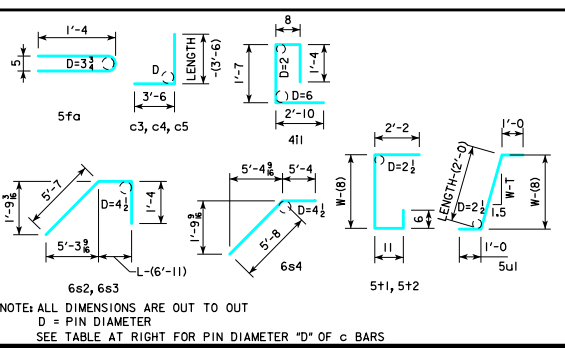


## BILL OF REINFORCING FOR ONE HEADWALL 0° SKEW CULVERT SPAN x CULVERT HEIGHT

LOCATION	SHAPE	8' x 10'				8' x 9'				8' x 8'				8' x 7'				8' x 6'				8' x 5'				8' x 4'																	
		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.															
FENCE ANCHOR (GALV.)	5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6											
WINGWALL, F.F.H.	5b1	2	33'-10	71	5b1	2	30'-10	64	5b1	2	27'-10	58	5b1	2	24'-10	52	5b1	2	21'-10	46	5b1	2	18'-10	39	5b1	2	15'-10	33	5b1	2	12'-10	26											
WINGWALL, F.F.H.	5b2	18 VAR	2 EACH 8'-10x32'-10	391	5b2	16 VAR	2 EACH 8'-10x29'-10	323	5b2	14 VAR	2 EACH 8'-10x26'-10	260	5b2	12 VAR	2 EACH 8'-10x23'-10	204	5b2	10 VAR	2 EACH 8'-10x20'-10	155	5b2	8 VAR	2 EACH 8'-10x17'-10	111	5b2	6 VAR	2 EACH 8'-10x14'-10	74	5b2	4 VAR	2 EACH 8'-10x11'-10	37											
WINGWALL, B.F.H.	4b3	2	33'-10	45	4b3	2	30'-10	41	4b3	2	27'-10	37	4b3	2	24'-10	33	4b3	2	21'-10	29	4b3	2	18'-10	25	4b3	2	15'-10	21	4b3	2	12'-10	17											
WINGWALL, B.F.H.	4b4	16 VAR	2 EACH 11'-10x32'-10	239	4b4	14 VAR	2 EACH 11'-10x29'-10	195	4b4	12 VAR	2 EACH 11'-10x26'-10	155	4b4	10 VAR	2 EACH 11'-10x23'-10	119	4b4	8 VAR	2 EACH 11'-10x20'-10	87	4b4	6 VAR	2 EACH 11'-10x17'-10	59	4b4	4 VAR	2 EACH 11'-10x14'-10	36	4b4	2 VAR	2 EACH 11'-10x11'-10	14											
WINGWALL, F.F.V. (L)	5c1	124 VAR	2 EACH 2'-6x12'-8	981	5c1	74 VAR	2 EACH 2'-6x11'-6	540	5c1	50 VAR	2 EACH 2'-6x10'-6	339	5c1	44 VAR	2 EACH 2'-6x9'-6	275	4c1	38 VAR	2 EACH 2'-6x8'-6	140	4c1	32 VAR	2 EACH 2'-6x7'-6	107	4c1	26 VAR	2 EACH 2'-6x6'-6	78	4c1	20 VAR	2 EACH 2'-6x5'-6	50											
WINGWALL, F.F.V. (R)	5c2	2	12'-9	27	5c2	2	11'-9	25	5c2	2	10'-9	22	5c2	2	9'-9	20	4c2	2	8'-9	12	4c2	2	7'-9	10	4c2	2	6'-9	9	4c2	2	5'-9	7											
WINGWALL, B.F.V. (L)	6c3	62 VAR	2 EACH 6'-1x16'-1	1032	6c3	56 VAR	2 EACH 6'-1x15'-1	618	6c3	50 VAR	2 EACH 6'-1x14'-1	526	6c3	44 VAR	2 EACH 6'-1x13'-1	440	6c3	38 VAR	2 EACH 6'-1x12'-1	518	6c3	32 VAR	2 EACH 6'-1x11'-1	286	6c3	26 VAR	2 EACH 6'-1x10'-1	219	6c3	20 VAR	2 EACH 6'-1x9'-1	152											
WINGWALL, B.F.V. (R)	6c4	2	16'-3	49	6c4	2	15'-3	32	6c4	2	14'-3	30	6c4	2	13'-3	28	6c4	2	12'-3	37	6c4	2	11'-3	23	6c4	2	10'-3	21	6c4	2	9'-3	19											
WINGWALL, B.F.V. (R)	6c5	42	8'-6	536	6c5	38	8'-6	337	6c5	34	8'-6	301	6c5	30	8'-6	266	c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-											
APRON, LONGIT., BOT.	4d1	7	33'-10	158	4d1	7	30'-10	144	4d1	7	27'-10	130	4d1	7	24'-10	116	4d1	7	21'-10	102	4d1	7	18'-10	88	4d1	7	15'-10	74	4d1	7	12'-10	60											
APRON, LONGIT., TOP	6f1	9	33'-10	457	6f1	9	30'-10	417	6f1	9	27'-10	376	6f1	9	24'-10	336	6f1	9	21'-10	295	6f1	9	18'-10	255	6f1	9	15'-10	214	6f1	9	12'-10	173											
PARAPET, VERTICAL	4i1	17	6'-5	73	4i1	17	6'-5	73	4i1	17	6'-5	73	4i1	17	6'-5	73	4i1	17	6'-5	73	4i1	17	6'-5	73	4i1	17	6'-5	73	4i1	17	6'-5	73											
PARAPET, HORIZ.	7j1	4	9'-4	76	7j1	4	9'-4	76	7j1	4	9'-4	76	7j1	4	9'-2	75	7j1	4	9'-2	75	7j1	4	9'-2	75	7j1	4	9'-2	75	7j1	4	9'-2	75											
APRON, TRANS., TOP	6m1	32	9'-10	473	6m1	29	9'-10	428	6m1	26	9'-10	384	6m1	23	9'-8	334	6m1	20	9'-8	290	6m1	17	9'-8	247	6m1	14	9'-8	203	6m1	11	9'-8	160											
APRON, TRANS., BOT.	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-	m2	-	-	-											
CURTAIN, HORIZ.	6p1	6	9'-10	419	6p1	6	9'-10	419	6p1	6	9'-10	419	6p1	6	9'-10	419	6p1	6	9'-10	419	6p1	6	9'-10	419	6p1	6	9'-10	419	6p1	6	9'-10	419											
WING SLOPE, BOTH F.	6s1	4	29'-4	176	6s1	4	26'-2	157	6s1	4	23'-0	138	6s1	4	19'-10	119	6s1	4	16'-8	100	6s1	4	13'-7	82	6s1	4	10'-5	63	6s1	4	7'-3	44											
WING SLOPE, BOTH F. (L)	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23											
WING SLOPE, BOTH F. (R)	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23											
WING SLOPE, F. F.	6s4	2	11'-0	33	6s4	2	11'-0	33	6s4	2	11'-0	33	6s4	2	11'-0	33	6s4	2	11'-0	33	6s4	2	11'-0	33	6s4	2	11'-0	33	6s4	2	11'-0	33											
WING SLOPE, F. F. (L)	6s5	2	27'-1	81	6s5	2	23'-11	72	6s5	2	20'-9	62	6s5	2	17'-7	53	6s5	2	14'-5	43	6s5	2	11'-3	34	6s5	2	8'-1	24	6s5	2	4'-9	15											
CURTAIN, VERT.	5t1	9	7'-5	70	5t1	9	7'-2	67	5t1	9	6'-11	65	5t1	9	6'-8	63	5t1	9	6'-5	60	5t1	9	6'-2	57	5t1	9	5'-10	54	5t1	9	4'-8	51											
CURTAIN, VERT., ENDS	5t2	4	7'-5	31	5t2	4	7'-2	30	5t2	4	6'-11	29	5t2	4	6'-8	28	5t2	4	6'-5	27	5t2	4	6'-2	26	5t2	4	5'-10	25	5t2	4	5'-7	24											
BRACKET, VERT.	5u1	4	6'-2	26	5u1	4	5'-11	25	5u1	4	5'-8	24	5u1	4	5'-6	23	5u1	4	5'-3	22	5u1	4	5'-0	21	5u1	4	4'-7	20	5u1	4	4'-4	19											
REINFORCING QUANTITIES	REINF. STEEL	5661 LBS.				4207 LBS.				3483 LBS.				2945 LBS.				2389 LBS.				1874 LBS.				1562 LBS.																	
CONCRETE QUANTITIES	CONCRETE	28.6 CU.YD.				25.1 CU.YD.				21.8 CU.YD.				17.7 CU.YD.				15.1 CU.YD.				12.6 CU.YD.				10.3 CU.YD.																	
ONE HEADWALL	CONCRETE	PARAPET Δ	1.2	WINGWALLS	13.2	APRON	14.2	PARAPET Δ	1.2	WINGWALLS	11.0	APRON	12.9	PARAPET Δ	1.2	WINGWALLS	9.0	APRON	11.6	PARAPET Δ	1.2	WINGWALLS	6.4	APRON	10.1	PARAPET Δ	1.2	WINGWALLS	5.0	APRON	8.9	PARAPET Δ	1.2	WINGWALLS	3.7	APRON	7.7	PARAPET Δ	1.2	WINGWALLS	2.5	APRON	6.6

Δ INCLUDES TOP OF WINGWALL QUANTITIES. (L) - INDICATES BAR LOCATED AT LEFT CORNER.  
 NOTE: WEIGHT OF BARS OVER 40'-0 LONG INCLUDE AN ALLOWANCE OF 2'-0 FOR LAP. (R) - INDICATES BAR LOCATED AT RIGHT CORNER.  
 REFER TO SHEET PWH 0-1-12 FOR LEFT AND RIGHT CORNER LOCATIONS.

### BENT BAR DETAILS



c BAR PIN DIAMETER	
BAR SIZE	D
4	3
5	3 1/4
6	4 1/2

### 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 3/4" 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 3'-0 IN EITHER DIRECTION AS OUTLINED IN THE STANDARD SPECIFICATIONS.  
 CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2" UNLESS OTHERWISE NOTED OR SHOWN. CLEARANCE TO THE BOTTOM ENDS OF VERTICAL BARS SHALL BE 3 INCHES.  
 CONCRETE QUANTITIES ARE ESTIMATED FROM BACK OF PARAPET.  
 HORIZONTAL TAILS OF BARS "b" & "c" ESTIMATED TO EXTEND 2'-0 BEYOND BACK OF PARAPET (INTO END OF BARREL). LONGITUDINAL BARS "4d1" AND "6f1" ESTIMATED TO PROJECT INTO END SECTION OF BARREL A MINIMUM OF 2'-0 BEYOND BACK OF PARAPET.  
 THE "LENGTH" COLUMN REFLECTS TOTAL NUMBER OF FEET NECESSARY TO MEET THESE REQUIREMENTS.

LATEST REVISION DATE  
 07-2016  
 APPROVED BY BRIDGE ENGINEER

Iowa Department of Transportation  
Highway Division

STANDARD DESIGN - SINGLE REINFORCED CONCRETE BOX CULVERTS

PARALLEL WING HEADWALLS

APRIL, 2012

QUANTITY TABULATION

8'-0 SPAN  
0° SKEW

PWH 0-7-12

REVISED 07-2016 - CHANGED FENCE ANCHOR BAR (5fa) FROM 3'-1 TO 2'-10. ENGLISH REVISIONS IN EQUILIBRIUM. DGN - PWH 0-7-12 - THIS SHEET ISSUED 04-12.