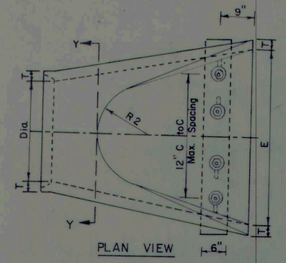
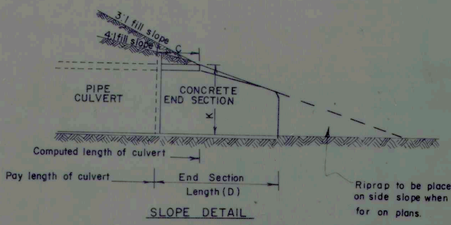
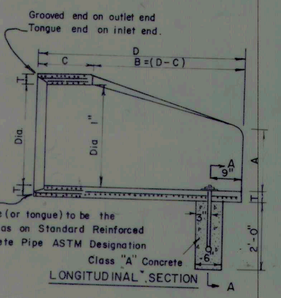


PLAN VIEW

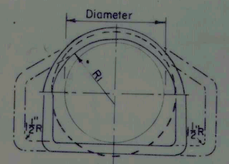


SLOPE DETAIL

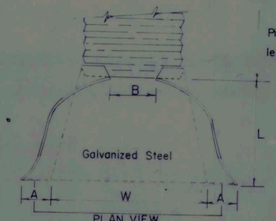
Riprap to be placed on side slope when called for on plans.



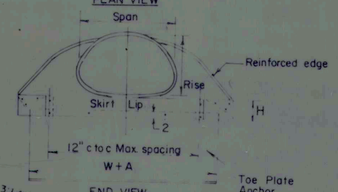
LONGITUDINAL SECTION



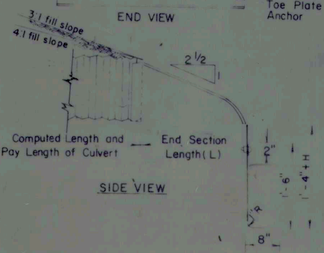
SECTION Y-Y



PLAN VIEW



END VIEW

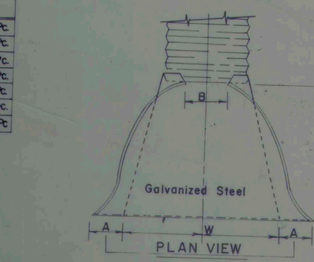


SIDE VIEW

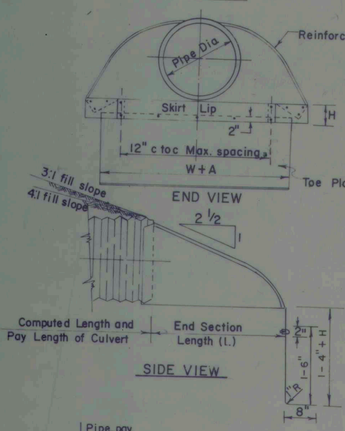
PIPE ARCH DIMENSIONS		T	DIMENSIONS					SLOPE approx	BODY
SPAN	RISE	in.	A (1" ±)	B (Max)	H (1" ±)	L (1 1/2" ±)	W (2" ±)		
18	11	.064	7	9	6	19	30	2 1/2	1 Pc.
22	13	.064	7	10	6	23	36	2 1/2	1 Pc.
25	16	.064	8	12	6	28	42	2 1/2	1 Pc.
29	18	.064	9	14	6	32	48	2 1/2	1 Pc.
36	22	.079	10	16	6	39	60	2 1/2	1 Pc.
43	27	.079	12	18	8	46	75	2 1/2	1 Pc.

PIPE DIA.	T in.	DIMENSIONS A (1" ±)	B (Max)	H (1" ±)	L (1 1/2" ±)	W (2" ±)	SLOPE approx	BODY
12	.064	6	6	6	21	24	2 1/2	1 Pc.
15	.064	7	8	6	26	30	2 1/2	1 Pc.
18	.064	8	10	6	31	36	2 1/2	1 Pc.
21	.064	9	12	6	36	42	2 1/2	1 Pc.
24	.064	10	13	6	41	48	2 1/2	1 Pc.
30	.079	12	16	8	51	60	2 1/2	1 Pc.
36	.079	14	19	9	60	72	2 1/2	2 Pc.

1. End sections and Toe Plate Anchors shall conform to all applicable requirements as set out in the Standard Specifications.
2. Multiple panel bodies shall have lap seams which shall be tightly jointed with 3/8" ϕ galvanized rivets or bolts.
3. The toe plate anchor shall be constructed of 0.138" Thickness Galvanized steel and be required on all steel pipe end section. It shall be matched-punched to fit holes in skirt lip and supplied loose, complete with 3/8" ϕ galvanized bolts. Cost thereof shall be included in the contract unit price per each for Pipe End Section.
4. Pimpled Connection Band may be used to connect Pipe End Section to Helically Corrugated pipe.
5. If aluminum alloy pipe culvert is furnished, aluminum alloy end sections shall also be used and all component parts shall be aluminum alloy as set out in the Standard Specifications.
6. End sections will be paid for at the contact unit price each for Pipe End Section complete in place and accepted.
7. Where Vitrified Clay Culvert or Cast Iron Culvert pipe is used a Pipe End Section comparable to that as shown for Metal or Concrete shall be furnished and shall be as approved by the Engineer.
8. In areas of Acid or Mine Water the "Pipe End Section" shall be metal and shall be either Asbestos Bonded Fully Bituminous Coated with paved invert or of a metal of equal resistance to Acid or Mine Water.

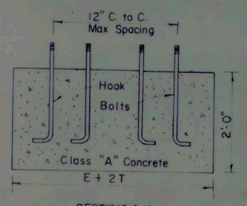


PLAN VIEW



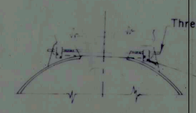
END VIEW

SIDE VIEW



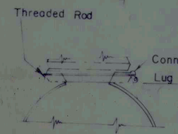
SECTION A-A

Concrete Pipe Toe Anchor



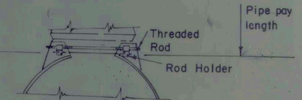
TYPE #1

For 18" x 11" thru 43" x 27" only



TYPE #3

For 12" thru 24" only



TYPE #4

For 30" thru 36" only

METAL END SECTION

DEMENSIONS										
DIA	T min.	A ±	C ±	D ±	E ±	K	R1	R2	APPROX. WEIGHT
12"	2"	5"	4-3"	6-2"	2'-0"	1.3	10 1/8"	9"	800
15"	2 1/4"	7"	4-0"	6-3"	2'-6"	1.5	12 1/2"	11"	1100
18"	2 1/2"	11"	4-1"	6-2"	3'-0"	1.8	15 1/2"	12"	1300
21"	2 3/4"	11"	3'-6"	6-3"	3'-6"	2.1	16 1/8"	13"	1500
24"	3"	1'-0"	2'-8"	6-3"	4'-0"	2.3	16 3/16	14"	1800
27"	3 1/4"	1'-3"	2'-5"	6-3"	4'-6"	2.6	18 9/16	14 1/2"	2100
30"	3 1/2"	1'-2"	1'-10"	6-3"	5'-0"	2.9	18 1/2"	15"	2400
33"	3 3/4"	1'-3"	3-6"	8-3"	5'-6"	3.1	23 3/4"	17 1/2"	4100
36"	4"	1'-5"	3'-1"	8-3"	6'-0"	3.4	24 5/16	20"	4200

± Tolerance ± 1"

1. Concrete in these end sections shall be the same grade and strength as specified for reinforced concrete pipe, A.S.T.M. designation C76 CLASS II (As set out in the Standard Specifications
2. Reinforcement in the "C" Portion shall be the same as specified for reinforced concrete, A.S.T.M. designation C76, CLASS II for the size of connecting pipe.
3. Reinforcement in the "B" Portion shall have a cross-sectional area equal to that of one layer of steel in the "C" Portion.
4. The end of the pipe culvert shall be placed in the concrete end section so that the flow lines are flush. The joint shall be completely filled with mortar.
5. In 3:1 or 4:1 fill slope, change to the slope of the end section in a smooth, pleasing transition approximately 10'-0" in length.
6. Variations in Dimensions - The thickness of the concrete, the position of steel, and the internal diameter of the pipe shall conform with the variations in dimensions as provided in the Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, A.S.T.M. Designation C-76.
7. Where Vitrified Clay Culvert or Cast Iron Culvert pipe is used, a "Pipe End Section" comparable to that as shown for Metal or Concrete shall be furnished and shall be as approved by the Engineer.
8. End sections will be paid for at the contract unit price each for "Pipe End Section" complete in place and accepted.
9. Concrete pipe toe anchors shall be required on all concrete pipe sections. The cost thereof shall be included in the contract unit price per each for "Pipe End Sections"
10. For type of Pipe End Section permitted in Acid or Mine water areas see "Instruction to Bidders" of the contract proposal.

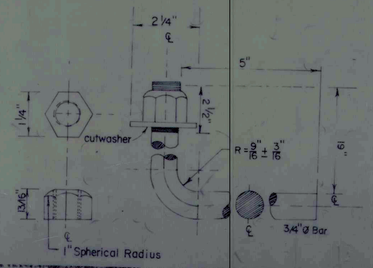
PRECAST CONCRETE END SECTION

NOTE: Metal Pipe End Sections may be used with Concrete Pipe providing the method of connection is approved by the engineer prior to installation of pipe.

SPECIFICATION FOR HOOK BOLT & NUT

Hook Bolt material shall meet the current ASTM A-307. Threads shall be American Standard Coarse Thread Series, Class 2, Free Fit. Bolts shall be galvanized to meet current ASTM specification A-153. The threaded portion shall not prevent turning the nut by hand.

Nut and washers shall be carbon steel hot dip galvanized to meet ASTM specification A-153. Nut threads shall be American standard Coarse Thread Series (1/64" maximum oversize), cleaned after galvanizing to provide a free running fit on the Class 2 bolt. Nuts shall be 1 1/4" across flats, 13/16" thick, curve crowned to approximately 1" radius.



MISCELLANEOUS STANDARDS
STATE OF INDIANA
JULY 1972

REVISIONS	
10-2-72	Metal Note 8
1-2-74	1974 Specs

RECOMMENDED FOR APPROVAL — Engineer of Road Design

APPROVED — Chief, Division of Design

APPROVED — Chief Engineer

M E 2

RECORD DRAWING

Sheet 8A

14A