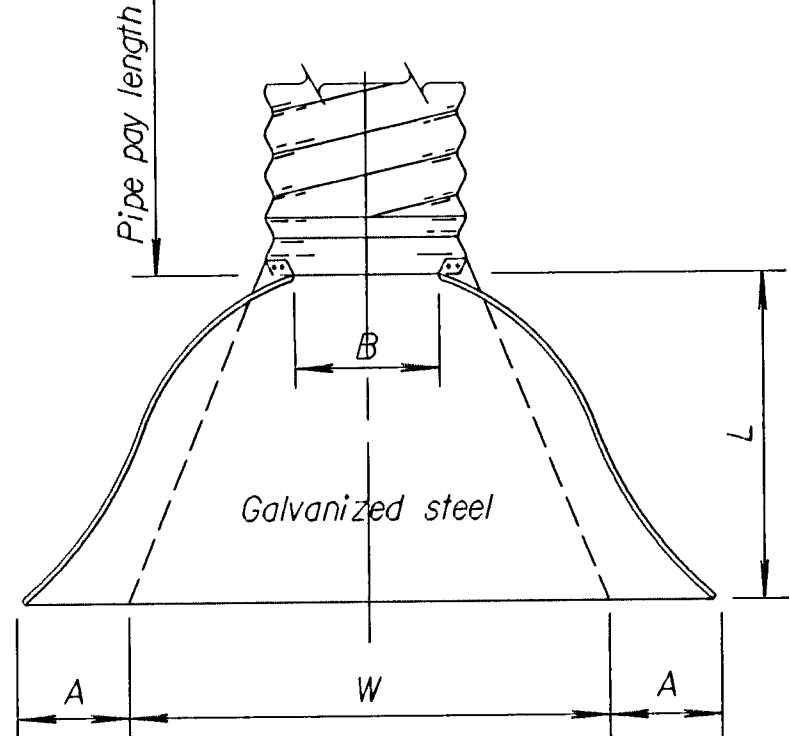
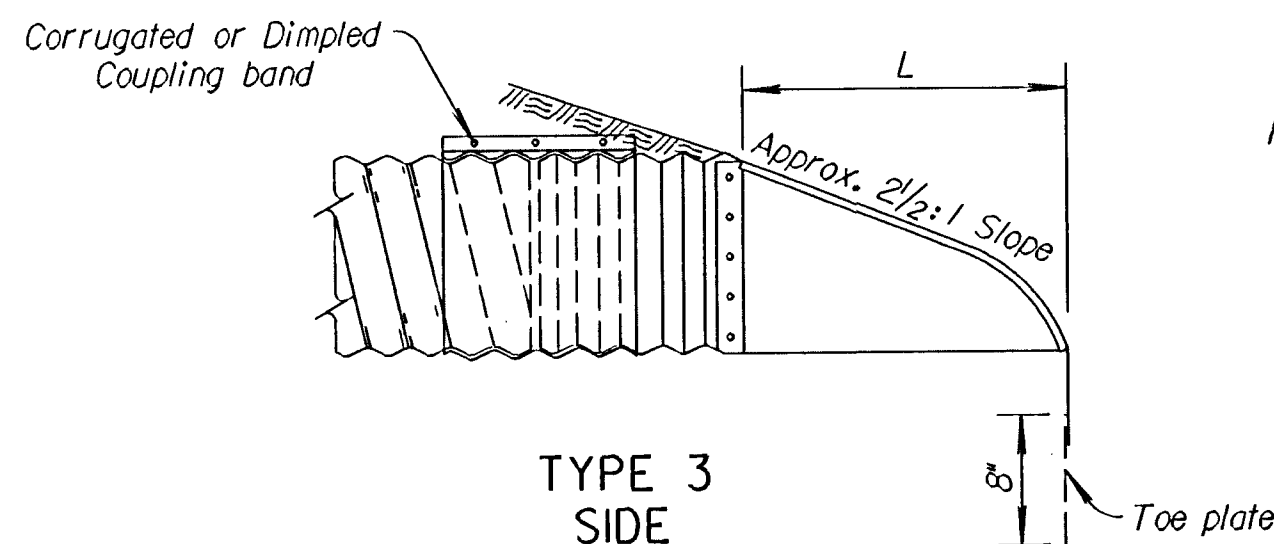
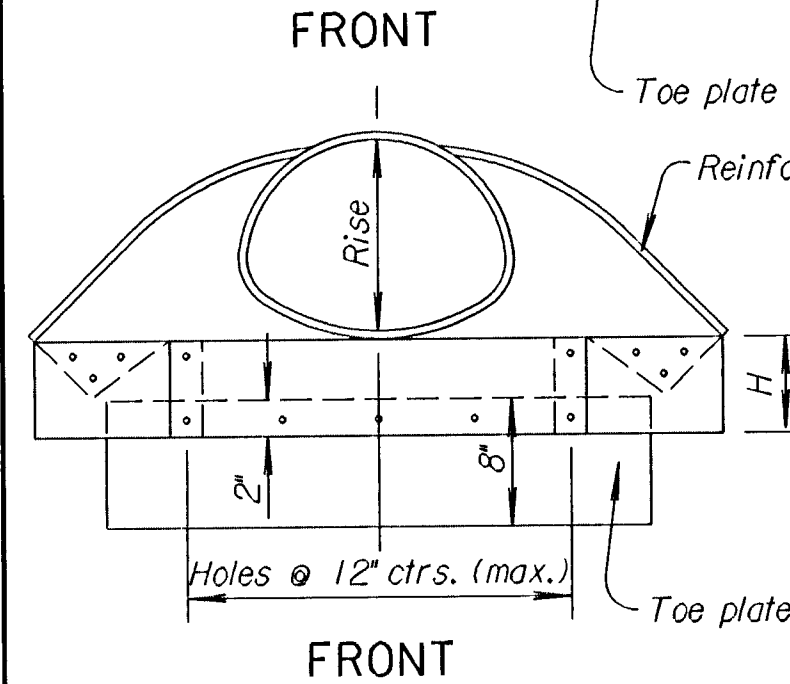
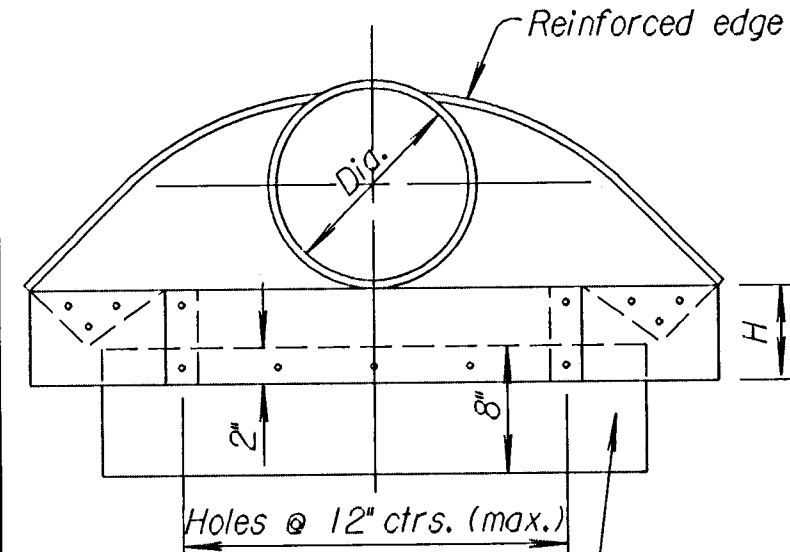


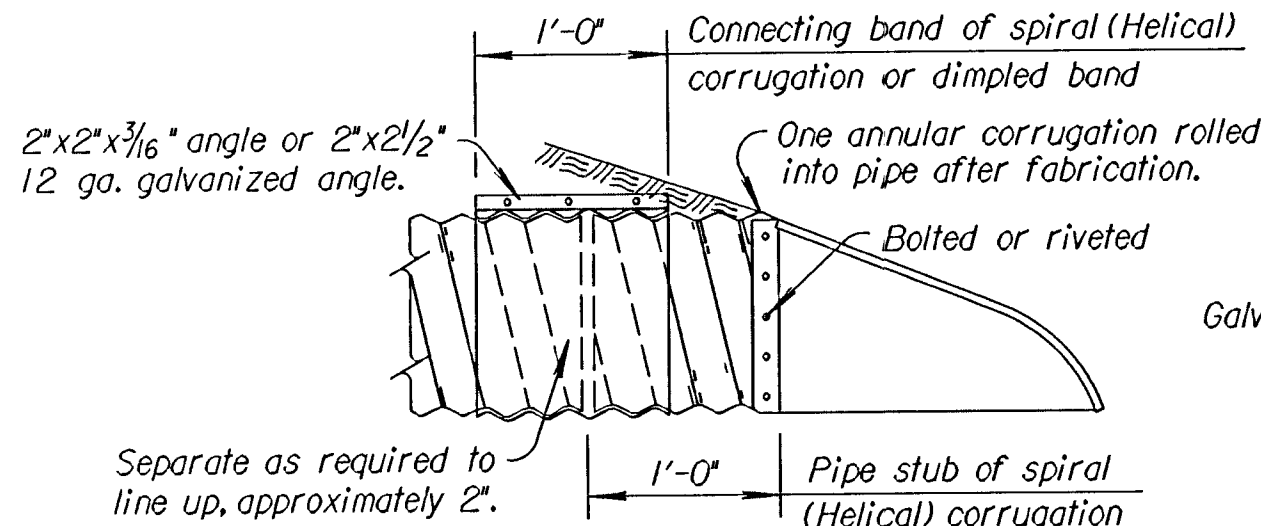
FHWA REGION NO.	STATE	PROJECT NO.	YEAR	SHEET NO.	TOTAL SHEETS
7	KANSAS	618-34	1998	63	169



PLAN
(Illustrated with Type #3 Connection)

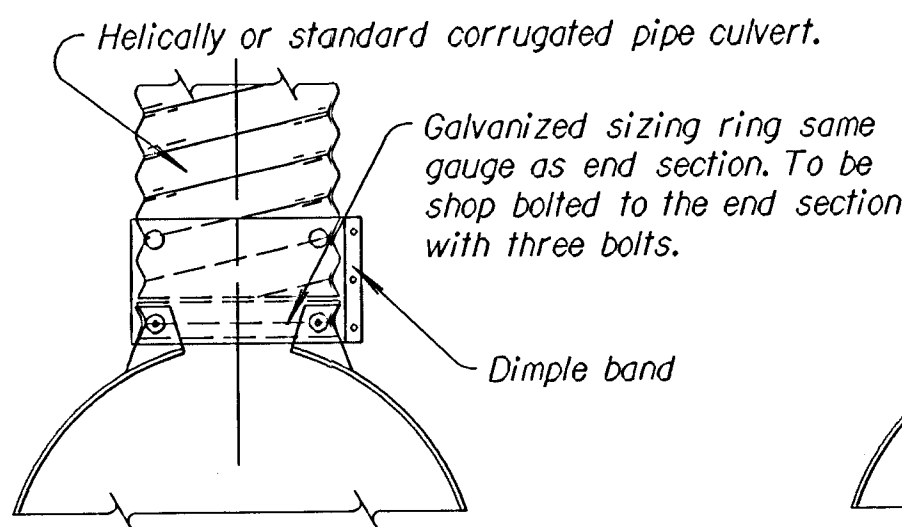


TYPE 3
SIDE



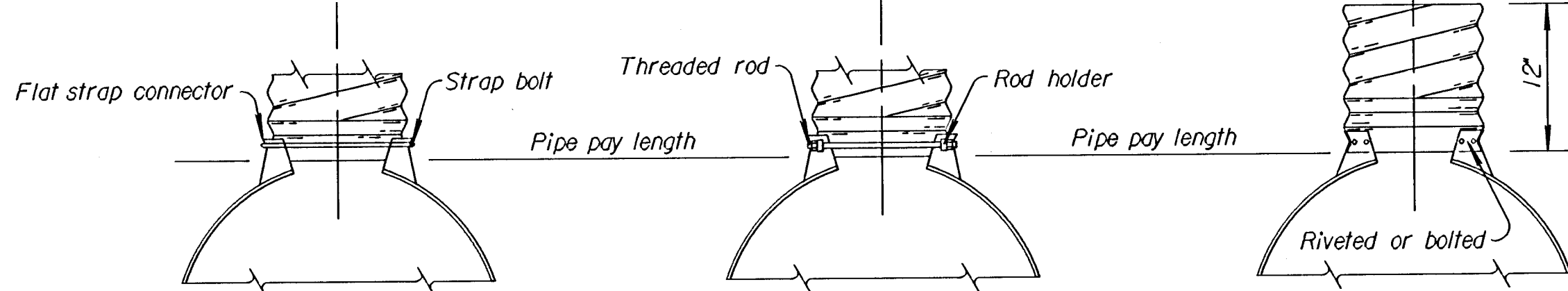
SPIRAL (HELICAL) CORRUGATION

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



ALTERNATE TYPE D CONNECTION
with Sizing Ring

Available in sizes 12" through 36" and 17"x13" through 57"x38" Pipe-Arches.



TYPE 1

Available in sizes 12" through 24" only.

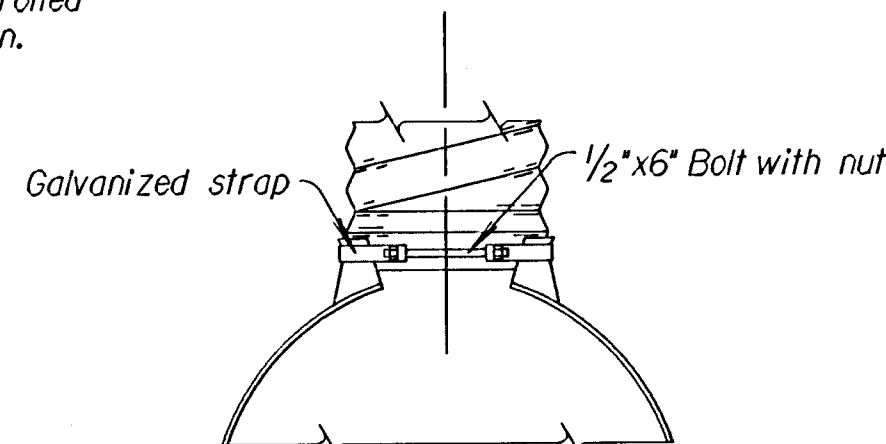
TYPE 2

Available in sizes 30" and 36" Round and 17"x13" through 57"x38" Pipe-Arches.

TYPE 3

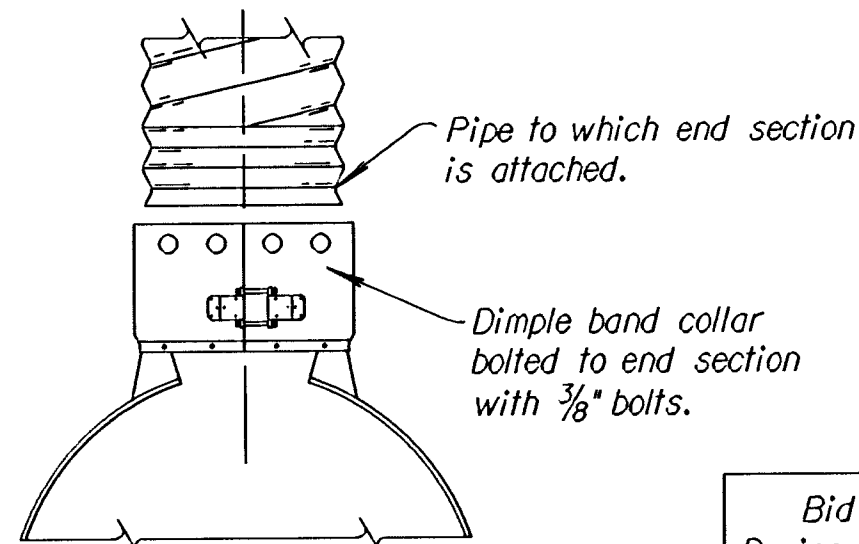
Available in sizes 42" through 96" Round and 60"x46" through 81"x59" Pipe-Arches.

Note: Type #3 connection may be furnished instead of Types #1 & #2 for smaller sizes of pipe and pipe arches.



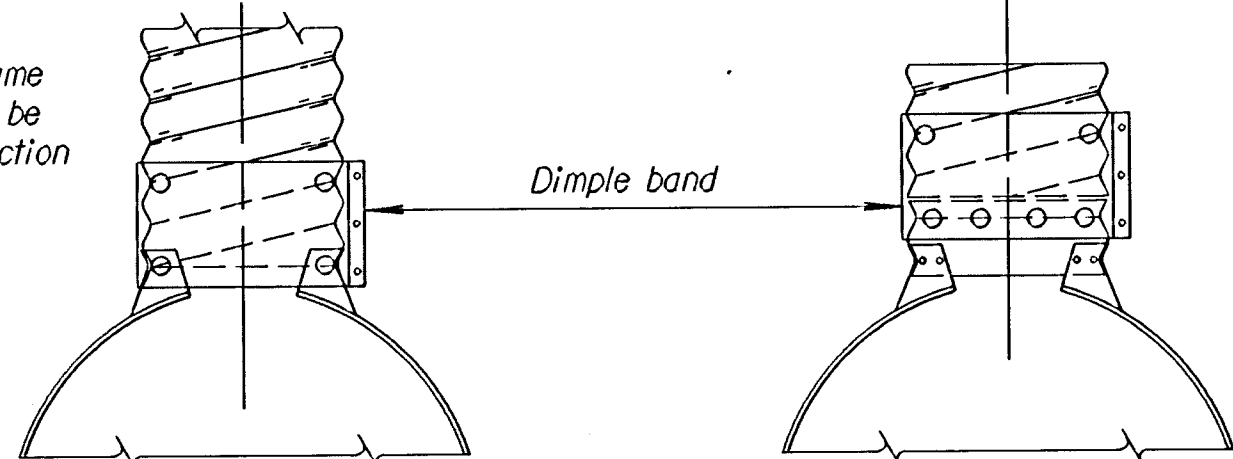
ALTERNATE TYPE 1

For 12" through 24" only.



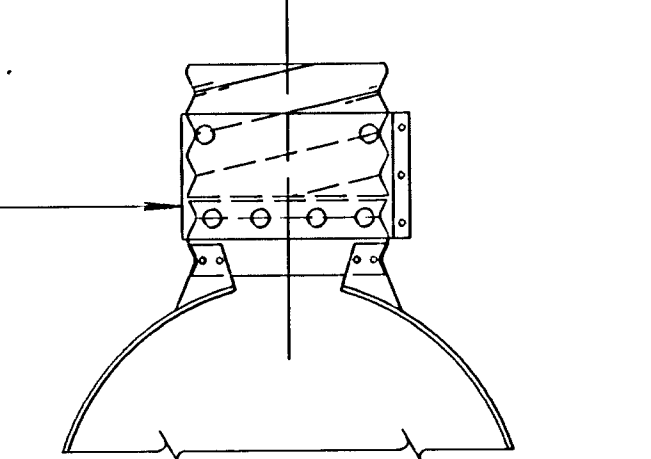
TYPE 5

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



TYPE D

Available in sizes 12" through 36" and 17"x13" through 57"x38" Pipe-Arches.

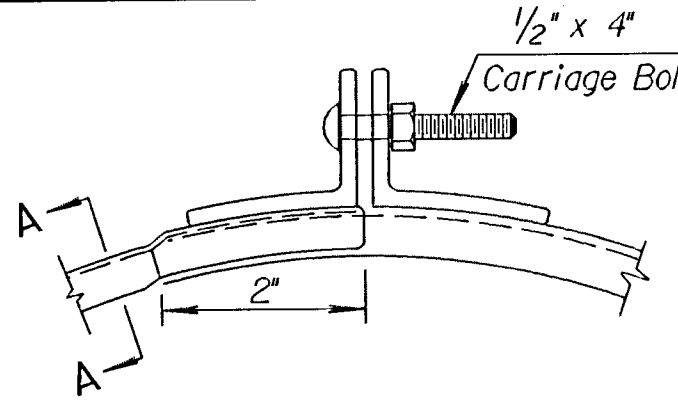


TYPE 3

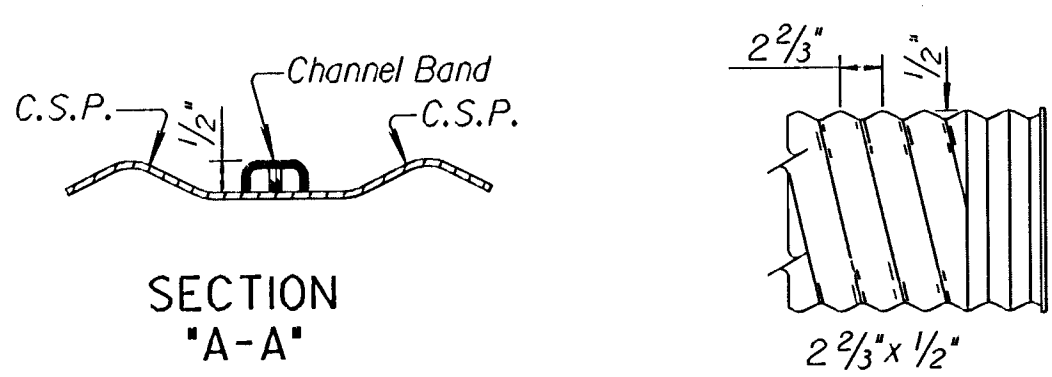
Available in sizes 42" and 96" Round and 60"x46" through 81"x59" Pipe-Arches.

Bid Designation Sq. Ft.	Nom. W.W. Area Sq. Ft.	Pipe Arch		Min. Gauge End Sect.	Dimensions in Inches						No. Apron Panels	Slope
		Span (In.)	Rise (In.)		A 1" Tol.	B Max.	H 1" Tol.	L 1 1/2" Tol.	W 2" Tol.			
1.0	1.1	17	13	16	7	9	6	19	30	1	2 1/2:1	
1.5	1.6	21	15	16	7	10	6	23	36	1	2 1/2:1	
2.0	2.2	24	18	16	8	12	6	28	42	1	2 1/2:1	
2.5	2.8	28	20	16	9	14	6	32	48	1	2 1/2:1	
Sizes below with alternate dimensions												
3.0 or 4.0	4.4	35	24	14	10	16	6 & 8	39	60	1	2 1/2:1	
5.0 or 6.0	6.4	42	29	14	12	18	8 & 9	46	75	2	2 1/2:1	
7.0 or 8.5	8.7	49	33	12	13	21	9 & 12	53	85	2	2 1/2:1	
10.0 or 11.0	11.4	57	38	12	18	26	12	63	90	2	2 1/2:1	
12.5 or 14.0	15.6	60	46	12	18	30 & 34	12	70	102	2	2 : 1	
16.5	19.3	66	51	12 & 10	18	33	12	77	114 & 116	3	1 1/2:1	
21.0	23.2	73	55	12 & 10	18	36	12	77	126	3	1 1/2:1	
25.0	27.4	81	59	12 & 10	18	39	12	77	138	3	1 1/2:1	
32.0	32.1	87	63	12 & 10	22	38	12	77	148	3	1 1/2:1	
36.0	37.0	95	67	12 & 10	22	34	12	77	162	3	1 1/2:1	
42.0	42.4	103	71	12 & 10	22	38	12	77	174	3	1 1/2:1	
47.0	48.0	112	75	12 & 10	24	40	12	77	174	3	1 1/2:1	

Pipe Dia. (In.)	Min. Gauge Ends	Dimensions in Inches						No. Apron Panels	Slope
		A 1" Tol.	B Max.	H 1" Tol.	L 1 1/2" Tol.	W 2" Tol.			
12"	16	6	6	6	21	24	1	2 1/2:1	
15"	16	7	8	6	26	30	1	2 1/2:1	
18"	16	8	10	6	31	36	1	2 1/2:1	
21"	16	9	12	6	36	42	1	2 1/2:1	
24"	16	10	13	6	41	48	1	2 1/2:1	
30"	14	12	16	8	51	60	1	2 1/2:1	
36"	14	14	19	9	60	72	2	2 1/2:1	
42"	12	16	22	11	69	84	2	2 1/2:1	
48"	12	18	27	12	78	90	2	2 1/2:1	
54"	12	18	30	12	84	102	2	2 1/2:1	
60"	12 & 10	18	33	12	87	114	3	2:1	
66"	12 & 10	18	36	12	87	120	3	2:1	
72"	12 & 10	18	39	12	87	126	3	2:1	
78"	12 & 10	18	42	12	87	132	3	1 1/2:1	
84"	12 & 10	18	45	12	87	138	3	1 1/2:1	
90"	12 & 10	18 & 24	37 & 45	11 & 12	87	138 & 144	3	1 1/2:1	
96"	12 & 10	18 & 25	35 & 45	12	87	138 & 150	3	1 1/2:1	



CHANNEL BAND DETAILS



SECTION
"A-A"

Reformed to accept Channel, Annular, Dimple and Hugger Bands.

- Channel band couplers shall:
- Be of two piece design.
 - Be fabricated from galvanized steel stock.
 - Be 14 ga. thickness for pipe 12 ga. or lighter. (A= 3/4")
 - Be 12 ga. thickness for pipe 10 ga. or heavier. (A= 1")
 - Have 2" x 2" x 3/16" angles securely fastened to the band ends to allow for proper tightening.

Pipe Dia. Inches	* Minimum Gauge of Pipe				
	2 2/3" x 1/2" Corr. Steel	3" x 1" Corr. Steel	6" x 2" Corr. Steel	6" x 1" Corr. Steel	Alum.
12"	16	16			
15"	16	16			
18"	16	16			
21"	16	16			
24"	14	14			
30"	14	12			
36"	14	12			16
42"	12	12	14		16
48"	12	10	14		16
54"	12	10	14		16
60"	10	8	14	12	16
66"	10	8	14	12	16
72"	10	6	14	12	14
78"	8		14	12	12
84"			12	12	12
90"			12	12	
96"			12	12	
102"			12	12	
108"			10	12	
114"			10	12	
120"			10	12	

Bid Designation Sq. Ft.	Pipe Dimension Span & Rise	Sq. Ft.	* Min. Gauge of Pipe		
			2 2/3" x 1/2" Corr. Steel	3" x 1" Corr. Steel	Alum.
1.0	17" x 13"	1.1	16	16	
1.5	21" x 15"	1.6	16	16	
2.0	24" x 18"	2.2	16	16	
2.5	28" x 20"	2.8	14	14	
3.0 or 4.0	35" x 24"	4.4	14	12	
5.0 or 6.0	42" x 29"	6.4	14	12	
7.0 or 8.5	49" x 33"	8.7	12	12	
10.0 or 11.0	57" x 38"	11.4	12	10	
12.5 or 14.0	60" x 46"	15.6		10	14
16.5	66" x 51"	19.3		8	14
21.0	73" x 56"	23.2			12
25.0	81" x 59"	27.4			12
32.0	87" x 63"	32.1			12
36.0	96" x 67"	37.0			12
42.0	103" x 71"	42.4			12
47.0	112" x 75"	48.0			12
54.0	117" x 79"	54.2			10
60.0	128" x 83"	60.5			10
67.0	137" x 87"	67.4			10
74.0	142" x 91"	74.5			10

Note: The culverts listed on this sheet may not indicate that the culvert installed will be steel, aluminum or reinforced concrete. * For gauge above minimum requirements see summary of culverts.

Connection of end sections by welding will not be permitted. All 3 piece apron sections shall have 12 gauge sides and 10 gauge center panels. Multiple panel apron sections shall have lap seams which are to be tightly jointed by galvanized rivets or bolts at equal distances from center line.

For 60" to 120" diameter pipe apron sections, reinforced edges to be supplemented by hot dipped galvanized stiffener angles. The angles to be attached by galvanized nuts and bolts.

For 73"x55" and larger pipe-arch sections, reinforced edges to be supplemented by hot dipped galvanized stiffener angles. The angles to be attached by galvanized bolts and nuts.

Angle reinforcement shall be placed under the center panel seams on 73"x55" and larger pipe arch apron sections.

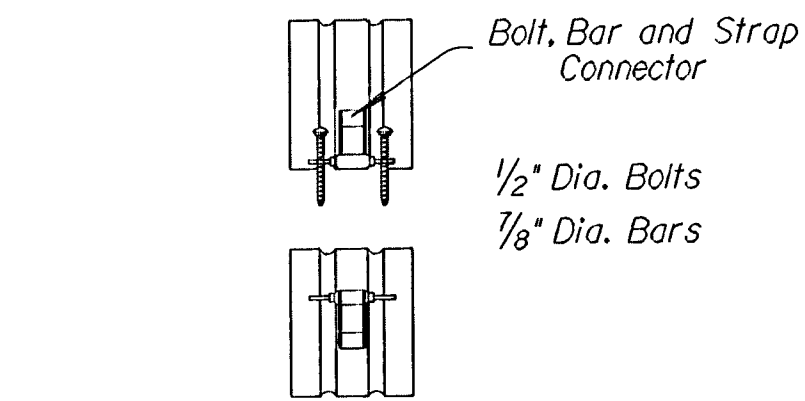
All references to galvanized metal refer to steel only. Gain in pipe length due to fit of pipe at connecting band shall not be paid for.

When Hugger Bands are used the H-7 Hugger Band may be used on circular pipes 36" diameter and smaller and pipe arches 42"x29" and smaller. The H-10 Hugger Band is required for larger size pipes.

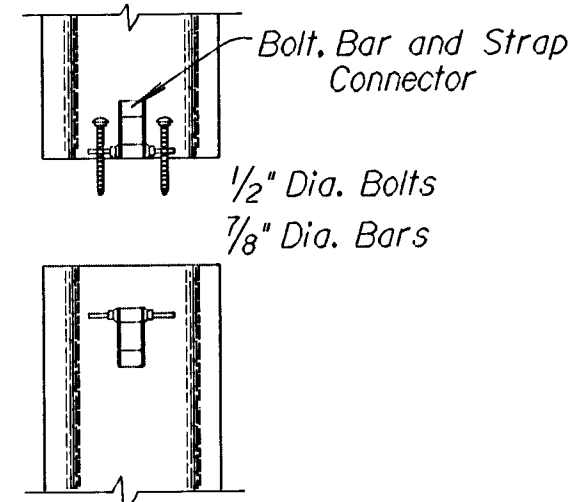
Beveled End Sections

NO.	DATE	REVISIONS					BY	APP'D	
KANSAS DEPARTMENT OF TRANSPORTATION									
METAL END SECTION FOR ROUND									
& ARCH METAL CULVERTS (TYPE I)									
& PIPE GAUGE TABLES									
RD660									
FHWA APPROVAL		1- 6-92			APP'D. James O. Brewer				
DESIGNED		DETAILED			QUANTITIES		TRACED Bowser		
DESIGN CK.		DETAIL CK.			QUAN.CK.		TRACE CK. Self		

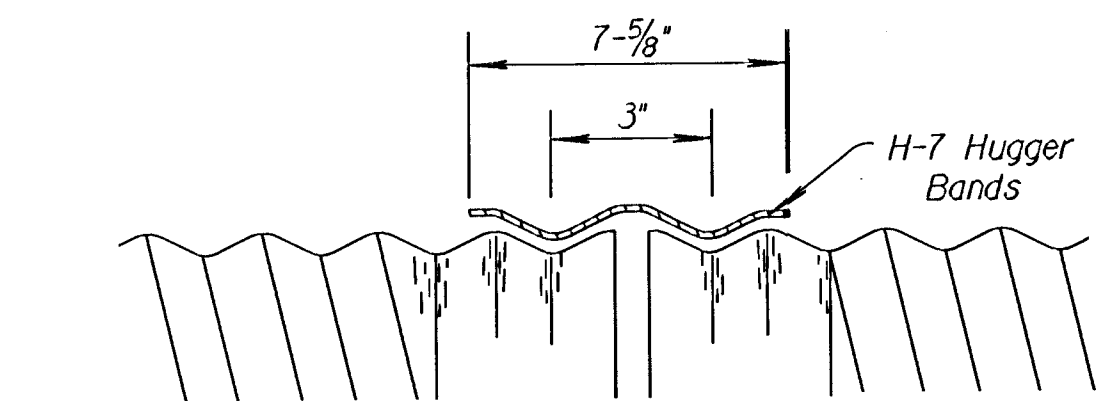
Drawn By: KCOJ
 Date: 11-5-97
 File: 1995/95297/002/standard/rd660.dgn



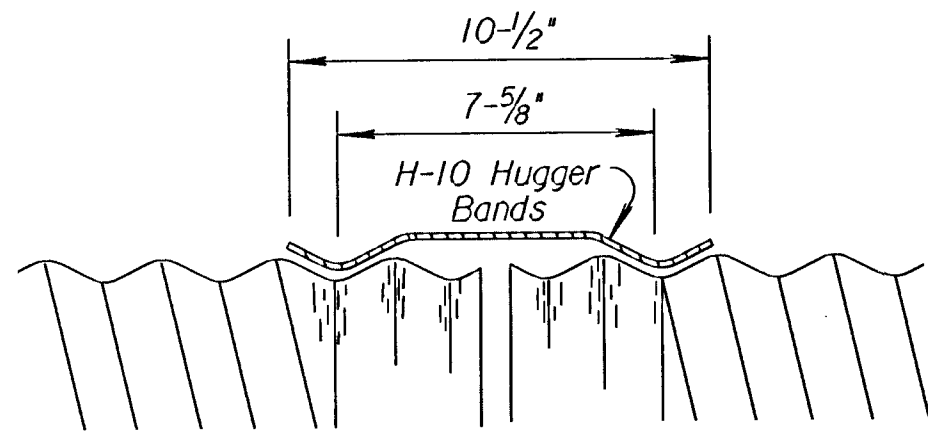
ALTERNATE CONNECTION DETAIL



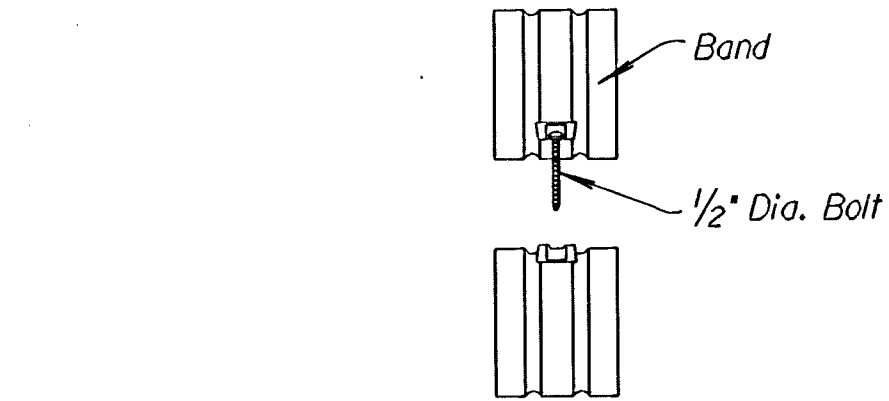
CONNECTION DETAIL
SINGLE HARNESS



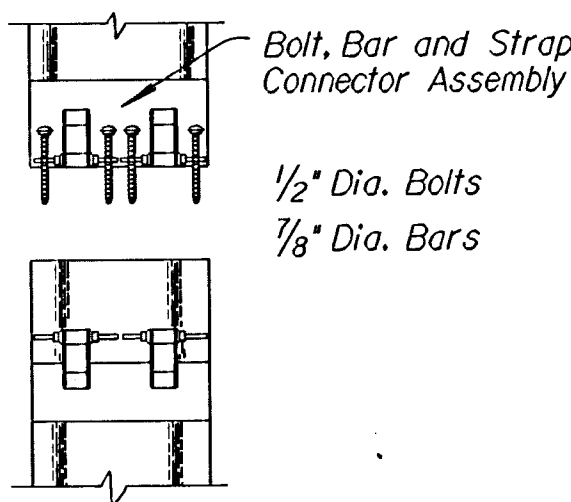
UNIVERSAL REFORMED END with H-7 HUGGER BAND
DETAILS FOR H-7 HUGGER BANDS (16 ga.)



UNIVERSAL REFORMED END with H-10 HUGGER BAND
DETAILS FOR H-10 HUGGER BANDS (16 ga.)



STANDARD CONNECTION DETAIL



CONNECTION DETAIL
DOUBLE HARNESS

PIPE CULVERT SUMMARY													
Station	Location	Type	Size or Bid Designation Sq. Ft.	Crown Grade Elev.	Flow Line		Horizontal Roadway		Degree of Rotation	Length of Pipe	Lin. Ft. of Pipe	End Sections	
					Lt.	Rt.	Lt.	Rt.				Type I	Type II
35+59.50 Lt.	Greenwich	2	57"x38"	1373.37	1364.38	---	47.00	---	15	18'	36	---	2
35+59.50 Rt.	Greenwich	2	57"x38"	1373.37	---	1365.72	---	41.00	0	---	12'	24	---