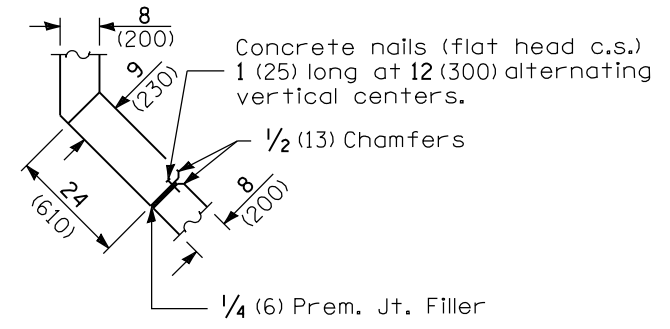
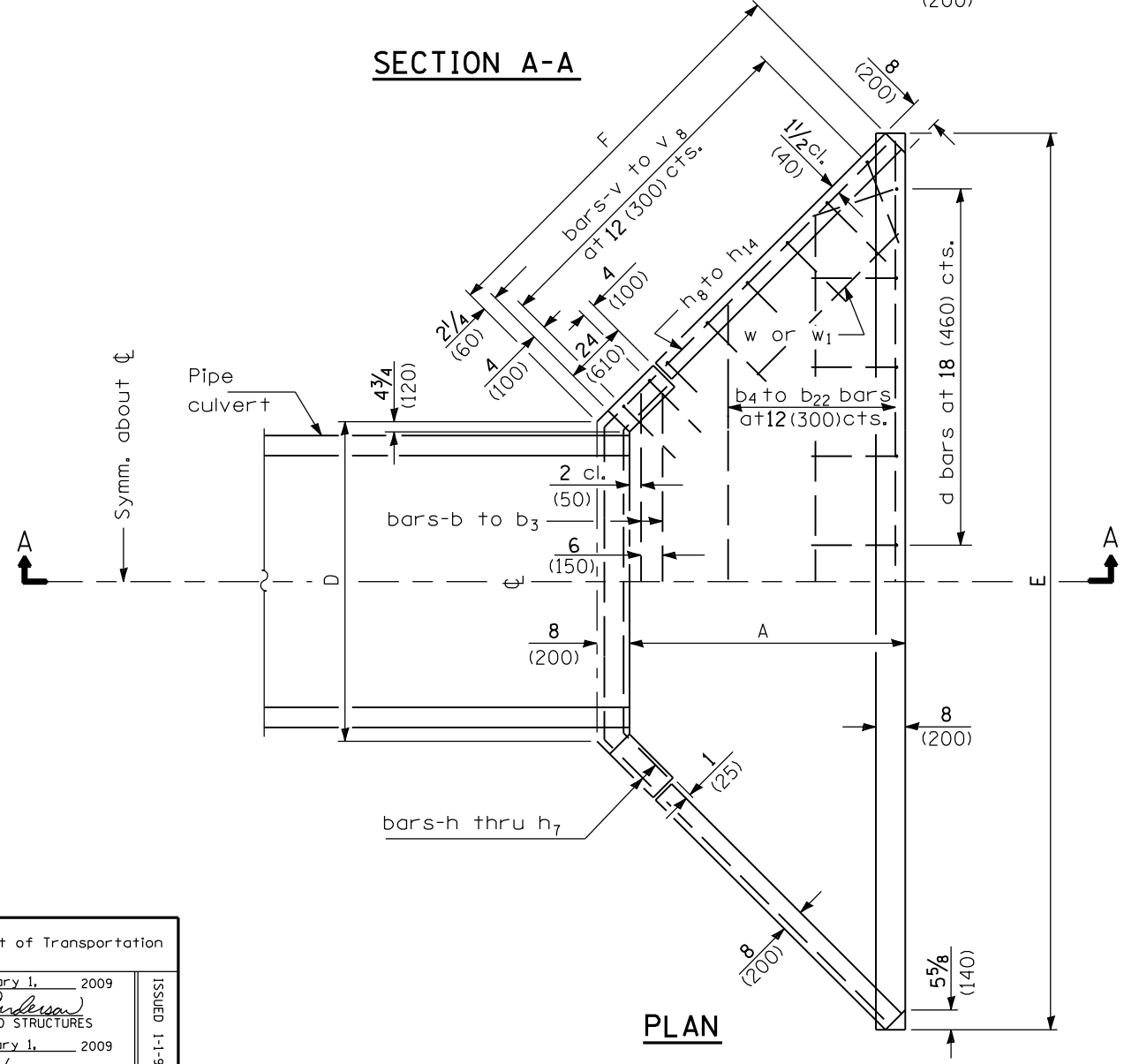
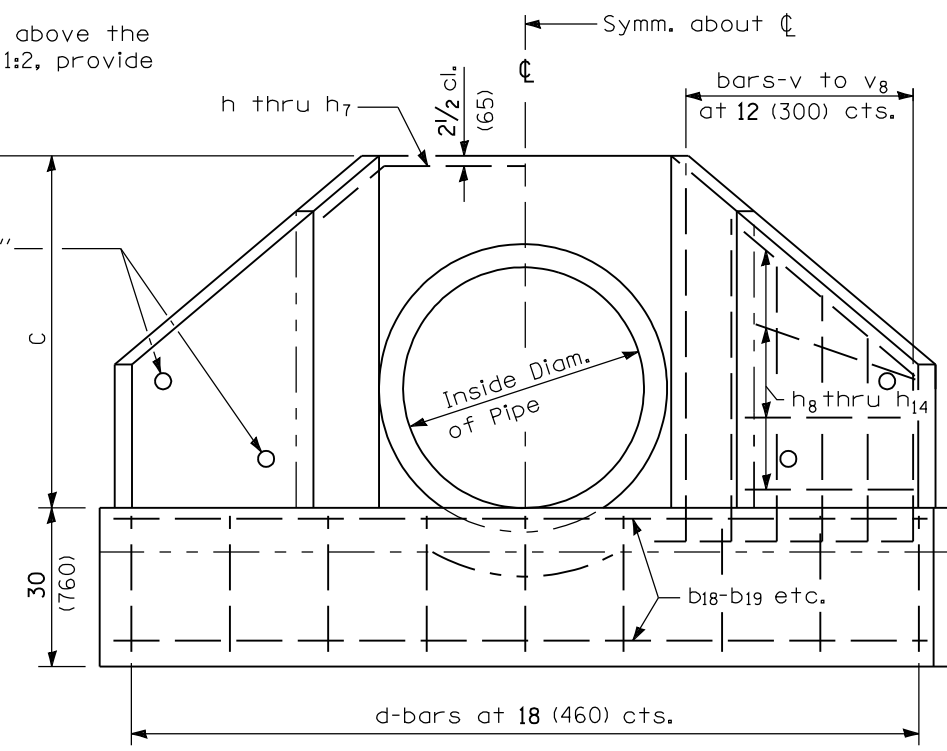


* If the embankment slope above the headwall is flatter than 1:2, provide wings for a 1:2 slope.



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 PIPE CULVERTS
66" (1650 mm) THRU 84" (2100 mm) DIA. AT RIGHT ANGLES WITH ROADWAY
 (Sheet 1 of 2)
STANDARD 542111-02

Illinois Department of Transportation

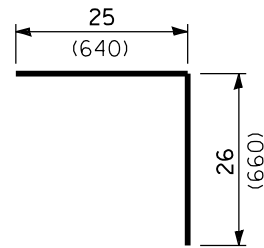
APPROVED January 1, 2009
Ralph E. Anderson
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APPROVED January 1, 2009
Ken E. Han
 ENGINEER OF DESIGN AND ENVIRONMENT

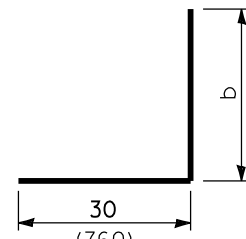
ISSUED 1-1-07

DIMENSIONS OF STRAIGHT BARS

Bar	Size	Length	Bar	Size	Length
b	No. 5 (No. 16)	8'-3" (2.51 m)	b ₁₆	No. 4 (No. 13)	20'-3" (6.17 m)
b ₁	No. 5 (No. 16)	9'-0" (2.74 m)	b ₁₇	No. 4 (No. 13)	21'-0" (6.4 m)
b ₂	No. 5 (No. 16)	9'-6" (2.9 m)	b ₁₈	No. 4 (No. 13)	22'-6" (6.86 m)
b ₃	No. 5 (No. 16)	10'-3" (3.12 m)	b ₁₉	No. 4 (No. 13)	24'-0" (7.32 m)
b ₄	No. 4 (No. 13)	11'-3" (3.43 m)	b ₂₀	No. 4 (No. 13)	24'-9" (7.54 m)
b ₅	No. 4 (No. 13)	12'-0" (3.66 m)	b ₂₁	No. 4 (No. 13)	27'-0" (8.23 m)
b ₆	No. 4 (No. 13)	13'-0" (3.96 m)	b ₂₂	No. 4 (No. 13)	29'-6" (8.99 m)
b ₇	No. 4 (No. 13)	13'-6" (4.11 m)	h ₈	No. 4 (No. 13)	5'-3" (1.6 m)
b ₈	No. 4 (No. 13)	14'-0" (4.27 m)	h ₉	No. 4 (No. 13)	6'-6" (1.98 m)
b ₉	No. 4 (No. 13)	14'-9" (4.5 m)	h ₁₀	No. 4 (No. 13)	7'-6" (2.29 m)
b ₁₀	No. 4 (No. 13)	15'-6" (4.72 m)	h ₁₁	No. 4 (No. 13)	8'-9" (2.67 m)
b ₁₁	No. 4 (No. 13)	16'-3" (4.95 m)	h ₁₂	No. 4 (No. 13)	9'-3" (2.82 m)
b ₁₂	No. 4 (No. 13)	16'-9" (5.11 m)	h ₁₃	No. 4 (No. 13)	10'-9" (3.28 m)
b ₁₃	No. 4 (No. 13)	17'-6" (5.33 m)	h ₁₄	No. 4 (No. 13)	12'-3" (3.73 m)
b ₁₄	No. 4 (No. 13)	18'-6" (5.64 m)	w	No. 4 (No. 13)	6'-0" (1.83m)
b ₁₅	No. 4 (No. 13)	19'-6" (5.94 m)	w ₁	No. 4 (No. 13)	10'-0" (3.05 m)



No. 4 (No. 13) BAR-d



BARs - v to v₈

BARs IN ONE END SECTION

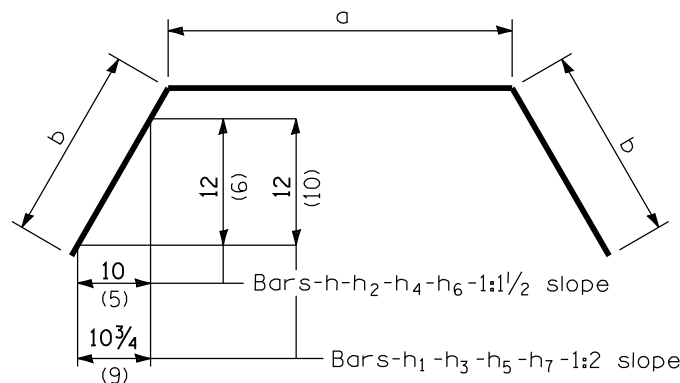
66 Pipe (1650)				72 Pipe (1800)				78 Pipe (1950)				84 Pipe (2100)			
66-1/2 (1.65-1/2)		66-2 (1.65-2)		72-1/2 (1.8-1/2)		72-2 (1.8-2)		78-1/2 (1.95-1/2)		78-2 (1.95-2)		84-1/2 (2.1-1/2)		84-2 (2.1-2)	
BARS	No.	BARS	No.	BARS	No.	BARS	No.	BARS	No.	BARS	No.	BARS	No.	BARS	No.
d	12	d	14	d	14	d	17	d	16	d	19	d	17	d	20
b	2	b	2	b ₁	2	b ₁	2	b ₂	2	b ₂	2	b ₃	2	b ₃	2
b ₄	1	b ₄	1	b ₅	1	b ₅	1	b ₅	1	b ₅	1	b ₆	1	b ₆	1
b ₇	1	b ₇	1	b ₈	1	b ₈	1	b ₈	1	b ₉	1	b ₉	1	b ₉	1
b ₁₀	1	b ₁₀	1	b ₁₁	1	b ₁₁	1	b ₁₁	1	b ₁₁	1	b ₁₂	1	b ₁₂	1
b ₁₃	2	b ₁₃	1	b ₁₄	1	b ₁₄	1	b ₁₄	1	b ₁₄	1	b ₁₄	1	b ₁₄	1
		b ₁₅	1	b ₁₆	2	b ₁₆	1	b ₁₆	1	b ₁₇	1	b ₁₇	1	b ₁₇	1
		b ₁₇	2			b ₁₈	1	b ₁₈	2	b ₁₈	1	b ₁₈	1	b ₁₈	1
						b ₁₉	2			b ₂₀	1	b ₁₉	2	b ₂₀	1
										b ₂₁	2			b ₂₁	1
														b ₂₂	2
h	2	h ₁	2	h ₂	2	h ₃	2	h ₄	2	h ₅	2	h ₆	2	h ₇	2
h ₈	8	h ₁₀	8	h ₉	10	h ₁₂	10	h ₁₀	12	h ₁₃	12	h ₁₁	12	h ₁₄	12
								v	4	v	4	v	4	v	4
v	4	v	4	v	4	v	4	v ₁	4	v ₁	8	v ₁	4	v ₁	6
v ₁	4	v ₁	6	v ₁	4	v ₁	8	v ₂	4	v ₂	6	v ₂	4	v ₂	4
v ₂	4	v ₂	4	v ₂	4	v ₃	6	v ₄	4	v ₄	6	v ₄	4	v ₄	6
v ₄	8	v ₄	10	v ₄	10	v ₅	10	v ₅	8	v ₆	8	v ₆	4	v ₆	6
												v ₇	8	v ₈	8
h ₈	4	h ₉	4	h ₈	4	h ₁₀	4	h ₉	4	h ₁₁	4	h ₁₀	4	h ₁₂	4
w	2	w	2	w	2	w ₁	2	w	2	w ₁	2	w ₁	2	w ₁	2

DIMENSIONS OF BENT BARS

No. 5-bars v to v ₈ (No. 16)			No. 5-bars h to h ₇ (No. 16)			
BAR	b	TOTAL LENGTH	BAR	a	TOTAL LENGTH	
v	39 (990)	5'-9" (1.75 m)	h	7'-0" (2.13 m)	24 (610)	11'-0" (3.35 m)
v ₁	4'-0" (1.22 m)	6'-6" (1.98 m)	h ₁	7'-0" (2.13 m)	24 (610)	11'-0" (3.35 m)
v ₂	5'-0" (1.52 m)	7'-6" (2.28 m)	h ₂	7'-7" (2.31 m)	23 1/2 (600)	11'-6" (3.51 m)
v ₃	5'-6" (1.68 m)	8'-0" (2.44 m)	h ₃	7'-7" (2.31 m)	23 1/2 (600)	11'-6" (3.51 m)
v ₄	6'-0" (1.83 m)	8'-6" (2.59 m)	h ₄	8'-2" (2.49 m)	23 (580)	12'-0" (3.65 m)
v ₅	6'-6" (1.98 m)	9'-0" (2.74 m)	h ₅	8'-2" (2.49 m)	23 (580)	12'-0" (3.65 m)
v ₆	7'-0" (2.13 m)	9'-6" (2.89 m)	h ₆	8'-9" (2.67 m)	24 (610)	12'-9" (3.89 m)
v ₇	7'-6" (2.29 m)	10'-0" (3.05 m)	h ₇	8'-9" (2.67 m)	24 (610)	12'-9" (3.89 m)
v ₈	8'-0" (2.44 m)	10'-6" (3.2 m)				

DIMENSIONS AND QUANTITIES

Design No.	Nominal Inside Dia. of Pipe	Slope of Wing Walls	Dimensions					Concrete 2 End Secs. cu. yds. (m ³)	Reinf. Bars 2 End Secs. lbs. (kg)
			A	C	D	E	F		
D66-1/2 (D1.65-1/2)	66 (1650)	1:1/2	5'-4" (1.65 m)	6'-6 1/2" (2.0 m)	7'-4 1/2" (2.25 m)	18'-5" (5.63 m)	7'-10" (2.39 m)	10.2 (7.8)	660 (300)
D66-2 (D1.65-2)	66 (1650)	1:2	7'-1" (2.18 m)	6'-6 1/2" (2.0 m)	7'-4 1/2" (2.25 m)	21'-11" (6.69 m)	10'-3 1/2" (3.14 m)	13.5 (10.3)	820 (372)
D72-1/2 (D1.8-1/2)	72 (1800)	1:1/2	6'-2" (1.9 m)	7'-1" (2.16 m)	7'-11 1/2" (2.43 m)	20'-8" (6.3 m)	9'-0" (2.74 m)	12.4 (9.5)	770 (350)
D72-2 (D1.8-2)	72 (1800)	1:2	8'-2" (2.51 m)	7'-1" (2.16 m)	7'-11 1/2" (2.43 m)	24'-8" (7.54 m)	11'-10" (3.61 m)	16.5 (12.6)	1020 (463)
D78-1/2 (D1.95-1/2)	78 (1950)	1:1/2	6'-11" (2.12 m)	7'-7 1/2" (2.32 m)	8'-6 1/2" (2.6 m)	22'-9" (6.93 m)	10'-0 1/2" (3.06 m)	14.5 (11.1)	910 (413)
D78-2 (D1.95-2)	78 (1950)	1:2	9'-3" (2.82 m)	7'-7 1/2" (2.32 m)	8'-6 1/2" (2.6 m)	27'-5" (8.37 m)	13'-4 1/2" (4.08 m)	19.6 (15.0)	1210 (550)
D84-1/2 (D2.1-1/2)	84 (2100)	1:1/2	7'-9" (2.38 m)	8'-2" (2.49 m)	9'-1 1/2" (2.78 m)	25'-0" (7.63 m)	11'-3" (3.43 m)	17.1 (13.1)	1090 (495)
D84-2 (D2.1-2)	84 (2100)	1:2	10'-4" (3.17 m)	8'-2" (2.49 m)	9'-1 1/2" (2.78 m)	30'-2" (9.2 m)	14'-10 3/4" (4.54 m)	23.2 (17.7)	1360 (617)



BARs - h to h₇

Illinois Department of Transportation

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ISSUED 1-1-97

REINFORCED CONCRETE END SECTIONS
 FOR PIPE CULVERTS
 66" (1650 mm) THRU 84" (2100 mm) DIA.
 AT RIGHT ANGLES WITH ROADWAY
 (Sheet 2 of 2)

STANDARD 542111-02