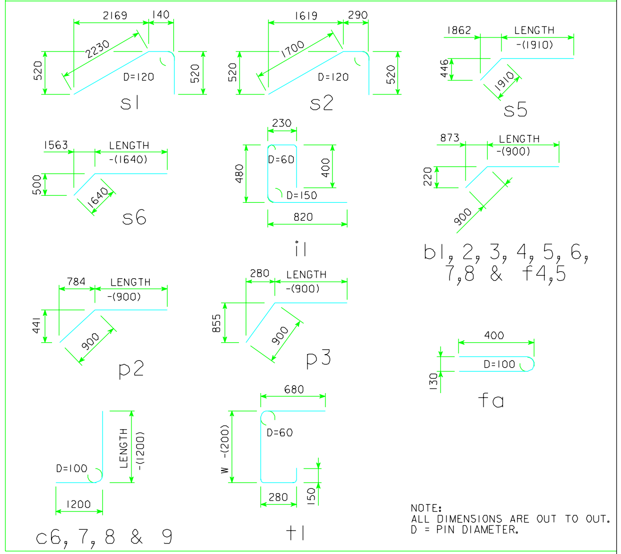
BILL OF REINF. FOR ONE HEADWALL 30° SKEW CULVERT SPAN X CULVERT HEIGHT

LOCATION ∆∆	SHAPE	SIZE	MARK	1800x2400 NO.	LENGTH	MASS	1800x1800 NO.	LENGTH	MASS	1800x1500 NO.	LENGTH	MASS	1800x1200 NO.	LENGTH	MASS	1800x900 NO.	LENGTH	MASS	MARK
FENCE ANCHOR		15	fa	2	930	3	2	930	3	2	930	3	2	930	3	2	930	3	fa
WINGWALL, BFH L		15	b1	1	11 280	18	1	8780	14	1	7530	12	1	6280	10	1	5020	8	b1
WINGWALL, BFH S		15	b2	1	8650	14	1	6780	11	1	5840	9	1	4910	8	1	3970	6	b2
WINGWALL BFH L		15	b3	6 (LENGTH VARIES)	4330 TO 10 590	70	4 (LENGTH VARIES)	4330 TO 8090	39	3 (LENGTH VARIES)	4330 TO 6840	26	2 (LENGTH VARIES)	4330 TO 5590	16	1	4330	7	b3
WINGWALL BFH S		15	b4	6 (LENGTH VARIES)	3460 TO 8140	55	4 (LENGTH VARIES)	3460 TO 6270	31	3 (LENGTH VARIES)	3460 TO 5340	21	2 (LENGTH VARIES)	3460 TO 4400	12	1	3460	5	b4
WINGWALL FFH L		15	b5	1	11 280	18	1	8780	14	1	7530	12	1	6280	10	1	5020	8	b5
WINGWALL FFH S		15	b6	1	8650	14	1	6780	11	1	5840	9	1	4910	8	1	3970	6	b6
WINGWALL FFH L		15	b7	7 (LENGTH VARIES)	3080 TO 10 590	75	5 (LENGTH VARIES)	3080 TO 8090	44	4 (LENGTH VARIES)	3080 TO 6840	31	3 (LENGTH VARIES)	3080 TO 5590	20	2 (LENGTH VARIES)	3080 TO 4330	12	b7
WINGWALL FFH S		15	b8	7 (LENGTH VARIES)	2530 TO 8140	59	5 (LENGTH VARIES)	2530 TO 6270	35	4 (LENGTH VARIES)	2530 TO 5340	25	3 (LENGTH VARIES)	2530 TO 4400	15	2 (LENGTH VARIES)	2530 TO 3460	9	b8
WINGWALL FFV L		15	c1	35 (LENGTH VARIES)	760 TO 3210	109	26 (LENGTH VARIES)	760 TO 2560	68	22 (LENGTH VARIES)	760 TO 2270	52	18 (LENGTH VARIES)	760 TO 1990	39	14 (LENGTH VARIES)	760 TO 1700	27	c1
WINGWALL FFV S		15	c2	26 (LENGTH VARIES)	770 TO 3180	81	20 (LENGTH VARIES)	770 TO 2600	53	17 (LENGTH VARIES)	770 TO 2310	41	14 (LENGTH VARIES)	770 TO 2020	31	10 (LENGTH VARIES)	770 TO 1640	19	c2
WINGWALL FFV L		15	c3	1	3100	5	1	2500	4	2	2200	7	1	1900	3	1	1600	3	c3
WINGWALL FFV S		15	c3	1	3100	5	2	2500	8	1	2200	3	1	1900	3	2	1600	5	c3
WINGWALL BFV L		15	c4	11 (LENGTH VARIES)	760 TO 1480	19	11 (LENGTH VARIES)	760 TO 1480	19	11 (LENGTH VARIES)	760 TO 1480	19	11 (LENGTH VARIES)	760 TO 1480	19	11 (LENGTH VARIES)	760 TO 1480	19	c4
WINGWALL BFV S		15	c5	6 (LENGTH VARIES)	770 TO 1260	10	6 (LENGTH VARIES)	770 TO 1260	10	6 (LENGTH VARIES)	770 TO 1260	10	6 (LENGTH VARIES)	770 TO 1260	10	6 (LENGTH VARIES)	770 TO 1260	10	c5
WINGWALL BFV L		15	c6	24 (LENGTH VARIES)	2760 TO 4410	135	15 (LENGTH VARIES)	2760 TO 3760	77	11 (LENGTH VARIES)	2760 TO 3470	54	7 (LENGTH VARIES)	2760 TO 3190	33	3 (LENGTH VARIES)	2760 TO 2900	13	c6
WINGWALL BFV S		15	c7	20 (LENGTH VARIES)	2550 TO 4380	109	14 (LENGTH VARIES)	2550 TO 3800	70	11 (LENGTH VARIES)	2550 TO 3510	52	8 (LENGTH VARIES)	2550 TO 3220	36	4 (LENGTH VARIES)	2550 TO 2840	17	c7
WINGWALL BFV L		15	c8	13	3150	64	---	---	0	---	---	0	---	---	0	---	---	0	c8
WINGWALL BFV S		15	c8	8	3150	40	---	---	0	---	---	0	---	---	0	---	---	0	c8
WINGWALL BFV L		15	c9	1	4300	7	1	3700	6	2	3400	11	1	3100	5	1	2800	4	c9
WINGWALL BFV S		15	c9	1	4300	7	2	3700	12	1	3400	5	1	3100	5	2	2800	9	c9
APRON, LONG BOT		15	d1	5	6760	53	5	5370	42	5	4680	37	5	3980	31	5	3290	26	d1
APRON, LONG BOT L		15	d2	3	9870	46	3	7400	35	3	6170	29	3	4950	23	2	4720	15	d2
APRON, LONG BOT S		15	d3	3	7450	35	3	5600	26	3	4690	22	3	3780	18	2	3590	11	d3
APRON, LONG TOP		20	f1	6	6760	96	6	5370	76	6	4680	66	6	3980	56	6	3290	46	f1
APRON, LONG TOP L		20	f2	8 (LENGTH VARIES)	550 TO 5440	56	6 (LENGTH VARIES)	540 TO 4050	32	5 (LENGTH VARIES)	540 TO 3350	23	4 (LENGTH VARIES)	530 TO 2660	15	3 (LENGTH VARIES)	530 TO 1960	9	f2
APRON, LONG TOP S		20	f3	6 (LENGTH VARIES)	690 TO 5380	43	4 (LENGTH VARIES)	1160 TO 3990	24	4 (LENGTH VARIES)	450 TO 3300	18	3 (LENGTH VARIES)	680 TO 2600	12	2 (LENGTH VARIES)	930 TO 1900	7	f3
APRON, LONG TOP L		20	f4	1	11 280	27	1	8780	21	1	7530	18	1	6280	15	1	5020	12	f4
APRON, LONG TOP S		20	f5	1	8650	20	1	6780	16	1	5840	14	1	4910	12	1	3970	9	f5
PARAPET, VERT		15	i1	13	1930	39	13	1930	39	13	1930	39	13	1930	39	13	1930	39	i1
PARAPET, HORIZ		25	j1	4	2550	40	4	2490	39	4	2490	39	4	2490	39	4	2490	39	j1
APRON, TRANS TOP		20	m1	4 (LENGTH VARIES)	2280 TO 2450	22	4 (LENGTH VARIES)	2230 TO 2400	22	4 (LENGTH VARIES)	2230 TO 2400	22	4 (LENGTH VARIES)	2230 TO 2400	22	4 (LENGTH VARIES)	2230 TO 2400	22	m1
APRON, TRANS TOP		20	m2	20 (LENGTH VARIES)	2540 TO 4630	169	14 (LENGTH VARIES)	2490 TO 3920	106	11 (LENGTH VARIES)	2490 TO 3590	79	8 (LENGTH VARIES)	2490 TO 3260	54	5 (LENGTH VARIES)	2490 TO 2930	32	m2
APRON, TRANS TOP		20	m3	3	3230	23	3	2870	20	3	2690	19	3	2490	18	3	2340	17	m3
APRON, TRANS BOT		20	m4	17 (LENGTH VARIES)	380 TO 3650	81	13 (LENGTH VARIES)	380 TO 2830	49	11 (LENGTH VARIES)	380 TO 2420	36	9 (LENGTH VARIES)	380 TO 2020	25	7 (LENGTH VARIES)	380 TO 1610	16	m4
CURTAIN, HORIZ		20	p1	4	2030	19	4	2030	19	4	2030	19	4	2030	19	4	2030	19	p1
CURTAIN, HORIZ L		20	p2	4	6030	57	4	4820	45	4	4220	40	4	3620	34	4	3010	28	p2
CURTAIN, HORIZ S		20	p3	4	3540	33	4	2920	28	4	2610	25	4	2290	22	4	1980	19	p3
WING SLOPE EF L		20	s1	2	2890	14	2	2890	14	2	2890	14	2	2890	14	2	2890	14	s1
WING SLOPE EF S		20	s2	2	2510	12	2	2510	12	2	2510	12	2	2510	12	2	2510	12	s2
WING SLOPE EF L		20	s3	2	9410	44	2	6840	32	2	5550	26	2	4260	20	2	2970	14	s3
WING SLOPE EF S		20	s4	2	7380	35	2	5410	25	2	4430	21	2	3450	16	2	2460	12	s4
WING SLOPE FF L		20	s5	1	11 550	27	1	8970	21	1	7690	18	1	6400	15	1	5110	12	s5
WING SLOPE FF S		20	s6	1	8980	21	1	7010	17	1	6030	14	1	5040	12	1	4060	10	s6
CURTAIN, VERT		15	t1	21	2110	70	17	1960	52	15	1960	46	12	1960	37	9	1960	28	t1
	REINF STEEL			1999 kg			1341 kg			1098 kg			867 kg			658 kg			
ESTIMATED QUANTITIES ONE HEADWALL	CONC	PARAPET∆		1.0	23.1 m^3		0.9	14.9 m^3		0.9	12.0 m^3		0.9	9.3 m^3		0.9	7.0 m^3		
		WINGS		8.0			4.4			3.3			2.2			1.3			
		FOOTING		14.1			9.6			7.8			6.2			4.8			

NOTES: ∆ INCLUDES TOP OF WINGWALL QUANTITIES.

∆∆ SUBSCRIPT L DENOTES LONG WING.
SUBSCRIPT S DENOTES SHORT WING.

BENT BAR DETAILS



NOTE:
ALL DIMENSIONS ARE OUT TO OUT.
D = PIN DIAMETER.

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 650 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-G1-95 FOR GENERAL INFORMATION, SPECIFICATIONS, AND DESIGN STRESSES.

LATEST REVISION DATE: 04-02

APPROVED BY: [signature]

STANDARD DESIGN

FLARED WING HEADWALLS

FOR
REINFORCED CONCRETE BOX CULVERTS

PROJECT DEVELOPMENT DIVISION
IOWA DEPARTMENT OF TRANSPORTATION

JULY, 1995

MFWH 30-4-95

REVISED 1/98; BEND DIMENSIONS OF i1 BAR CHANGED.

REVISED 04-02 - CHANGED THE NUMBER OF d1 BARS FOR 1800 SPANS. CONCRETE QUANTITIES ADJUSTED.

FWH304M.S01

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