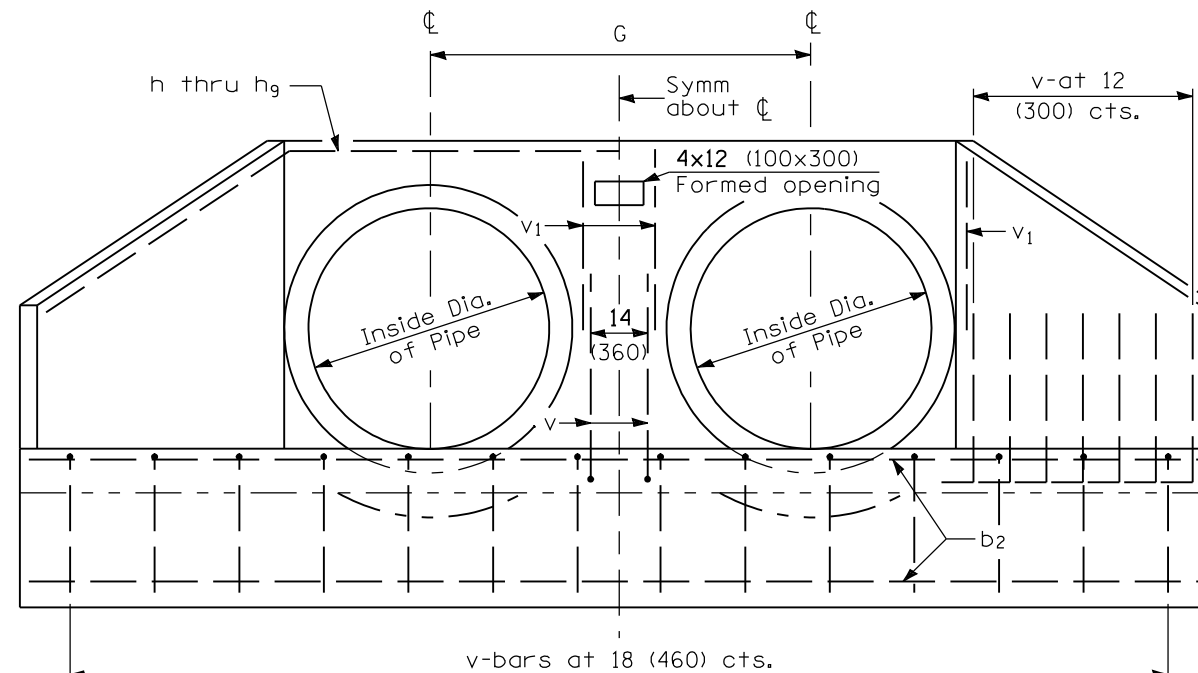
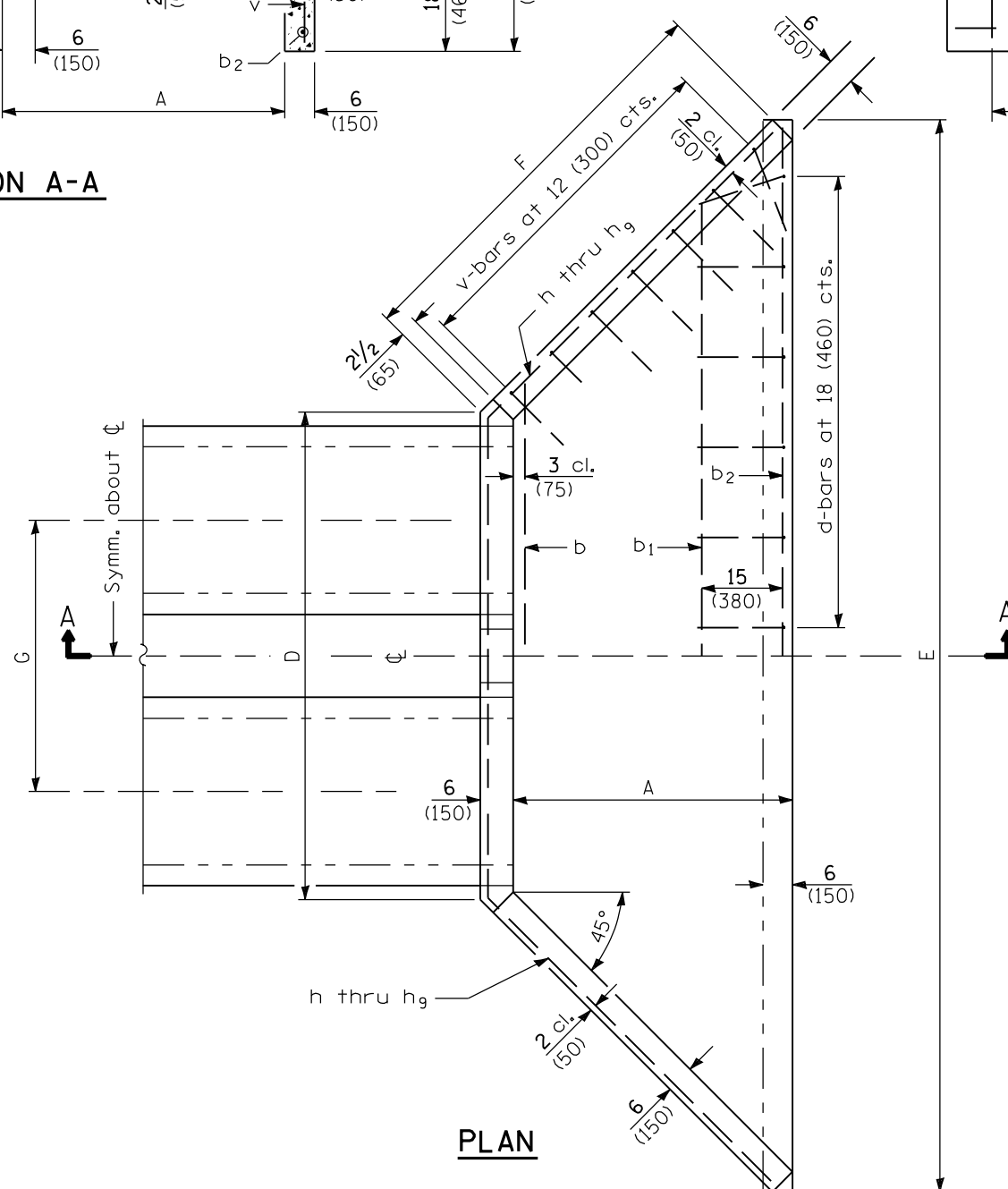


SECTION A-A



END ELEVATION



PLAN

GENERAL NOTES

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.

REINFORCED CONCRETE END SECTIONS FOR MULTIPLE (2 & 3) PIPE CULVERTS 15" (375 mm) THRU 36" (900 mm) DIA. AT RIGHT ANGLES WITH ROADWAY
(Sheet 1 of 3)

STANDARD 542116-02

Illinois Department of Transportation

APPROVED January 1, 2009
Ralph E. Anderson
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APPROVED January 1, 2009
Ken E. Han
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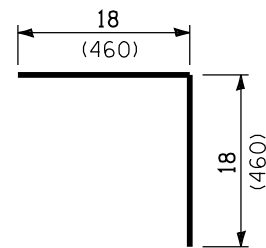
ISSUED 1-1-07

DIMENSIONS OF BARS-h to h₉

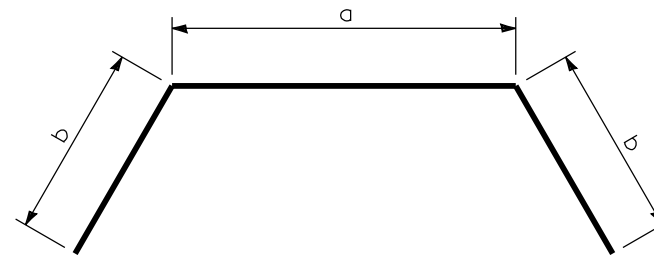
Bars	For 2 Pipes		For 3 Pipes	
	a	b	a	b
h	4'-11" (1.5 m)	29 (740)	8'-0" (2.44 m)	30 (760)
h ₁	4'-11" (1.5 m)	3'-3 1/2" (1.0 m)	8'-0" (2.44 m)	39 (990)
h ₂	5'-5" (1.65 m)	29 (740)	8'-9" (2.67 m)	30 (760)
h ₃	5'-5" (1.65 m)	3'-3 1/2" (1.0 m)	8'-9" (2.67 m)	39 (990)
h ₄	6'-9" (2.06 m)	39 (990)	10'-9" (3.28 m)	39 (990)
h ₅	6'-9" (2.06 m)	4'-3" (1.3 m)	10'-9" (3.28 m)	4'-3" (1.3 m)
h ₆	7'-9" (2.36 m)	3'-10 1/2" (1.18 m)	12'-3" (3.74 m)	3'-10 1/2" (1.18 m)
h ₇	7'-9" (2.36 m)	4'-10 1/2" (1.49 m)	12'-3" (3.74 m)	4'-10 1/2" (1.49 m)
h ₈	9'-0" (2.75 m)	4'-9" (1.45 m)	14'-0" (4.27 m)	4'-9" (1.45 m)
h ₉	9'-0" (2.75 m)	5'-9" (1.75 m)	14'-0" (4.27 m)	5'-9" (1.75 m)

TABLE OF DIMENSIONS

Design No.	Nominal Inside Dia. of Pipe	Slope of Wing Walls	Dimensions								
			For all Multiples of Pipes				For 2 Pipes		For 3 Pipes		
			A	B	C	F	G	D	E	D	E
D15-1 1/2 (D375-1 1/2)	15 (375)	1:1 1/2	19 (495)	10 (260)	23 (590)	29 1/2 (750)	37 (940)	5'-1" (1.55 m)	8'-6 1/2" (2.61 m)	8'-2" (2.49 m)	11'-7 1/2" (3.55 m)
D15-2 (D375-2)	15 (375)	1:2	26 (660)	10 (260)	23 (590)	3'-3 1/4" (1.0 m)	37 (940)	5'-1" (1.55 m)	9'-8 1/2" (2.96 m)	8'-2" (2.49 m)	12'-9 1/2" (3.9 m)
D18-1 1/2 (D450-1 1/2)	18 (450)	1:1 1/2	19 (495)	13 (330)	26 (660)	29 1/2 (750)	3'-4" (1.02 m)	5'-7" (1.71 m)	9'-0 1/2" (2.77 m)	8'-11" (2.73 m)	12'-4 1/2" (3.79 m)
D18-2 (D450-2)	18 (450)	1:2	26 (660)	13 (330)	26 (660)	3'-3 1/4" (1.0 m)	3'-4" (1.02 m)	5'-7" (1.71 m)	10'-2 1/2" (3.12 m)	8'-11" (2.73 m)	13'-6 1/2" (4.14 m)
D24-1 1/2 (D600-1 1/2)	24 (600)	1:1 1/2	25 (640)	16 (410)	33 (840)	38 (965)	4'-0" (1.22 m)	6'-11" (2.11 m)	11'-4 1/2" (3.47 m)	10'-11" (3.33 m)	15'-4 1/2" (4.69 m)
D24-2 (D600-2)	24 (600)	1:2	34 (860)	16 (410)	33 (840)	4'-2 1/2" (1.28 m)	4'-0" (1.22 m)	6'-11" (2.11 m)	12'-10 1/2" (3.92 m)	10'-11" (3.33 m)	16'-10 1/2" (5.14 m)
D30-1 1/2 (D750-1 1/2)	30 (750)	1:1 1/2	30 (760)	19 (485)	39 (990)	3'-9" (1.14 m)	4'-6" (1.37 m)	7'-11" (2.41 m)	13'-2 1/2" (4.02 m)	12'-5" (3.78 m)	17'-8 1/2" (5.39 m)
D30-2 (D750-2)	30 (750)	1:2	3'-4" (1.01 m)	19 (485)	39 (990)	4'-11" (1.5 m)	4'-6" (1.37 m)	7'-11" (2.41 m)	14'-10 1/2" (4.53 m)	12'-5" (3.78 m)	19'-4 1/2" (5.9 m)
D36-1 1/2 (D900-1 1/2)	36 (900)	1:1 1/2	36 (915)	22 (560)	3'-10" (1.17 m)	4'-5 1/2" (1.36 m)	5'-2" (1.57 m)	9'-0" (2.75 m)	15'-6 1/2" (4.67 m)	14'-5" (4.32 m)	20'-8 1/2" (6.24 m)
D36-2 (D900-2)	36 (900)	1:2	4'-0" (1.22 m)	22 (560)	3'-10" (1.17 m)	5'-10 1/2" (1.79 m)	5'-2" (1.57 m)	9'-0" (2.75 m)	17'-6 1/2" (5.28 m)	14'-5" (4.32 m)	22'-8 1/2" (6.85 m)



BAR v



BARS - h to h₉

Bend in field
One required in each headwall

Illinois Department of Transportation

APPROVED January 1, 2009
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APPROVED January 1, 2009
Ken E. Han
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ISSUED 1-1-97

REINFORCED CONCRETE END SECTIONS
FOR MULTIPLE (2 & 3) PIPE CULVERTS
15" (375 mm) THRU 36" (900 mm) DIA.
AT RIGHT ANGLES WITH ROADWAY
(Sheet 2 of 3)

STANDARD 542116-02

TABLE OF QUANTITIES

Design No.	Concrete 2 End Secs. cu. yds. (m ³)	For 2 Pipes										Total Quantity 2 End Secs. lbs. (kg)	
		Reinforcement Bars in One End Section											
		No. 4-h Bars (No. 13)		No. 4-b ₂ Bars (No. 13)		No. 4-b ₁ Bars (No. 13)		No. 4-b Bars (No. 13)		No. 4-v ₁ Bars (No. 13)			No. 4-v Bars (No. 13)
Bar	Length	Qty.	Length	Qty.	Length	Qty.	Length	Qty.	Length	Qty.	Length	Qty.	
D15-1/2 (D375-1/2)	1.4 (1.1)	h	9'-9" (2.98 m)	2	8'-3" (2.5 m)			1	6'-3" (1.9 m)			14	100 (45.4)
D15-2 (D375-2)	1.8 (1.4)	h ₁	11'-6" (3.5 m)	2	9'-3" (2.82 m)	1	7'-3" (2.21 m)	1	6'-3" (1.9 m)			17	130 (59.0)
D18-1/2 (D450-1/2)	1.7 (1.3)	h ₂	10'-3" (3.13 m)	2	8'-6" (2.59 m)			1	6'-9" (2.06 m)			14	100 (45.4)
D18-2 (D450-2)	2.0 (1.5)	h ₃	12'-0" (3.65 m)	2	9'-9" (2.97 m)	1	7'-9" (2.36 m)	1	6'-9" (2.06 m)			17	130 (59.0)
D24-1/2 (D600-1/2)	2.4 (1.8)	h ₄	13'-3" (4.04 m)	2	11'-0" (3.35 m)	1	9'-0" (2.74 m)	1	8'-0" (2.44 m)	4	31 (790)	18	160 (72.6)
D24-2 (D600-2)	3.0 (2.3)	h ₅	15'-3" (4.66 m)	2	12'-6" (3.81 m)	1	10'-6" (3.2 m)	1	8'-0" (2.44 m)	4	31 (790)	21	180 (81.6)
D30-1/2 (D750-1/2)	3.0 (2.3)	h ₆	15'-6" (4.72 m)	2	12'-9" (3.89 m)	1	10'-3" (3.12 m)	1	8'-3" (2.51 m)	4	31 (790)	19	170 (77.1)
D30-2 (D750-2)	3.8 (2.9)	h ₇	17'-6" (5.34 m)	2	14'-6" (4.42 m)	1	12'-3" (3.73 m)	1	8'-3" (2.51 m)	4	31 (790)	22	190 (86.2)
D36-1/2 (D900-1/2)	3.9 (3.0)	h ₈	18'-6" (5.65 m)	2	15'-0" (4.57 m)	1	12'-6" (3.81 m)	1	9'-9" (2.97 m)	4	3'-6" (1.07 m)	22	200 (90.7)
D36-2 (D900-2)	5.0 (3.8)	h ₉	20'-6" (6.25 m)	2	17'-0" (5.18 m)	1	14'-6" (4.42 m)	1	9'-9" (2.97 m)	4	3'-6" (1.07 m)	26	230 (104)
Design No.	Concrete 2 End Secs. cu. yds. (m ³)	For 3 Pipes										Total Quantity 2 End Secs. lbs. (kg)	
		Reinforcement Bars in One End Section											
		No. 4-h Bars (No. 13)		No. 4-b ₂ Bars (No. 13)		No. 4-b ₁ Bars (No. 13)		No. 4-b Bars (No. 13)		No. 4-v ₁ Bars (No. 13)			No. 4-v Bars (No. 13)
Bar	Length	Qty.	Length	Qty.	Length	Qty.	Length	Qty.	Length	Qty.	Length	Qty.	
D15-1/2 (D375-1/2)	2.0 (1.5)	h	13'-0" (3.96 m)	2	11'-3" (3.43 m)			1	9'-3" (2.82 m)			18	130 (59.0)
D15-2 (D375-2)	2.5 (1.9)	h ₁	14'-6" (4.42 m)	2	12'-3" (3.74 m)	1	11'-0" (3.35 m)	1	9'-3" (2.82 m)			21	170 (77.1)
D18-1/2 (D450-1/2)	2.3 (1.8)	h ₂	13'-9" (4.19 m)	2	12'-0" (3.66 m)			1	10'-0" (3.05 m)			19	140 (63.5)
D18-2 (D450-2)	2.7 (2.0)	h ₃	15'-3" (4.65 m)	2	13'-0" (3.96 m)	1	11'-9" (3.58 m)	1	10'-0" (3.05 m)			21	190 (86.2)
D24-1/2 (D600-1/2)	3.2 (2.4)	h ₄	17'-3" (5.26 m)	2	15'-0" (4.57 m)	1	13'-6" (4.11 m)	1	12'-0" (3.65 m)	6	31 (790)	22	210 (95.3)
D24-2 (D600-2)	3.9 (3.0)	h ₅	19'-3" (5.88 m)	2	16'-6" (5.03 m)	1	15'-6" (4.72 m)	1	12'-0" (3.65 m)	6	31 (790)	25	230 (104)
D30-1/2 (D750-1/2)	4.1 (3.1)	h ₆	20'-0" (6.1 m)	2	17'-3" (5.26 m)	1	14'-9" (4.5 m)	1	13'-0" (3.96 m)	6	31 (790)	24	230 (104)
D30-2 (D750-2)	5.0 (3.8)	h ₇	22'-0" (6.72 m)	2	19'-0" (5.79 m)	1	16'-9" (5.11 m)	1	13'-0" (3.96 m)	6	31 (790)	27	250 (113)
D36-1/2 (D900-1/2)	5.3 (4.1)	h ₈	23'-6" (7.17 m)	2	20'-0" (6.1 m)	1	17'-6" (5.33 m)	1	14'-9" (4.5 m)	6	3'-6" (1.07 m)	28	270 (122)
D36-2 (D900-2)	6.5 (5.0)	h ₉	25'-6" (7.77 m)	2	22'-0" (6.71 m)	1	19'-6" (5.94 m)	1	14'-9" (4.5 m)	6	3'-6" (1.07 m)	31	290 (132)

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(Sheet 3 of 3)

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