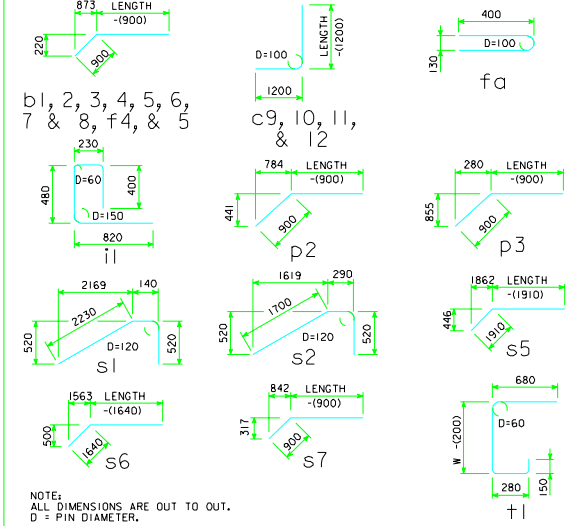


BILL OF REINFORCING FOR ONE HEADWALL
30° SKEW CULVERT SPAN X CULVERT HEIGHT

LOCATION	SHAPE	SIZE	MARK	2400x3000			2400x2400			2400x1800			MARK
				NO.	LENGTH	MASS	NO.	LENGTH	MASS	NO.	LENGTH	MASS	
FENCE ANCHOR		15	Fa	2	980	3	2	980	3	2	980	3	Fa
WINGWALL BFH L		15	b1	1	1790	22	1	11 280	18	1	11 280	18	b1
WINGWALL BFH R		15	b2	1	10 520	17	1	8650	14	1	6780	11	b2
WINGWALL BFH L		15	b8	8	4330	109	5	4330	70	4	4330	59	b8
WINGWALL BFH R		15	b4	8	3460	10	85	3460	10	55	3460	31	b4
WINGWALL FFH L		15	b5	1	10 020	13	1	790	18	1	6270	14	b5
WINGWALL FFH R		15	b6	1	10 020	17	1	8650	14	1	6780	11	b6
WINGWALL FFH L		15	b7	9	3080	7	114	3080	75	5	3080	44	b7
WINGWALL FFH R		15	b8	9	2530	18	89	2530	59	5	2530	25	b8
CENTER WALL EFH		15	b9	17	1550	10	125	1550	81	15	1550	47	b9
WINGWALL FFV L		15	c1	4	760	35	158	760	26	104	760	68	c1
WINGWALL FFV R		15	c2	2	8700	12	114	8700	81	20	8700	53	c2
WINGWALL FFV L		15	c3	2	3700	12	1	3100	5	2	2500	4	c3
WINGWALL FFV R		15	c4	2	480	1	2	480	1	2	430	1	c4
CENTER WALL EFV		15	e5	46	490	10	129	490	89	10	490	50	e5
CENTER WALL EFV		15	e6	2	3160	10	2	2560	8	2	1960	6	e6
WINGWALL BFV L		15	e7	11	760	19	11	760	19	11	760	19	e7
WINGWALL BFV R		15	e8	6	770	10	6	770	10	6	770	10	e8
WINGWALL BFV L		15	e9	32	2760	24	194	2760	15	195	2760	77	e9
WINGWALL BFV R		15	c10	25	2550	20	158	2550	14	109	2550	70	c10
WINGWALL BFV L		15	c11	21	8150	104	15	8150	84	---	---	0	c11
WINGWALL BFV R		15	c12	2	4900	15	1	4900	7	1	3700	6	c12
APRON LONG BOT L		15	e11	11	8140	141	11	8760	117	11	5370	93	e11
APRON LONG BOT R		15	e2	3	12 560	58	3	9870	46	3	7400	25	e2
APRON LONG TOP L		15	e3	3	9800	44	3	7450	35	3	5600	26	e3
APRON LONG TOP R		20	f1	16	8140	107	16	8760	255	16	5370	202	f1
APRON LONG TOP L		20	f2	8	700	8	8	700	8	8	980	8	f2
APRON LONG TOP R		20	f3	8	7240	75	8	5850	50	8	4470	30	f3
APRON LONG TOP L		20	f4	1	13 790	92	1	11 280	27	1	8780	21	f4
APRON LONG TOP R		20	f5	1	10 920	25	1	8650	20	1	6780	16	f5
PARAPET VERT		15	j1	87	1980	132	87	1980	132	86	1930	109	j1
PARAPET HORIZ		25	j1	4	13810	99	4	13810	99	4	8220	98	j1
APRON TRANS TOP		20	m1	8	5780	8	112	5780	8	5700	111	m1	
APRON TRANS TOP		20	m2	19	6190	13	209	6190	6	6120	90	m2	
APRON TRANS TOP		20	m3	8	5980	89	7	5990	86	7	5190	70	m3
APRON TRANS TOP		20	m4	4	4110	4	221	4110	16	4200	154	m4	
APRON TRANS BOT		20	m5	4	4110	4	221	4110	16	4200	154	m5	
CURTAIN HORIZ		20	p1	4	5790	95	4	5790	95	4	5760	54	p1
CURTAIN HORIZ L		20	p2	4	7240	88	4	8020	57	4	4820	45	p2
CURTAIN HORIZ R		20	p3	4	4170	49	4	3540	23	4	2920	28	p3
WING %LOPE EF L		20	s1	2	2890	14	2	2890	14	2	2890	14	s1
WING %LOPE EF R		20	s2	2	2510	12	2	2510	12	2	2510	12	s2
WING %LOPE EF L		20	s3	2	11 980	56	2	9410	44	2	6860	32	s3
WING %LOPE EF R		20	s4	2	9850	44	2	7880	35	2	5410	25	s4
WING %LOPE FF L		20	s5	1	14 120	33	1	11 550	27	1	8970	21	s5
WING %LOPE FF R		20	s6	1	10 940	26	1	8980	21	1	7010	17	s6
CENTER WALL EFH		20	t1	2	8440	40	2	8980	23	2	5430	26	t1
CURTAIN VERT		15	u1	16	2260	128	16	2110	99	16	1960	80	u1
ESTIMATED QUANTITIES	REINFORCING			3965 kg			2987 kg				2111 kg		
CONCRETE				44.6 m³			39.0 m³				22.2 m³		

NOTE:
 Δ INCLUDES TOP OF WINGWALL QUANTITIES
 L DENOTES LONG WING
 S DENOTES SHORT WING.

BENT BAR DETAILS



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 WIRE 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 900mm 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" AND "f3" 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.

NOTES:

1. SEE SHEET MTWRB-G1-95 FOR GENERAL INFORMATION, SPECIFICATIONS, AND DESIGN STRESSES.

LATEST REVISION DATE :
 04-02
 APPROVED BY :
William G. ...

STANDARD DESIGN
FLARED WING HEADWALLS
 FOR
 TWIN REINFORCED CONCRETE BOX CULVERTS

PROJECT DEVELOPMENT DIVISION
 IOWA DEPARTMENT OF TRANSPORTATION

JULY, 1995

MTWH 30-6-95