

**BILL OF REINFORCING FOR ONE HEADWALL
30° 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	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6
WINGWALL, F.F.H.		5b1	2	25'-1	52	5b1	2	21'-7	45	5b1	2	18'-1	38	5b1	2	14'-8	31
WINGWALL, F.F.H.		5b2	10 VAR	2 EACH 10'-0x23'-11	177	5b2	8 VAR	2 EACH 10'-0x20'-5	127	5b2	6 VAR	2 EACH 10'-0x17'-0	84	5b2	4 VAR	2 EACH 10'-0x13'-6	49
WINGWALL, B.F.H.		4b3	2	25'-3	34	4b3	2	21'-9	29	4b3	2	18'-4	24	4b3	2	14'-10	20
WINGWALL, B.F.H.		4b4	8 VAR	2 EACH 13'-8x24'-1	101	4b4	6 VAR	2 EACH 13'-8x20'-7	69	4b4	4 VAR	2 EACH 13'-8x17'-2	41	4b4	2	13'-8	18
WINGWALL, F.F.V.		4c1	44 VAR	2 EACH 2'-6x8'-6	162	4c1	36 VAR	2 EACH 2'-6x7'-5	119	4c1	30 VAR	2 EACH 2'-6x6'-6	90	4c1	24 VAR	2 EACH 2'-6x5'-8	65
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	44 VAR	2 EACH 6'-1x12'-1	600	6c3	36 VAR	2 EACH 6'-1x11'-0	321	6c3	30 VAR	2 EACH 6'-1x10'-1	162	6c3	24 VAR	2 EACH 6'-1x9'-3	123
WINGWALL, B.F.V. (O)		6c4	1	12'-3	18	6c4	1	11'-3	12	6c4	1	10'-3	7	6c4	1	9'-3	6
WINGWALL, B.F.V. (A)		6c4	3	12'-3	55	6c4	3	11'-3	35	6c4	3	10'-3	21	6c4	3	9'-3	19
WINGWALL, B.F.V.		c5	-	-	-	c5	-	-	-	c5	-	-	-	c5	-	-	-
APRON, LONGIT., BOT.		4d1	5	24'-11	83	4d1	5	21'-6	72	4d1	5	18'-0	60	4d1	5	14'-6	48
APRON, LONGIT., TOP		6f1	6	24'-11	225	6f1	6	21'-6	194	6f1	6	18'-0	162	6f1	6	14'-6	131
PARAPET, VERTICAL		4f1	12	7'-0	56	4f1	12	7'-0	56	4f1	12	7'-0	56	4f1	12	7'-0	56
PARAPET, HORIZ.		7j1	4	7'-1	58	7j1	4	7'-1	58	7j1	4	7'-1	58	7j1	4	7'-1	58
APRON, TRANS., TOP		6m1	22	6'-8	220	6m1	18	6'-8	180	6m1	15	6'-8	150	6m1	11	6'-8	110
APRON, TRANS., TOP		6m2	2 VAR	2'-9x4'-6	11	6m2	2 VAR	3'-8x5'-5	14	6m2	2 VAR	2'-11x4'-7	11	6m2	3 VAR	2'-11x5'-6	17
APRON, TRANS., BOT.		5m3	19	4'-4	86	4m3	16	3'-6	37	4m3	13	3'-6	30	4m3	10	3'-6	23
CURTAIN, HORIZ.		6p1	5	7'-5	56	6p1	5	7'-5	56	6p1	5	7'-5	56	6p1	5	7'-5	56
WING SLOPE, BOTH F.		6s1	4	18'-8	112	6s1	4	15'-0	90	6s1	4	11'-5	69	6s1	4	7'-10	47
WING SLOPE, BOTH F. (O)		6s2	2	8'-4	25	6s2	2	8'-4	25	6s2	2	8'-4	25	6s2	2	8'-4	25
WING SLOPE, BOTH F. (A)		6s3	2	8'-9	26	6s3	2	8'-9	26	6s3	2	8'-9	26	6s3	2	8'-9	26
WING SLOPE, F. F.		6s4	2	12'-0	36	6s4	2	12'-0	36	6s4	2	12'-0	36	6s4	2	12'-0	36
WING SLOPE, F. F.		6s5	2	16'-5	49	6s5	2	12'-10	39	6s5	2	9'-3	28	6s5	2	5'-7	17
CURTAIN, VERT.		5t1	6	6'-5	40	5t1	6	6'-5	40	5t1	6	6'-5	40	5t1	6	6'-5	40
CURTAIN, VERT., ENDS		5t2	4	6'-7	27	5t2	4	6'-7	27	5t2	4	6'-7	27	5t2	4	6'-7	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	2361 LBS.				1755 LBS.				1347 LBS.				1092 LBS.			
	CONCRETE	PARAPET Δ	1.1	14.2 CU.YD.	PARAPET Δ	1.1	11.8 CU.YD.	PARAPET Δ	1.1	9.5 CU.YD.	PARAPET Δ	1.1	7.5 CU.YD.				
		WINGWALLS	5.7		WINGWALLS	4.2		WINGWALLS	2.9		WINGWALLS	1.8					
		APRON	7.4		APRON	6.5		APRON	5.5		APRON	4.6					

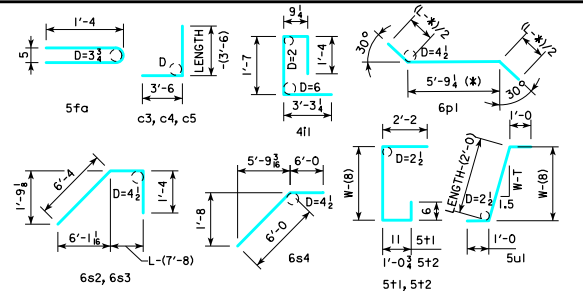
Δ INCLUDES TOP OF WINGWALL QUANTITIES.

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 30-1-12 FOR ACUTE AND OBTUSE CORNER LOCATIONS.

c BAR PIN DIAMETER	
BAR SIZE	D
4	3
5	3½
6	4½

BENT BAR DETAILS



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

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 ¾" 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.

REVISED 07-2016 - CHANGED FENCE ANCHOR BAR (5fa) FROM 3'-1 TO 2'-10. ENGLISH REVISIONS IN BLUE. VERT. DGN - PWH 30-9-12 - THIS SHEET ISSUED 04-12

LATEST REVISION DATE 07-2016	APPROVED BY BRIDGE ENGINEER <i>Thomas E. Mc Donnell</i>	 Iowa Department of Transportation Highway Division
		STANDARD DESIGN - SINGLE REINFORCED CONCRETE BOX CULVERTS PARALLEL WING HEADWALLS
		APRIL, 2012
		QUANTITY TABULATION 5'-0 SPAN 30° SKEW
		PWH 30-9-12