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CULVERT SIZE DIAMETER (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
12	1.59	0.79	1.06	1.59	1.50	0.75	1.00	1.50
15	2.49	1.24	1.66	2.49	2.34	1.17	1.56	2.34
18	3.61	1.81	2.41	3.61	3.39	1.69	2.26	3.39
24	6.39	3.19	4.26	6.39	6.00	3.00	4.00	6.00
30	9.97	4.99	6.65	9.97	9.37	4.69	6.25	9.37
36	21.18	10.59	14.12	21.18	19.97	9.98	13.31	19.97
42	28.55	14.27	19.03	28.55	26.91	13.46	17.94	26.91
48	36.93	18.47	24.62	36.93	34.80	17.40	23.20	34.80
54	46.53	23.27	31.02	46.53	43.82	21.91	29.21	43.82
60	57.23	28.61	38.15	57.23	53.24	26.62	35.49	53.24

TABLE D-1 CULVERT OUTLET PROTECTION WITH ST'D. ES-1 END SECTIONS

CULVERT SIZE DIAMETER (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
12	1.78	0.89	1.19	1.78	1.69	0.85	1.13	1.69
15	2.77	1.39	1.85	2.77	2.62	1.31	1.75	2.62
18	3.99	1.99	2.66	3.99	3.76	1.88	2.51	3.76
24	7.05	3.52	4.70	7.05	6.64	3.32	4.43	6.64
30	10.96	5.48	7.31	10.96	10.35	5.17	6.90	10.35
36	22.56	11.28	15.04	22.56	21.33	10.67	14.22	21.33
42	30.69	15.35	20.46	30.69	29.01	14.51	19.34	29.01
48	39.68	19.84	26.45	39.68	37.47	18.74	24.98	37.47
54	49.98	24.99	33.32	49.98	47.21	23.60	31.47	47.21
60	61.53	30.77	41.02	61.53	57.45	28.73	38.30	57.45

TABLE D-2 CULVERT OUTLET PROTECTION WITH ST'D. ES-2 END SECTIONS*

* Rev. 7/08

PIPE ARCH SPAN RISE (in)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
17 x 13	2.73	1.36	1.82	2.73	2.59	1.30	1.73	2.59
21 x 15	3.93	1.96	2.62	3.93	3.67	1.84	2.45	3.67
24 x 18	8.34	4.17	5.56	8.34	4.99	2.50	3.33	4.99
28 x 20	6.97	3.49	4.65	6.97	6.51	3.25	4.34	6.51
35 x 24	10.59	5.29	7.06	10.59	9.88	4.94	6.59	9.88
42 x 29	24.74	12.37	16.49	24.74	23.27	11.63	15.51	23.27
49 x 33	33.14	16.57	22.09	33.14	31.14	15.57	20.76	31.14
57 x 38	44.43	22.22	29.62	44.43	41.73	20.87	27.82	41.73
64 x 43	56.52	28.26	37.68	56.52	53.12	26.56	35.41	53.12
71 x 47	69.42	34.71	46.28	69.42	65.24	32.62	43.49	65.24

TABLE D-3 CULVERT OUTLET PROTECTION WITH ST'D. ES-3 END SECTIONS*

* Rev. 7/08

CULVERT SIZE DIAMETER (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
12	1.09	0.55	0.73	1.09	1.03	0.52	0.69	1.03
15	1.71	0.85	1.14	1.71	1.62	0.81	1.08	1.62
18	2.47	1.24	1.65	2.47	2.34	1.17	1.56	2.34
24	4.39	2.20	2.93	4.39	4.17	2.08	2.78	4.17
30	6.88	3.44	4.59	6.88	6.54	3.27	4.36	6.54
36	16.76	8.38	11.17	16.76	15.93	7.97	10.62	15.93

TABLE D-4 CULVERT OUTLET PROTECTION WITH ST'D. EW-1 ENDWALLS

CULVERT SIZE DIAMETER (in.)	Increments For Each Additional Pipe							
	EC-3 Type B		Depth (T) (18") Class A1		Depth (T) (24") Class I		Depth (T) (36") Class II	
	Conc.	C. M.	Conc.	C. M.	Conc.	C. M.	Conc.	C. M.
	Sq. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
12	0.52	0.45	0.26	0.22	0.35	0.30	0.52	0.45
15	0.81	0.70	0.40	0.35	0.54	0.47	0.81	0.70
18	1.18	1.03	0.59	0.51	0.79	0.69	1.18	1.03
24	2.07	1.83	1.03	0.91	1.38	1.22	2.07	1.83
30	3.25	2.88	1.63	1.44	2.17	1.92	3.25	2.88
36	6.74	5.53	3.37	3.43	4.49	4.13	6.74	5.33

TABLE D-5 CULVERT OUTLET PROTECTION WITH ST'D. EW-6 ENDWALLS*

* Rev. 7/08

ELLIPTICAL PIPE SPAN RISE (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18") Class A1	Depth (T) (24") Class I	Depth (T) (36") Class II	EC-3 Type B	Depth (T) (18") Class A1	Depth (T) (24") Class I	Depth (T) (36") Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
23 x 14	2.43	1.21	1.62	2.43	2.31	1.15	1.54	2.31
30 x 19	4.35	2.17	2.90	4.35	4.12	2.06	2.75	4.12
34 x 22	5.71	2.85	3.81	5.71	5.41	2.71	3.61	5.41
38 x 24	6.94	3.47	4.63	6.94	6.60	3.30	4.40	6.60
42 x 27	8.67	4.33	5.78	8.67	8.25	4.12	5.49	8.23
45 x 29	9.97	4.99	6.65	9.97	9.46	4.73	6.31	9.46
49 x 32	12.01	6.00	8.01	12.01	11.40	5.70	7.60	11.40
53 x 34	13.78	6.89	9.19	13.78	13.09	6.55	8.73	13.09

**TABLE D-6 CULVERT OUTLET PROTECTION WITH ST'D. EW-2S AND EW-7S
ENDWALLS (30° SKEW)***

* Rev. 7/08

CULVERT SIZE DIAMETER (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
42	25.46	12.73	16.97	25.46	23.91	11.96	15.94	23.91
48	33.29	16.64	22.19	33.29	31.25	15.62	20.83	31.25
54	42.02	21.01	28.01	42.02	39.56	19.78	26.37	39.56
60	52.04	26.02	34.69	52.04	48.20	24.10	32.13	48.20
66	63.29	31.64	42.19	63.29	59.15	29.57	39.43	59.15
72	75.03	37.52	50.02	75.03	70.41	35.21	46.94	70.41
78	88.08	44.04	58.72	88.08	82.67	41.33	55.11	82.67
84	102.17	51.08	68.11	102.17	95.90	47.95	63.93	95.90

**TABLE D-7 CULVERT OUTLET PROTECTION WITH ST'D. EW-2 ENDWALLS
(30° SKEW)**

CULVERT SIZE DIAMETER (in.)	Increments For Each Additional Pipe			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II
	Conc.	Conc.	Conc.	Conc.
Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	
42	11.67	5.83	7.78	11.67
48	15.17	7.58	10.11	15.17
54	19.17	9.58	12.78	19.17
60	23.60	11.80	15.73	23.60
66	28.51	14.26	19.01	28.51
72	33.90	16.95	22.60	33.90
78	39.71	19.86	26.48	39.71
84	46.01	23.01	30.68	46.01

**TABLE D-8 CULVERT OUTLET PROTECTION WITH ST'D. EW-7 ENDWALLS
(30° SKEW)***

* Rev. 7/08

CULVERT SIZE DIAMETER (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
42	26.09	13.04	17.39	26.09	24.54	12.27	16.36	24.54
48	34.11	17.06	22.74	34.11	32.07	16.04	21.38	32.07
54	43.20	21.60	28.80	43.20	40.61	20.30	27.07	40.61
60	53.34	26.67	35.56	53.34	49.50	24.75	33.00	49.50
66	64.85	32.42	43.23	64.85	60.71	30.35	40.47	60.71
72	76.89	38.45	51.26	76.89	72.27	36.14	48.18	72.27
78	90.27	45.14	60.18	90.27	70.83	35.42	47.22	70.83
84	104.70	52.35	69.80	104.70	98.42	49.21	65.61	98.42

**TABLE D-9 CULVERT OUTLET PROTECTION WITH ST'D. EW-2S ENDWALLS
(30° SKEW)**

CULVERT SIZE DIAMETER (in.)	Increments For Each Additional Pipe			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
	Class A1	Class I	Class I	Class II
	Conc.	Conc.	Conc.	Conc.
Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	
42	13.46	6.73	8.98	13.46
48	17.50	8.75	11.66	17.50
54	22.15	11.06	14.76	22.15
60	27.25	13.61	18.17	27.25
66	32.95	16.46	21.96	32.95
72	39.15	19.56	26.10	39.15
78	45.85	22.91	30.57	45.85
84	53.15	26.56	35.43	53.15

**TABLE D-10 CULVERT OUTLET PROTECTION WITH ST'D. EW-7S ENDWALLS
(30° SKEW)***

* Rev. 7/08

CULVERT SIZE DIAMETER (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
42	28.80	14.40	19.20	28.80	27.65	13.82	18.43	27.65
48	37.64	18.82	25.09	37.64	36.12	18.06	24.08	36.12
54	47.64	23.82	31.76	47.64	45.71	22.85	30.47	45.71
60	58.80	29.40	39.20	58.80	55.77	27.89	37.18	55.77
66	71.12	35.56	47.41	71.12	68.30	34.15	45.53	68.30
72	84.71	42.35	56.47	84.71	81.29	40.64	54.19	81.29
78	99.41	49.70	66.27	99.41	95.39	47.69	63.59	95.39
84	115.29	57.65	76.86	115.29	110.63	55.31	73.75	110.63

**TABLE D-11 CULVERT OUTLET PROTECTION WITH ST'D. EW-2S ENDWALLS
(45° SKEW)**

CULVERT SIZE DIAMETER (in.)	Increments For Each Additional Pipe			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II
	Conc.	Conc.	Conc.	Conc.
Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	
42	12.63	6.32	8.42	12.63
48	16.44	8.22	10.96	16.44
54	20.78	10.39	13.85	20.78
60	25.58	12.79	17.05	25.58
66	30.92	15.46	20.61	30.92
72	36.75	18.38	24.50	36.75
78	43.10	21.55	28.73	43.10
84	49.94	24.97	33.29	49.94

**TABLE D-12 CULVERT OUTLET PROTECTION WITH ST'D. EW-7S ENDWALLS
(45° SKEW)***

* Rev. 7/08

ELLIPTICAL PIPE SPAN RISE (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18") Class A1	Depth (T) (24") Class I	Depth (T) (36") Class II	EC-3 Type B	Depth (T) (18") Class A1	Depth (T) (24") Class I	Depth (T) (36") Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
60 x 38	29.10	14.55	19.40	29.10	26.39	13.19	17.59	26.39
68 x 43	37.95	18.98	25.30	37.95	34.52	17.26	23.01	34.52
76 x 48	47.31	23.66	31.54	47.31	42.99	21.50	28.66	42.99
83 x 53	57.03	28.52	38.02	57.03	51.86	25.93	34.57	51.86
91 x 58	68.34	34.17	45.56	68.34	62.07	31.04	41.38	62.07
98 x 63	80.82	40.41	53.88	80.82	72.66	36.33	48.44	72.66
106 x 68	93.35	46.67	62.23	93.35	84.74	42.37	56.49	84.74

TABLE D-13 CULVERT OUTLET PROTECTION WITH ST'D. EW-2A ENDWALLS*

* Rev. 7/08

PIPE ARCH Span Riser (in.)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
17 x 13	1.68	0.84	1.12	1.68	1.59	0.79	1.06	1.59
21 x 15	2.40	1.20	1.60	2.40	2.28	1.14	1.52	2.28
24 x 18	3.30	1.65	2.20	3.30	3.13	1.57	2.09	3.13
28 x 20	4.29	2.14	2.86	4.29	4.06	2.03	2.71	4.06
35 x 24	6.40	3.20	4.27	6.40	6.07	3.04	4.05	6.07
42 x 29	9.30	4.65	6.20	9.30	8.83	4.42	5.89	8.83
49 x 33	12.40	6.20	8.27	12.40	11.77	5.89	7.85	11.77
57 x 38	24.33	12.11	16.15	24.33	23.03	11.51	15.35	23.03

TABLE D-14 CULVERT OUTLET PROTECTION WITH ST'D. EW-9 PIPE ARCHES

PIPE ARCH Span Riser (in.)	Increments For Each Additional Pipe			
	EC-3 Type B	Depth (T) (18") Class A1	Depth (T) (24") Class I	Depth (T) (36") Class II
	Conc.	Conc.	Conc.	Conc.
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
17 x 13	0.78	0.39	0.52	0.78
21 x 15	1.05	0.52	0.70	1.05
24 x 18	1.38	0.69	0.92	1.38
28 x 20	1.71	0.85	1.14	1.71
35 x 24	2.37	1.18	1.58	2.37
42 x 29	3.49	1.75	2.33	3.49
49 x 33	4.65	2.32	3.10	4.65
57 x 38	11.33	5.66	7.55	11.33

TABLE D-15 CULVERT OUTLET PROTECTION WITH ST'D. EW-10 PIPE ARCHES*

* Rev. 7/08

CULVERT SIZE (FEET) SPAN X RISE	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	21.12	10.56	14.08	21.12	20.39	10.19	13.59	20.39
3 x 4	28.71	14.36	19.14	28.71	28.26	14.13	18.84	28.26
4 x 3	28.49	14.24	18.99	28.49	26.85	13.43	17.90	26.85
4 x 4	37.61	18.80	25.07	37.61	36.41	18.20	24.27	36.41
4 x 5	47.66	23.83	31.77	47.66	46.86	23.43	31.24	46.86
4 x 6	58.01	29.00	38.67	58.01	58.34	29.17	38.89	58.34
5 x 3	36.62	18.31	24.41	36.62	33.95	16.97	22.63	33.95
5 x 4	47.25	23.63	31.50	47.25	44.78	22.39	29.85	44.78
5 x 5	58.82	29.41	39.21	58.82	56.72	28.36	37.81	56.72
5 x 6	70.86	35.43	47.24	70.86	69.62	34.81	46.41	69.62
5 x 7	84.08	42.04	56.05	84.08	83.45	41.72	55.63	83.45
6 x 4	57.68	28.84	38.45	57.68	53.93	26.96	35.95	53.93
6 x 5	70.74	35.37	47.16	70.74	67.20	33.60	44.80	67.20
6 x 6	84.50	42.25	56.33	84.50	81.54	40.77	54.36	81.54
6 x 7	97.89	48.95	65.26	97.89	96.83	48.41	64.55	96.83
6 x 8	114.17	57.08	76.11	114.17	113.04	56.52	75.36	113.04
7 x 4	68.82	34.41	45.88	68.82	63.77	31.88	42.51	63.77
7 x 6	98.96	49.48	65.97	98.96	94.10	47.05	62.73	94.10
7 x 8	132.47	66.23	88.31	132.47	128.49	64.25	85.66	128.49
7 x 10	167.46	83.73	111.64	167.46	165.53	82.76	110.35	165.53
8 x 4	80.73	40.37	53.82	80.73	74.30	37.15	49.53	74.30
8 x 6	114.09	57.05	76.06	114.09	107.36	53.68	71.57	107.36
8 x 8	150.47	75.23	100.31	150.47	145.11	72.56	96.74	145.11
8 x 10	189.00	94.50	126.00	189.00	174.18	87.09	116.12	174.18
9 x 4	93.39	46.70	62.26	93.39	85.47	42.74	56.98	85.47
9 x 6	130.17	65.09	86.78	130.17	121.41	60.71	80.94	121.41
9 x 8	163.32	81.66	108.88	163.32	161.72	80.86	107.81	161.72
9 x 10	211.31	105.65	140.87	211.31	217.35	108.68	144.90	217.35
9 x 12	256.28	128.14	170.85	256.28	293.36	146.68	195.57	293.36
10 x 4	106.83	53.42	71.22	106.83	97.31	48.65	64.87	97.31
10 x 6	147.00	73.50	98.00	147.00	136.13	68.06	90.75	136.13
10 x 8	189.03	94.52	126.02	189.03	179.00	89.50	119.33	179.00
10 x 10	234.86	117.43	156.57	234.86	226.31	113.15	150.87	226.31
10 x 12	283.50	141.75	189.00	283.50	277.40	138.70	184.93	277.40
12 x 6	182.09	91.04	121.39	182.09	168.32	84.16	112.21	168.32
12 x 8	231.05	115.52	154.03	231.05	215.67	107.84	143.78	215.67
12 x 10	283.01	141.50	188.67	283.01	268.80	134.40	179.20	268.80
12 x 12	338.57	169.28	225.71	338.57	326.13	163.07	217.42	326.13

**TABLE D-16 CULVERT OUTLET PROTECTION FOR BOX CULVERT ST'D BCS-02
THRU BCS-50 (NO SKEW)***

* Rev. 7/08

CULVERT SIZE (FEET) SPAN X RISE	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	21.23	10.61	14.15	21.23	20.49	10.25	13.66	20.49
3 x 4	28.86	14.43	19.24	28.86	28.40	14.20	18.93	28.40
4 x 3	28.62	14.31	19.08	28.62	27.00	13.50	18.00	27.00
4 x 4	37.80	18.90	25.20	37.80	36.59	18.29	24.39	36.59
4 x 5	47.90	23.95	31.93	47.90	47.13	23.57	31.42	47.13
4 x 6	58.29	29.15	38.86	58.29	58.62	29.31	39.08	58.62
5 x 3	36.50	18.25	24.33	36.50	34.13	17.06	22.75	34.13
5 x 4	47.48	23.74	31.65	47.48	45.00	22.50	30.00	45.00
5 x 5	59.12	29.56	39.41	59.12	57.02	28.51	38.01	57.02
5 x 6	71.21	35.60	47.47	71.21	69.96	34.98	46.64	69.96
5 x 7	84.50	42.25	56.33	84.50	83.87	41.93	55.91	83.87
6 x 4	57.96	28.98	38.64	57.96	54.21	27.11	36.14	54.21
6 x 5	71.10	35.55	47.40	71.10	67.56	33.78	45.04	67.56
6 x 6	84.93	42.47	56.62	84.93	81.98	40.99	54.65	81.98
6 x 7	98.39	49.19	65.59	98.39	97.32	48.66	64.88	97.32
6 x 8	114.72	57.36	76.48	114.72	113.61	56.81	75.74	113.61
7 x 4	69.17	34.58	46.11	69.17	64.10	32.05	42.73	64.10
7 x 6	99.45	49.73	66.30	99.45	30.18	15.09	20.12	30.18
7 x 8	197.39	98.69	131.59	197.39	129.15	64.58	86.10	129.15
7 x 10	168.27	84.14	112.18	168.27	166.35	83.18	110.90	166.35
8 x 4	81.11	40.55	54.07	81.11	74.67	37.34	49.78	74.67
8 x 6	114.65	57.32	76.43	114.65	107.91	53.96	71.94	107.91
8 x 8	151.22	75.61	100.81	151.22	145.86	72.93	97.24	145.86
8 x 10	189.95	94.97	126.63	189.95	175.11	87.56	116.74	175.11
9 x 4	93.83	46.91	62.55	93.83	85.89	42.95	57.26	85.89
9 x 6	130.80	65.40	87.20	130.80	122.04	61.02	81.36	122.04
9 x 8	164.18	82.09	109.45	164.18	162.57	81.29	108.38	162.57
9 x 10	212.37	106.19	141.58	212.37	218.42	109.21	145.61	218.42
9 x 12	257.54	128.77	171.69	257.54	294.63	147.32	196.42	294.63
10 x 4	107.30	53.65	71.53	107.30	97.77	48.89	65.18	97.77
10 x 6	147.71	73.85	98.47	147.71	136.83	68.42	91.22	136.83
10 x 8	189.98	94.99	126.65	189.98	179.93	89.96	119.95	179.93
10 x 10	236.03	118.01	157.35	236.03	227.48	113.74	151.65	227.48
10 x 12	284.91	142.46	189.94	284.91	278.81	139.40	185.87	278.81
12 x 6	182.94	91.47	121.96	182.94	169.17	84.59	112.78	169.17
12 x 8	232.17	116.09	154.78	232.17	216.80	108.40	144.53	216.80
12 x 10	284.42	142.21	189.61	284.42	270.21	135.11	180.14	270.21
12 x 12	340.26	170.13	226.84	340.26	327.83	163.91	218.55	327.83

**TABLE D-17 CULVERT OUTLET PROTECTION FOR BOX CULVERT ST'D BCS-02
THRU BCS-50 (15° SKEW)***

* Rev. 7/08

CULVERT SIZE (FEET)	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	SPAN X RISE	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	21.69	10.85	14.46	21.69	21.03	10.52	14.02	21.03
3 x 4	29.61	14.81	19.74	29.61	29.40	14.70	19.60	29.40
4 x 3	29.07	14.54	19.38	29.07	27.48	13.74	18.32	27.48
4 x 4	38.67	19.34	25.78	38.67	37.59	18.80	25.06	37.59
4 x 5	49.22	24.61	32.81	49.22	48.87	24.44	32.58	48.87
4 x 6	60.56	30.28	40.37	60.56	61.35	30.68	40.90	61.35
5 x 3	37.22	18.61	24.81	37.22	34.55	17.27	23.03	34.55
5 x 4	48.27	24.14	32.18	48.27	45.90	22.95	30.60	45.90
5 x 5	60.39	30.20	40.26	60.39	62.21	31.10	41.47	62.21
5 x 6	73.35	36.68	48.90	73.35	72.50	36.25	48.33	72.50
5 x 7	87.30	43.65	58.20	87.30	87.38	43.69	58.25	87.38
6 x 4	58.77	29.39	39.18	58.77	55.04	27.52	36.69	55.04
6 x 5	72.35	36.17	48.23	72.35	69.00	34.50	46.00	69.00
6 x 6	86.93	43.46	57.95	86.93	84.30	42.15	56.20	84.30
6 x 7	100.83	50.42	67.22	100.83	100.64	50.32	67.09	100.64
6 x 8	118.52	59.26	79.01	118.52	118.22	59.11	78.81	118.22
7 x 4	84.98	42.49	56.65	84.98	64.86	32.43	43.24	64.86
7 x 6	101.27	50.63	67.51	101.27	96.74	48.37	64.49	96.74
7 x 8	136.32	68.16	90.88	136.32	133.52	66.76	89.01	133.52
7 x 10	174.42	87.21	116.28	174.42	174.21	87.11	116.14	174.21
8 x 4	81.96	40.98	54.64	81.96	75.36	37.68	50.24	75.36
8 x 6	116.39	58.19	77.59	116.39	109.85	54.92	73.23	109.85
8 x 8	154.32	77.16	102.88	154.32	150.05	75.02	100.03	150.05
8 x 10	196.26	98.13	130.84	196.26	182.82	91.41	121.88	182.82
9 x 4	94.68	47.34	63.12	94.68	86.52	43.26	57.68	86.52
9 x 6	132.45	66.23	88.30	132.45	123.81	61.91	82.54	123.81
9 x 8	167.51	83.75	111.67	167.51	166.50	83.25	111.00	166.50
9 x 10	218.42	109.21	145.61	218.42	225.68	112.84	150.45	225.68
9 x 12	266.64	133.32	177.76	266.64	305.79	152.90	203.86	305.79
10 x 4	108.18	54.09	72.12	108.18	98.34	49.17	65.56	98.34
10 x 6	149.27	74.63	99.51	149.27	138.45	69.23	92.30	138.45
10 x 8	193.16	96.58	128.77	193.16	183.66	91.83	122.44	183.66
10 x 10	241.77	120.89	161.18	241.77	234.47	117.23	156.31	234.47
10 x 12	293.69	146.84	195.79	293.69	289.74	144.87	193.16	289.74
12 x 6	184.10	92.05	122.73	184.10	170.30	85.15	113.53	170.30
12 x 8	235.04	117.52	156.69	235.04	219.90	109.95	146.60	219.90
12 x 10	289.53	144.77	193.02	289.53	276.30	138.15	184.20	276.30
12 x 12	348.38	174.19	232.25	348.38	337.88	168.94	225.25	337.88

**TABLE D-18 CULVERT OUTLET PROTECTION FOR BOX CULVERT ST'D BCS-02
THRU BCS-50 (30° SKEW)***

* Rev. 7/08

CULVERT SIZE (FEET) SPAN X RISE	1 ½ : 1 Slope				2 : 1 Slope			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	22.46	11.23	14.97	22.46	21.80	10.90	14.53	21.80
3 x 4	30.65	15.32	20.43	30.65	30.44	15.22	20.29	30.44
4 x 3	30.11	15.05	20.07	30.11	28.52	14.26	19.01	28.52
4 x 4	40.05	20.03	26.70	40.05	38.97	19.49	25.98	38.97
4 x 5	50.96	25.48	33.97	50.96	50.60	25.30	33.73	50.60
4 x 6	62.64	31.32	41.76	62.64	63.42	31.71	42.28	63.42
5 x 3	38.51	19.25	25.67	38.51	35.85	17.93	23.90	35.85
5 x 4	50.01	25.01	33.34	50.01	47.63	23.81	31.75	47.63
5 x 5	62.57	31.28	41.71	62.57	60.77	30.38	40.51	60.77
5 x 6	75.95	37.97	50.63	75.95	75.09	37.55	50.06	75.09
5 x 7	90.33	45.17	60.22	90.33	90.41	45.20	60.27	90.41
6 x 4	60.86	30.43	40.57	60.86	57.11	28.55	38.07	57.11
6 x 5	74.94	37.47	49.96	74.94	71.60	35.80	47.73	71.60
6 x 6	90.03	45.02	60.02	90.03	87.42	43.71	58.28	87.42
6 x 7	104.73	52.37	69.82	104.73	104.27	52.13	69.51	104.27
6 x 8	122.67	61.34	81.78	122.67	122.37	61.19	81.58	122.37
7 x 4	72.39	36.20	48.26	72.39	67.28	33.64	44.85	67.28
7 x 6	104.90	52.45	69.93	104.90	100.37	50.18	66.91	100.37
7 x 8	141.17	70.58	94.11	141.17	138.36	69.18	92.24	138.36
7 x 10	180.48	90.24	120.32	180.48	180.26	90.13	120.17	180.26
8 x 4	84.72	42.36	56.48	84.72	78.14	39.07	52.09	78.14
8 x 6	120.54	60.27	80.36	120.54	114.00	57.00	76.00	114.00
8 x 8	160.23	80.12	106.82	160.23	155.63	77.81	103.75	155.63
8 x 10	203.22	101.61	135.48	203.22	189.74	94.87	126.49	189.74
9 x 4	97.80	48.90	65.20	97.80	89.64	44.82	59.76	89.64
9 x 6	137.13	68.57	91.42	137.13	128.49	64.25	85.66	128.49
9 x 8	173.73	86.87	115.82	173.73	172.73	86.36	115.15	172.73
9 x 10	226.20	113.10	150.80	226.20	233.46	116.73	155.64	233.46
9 x 12	275.97	137.99	183.98	275.97	315.14	157.57	210.09	315.14
10 x 4	111.65	55.82	74.43	111.65	101.81	50.90	67.87	101.81
10 x 6	154.46	77.23	102.97	154.46	143.64	71.82	95.76	143.64
10 x 8	200.07	100.04	133.38	200.07	190.59	95.30	127.06	190.59
10 x 10	250.41	125.21	166.94	250.41	243.12	121.56	162.08	243.12
10 x 12	304.07	152.03	202.71	304.07	300.12	150.06	200.08	300.12
12 x 6	190.32	95.16	126.88	190.32	176.52	88.26	117.68	176.52
12 x 8	243.35	121.67	162.23	243.35	228.20	114.10	152.13	228.20
12 x 10	299.91	149.96	199.94	299.91	286.68	143.34	191.12	286.68
12 x 12	360.83	180.41	240.55	360.83	350.34	175.17	233.56	350.34

TABLE D-19 CULVERT OUTLET PROTECTION FOR BOX CULVERT ST'D BCS-02 THRU BCS-50 (45° SKEW)*

* Rev. 7/08

CULVERT SIZE (FEET) SPAN X RISE	1 ½ : 1 Slope No Skew				1 ½ : 1 Slope 15° Skew			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	5.84	2.92	3.89	5.84	5.97	2.99	3.98	5.97
3 x 4	7.29	3.65	4.86	7.29	7.47	3.74	4.98	7.47
4 x 3	8.22	4.11	5.48	8.22	8.40	4.20	5.60	8.40
4 x 4	9.78	4.89	6.52	9.78	10.01	5.00	6.67	10.01
4 x 5	11.34	5.67	7.56	11.34	11.61	5.81	7.74	11.61
4 x 6	12.89	6.44	8.59	12.89	13.22	6.61	8.81	13.22
5 x 3	11.22	5.61	7.48	11.22	11.42	5.71	7.61	11.42
5 x 4	13.10	6.55	8.73	13.10	13.38	6.69	8.92	13.38
5 x 5	15.00	7.50	10.00	15.00	15.33	7.67	10.22	15.33
5 x 6	16.89	8.45	11.26	16.89	17.30	8.65	11.53	17.30
5 x 7	18.78	9.39	12.52	18.78	19.23	9.62	12.82	19.23
6 x 4	16.89	8.45	11.26	16.89	17.21	8.60	11.47	17.21
6 x 5	19.23	9.62	12.82	19.23	19.62	9.81	13.08	19.62
6 x 6	21.69	10.85	14.46	21.69	22.16	11.08	14.77	22.16
6 x 7	24.15	12.08	16.10	24.15	24.69	12.35	16.46	24.69
6 x 8	25.77	12.89	17.18	25.77	26.40	13.20	17.60	26.40
7 x 4	21.11	10.55	14.07	21.11	21.47	10.73	14.31	21.47
7 x 6	26.40	13.20	17.60	26.40	26.94	13.47	17.96	26.94
7 x 8	31.98	15.99	21.32	31.98	32.70	16.35	21.80	32.70
7 x 10	37.56	18.78	25.04	37.56	38.46	19.23	25.64	38.46
8 x 4	25.77	12.89	17.18	25.77	26.19	13.10	17.46	26.19
8 x 6	31.55	15.77	21.03	31.55	32.18	16.09	21.45	32.18
8 x 8	37.32	18.66	24.88	37.32	38.15	19.07	25.43	38.15
8 x 10	43.11	21.56	28.74	43.11	44.13	22.07	29.42	44.13
9 x 4	30.90	15.45	20.60	30.90	31.35	15.68	20.90	31.35
9 x 6	37.34	18.67	24.89	37.34	38.03	19.01	25.35	38.03
9 x 8	43.76	21.88	29.17	43.76	44.69	22.34	29.79	44.69
9 x 10	51.00	25.50	34.00	51.00	52.13	26.06	34.75	52.13
9 x 12	57.92	28.96	38.61	57.92	59.28	29.64	39.52	59.28
10 x 4	36.44	18.22	24.29	36.44	36.95	18.47	24.63	36.95
10 x 6	43.56	21.78	29.04	43.56	44.31	22.16	29.54	44.31
10 x 8	50.67	25.34	33.78	50.67	51.68	25.84	34.45	51.68
10 x 10	57.77	28.88	38.51	57.77	59.03	29.51	39.35	59.03
10 x 12	64.88	32.44	43.25	64.88	66.39	33.20	44.26	66.39
12 x 6	57.33	28.67	38.22	57.33	58.22	29.11	38.81	58.22
12 x 8	65.78	32.89	43.85	65.78	66.96	33.48	44.64	66.96
12 x 10	74.22	37.11	49.48	74.22	75.71	37.85	50.47	75.71
12 x 12	82.67	41.33	55.11	82.67	84.45	42.23	56.30	84.45

**TABLE D-20 CULVERT OUTLET PROTECTION FOR MULTIPLE BOX CULVERT
(INCREMENTS FOR EACH ADDITIONAL BARREL)***

* Rev. 7/08

CULVERT SIZE (FEET) SPAN X RISE	2 : 1 Slope 30° Skew				2 : 1 Slope 45° Skew			
	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")	EC-3 Type B	Depth (T) (18")	Depth (T) (24")	Depth (T) (36")
		Class A1	Class I	Class II		Class A1	Class I	Class II
	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.	Sq. Yds.	Cu. Yds.	Cu. Yds.	Cu. Yds.
3 x 3	6.45	3.23	4.30	6.45	7.41	3.71	4.94	7.41
3 x 4	7.83	3.92	5.22	7.83	9.42	4.71	6.28	9.42
4 x 3	8.94	4.47	5.96	8.94	10.16	5.08	6.77	10.16
4 x 4	10.74	5.37	7.16	10.74	12.36	6.18	8.24	12.36
4 x 5	12.54	6.27	8.36	12.54	14.57	7.28	9.71	14.57
4 x 6	14.34	7.17	9.56	14.34	16.76	8.38	11.17	16.76
5 x 3	12.09	6.05	8.06	12.09	13.56	6.78	9.04	13.56
5 x 4	14.28	7.14	9.52	14.28	16.23	8.12	10.82	16.23
5 x 5	16.46	8.23	10.97	16.46	18.92	9.46	12.61	18.92
5 x 6	18.65	9.32	12.43	18.65	21.59	10.79	14.39	21.59
5 x 7	20.82	10.41	13.88	20.82	24.24	12.12	16.16	24.24
6 x 4	18.27	9.14	12.18	18.27	20.57	10.28	13.71	20.57
6 x 5	20.99	10.49	13.99	20.99	23.87	11.93	15.91	23.87
6 x 6	23.75	11.87	15.83	23.75	27.21	13.61	18.14	27.21
6 x 7	26.73	13.37	17.82	26.73	30.74	15.37	20.49	30.74
6 x 8	28.53	14.27	19.02	28.53	33.14	16.57	22.09	33.14
7 x 4	22.68	11.34	15.12	22.68	25.34	12.67	16.89	25.34
7 x 6	28.76	14.38	19.17	28.76	32.75	16.37	21.83	32.75
7 x 8	35.30	17.65	23.53	35.30	40.61	20.30	27.07	40.61
7 x 10	41.79	20.90	27.86	41.79	48.44	24.22	32.29	48.44
8 x 4	27.57	13.79	18.38	27.57	30.57	15.29	20.38	30.57
8 x 6	34.25	17.12	22.83	34.25	38.23	19.12	25.82	38.23
8 x 8	40.91	20.45	27.27	40.91	46.91	23.45	31.27	46.91
8 x 10	47.58	23.79	31.72	47.58	55.23	27.62	36.82	55.23
9 x 4	32.90	16.45	21.93	32.90	36.23	18.11	24.15	36.23
9 x 6	40.34	20.17	26.89	40.34	45.33	22.67	30.22	45.33
9 x 8	48.00	24.00	32.00	48.00	54.69	27.35	36.46	54.69
9 x 10	56.18	28.09	37.45	56.18	64.55	32.27	43.03	64.55
9 x 12	64.22	32.11	42.81	64.22	74.24	37.12	49.49	74.24
10 x 4	38.64	19.32	25.76	38.64	42.33	21.17	28.22	42.33
10 x 6	46.85	23.42	31.23	46.85	52.40	26.20	34.93	52.40
10 x 8	55.07	27.53	36.71	55.07	62.45	31.22	41.63	62.45
10 x 10	63.27	31.64	42.18	63.27	72.51	36.26	48.34	72.51
10 x 12	71.49	35.75	47.66	71.49	82.56	41.28	55.04	82.56
12 x 6	61.25	30.62	40.83	61.25	67.83	33.92	45.22	67.83
12 x 8	71.01	35.51	47.34	71.01	79.77	39.89	53.18	79.77
12 x 10	80.76	40.38	53.84	80.76	91.71	45.86	61.14	91.71
12 x 12	90.51	45.26	60.34	90.51	103.65	51.83	69.10	103.65

**TABLE D-21 CULVERT OUTLET PROTECTION FOR MULTIPLE BOX CULVERT
(INCREMENTS FOR EACH ADDITIONAL BARREL)***

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