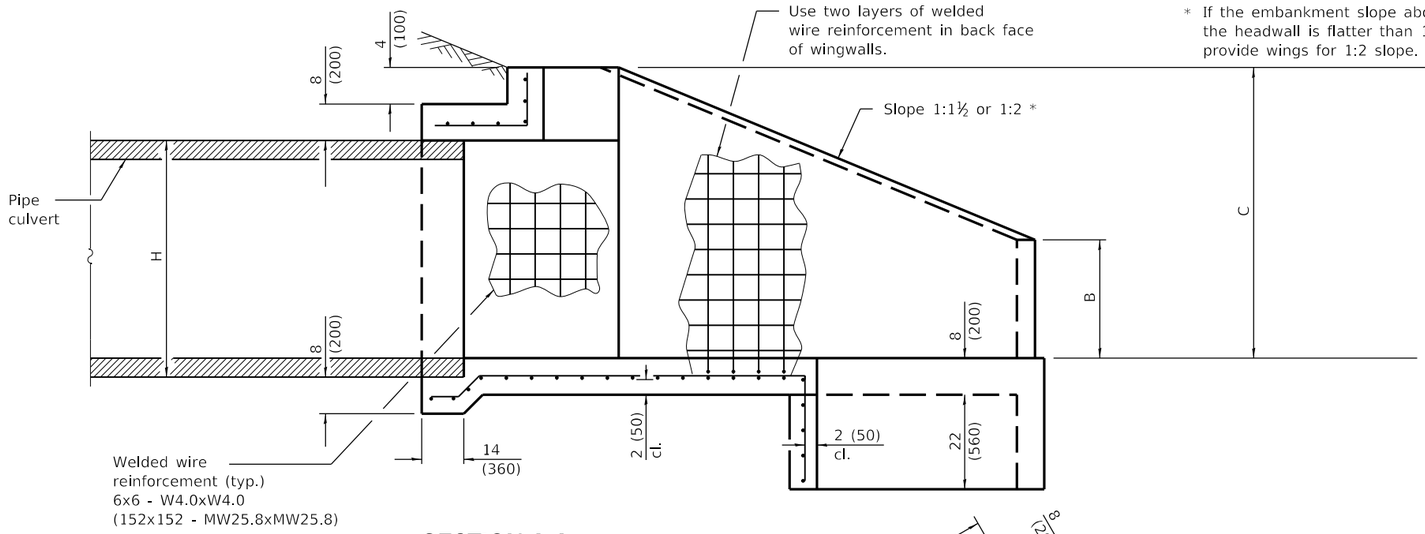
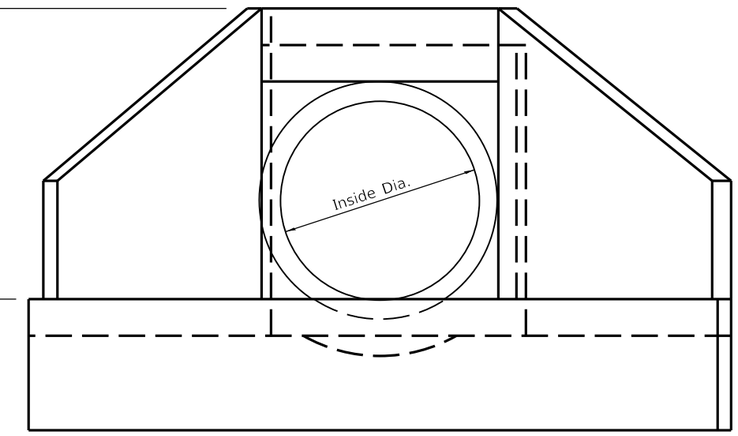
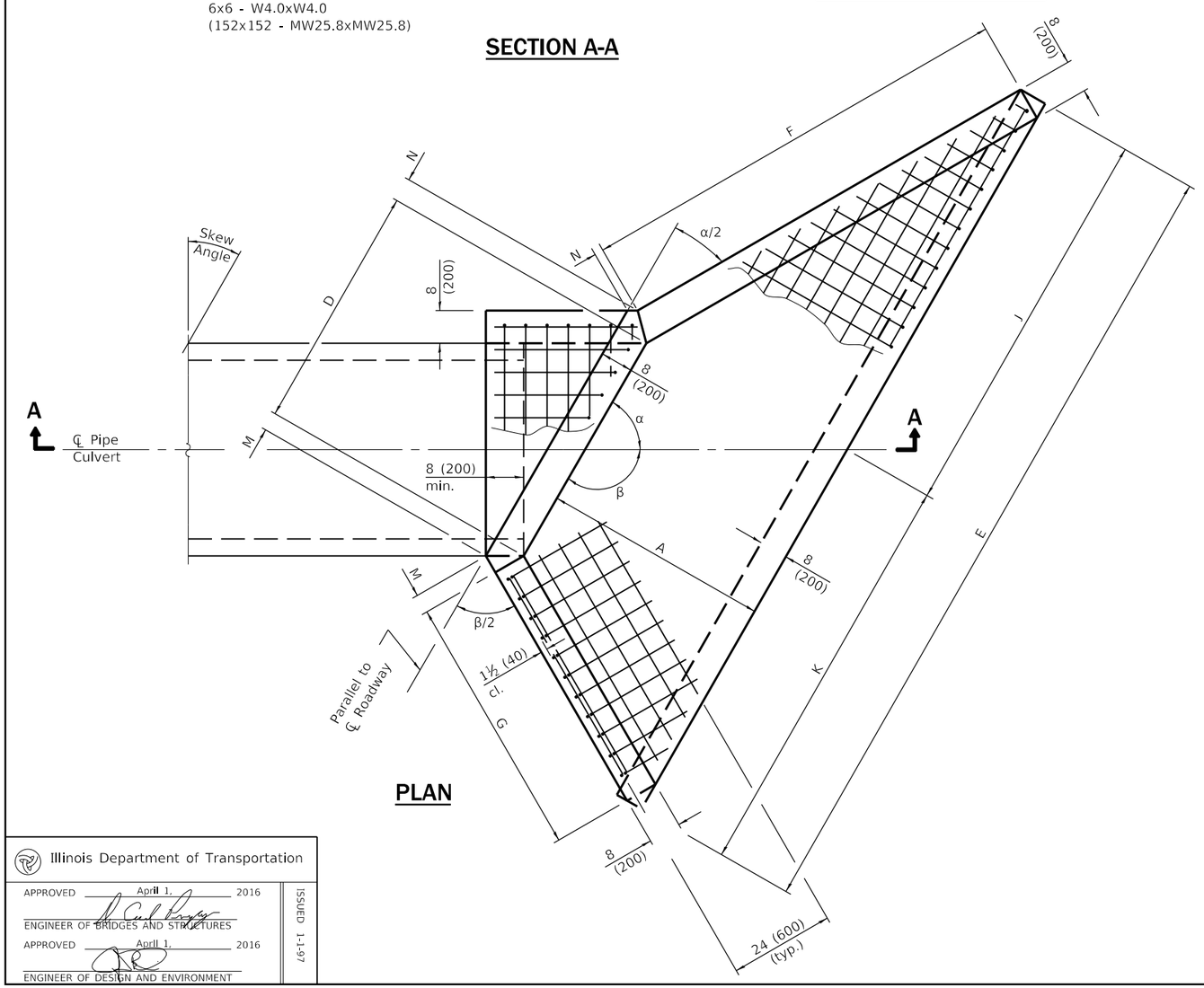


SECTION A-A



END VIEW



PLAN

GENERAL NOTES

Build tops of headwalls parallel to grade line.

When lapping sheets of welded wire reinforcement, the overlap measured between the outermost cross wires of each reinforcement sheet shall not be less than 8 (200).

All slope ratios are expressed as units of vertical displacement to units of horizontal displacement (V:H).

All dimensions are in inches (millimeters) unless otherwise shown.

Illinois Department of Transportation

APPROVED April 1, 2016
ENGINEER OF BRIDGES AND STRUCTURES

APPROVED April 1, 2016
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

DATE	REVISIONS
4-1-16	Changed terminology to
	'welded wire reinforcement'.
1-1-14	Corrected skew angles in
	table on Sheet 5.

REINFORCED CONCRETE END SECTIONS FOR PIPE CULVERTS
42" (1050 mm) THRU 60" (1500 mm) DIA.
SKEWED WITH ROADWAY

(Sheet 1 of 5)

STANDARD 542206-04

WINGS FOR 1:1 1/2 SLOPE

Skew Angle	Nominal Pipe Dia.	Dimensions for Concrete													Concrete 2 End Secs. cu. yd. (m^3)	Welded Wire Reinforcement 2 End Secs. sq. yd. (m^2)
		A	B	C	D	E	F	G	H	J	K	M	N	α		
5°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	4'-3¼" (1.299 m)	13'-5" (4.09 m)	6'-0½" (1.85 m)	5'-6½" (1.69 m)	4'-3" (1.295 m)	6'-8¼" (2.04 m)	6'-8¾" (2.05 m)	3½ (90)	3 (80)	85°	6.0 (4.6)	46 (38)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	4'-10¼" (1.478 m)	14'-10" (4.48 m)	6'-8" (2.0 m)	6'-1¼" (1.83 m)	4'-10" (1.473 m)	7'-4¾" (2.23 m)	7'-5¼" (2.25 m)	3½ (90)	3 (80)	85°	7.2 (5.5)	53 (44)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	5'-5¼" (1.657 m)	16'-3" (5.08 m)	7'-3¼" (2.31 m)	6'-8" (2.12 m)	5'-5" (1.651 m)	8'-1¼" (2.53 m)	8'-1¾" (2.55 m)	3½ (90)	3 (80)	85°	8.4 (6.4)	65 (55)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	6'-0¼" (1.835 m)	17'-8" (5.37 m)	7'-10¾" (2.4 m)	7'-2¾" (2.2 m)	6'-0" (1.829 m)	8'-9¾" (2.68 m)	8'-10¼" (2.69 m)	3½ (90)	3 (80)	85°	9.8 (7.5)	71 (59)
10°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	4'-3¾" (1.314 m)	13'-6½" (4.13 m)	6'-4¼" (1.94 m)	5'-4" (1.63 m)	4'-3" (1.295 m)	6'-8¾" (2.05 m)	6'-9¾" (2.08 m)	3¾ (100)	3 (80)	80°	6.3 (4.8)	47 (39)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	4'-11" (1.495 m)	15'-0" (4.52 m)	7'-0" (2.1 m)	5'-10½" (1.77 m)	4'-10" (1.473 m)	7'-5½" (2.25 m)	7'-6½" (2.27 m)	3¾ (100)	3 (80)	80°	7.5 (5.7)	54 (45)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	5'-6" (1.676 m)	16'-5" (5.13 m)	7'-7¾" (2.43 m)	6'-5" (2.04 m)	5'-5" (1.651 m)	8'-2" (2.55 m)	8'-3" (2.58 m)	3¾ (100)	3 (80)	80°	8.8 (6.7)	66 (56)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	6'-1" (1.857 m)	17'-10½" (5.43 m)	8'-3½" (2.52 m)	6'-11½" (2.12 m)	6'-0" (1.829 m)	8'-10¾" (2.7 m)	8'-11¾" (2.73 m)	3¾ (100)	3 (80)	80°	10.3 (7.9)	73 (61)
15°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	4'-4¾" (1.34 m)	13'-9½" (4.2 m)	6'-8½" (2.05 m)	5'-1¾" (1.57 m)	4'-3" (1.295 m)	6'-10" (2.08 m)	6'-11½" (2.12 m)	4 (100)	2¾ (70)	75°	6.6 (5.0)	48 (40)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	5'-0" (1.524 m)	15'-3" (4.6 m)	7'-4¾" (2.22 m)	5'-8" (1.71 m)	4'-10" (1.473 m)	7'-6¾" (2.28 m)	7'-8¼" (2.32 m)	4 (100)	2¾ (70)	75°	7.9 (6.0)	55 (46)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	5'-7¼" (1.709 m)	16'-8¾" (5.22 m)	8'-1" (2.57 m)	6'-2¼" (1.97 m)	5'-5" (1.651 m)	8'-3¾" (2.59 m)	8'-5" (2.63 m)	4 (100)	2¾ (70)	75°	9.3 (7.1)	68 (57)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	6'-2½" (1.893 m)	18'-2¼" (5.53 m)	8'-9¼" (2.66 m)	6'-8¾" (2.05 m)	6'-0" (1.829 m)	9'-0½" (2.75 m)	9'-1¾" (2.78 m)	4 (100)	2¾ (70)	75°	10.8 (8.3)	75 (62)
20°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	4'-6¼" (1.378 m)	14'-1¾" (4.31 m)	7'-1½" (2.17 m)	4'-11¾" (1.52 m)	4'-3" (1.295 m)	7'-0" (2.13 m)	7'-1¾" (2.18 m)	4¼ (105)	2½ (70)	70°	7.0 (5.4)	49 (41)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	5'-1¾" (1.567 m)	15'-7¾" (4.72 m)	7'-10¼" (2.36 m)	5'-6" (1.65 m)	4'-10" (1.473 m)	7'-9" (2.34 m)	7'-10¾" (2.38 m)	4¼ (105)	2½ (70)	70°	8.4 (6.4)	57 (48)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	5'-9¼" (1.756 m)	17'-2" (5.36 m)	8'-6¾" (2.72 m)	6'-0" (1.91 m)	5'-5" (1.651 m)	8'-6" (2.65 m)	8'-8" (2.7 m)	4¼ (105)	2½ (70)	70°	9.9 (7.6)	70 (59)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	6'-4½" (1.946 m)	18-8" (5.68 m)	9'-3½" (2.83 m)	6'-6¼" (1.98 m)	6'-0" (1.829 m)	9'-3" (2.82 m)	9'-5" (2.86 m)	4¼ (105)	2½ (70)	70°	11.5 (8.8)	77 (64)
25°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	4'-8¼" (1.428 m)	14'-7½" (4.46 m)	7'-7¼" (2.32 m)	4'-10" (1.48 m)	4'-3" (1.295 m)	7'-2½" (2.22 m)	7'-5" (2.26 m)	4½ (110)	2¼ (60)	65°	7.4 (5.7)	51 (43)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	5'-4" (1.625 m)	16'-2¼" (4.88 m)	8'-4½" (2.52 m)	5'-4" (1.6 m)	4'-10" (1.473 m)	8'-0" (2.41 m)	8'-2¼" (2.47 m)	4½ (110)	2¼ (60)	65°	8.9 (6.8)	59 (49)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	5'-11¾" (1.821 m)	17'-9" (5.54 m)	9'-1¾" (2.91 m)	5'-10" (1.85 m)	5'-5" (1.651 m)	8'-9¼" (2.74 m)	8'-11¾" (2.8 m)	4½ (110)	2¼ (60)	65°	10.5 (8.0)	73 (61)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	6'-7½" (2.018 m)	19'-3¾" (5.87 m)	9'-11" (3.02 m)	6'-4" (1.92 m)	6'-0" (1.829 m)	9'-6¾" (2.90 m)	9'-9" (2.97 m)	4½ (110)	2¼ (60)	65°	12.2 (9.3)	80 (67)
30°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	4'-11" (1.495 m)	15'-3" (4.65 m)	8'-2" (2.49 m)	4'-8½" (1.44 m)	4'-3" (1.295 m)	7'-6" (2.29 m)	7'-9" (2.36 m)	4½ (120)	2¼ (60)	60°	7.9 (6.0)	53 (45)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	5'-7" (1.7 m)	16'-10½" (5.1 m)	9'-0" (2.7 m)	5'-2¼" (1.56 m)	4'-10" (1.473 m)	8'-3¾" (2.51 m)	8'-6¾" (2.59 m)	4½ (120)	2¼ (60)	60°	9.5 (7.3)	62 (52)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	6'-3" (1.906 m)	18'-6¼" (5.79 m)	9'-10" (3.12 m)	5'-8" (1.8 m)	5'-5" (1.651 m)	9'-1¾" (2.85 m)	9'-4½" (2.92 m)	4½ (120)	2¼ (60)	60°	11.2 (8.6)	77 (64)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	6'-11¼" (2.111 m)	20'-2" (6.13 m)	10'-8" (3.24 m)	6'-2" (1.87 m)	6'-0" (1.829 m)	9'-11½" (3.03 m)	10'-2½" (3.1 m)	4½ (120)	2¼ (60)	60°	13.1 (10.0)	84 (70)

Illinois Department of Transportation

APPROVED April 1, 2016
ENGINEER OF BRIDGES AND STRUCTURES

APPROVED April 1, 2016
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

REINFORCED CONCRETE END SECTIONS FOR PIPE CULVERTS
42" (1050 mm) THRU 60" (1500 mm) DIA.
SKEWED WITH ROADWAY

(Sheet 2 of 5)

STANDARD 542206-04

WINGS FOR 1:1 1/2 SLOPE

Skew Angle	Nominal Pipe Dia.	Dimensions for Concrete													Concrete 2 End Secs. cu. yd. (m^3)	Welded Wire Reinforcement 2 End Secs. sq. yd. (m^2)
		A	B	C	D	E	F	G	H	J	K	M	N	α		
35°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	5'-2¼" (1.58 m)	16'-0¾" (4.59 m)	8'-10" (2.71 m)	4'-7¼" (1.41 m)	4'-3" (1.295 m)	7'-10¾" (2.4 m)	8'-2" (2.49 m)	4¾ (120)	2 (50)	55°	8.5 (6.5)	56 (47)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	5'-10¾" (1.798 m)	17'-9½" (5.36 m)	9'-9" (2.93 m)	5'-1" (1.53 m)	4'-10" (1.473 m)	8'-9" (2.64 m)	9'-0½" (2.73 m)	4¾ (120)	2 (50)	55°	10.2 (7.8)	66 (55)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	6'-7¼" (2.015 m)	19'-6¼" (6.1 m)	10'-7¾" (3.38 m)	5'-6½" (1.76 m)	5'-5" (1.651 m)	9'-7½" (3.01 m)	9'-10¾" (3.09 m)	4¾ (120)	2 (50)	55°	12.0 (9.2)	81 (68)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	7'-4" (2.232 m)	21'-3" (6.46 m)	11'-6½" (3.51 m)	6'-0¼" (1.83 m)	6'-0" (1.829 m)	10'-5¾" (3.19 m)	10'-9¼" (3.27 m)	4¾ (120)	2 (50)	55°	14.1 (10.8)	89 (74)
40°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	5'-6½" (1.69 m)	17'-1¼" (5.21 m)	9'-8" (2.95 m)	4'-6" (1.38 m)	4'-3" (1.295 m)	8'-4¾" (2.56 m)	8'-8½" (2.65 m)	5 (130)	1¾ (50)	50°	9.1 (7.0)	60 (50)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	6'-3¾" (1.922 m)	18'-11¼" (5.72 m)	10'-7¾" (3.2 m)	4'-11½" (1.49 m)	4'-10" (1.473 m)	9'-3¾" (2.81 m)	9'-7½" (2.91 m)	5 (130)	1¾ (50)	50°	11.0 (8.4)	70 (58)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	7'-0¾" (2.155 m)	20'-9½" (6.5 m)	11'-7½" (3.69 m)	5'-5" (1.72 m)	5'-5" (1.651 m)	10'-2¾" (3.2 m)	10'-6¾" (3.3 m)	5 (130)	1¾ (50)	50°	13.0 (9.9)	86 (72)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	7'-10" (2.387 m)	22'-7¾" (6.89 m)	12'-7½" (3.84 m)	6'-0" (1.79 m)	6'-0" (1.829 m)	11'-2" (3.4 m)	11'-5¾" (3.49 m)	5 (130)	1¾ (50)	50°	15.2 (11.6)	95 (79)
45°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	6'-0" (1.831 m)	18'-5¼" (5.62 m)	10'-8" (3.26 m)	4'-5" (1.35 m)	4'-3" (1.295 m)	9'-0½" (2.76 m)	9'-4¾" (2.86 m)	5¼ (140)	1½ (40)	45°	10.0 (7.6)	65 (54)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	6'-10" (2.083 m)	20'-5¼" (6.17 m)	11'-9" (3.53 m)	4'-10½" (1.46 m)	4'-10" (1.473 m)	10'-0½" (3.03 m)	10'-4¾" (3.14 m)	5¼ (140)	1½ (40)	45°	12.0 (9.2)	75 (63)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	7'-8" (2.334 m)	22'-5¼" (7.01 m)	12'-10¼" (4.08 m)	5'-3¾" (1.69 m)	5'-5" (1.651 m)	11'-0½" (3.45 m)	11'-4¾" (3.56 m)	5¼ (140)	1½ (40)	45°	14.2 (10.9)	93 (78)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	8'-5¾" (2.586 m)	24'-5¼" (7.43 m)	13'-11¼" (4.24 m)	5'-9¼" (1.76 m)	6'-0" (1.829 m)	12'-0½" (3.66 m)	12'-4¾" (3.77 m)	5¼ (140)	1½ (40)	45°	16.7 (12.8)	103 (86)
50°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	6'-7¼" (2.014 m)	20'-2" (6.15 m)	11'-11¼" (3.64 m)	4'-4½" (1.33 m)	4'-3" (1.295 m)	9'-10½" (3.01 m)	10'-3½" (3.14 m)	5½ (140)	1½ (40)	40°	11.0 (8.4)	71 (59)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	7'-6¼" (2.291 m)	22'-4½" (6.75 m)	13'-2" (3.95 m)	4'-9½" (1.44 m)	4'-10" (1.473 m)	10'-11¾" (3.31 m)	11'-4¾" (3.44 m)	5½ (140)	1½ (40)	40°	13.3 (10.2)	82 (69)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	8'-5" (2.568 m)	24'-7" (7.68 m)	14'-4½" (4.56 m)	5'-2¾" (1.66 m)	5'-5" (1.651 m)	12'-1" (3.78 m)	12'-6" (3.9 m)	5½ (140)	1½ (40)	40°	15.8 (12.1)	102 (85)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	9'-4" (2.845 m)	26'-9¼" (8.15 m)	15'-7¼" (4.72 m)	5'-8" (1.73 m)	6'-0" (1.829 m)	13'-2¼" (4.02 m)	13'-7" (4.13 m)	5½ (140)	1½ (40)	40°	18.5 (14.1)	112 (94)
55°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	7'-5" (2.257 m)	22'-5¾" (6.85 m)	13'-7" (4.14 m)	4'-3½" (1.31 m)	4'-3" (1.295 m)	11'-0¼" (3.36 m)	11'-5½" (3.49 m)	5¾ (150)	1¼ (30)	35°	12.3 (9.4)	79 (66)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	8'-5" (2.568 m)	24'-11½" (7.53 m)	14'-11½" (4.49 m)	4'-8½" (1.42 m)	4'-10" (1.473 m)	12'-3" (3.7 m)	12'-8½" (3.83 m)	5¾ (150)	1¼ (30)	35°	14.9 (11.4)	92 (77)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	9'-5¼" (2.878 m)	27'-5" (8.57 m)	16'-4¼" (5.19 m)	5'-1¾" (1.64 m)	5'-5" (1.651 m)	13'-6" (4.22 m)	13'-11" (4.35 m)	5¾ (150)	1¼ (30)	35°	17.7 (13.5)	113 (95)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	10'-5½" (3.188 m)	29'-10¾" (9.09 m)	17'-8¾" (5.39 m)	5'-7" (1.7 m)	6'-0" (1.829 m)	14'-8¾" (4.48 m)	15'-2" (4.61 m)	5¾ (150)	1¼ (30)	35°	20.8 (15.9)	125 (104)
60°	42 (1050)	4'-1" (1.25 m)	26 (660)	4'-10½" (1.49 m)	8'-6" (2.59 m)	25'-7¾" (7.82 m)	15'-9¼" (4.81 m)	4'-2¾" (1.29 m)	4'-3" (1.295 m)	12'-7" (3.84 m)	13'-0¾" (3.98 m)	6¼ (160)	1 (30)	30°	14.1 (10.8)	89 (75)
	48 (1200)	4'-6" (1.35 m)	29 (740)	5'-5" (1.64 m)	9'-8" (2.946 m)	28'-5¾" (8.59 m)	17'-4¾" (5.22 m)	4'-8" (1.4 m)	4'-10" (1.473 m)	14'-0" (4.22 m)	14'-5¾" (4.37 m)	6¼ (160)	1 (30)	30°	17.0 (13.0)	104 (87)
	54 (1350)	4'-11" (1.56 m)	32 (810)	5'-11½" (1.85 m)	10'-10" (3.302 m)	31'-3¾" (9.79 m)	19'-0" (6.03 m)	5'-1" (1.62 m)	5'-5" (1.651 m)	15'-5" (4.82 m)	15'-10¾" (4.97 m)	6¼ (160)	1 (30)	30°	20.3 (15.5)	129 (108)
	60 (1500)	5'-4" (1.62 m)	35 (890)	6'-6" (1.97 m)	12'-0" (3.658 m)	34'-1¾" (10.39 m)	20'-7¼" (6.26 m)	5'-6¼" (1.68 m)	6'-0" (1.829 m)	16'-10" (5.12 m)	17'-3¾" (5.27 m)	6¼ (160)	1 (30)	30°	23.8 (18.2)	142 (119)

Illinois Department of Transportation

APPROVED April 1, 2016
ENGINEER OF BRIDGES AND STRUCTURES

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42" (1050 mm) THRU 60" (1500 mm) DIA.
SKEWED WITH ROADWAY
(Sheet 3 of 5)

STANDARD 542206-04

WINGS FOR 1:2 SLOPE

Skew Angle	Nominal Pipe Dia.	Dimensions for Concrete													Concrete 2 End Secs. cu. yd. (m^3)	Welded Wire Reinforcement 2 End Secs. sq. yd. (m^2)
		A	B	C	D	E	F	G	H	J	K	M	N	α		
5°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	4'-3¼" (1.299 m)	16'-1" (4.29 m)	8'-0¼" (2.46 m)	7'-4¼" (2.26 m)	4'-3" (1.295 m)	8'-0¼" (2.45 m)	8'-0¾" (2.47 m)	3½ (90)	3 (80)	85°	8.0 (6.1)	61 (51)
	48 (1200)	6'-0" (1.8 m)	29 (740)	5'-5" (1.64 m)	4'-10¼" (1.478 m)	17'-10" (5.38 m)	8'-10½" (2.67 m)	8'-1¾" (2.44 m)	1.473 m (4'-10")	8'-10¾" (2.68 m)	8'-11¼" (2.7 m)	3½ (90)	3 (80)	85°	9.6 (7.3)	71 (59)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	5'-5¼" (1.657 m)	19'-7" (6.12 m)	9'-9" (3.08 m)	8'-11¼" (2.82 m)	1.651 m (5'-5")	9'-9¼" (3.05 m)	9'-9¾" (3.07 m)	3½ (90)	3 (80)	85°	11.3 (8.6)	88 (74)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	6'-0¼" (1.835 m)	21'-4¼" (6.46 m)	10'-7¼" (3.2 m)	9'-8¾" (2.93 m)	1.829 m (6'-0")	10'-8" (3.22 m)	10'-8¼" (3.24 m)	3½ (90)	3 (80)	85°	13.2 (10.1)	96 (80)
10°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	4'-3¾" (1.314 m)	16'-3" (4.97 m)	8'-5" (2.59 m)	7'-0¾" (2.17 m)	1.295 m (4'-3")	8'-1" (2.47 m)	8'-2" (2.5 m)	3¾ (100)	3 (80)	80°	8.3 (6.3)	62 (52
	48 (1200)	6'-0" (1.8 m)	29 (740)	5'-5" (1.64 m)	4'-11" (1.495 m)	18'-0½" (5.43 m)	9'-4" (2.8 m)	7'-10" (2.35 m)	1.473 m (4'-10")	8'-11¾" (2.71 m)	9'-0¾" (2.73 m)	3¾ (100)	3 (80)	80°	9.9 (7.6)	72 (60)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	5'-6" (1.676 m)	19'-9¾" (6.19 m)	10'-3" (3.24 m)	8'-7¼" (2.72 m)	1.651 m (5'-5")	9'-10½" (3.08 m)	9'-11¼" (3.11 m)	3¾ (100)	3 (80)	80°	11.7 (8.9)	90 (75)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	6'-1" (1.857 m)	21'-7" (6.53 m)	11'-1¾" (3.36 m)	9'-4¼" (2.82 m)	1.829 m (6'-0")	10'-9" (3.25 m)	10'-10" (3.28 m)	3¾ (100)	3 (80)	80°	13.7 (10.5)	98 (82)
15°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	4'-4¾" (1.34 m)	16'-6½" (5.06 m)	8'-10¾" (2.73 m)	6'-10" (2.1 m)	1.295 m (4'-3")	8'-2½" (2.51 m)	8'-4" (2.55 m)	4 (100)	2¾ (70)	75°	8.6 (6.6)	64 (53)
	48 (1200)	6'-0" (1.8 m)	29 (740)	5'-5" (1.64 m)	5'-0" (1.524 m)	18'-4½" (5.54 m)	9'-10¼" (2.96 m)	7'-6¾" (2.27 m)	1.473 m (4'-10")	9'-1½" (2.75 m)	9'-3" (2.79 m)	4 (100)	2¾ (70)	75°	10.4 (8.0)	74 (62)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	5'-7¼" (1.709 m)	20'-2" (6.3 m)	10'-9¾" (3.42 m)	8'-3½" (2.63 m)	1.651 m (5'-5")	10'-0¼" (3.13 m)	10'-1¾" (3.17 m)	4 (100)	2¾ (70)	75°	12.3 (9.4)	92 (77)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	6'-2½" (1.893 m)	21'-11¾" (6.65 m)	11'-9¼" (3.55 m)	9'-0½" (2.73 m)	1.829 m (6'-0")	10'-11¼" (3.31 m)	11'-0½" (3.34 m)	4 (100)	2¾ (70)	75°	14.3 (10.9)	100 (84)
20°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	4'-6¼" (1.378 m)	16'-11¾" (5.19 m)	9'-5¼" (2.9 m)	6'-7¼" (2.03 m)	1.295 m (4'-3")	8'-5" (2.57 m)	8'-6¾" (2.62 m)	4¼ (110)	2½ (70)	70°	9.0 (6.9)	66 (55)
	48 (1200)	6'-0" (1.8 m)	29 (740)	5'-5" (1.64 m)	5'-1¾" (1.567 m)	18'-10" (5.68 m)	10'-5½" (3.14 m)	7'-4" (2.2 m)	1.473 m (4'-10")	9'-4" (2.81 m)	9'-6" (2.86 m)	4¼ (110)	2½ (70)	70°	10.9 (8.3)	76 (64)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	5'-9¼" (1.756 m)	20'-8½" (6.47 m)	11'-5¾" (3.63 m)	8'-0½" (2.54 m)	1.651 m (5'-5")	10'-3¼" (3.21 m)	10'-5¼" (3.26 m)	4¼ (110)	2½ (70)	70°	12.9 (9.9)	94 (79)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	6'-4½" (1.946 m)	22'-6¾" (6.83 m)	12'-6" (3.77 m)	8'-9" (2.64 m)	1.829 m (6'-0")	11'-2½" (3.39 m)	11'-4¼" (3.44 m)	4¼ (110)	2½ (70)	70°	15.1 (11.5)	103 (86)
25°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	4'-8¼" (1.428 m)	17'-6¾" (5.37 m)	10'-1" (3.09 m)	6'-5" (1.64 m)	1.295 m (4'-3")	8'-8¼" (2.65 m)	8'-10½" (2.72 m)	4½ (110)	2¼ (60)	65°	9.5 (7.3)	65 (55)
	48 (1200)	6'-0" (1.8 m)	29 (740)	5'-5" (1.64 m)	5'-4" (1.625 m)	19'-6" (5.88 m)	11'-2' (3.35 m)	7'-1¼" (2.14 m)	1.473 m (4'-10")	9'-7¾" (2.91 m)	9'-10¼" (2.97 m)	4½ (110)	2¼ (60)	65°	11.5 (8.8)	79 (66)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	5'-11¾" (1.821 m)	21'-5" (6.69 m)	12'-3" (3.87 m)	7'-9¾" (2.47 m)	1.651 m (5'-5")	10'-7¼" (3.31 m)	10'-9¾" (3.37 m)	4½ (110)	2¼ (60)	65°	13.6 (10.4)	98 (82)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	6'-7½" (2.018 m)	23'-4¼" (7.06 m)	13'-4" (4.02 m)	8'-6" (2.56 m)	1.829 m (6'-0")	11'-7" (3.5 m)	11'-9¼" (3.56 m)	4½ (110)	2¼ (60)	65°	15.9 (12.2)	107 (90)
30°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	4'-11" (1.495 m)	18'-4" (5.61 m)	10'-10" (3.32 m)	6'-3" (1.92 m)	1.295 m (4'-3")	9'-0½" (2.77 m)	9'-3½" (2.84 m)	4½ (120)	2¼ (60)	60°	10.1 (7.7)	71 (59)
	48 (1200)	6'-0" (1.8 m)	29 (740)	5'-5" (1.64 m)	5'-7" (1.7 m)	20'-4¼" (6.13 m)	12'-0" (3.6 m)	6'-11¼" (2.08 m)	1.473 m (4'-10")	10'-0¾" (3.03 m)	10'-3½" (3.1 m)	4½ (120)	2¼ (60)	60°	12.2 (9.3)	82 (69)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	6'-3" (1.906 m)	22'-4½" (6.99 m)	13'-2" (4.16 m)	7'-7¼" (2.41 m)	1.651 m (5'-5")	11'-0¾" (3.46 m)	11'-3¾" (3.53 m)	4½ (120)	2¼ (60)	60°	14.4 (11.0)	102 (86)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	6'-11¼" (2.111 m)	24'-4¾" (7.38 m)	14'-4" (4.32 m)	8'-3¼" (2.45 m)	1.829 m (6'-0")	12'-1" (3.65 m)	12'-3¾" (3.73 m)	4½ (120)	2¼ (60)	60°	16.9 (12.9)	112 (93)

Illinois Department of Transportation

APPROVED April 1, 2016
ENGINEER OF BRIDGES AND STRUCTURES

APPROVED April 1, 2016
ENGINEER OF DESIGN AND ENVIRONMENT

ISSUED 1-1-97

REINFORCED CONCRETE END SECTIONS FOR PIPE CULVERTS
42" (1050 mm) THRU 60" (1500 mm) DIA.
SKEWED WITH ROADWAY

(Sheet 4 of 5)

STANDARD 542206-04

WINGS FOR 1:1 1/2 SLOPE

Skew Angle	Nominal Pipe Dia.	Dimensions for Concrete													Concrete 2 End Secs. cu. yd. (m^3)	Welded Wire Reinforcement 2 End Secs. sq. yd. (m^2)
		A	B	C	D	E	F	G	H	J	K	M	N	α		
35°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	5'-2¼" (1.58 m)	19'-3¾" (5.91 m)	11'-8¾" (3.6 m)	6'-1¼" (1.87 m)	4'-3" (1.295 m)	9'-6¼" (2.91 m)	9'-9½" (3.0 m)	4¾ (120)	2 (50)	55°	10.8 (8.3)	75 (63)
	48 (1200)	6'-0" (1.80 m)	29 (740)	5'-5" (1.64 m)	5'-10¾" (1.798 m)	21'-5½" (6.47 m)	13'-0" (3.9 m)	6'-9¼" (2.03 m)	4'-10" (1.473 m)	10'-7" (3.91 m)	10'-10½" (3.28 m)	4¾ (120)	2 (50)	55°	13.0 (9.9)	87 (73)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	6'-7¼" (2.015 m)	23'-7" (7.37 m)	14'-3" (4.51 m)	7'-5" (2.35 m)	5'-5" (1.651 m)	11'-7¾" (3.64 m)	11'-11¼" (3.73 m)	4¾ (120)	2 (50)	55°	15.4 (11.8)	108 (90)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	7'-4" (2.232 m)	25'-8¾" (7.78 m)	15'-6¼" (4.68 m)	8'-1" (2.44 m)	6'-0" (1.829 m)	12'-8¾" (3.85 m)	13'-0" (3.93 m)	4¾ (120)	2 (50)	55°	18.1 (13.8)	118 (99)
40°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	5'-6½" (1.69 m)	20'-7" (6.29 m)	12'-9¾" (3.93 m)	5'-11¾" (1.84 m)	4'-3" (1.295 m)	10'-1½" (3.1 m)	10'-5½" (3.19 m)	5 (130)	1¾ (50)	50°	11.6 (8.9)	80 (67)
	48 (1200)	6'-0" (1.80 m)	29 (740)	5'-5" (1.64 m)	6'-3¾" (1.922 m)	22'-10¼" (6.89 m)	14'-2¼" (4.26 m)	6'-7½" (1.99 m)	4'-10" (1.473 m)	11'-3¼" (3.4 m)	11'-7" (3.49 m)	5 (130)	1¾ (50)	50°	14.0 (10.7)	93 (77)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	7'-0¾" (2.155 m)	25'-1¾" (7.86 m)	15'-7" (4.93 m)	7'-3¼" (2.3 m)	5'-5" (1.651 m)	12'-5" (3.88 m)	12'-8¾" (3.98 m)	5 (130)	1¾ (50)	50°	16.7 (12.8)	115 (96)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	7'-10" (2.387 m)	27'-5¼" (8.3 m)	16'-11½" (5.11 m)	7'-11" (2.39 m)	6'-0" (1.829 m)	13'-6¾" (4.1 m)	13'-10½" (4.2 m)	5 (130)	1¾ (50)	50°	19.5 (14.9)	126 (105)
45°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	6'-0" (1.831 m)	22'-2½" (6.79 m)	14'-1¾" (4.34 m)	5'-10¼" (1.8 m)	4'-3" (1.295 m)	10'-11" (3.34 m)	11'-3½" (3.45 m)	5¼ (140)	1½ (40)	45°	12.6 (9.6)	86 (72)
	48 (1200)	6'-0" (1.80 m)	29 (740)	5'-5" (1.64 m)	6'-10" (2.083 m)	24'-8¼" (7.44 m)	15'-8¼" (4.7 m)	6'-6" (1.95 m)	4'-10" (1.473 m)	12'-2" (3.67 m)	12'-6¼" (3.77 m)	5¼ (140)	1½ (40)	45°	15.2 (12.0)	100 (83)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	7'-8" (2.334 m)	27'-1¾" (8.48 m)	17'-2½" (5.44 m)	7'-1½" (2.25 m)	5'-5" (1.651 m)	13'-4¾" (4.19 m)	13'-9" (4.29 m)	5¼ (140)	1½ (40)	45°	18.2 (13.9)	124 (104)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	8'-5¾" (2.586 m)	29'-7½" (8.96 m)	18'-8¾" (5.65 m)	7'-9" (2.34 m)	6'-0" (1.829 m)	14'-7½" (4.43 m)	15'-0" (4.53 m)	5¼ (140)	1½ (40)	45°	21.3 (16.3)	136 (114)
50°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	6'-7¼" (2.014 m)	24'-3¾" (7.44 m)	15'-10" (4.86 m)	5'-9¼" (1.77 m)	4'-3" (1.295 m)	11'-11½" (3.66 m)	12'-4¼" (3.78 m)	5½ (150)	1½ (40)	40°	13.9 (10.6)	94 (78)
	48 (1200)	6'-0" (1.80 m)	29 (740)	5'-5" (1.64 m)	7'-6¼" (2.291 m)	27'-0½" (8.15 m)	17'-6½" (5.27 m)	6'-4½" (1.92 m)	4'-10" (1.473 m)	13'-3¾" (4.02 m)	13'-8¾" (4.13 m)	5½ (150)	1½ (40)	40°	16.8 (12.8)	109 (91)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	8'-5" (2.568 m)	29'-9¼" (9.3 m)	19'-3" (6.09 m)	7'-0" (2.21 m)	5'-5" (1.651 m)	14'-8¼" (4.59 m)	15'-1" (4.71 m)	5½ (150)	1½ (40)	40°	20.0 (15.3)	135 (113)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	9'-4" (2.845 m)	32'-5¾" (9.82 m)	20'-11½" (6.32 m)	7'-7½" (2.3 m)	6'-0" (1.829 m)	16'-0½" (4.86 m)	16'-5¼" (4.97 m)	5½ (150)	1½ (40)	40°	23.5 (18.0)	148 (124)
55°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	7'-5" (2.257 m)	27'-1½" (8.3 m)	18'-0¼" (5.52 m)	5'-8¼" (1.74 m)	4'-3" (1.295 m)	13'-4¼" (4.08 m)	13'-9¼" (4.22 m)	5¾ (150)	1¼ (30)	35°	15.5 (11.9)	104 (87)
	48 (1200)	6'-0" (1.80 m)	29 (740)	5'-5" (1.64 m)	8'-5" (2.568 m)	30'-2¼" (9.1 m)	19'-11½" (5.99 m)	6'-3½" (1.89 m)	4'-10" (1.473 m)	14'-10½" (4.48 m)	15'-3¾" (4.62 m)	5¾ (150)	1¼ (30)	35°	18.8 (14.4)	121 (101)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	9'-5¼" (2.878 m)	33'-2¾" (10.39 m)	21'-10¾" (6.92 m)	6'-10¾" (2.18 m)	5'-5" (1.651 m)	16'-4¾" (5.13 m)	16'-10" (5.26 m)	5¾ (150)	1¼ (30)	35°	22.4 (17.1)	150 (125)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	10'-5½" (3.188 m)	36'-3½" (10.97 m)	23'-10" (7.18 m)	7'-6¼" (2.27 m)	6'-0" (1.829 m)	17'-11¼" (5.42 m)	18'-4¼" (5.55 m)	5¾ (150)	1¼ (30)	35°	26.4 (20.2)	165 (138)
60°	42 (1050)	5'-5" (1.66 m)	26 (660)	4'-10½" (1.49 m)	8'-6" (2.59 m)	30'-11¾" (9.48 m)	20'-11¼" (6.42 m)	5'-7¼" (1.72 m)	4'-3" (1.295 m)	15'-3" (4.67 m)	15'-8¾" (4.81 m)	6¼ (160)	1 (30)	30°	17.7 (13.5)	118 (98)
	48 (1200)	6'-0" (1.80 m)	29 (740)	5'-5" (1.64 m)	9'-8" (2.946 m)	34'-5¾" (10.39 m)	23'-2¼" (6.96 m)	6'-2½" (1.87 m)	4'-10" (1.473 m)	17'-0" (5.12 m)	17'-5¾" (5.27 m)	6¼ (160)	1 (30)	30°	21.5 (16.4)	137 (115)
	54 (1350)	6'-7" (2.08 m)	32 (810)	5'-11½" (1.85 m)	10'-10" (3.302 m)	37'-11¾" (11.87 m)	25'-5¼" (8.04 m)	6'-9¾" (2.16 m)	5'-5" (1.651 m)	18'-9" (5.86 m)	19'-2¾" (6.01 m)	6¼ (160)	1 (30)	30°	25.7 (19.6)	170 (142)
	60 (1500)	7'-2" (2.16 m)	35 (890)	6'-6" (1.97 m)	12'-0" (3.658 m)	41'-5¾" (12.55 m)	27'-8¼" (8.35 m)	7'-5" (2.24 m)	6'-0" (1.829 m)	20'-6" (6.2 m)	20'-11¾" (6.35 m)	6¼ (160)	1 (30)	30°	30.2 (23.1)	187 (157)

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REINFORCED CONCRETE END SECTIONS FOR PIPE CULVERTS
42" (1050 mm) THRU 60" (1500 mm) DIA.
SKEWED WITH ROADWAY
(Sheet 5 of 5)

STANDARD 542206-04