

## BILL OF REINFORCING FOR ONE HEADWALL 15° SKEW CULVERT SPAN x CULVERT HEIGHT

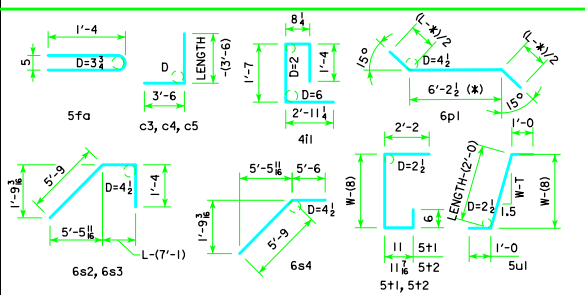
LOCATION	SHAPE	6' x 8'				6' x 7'				6' x 6'				6' x 5'				6' x 4'				6' x 3'			
		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.		BAR NO.	LENGTH	WT.	
FENCE ANCHOR (GALV.)	5fa	2	3'-1	6	5fa	2	3'-1	6	5fa	2	3'-1	6	5fa	2	3'-1	6	5fa	2	3'-1	6	5fa	2	3'-1	6	
WINGWALL, F.F.H.	5b1	2	28'-10	60	5b1	2	25'-8	54	5b1	2	22'-7	47	5b1	2	19'-6	41	5b1	2	16'-5	34	5b1	2	13'-3	28	
WINGWALL, F.F.H.	5b2	14 VAR	2 EACH 9'-2x27'-9	270	5b2	12 VAR	2 EACH 9'-2x24'-8	212	5b2	10 VAR	2 EACH 9'-2x21'-7	160	5b2	8 VAR	2 EACH 9'-2x18'-5	115	5b2	6 VAR	2 EACH 9'-2x15'-4	77	5b2	4 VAR	2 EACH 9'-2x12'-3	45	
WINGWALL, B.F.H.	4b3	2	28'-11	39	4b3	2	25'-9	34	4b3	2	22'-8	30	4b3	2	19'-7	26	4b3	2	16'-6	22	4b3	2	13'-4	18	
WINGWALL, B.F.H.	4b4	12 VAR	2 EACH 12'-4x27'-11	161	4b4	10 VAR	2 EACH 12'-4x24'-9	124	4b4	8 VAR	2 EACH 12'-4x21'-8	91	4b4	6 VAR	2 EACH 12'-4x18'-6	62	4b4	4 VAR	2 EACH 12'-4x15'-5	37	4b4	2	12'-4	16	
WINGWALL, F.F.V.	5c1	68 VAR	2 EACH 2'-6x10'-6	461	5c1	46 VAR	2 EACH 2'-6x9'-7	290	4c1	40 VAR	2 EACH 2'-6x8'-7	148	4c1	34 VAR	2 EACH 2'-6x7'-8	115	4c1	26 VAR	2 EACH 2'-6x6'-4	77	4c1	20 VAR	2 EACH 2'-6x5'-5	53	
WINGWALL, F.F.V. (O)	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	8	
WINGWALL, F.F.V. (A)	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	8	
WINGWALL, B.F.V.	5c3	52 VAR	2 EACH 6'-1x14'-2	549	5c3	46 VAR	2 EACH 6'-1x13'-2	462	6c3	40 VAR	2 EACH 6'-1x12'-2	548	5c3	34 VAR	2 EACH 6'-1x11'-3	307	4c3	26 VAR	2 EACH 6'-1x9'-11	139	4c3	20 VAR	2 EACH 6'-1x9'-0	101	
WINGWALL, B.F.V. (O)	5c4	2	14'-3	30	5c4	2	13'-3	28	6c4	2	12'-3	37	5c4	2	11'-3	23	4c4	2	10'-3	14	4c4	2	9'-3	12	
WINGWALL, B.F.V. (A)	5c4	2	14'-3	30	5c4	2	13'-3	28	6c4	2	12'-3	37	5c4	2	11'-3	23	4c4	2	10'-3	14	4c4	2	9'-3	12	
WINGWALL, B.F.V.	5c5	34	8'-6	301	5c5	30	8'-6	266	c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-	
APRON, LONGIT., BOT.	4d1	6	28'-9	115	4d1	6	25'-8	103	4d1	6	22'-6	90	4d1	6	19'-5	78	4d1	6	16'-4	65	4d1	6	13'-3	53	
APRON, LONGIT., TOP	6f1	7	28'-9	302	6f1	7	25'-8	270	6f1	7	22'-6	237	6f1	7	19'-5	204	6f1	7	16'-4	172	6f1	7	13'-3	139	
PARAPET, VERTICAL	4l1	13	6'-7	57	4l1	13	6'-7	57	4l1	13	6'-7	57	4l1	13	6'-7	57	4l1	13	6'-7	57	4l1	13	6'-7	57	
PARAPET, HORIZ.	7j1	4	7'-7	62	7j1	4	7'-5	61	7j1	4	7'-5	61	7j1	4	7'-5	61	7j1	4	7'-5	61	7j1	4	7'-5	61	
APRON, TRANS., TOP	6m1	26	7'-10	306	6m1	23	7'-8	265	6m1	20	7'-8	230	6m1	17	7'-8	196	6m1	14	7'-8	161	6m1	11	7'-8	127	
APRON, TRANS., TOP	6m2	2 VAR	2'-2x5'-11	12	6m2	1	5'-5	8	6m2	1	5'-1	8	6m2	1	4'-8	7	6m2	1	4'-3	6	6m2	1	3'-10	6	
APRON, TRANS., BOT.	6m3	25	5'-8	213	6m3	22	4'-8	107	4m3	19	3'-10	49	4m3	16	3'-10	41	4m3	13	3'-10	33	4m3	10	3'-10	26	
CURTAIN, HORIZ.	6p1	6	8'-1	73	6p1	5	7'-11	59	6p1	5	7'-11	59	6p1	5	7'-11	59	6p1	5	7'-11	59	6p1	5	7'-11	59	
WING SLOPE, BOTH F.	6s1	4	23'-8	142	6s1	4	20'-5	123	6s1	4	17'-2	103	6s1	4	13'-11	84	6s1	4	10'-7	64	6s1	4	7'-4	44	
WING SLOPE, BOTH F. (O)	6s2	2	7'-11	24	6s2	2	7'-11	24	6s2	2	7'-10	24	6s2	2	7'-10	24	6s2	2	7'-10	24	6s2	2	7'-10	24	
WING SLOPE, BOTH F. (A)	6s3	2	8'-1	24	6s3	2	8'-1	24	6s3	2	8'-0	24	6s3	2	8'-0	24	6s3	2	8'-0	24	6s3	2	8'-0	24	
WING SLOPE, F. F.	6s4	2	11'-3	34	6s4	2	11'-3	34	6s4	2	11'-3	34	6s4	2	11'-3	34	6s4	2	11'-3	34	6s4	2	11'-3	34	
WING SLOPE, F. F.	6s5	2	21'-5	64	6s5	2	18'-1	54	6s5	2	14'-10	45	6s5	2	11'-7	35	6s5	2	8'-4	25	6s5	2	5'-1	15	
CURTAIN, VERT.	5t1	7	6'-11	50	5t1	7	6'-8	49	5t1	7	6'-5	47	5t1	7	6'-5	47	5t1	7	6'-5	47	5t1	7	6'-5	47	
CURTAIN, VERT., ENDS	5t2	4	6'-11	29	5t2	4	6'-8	28	5t2	4	6'-5	27	5t2	4	6'-5	27	5t2	4	6'-5	27	5t2	4	6'-5	27	
BRACKET, VERT.	5ul	4	5'-8	24	5ul	4	5'-6	23	5ul	4	5'-3	22	5ul	4	5'-3	22	5ul	4	5'-3	22	5ul	4	5'-3	22	
ESTIMATED QUANTITIES ONE HEADWALL	REINF. STEEL	3482 LBS.				2833 LBS.				2245 LBS.				1738 LBS.				1319 LBS.				1072 LBS.			
	CONCRETE	PARAPET Δ	1.1	20.3	PARAPET Δ	1.1	16.4	PARAPET Δ	1.1	13.7	PARAPET Δ	1.1	11.5	PARAPET Δ	1.1	9.3	PARAPET Δ	1.1	7.3	WINGWALLS	9.3	6.7	4.6	3.3	
		WINGWALLS	9.3	CU.YD.	WINGWALLS	6.7	CU.YD.	WINGWALLS	5.1	CU.YD.	WINGWALLS	3.8	CU.YD.	WINGWALLS	2.6	CU.YD.	WINGWALLS	1.6	CU.YD.	APRON	9.9	8.6	7.5	6.6	
		APRON	9.9	CU.YD.	APRON	8.6	CU.YD.	APRON	7.5	CU.YD.	APRON	6.6	CU.YD.	APRON	5.6	CU.YD.	APRON	4.6	CU.YD.						

Δ INCLUDES TOP OF WINGWALL QUANTITIES.

NOTE: WEIGHT OF BARS OVER 40'-0 LONG INCLUDE AN ALLOWANCE OF 2'-0 FOR LAP.

(A) - INDICATES BAR LOCATED AT ACUTE CORNER.  
(O) - INDICATES BAR LOCATED AT OBTUSE CORNER.  
REFER TO SHEET PWH 15-1-12 FOR ACUTE AND OBTUSE CORNER LOCATIONS.

### BENT BAR DETAILS



NOTE: ALL DIMENSIONS ARE OUT TO OUT  
D = PIN DIAMETER  
SEE TABLE AT RIGHT FOR PIN DIAMETER "D" OF C BARS

c BAR PIN DIAMETER	
BAR SIZE	D
4	3
5	3 1/2
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" & "s" 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	 IOWA Department of Transportation Highway Division
	STANDARD DESIGN - SINGLE REINFORCED CONCRETE BOX CULVERTS <b>PARALLEL WING HEADWALLS</b>
	APRIL, 2012
	<b>QUANTITY TABULATION</b> 6'-0 SPAN 15° SKEW
APPROVED BY BRIDGE ENGINEER  Norman E. M. Dwyer	PWH 15-8-12

ENGLISH/RS/DS/IG/NS/LE/CULVERTS.DGN - PWH 15-8-12 - THIS SHEET ISSUED 04-12