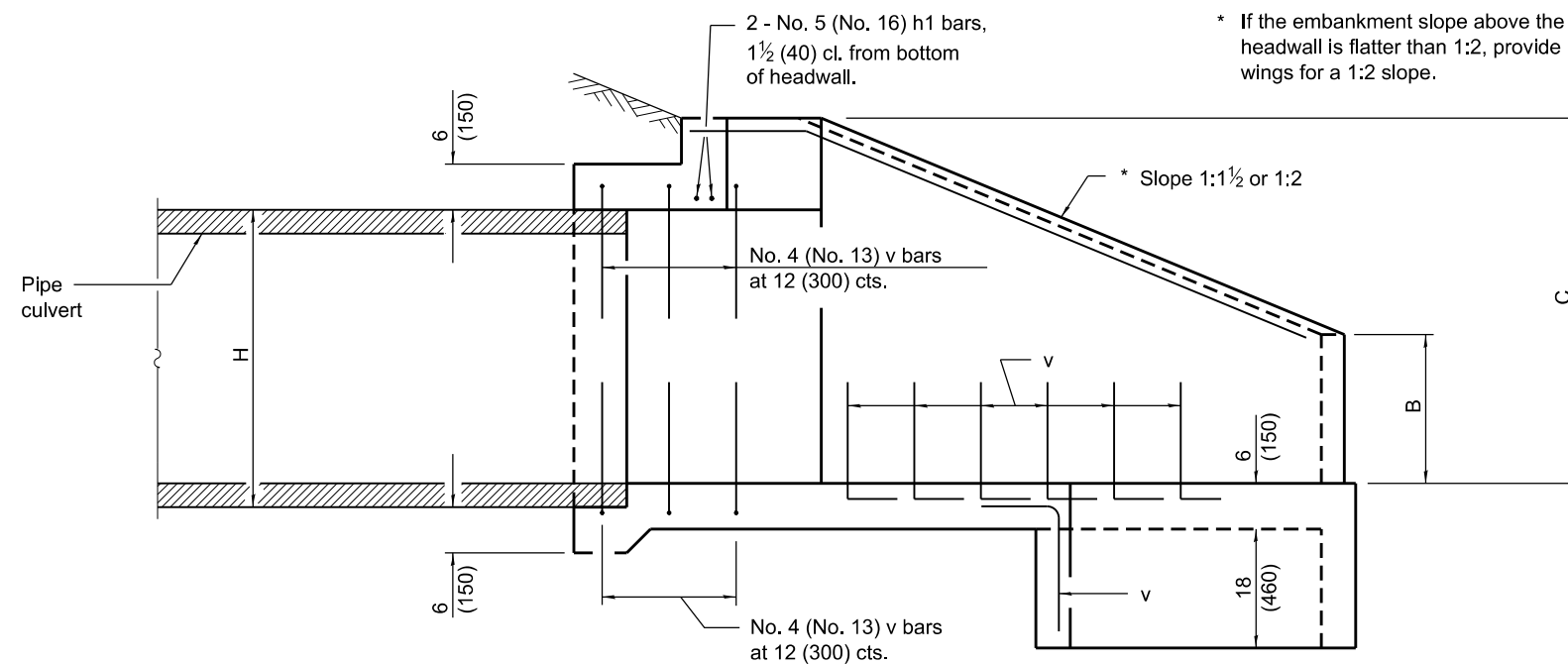
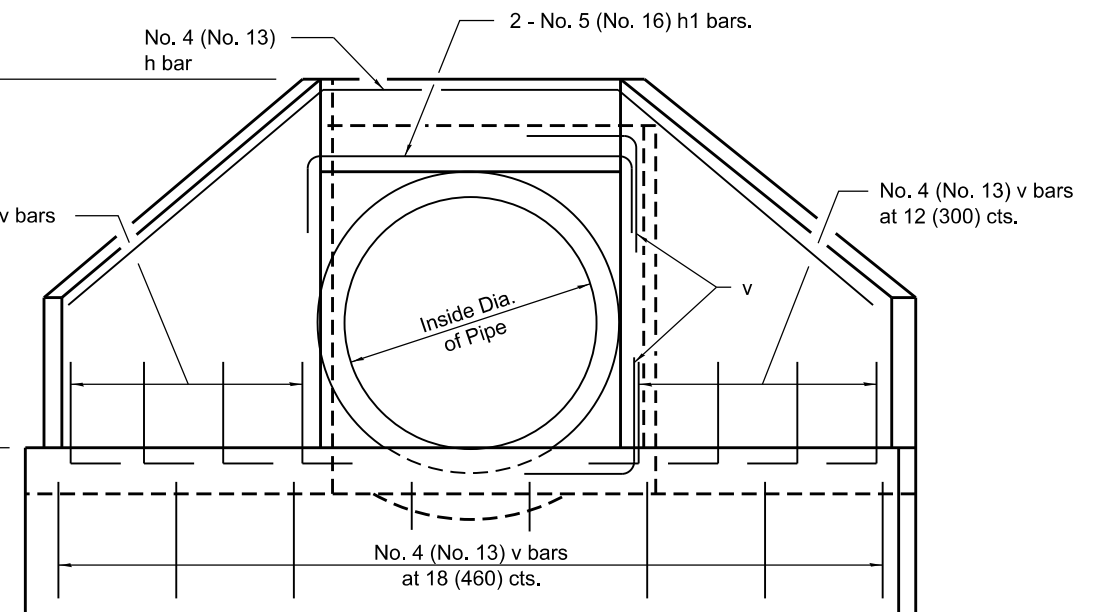
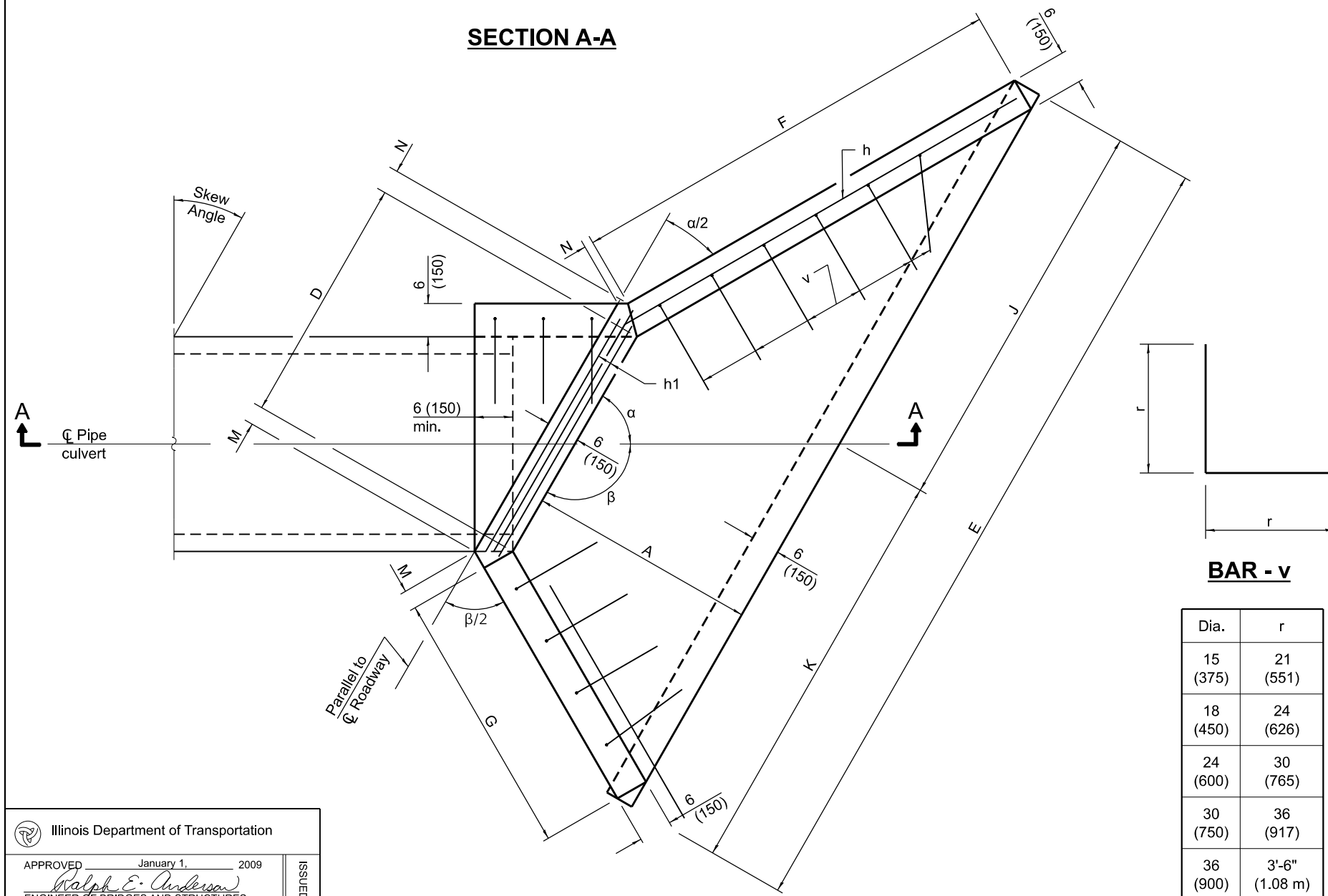




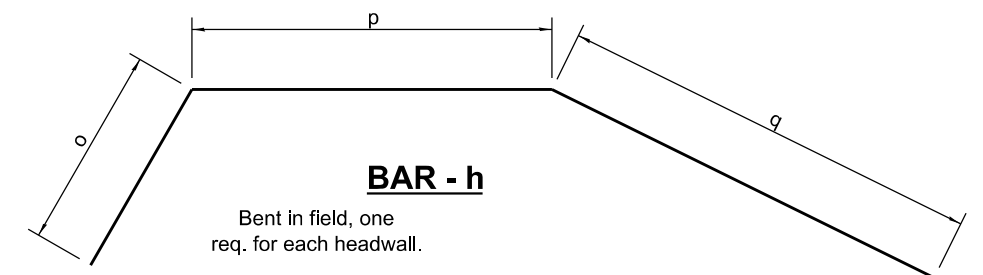
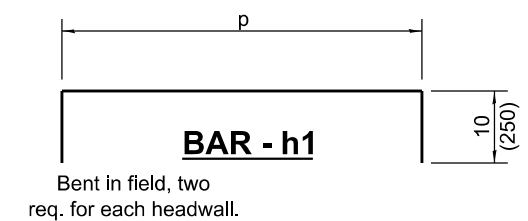
SECTION A-A



END VIEW



PLAN



BAR - v

Dia.	r
15 (375)	21 (551)
18 (450)	24 (626)
24 (600)	30 (765)
30 (750)	36 (917)
36 (900)	3'-6" (1.08 m)

GENERAL NOTES

Build tops of headwalls parallel to grade line.

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.

DATE	REVISIONS
1-1-09	Switched units to English (metric).
1-1-07	Soft converted metric reinforcement bars. Added h, bars.

REINFORCED CONCRETE END SECTIONS FOR PIPE CULVERTS 15" (375 mm) THRU 36" (900 mm) DIA. SKEWED WITH ROADWAY	
STANDARD 542201-02	

(Sheet 1 of 5)

WINGS FOR 1:1½ SLOPE

Skew Angle	Design No.	Nominal Pipe Dia.	DIMENSIONS FOR CONCRETE														Concrete 2 End Sections yd³ (m³)	Reinf. Bars - 2 End Sections							Bars for 2 End Sections lbs. (kg)
			A	B	C	D	E	F	G	H	J	K	M	N	α	h - bars				h1 - bars		v-bars No.			
																o		p	q	Lgth.	p		Lgth.		
5°	DS 15-1½	15	28	10	29	19	6'-11¾"	3'-5½"	38	19	3'-5¾"	3'-6"	2¾	2¼	85°	1.4	3'-6"	21	3'-9"	9'-0"	21	3'-5"	28	90	
	(DS 375-1½)	(375)	(720)	(260)	(740)	(485)	(2.15 m)	(1.07 m)	(980)	(483)	(1.07 m)	(1.08 m)	(70)	(60)		(1.1)	(1.01 m)	(551)	(1.09 m)	(2.65 m)	(551)	(1.04 m)	(41)	100	
	DS 18-1½	18	28	13	32	22	7'-2¾"	3'-5½"	38	22	3'-7¼"	3'-7½"	2¾	2¼	85°	1.6	3'-6"	24	3'-9"	9'-3"	24	3'-8"	28	(45)	
	(DS 450-1½)	(450)	(720)	(330)	(810)	(561)	(2.22 m)	(1.07 m)	(980)	(559)	(1.11 m)	(1.11 m)	(70)	(60)		(1.2)	(1.03 m)	(626)	(1.12 m)	(2.78 m)	(626)	(1.12 m)	(63)	140	
	DS 24-1½	24	34	16	39	30	8'-10¾"	4'-2¼"	3'-10"	30	4'-5¼"	4'-5½"	2¾	2¼	85°	2.2	4'-3"	32	4'-7"	11'-6"	32	4'-4"	32	(81)	
	(DS 600-1½)	(600)	(870)	(410)	(990)	(765)	(2.73 m)	(1.29 m)	(1.18 m)	(762)	(1.36 m)	(1.37 m)	(70)	(60)		(1.7)	(1.23 m)	(832)	(1.33 m)	(3.39 m)	(832)	(1.32 m)	42	240	
	DS 30-1½	30	39	19	39	36	10'-3"	4'-9¾"	4'-5"	36	5'-1¼"	5'-1¾"	2¾	2¼	85°	2.7	4'-10"	39	5'-2"	13'-3"	39	4'-11"	36	(108)	
(DS 750-1½)	(750)	(990)	(480)	(1140)	(917)	(3.12 m)	(1.47 m)	(1.35 m)	(914)	(1.56 m)	(1.56 m)	(70)	(60)		(2.1)	(1.39 m)	(983)	(1.51 m)	(3.88 m)	(983)	(1.50 m)	54	300		
10°	DS 36-1½	36	3'-9"	22	4'-4"	3'-8¼"	11'-11"	5'-6½"	5'-1"	3'-8"	5'-11¾"	5'-11¾"	2¾	2¼	85°	3.3	5'-7"	3'-11"	6'-0"	15'-6"	3'-11"	5'-7"	42	(135)	
	(DS 900-1½)	(900)	(1140)	(560)	(1320)	(1123)	(3.63 m)	(1.69 m)	(1.55 m)	(1.119 m)	(1.81 m)	(1.82 m)	(70)	(60)		(2.5)	(1.6 m)	(1.19 m)	(1.73 m)	(4.52 m)	(1.19 m)	(1.70 m)	54	(135)	
	DS 15-1½	15	28	10	29	19¼	7'-0½"	3'-7½"	36½	19	3'-6"	3'-6½"	2¾	2¼	80°	1.5	3'-4"	22	3'-10"	9'-0"	22	3'-6"	28	90	
	(DS 375-1½)	(375)	(720)	(260)	(740)	(490)	(2.17 m)	(1.12 m)	(940)	(483)	(1.08 m)	(1.09 m)	(70)	(60)		(1.2)	(972)	(557)	(1.14 m)	(2.67 m)	(557)	(1.07 m)	(41)	100	
	DS 18-1½	18	28	13	32	22¼	7'-3¾"	3'-7½"	36½	22	3'-7½"	3'-8¼"	2¾	2¼	80°	1.6	3'-4"	25	3'-10"	9'-3"	25	3'-9"	28	(45)	
	(DS 450-1½)	(450)	(720)	(330)	(810)	(568)	(2.24 m)	(1.12 m)	(940)	(559)	(1.11 m)	(1.13 m)	(70)	(60)		(1.2)	(990)	(633)	(1.17 m)	(2.8 m)	(633)	(1.14 m)	34	150	
	DS 24-1½	24	34	16	39	30½	9'-0"	4'-5"	3'-8½"	30	4'-5¾"	4'-6¼"	2¾	2¼	80°	2.2	4'-1"	33	4'-8"	11'-6"	33	4'-5"	34	(68)	
(DS 600-1½)	(600)	(870)	(410)	(990)	(774)	(2.76 m)	(1.36 m)	(1.14 m)	(762)	(1.37 m)	(1.39 m)	(70)	(60)		(1.7)	(1.18 m)	(841)	(1.4 m)	(3.42 m)	(841)	(1.35 m)	40	200		
15°	DS 30-1½	30	39	19	39	36½	10'-4½"	5'-0¾"	4'-3"	36	5'-1¾"	5'-2½"	2¾	2¼	80°	2.8	4'-9"	39	5'-6"	13'-6"	39	4'-11"	36	(81)	
	(DS 750-1½)	(750)	(990)	(480)	(1140)	(928)	(3.15 m)	(1.54 m)	(1.3 m)	(914)	(1.57 m)	(1.58 m)	(70)	(60)		(2.1)	(1.34 m)	(993)	(1.58 m)	(3.92 m)	(993)	(1.50 m)	42	240	
	DS 36-1½	36	3'-9"	22	4'-4"	3'-8¾"	12'-0½"	5'-10"	4'-10¾"	3'-8"	6'-0"	6'-0½"	2¾	2¼	80°	3.5	5'-6"	3'-11"	6'-4"	15'-9"	3'-11"	5'-7"	42	(108)	
	(DS 900-1½)	(900)	(1140)	(560)	(1320)	(1136)	(3.67 m)	(1.78 m)	(1.49 m)	(1.119 m)	(1.83 m)	(1.84 m)	(70)	(60)		(2.7)	(1.54 m)	(1.2 m)	(1.82 m)	(4.56 m)	(1.2 m)	(1.70 m)	54	(135)	
	DS 15-1½	15	28	10	29	19¼	7'-2"	3'-10"	35¾	19	3'-6½"	3'-7½"	3	2	75°	1.5	3'-4"	22	4'-1"	9'-3"	22	3'-6"	28	90	
	(DS 375-1½)	(375)	(720)	(260)	(740)	(500)	(2.2 m)	(1.19 m)	(910)	(483)	(1.09 m)	(1.11 m)	(80)	(50)		(1.2)	(942)	(567)	(1.2 m)	(2.71 m)	(567)	(1.07 m)	(41)	100	
	DS 18-1½	18	28	13	32	22¾	7'-5¼"	3'-10"	35¾	22	3'-8 "	3'-9¼"	3	2	75°	1.7	3'-4"	25	4'-1"	9'-6"	25	3'-9"	28	(45)	
(DS 450-1½)	(450)	(720)	(330)	(810)	(579)	(2.28 m)	(1.19 m)	(910)	(559)	(1.13 m)	(1.15 m)	(80)	(50)		(1.3)	(965)	(644)	(1.23 m)	(2.84 m)	(644)	(1.14 m)	34	150		
20°	DS 24-1½	24	34	16	39	31	9'-2"	4'-7¾"	3'-6¾"	30	4'-6½"	4'-7½"	3	2	75°	2.3	4'-0"	34	4'-11"	11'-9"	34	4'-6"	34	(68)	
	(DS 600-1½)	(600)	(870)	(410)	(990)	(789)	(2.8 m)	(1.43 m)	(1.1 m)	(762)	(1.39 m)	(1.41 m)	(80)	(50)		(1.8)	(1.15 m)	(857)	(1.47 m)	(3.47 m)	(857)	1.37 m)	40	200	
	DS 30-1½	30	39	19	39	37¼	10'-6½"	5'-4"	4'-1½"	36	5'-2¾"	5'-3¾"	3	2	75°	2.9	4'-8"	3'-4"	5'-9"	13'-9"	3'-4"	5'-0"	40	(90)	
	(DS 750-1½)	(750)	(990)	(480)	(1140)	(946)	(3.21 m)	(1.63 m)	(1.25 m)	(914)	(1.59 m)	(1.62 m)	(80)	(50)		(2.2)	(1.3 m)	(1.01 m)	(1.82 m)	(3.98 m)	(1.01 m)	(1.52 m)	46	260	
	DS 36-1½	36	3'-9"	22	4'-4"	3'-9½"	12'-3¼"	6'-2"	4'-8¾"	3'-8"	6'-1"	6'-2¼"	3	2	75°	3.8	5'-3"	4'-0"	6'-6"	15'-9"	4'-0"	5'-8"	46	(117)	
	(DS 900-1½)	(900)	(1140)	(560)	(1320)	(1158)	(3.73 m)	(1.87 m)	(1.44 m)	(1.119 m)	(1.85 m)	(1.88 m)	(80)	(50)		(2.9)	(1.49 m)	(1.22 m)	(1.92 m)	(4.63 m)	(1.22 m)	(1.73 m)	54	(135)	
	DS 15-1½	15	28	10	29	20¼	7'-4"	4'-0¾"	34¾	19	3'-7¼"	3'-8¾"	3	2	70°	1.6	39	23	4'-4"	9'-6"	23	3'-7"	28	90	
25°	(DS 375-1½)	(375)	(720)	(260)	(740)	(514)	(2.26 m)	(1.26 m)	(880)	(483)	(1.11 m)	(1.15 m)	(80)	(50)		(1.2)	(916)	(581)	(1.27 m)	(2.77 m)	(581)	(1.09 m)	(41)	100	
	DS 18-1½	18	28	13	32	23½	7'-7½"	4'-0¾"	34¼	22	3'-9"	3'-10½"	3	2	70°	1.7	39	26	4'-4"	9'-9"	26	3'-10"	28	(45)	
	(DS 450-1½)	(450)	(720)	(330)	(810)	(595)	(2.34 m)	(1.26 m)	(880)	(559)	(1.15 m)	(1.19 m)	(80)	(50)		(1.3)	(938)	(661)	(1.31 m)	(2.9 m)	(661)	(1.17 m)	38	160	
	DS 24-1½	24	34	16	39	32	9'-4½"	4'-11¼"	3'-5½"	30	4'-7½"	4'-9"	3	2	70°	2.4	3'-11"	35	5'-2"	12'-0"	35	4'-7"	42	(72)	
	(DS 600-1½)	(600)	(870)	(410)	(990)	(811)	(2.87 m)	(1.52 m)	(1.07 m)	(762)	(1.42 m)	(1.45 m)	(80)	(50)		(1.8)	(1.11 m)	(879)	(1.56 m)	(3.55 m)	(879)	(1.40 m)	50	280	
	DS 30-1½	30	39	19	39	28¼	10'-9¾"	5'-8"	3'-11½"	36	5'-4¼"	5'-5½"	3	2	70°	3.1	4'-5"	3'-5"	5'-11"	13'-9"	3'-5"	5'-1"	42	(95)	
	(DS 750-1½)	(750)	(990)	(480)	(1140)	(973)	(3.29 m)	(1.73 m)	(1.21 m)	(914)	(1.63 m)	(1.66 m)	(80)	(50)		(2.4)	(1.26 m)	(1.04 m)	(1.77 m)	(4.07 m)	(1.04 m)	(1.55 m)	54	300	
30°	DS 36-1½	36	3'-9"	22	4'-4"	3'-10¾"	12'-7"	6'-6½"	4'-7"	3'-8"	6'-2¾"	6'-4¼"	3	2	70°	4.0	5'-3"	4'-1"	6'-11"	16'-3"	4'-1"	5'-9"	50	(126)	
	(DS 900-1½)	(900)	(1140)	(560)	(1320)	(1191)	(3.86 m)	(1.99 m)	(1.41 m)	(1.119 m)	(1.9 m)	(1.93 m)	(80)	(50)		(3.1)	(1.45 m)	(1.26 m)	(2.03 m)	(4.73 m)	(1.26 m)	(1.75 m)	54	(135)	
	DS 15-1½	15	28	10	29	21	7'-7"	4'-4"	33¼	19	3'-8½"	3'-10½"	3¼	1¾	65°	1.6	39	23	4'-7"	9'-9"	23	3'-7"	28	90	
	(DS 375-1½)	(375)	(720)	(260)	(740)	(533)	(2.33 m)	(1.34 m)	(860)	(483)	(1.14 m)	(1.19 m)	(90)	(50)		(1.2)	(893)	(600)	(1.36 m)	(2.85 m)	(600)	(1.09 m)	(41)	120	
	DS 18-1½	18	28	13	32	24¼	7'-10¼"	4'-4"	33¼	22	3'-10¼"	4'-0"	3¼	1¾	65°	1.8	38	27	4'-7"	10'-0"	27	3'-11"	32	(54)	
	(DS 450-1½)	(450)	(720)	(330)	(810)	(617)	(2.42 m)	(1.34 m)	(860)	(559)	(1.19 m)	(1.23 m)	(90)	(50)		(1.4)	(914)	(683)	(1.39 m)	(2.99 m)	(683)	(1.19 m)	38	160	
	DS 24-1½	24	34	16	39	33	9'-8½"	5'-3¾"	3'-4¼"	30	4'-9¼"	4'-11¼"	3¼	1¾											

WINGS FOR 1:1½ SLOPE

Skew Angle	Design No.	Nominal Pipe Dia.	DIMENSIONS FOR CONCRETE													Concrete 2 End Sections yd³ (m³)	Reinf. Bars - 2 End Sections						Bars for 2 End Sections lbs. (kg)	
			A	B	C	D	E	F	G	H	J	K	M	N	α		h - bars				v-bars No.			
																	o	p	q	Lgth.		p		Lgth.
35°	DS 15-1½ (DS 375-1½)	15 (375)	28 (720)	10 (260)	29 (740)	23¼ (590)	8'-3¾" (2.55 m)	5'-0¾" (1.56 m)	31½ (820)	19 (483)	4'-0½" (1.24 m)	4'-3" (1.31 m)	3¾ (90)	1½ (40)	55° (1.4)	1.8 (1.4)	37 (855)	26 (658)	5'-3" (1.57 m)	10'-6" (3.09 m)	26 (658)	3'-10" (1.17 m)	36 (50)	110 (50)
	DS 18-1½ (DS 450-1½)	18 (450)	28 (720)	13 (330)	32 (810)	27 (682)	8'-7¼" (2.65 m)	5'-0¾" (1.56 m)	31½ (820)	22 (559)	4'-2¼" (1.29 m)	4'-5" (1.36 m)	3¾ (90)	1½ (40)	55° (1.5)	2.0 (1.5)	37 (876)	29 (750)	5'-3" (1.61 m)	10'-9" (3.24 m)	29 (750)	4'-1" (1.25 m)	36 (59)	130 (59)
	DS 24-1½ (DS 600-1½)	24 (600)	34 (870)	16 (410)	39 (990)	36½ (930)	10'-7¾" (3.26 m)	6'-1¾" (1.88 m)	38¼ (980)	30 (762)	5'-2½" (1.6 m)	5'-5¼" (1.66 m)	3¾ (90)	1½ (40)	55° (2.2)	2.9 (2.2)	3'-8" (1.04 m)	39 (1.0 m)	6'-4" (1.92 m)	13'-3" (3.96 m)	39 (1.0 m)	4'-11" (1.50 m)	40 (77)	170 (77)
	DS 30-1½ (DS 750-1½)	30 (750)	39 (990)	19 (480)	3'-9" (1140)	3'-8" (1116 m)	12'-3¼" (3.74 m)	7'-0½" (2.15 m)	3'-8" (1.12 m)	36 (914)	6'-0¼" (1.84 m)	3'-8" (1.9 m)	3¾ (90)	1½ (40)	55° (2.8)	3.7 (2.8)	4'-2" (1.17 m)	3'-11" (1.18 m)	7'-2" (2.18 m)	15'-3" (4.54 m)	3'-11" (1.18 m)	5'-7" (1.70 m)	50 (108)	240 (108)
	DS 36-1½ (DS 900-1½)	36 (900)	3'-9" (1140)	22 (560)	4'-4" (1320)	4'-5¾" (1.366 m)	14'-3¾" (4.35 m)	8'-1½" (2.47 m)	4'-2¾" (1.3 m)	3'-8" (1.119 m)	7'-0½" (2.14 m)	7'-3¼" (2.21 m)	3¾ (90)	1½ (40)	55° (3.8)	4.9 (3.8)	4'-11" (1.34 m)	4'-8" (1.43 m)	8'-5" (2.51 m)	18'-0" (5.29 m)	4'-8" (1.43 m)	6'-4" (1.93 m)	56 (140)	310 (140)
	DS 15-1½ (DS 375-1½)	15 (375)	28 (720)	10 (260)	29 (740)	24¾ (631)	8'-10" (2.71 m)	5'-6¼" (1.71 m)	31 (780)	19 (483)	4'-3½" (1.32 m)	4'-6½" (1.39 m)	3¾ (100)	1¼ (40)	50° (1.5)	1.9 (1.5)	37 (840)	27 (700)	5'-8" (1.71 m)	11'-0" (3.25 m)	27 (700)	3'-11" (1.19 m)	38 (54)	120 (54)
	DS 18-1½ (DS 450-1½)	18 (450)	28 (720)	13 (330)	32 (810)	28¾ (730)	9'-1¾" (2.81 m)	5'-6¼" (1.71 m)	31 (780)	22 (559)	4'-5½" (1.37 m)	4'-8¼" (1.44 m)	3¾ (100)	1¼ (40)	50° (1.7)	2.2 (1.7)	36 (860)	31 (798)	5'-8" (1.76 m)	11'-3" (3.41 m)	31 (798)	4'-3" (1.30 m)	38 (59)	130 (59)
40°	DS 24-1½ (DS 600-1½)	24 (600)	34 (870)	16 (410)	39 (990)	3'-3¼" (995)	11'-4" (3.47 m)	6'-8½" (2.08 m)	37½ (960)	30 (762)	5'-6½" (1.7 m)	5'-9½" (1.77 m)	3¾ (100)	1¼ (40)	50° (2.4)	3.1 (2.4)	3'-8" (1.02 m)	3'-6" (1.07 m)	6'-10" (2.1 m)	14'-0" (4.18 m)	3'-6" (1.07 m)	5'-2" (1.58 m)	48 (90)	200 (90)
	DS 30-1½ (DS 750-1½)	30 (750)	39 (990)	19 (480)	3'-9" (1140)	3'-11" (1.193 m)	13'-0¾" (3.98 m)	7'-8¼" (2.35 m)	3'-7" (1.1 m)	36 (914)	6'-5" (1.95 m)	6'-7¾" (2.03 m)	3¾ (100)	1¼ (40)	50° (3.1)	4.0 (3.1)	4'-2" (1.15 m)	4'-2" (1.26 m)	7'-11" (2.38 m)	16'-3" (4.79 m)	4'-2" (1.26 m)	5'-10" (1.78 m)	54 (117)	260 (117)
	DS 36-1½ (DS 900-1½)	36 (900)	3'-9" (1140)	22 (560)	4'-4" (1320)	4'-9½" (1.461 m)	15'-3" (4.64 m)	8'-10½" (2.7 m)	4'-1¾" (1.26 m)	3'-8" (1.119 m)	7'-6" (2.28 m)	7'-9" (2.35 m)	3¾ (100)	1¼ (40)	50° (4.1)	5.3 (4.1)	4'-10" (1.32 m)	5'-0" (1.53 m)	9'-2" (2.74 m)	19'-0" (5.59 m)	5'-0" (1.53 m)	6'-8" (2.03 m)	62 (153)	340 (153)
	DS 15-1½ (DS 375-1½)	15 (375)	28 (720)	10 (260)	29 (740)	27 (683)	9'-6" (2.92 m)	6'-1¼" (1.88 m)	30¼ (780)	19 (483)	4'-7½" (1.42 m)	4'-10½" (1.5 m)	4 (100)	1¼ (30)	45° (1.6)	2.1 (1.6)	36 (829)	29 (753)	6'-1" (1.89 m)	11'-6" (3.47 m)	29 (753)	4'-1" (1.25 m)	40 (59)	130 (59)
	DS 18-1½ (DS 450-1½)	18 (450)	28 (720)	13 (330)	32 (810)	31 (791)	9'-10¼" (3.03 m)	6'-1¼" (1.88 m)	30¼ (780)	22 (559)	4'-9½" (1.47 m)	5'-0¾" (1.56 m)	4 (100)	1¼ (30)	45° (1.8)	2.4 (1.8)	36 (847)	34 (859)	6'-2" (1.94 m)	12'-0" (3.64 m)	34 (859)	4'-6" (1.37 m)	44 (68)	150 (68)
	DS 24-1½ (DS 600-1½)	24 (600)	34 (870)	16 (410)	39 (990)	3'-6½" (1.078 m)	12'-3½" (3.74 m)	7'-4¾" (2.28 m)	36¾ (950)	30 (762)	5'-11½" (1.83 m)	6'-3" (1.91 m)	4 (100)	1¼ (30)	45° (2.6)	3.4 (2.6)	3'-8" (1.0 m)	3'-9" (1.15 m)	7'-7" (2.31 m)	15'-0" (4.47 m)	3'-9" (1.15 m)	5'-5" (1.65 m)	50 (95)	210 (95)
	DS 30-1½ (DS 750-1½)	30 (750)	39 (990)	19 (480)	3'-9" (1140)	4'-3" (1.293 m)	14'-1" (4.29 m)	8'-6" (2.59 m)	3'-6¼" (1.08 m)	36 (914)	6'-11" (2.1 m)	7'-2" (2.19 m)	4 (100)	1¼ (30)	45° (3.4)	4.4 (3.4)	4'-2" (1.13 m)	4'-5" (1.36 m)	8'-8" (2.63 m)	17'-3" (5.12 m)	4'-5" (1.36 m)	6'-1" (1.86 m)	62 (135)	300 (135)
45°	DS 36-1½ (DS 900-1½)	36 (900)	3'-9" (1140)	22 (560)	4'-4" (1320)	5'-2¼" (1.583 m)	16'-5¼" (5.01 m)	9'-9½" (2.98 m)	4'-0¾" (1.24 m)	3'-8" (1.119 m)	8'-1" (2.46 m)	8'-4¼" (2.55 m)	4 (100)	1¼ (30)	45° (4.4)	5.7 (4.4)	4'-10" (1.3 m)	5'-5" (1.65 m)	10'-0" (3.02 m)	20'-3" (5.97 m)	5'-5" (1.65 m)	7'-1" (2.16 m)	66 (167)	370 (167)
	DS 15-1½ (DS 375-1½)	15 (375)	28 (720)	10 (260)	29 (740)	29½ (751)	10'-4½" (3.18 m)	6'-10" (2.11 m)	29¾ (770)	19 (483)	5'-0½" (1.55 m)	5'-4" (1.64 m)	4¼ (110)	1 (30)	40° (1.8)	2.3 (1.8)	35 (817)	32 (822)	6'-11" (2.11 m)	12'-6" (3.75 m)	32 (822)	4'-4" (1.32 m)	46 (63)	140 (63)
	DS 18-1½ (DS 450-1½)	18 (450)	28 (720)	13 (330)	32 (810)	24¼ (870)	10'-9" (3.31 m)	6'-10" (2.11 m)	29¾ (770)	22 (559)	5'-2¾" (1.61 m)	5'-6¼" (1.7 m)	4¼ (110)	1 (30)	40° (2.0)	2.6 (2.0)	36 (836)	37 (939)	6'-11" (2.16 m)	13'-0" (3.94 m)	37 (939)	4'-9" (1.45 m)	46 (72)	160 (72)
	DS 24-1½ (DS 600-1½)	24 (600)	34 (870)	16 (410)	39 (990)	3'-10¾" (1.185 m)	13'-4¼" (4.08 m)	8'-3½" (2.55 m)	36¾ (930)	30 (762)	6'-6¼" (2 m)	6'-10" (2.09 m)	4¼ (110)	1 (30)	40° (2.8)	3.7 (2.8)	3'-7" (990)	4'-1" (1.26 m)	8'-4" (2.58 m)	16'-0" (4.83 m)	4'-1" (1.26 m)	5'-9" (1.75 m)	56 (104)	230 (104)
	DS 30-1½ (DS 750-1½)	30 (750)	39 (990)	19 (480)	3'-9" (1140)	4'-8" (1.422 m)	15'-5" (4.7 m)	9'-6" (2.9 m)	3'-5½" (1.06 m)	36 (914)	7'-6¾" (2.3 m)	7'-10¼" (2.39 m)	4¼ (110)	1 (30)	40° (3.7)	4.8 (3.7)	4'-1" (1.12 m)	4'-10" (1.49 m)	9'-7" (2.94 m)	18'-6" (5.54 m)	4'-10" (1.49 m)	6'-6" (1.98 m)	66 (144)	320 (144)
	DS 36-1½ (DS 900-1½)	36 (900)	3'-9" (1140)	22 (560)	4'-4" (1320)	5'-8½" (1.741 m)	18'-0¼" (5.48 m)	10'-11½" (3.34 m)	4'-0" (1.22 m)	3'-8" (1.119 m)	8'-10¼" (2.7 m)	9'-2" (2.78 m)	4¼ (110)	1 (30)	40° (4.8)	6.3 (4.8)	4'-9" (1.28 m)	5'-11" (1.81 m)	11'-1" (3.38 m)	21'-9" (6.47 m)	5'-11" (1.81 m)	7'-7" (2.31 m)	74 (185)	410 (185)
	DS 15-1½ (DS 375-1½)	15 (375)	28 (720)	10 (260)	29 (740)	33 (842)	11'-6¼" (3.54 m)	7'-9" (2.4 m)	29¼ (760)	19 (483)	5'-7¼" (1.72 m)	5'-11" (1.82 m)	4½ (110)	1 (30)	35° (2.0)	2.6 (2.0)	35 (809)	36 (914)	7'-10" (2.4 m)	13'-9" (4.12 m)	36 (914)	4'-8" (1.42 m)	50 (68)	150 (68)
55°	DS 18-1½ (DS 450-1½)	18 (450)	28 (720)	13 (330)	32 (810)	38¼ (975)	11'-11½" (3.68 m)	7'-9" (2.4 m)	29¼ (760)	22 (559)	5'-9¾" (1.79 m)	6'-1¾" (1.89 m)	4½ (110)	1 (30)	35° (2.2)	2.9 (2.2)	36 (827)	3'-5" (1.05 m)	7'-10" (2.46 m)	14'-3" (4.33 m)	3'-5" (1.05 m)	5'-1" (1.55 m)	50 (77)	170 (77)
	DS 24-1½ (DS 600-1½)	24 (600)	34 (870)	16 (410)	39 (990)	4'-4¼" (1.329 m)	14'-10½" (4.55 m)	9'-5" (2.9 m)	35¾ (910)	30 (762)	7'-3¼" (2.23 m)	7'-7¼" (2.32 m)	4½ (110)	1 (30)	35° (3.2)	4.2 (3.2)	3'-6" (978)	4'-7" (1.4 m)	9'-5" (2.94 m)	17'-6" (5.32 m)	4'-7" (1.4 m)	6'-3" (1.91 m)	62 (117)	260 (117)
	DS 30-1½ (DS 750-1½)	30 (750)	39 (990)	19 (480)	3'-9" (1140)	5'-2¾" (1.594 m)	17'-2¼" (5.24 m)	10'-9¾" (3.3 m)	3'-5" (1.04 m)	36 (914)	8'-5¼" (2.57 m)	8'-9" (2.67 m)	4½ (110)	1 (30)	35° (4.1)	5.4 (4.1)	4'-1" (1.1 m)	5'-6" (1.66 m)	10'-11" (3.33 m)	20'-6" (6.1 m)	5'-6" (1.66 m)	7'-2" (2.19 m)	74 (158)	350 (158)
	DS 36-1½ (DS 900-1½)	36 (900)	3'-9" (1140)	22 (560)	4'-4" (1320)																			

WINGS FOR 1:2 SLOPE

Skew Angle	Design No.	Nominal Pipe Dia.	DIMENSIONS FOR CONCRETE													Concrete 2 End Sections yd³ (m³)	Reinf. Bars - 2 End Sections							Bars for 2 End Sections lbs. (kg)
			A	B	C	D	E	F	G	H	J	K	M	N	α		h - bars				v-bars No.			
																	o	p	q	Lgth.		p	Lgth.	
5°	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	19 (485)	8'-7¾" (2.63 m)	4'-8¼" (1.42 m)	4'-3½" (1.31 m)	19 (483)	4'-3¾" (1.31 m)	4'-4" (1.32 m)	2¾ (70)	2¼ (60)	85°	1.9 (1.5)	4'-7" (1.33 m)	21 (551)	4'-11" (1.45 m)	11'-3" (3.33 m)	551 (551)	3'-5" (1.04 m)	34	110 (50)
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	22 (561)	8'-10¾" (2.7 m)	4'-8¼" (1.42 m)	4'-3½" (1.31 m)	22 (559)	4'-5¼" (1.35 m)	4'-5½" (1.35 m)	2¾ (70)	2¼ (60)	85°	2.0 (1.5)	4'-7" (1.36 m)	24 (626)	4'-11" (1.48 m)	11'-6" (4.47 m)	24 (626)	3'-8" (1.12 m)	34	120 (54)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	30 (765)	10'-11" (3.31 m)	5'-8" (1.72 m)	5'-2½" (1.58 m)	30 (762)	5'-5¼" (1.65 m)	5'-5¾" (1.66 m)	2¾ (70)	2¼ (60)	85°	2.9 (2.2)	5'-5" (1.62 m)	32 (832)	5'-11" (1.77 m)	14'-0" (4.22 m)	32 (832)	4'-4" (1.32 m)	42	180 (81)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	36 (917)	12'-5" (3.78 m)	6'-5" (1.96 m)	5'-10½" (1.79 m)	36 (914)	6'-2¼" (1.89 m)	6'-2¾" (1.89 m)	2¾ (70)	2¼ (60)	85°	3.7 (2.8)	6'-3" (1.84 m)	39 (983)	6'-9" (2.0 m)	16'-3" (4.83 m)	39 (983)	4'-11" (1.50 m)	48	230 (104)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	3'-8¼" (1.123 m)	14'-5" (4.39 m)	7'-4¾" (2.25 m)	6'-9½" (2.07 m)	3'-8" (1.119 m)	7'-2¼" (2.19 m)	7'-2¾" (2.2 m)	2¾ (70)	2¼ (60)	85°	4.5 (3.4)	7'-2" (2.12 m)	3'-11" (1.19 m)	7'-8" (2.3 m)	18'-9" (5.6 m)	3'-11" (1.19 m)	5'-7" (1.70 m)	54	300 (135)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	19¼ (490)	8'-9" (2.65 m)	4'-11" (1.5 m)	4'-1½" (1.26 m)	19 (483)	4'-4" (1.32 m)	4'-5" (1.33 m)	2¾ (70)	2¼ (60)	80°	2.0 (1.5)	4'-4" (1.28 m)	22 (557)	5'-1" (1.52 m)	22'-3" (3.36 m)	22 (557)	3'-6" (1.07 m)	34	110 (50)
10°	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	22¾ (568)	9'-0" (2.73 m)	4'-11" (1.5 m)	4'-1½" (1.26 m)	22 (559)	4'-5¾" (1.36 m)	4'-6¼" (1.37 m)	2¾ (70)	2¼ (60)	80°	2.1 (1.6)	4'-4" (1.32 m)	25 (633)	5'-1" (1.55 m)	11'-6" (3.5 m)	25 (633)	3'-9" (1.14 m)	34	120 (54)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	30½ (774)	11'-0¼" (3.34 m)	5'-11½" (1.81 m)	5'-0" (1.52 m)	30 (762)	5'-5¾" (1.66 m)	5'-6½" (1.68 m)	2¾ (70)	2¼ (60)	80°	3.0 (2.3)	5'-4" (1.57 m)	33 (841)	6'-2" (1.85 m)	14'-3" (4.26 m)	33 (841)	4'-5" (1.35 m)	42	180 (81)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	36½ (928)	12'-6¾" (3.82 m)	6'-9" (2.06 m)	5'-8" (1.73 m)	36 (914)	6'-3" (1.9 m)	6'-3¾" (1.92 m)	2¾ (70)	2¼ (60)	80°	3.8 (2.9)	6'-0" (1.78 m)	39 (993)	7'-0" (2.1 m)	16'-3" (4.87 m)	39 (993)	4'-11" (1.50 m)	48	230 (104)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	3'-8¾" (1.136 m)	14'-7" (4.44 m)	7'-9¼" (2.37 m)	6'-6¼" (1.99 m)	3'-8" (1.119 m)	7'-3" (2.21 m)	7'-4" (2.23 m)	2¾ (70)	2¼ (60)	80°	4.7 (3.6)	7'-0" (2.04 m)	3'-11" (1.2 m)	8'-1" (2.42 m)	19'-0" (5.66 m)	3'-11" (1.2 m)	5'-7" (1.70 m)	54	300 (135)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	19¾ (500)	8'-10¾" (2.7 m)	5'-2½" (1.58 m)	4'-0" (1.21 m)	19 (483)	4'-4¾" (1.34 m)	4'-6" (1.36 m)	3 (80)	2 (50)	75°	2.0 (1.5)	4'-3" (1.24 m)	22 (567)	5'-5" (1.6 m)	11'-6" (3.41 m)	22 (567)	3'-6" (1.07 m)	34	110 (50)
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	22¾ (579)	9'-2" (2.78 m)	5'-2½" (1.58 m)	4'-0" (1.21 m)	22 (559)	4'-6½" (1.38 m)	4'-7½" (1.4 m)	3 (80)	2 (50)	75°	2.2 (1.7)	4'-3" (1.27 m)	25 (644)	5'-5" (1.64 m)	11'-9" (3.55 m)	25 (644)	3'-9" (1.14 m)	34	120 (54)
15°	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	31 (789)	11'-2¾" (3.4 m)	6'-3½" (1.91 m)	4'-10" (1.47 m)	30 (762)	5'-6¾" (1.69 m)	5'-8" (1.72 m)	3 (80)	2 (50)	75°	3.1 (2.4)	5'-2" (1.52 m)	34 (857)	6'-6" (1.95 m)	14'-6" (4.32 m)	34 (857)	4'-6" (1.37 m)	42	180 (81)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	37¼ (946)	12'-9¼" (3.89 m)	7'-1½" (2.17 m)	5'-5½" (1.67 m)	36 (914)	6'-4" (1.93 m)	6'-5¼" (1.96 m)	3 (80)	2 (50)	75°	3.9 (3.0)	5'-10" (1.72 m)	3'-4" (1.01 m)	7'-4" (2.21 m)	16'-6" (4.94 m)	3'-4" (1.01 m)	5'-0" (1.52 m)	52	250 (113)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	3'-9½" (1.158)	14'-10¼" (4.52 m)	8'-2½" (2.5 m)	6'-3½" (1.92 m)	3'-8" (1.119 m)	7'-4½" (2.25 m)	7'-5¾" (2.27 m)	3 (80)	2 (50)	75°	5.0 (3.8)	6'-9" (1.97 m)	4'-0" (1.22 m)	8'-6" (2.55 m)	19'-3" (5.74 m)	4'-0" (1.22 m)	5'-8" (1.73 m)	56	310 (140)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	20¼ (514)	9'-1½" (2.77 m)	5'-6¼" (1.68 m)	3'-10½" (1.18 m)	19 (483)	4'-6" (1.37 m)	4'-7½" (1.4 m)	3 (80)	2 (50)	70°	2.1 (1.6)	4'-2" (1.21 m)	23 (581)	5'-8" (1.69 m)	11'-9" (3.48 m)	23 (581)	3'-7" (1.09 m)	36	110 (50)
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	23½ (595)	9'-4½" (2.85 m)	5'-6¼" (1.68 m)	3'-10½" (1.18 m)	22 (559)	4'-7½" (1.41 m)	4'-9" (1.44 m)	3 (80)	2 (50)	70°	2.3 (1.8)	4'-2" (1.24 m)	26 (661)	5'-8" (1.73 m)	12'-0" (3.63 m)	26 (661)	3'-10" (1.17 m)	36	130 (59)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	32 (811)	11'-6¼" (3.49 m)	6'-8¼" (2.03 m)	4'-8½" (1.42 m)	30 (762)	5'-8½" (1.73 m)	5'-9¾" (1.76 m)	3 (80)	2 (50)	70°	3.2 (2.4)	5'-0" (1.47 m)	35 (879)	6'-10" (2.07 m)	14'-9" (4.42 m)	35 (879)	4'-7" (1.40 m)	48	200 (90)
20°	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	38¼ (973)	13'-1¼" (3.99 m)	7'-6¾" (2.3 m)	5'-3½" (1.61 m)	36 (914)	6'-6" (1.98 m)	6'-7¼" (2.01 m)	3 (80)	2 (50)	70°	4.1 (3.1)	5'-9" (1.67 m)	3'-5" (1.04 m)	7'-10" (2.35 m)	17'-0" (5.05 m)	3'-5" (1.04 m)	5'-1" (1.55 m)	52	250 (113)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	3'-10¾" (1.191 m)	15'-3" (4.64 m)	8'-8½" (2.65 m)	6'-1¼" (1.86 m)	3'-8" (1.119 m)	7'-6¾" (2.3 m)	7'-8¼" (2.34 m)	3 (80)	2 (50)	70°	5.3 (4.1)	6'-6" (1.91 m)	4'-1" (1.26 m)	8'-11" (2.7 m)	19'-6" (5.87 m)	4'-1" (1.26 m)	5'-9" (1.75 m)	58	320 (144)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	21 (533)	9'-5" (2.86 m)	5'-10¾" (1.79 m)	3'-9" (1.14 m)	19 (483)	4'-7½" (1.41 m)	4'-9½" (1.45 m)	3¼ (90)	1¾ (50)	65°	2.2 (1.7)	4'-1" (1.12 m)	23 (600)	6'-0" (1.8 m)	12'-0" (3.58 m)	23 (600)	3'-7" (1.09 m)	38	120 (54)
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	24¼ (617)	9'-8½" (2.95 m)	5'-10¾" (1.79 m)	3'-9" (1.14 m)	22 (559)	4'-9¼" (1.45 m)	4'-11¼" (1.5 m)	3¼ (90)	1¾ (50)	65°	2.4 (1.8)	4'-0" (1.2 m)	27 (683)	6'-0" (1.85 m)	12'-3" (3.73 m)	27 (683)	3'-11" (1.19 m)	42	140 (63)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	33 (841)	11'-11" (3.61 m)	7'-1½" (2.16 m)	4'-6½" (1.38 m)	30 (762)	5'-10½" (1.78 m)	6'-0½" (1.83 m)	3¼ (90)	1¾ (50)	65°	3.4 (2.6)	4'-11" (1.43 m)	35 (909)	7'-4" (2.2 m)	15'-3" (4.55 m)	35 (909)	4'-7" (1.40 m)	48	200 (90)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	3'-3¼" (1.008 m)	13'-6¾" (4.13 m)	8'-0¾" (2.46 m)	5'-1¾" (1.57 m)	36 (914)	6'-8½" (2.04 m)	6'-10¼" (2.09 m)	3¼ (90)	1¾ (50)	65°	4.3 (3.3)	5'-6" (1.62 m)	3'-6" (1.08 m)	8'-3" (2.5 m)	17'-3" (5.2 m)	3'-6" (1.08 m)	5'-2" (1.58 m)	52	250 (113)
25°	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	4'-0½" (1.235 m)	15'-9¼" (4.8 m)	9'-3¾" (2.83 m)	5'-11¼" (1.81 m)	3'-8" (1.119 m)	7'-9¾" (2.38 m)	7'-11½" (2.42 m)	3¼ (90)	1¾ (50)	65°	5.6 (4.3)	6'-5" (1.86 m)	4'-3" (1.3 m)	9'-7" (2.88 m)	20'-3" (6.04 m)	4'-3" (1.3 m)	5'-11" (1.80 m)	60	330 (149)
	DS 15-2																							

WINGS FOR 1:2 SLOPE

Skew Angle	Design No.	Nominal Pipe Dia.	DIMENSIONS FOR CONCRETE													Concrete 2 End Sections yd³ (m³)	Reinf. Bars - 2 End Sections							Bars for 2 End Sections lbs. (kg)
			A	B	C	D	E	F	G	H	J	K	M	N	α		h - bars				v-bars No.			
																	o	p	q	Lgth.		p	Lgth.	
35°	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	23¼ (590)	10'-4" (3.14 m)	6'-10¼" (2.08 m)	3'-6¾" (1.08 m)	19 (485)	5'-0¾" (1.54 m)	5'-3¼" (1.6 m)	3¾ (90)	1½ (40)	55°	2.4 (1.8)	3'-11" (1.13 m)	26 (658)	6'-11" (2.09 m)	13'-0" (3.87 m)	26 (658)	3'-10" (1.17 m)	44 (63)	140 (63)
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	27 (683)	10'-7¾" (3.23 m)	6'-10¼" (2.08 m)	3'-6¾" (1.09 m)	22 (559)	5'-2½" (1.58 m)	5'-5¼" (1.65 m)	3¾ (90)	1½ (40)	55°	2.6 (2.0)	3'-11" (1.15 m)	29 (750)	6'-11" (2.14 m)	13'-3" (4.04 m)	29 (750)	4'-1" (1.25 m)	44 (68)	150 (68)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	36½ (930)	13'-1" (3.97 m)	8'-3½" (2.52 m)	4'-3¾" (1.31 m)	30 (762)	6'-5¼" (1.95 m)	6'-7¾" (2.02 m)	3¾ (90)	1½ (40)	55°	3.8 (2.9)	4'-8" (1.37 m)	39 (1.0 m)	8'-4" (2.56 m)	16'-3" (4.93 m)	39 (1.0 m)	4'-11" (1.50 m)	52 (99)	220 (99)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	3'-8" (1.116 m)	14'-11" (4.54 m)	9'-4½" (2.86 m)	4'-10½" (1.49 m)	36 (914)	7'-4¼" (2.24 m)	7'-6¾" (2.3 m)	3¾ (90)	1½ (40)	55°	4.8 (3.7)	5'-4" (1.55 m)	3'-11" (1.18 m)	9'-6" (2.9 m)	18'-9" (5.64 m)	3'-11" (1.18 m)	5'-7" (1.70 m)	60 (131)	290 (131)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	4'-5¾" (1.366 m)	17'-4¼" (5.28 m)	10'-10" (3.29 m)	5'-7¾" (1.72 m)	3'-8" (1.119 m)	8'-6¾" (2.61 m)	8'-9½" (2.67 m)	3¾ (90)	1½ (40)	55°	6.3 (4.8)	6'-1" (1.78 m)	4'-8" (1.43 m)	11'-0" (3.34 m)	21'-9" (6.55 m)	4'-8" (1.43 m)	6'-4" (1.93 m)	70 (171)	380 (171)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	34¾ (631)	11'-0" (3.34 m)	7'-6" (2.27 m)	3'-6" (1.06 m)	19 (485)	5'-4½" (1.63 m)	5'-7½" (1.71 m)	3¾ (100)	1¼ (40)	50°	2.6 (2.0)	3'-10" (1.1 m)	28 (700)	7'-7" (2.28 m)	13'-9" (4.08 m)	28 (700)	3'-11" (1.19 m)	48 (68)	150 (68)
40°	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	28¾ (730)	11'-4" (3.44 m)	7'-6" (2.27 m)	3'-6" (1.08 m)	22 (559)	5'-6½" (1.68 m)	5'-9½" (1.76 m)	3¾ (100)	1¼ (40)	50°	2.8 (2.1)	3'-10" (1.13 m)	31 (798)	7'-7" (2.34 m)	14'-0" (4.26 m)	31 (798)	4'-3" (1.30 m)	48 (72)	160 (72)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	3'-3¼" (995)	13'-11¼" (4.23 m)	9'-0¾" (2.75 m)	4'-2¾" (1.28 m)	30 (762)	6'-10¼" (2.08 m)	7'-1" (2.15 m)	3¾ (100)	1¼ (40)	50°	4.1 (3.1)	4'-7" (1.34 m)	3'-6" (1.07 m)	9'-2" (2.79 m)	17'-3" (5.2 m)	3'-6" (1.07 m)	5'-2" (1.58 m)	58 (108)	240 (108)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	3'-11" (1.193 m)	15'-10¾" (4.84 m)	10'-3" (3.12 m)	4'-9½" (1.46 m)	36 (914)	7'-10" (2.38 m)	8'-0¾" (2.46 m)	3¾ (100)	1¼ (40)	50°	5.2 (4.0)	5'-3" (1.52 m)	4'-2" (1.26 m)	10'-4" (3.17 m)	19'-9" (5.95 m)	4'-2" (1.26 m)	5'-10" (1.78 m)	64 (140)	310 (140)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	4'-9½" (1.461 m)	18'-6" (5.63 m)	11'-10" (3.6 m)	5'-6¼" (1.68 m)	3'-8" (1.119 m)	9'-1½" (2.78 m)	9'-4½" (2.85 m)	3¾ (100)	1¼ (40)	50°	6.8 (5.2)	6'-0" (1.74 m)	5'-0" (1.53 m)	12'-0" (3.65 m)	23'-0" (6.92 m)	5'-0" (1.53 m)	6'-3" (2.03 m)	78 (189)	420 (189)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	11'-10¼" (3.6 m)	8'-3¼" (2.51 m)	3'-5¼" (1.04 m)	19 (485)	5'-9½" (1.76 m)	6'-0¾" (1.84 m)	4 (100)	1¼ (30)	45°	2.8 (2.1)	3'-9" (1.09 m)	29 (753)	8'-4" (2.51 m)	14'-6" (4.35 m)	29 (753)	4'-1" (1.25 m)	48 (68)	150 (68)	
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	31 (791)	12'-2½" (3.7 m)	8'-3¼" (2.51 m)	3'-5¼" (1.04 m)	22 (559)	5'-11½" (1.81 m)	6'-3" (1.89 m)	4 (100)	1¼ (30)	45°	3.1 (2.4)	3'-10" (1.11 m)	34 (859)	8'-4" (2.58 m)	15'-0" (4.55 m)	34 (859)	4'-6" (1.37 m)	52 (81)	180 (81)
45°	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	3'-6½" (1.078 m)	15'-0¼" (4.56 m)	10'-0¼" (3.03 m)	4'-1¾" (1.26 m)	30 (762)	7'-4½" (2.24 m)	7'-7¾" (2.32 m)	4 (100)	1¼ (30)	45°	4.4 (3.4)	4'-6" (1.32 m)	3'-9" (1.15 m)	10'-0" (3.08 m)	18'-3" (5.55 m)	3'-9" (1.15 m)	5'-5" (1.65 m)	60 (113)	250 (113)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	4'-3" (1.293 m)	17'-1¾" (5.23 m)	11'-4" (3.45 m)	4'-8¼" (1.43 m)	36 (914)	8'-5¼" (2.57 m)	8'-8½" (2.66 m)	4 (100)	1¼ (30)	45°	5.6 (4.3)	5'-2" (1.49 m)	4'-5" (1.36 m)	11'-5" (3.5 m)	21'-0" (6.35 m)	4'-5" (1.36 m)	6'-1" (1.86 m)	72 (153)	340 (153)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	5'-2¼" (1.583 m)	19'-11¾" (6.08 m)	13'-0¾" (3.97 m)	5'-5" (1.65 m)	3'-8" (1.119 m)	9'-10¼" (3.0 m)	10'-1½" (3.08 m)	4 (100)	1¼ (30)	45°	7.4 (5.7)	5'-11" (1.71 m)	5'-5" (1.65 m)	13'-2" (4.02 m)	24'-6" (7.39 m)	5'-5" (1.65 m)	7'-1" (2.16 m)	82 (203)	450 (203)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	29½" (751)	12'-11½" (3.93 m)	9'-3" (2.81 m)	3'-4½" (1.03 m)	19 (485)	6'-4" (1.92 m)	6'-7½" (2.01 m)	4¼ (110)	1 (30)	40°	3.1 (2.4)	3'-9" (1.07 m)	32 (822)	9'-4" (2.81 m)	15'-9" (4.7 m)	32 (822)	4'-4" (1.32 m)	54 (77)	170 (77)
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	34¼ (870)	13'-4¼" (4.05 m)	9'-3" (2.81 m)	3'-4½" (1.03 m)	22 (559)	6'-6¼" (1.98 m)	6'-10" (2.07 m)	4¼ (110)	1 (30)	40°	3.4 (2.6)	3'-8" (1.1 m)	37 (939)	9'-3" (2.88 m)	16'-0" (4.92 m)	37 (939)	4'-9" (1.45 m)	54 (86)	190 (86)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	3'-10¾" (1.185 m)	16'-5½" (4.99 m)	11'-2½" (3.39 m)	4'-1" (1.24 m)	30 (762)	8'-1" (2.45 m)	8'-4½" (2.54 m)	4¼ (110)	1 (30)	40°	4.8 (3.7)	4'-6" (1.3 m)	4'-1" (1.26 m)	11'-2" (3.44 m)	19'-9" (6.0 m)	4'-1" (1.26 m)	5'-9" (1.75 m)	68 (126)	280 (126)
50°	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	4'-8" (1.422 m)	18'-9½" (5.72 m)	12'-8" (3.86 m)	4'-7½" (1.41 m)	36 (914)	9'-3" (2.82 m)	9'-6½" (2.92 m)	4¼ (110)	1 (30)	40°	6.2 (4.7)	5'-1" (1.47 m)	4'-10" (1.49 m)	12'-9" (3.91 m)	22'-9" (6.87 m)	4'-10" (1.49 m)	6'-6" (1.98 m)	78 (167)	370 (167)
	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	5'-8½" (1.741 m)	21'-10¾" (6.67 m)	14'-7½" (4.45 m)	5'-3¾" (1.62 m)	3'-8" (1.119 m)	10'-9½" (3.29 m)	11'-1¼" (3.38 m)	4¼ (110)	1 (30)	40°	8.1 (6.2)	5'-10" (1.69 m)	5'-11" (1.81 m)	14'-9" (4.5 m)	26'-6" (8.0 m)	5'-11" (1.81 m)	7'-7" (2.31 m)	90 (221)	490 (221)
	DS 15-2 (DS 375-2)	15 (375)	38 (960)	10 (260)	29 (740)	33 (842)	14'-5" (4.38 m)	10'-6¼" (3.2 m)	3'-4" (1.01 m)	19 (485)	7'-0½" (2.14 m)	7'-4½" (2.24 m)	4½ (110)	1 (30)	35°	3.4 (2.6)	3'-8" (1.06 m)	36 (914)	10'-7" (3.18 m)	17'-3" (5.17 m)	36 (914)	4'-8" (1.42 m)	60 (81)	180 (81)
	DS 18-2 (DS 450-2)	18 (450)	38 (960)	13 (330)	32 (810)	38¼ (975)	14'-10¼" (14'-10¼")	10'-6¼" (3.2 m)	3'-4" (1.01 m)	22 (559)	7'-3¼" (2.21 m)	7'-7" (2.3 m)	4½ (110)	1 (30)	35°	3.7 (2.8)	3'-9" (1.08 m)	3'-5" (1.05 m)	10'-7" (3.27 m)	17'-9" (5.4 m)	3'-5" (1.05 m)	5'-1" (1.55 m)	60 (95)	210 (95)
	DS 24-2 (DS 600-2)	24 (600)	3'-10" (1.16 m)	16 (410)	39 (990)	4'-4¼" (1.329 m)	14'-10¼" (5.56 m)	12'-9" (3.86 m)	4'-0¼" (1.22 m)	30 (762)	9'-0¼" (2.73 m)	9'-4" (2.83 m)	4½ (110)	1 (30)	35°	5.4 (4.1)	4'-5" (1.29 m)	4'-7" (1.4 m)	12'-9" (3.91 m)	21'-9" (6.6 m)	4'-7" (1.4 m)	6'-3" (1.91 m)	74 (135)	300 (135)
	DS 30-2 (DS 750-2)	30 (750)	4'-4" (1.32 m)	19 (480)	3'-9" (1.14 m)	5'-2¾" (1.594 m)	20'-11½" (6.39 m)	14'-5" (4.39 m)	4'-6½" (1.39 m)	36 (914)	10'-3¾" (3.15 m)	10'-7¾" (3.24 m)	4½ (110)	1 (30)	35°	6.9 (5.3)	5'-1" (1.45 m)	5'-6" (1.66 m)	14'-6" (4.44 m)	25'-0" (7.56 m)	5'-6" (1.66 m)	7'-2" (2.19 m)	88 (189)	420 (189)
60°	DS 36-2 (DS 900-2)	36 (900)	5'-0" (1.52 m)	22 (560)	4'-4" (1.32 m)	6'-4¾" (1																		