

# STANDARD M 603 1

(SHEET 1 OF 2)  
(JANUARY, 1982)

REVISION NO. VIII	REVISION COLORADO	PROJECT NO.	SHEET NO.
REVISIONS			

**TABLE I - 2 3/4" x 1/2" CORRUGATIONS**  
ROUND STEEL PIPE

PIPE DIA. in.	WALL THICKNESS (Inches)				
	0.064	0.079	0.109	0.138	0.168
16	74	80	100	100	100
18	61	67	86	90	94
21	53	57	74	77	81
24	46	50	63	68	71
27	41	44	57	60	63
30	37	40	52	54	56
36	30	33	43	45	47
42	34	47	74	77	81
48	30	41	63	68	71
54	30	36	57	60	63
60			52	54	57
66				49	51
72				45	47
78				45	47
84					40

**TABLE II - 3' x 1' CORRUGATIONS**  
ROUND STEEL PIPE

PIPE DIA. in.	* MIN. COVER in.	WALL THICKNESS (Inches)				
		0.064	0.079	0.109	0.138	0.168
36	12	53	66	98	100	100
42	12	45	56	84	100	100
48	12	39	49	73	88	98
54	12	35	44	63	78	87
60	12	31	39	58	70	78
66	12	28	36	53	64	71
72	12	26	33	49	58	63
78	12	24	30	45	54	60
84	12	22	28	42	50	56
90	12	21	26	39	47	52
96	12		24	36	44	49
102	18		23	34	41	46
108	18			32	39	43
114	18			30	37	41
120	18			29	35	39

\* COVER GREATER THAN 90 FT. SHALL BE USED ONLY AFTER THOROUGH INVESTIGATION OF FOUNDATION MATERIAL.

**TABLE III - 125mm x 25mm CORRUGATIONS**  
ROUND STEEL PIPE

PIPE DIA. in.	* MIN. COVER in.	WALL THICKNESS (Inches)				
		0.064	0.079	0.109	0.138	0.168
48	12	39	49	73	88	98
54	12	35	44	63	78	87
60	12	31	39	58	70	78
66	12	28	36	53	64	71
72	12	26	33	49	58	63
78	12	24	30	45	54	60
84	12	22	28	42	50	56
90	12	21	26	39	47	52
96	12		24	36	44	49
102	18		23	34	41	46
108	18			32	39	43
114	18			30	37	41
120	18			29	35	39

## GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.

THE TABLES ON THESE SHEETS SHOW MINIMUM THICKNESS FOR STRUCTURAL REQUIREMENTS ONLY. THEY ARE INTENDED FOR USE ONLY WHERE CORROSIVE AND/OR ABRASIVE CONDITIONS ARE NEGLIGIBLE. HEAVIER METAL AND/OR PROTECTIVE COATINGS SHALL BE USED WHERE SITE INVESTIGATIONS INDICATE CORROSIVE AND/OR ABRASIVE CONDITIONS.

PIPE-ARCH WITH EQUAL PERIMETRY AND WITH SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO THOSE REQUIRED BY PLANS WILL BE PERMITTED.

ADEQUATE COVER SHALL BE PROVIDED DURING CONSTRUCTION TO PROTECT THE STRUCTURE FROM DAMAGE.

PIPE SHALL BE PLACED WITH LONGITUDINAL SEAMS AT THE SIDES OR QUARTER POINTS BUT NOT ALONG TOP OF VERTICAL AXIS.

~~STRUCTURAL PLATE PIPES OF EQUAL OR GREATER DIAMETER CONFORMING TO SECTION 806 OF THE STANDARD SPECIFICATIONS, MAY BE SUBSTITUTED FOR THE PIPES ON THESE SHEETS AT NO ADDITIONAL COST TO THE PROJECT.~~

WHEN A CULVERT IS TO BE EXTENDED WITH PIPE OF A DIFFERENT MATERIAL, THE CONNECTION SHALL CONFORM TO THE DETAILS ON PLANS OR BE APPROVED.

EXTENSIONS FOR CUP ARCH CULVERT SHALL MATCH THE CORRUGATIONS AND THE SPAN AND RISE DIMENSIONS OF THE CULVERT TO BE EXTENDED.

THE MINIMUM COVER, EXCLUDING PAVEMENT, OVER CORRUGATED METAL PIPE CULVERT SHALL BE AS STATED BY THE ENGINEER, BUT SHALL NOT BE LESS THAN SHOWN IN THE TABLES ON THESE SHEETS.

~~BACKFILL AND CONNECTION SHALL BE IN ACCORDANCE WITH SECTION 806.~~

### TRENCH INSTALLATION:

INSTALLATION AND MAXIMUM FILL HEIGHTS SHALL CONFORM TO THE "M" STANDARD FOR PIPE SEWER IN TRENCH.

\* Top of Pipe to Top of Subgrade

ROUND PIPE - STEEL  
PIPE - ARCH - STEEL

**TABLE IV - 2 1/2" x 1/2" CORRUGATIONS**  
STEEL PIPE - ARCH

PIPE SIZE in.	EQUIV. DIA. in.	WALL THICKNESS in.	HEIGHT OF COVER LIMITS, H FT.	
			CORNER BEARING PRESSURE 2 Tons Per Sq Ft.	CORNER RADIUS
17 x 13	15	0.064	3'	11
21 x 15	18	0.064	3'	9
24 x 18	21	0.064	3'	8
28 x 20	24	0.064	3'	7
35 x 24	30	0.064	3'	5
42 x 29	36	0.064	3 1/2'	5
49 x 33	42	0.079	4'	5
57 x 38	48	0.109	5'	5
64 x 43	54	0.109	6'	6
71 x 47	60	0.138	7'	6
77 x 52	66	0.168	8'	6
83 x 57	72	0.168	9'	7

**TABLE V - 3' x 1' & 125 mm x 25 mm CORRUGATIONS**  
STEEL PIPE - ARCH

PIPE SIZE in.	EQUIV. DIA. in.	WALL THICKNESS in.	* MIN. COVER in.	HEIGHT OF COVER LIMITS, H FT.	
				CORNER BEARING PRESSURE 2 Tons Per Sq Ft.	CORNER RADIUS
40 x 31	36	0.064	12	8	8
46 x 34	42	0.064	12	8	8
53 x 41	48	0.064	12	7	8
60 x 46	54	0.064	12	8	8
66 x 51	60	0.064	12	9	10
73 x 55	66	0.064	12	10	10
81 x 59	72	0.064	12	14	11
87 x 63	78	0.064	12	14	10
95 x 67	84	0.079	12	16	11
103 x 71	90	0.109	18	16	10
112 x 75	96	0.109	18	18	10
117 x 79	102	0.109	18	18	10
128 x 83	108	0.138	24	18	9
137 x 87	114	0.138	24	18	9
142 x 91	120	0.168	24	18	8

PIPE-ARCH IS INTENDED FOR USE WHERE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CAN NOT BE MET. WHEN COVER EXCEEDS 15 FT. - USE ROUND PIPE.

SEE THIRD GENERAL NOTE.

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

CITY OF COLORADO SPRINGS

METAL CULVERT PIPE

APPROVED BY *Clay R. Hayes*  
CITY ENGINEER

SCALE: NO SCALE	DATE: JAN. 90	DRAWN: P.L.B.	SHEET D - 26
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# STANDARD M-510-1

(SHEET 1 OF 2)  
(JANUARY, 1982)

PROJECT NO.	LOCATION	SHEET NO.	TOTAL SHEETS
VIII	COLORADO		
REVISIONS			

**TABLE I** 6' x 2' CORRUGATIONS  
ROUND STEEL PIPE

PIPE DIA. IN.	* MIN. COVER IN.	HEIGHT OF COVER LIMITS, H ft.						
		WALL THICKNESS (Inches)						
		0.109	0.138	0.168	0.188	0.218	0.249	0.280
60	12	47	68	90	100	100	100	100
66	12	43	62	81	93	100	100	100
72	12	39	57	75	86	100	100	100
78	12	36	52	69	79	95	100	100
84	12	34	49	64	73	88	100	100
90	12	31	45	60	68	82	97	100
96	12	29	43	56	64	77	91	100
102	18	28	40	52	60	73	86	94
108	18	26	38	50	57	69	81	88
114	18	25	36	47	54	65	77	84
120	18	23	34	45	51	62	73	80
126	18	22	32	42	49	59	69	76
132	18	21	31	40	46	56	66	72
138	18	20	29	39	44	54	63	69
144	18	19	28	37	43	51	61	66
150	24	19	27	36	41	49	58	64
156	24	18	26	34	39	47	56	61
162	24	17	25	33	38	46	54	59
168	24	17	24	32	36	44	52	57
174	24	16	23	31	35	42	50	55
180	24	15	22	30	34	41	48	53
186	24	15	22	29	33	40	47	51
192	24		21	28	32	38	45	50
198	30		20	27	31	37	44	48
204	30		20	26	30	36	43	47
210	30		19	25	29	35	41	45
216	30			25	28	34	40	44
222	30			24	27	33	39	43
228	30			23	27	32	38	42
234	30			23	26	31	37	41
240	30				25	31	36	40
246	36				25	30	35	39
252	36					29	34	38
258	36					28	34	37
264	36						29	33
270	36					27	32	35
276	36						31	34
282	36						31	34
288	42						30	33
294	42							32
300	42							32
306	42							31

**TABLE II** 6' x 2' CORRUGATIONS  
STEEL PIPE-ARCH

PIPE SIZE FT - IN.	* MIN. COVER IN.	MIN. WALL THICKNESS IN.	HEIGHT OF COVER LIMITS, H ft.	
			CORNER BEARING PRESSURE	
			2 Tons Per Sq. Ft.	
6-1 x 4-7	12	0.109	15	15
6-4 x 4-8	12	0.109	14	14
6-9 x 4-11	12	0.109	14	14
7-0 x 5-1	12	0.109	13	13
7-3 x 5-3	12	0.109	12	12
7-8 x 5-5	12	0.109	12	12
7-11 x 5-7	12	0.109	11	11
8-2 x 5-9	18	0.109	11	11
8-7 x 5-11	18	0.109	10	10
8-10 x 6-1	18	0.109	10	10
9-4 x 6-3	18	0.109	9	9
9-6 x 6-5	18	0.109	9	9
9-9 x 6-7	18	0.109	8	8
10-3 x 6-9	18	0.109	7	7
10-8 x 6-11	18	0.109	7	7
10-11 x 7-1	18	0.109	6	6
11-5 x 7-3	18	0.109	6	6
11-7 x 7-5	18	0.109	6	6
11-10 x 7-7	18	0.109	6	6
12-4 x 7-9	30	0.109	6	6
12-6 x 7-11	30	0.109	6	6
12-8 x 8-1	30	0.109	6	6
12-10 x 8-4	30	0.109	6	6
13-3 x 9-4	30	0.109	6	6
13-6 x 9-6	30	0.109	6	6
14-0 x 9-8	30	0.109	6	6
14-2 x 9-10	30	0.109	6	6
14-5 x 10-0	30	0.109	6	6
14-11 x 10-2	30	0.109	6	6
15-4 x 10-4	30	0.109	6	6
15-7 x 10-6	30	0.109	6	6
15-10 x 10-8	30	0.109	6	6
16-3 x 10-10	30	0.138	6	6
16-6 x 11-0	30	0.138	6	6
17-0 x 11-2	30	0.138	6	6
17-2 x 11-4	30	0.138	6	6
17-5 x 11-6	30	0.138	6	6
17-11 x 11-8	30	0.138	6	6
18-1 x 11-10	30	0.168	6	6
18-7 x 12-0	30	0.168	6	6
18-9 x 12-2	30	0.168	6	6
19-3 x 12-4	30	0.168	6	6
19-6 x 12-6	30	0.168	6	6
19-8 x 12-8	30	0.168	6	6
19-11 x 12-10	30	0.168	6	6
20-5 x 13-0	36	0.188	6	6
20-7 x 13-2	36	0.188	6	6

18"  
37"  
CORNER RADIUS

Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

\* — TOP OF PIPE TO TOP OF SUBGRADE.

② — PIPE-ARCH IS INTENDED FOR USE WHERE MINIMUM COVER REQUIREMENTS FOR ROUND PIPE CAN NOT BE MET. USE ROUND PIPE WHEN COVER EXCEEDS 15 FEET.

H — HEIGHT OF COVER LIMIT, IN FEET, MAXIMUM HEIGHT OF FILL OVER TOP OF CULVERT, INCLUDING PAVEMENT.

**GENERAL NOTES**

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS APPLICABLE TO THE PROJECT.

PIPE OR PIPE-ARCH WITH ENDS CUT TO FIT A SLOPE, SHALL BE REINFORCED AND THE DETAILS SHALL BE AS SHOWN ON THE LAYOUT FOR THE STRUCTURE ON THE PLANS.

WHERE MULTIPLE PIPES ARE USED, THEY SHALL BE SPACED SO THAT ADJACENT SIDES OF THE PIPE SHALL BE AT LEAST ONE-HALF DIAMETER OR ONE-HALF SPAN APART TO PERMIT CAREFUL TAMPING OF THE BACKFILL MATERIAL, EXCEPT THAT THE CLEAR DISTANCE BETWEEN ADJACENT SIDES NEED NOT BE MORE THAN 3 FEET.

DURING CONSTRUCTION, ADEQUATE COVER SHALL BE PROVIDED TO PROTECT THE STRUCTURE FROM DAMAGE.

COVER GREATER THAN 100 FEET SHALL BE USED ONLY AFTER THOROUGH INVESTIGATION OF FOUNDATION MATERIAL.

▼ — PIPE-ARCH WITH EQUAL PERIMETRY AND WITH SPAN AND RISE DIMENSIONS APPROXIMATELY EQUAL TO THOSE REQUIRED BY PLANS WILL BE PERMITTED.

PIPE OR PIPE-ARCH IN ACCORDANCE WITH SECTION 603 SHALL NOT BE SUBSTITUTED FOR STRUCTURAL PLATE PIPE OR PIPE-ARCH.

**CITY OF COLORADO SPRINGS**

**STRUCTURAL PLATE  
CULVERT PIPE**

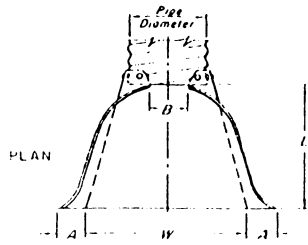
APPROVED BY *Jay R. Hayes*  
CITY ENGINEER

SCALE: NO SCALE	DATE: JAN. 90	DRAWN: P.L.B.	SHEET D-27
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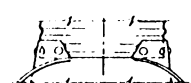
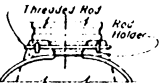
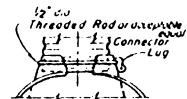
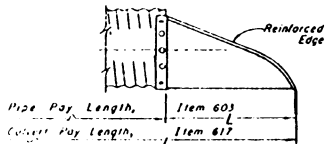
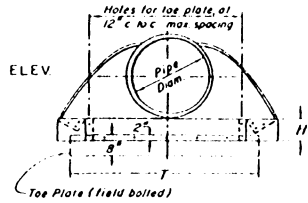
Adopted from and in conformance with the  
 State of Colorado Department of Highways  
 with Revisions by the City of Colorado  
 Springs Engineering Division

STANDARD M-603-10  
 (JANUARY, 1982)

FEDERAL ROAD DISTRICT NO.	DIVISION	PROJ. NO.	SHEET NO.	TOTAL SHEETS
711	COLORADO			
REVISIONS				



PIPE DIAM. in.	THICK. INCHES	D I M E N S I O N S					
		A (ft.)	B (ft.)	H (ft.)	L (ft.)	W (ft.)	T (ft.)
15	0.64	7	8	6	26	30	40
18	0.64	8	10	6	31	36	46
21	0.64	9	12	6	36	42	52
24	0.64	10	13	6	41	48	58
30	0.79	12	16	8	51	60	70
36	0.79	14	19	9	60	72	84
42	1.04	16	22	11	69	84	106
48	1.04	18	27	12	78	90	112
54	1.03	18	30	12	84	102	124

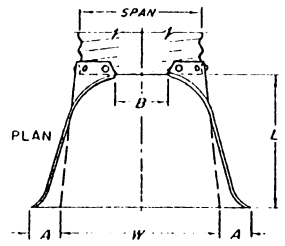


**TYPE 1**  
 For 12" thru 24" pipe with annular corrugations. Not to be used on helically formed pipe unless recorrugated.

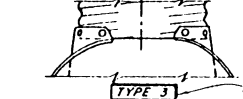
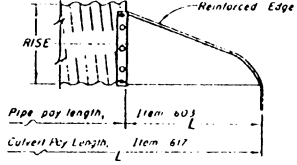
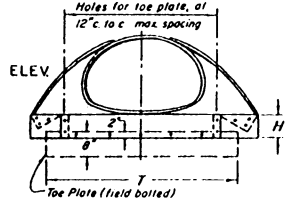
**TYPE 2**  
 For 30" thru 36" pipe with annular corrugations. Not to be used on helically formed pipe unless recorrugated.

**TYPE 3**  
 For 42" thru 84" pipe with annular corrugations and all sizes with helical corrugations. Show a notch at 2 ft. min. length of annular pipe with girth nuts or 100% bolted, or 2" long slipwelds on 8" dia. anchor bolts per specs.

TYPICAL CONNECTIONS  
 END SECTION AND CONNECTION DETAILS FOR ROUND CORRUGATED METAL PIPE CULVERTS

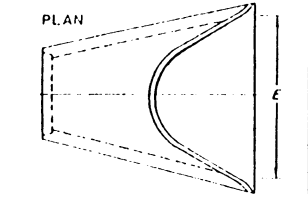


PIPE ARCH SPAN-RISE in.	THICK. INCHES	D I M E N S I O N S					
		A (ft.)	B (ft.)	H (ft.)	L (ft.)	W (ft.)	T (ft.)
17 x 13	0.64	7	9	6	19	30	40
21 x 15	0.64	7	10	6	23	36	46
24 x 18	0.64	8	12	6	29	42	52
28 x 20	0.64	9	14	6	32	48	58
35 x 24	0.79	10	16	6	39	60	70
42 x 29	0.79	12	18	8	46	72	84
49 x 33	1.03	13	21	9	53	84	103
57 x 38	1.03	18	26	12	63	90	108
64 x 43	1.03	18	30	12	70	102	120

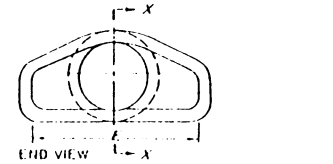
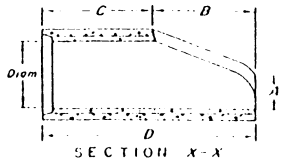


NOTE:  
 End sections for pipe arches shall be shop attached to a minimum 2 ft. of pipe with galvanized irrets or bolts, or by welding.

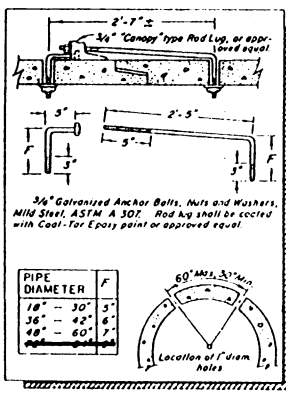
CONNECTION  
 END SECTION AND CONNECTION DETAIL FOR CORRUGATED METAL PIPE ARCH CULVERT



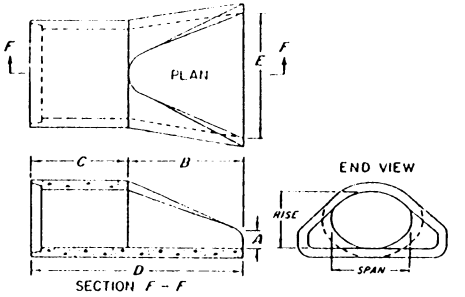
PIPE DIAM. in.	D I M E N S I O N S				
	A	B	C	D	E
10	10	10	10	10	10
15	7	26	47	73	29
18	11 1/2	26	48	74	36
24	12	43	54	97	48
30	17	53	63	96	60
36	18	60	67	97	71
42	24	61	66	97	78
48	29	70	78	98	84
54	27	63	63	100	90



END SECTION FOR REINFORCED CONCRETE CIRCULAR PIPE



CONCRETE JOINT FASTENER



EQUIVALENT CIRCULAR DIAM. (inches)	NOMINAL (in)	D I M E N S I O N S (inches)						
		SPAN	RISE	A	B	C	D	E
24	30	19	8 1/2	39	33	72	48	60
30	36	24	9 1/2	54	38	72	48	60
36	42	29	11 1/2	60	44	84	72	72
42	48	34	13 1/4	60	36	96	78	78
48	60	38	21	60	36	96	84	84
54	68	43	23 1/2	60	36	96	90	90

END SECTION FOR REINFORCED CONCRETE ELLIPTICAL PIPE

CITY OF COLORADO SPRINGS

CONCRETE AND METAL END SECTIONS

APPROVED BY *Ray P. Holmes*  
 CITY ENGINEER

SCALE: NO SCALE	DATE: JAN. 90	DRAWN: R.L.B.	SHEET D-28
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Adopted from and in conformance with the State of Colorado Department of Highways with Revisions by the City of Colorado Springs Engineering Division

\*Depth of toe wall to be increased if required by scour potential. Indicate dimension on plan.

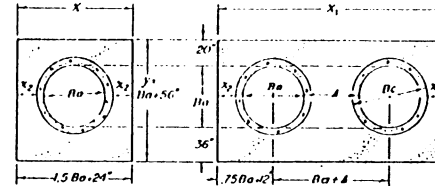
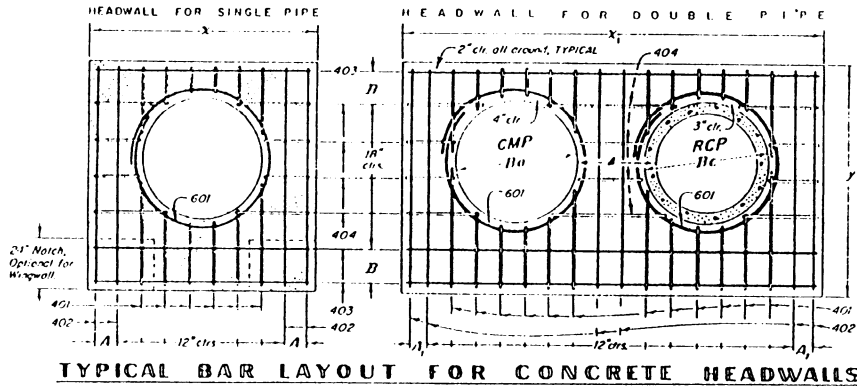
# STANDARD M-601-10

(JANUARY, 1982)

REVISION NO.	DATE	BY	CHKD.
1			

REVISIONS



### HEADWALL FOR RCP ~ ROUND

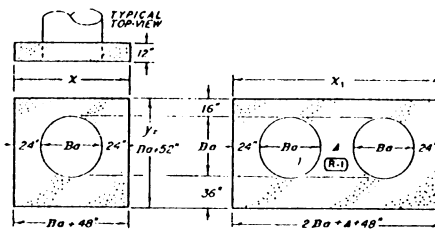
**DIMENSIONS**

Eqn.	Span	Rise	X	A	X <sub>1</sub>	A <sub>1</sub>	y	B	X <sub>2</sub>	CONCRETE	STEEL	
in.	in.	in.	ft.-in.	in.	ft.-in.	in.	ft.-in.	in.	in.	SGl	DBL	
										cu yd	cu yd	
60	72	9-6	7	17-0	10	11	21	235	399	236	414	
66	79	10-3	11/2	18-6	7	10-2	14	22	260	444	249	433
72	86	11-0	10	20-0	10	10-8	17	23	285	491	270	476
78	93	11-9	8 1/2	21-3	11	11-2	11	24	311	529	306	527
84	100	12-6	7	22-6	7	11-9	14	25	338	568	333	572
90	107	13-3	11/2	23-9	8 1/2	12-2	17	26	365	608	359	593
96	114	14-0	10	25-0	10	12-9	11	27	394	648	375	649
102	121	14-9	8 1/2	26-3	11/2	13-2	14	28	424	689	400	664
108	128	15-6	7	27-6	7	13-9	17	29	454	730	424	707

### HEADWALL FOR CMP ~ ARCH

**DIMENSIONS**

Eqn.	Span	Rise	X	A	X <sub>1</sub>	A <sub>1</sub>	y	B	CONCRETE	STEEL	
in.	in.	in.	ft.-in.	in.	ft.-in.	in.	ft.-in.	in.	SGl	DBL	
									cu yd	cu yd	
72	81	9-9	8 1/2	20-6	7	9-3	17 1/2	272	510	250	457
78	87	10-6	7	21-6	7	9-7	18 1/2	285	534	273	531
84	93	11-3	8 1/2	22-10	9	9-11	19 1/2	308	579	290	547
90	103	12-0	7 1/2	24-2	11	10-3	15	330	621	321	591
96	112	12-6	10	25-8	8	10-7	16 1/2	352	665	344	606
102	117	13-3	8 1/2	26-6	7	10-11	17 1/2	363	686	356	622
108	128	14-8	8	28-4	12	11-3	17 1/2	395	731	376	699



### HEADWALL FOR STRUCTURAL PLATE ~ ARCH

**DIMENSIONS**

Eqn.	Span	Rise	X	A	X <sub>1</sub>	A <sub>1</sub>	y	B	CONCRETE	STEEL		
in.	ft.-in.	ft.-in.	ft.-in.	in.	ft.-in.	in.	ft.-in.	in.	SGl	DBL		
									cu yd	cu yd		
66	6-1	4-7	10	10 1/2	19-2	11	8-11	15 1/2	232	470	232	474
75	7-0	5-1	11-0	10	21-0	10	9-5	16 1/2	260	525	282	509
84	7-11	5-7	11-11	9 1/2	22-10	9	9-11	17 1/2	308	579	291	540
93	8-10	6-1	12-10	9	24-8	8	10-5	18 1/2	363	633	309	622
102	9-9	6-7	13-9	8 1/2	26-6	7	10-11	19 1/2	403	686	379	673
111	10-11	7-1	14-11	8 1/2	28-10	9	11-5	19 1/2	454	749	395	711
120	11-10	7-7	15-10	9	30-8	8	11-11	19 1/2	517	828	448	771
132	12-10	8-4	16-10	9	32-8	8	12-8	11	475	903	441	819
141	14-1	8-9	16-1	10 1/2	35-2	11	13-7	13 1/2	517	966	448	831
150	15-4	9-3	19-4	12	37-8	14	13-7	14 1/2	569	1049	490	953
159	15-10	9-10	19-10	9	39-8	14	14-2	11	589	1125	534	1019

### HEADWALL FOR CMP ~ ROUND

**DIMENSIONS**

Eqn.	Span	Rise	X	A	X <sub>1</sub>	A <sub>1</sub>	y	B	CONCRETE	STEEL
in.	ft.-in.	ft.-in.	ft.-in.	in.	ft.-in.	in.	ft.-in.	in.	SGl	DBL
									cu yd	cu yd
60	9-0	10	16-6	7	9-4	18	238	225	217	396
66	9-6	7	12-9	8 1/2	9-10	12	258	470	252	454
72	10-0	10	19-0	10	10-4	15	278	517	295	472
78	10-6	7	20-0	10	10-10	18	298	535	316	499
84	11-0	10	21-0	10	11-4	12	318	565	297	553
90	11-6	7	22-0	10	11-10	15	340	636	317	571
96	12-0	10	23-0	10	12-4	18	362	679	371	597
102	12-6	7	24-0	10	12-10	12	384	727	364	683
108	13-0	10	25-0	10	13-4	15	406	763	362	678

**GENERAL NOTES**

All work shall be done in accordance with the Standard Specifications applicable to the project.

Concrete shall be Class A or B

Headwall shall be perpendicular to the culvert, unless otherwise shown on the plans.

For Wingwall details, see Standard M-601-WW.

Volume occupied by pipe has been deducted from Steel and Concrete quantities.

When 2 or more conduits are installed by side they shall be placed so that the adjacent pipes will be 1/2 inside diameter or 1/2 inside span or 1 foot apart (including wall thickness) whichever is less.

**CITY OF COLORADO SPRINGS**

**HEADWALL FOR PIPE CULVERTS**

APPROVED BY: *Ray R. Skyles*  
CITY ENGINEER

SCALE: NO SCALE	DATE: JAN. 90	DRAWN: R.L.B.	SHEET: D-29
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