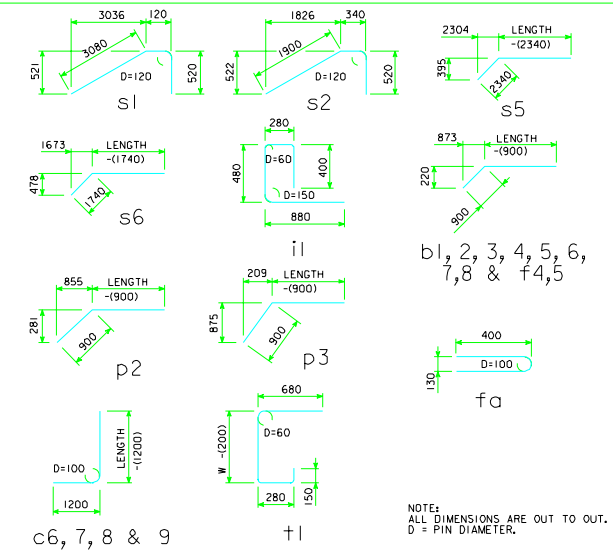


BILL OF REINF. FOR ONE HEADWALL 45° SKEW CULVERT SPAN X CULVERT HEIGHT

BENT BAR DETAILS

LOCATION	SHAPE	SIZE	MARK	1500x1800		1500x1500		1500x1200		1500x900		1200x1200		900x900		MARK		
				NO.	LENGTH	MASS	NO.	LENGTH	MASS	NO.	LENGTH	MASS	NO.	LENGTH	MASS		NO.	LENGTH
FENCE ANCHOR	b1	2	930	3	2	930	3	2	930	3	2	930	3	2	930	f a		
WINGWALL, BFH L	b1	1	11 930	19	1	10 180	16	1	8430	13	1	8430	10	1	6680	b1		
WINGWALL, BFH S	b2	1	7500	12	1	6450	10	1	5400	8	1	4350	7	1	5400	b2		
WINGWALL BFH L	b3	4	5700	52	3	4750	35	3	5700	21	1	5700	9	2	5700	b3		
WINGWALL BFH S	b4	4	(LENGTH VARIES)	10 950	3	(LENGTH VARIES)	9200	3	3780	2	3780	2	3780	2	3780	b4		
WINGWALL FFH L	b5	1	11 930	19	1	10 180	16	1	8430	13	1	8430	10	1	6680	b5		
WINGWALL FFH S	b6	5	7500	12	1	6450	10	1	5400	8	1	4350	7	1	5400	b6		
WINGWALL FFH L	b7	5	5700	4	4	3960	5	4	3960	2	2	3960	3	3	3960	b7		
WINGWALL FFH S	b8	5	2730	38	4	2730	3	3	2730	2	2	2730	3	2	2730	b8		
WINGWALL FFV L	c1	37	760	98	31	760	25	760	19	760	25	760	15	760	36	c1		
WINGWALL FFV S	c2	22	770	58	19	770	12	770	12	770	15	770	12	770	23	c2		
WINGWALL FFV L	c3	2	2500	8	2	2200	7	2	1900	6	2	1600	5	2	1600	c3		
WINGWALL FFV S	c4	2	2500	8	2	2200	7	2	1900	6	2	1600	5	2	1600	c4		
WINGWALL BFV L	e4	4	770	26	4	770	10	4	770	10	4	770	6	4	770	e4		
WINGWALL BFV S	e5	4	770	6	4	770	6	4	770	6	4	770	6	4	770	e5		
WINGWALL BFV L	e6	22	2730	113	16	2730	10	2730	4	2730	18	2730	4	2730	18	e6		
WINGWALL BFV S	e7	18	2310	86	15	2310	8	2310	11	2310	8	2310	8	2310	33	e7		
WINGWALL BFV L	e8	---	---	0	---	---	0	---	---	0	---	---	0	---	0	e8		
WINGWALL BFV S	e8	---	---	0	---	---	0	---	---	0	---	---	0	---	0	e8		
WINGWALL BFV L	e9	1	3700	6	1	3400	5	3100	5	1	2800	4	1	3100	5	e9		
WINGWALL BFV S	e9	2	3700	12	2	3400	11	3100	10	2	2800	9	2	3100	10	e9		
APRON, LONG BOT	d1	3	6580	31	3	5730	27	4880	29	5	4030	19	3	4880	23	d1		
APRON, LONG BOT L	d2	3	10 730	51	3	9000	42	7280	34	3	5570	26	3	7280	21	d2		
APRON, LONG BOT S	d3	3	6540	31	3	5510	26	3	4480	21	3	3470	16	3	4120	d3		
APRON, LONG TOP	f1	5	6580	77	5	5730	67	5	4880	57	5	4030	47	4	4880	28	f1	
APRON, LONG TOP L	f2	8	5060	55	7	4210	39	3360	26	4	2500	15	6	2800	4	f2		
APRON, LONG TOP S	f3	5	840	34	4	1000	3	1170	3	290	3	1170	3	290	3	f3		
APRON, LONG TOP L	f4	1	11 930	28	1	10 180	24	8430	20	1	6680	16	1	8430	20	f4		
APRON, LONG TOP S	f5	1	7500	18	1	6450	15	5400	18	1	4350	10	1	5400	13	f5		
PARAPET, VERT	j1	11	2040	35	11	2040	35	11	2040	35	11	2040	35	9	9	2040	22	j1
PARAPET, HORIZ	j1	4	2630	41	4	2630	41	4	2630	41	4	2630	41	4	2200	35	4	j1
APRON, TRANS TOP	m1	17	2260	18	13	2260	9	2260	17	11	1850	8	1550	8	1550	10	m1	
APRON, TRANS TOP	m2	10	4020	126	10	3580	89	2140	57	5	2260	20	62	8	2260	36	m2	
APRON, TRANS TOP	m3	4	2740	26	4	2240	23	2240	21	4	2080	20	3	2000	14	2	m3	
APRON, TRANS BOT	m4	11	520	55	9	520	38	520	24	5	420	6	2180	6	420	2	m4	
CURTAIN, HORIZ	p1	4	2010	19	4	2010	19	4	2010	19	4	1580	15	---	---	0	p1	
CURTAIN, HORIZ L	p2	4	7040	65	4	6090	57	4	5150	49	4	4200	40	4	4200	40	p2	
CURTAIN, HORIZ S	p3	4	2870	27	4	2570	24	4	2260	21	4	1960	18	4	1960	18	p3	
WING SLOPE EF L	s1	2	3720	18	2	3720	18	2	3720	18	2	3720	18	2	3720	18	s1	
WING SLOPE EF S	s2	2	2760	18	2	2760	18	2	2760	18	2	2760	18	2	2760	18	s2	
WING SLOPE EF L	s3	2	9020	42	2	7250	34	2	5470	26	2	3700	17	2	3700	17	s3	
WING SLOPE EF S	s4	2	5900	28	2	4810	23	2	3720	18	2	2630	12	2	2630	12	s4	
WING SLOPE FF L	s5	1	12 070	30	1	10 300	24	1	8530	20	1	6750	16	1	6750	16	s5	
WING SLOPE FF S	s6	1	7710	18	1	6620	16	1	5580	18	1	4430	10	1	4430	10	s6	
CURTAIN, VERT	t1	1	1960	65	18	1960	55	14	1960	43	11	1960	34	13	1960	40	8	t1



HEADWALL NOTES:

THIS HEADWALL IS BASED ON A 3:1 SLOPE NORMAL TO CENTERLINE OF ROADWAY. THE SIDES OF THE FOOTING ARE TO BE FORMED TO INSURE CORRECT LINE AND GRADE. ALL EXPOSED CORNERS OF 90° OR SHARPER ARE TO BE FILLETED WITH A 20 mm DRESSED AND BEVELED STRIP. ALL REINFORCING IS TO BE SECURELY WIRED IN PLACE BEFORE THE CONCRETE IS POURED. ALL SLAB AND FLOOR REINFORCING STEEL IS TO BE SUPPORTED BY BAR CHAIRS AT INTERVALS OF NOT MORE THAN 900 mm IN EITHER DIRECTION AS OUTLINED IN THE STANDARD SPECIFICATIONS. CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 50 mm UNLESS OTHERWISE NOTED OR SHOWN. CLEARANCE TO THE BOTTOM ENDS OF VERTICAL BARS SHALL BE 75 mm. CONCRETE QUANTITIES ARE ESTIMATED FROM BACK OF PARAPET. HORIZONTAL TAILS OF BARS "b" & "s" ESTIMATED TO EXTEND 600 mm BEYOND BACK OF PARAPET (INTO END OF BARREL). LONGITUDINAL BARS "d", "f1", "f4" AND "f5" ESTIMATED TO PROJECT INTO END SECTION OF BARREL A MINIMUM OF 600 mm BEYOND BACK OF PARAPET. THE "LENGTH" COLUMN REFLECTS TOTAL NUMBER OF MILLIMETERS NECESSARY TO MEET CLEARANCE REQUIREMENTS. "MASS" COLUMN INCLUDES AN ALLOWANCE OF 50 mm FOR LAP ON BARS THAT ARE OVER 12 000 mm LONG. ALL DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED OR SHOWN.

NOTES:

1. SEE SHEET MRCB-GI-95 FOR GENERAL INFORMATION, SPECIFICATIONS, AND DESIGN STRESSES.

LATEST REVISION DATE: 04-02  
 APPROVED BY: *William B. Thompson*  
 STANDARD DESIGN  
**FLARED WING HEADWALLS**  
 FOR REINFORCED CONCRETE BOX CULVERTS  
 PROJECT DEVELOPMENT DIVISION  
 IOWA DEPARTMENT OF TRANSPORTATION  
 JULY, 1995  
 MFWH 45-5-95

ESTIMATED QUANTITIES ONE HEADWALL	REINF. STEEL	1627 kg	PARAPET	1.1	1507 kg	1015 kg	761 kg	1.0	968 kg	0.9	668 kg
GONC	WINGS	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	0.9	0.9
	FOOTING	5.6	4.1	2.8	1.7	2.8	1.7	2.8	1.7	1.7	1.7
		12.3	9.9	7.8	5.9	7.8	5.9	7.3	5.9	5.1	5.1
		19.0 m <sup>3</sup>	15.1 m <sup>3</sup>	11.7 m <sup>3</sup>	8.7 m <sup>3</sup>	11.1 m <sup>3</sup>	8.7 m <sup>3</sup>	11.1 m <sup>3</sup>	8.7 m <sup>3</sup>	7.7 m <sup>3</sup>	7.7 m <sup>3</sup>

NOTES: Δ INCLUDES TOP OF WINGWALL QUANTITIES.

ΔΔ SUBSCRIPT L DENOTES LONG WING, SUBSCRIPT S DENOTES SHORT WING.

REVISED 1/99; BEND DIMENSIONS OF "i" BAR CHANGED.

REVISED 04-02 - CHANGED THE NUMBER OF "d" BARS FOR 1500 SPANS. CONCRETE QUANTITIES ADJUSTED. (FWH45501)