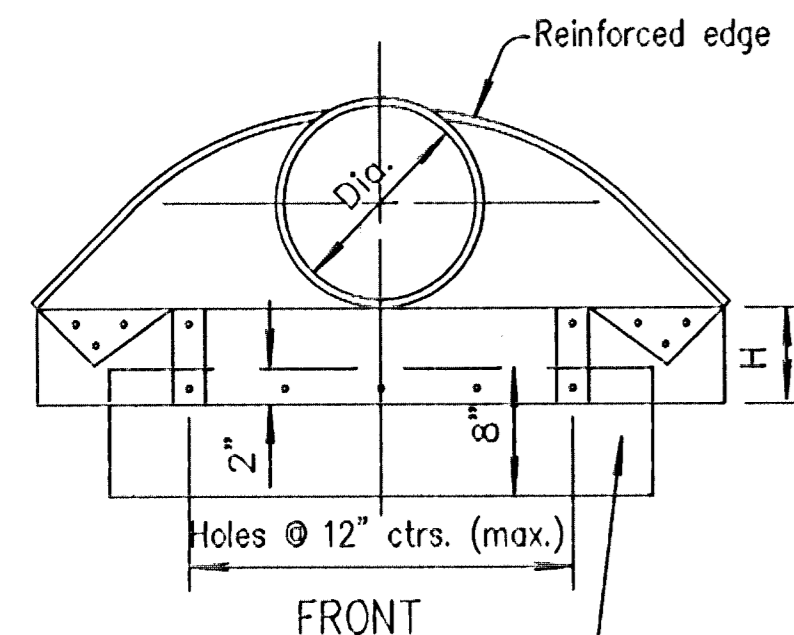
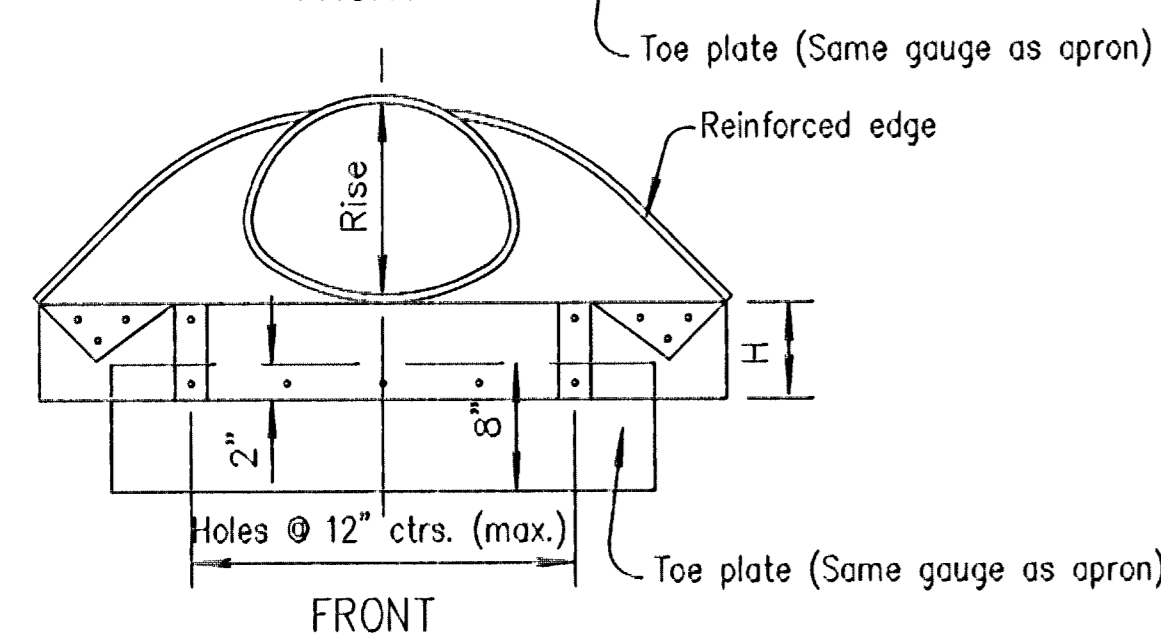


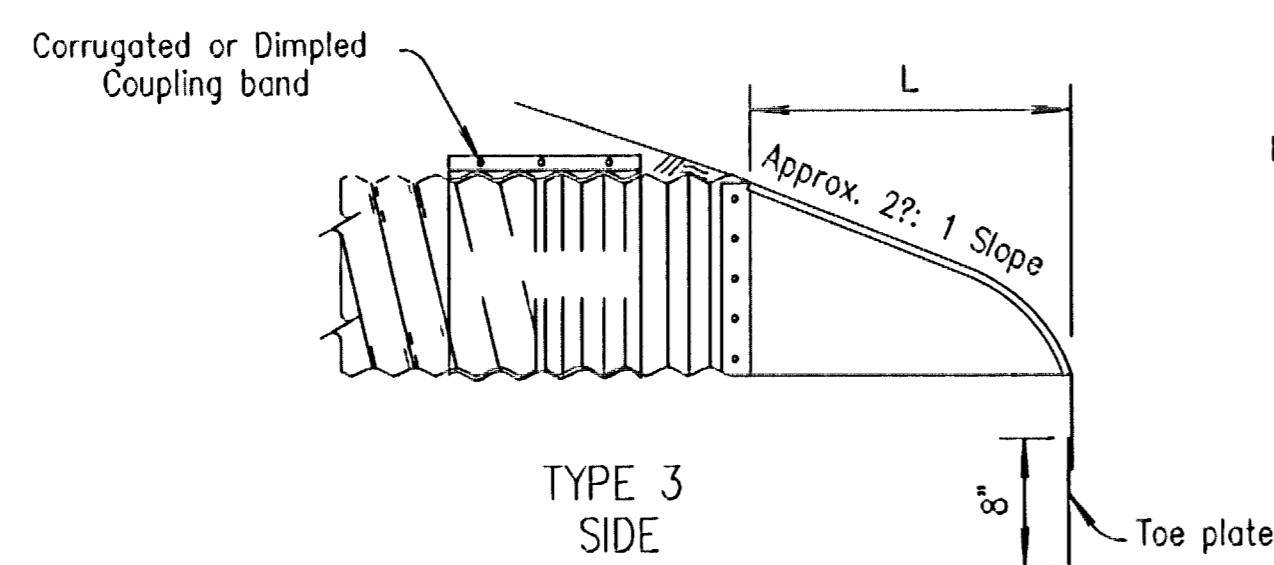
PLAN (Illustrated with Type #3 Connection)



FRONT

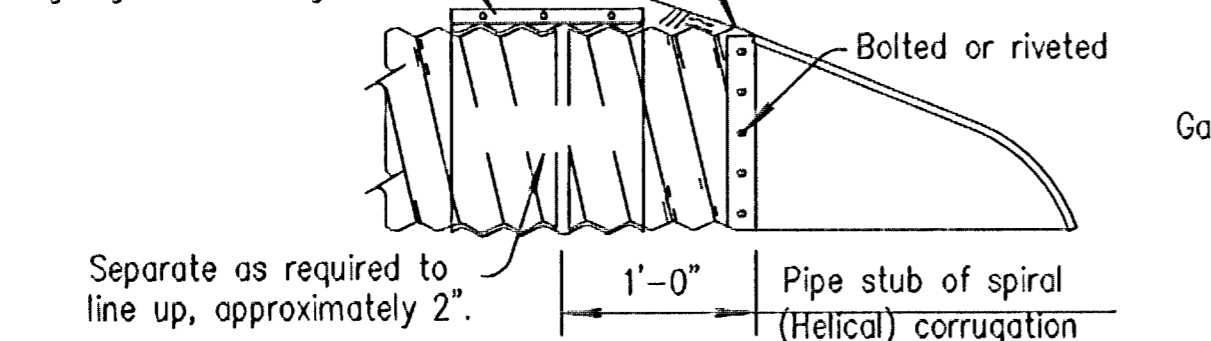


FRONT



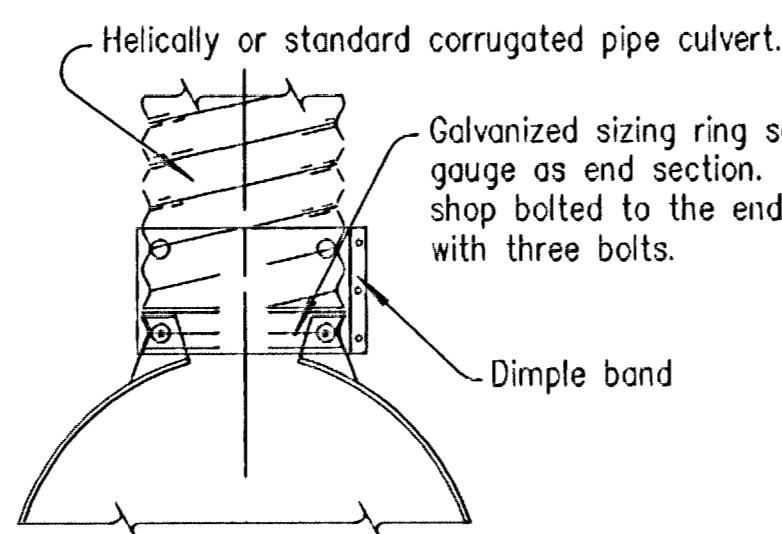
TYPE 3 SIDE

2"x2"x?" angle or 2"x2"x? 12 ga. galvanized angle.



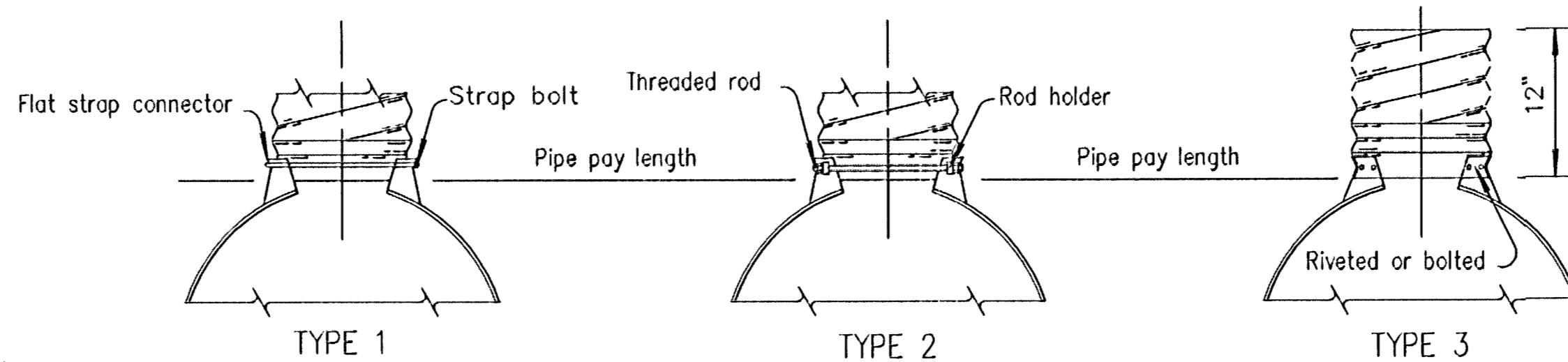
SPIRAL (HELICAL) CORRUGATION

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

TYPE 2

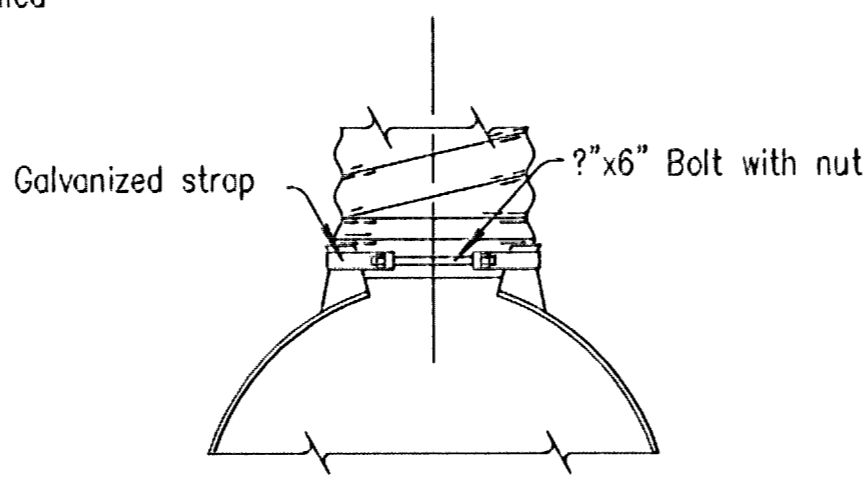
TYPE 3

Available in sizes 12" through 24" only.

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

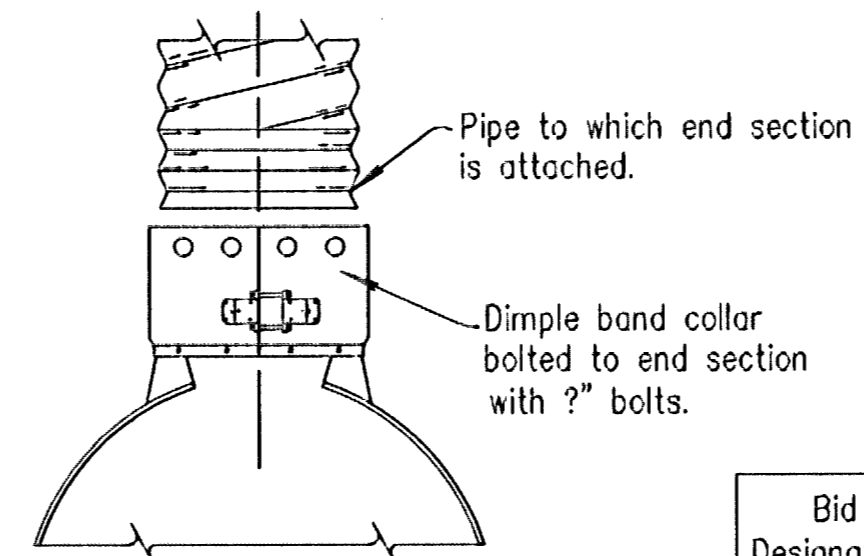
Available in sizes 42" through 96" Round and 60"x46" through 81"x59" Pipe-Arches.

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



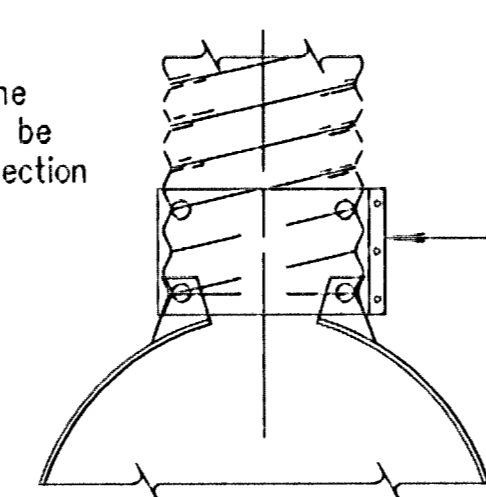
ALTERNATE TYPE 1

For 12" through 24" only.



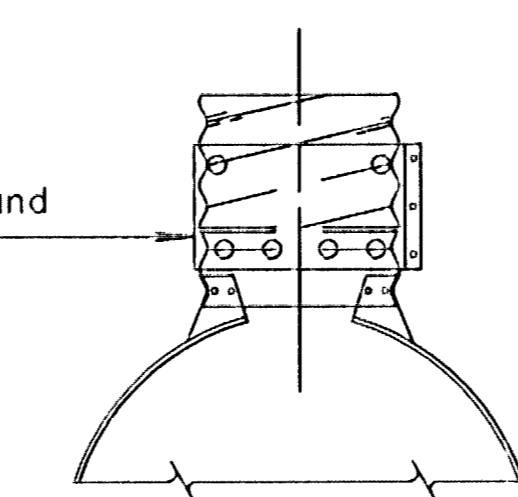
TYPE 5

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.

NOTE: Toe plate, where specified, to be punched to match holes in apron lip. ?" dia. galvanized bolts to be furnished. The length of toe plate to be as follows:

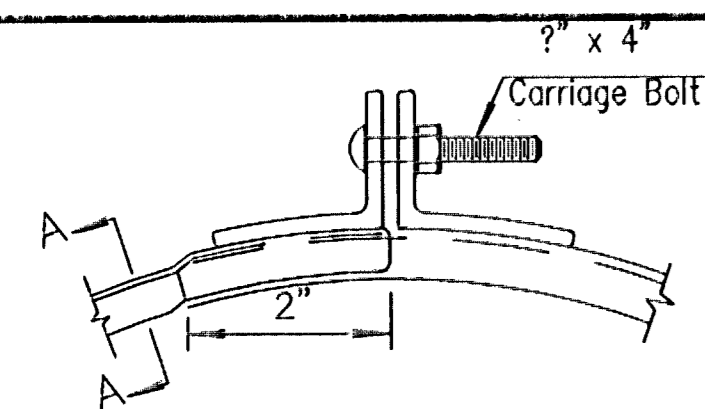
- W + 10" for 12" to 30" diameter pipes inclusive.
- W + 20" for 36" to 84" diameter pipes inclusive.
- W + 10" for pipe-arches with a rise of 13" to 29" inclusive.
- W + 20" for pipe-arches with a rise of 33" to 59" inclusive.

Apron section for 12" to 24" diameter pipe inclusive, and pipe-arches with rise of 13" to 24" inclusive, to be made from one sheet. Apron sections for 30" to 42" diameter pipe inclusive, and pipe-arches with rise of 29" to 33" inclusive, may be made from up to two sheets joined by riveting or bolting on the centerline apron section. Apron section for 48" to 72" diameter pipe inclusive, and pipe-arches with rise of 38" to 63" inclusive, may be made from up to three sheets joined by riveting or bolting at equal distances from centerline. Apron sections for 78" diameter pipe and above and pipe-arches with rise 67" and above may be made from up to four sheets joined by riveting or bolting.

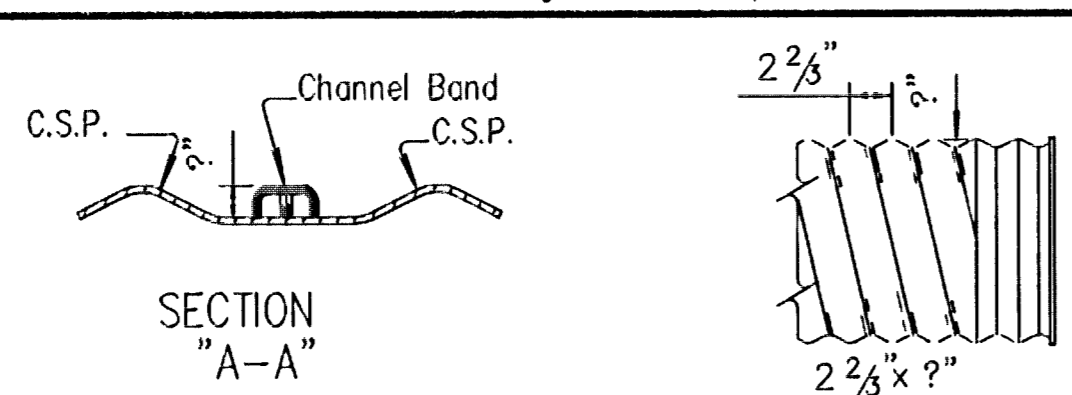
Corner sections, corner plate and toe plate to be same gauge as apron and each to be galvanized in accordance with the specifications. Other approved designs may be used in lieu of type shown.

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

Pipe Dia. (in.)	Min. Gauge Ends	Dimensions in Inches					No. Apron Panels	Slope
		A 1" Tol.	B Max.	H 1" Tol.	L 2" Tol.	W 2" Tol.		
12"	16	6	6	6	21	24	1	2?: 1
15"	16	7	8	6	26	30	1	2?: 1
18"	16	8	10	6	31	36	1	2?: 1
21"	16	9	12	6	36	42	1	2?: 1
24"	16	10	13	6	41	48	1	2?: 1
30"	14	12	16	8	51	60	1	2?: 1
36"	14	14	19	9	60	72	2	2?: 1
42"	12	16	22	11	69	84	2	2?: 1
48"	12	18	27	11	78	90	2	2?: 1
54"	12	18	30	11	84	102	2	2?: 1
60"	12 & 10	18	33	11	87	114	3	2: 1
66"	12 & 10	18	36	11	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
84"	12 & 10	18	45	12	87	138	3	1?: 1
90"	12 & 10	18 & 24	47 & 45	11 & 12	87	38 & 144	3	1?: 1
96"	12 & 10	18 & 25	45 & 45	12	87	38 & 150	3	1?: 1



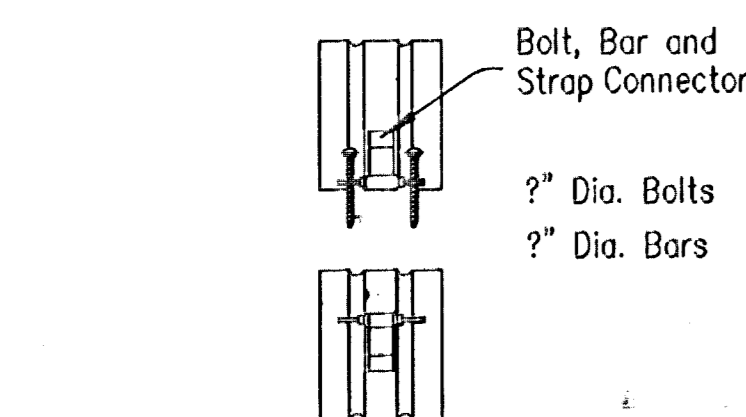
CHANNEL BAND DETAILS



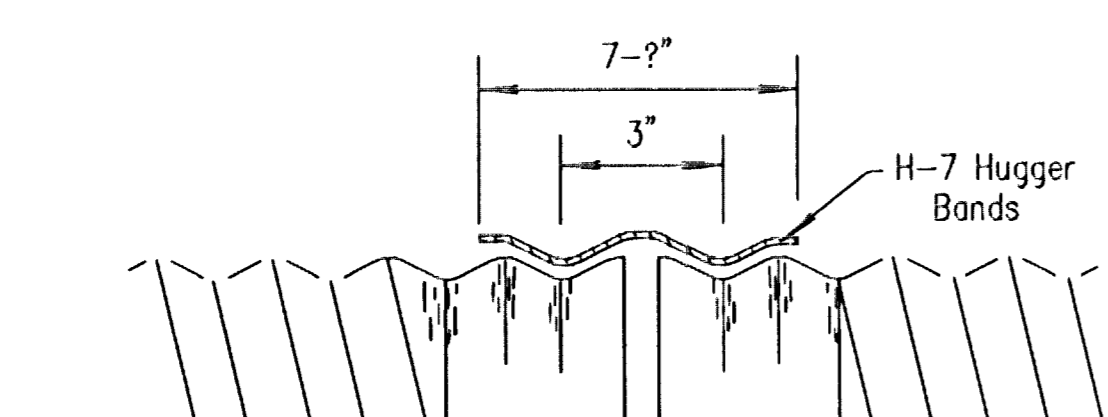
SECTION "A-A"

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

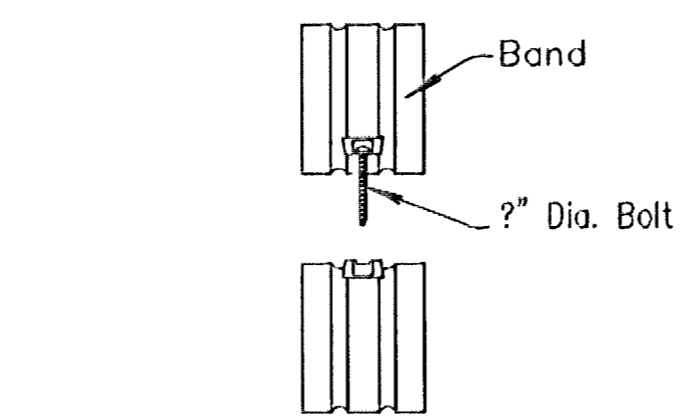
- Channel band couplers shall:
- Be of two piece design.
  - Be fabricated from galvanized steel stock.
  - Be 14 ga. thickness for pipe 12 ga. or lighter. (A= ?")
  - Be 12 ga. thickness for pipe 10 ga. or heavier. (A= 1")
  - Have 2" x 2" x ?" angles securely fastened to the band ends to allow for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



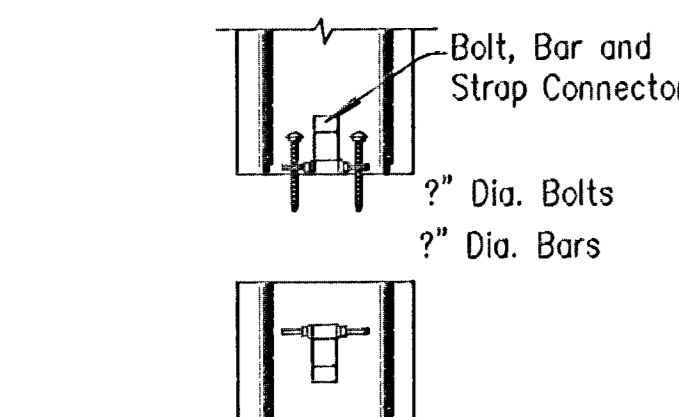
ALTERNATE CONNECTION DETAIL



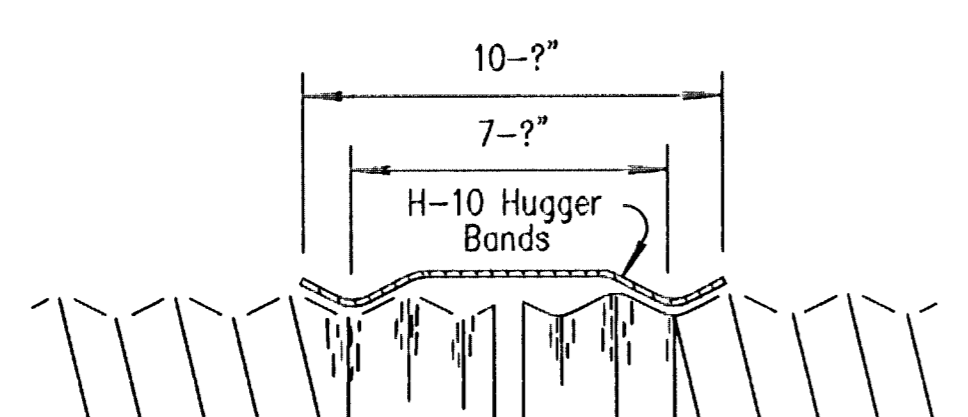
UNIVERSAL REFORMED END with H-7 HUGGER BAND DETAILS FOR H-7 HUGGER BANDS (16 ga.)



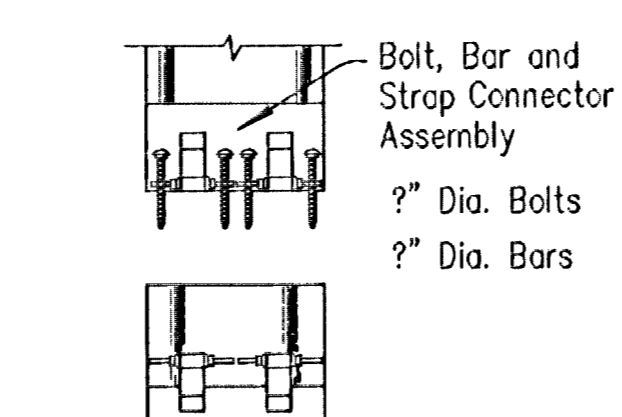
STANDARD CONNECTION DETAIL



CONNECTION DETAIL SINGLE HARNESS



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



CONNECTION DETAIL DOUBLE HARNESS

▲ Note: At the Contractor's option, 5"x1" corrugated steel pipe of equal gauge may be substituted for the 3"x1" corrugated steel pipe listed in the table with the following restrictions:

- Fill height over top of pipe shall be less than 25 ft.
- Pipe shall be fabricated with helical corrugations and lock seams or continuous welded seams.

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.		Lt.	Rt.		Type II			
										Lt.	Rt.		Lt.	Rt.	Lt.	Rt.
Lynndale, 0+21.40	16.5' RT.	CMAC	57"x38"	-	-	128.10	-	-	-	-	5'	5'	-	-	-	-
Lynndale, 17+24.40	15.13' RT.	CMP	24"	-	-	136.50	-	-	-	-	5'	5'	-	-	-	-
Irving, 20+22.00	15.3' LT.	CMAC	42"x29"	-	-	130.60	-	-	-	-	6'	6'	1	-	-	-
Irving, 20+22.00	15.3' RT.	CMAC	42"x29"	-	-	130.70	-	-	-	-	11'	11'	-	1	-	-
Walker, 30+23.00	21.4' LT.	CMP	24"	-	-	131.45	-	-	-	-	3'	3'	1	-	-	-
Walker, 30+23.00	19.15' RT.	CMP	24"	-	-	132.00	-	-	-	-	3'	3'	-	1	-	-
Rogers, 77+87.00	22.0' LT.	CMAC	36"x30"	-	-	129.50	-	-	-	-	2'	2'	1	-	-	-
Rogers, 77+87.00	19.36' RT.	CMAC	36"x30"	-	-	130.00	-	-	-	-	4'	4'	-	1	-	-
Wheatridge, 87+41.00	12.9' LT.	CMP	15"	-	-	132.55	-	-	-	-	10'	10'	1	-	-	-
Wheatridge, 87+41.00	17.0' RT.	CMP	15"	-	-	133.60	-	-	-	-	8'	8'	-	1	-	-

\*FOR DRIVEWAY PIPE INFO, SEE SHEET NO. 21

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 joined 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, reinforced 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 galvanize metal refer to steel only. Gain in pipe length due to it 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.

STREET PAVING IMPROVEMENTS  
**METAL END SECTIONS**  
 WICHITA, SEDGWICK COUNTY, KANSAS  
 CED PROJ. NO.: 20030988  
**CERTIFIED ENGINEERING DESIGN, P.A.**  
 810 WEST DOUGLAS, SUITE C  
 WICHITA, KANSAS 67203  
 PH.(316)262-8808 FAX.(316)262-1669

DESIGNED: HDF SCALE: NTS SHEET  
 DRAWN: HDF DATE: 7/03 20  
 CHECKED: HDF CED FILE: 20-CMP.dwg TOTAL 43