

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

LOCATION	SHAPE	5' x 6'				5' x 5'				5' x 4'				5' x 3'			
		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
WINGWALL, F.F.H.		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	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	22'-8	30	4b3	2	19'-7	26	4b3	2	16'-6	22	4b3	2	13'-4	18
WINGWALL, B.F.H.		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.		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)		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)		4c2	2	8'-9	12	4c2	2	7'-9	10	4c2	2	6'-9	9	4c2	2	5'-9	8
WINGWALL, B.F.V.		6c3	40 VAR	2 EACH 6'-1x12'-2	548	6c3	34 VAR	2 EACH 6'-1x11'-3	307	6c3	26 VAR	2 EACH 6'-1x9'-11	139	6c3	20 VAR	2 EACH 6'-1x9'-0	101
WINGWALL, B.F.V. (O)		6c4	2	12'-3	37	6c4	2	11'-3	23	6c4	2	10'-3	14	6c4	2	9'-3	12
WINGWALL, B.F.V. (A)		6c4	2	12'-3	37	6c4	2	11'-3	23	6c4	2	10'-3	14	6c4	2	9'-3	12
WINGWALL, B.F.V.		c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-
APRON, LONGIT., BOT.		4d1	5	22'-6	75	4d1	5	19'-5	65	4d1	5	16'-4	55	4d1	5	13'-3	44
APRON, LONGIT., TOP		6f1	6	22'-6	203	6f1	6	19'-5	175	6f1	6	16'-4	147	6f1	6	13'-3	119
PARAPET, VERTICAL		4f1	11	6'-7	48	4f1	11	6'-7	48	4f1	11	6'-7	48	4f1	11	6'-7	48
PARAPET, HORIZ.		7j1	4	6'-5	52	7j1	4	6'-5	52	7j1	4	6'-5	52	7j1	4	6'-5	52
APRON, TRANS., TOP		6m1	20	6'-8	200	6m1	17	6'-8	170	6m1	14	6'-8	140	6m1	11	6'-8	110
APRON, TRANS., TOP		6m2	1	4'-7	7	6m2	1	4'-2	6	6m2	1	3'-9	6	6m2	1	3'-4	5
APRON, TRANS., BOT.		4m3	19	2'-9	35	4m3	16	2'-9	29	4m3	13	2'-9	24	4m3	10	2'-9	18
CURTAIN, HORIZ.		6p1	5	6'-10	51	6p1	5	6'-10	51	6p1	5	6'-10	51	6p1	5	6'-10	51
WING SLOPE, BOTH F.		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'-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'-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
WING SLOPE, F. F.		6s5	2	14'-10	45	6s5	2	11'-7	35	6s5	2	8'-4	25	6s5	2	5'-1	15
CURTAIN, VERT.		5+1	6	6'-5	40	5+1	6	6'-5	40	5+1	6	6'-5	40	5+1	6	6'-5	40
CURTAIN, VERT., ENDS		5+2	4	6'-5	27	5+2	4	6'-5	27	5+2	4	6'-5	27	5+2	4	6'-5	27
BRACKET, VERT.		5u1	4	5'-3	22	5u1	4	5'-3	22	5u1	4	5'-3	22	5u1	4	5'-3	22
ESTIMATED QUANTITIES ONE HEADWALL	REINF. STEEL	2118 LBS.				1624 LBS.				1221 LBS.				984 LBS.			
	CONCRETE	PARAPET Δ	1.0	12.8 CU.YD.	PARAPET Δ	1.0	10.6 CU.YD.	PARAPET Δ	1.0	8.6 CU.YD.	PARAPET Δ	1.0	6.7 CU.YD.				
		WINGWALLS	5.1		WINGWALLS	3.8		WINGWALLS	2.6		WINGWALLS	1.6					
		APRON	6.7		APRON	5.8		APRON	5.0		APRON	4.1					

**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.

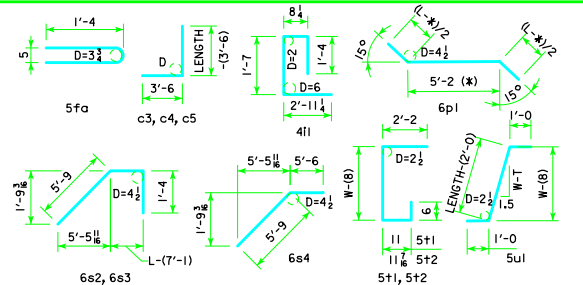
CLEAR DISTANCE FROM FACE OF CONCRETE TO NEAR REINFORCING BAR IS TO BE 2" UNLESS OTHERWISE NOTED OR SHOWN. CLEARANCE TO THE BOTTOM ENDS OF VERTICAL BARS SHALL BE 3 INCHES.

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.

ENGLISH\RD\DESIGN\SINGLE\CULVERTS.DGN - PWH 15-9-12 - THIS SHEET ISSUED 04-12

**BENT BAR DETAILS**



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

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.

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

LATEST REVISION DATE	APPROVED BY BRIDGE ENGINEER 	 STANDARD DESIGN - SINGLE REINFORCED CONCRETE BOX CULVERTS <b>PARALLEL WING HEADWALLS</b>
		APRIL, 2012
		<b>QUANTITY TABULATION</b> 5'-0 SPAN 15° SKEW
		PW 15-9-12