

CULVERT SIZE DIAMETER (in)	1½ :1 Slope		2:1 Slope	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
12	1.06	0.53	1.00	0.50
15	1.66	0.83	1.56	0.78
18	2.41	1.20	2.26	1.13
24	4.26	2.13	4.00	2.00
30	6.65	3.33	6.25	3.13
36	9.59	4.79	9.01	4.51
42	12.86	6.43	12.07	6.04
48	16.55	8.27	15.53	7.76
54	20.81	10.40	19.51	9.76
60	25.56	12.78	23.95	11.98

Table D-1
STONE FOR EROSION CONTROL WITH ST'D. ES-1 END SECTIONS

CULVERT SIZE DIAMETER (in)	1½ :1 Slope		2:1 Slope	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
12	1.19	0.60	1.13	0.56
15	1.85	0.93	1.75	0.87
18	2.66	1.33	2.51	1.25
24	4.70	2.35	4.43	2.21
30	7.31	3.66	6.90	3.45
36	10.51	5.26	9.91	4.96
42	14.29	7.15	13.47	6.74
48	18.38	9.19	17.31	8.66
54	23.11	11.56	21.77	10.88
60	28.43	14.22	26.76	13.38

Table D-2
STONE FOR EROSION CONTROL WITH ST'D. ES-2 END SECTIONS

PIPE ARCH Span Rise (in)	1½ :1 Slope		2:1 Slope	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
17 13	1.82	0.91	1.71	0.85
21 15	2.62	1.31	2.45	1.22
24 18	3.56	1.78	3.33	1.67
28 20	4.65	2.33	4.34	2.17
35 24	7.06	3.53	6.59	3.29
42 29	10.32	5.16	9.64	4.82
49 33	13.69	6.85	12.77	6.39
57 38	18.24	9.12	17.01	8.51
64 43	23.35	11.68	21.79	10.89
71 47	28.63	14.31	26.70	13.35

Table D-3
STONE FOR EROSION CONTROL WITH ST'D. ES-3 END SECTIONS

CULVERT SIZE DIAMETER (in)	1½ :1 Slope		2:1 Slope		Increments For Each Add'l. Pipe (St'd. EW-6)	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Conc.	C.M.
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
	12	0.73	0.36	0.69	0.34	0.35
15	1.14	0.57	1.08	0.54	0.54	0.47
18	1.65	0.82	1.56	0.78	0.79	0.69
24	2.93	1.46	2.78	1.39	1.38	1.22
30	4.59	2.29	4.36	2.18	2.17	1.92
36	6.64	3.32	6.31	3.15	3.16	2.80

Table D-4
STONE FOR EROSION CONTROL WITH ST'D. EW-1 AND EW-6 ENDWALLS

ELLIPTICAL PIPE Span Rise (in)		1½ :1 Slope		2:1 Slope	
		Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
		Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
23	14	1.62	0.81	1.54	0.77
30	19	2.90	1.45	2.75	1.38
34	22	3.81	1.90	3.61	1.81
38	24	4.63	2.32	4.40	2.20
42	27	5.78	2.89	5.49	2.75
45	29	6.65	3.32	6.31	3.15
49	32	8.01	4.00	7.60	3.80
53	34	9.19	4.60	8.73	4.36

Table D-5
STONE FOR EROSION CONTROL WITH ST'D. EW-1A ENDWALLS

CULVERT SIZE DIAMETER (in)	1½ :1 Slope		2:1 Slope		ST'D. EW-7
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Increments For Each Add'l. Pipe (Conc.)
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
42	10.80	5.40	10.07	5.03	4.67
48	14.12	7.06	13.16	6.58	6.07
54	17.89	8.95	16.67	8.33	7.67
60	22.10	11.05	20.59	10.30	9.44
66	26.94	13.47	24.93	12.46	11.41
72	31.87	15.93	29.68	14.84	13.56
78	37.42	18.71	34.85	17.42	15.89
84	43.41	21.71	40.43	20.21	18.41

Table D-6
STONE FOR EROSION CONTROL WITH ST'D. EW-2
AND EW-7 ENDWALLS

CULVERT SIZE DIAMETER (in)	1½ :1 Slope		2:1 Slope		ST'D. EW-7S
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Increments For Each Add'l. Pipe (Conc.)
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
42	11.22	5.61	10.49	5.24	5.39
48	14.67	7.33	13.71	6.85	7.00
54	18.59	9.29	17.37	8.68	8.86
60	22.97	11.49	21.46	10.73	10.90
66	27.98	13.99	25.97	12.99	13.18
72	33.11	16.55	30.92	15.46	15.66
78	38.88	19.44	36.31	18.15	18.34
84	45.10	22.55	42.11	21.06	21.26

Table D-7
STONE FOR EROSION CONTROL WITH ST'D. EW-2S
AND EW-7S ENDWALLS (30° Skew)

CULVERT SIZE DIAMETER (in)	1½ :1 Slope		2:1 Slope		ST'D. EW-7S
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Increments For Each Add'l. Pipe (Conc.)
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
42	13.03	6.51	12.56	6.28	6.61
48	17.02	8.51	16.41	8.21	8.59
54	21.55	10.77	20.77	10.39	10.85
60	26.61	13.30	25.64	12.82	13.35
66	32.16	16.08	31.03	15.51	16.13
72	38.32	19.16	36.93	18.46	19.17
78	44.97	22.48	43.33	21.66	22.47
84	52.16	26.08	50.25	25.13	26.04

Table D-7A
STONE FOR EROSION CONTROL WITH ST'D. EW-2S
AND EW-7S ENDWALLS (45° Skew)

ELLIPTICAL PIPE Span Rise (in)		1½ :1 Slope		2:1 Slope	
		Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
		Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
60	38	14.36	7.18	12.79	6.39
68	43	18.84	9.42	16.87	8.44
76	48	23.47	11.74	20.99	10.50
83	53	28.20	14.10	25.22	12.61
91	58	33.81	16.90	30.20	15.10
98	63	39.98	19.99	35.23	17.62
106	68	46.03	23.01	41.09	20.54

Table D-8
STONE FOR EROSION CONTROL WITH ST'D. EW-2A ENDWALLS

PIPE ARCH Span Rise (in)		1½ :1 Slope		2:1 Slope		ST'D. EW-10
		Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Increments For Each Add'l. Pipe
		Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
17	13	1.12	0.56	1.06	0.53	0.52
21	15	1.60	0.80	1.52	0.76	0.70
24	18	2.20	1.10	2.09	1.04	0.92
28	20	2.86	1.43	2.71	1.36	1.14
35	24	4.27	2.13	4.05	2.03	1.58
42	29	6.20	3.10	5.89	2.94	2.33
49	33	8.27	4.13	7.85	3.92	3.10
57	38	11.11	5.56	10.55	5.28	4.21

Table D-9
STONE FOR EROSION CONTROL WITH ST'D. EW-9
AND EW-10 PIPE ARCHES

CULVERT SIZE (Feet) Span x Rise	1½ :1 Slope		2:1 Slope	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	9.55	4.77	9.28	4.64
3 x 4	13.10	6.55	13.09	6.54
4 x 3	12.95	6.48	12.14	6.07
4 x 4	17.01	8.51	16.60	8.30
4 x 5	21.70	10.85	21.68	10.84
4 x 6	26.58	13.29	27.39	13.69
5 x 3	16.86	8.43	15.44	7.72
5 x 4	21.43	10.71	20.27	10.13
5 x 5	26.62	13.31	25.83	12.92
5 x 6	32.13	16.06	32.03	16.01
5 x 7	38.42	19.21	38.85	19.43
6 x 4	26.34	13.17	24.44	12.22
6 x 5	32.04	16.02	30.42	15.21
6 x 6	38.18	19.09	37.10	18.55
6 x 7	44.98	22.49	44.41	22.21
6 x 8	51.91	25.95	52.35	26.17
7 x 4	31.77	15.88	29.10	14.55
7 x 6	44.80	22.40	42.61	21.31
7 x 8	59.98	29.99	58.83	29.42
7 x 10	76.35	38.17	76.81	38.40
8 x 4	37.69	18.85	34.20	17.10
8 x 6	51.87	25.93	48.57	24.28
8 x 8	68.05	34.02	66.07	33.03
8 x 10	85.68	42.84	85.45	42.72
9 x 4	44.12	22.06	39.73	19.86
9 x 6	59.56	29.78	55.06	27.53
9 x 8	76.62	38.31	73.30	36.65
9 x 10	95.51	47.76	93.77	46.89
9 x 12	116.42	58.21	116.95	58.48
10 x 4	51.06	25.53	45.70	22.85
10 x 6	67.76	33.88	61.99	31.00
10 x 8	85.70	42.85	80.98	40.49
10 x 10	106.17	53.08	102.93	51.47
10 x 12	128.52	64.26	127.40	63.70
12 x 6	85.09	42.55	76.71	38.36
12 x 8	105.63	52.81	97.78	48.89
12 x 10	128.17	64.09	121.69	60.84
12 x 12	153.11	76.55	148.41	74.21

Table D-10
STONE FOR EROSION CONTROL FOR BOX CULVERT
ST'D. BCS-02 THRU BCS-50 (No Skew)

CULVERT SIZE (Feet) Span x Rise	1½ :1 Slope		2:1 Slope	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	9.62	4.81	9.35	4.67
3 x 4	13.20	6.60	13.18	6.59
4 x 3	13.04	6.52	12.24	6.12
4 x 4	17.14	8.57	16.72	8.36
4 x 5	21.86	10.93	21.84	10.92
4 x 6	26.77	13.38	27.58	13.79
5 x 3	16.98	8.49	15.56	7.78
5 x 4	21.58	10.79	20.42	10.21
5 x 5	26.82	13.41	26.03	13.01
5 x 6	32.36	16.18	32.26	16.13
5 x 7	38.70	19.35	39.13	19.56
6 x 4	26.53	13.27	24.63	12.32
6 x 5	32.28	16.14	30.66	15.33
6 x 6	38.47	19.23	37.39	18.69
6 x 7	45.31	22.66	44.74	22.37
6 x 8	52.28	26.14	52.73	26.36
7 x 4	31.99	15.99	29.32	14.66
7 x 6	45.13	22.57	42.94	21.47
7 x 8	60.42	30.21	59.27	29.63
7 x 10	76.89	38.45	77.36	38.68
8 x 4	37.94	18.97	34.45	17.22
8 x 6	52.24	26.12	48.94	24.47
8 x 8	68.55	34.27	66.57	33.28
8 x 10	86.31	46.15	86.07	43.04
9 x 4	44.41	22.20	40.01	20.01
9 x 6	59.98	29.99	55.48	27.74
9 x 8	77.19	38.59	73.87	36.93
9 x 10	96.22	48.11	94.48	47.24
9 x 12	117.26	58.63	117.80	58.90
10 x 4	51.37	25.69	46.01	23.00
10 x 6	68.23	34.11	62.46	31.23
10 x 8	86.33	43.17	81.60	40.80
10 x 10	106.95	53.48	103.71	51.86
10 x 12	129.46	64.73	128.34	64.17
12 x 6	85.66	42.83	77.28	38.64
12 x 8	106.38	53.19	98.53	49.27
12 x 10	129.11	64.56	122.63	61.32
12 x 12	154.24	77.12	149.54	74.77

Table D-11
STONE FOR EROSION CONTROL FOR BOX CULVERT
ST'D. BCS-02 THRU BCS-50 (15° Skew)

CULVERT SIZE (Feet) Span x Rise	1½ :1 Slope		2:1 Slope	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	9.93	4.96	9.71	4.85
3 x 4	13.70	6.85	13.85	6.92
4 x 3	13.34	6.67	12.56	6.28
4 x 4	17.72	8.86	17.39	8.69
4 x 5	22.74	11.37	23.00	11.50
4 x 6	28.28	14.14	29.40	14.70
5 x 3	17.26	8.63	15.84	7.92
5 x 4	22.11	11.06	21.02	10.51
5 x 5	27.67	13.84	27.09	13.55
5 x 6	33.79	16.89	33.95	16.98
5 x 7	40.57	20.28	41.47	20.74
6 x 4	27.07	13.54	25.18	12.59
6 x 5	33.11	16.56	31.62	15.81
6 x 6	39.80	19.90	38.94	19.47
6 x 7	46.94	23.47	46.95	23.47
6 x 8	54.81	27.41	55.80	27.90
7 x 4	32.54	16.27	29.83	14.91
7 x 6	46.34	23.17	44.37	22.18
7 x 8	62.65	31.33	62.18	31.08
7 x 10	80.99	40.50	82.60	41.30
8 x 4	38.51	19.25	34.91	17.46
8 x 6	53.40	26.70	50.23	25.12
8 x 8	70.62	35.31	69.39	34.69
8 x 10	90.54	45.27	91.21	45.61
9 x 4	44.98	22.49	40.43	20.22
9 x 6	61.08	30.54	56.66	28.33
9 x 8	79.41	39.70	76.49	38.24
9 x 10	100.25	50.13	99.32	49.66
9 x 12	123.33	61.66	125.24	62.62
10 x 4	51.96	25.98	46.39	23.20
10 x 6	69.27	34.63	63.54	31.77
10 x 8	88.45	44.22	84.09	42.05
10 x 10	110.78	55.39	108.37	54.18
10 x 12	135.31	67.65	135.63	67.82
12 x 6	86.43	43.22	78.03	39.02
12 x 8	108.29	54.15	100.60	50.30
12 x 10	132.52	66.26	126.69	63.34
12 x 12	159.65	79.82	156.24	78.12

Table D-12
STONE FOR EROSION CONTROL FOR BOX CULVERT
ST'D. BCS-02 THRU BCS-50 (30° Skew)

CULVERT SIZE (Feet) Span x Rise	1½ :1 Slope		2:1 Slope	
	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal	Normal Depth (2 Feet)	Increments For Each Add'l. Foot Above Normal
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	10.44	5.22	10.22	5.11
3 x 4	14.39	7.20	14.54	7.27
4 x 3	14.03	7.02	13.25	6.62
4 x 4	18.64	9.32	18.31	9.15
4 x 5	23.90	11.95	24.15	12.08
4 x 6	29.67	14.83	30.78	15.39
5 x 3	18.12	9.06	16.71	8.35
5 x 4	23.27	11.63	22.17	11.09
5 x 5	29.12	14.56	28.53	14.27
5 x 6	35.52	17.76	35.68	17.84
5 x 7	42.59	21.29	43.49	21.74
6 x 4	28.46	14.23	26.56	13.28
6 x 5	34.84	17.42	33.35	16.67
6 x 6	41.87	20.94	41.02	20.51
6 x 7	49.54	24.77	49.37	24.69
6 x 8	57.58	28.79	58.57	29.28
7 x 4	34.15	17.08	31.44	15.72
7 x 6	48.76	24.38	46.79	23.39
7 x 8	65.88	32.94	65.41	32.70
7 x 10	85.03	42.52	86.63	43.32
8 x 4	40.35	20.18	36.76	18.38
8 x 6	56.17	28.09	53.00	26.50
8 x 8	74.56	37.28	73.08	36.54
8 x 10	95.16	47.58	95.82	47.91
9 x 4	47.06	23.53	42.51	21.26
9 x 6	64.20	32.10	59.78	29.89
9 x 8	83.56	41.78	80.64	40.32
9 x 10	105.44	52.72	104.51	52.26
9 x 12	129.55	64.78	131.47	65.73
10 x 4	54.27	27.13	48.70	24.35
10 x 6	72.73	36.36	67.00	33.50
10 x 8	93.06	46.53	88.71	44.35
10 x 10	116.54	58.27	114.14	57.07
10 x 12	142.23	71.11	142.55	71.28
12 x 6	90.58	45.29	82.18	41.09
12 x 8	113.83	56.92	106.13	53.07
12 x 10	139.44	69.72	133.61	66.80
12 x 12	167.95	83.98	164.55	82.27

Table D-13
STONE FOR EROSION CONTROL FOR BOX CULVERT
ST'D. BCS-02 THRU BCS-50 (45° Skew)

CULVERT SIZE (Feet) Span × Rise	No Skew	15° Skew	30° Skew	45° Skew
	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 × 3	2.56	2.65	2.97	3.61
3 × 4	3.53	3.65	3.89	4.95
4 × 3	3.11	3.23	3.59	4.40
4 × 4	4.15	4.30	4.79	5.87
4 × 5	5.19	5.37	5.99	7.34
4 × 6	6.22	6.44	7.19	8.80
5 × 3	3.78	3.91	4.36	5.34
5 × 4	5.03	5.22	5.82	7.12
5 × 5	6.30	6.52	7.27	8.91
5 × 6	7.56	7.83	8.73	10.69
5 × 7	8.82	9.12	10.18	12.46
6 × 4	5.93	6.14	6.85	8.38
6 × 5	7.49	7.75	8.66	10.58
6 × 6	9.13	9.44	10.50	12.81
6 × 7	10.77	11.13	12.49	15.16
6 × 8	11.85	12.27	13.69	16.76
7 × 4	6.82	7.06	7.87	9.64
7 × 6	10.35	10.71	11.92	14.58
7 × 8	14.07	14.55	16.28	19.82
7 × 10	17.79	18.39	20.61	25.04
8 × 4	7.70	7.98	8.90	10.90
8 × 6	11.55	11.97	13.35	16.34
8 × 8	15.40	15.95	17.79	21.79
8 × 10	19.26	19.94	22.24	27.24
9 × 4	8.60	8.90	9.93	12.15
9 × 6	12.89	13.35	14.89	18.22
9 × 8	17.19	17.79	20.00	24.46
9 × 10	22.00	22.75	25.45	31.03
9 × 12	26.61	27.52	30.81	37.49
10 × 4	9.48	9.82	10.95	13.41
10 × 6	14.23	14.73	16.42	20.12
10 × 8	18.97	19.64	21.90	26.82
10 × 10	23.70	24.54	27.37	33.53
10 × 12	28.44	29.45	32.85	40.23
12 × 6	16.89	17.48	19.50	23.89
12 × 8	22.52	23.31	26.01	31.85
12 × 10	28.15	29.14	32.51	39.81
12 × 12	33.78	34.97	39.01	47.77

Table D-14
STONE FOR EROSION CONTROL FOR MULTIPLE BOX CULVERTS
(Increments For Each Additional Barrel)

DISPLACEMENT QUANTITIES FOR PIPE OPENINGS
(To be used with Standard JB-1 Junction Box)

PIPE SIZE	PIPE CLASS	CONCRETE				REINFORCING STEEL
		0°	15°	30°	45°	
		CJ. YDS.	CJ. YDS.	CJ. YDS.	CJ. YDS.	LBS.
12"	III, IV, V C. M.	0.035	0.036	0.040	0.050	17.67
		0.019	0.020	0.022	0.027	11.06
15"	III, IV, V C. M.	0.050	0.052	0.058	0.071	24.88
		0.030	0.031	0.034	0.042	15.93
18"	III, IV, V C. M.	0.069	0.072	0.080	0.099	33.23
		0.043	0.044	0.049	0.061	21.68
24"	III, IV, V C. M.	0.118	0.122	0.137	0.168	53.53
		0.076	0.078	0.087	0.108	35.83
30"	III, IV, V C. M.	0.179	0.186	0.208	0.256	78.64
		0.118	0.122	0.137	0.168	53.53
36"	III, IV, V C. M.	0.254	0.263	0.294	0.362	108.76
		0.170	0.176	0.197	0.242	74.76
42"	III, IV, V C. M.	0.341	0.353	0.395	0.486	143.33
		0.231	0.240	0.268	0.330	99.53
48"	III, IV, V C. M.	0.441	0.457	0.511	0.629	182.90
		0.302	0.313	0.350	0.431	127.85
54"	III & IV V C. M.	0.554	0.574	0.642	0.789	227.29
		0.580	0.600	0.672	0.826	237.42
60"	III & IV V C. M.	0.679	0.704	0.787	0.965	276.49
		0.708	0.734	0.821	1.009	287.65
66"	III & IV V C. M.	0.818	0.847	0.948	1.166	330.50
		0.849	0.880	0.985	1.211	342.70
72"	III & IV V C. M.	0.969	1.004	1.123	1.382	389.34
		1.003	1.040	1.163	1.431	402.58
		0.679	0.704	0.787	0.969	276.49

TABLE D-15
ADJUSTMENT QUANTITIES FOR JUNCTION BOX

PROJECT _____ STATION _____

1. Grade Elevation _____
 2. Minus Inv. Elev. _____
 3. Vertical Difference _____
 4. Minus Pipe Size _____
 5. Difference _____

If Line 5 is over 5' 4", use Type A Tower
 If Line 5 is 3' 2" to 5' 4", use Type B Tower
 If Line 5 is 2' 4" to 3' 2", use Type C Tower

Increase above dimensions by 1' for use with 72" pipe.

CHAMBER

6. Type _____ Pipe Size _____ Turn Angle _____

CONCRETE REINFORCING
CU. YDS. STEEL LBS.

Less: Pipe Openings

7. Size _____ Class _____ Defl. Angle _____

8. Size _____ Class _____ Defl. Angle _____

9. Size _____ Class _____ Defl. Angle _____

10. Size _____ Class _____ Defl. Angle _____

11. Total Deductions (Lines 7-10)

12. Quantities for Chamber (Subtract Line 11 from Line 6 and Transfer to Line 17)

TOWER

13. Type _____ X Height _____

X 48" Pipe - Line 3 minus 6.33'

X 54" Pipe - Line 3 minus 6.83'

X 60" Pipe - Line 3 minus 7.33'

X 66" Pipe - Line 3 minus 7.83'

X 72" Pipe - Line 3 minus 9.33'

Min. Height
 Type A = 3.00'
 Type B = 0.83'
 Type C = 0.00'

14. Minimum Height Quantities

15. (Line 13 less Min. Height) x increment per foot

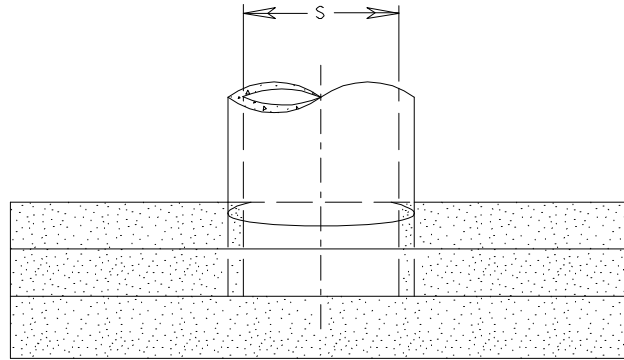
16. Quantities for tower (Add Lines 14 & 15)

17. Quantities for Chamber (Line 12)

18. Total Concrete and Reinforcing Steel (Add Lines 16 & 17)

STRUCTURAL STEEL QUANTITY (Lbs.)

FIGURE D-1
COMPUTATIONS FOR STANDARD JB-1 JUNCTION BOX



PLAN VIEW



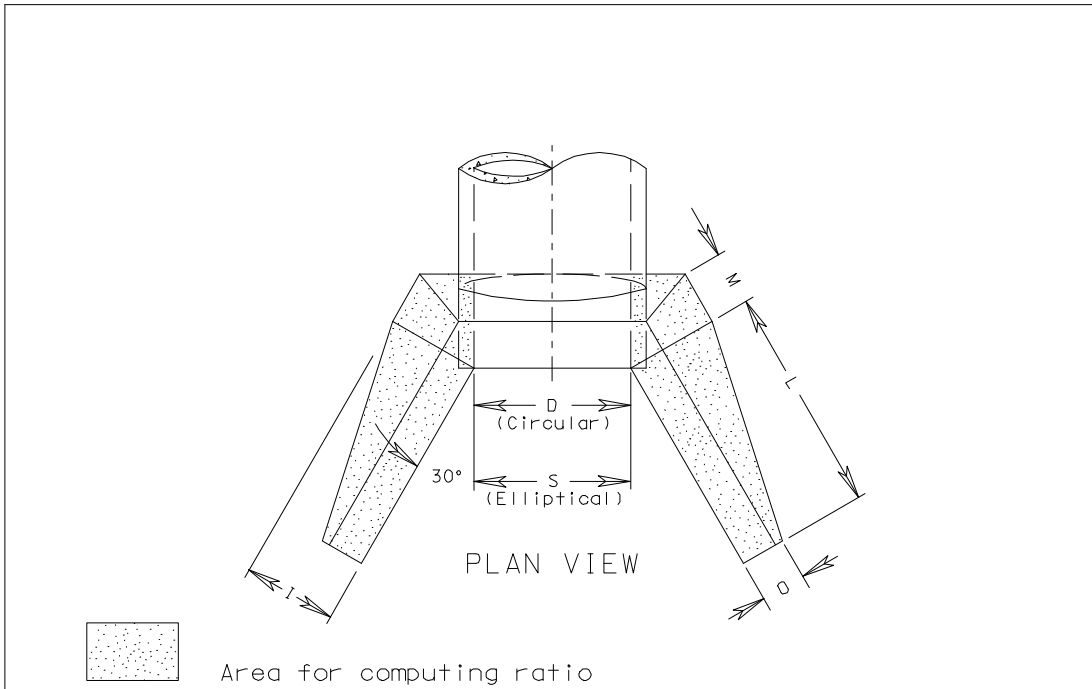
Area for computing ratio

Standard	(S) Span of Culvert (inches)	Area (A)
		Conc. or C. M. Sq. Ft.
EW-1A	49	24.40
	53	27.06

Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	A
	S (in feet) X Length of Culvert

TABLE D-16
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-1A



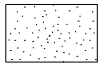
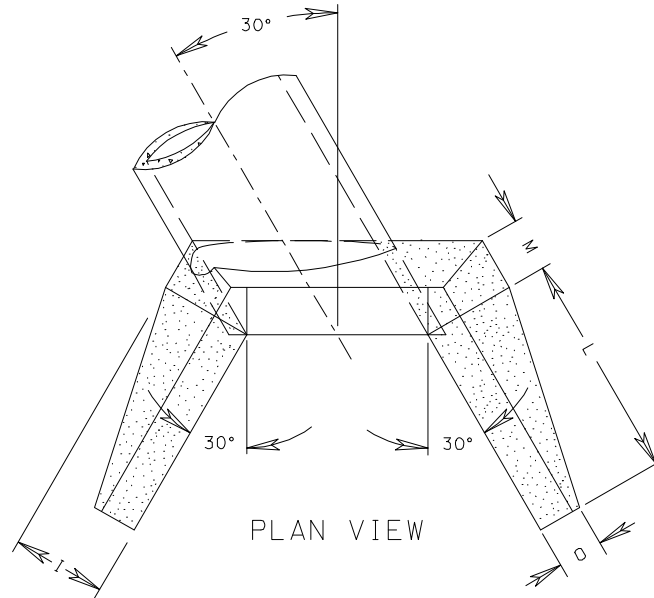
(D) Diameter of Culvert (inches)	Area (A)	
	1 1/2:1 Slope	2:1 Slope
	Sq. Ft.	Sq. Ft.
48	27.31	33.95
54	33.43	41.64
60	40.07	50.05
66	47.38	59.29
72	55.29	69.25
78	63.74	80.00
84	72.80	91.55

(S) Span of Culvert (inches)	Area (A)	
	1 1/2:1 Slope	2:1 Slope
	Sq. Ft.	Sq. Ft.
60	23.31	28.88
68	23.31	28.88
76	27.31	33.95
83	33.43	41.64
91	40.07	50.05
98	47.38	59.29
106	55.29	69.25

Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	$\frac{A}{D \text{ or } S \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-------------------------------------------------------------------------------

TABLE D-17
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARDS EW-2, EW-2A



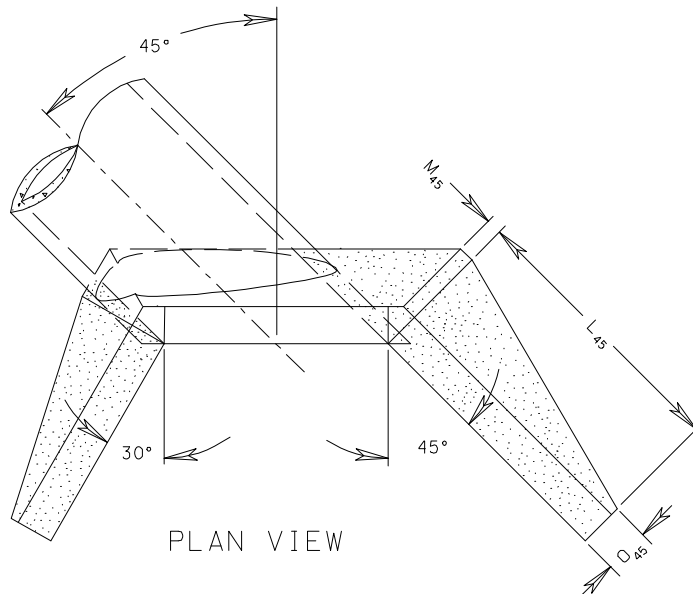
Area for computing ratio

(D) Diameter of Culvert (inches)	Area (A)	
	1 1/2:1 Slope	2:1 Slope
	Sq. Ft.	Sq. Ft.
48	27.31	33.95
54	33.43	41.64
60	40.07	50.05
66	47.38	59.29
72	55.29	69.25
78	63.74	80.00
84	72.80	91.55

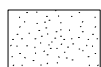
Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	$\frac{A}{D \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-18
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-2S (30°)



PLAN VIEW



Area for computing ratio

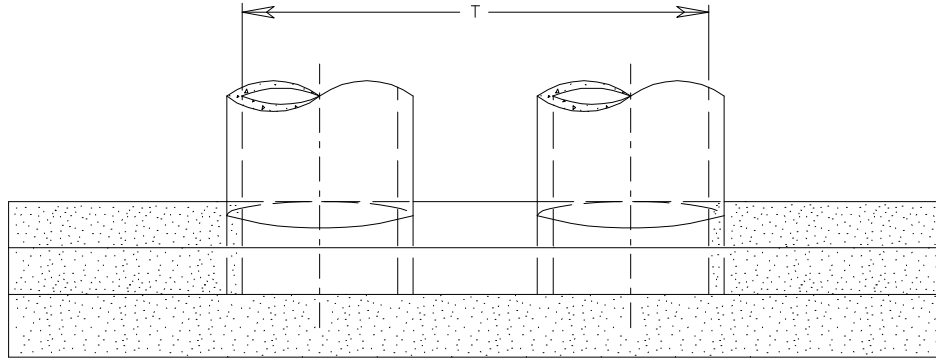
$$D_{45} = D + \frac{5}{8}''$$

(D) Diameter of Culvert (inches)	Area (A)	
	1 1/2:1 Slope	2:1 Slope
	Sq. Ft.	Sq. Ft.
48	32.23	40.50
54	39.37	49.45
60	47.31	59.51
66	55.90	70.43
72	65.20	82.30
78	75.25	95.11
84	85.96	108.84

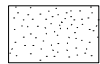
Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	A
	$\frac{D \text{ (in feet)} \times \text{Length of Culvert}}{}$

TABLE D-19
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-2S (45°)



PLAN VIEW



Area for computing ratio

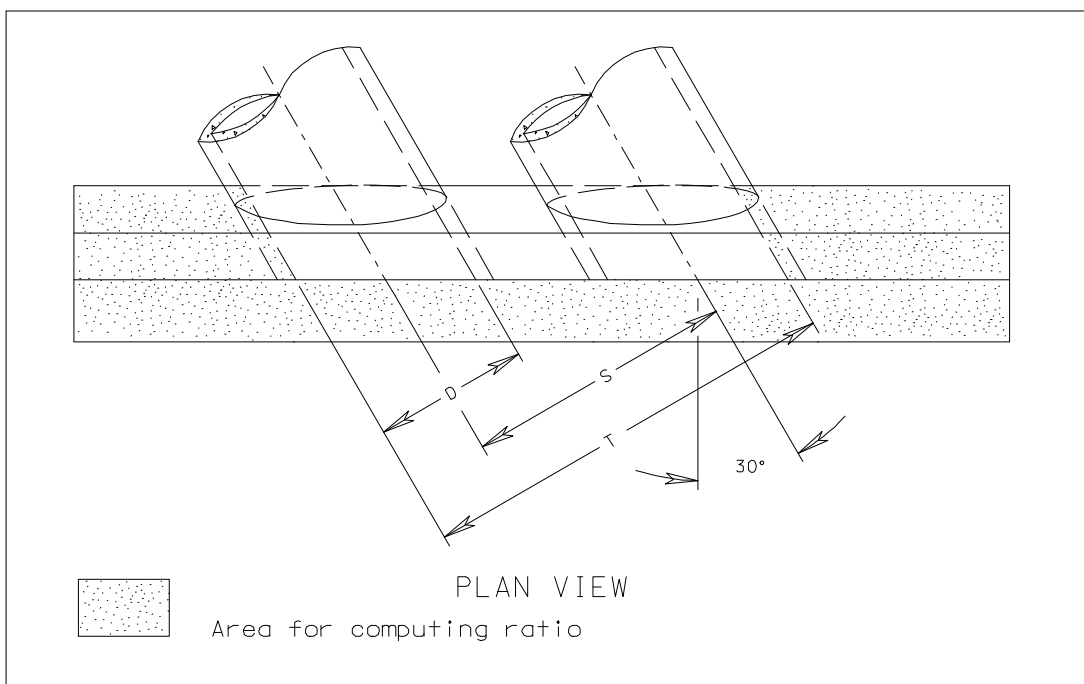
(D) Diameter of Culvert (inches)	Area (A)					
	Double Line		Triple Line		Quadruple Line	
	Conc.	C.M.	Conc.	C.M.	Conc.	C.M.
	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
15			8.81	8.52	9.94	9.50
18	9.96	9.79	11.29	10.96	12.63	12.13
24	16.67	16.39	19.00	18.44	21.33	20.50
30	23.88	23.50	27.13	26.38	30.38	29.25
36	30.88	30.44	34.75	33.88	38.63	37.31
	Culvert+ Width (T)					
	Feet	Feet	Feet	Feet	Feet	Feet
15			5.75	5.17	8.00	7.13
18	4.17	3.83	6.83	6.17	9.50	8.50
24	5.50	5.08	9.00	8.17	12.50	11.25
30	6.83	6.33	11.17	10.17	15.50	14.00
36	8.17	7.58	13.33	12.17	18.50	16.75

Area is given for one endwall.

Double area shown if two endwalls are used.

TO DETERMINE RATIO	$\frac{A}{T \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-20
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-6

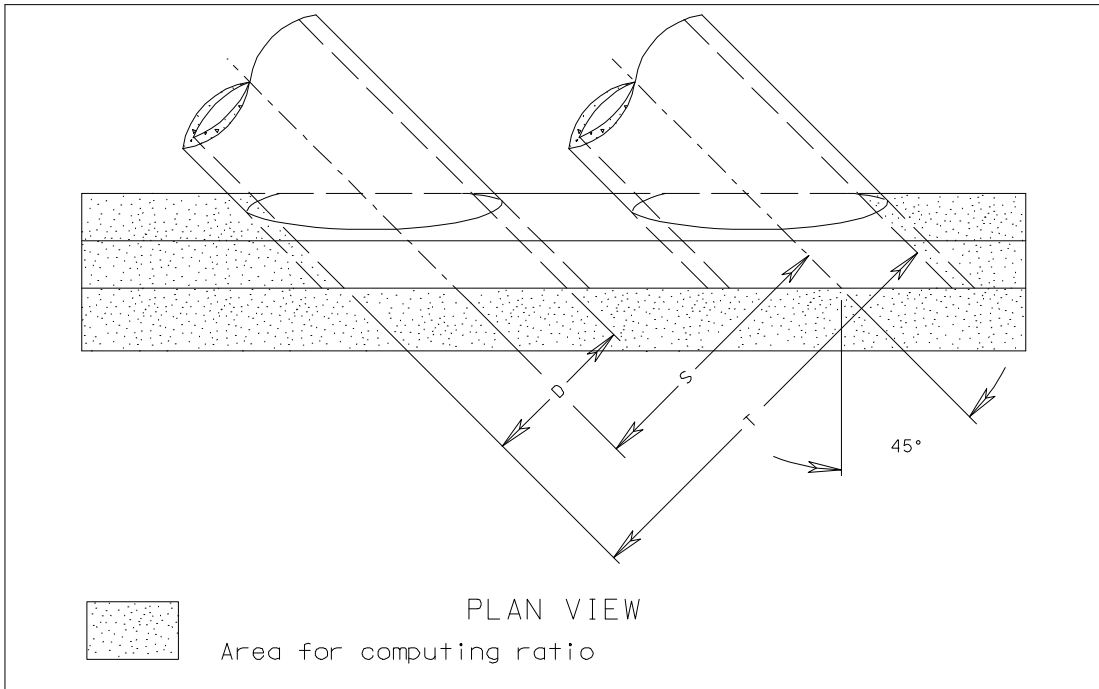


(D) Diameter of Culvert (inches)	Area (A)					
	Double Line		Triple Line		Quadruple Line	
	Conc.	C.M.	Conc.	C.M.	Conc.	C.M.
	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
15			8.94	8.61	10.23	9.74
18	9.88	9.69	11.43	11.04	12.98	12.40
24	16.56	16.25	19.26	18.63	21.95	21.00
30	23.69	23.27	27.44	26.59	31.18	29.91
36	30.44	30.04	34.81	34.01	39.17	37.97
	Culvert Width (T)					
	Feet	Feet	Feet	Feet	Feet	Feet
15			5.75	5.17	8.00	7.13
18	4.17	3.83	6.83	6.17	9.50	8.50
24	5.50	5.08	9.00	8.17	12.50	11.25
30	6.83	6.33	11.17	10.17	15.50	14.00
36	8.17	7.58	13.33	12.17	18.50	16.75

Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	$\frac{A}{T \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-21
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-6S (30°)

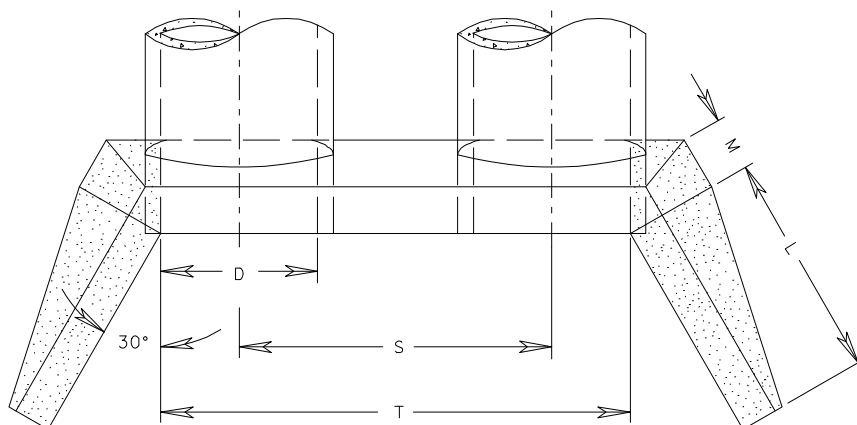


(D) Diameter of Culvert (inches)	Area (A)					
	Double Line		Triple Line		Quadruple Line	
	Conc.	C.M.	Conc.	C.M.	Conc.	C.M.
	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
15			9.17	8.78	10.75	10.16
18	9.73	9.50	11.62	11.16	13.50	12.81
24	16.39	16.01	19.68	18.92	22.98	21.84
30	23.40	22.87	27.99	26.92	32.58	30.98
36	29.98	29.37	35.45	34.22	40.92	39.08
	Culvert Width (T)					
	Feet	Feet	Feet	Feet	Feet	Feet
15			5.75	5.17	8.00	7.13
18	4.17	3.83	6.83	6.17	9.50	8.50
24	5.50	5.08	9.00	8.17	12.50	11.25
30	6.83	6.33	11.17	10.17	15.50	14.00
36	8.17	7.58	13.33	12.17	18.50	16.75

Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	$\frac{A}{T \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-22
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-6S (45°)



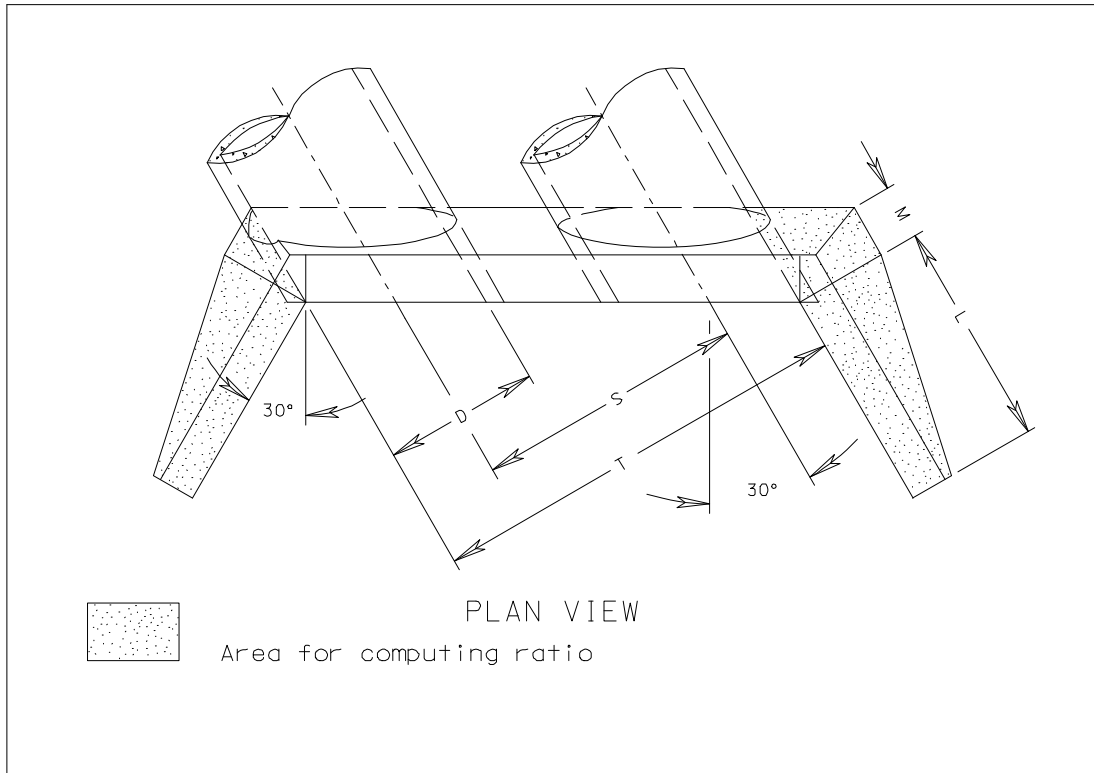
PLAN VIEW
Area for computing ratio

(D) Diameter of Culvert (inches)	Area (A)		Culvert Width (T)					
	1 1/2:1 Slope Sq. Ft.	2:1 Slope Sq. Ft.	Double Line		Triple Line		Quadruple Line	
			Conc. Feet	C.M. Feet	Conc. Feet	C.M. Feet	Conc. Feet	C.M. Feet
42	23.31	28.88	9.50	8.79	15.50	14.08	21.50	19.37
48	27.31	33.95	10.83	10.04	17.67	16.08	24.50	22.12
54	33.43	41.64	12.17	11.29	19.83	18.08	27.50	24.87
60	40.07	50.05	13.50	12.54	22.00	20.08	30.50	27.62
66	47.38	59.29	14.83	13.79	24.17	22.08	33.50	30.37
72	55.29	69.25	16.17	15.04	26.33	24.08	36.50	33.12
78	63.74	80.00	17.50	16.29	28.50	26.08	39.50	35.87
84	72.80	91.55	18.83	17.54	30.67	28.08	42.50	38.62

Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	$\frac{A}{T \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-23
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-7

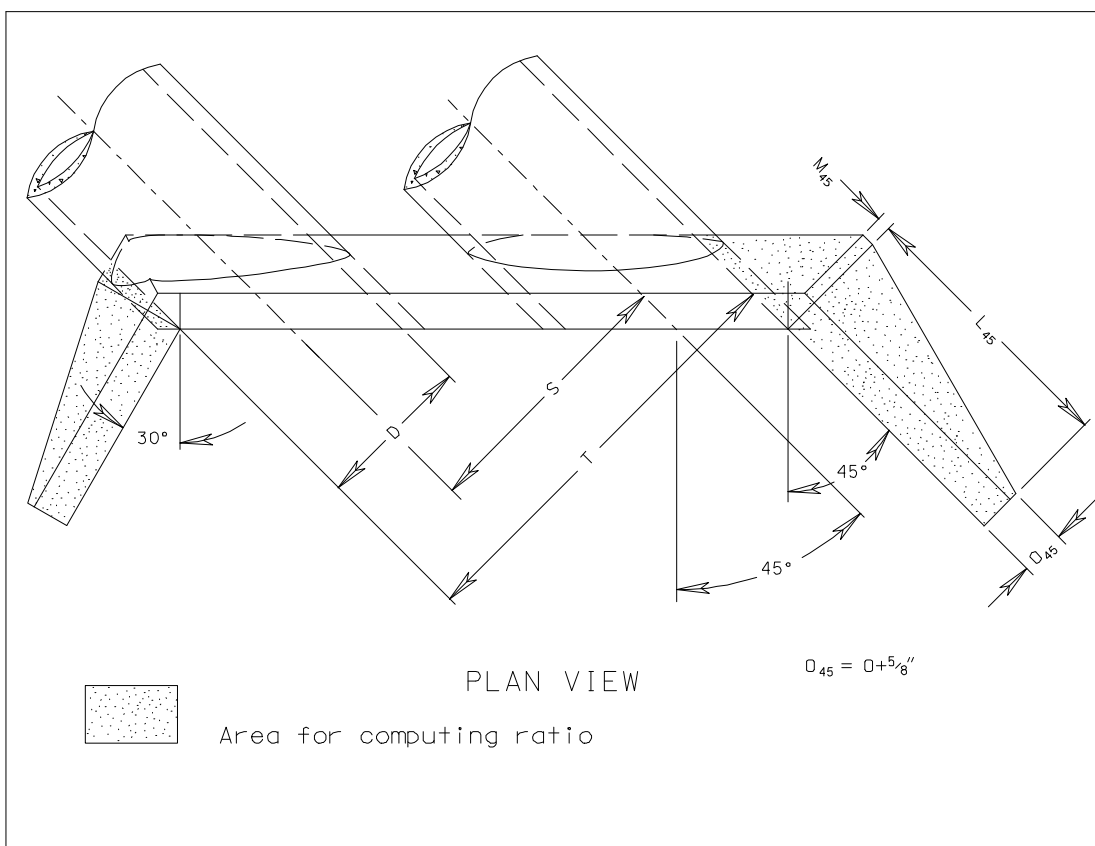


(D) Diameter of Culvert (inches)	Area (A)		Culvert Width (T)					
	1 1/2:1 Slope Sq. Ft.	2:1 Slope Sq. Ft.	Double Line		Triple Line		Quadruple Line	
			Conc. Feet	C.M. Feet	Conc. Feet	C.M. Feet	Conc. Feet	C.M. Feet
42	23.31	28.88	9.50	8.79	15.50	14.08	21.50	19.37
48	27.31	33.95	10.83	10.04	17.67	16.08	24.50	22.12
54	33.43	41.64	12.17	11.29	19.83	18.08	27.50	24.87
60	40.07	50.05	13.50	12.54	22.00	20.08	30.50	27.62
66	47.38	59.29	14.83	13.79	24.17	22.08	33.50	30.37
72	55.29	69.25	16.17	15.04	26.33	24.08	36.50	33.12
78	63.74	80.00	17.50	16.29	28.50	26.08	39.50	35.87
84	72.80	91.55	18.83	17.54	30.67	28.08	42.50	38.62

Area is given for one endwall.
Double area shown if two endwalls are used.



TABLE D-24
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-7S (30°)

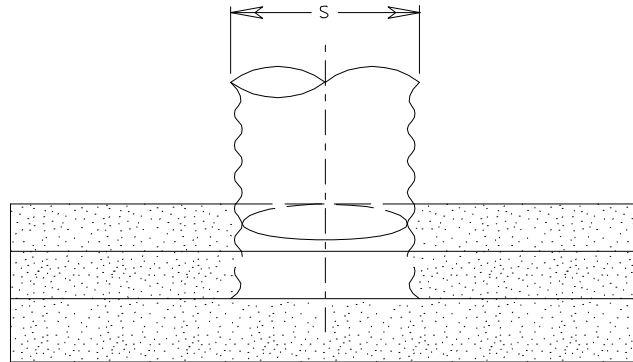


(D) Diameter of Culvert (inches)	Area (A)		Culvert Width (T)					
	1 1/2:1 Slope Sq. Ft.	2:1 Slope Sq. Ft.	Double Line		Triple Line		Quadruple Line	
			Conc. Feet	C.M. Feet	Conc. Feet	C.M. Feet	Conc. Feet	C.M. Feet
42	27.37	34.10	9.50	8.79	15.50	14.08	21.50	19.37
48	32.23	40.50	10.83	10.04	17.67	16.08	24.50	22.12
54	39.37	49.45	12.17	11.29	19.83	18.08	27.50	24.87
60	47.31	59.51	13.50	12.54	22.00	20.08	30.50	27.62
66	55.90	70.43	14.83	13.79	24.17	22.08	33.50	30.37
72	65.20	82.30	16.17	15.04	26.33	24.08	36.50	33.12
78	75.25	95.11	17.50	16.29	28.50	26.08	39.50	35.87
84	85.96	108.84	18.83	17.54	30.67	28.08	42.50	38.62

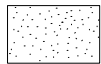
Area is given for one endwall.
Double area shown if two endwalls are used.

TO DETERMINE RATIO	$\frac{A}{T \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-25
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-7S (45°)



PLAN VIEW



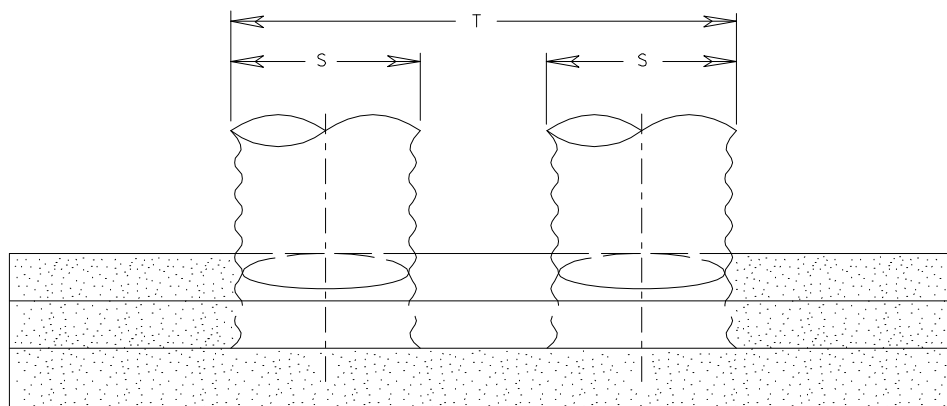
Area for computing ratio

(S) Span of Culvert (inches)	Area (A)
	Sq. Ft.
49	22.65
*46	23.08
57	28.54
*53	29.21

Area is given for one endwall.
 Double area shown if two endwalls are used.
 * 3" x 1" corrugation dimension.

TO DETERMINE RATIO	A
	S (in feet) X Length of Culvert

TABLE D-26
 COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
 STANDARD EW-9



PLAN VIEW



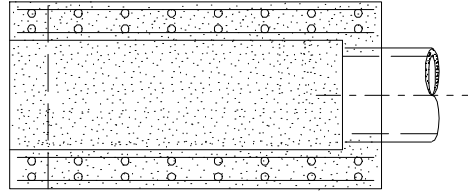
Area for computing ratio

(S) Span of Culvert (inches)	Area (A)			Culvert Width (T)		
	Double Line	Triple Line	Quadruple Line	Double Line	Triple Line	Quadruple Line
	Sq. Ft.	Sq. Ft.	Sq. Ft.	Feet	Feet	Feet
21	6.47	7.65	8.83	4.58	7.42	10.25
24	8.93	10.34	11.75	5.08	8.17	11.25
28	11.04	12.75	14.46	5.75	9.17	12.58
35	16.71	19.38	22.04	6.92	10.92	14.92
42	23.33	26.96	30.58	8.33	13.17	18.00
* 40	23.63	27.25	30.88	8.17	13.00	17.83
49	27.04	31.23	35.42	9.67	15.25	20.83
* 46	27.48	31.67	35.85	9.42	15.00	20.58
57	33.42	38.29	43.17	11.25	17.75	24.25
* 53	34.08	38.96	43.83	10.92	17.42	23.92

Area is given for one endwall.
 Double area shown if two endwalls are used.
 * 3" x 1" corrugation dimensions.

TO DETERMINE RATIO	$\frac{A}{T \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-27
 COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
 STANDARD EW-10



PLAN VIEW

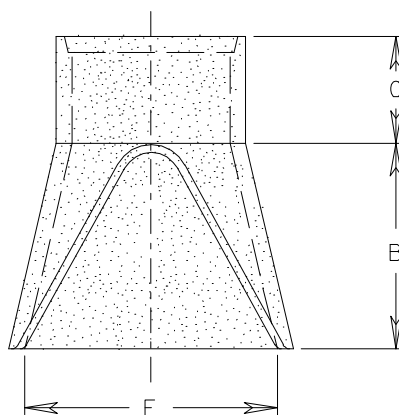


Area for computing ratio

(D) Diameter of Culvert (inches)	Area (A)		
	3:1 Slope	4:1 Slope	6:1 Slope
	Sq. Ft.	Sq. Ft.	Sq. Ft.
48	114.42	150.00	221.17
54	143.83	188.83	278.83
60	156.33	205.67	304.33

TO DETERMINE RATIO	A
	D (in feet) X Length of Culvert

TABLE D-28
COMPUTATIONS OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD EW-11



PLAN VIEW



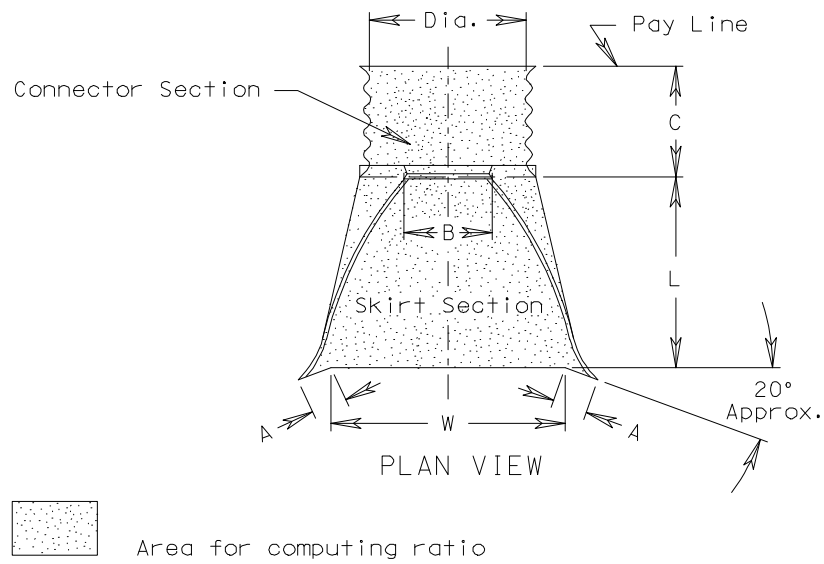
Area for computing ratio

(D) Diameter of Culvert (inches)	Area (A)
	Sq. Ft.
48	48.47
54	52.47
60	57.00

Area is given for one end section.
Double area shown if two end sections are used.

TO DETERMINE RATIO	A
	$\frac{A}{D \text{ (in feet)} \times \text{Length of Culvert}}$

TABLE D-29
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD ES-1

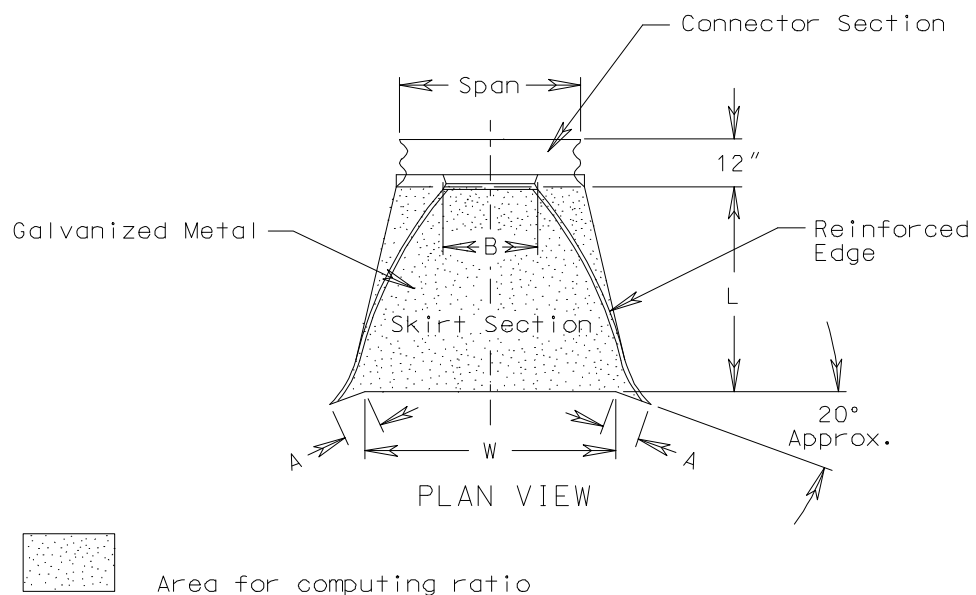


(D) Diameter of Culvert (inches)	Area (A)
	Sq. Ft.
48	53.64
54	67.84
60	76.63

Area is given for one end section.
Double area shown if two end sections are used.

TO DETERMINE RATIO	$\frac{A}{D \text{ (in feet)} \times \text{Length of Culvert}}$
-----------------------	-----------------------------------------------------------------

TABLE D-30
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD ES-2



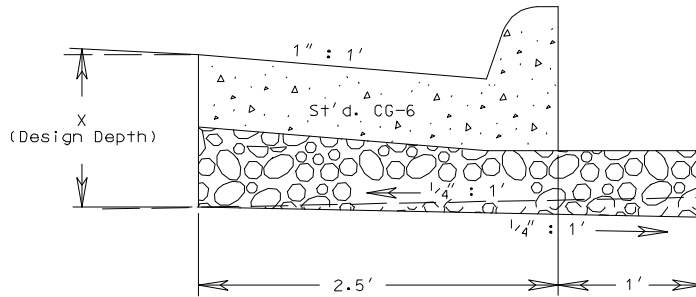
(S) Span of Culvert (inches)	Area (A)
	Sq. Ft.
46	28.31
53	37.63
60	48.03
66	59.27

(S) Span of Culvert (inches)	Area (A)
	Sq. Ft.
49	28.92
57	38.58
64	49.07
71	60.70

Area is given for one end section.
Double area shown if two end sections are used.

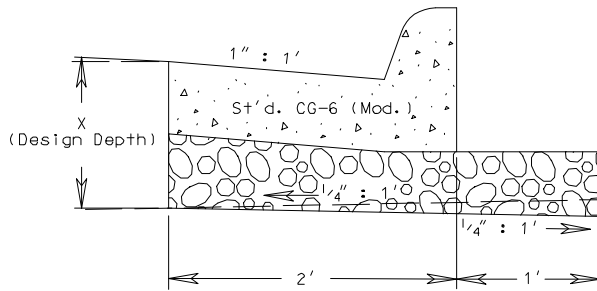
TO DETERMINE RATIO	A
	S (in feet) X Length of Culvert

TABLE D-31
COMPUTATION OF RATIOS FOR MINOR STRUCTURE EXCAVATION
STANDARD ES-3



AREA	
Normal	$= (3.5)(X) - 2.3542$
Super	$= (3.5)(X) - 2.6094$

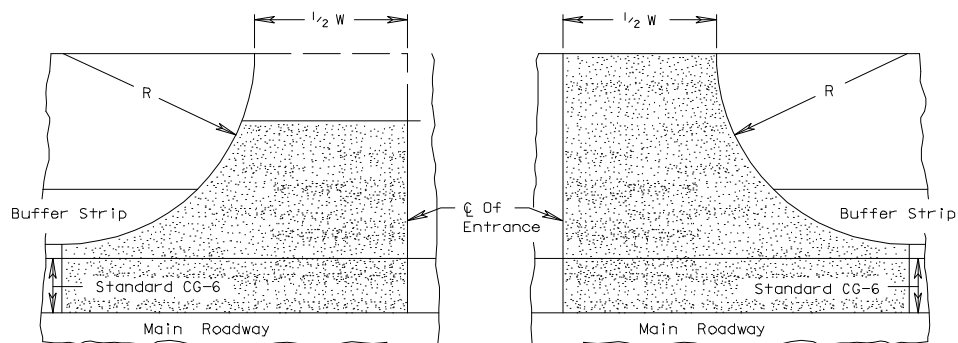
2.5' CURB AND GUTTER



AREA	
Normal	$= (3)(X) - 1.9609$
Super	$= (3)(X) - 2.1484$

2' CURB AND GUTTER

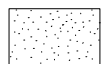
FIGURE D-2
SUBBASE END AREAS AT CURB AND GUTTER LOCATION



HALF PLAN
AREA WITHOUT SIDEWALK

HALF PLAN
AREA WITH SIDEWALK

W = Width of Entrance



Area for computing ratio

Width of Entrance (Feet)	R = 6'		R = 7'		R = 8.5'	
	2' Buffer Strip		2' Buffer Strip		3.5' Buffer Strip	
	Without Sidewalk	With 4' Sidewalk	Without Sidewalk	With 5' Sidewalk	Without Sidewalk	With 5' Sidewalk
	Sq. Yds.	Sq. Yds.	Sq. Yds.	Sq. Yds.	Sq. Yds.	Sq. Yds.
12	14.36	16.39	15.47	18.90	17.21	22.84
16	17.47	20.16	18.59	23.12	20.32	27.73
20	20.58	23.94	21.70	27.34	23.43	32.62
24	23.70	27.72	24.81	31.56	26.55	37.51
25	24.47	28.66	25.59	32.62	27.32	38.73
26	25.25	29.61	26.36	33.67	28.10	39.95
30	28.36	33.39	29.47	37.89	31.21	44.84
36	33.03	39.05	34.14	44.23	35.88	52.17
40	36.14	42.83	37.25	48.45	38.99	57.06
42	37.70	44.72	38.81	50.56	40.55	59.50
44	39.25	46.61	40.36	52.67	42.10	61.95
48	42.36	50.39	43.47	56.89	45.21	66.84
50	43.92	52.28	45.03	59.01	46.77	69.29
Each Additional Foot	0.778	0.944	0.778	1.056	0.778	1.222

TABLE D-32
AREAS FOR ENTRANCE GUTTER
STANDARD CG-9D

Manhole Size	36" I.D.			48" I.D.				60" I.D.						72" I.D.						Manhole Size								
	Pipe Size	15"	18"	21"	15"	18"	21"	24"	15"	18"	21"	24"	27"	30"	33"	36"	15"	18"	21"		24"	27"	30"	33"	36"	42"	48"	Pipe Size
15"		86°	81°	72°					133°	129°	126°	122°	116°	109°	103°	95°	142°	138°	136°	132°	128°	123°	119°	114°	104°	94°	15"	
18"			75°	65°						126°	123°	119°	112°	106°	100°	92°		136°	134°	130°	125°	121°	116°	112°	102°	92°	18"	
21"				58°							120°	116°	109°	103°	96°	89°				131°	127°	122°	118°	114°	103°	93°	21"	
24"												111°	105°	98°	92°	84°					124°	119°	114°	110°	106°	96°	85°	24"
27"													99°	92°	86°	78°						114°	110°	106°	101°	91°	81°	27"
30"														85°	79°	72°						105°	100°	96°	86°	76°	30"	
33"															73°	66°							97°	92°	82°	72°	33"	
36"																59°								87°	77°	61°	36"	
42"																								67°	57°	47°	42"	
48"																											48"	

Manhole Size	84" I.D.											96" I.D.											Manhole Size	
	Pipe Size	15"	18"	21"	24"	27"	30"	33"	36"	42"	48"	54"	15"	18"	21"	24"	27"	30"	33"	36"	42"	48"		54"
15"		147°	145°	143°	140°	136°	132°	129°	126°	118°	112°	104°	151°	149°	147°	145°	142°	138°	135°	133°	127°	122°	117°	15"
18"			143°	140°	137°	134°	129°	126°	123°	116°	110°	102°		147°	145°	143°	140°	136°	133°	131°	125°	120°	115°	18"
21"				138°	135°	132°	127°	124°	121°	113°	108°	100°			143°	141°	138°	134°	131°	129°	123°	118°	113°	21"
24"					132°	129°	124°	121°	118°	111°	105°	97°				139°	135°	132°	129°	126°	121°	116°	111°	24"
27"						125°	120°	117°	114°	107°	101°	93°					132°	129°	126°	123°	117°	112°	107°	27"
30"							116°	113°	110°	103°	97°	89°					125°	122°	120°	114°	109°	104°	30"	
33"								110°	107°	99°	93°	86°						120°	117°	111°	106°	101°	33"	
36"									103°	96°	90°	82°							114°	108°	104°	98°	36"	
42"										89°	83°	75°								103°	98°	93°	42"	
48"											76°	68°									93°	86°	48"	
54"												62°											82°	54"

INSTRUCTIONS FOR ANGLE OF DEFLECTION CHART

1. Determine angles of deflection from plans and profiles.
2. Locate pipes on vertical and horizontal scales.
3. Check angles of deflection on charts beginning with 36" going up through 96". If the angle of deflection is less than the maximum angle given in any particular chart, but greater than the previous chart, then you have determined the proper size of the manhole. In cases where there are more than two pipes in one manhole, you must analyze each pipe individually with the pipe adjacent to it. The worst angle of deflection will be the deciding factor in determining the size of the manhole.

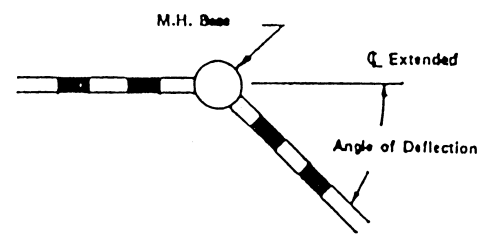
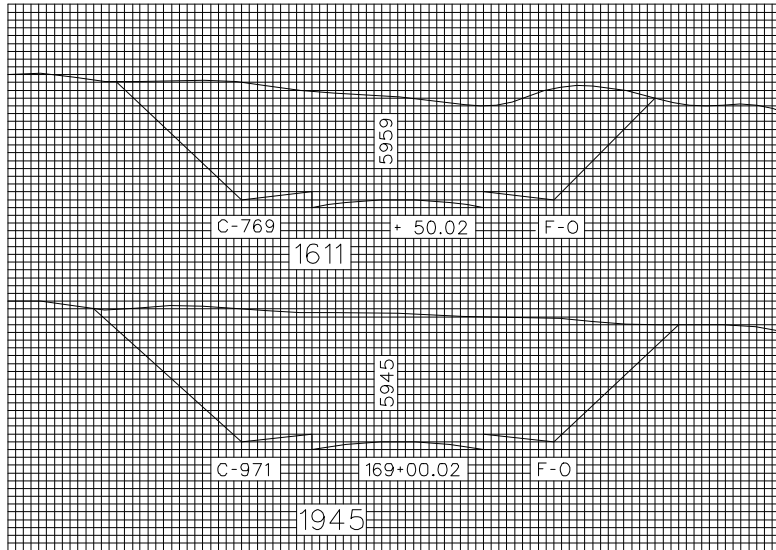


Table D-33
DETERMINING PROPER SIZE OF CIRCULAR MANHOLE

PAGES 31 THROUGH 37 HAVE BEEN OMITTED

**IN ACCORDANCE WITH THE 2001 ROAD AND BRIDGE STANDARDS
THE METHOD OF COMPUTING PIPE BEDDING IS INCLUDED IN IIM 225**



The cut area of station 163+00.02 is 971 square feet, and the area of station 169+50.02 is 769 square feet. To find the average area of the two, we would add the two and divide by two.

$$\text{Thus, } \frac{971 + 769}{2} = \frac{1740}{2} = 870 \text{ Sq. Ft. (average)}$$

Now we must find the volume of the area between the two stations. The cross section has an average of 870 square feet and there is 50 feet between stations. Therefore, 870 multiplied by 50 equals 43,500 cubic feet to be removed from between these stations.

In order to arrive at 1611 cubic yards (this is the unit used as a basis of payment in earthwork) we divide the 43,500 cubic feet by 27, since there are twenty-seven cubic feet in one cubic yard.

The formula used to determine the volume of earthwork is called the AVERAGE END AREA METHOD and is noted below. Examine it closely.

$$\text{Volume} = \frac{L (A' + A'')}{2 \times 27}$$

L = distance between stations
 A' = area of one station
 A'' = area of second station
 2 gets the average of A' & A''
 27 converts cubic feet to cubic yards

EXAMPLE

$$\text{Volume} = \frac{50 (971 + 769)}{2 \times 27} = 1611$$

FIGURE D-4
EARTHWORK QUANTITY COMPUTATIONS

**CUBIC YARDS PER 100 FEET
CORRESPONDING TO SUM OF END AREAS
Table D-42**

SUM OF END AREA	DECIMAL END AREA									
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	0.00	0.19	0.37	0.56	0.74	0.93	1.11	1.30	1.48	1.67
1	1.85	2.04	2.22	2.41	2.59	2.78	2.96	3.15	3.33	3.52
2	3.70	3.89	4.07	4.26	4.44	4.63	4.81	5.00	5.19	5.37
3	5.56	5.74	5.93	6.11	6.30	6.48	6.67	6.85	7.04	7.22
4	7.41	7.59	7.78	7.96	8.15	8.33	8.52	8.70	8.89	9.07
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
5	9.26	9.44	9.63	9.81	10.00	10.19	10.37	10.56	10.74	10.93
6	11.11	11.30	11.48	11.67	11.85	12.04	12.22	12.41	12.59	12.78
7	12.96	13.15	13.33	13.52	13.70	13.89	14.07	14.26	14.44	14.63
8	14.81	15.00	15.19	15.37	15.56	15.74	15.93	16.11	16.30	16.48
9	16.67	16.85	17.04	17.22	17.41	17.59	17.78	17.96	18.15	18.33
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
10	18.52	18.70	18.89	19.07	19.26	19.44	19.63	19.81	20.00	20.19
11	20.37	20.56	20.74	20.93	21.11	21.30	21.48	21.67	21.85	22.04
12	22.22	22.41	22.59	22.78	22.96	23.15	23.33	23.52	23.70	23.89
13	24.07	24.26	24.44	24.63	24.81	25.00	25.19	25.37	25.56	25.74
14	25.93	26.11	26.30	26.48	26.67	26.85	27.04	27.22	27.41	27.59
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
15	27.78	27.96	28.15	28.33	28.52	28.70	28.89	29.07	29.26	29.44
16	29.63	29.81	30.00	30.19	30.37	30.56	30.74	30.93	31.11	31.30
17	31.48	31.67	31.85	32.04	32.22	32.41	32.59	32.78	32.96	33.15
18	33.33	33.52	33.70	33.89	34.07	34.26	34.44	34.63	34.81	35.00
19	35.19	35.37	35.56	35.74	35.93	36.11	36.30	36.48	36.67	36.85
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
20	37.04	37.22	37.41	37.59	37.78	37.96	38.15	38.33	38.52	38.70
21	38.89	39.07	39.26	39.44	39.63	39.81	40.00	40.19	40.37	40.56
22	40.74	40.93	41.11	41.30	41.48	41.67	41.85	42.04	42.22	42.41
23	42.59	42.78	42.96	43.15	43.33	43.52	43.70	43.89	44.07	44.26
24	44.44	44.63	44.81	45.00	45.19	45.37	45.56	45.74	45.93	46.11
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
25	46.30	46.48	46.67	46.85	47.04	47.22	47.41	47.59	47.78	47.96
26	48.15	48.33	48.52	48.70	48.89	49.07	49.26	49.44	49.63	49.81
27	50.00	50.19	50.37	50.56	50.74	50.93	51.11	51.30	51.48	51.67
28	51.85	52.04	52.22	52.41	52.59	52.78	52.96	53.15	53.33	53.52
29	53.70	53.89	54.07	54.26	54.44	54.63	54.81	55.00	55.19	55.37
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
30	55.56	55.74	55.93	56.11	56.30	56.48	56.67	56.85	57.04	57.22
31	57.41	57.59	57.78	57.96	58.15	58.33	58.52	58.70	58.89	59.07
32	59.26	59.44	59.63	59.81	60.00	60.19	60.37	60.56	60.74	60.93
33	61.11	61.30	61.48	61.67	61.85	62.04	62.22	62.41	62.59	62.78
34	62.96	63.15	63.33	63.52	63.70	63.89	64.07	64.26	64.44	64.63
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
35	64.81	65.00	65.19	65.37	65.56	65.74	65.93	66.11	66.30	66.48
36	66.67	66.85	67.04	67.22	67.41	67.59	67.78	67.96	68.15	68.33
37	68.52	68.70	68.89	69.07	69.26	69.44	69.63	69.81	70.00	70.19
38	70.37	70.56	70.74	70.93	71.11	71.30	71.48	71.67	71.85	72.04
39	72.22	72.41	72.59	72.78	72.96	73.15	73.33	73.52	73.70	73.89
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
40	74.07	74.26	74.44	74.63	74.81	75.00	75.19	75.37	75.56	75.74
41	75.93	76.11	76.30	76.48	76.67	76.85	77.04	77.22	77.41	77.59
42	77.78	77.96	78.15	78.33	78.52	78.70	78.89	79.07	79.26	79.44
43	79.63	79.81	80.00	80.19	80.37	80.56	80.74	80.93	81.11	81.30
44	81.48	81.67	81.85	82.04	82.22	82.41	82.59	82.78	82.96	83.15
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
45	83.33	83.52	83.70	83.89	84.07	84.26	84.44	84.63	84.81	85.00
46	85.19	85.37	85.56	85.74	85.93	86.11	86.30	86.48	86.67	86.85
47	87.04	87.22	87.41	87.59	87.78	87.96	88.15	88.33	88.52	88.70
48	88.89	89.07	89.26	89.44	89.63	89.81	90.00	90.19	90.37	90.56
49	90.74	90.93	91.11	91.30	91.48	91.67	91.85	92.04	92.22	92.41
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
50	92.59	92.78	92.96	93.15	93.33	93.52	93.70	93.89	94.07	94.26

**CUBIC YARDS PER 100 FEET
CORRESPONDING TO SUM OF END AREAS
Table D-43**

SUM OF END AREA	DECIMAL END AREA									
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
50	92.59	92.78	92.96	93.15	93.33	93.52	93.70	93.89	94.07	94.26
51	94.44	94.63	94.81	95.00	95.19	95.37	95.56	95.74	95.93	96.11
52	96.30	96.48	96.67	96.85	97.04	97.22	97.41	97.59	97.78	97.96
53	98.15	98.33	98.52	98.70	98.89	99.07	99.26	99.44	99.63	99.81
54	100.00	100.19	100.37	100.56	100.74	100.93	101.11	101.30	101.48	101.67
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
55	101.85	102.04	102.22	102.41	102.59	102.78	102.96	103.15	103.33	103.52
56	103.70	103.89	104.07	104.26	104.44	104.63	104.81	105.00	105.19	105.37
57	105.56	105.74	105.93	106.11	106.30	106.48	106.67	106.85	107.04	107.22
58	107.41	107.59	107.78	107.96	108.15	108.33	108.52	108.70	108.89	109.07
59	109.26	109.44	109.63	109.81	110.00	110.19	110.37	110.56	110.74	110.93
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
60	111.11	111.30	111.48	111.67	111.85	112.04	112.22	112.41	112.59	112.78
61	112.96	113.15	113.33	113.52	113.70	113.89	114.07	114.26	114.44	114.63
62	114.81	115.00	115.19	115.37	115.56	115.74	115.93	116.11	116.30	116.48
63	116.67	116.85	117.04	117.22	117.41	117.59	117.78	117.96	118.15	118.33
64	118.52	118.70	118.89	119.07	119.26	119.44	119.63	119.81	120.00	120.19
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
65	120.37	120.56	120.74	120.93	121.11	121.30	121.48	121.67	121.85	122.04
66	122.22	122.41	122.59	122.78	122.96	123.15	123.33	123.52	123.70	123.89
67	124.07	124.26	124.44	124.63	124.81	125.00	125.19	125.37	125.56	125.74
68	125.93	126.11	126.30	126.48	126.67	126.85	127.04	127.22	127.41	127.59
69	127.78	127.96	128.15	128.33	128.52	128.70	128.89	129.07	129.26	129.44
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
70	129.63	129.81	130.00	130.19	130.37	130.56	130.74	130.93	131.11	131.30
71	131.48	131.67	131.85	132.04	132.22	132.41	132.59	132.78	132.96	133.15
72	133.33	133.52	133.70	133.89	134.07	134.26	134.44	134.63	134.81	135.00
73	135.19	135.37	135.56	135.74	135.93	136.11	136.30	136.48	136.67	136.85
74	137.04	137.22	137.41	137.59	137.78	137.96	138.15	138.33	138.52	138.70
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
75	138.89	139.07	139.26	139.44	139.63	139.81	140.00	140.19	140.37	140.56
76	140.74	140.93	141.11	141.30	141.48	141.67	141.85	142.04	142.22	142.41
77	142.59	142.78	142.96	143.15	143.33	143.52	143.70	143.89	144.07	144.26
78	144.44	144.63	144.81	145.00	145.19	145.37	145.56	145.74	145.93	146.11
79	146.30	146.48	146.67	146.85	147.04	147.22	147.41	147.59	147.78	147.96
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
80	148.15	148.33	148.52	148.70	148.89	149.07	149.26	149.44	149.63	149.81
81	150.00	150.19	150.37	150.56	150.74	150.93	151.11	151.30	151.48	151.67
82	151.85	152.04	152.22	152.41	152.59	152.78	152.96	153.15	153.33	153.52
83	153.70	153.89	154.07	154.26	154.44	154.63	154.81	155.00	155.19	155.37
84	155.56	155.74	155.93	156.11	156.30	156.48	156.67	156.85	157.04	157.22
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
85	157.41	157.59	157.78	157.96	158.15	158.33	158.52	158.70	158.89	159.07
86	159.26	159.44	159.63	159.81	160.00	160.19	160.37	160.56	160.74	160.93
87	161.11	161.30	161.48	161.67	161.85	162.04	162.22	162.41	162.59	162.78
88	162.96	163.15	163.33	163.52	163.70	163.89	164.07	164.26	164.44	164.63
89	164.81	165.00	165.19	165.37	165.56	165.74	165.93	166.11	166.30	166.48
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
90	166.67	166.85	167.04	167.22	167.41	167.59	167.78	167.96	168.15	168.33
91	168.52	168.70	168.89	169.07	169.26	169.44	169.63	169.81	170.00	170.19
92	170.37	170.56	170.74	170.93	171.11	171.30	171.48	171.67	171.85	172.04
93	172.22	172.41	172.59	172.78	172.96	173.15	173.33	173.52	173.70	173.89
94	174.07	174.26	174.44	174.63	174.81	175.00	175.19	175.37	175.56	175.74
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
95	175.93	176.11	176.30	176.48	176.67	176.85	177.04	177.22	177.41	177.59
96	177.78	177.96	178.15	178.33	178.52	178.70	178.89	179.07	179.26	179.44
97	179.63	179.81	180.00	180.19	180.37	180.56	180.74	180.93	181.11	181.30
98	181.48	181.67	181.85	182.04	182.22	182.41	182.59	182.78	182.96	183.15
99	183.33	183.52	183.70	183.89	184.07	184.26	184.44	184.63	184.81	185.00
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
100	185.19	185.37	185.56	185.74	185.93	186.11	186.30	186.48	186.67	186.85