

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

LOCATION	SHAPE	12' x 12'				12' x 11'				12' x 10'				12' x 9'				12' x 8'				12' x 7'				12' x 6'				12' x 5'				12' 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.	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	5fa	2	2'-10	6	
WINGWALL, F.F.H.	5b1	2	4'-3	90	5b1	2	38'-2	80	5b1	2	35'-0	73	5b1	2	31'-11	67	5b1	2	28'-10	60	5b1	2	25'-8	54	5b1	2	19'-6	41	5b1	2	16'-5	34	5b1	2	16'-5	34	
WINGWALL, F.F.H.	5b2	22 VAR	2 EACH 9'-240'-2	570	5b2	20 VAR	2 EACH 9'-237'-1	482	5b2	18 VAR	2 EACH 9'-234'-0	405	5b2	16 VAR	2 EACH 9'-230'-11	334	5b2	14 VAR	2 EACH 9'-227'-9	270	5b2	12 VAR	2 EACH 9'-224'-8	212	5b2	10 VAR	2 EACH 9'-221'-7	160	5b2	8 VAR	2 EACH 9'-218'-5	115	5b2	6 VAR	2 EACH 9'-215'-4	77	
WINGWALL, B.F.H.	4b3	2	4'-5	58	4b3	2	38'-3	51	4b3	2	35'-1	47	4b3	2	32'-0	43	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	
WINGWALL, B.F.H.	4b4	20 VAR	2 EACH 12'-540'-4	355	4b4	18 VAR	2 EACH 12'-537'-3	299	4b4	16 VAR	2 EACH 12'-534'-1	248	4b4	14 VAR	2 EACH 12'-531'-0	203	4b4	12 VAR	2 EACH 12'-527'-11	161	4b4	10 VAR	2 EACH 12'-524'-9	124	4b4	8 VAR	2 EACH 12'-521'-8	91	4b4	6 VAR	2 EACH 12'-518'-6	62	4b4	4 VAR	2 EACH 12'-515'-5	37	
WINGWALL, F.F.V.	5c1	152 VAR	2 EACH 2'-914'-10	1394	6c1	70 VAR	2 EACH 2'-913'-8	863	6c1	64 VAR	2 EACH 2'-911'-9	745	5c1	58 VAR	2 EACH 2'-910'-10	439	5c1	52 VAR	2 EACH 2'-910'-10	368	4c1	46 VAR	2 EACH 2'-909'-10	193	4c1	40 VAR	2 EACH 2'-908'-10	155	4c1	34 VAR	2 EACH 2'-907'-11	121	4c1	26 VAR	2 EACH 2'-906'-7	81	
WINGWALL, F.F.V. (O)	5c2	2	15'-0	31	6c2	2	14'-0	42	6c2	2	13'-0	39	5c2	2	12'-0	25	5c2	2	11'-0	23	4c2	2	10'-0	13	4c2	2	9'-0	12	4c2	2	8'-0	11	4c2	2	7'-0	9	
WINGWALL, F.F.V. (A)	5c2	2	15'-0	31	6c2	2	14'-0	42	6c2	2	13'-0	39	5c2	2	12'-0	25	5c2	2	11'-0	23	4c2	2	10'-0	13	4c2	2	9'-0	12	4c2	2	8'-0	11	4c2	2	7'-0	9	
WINGWALL, B.F.V.	6c3	76 VAR	2 EACH 6'-418'-3	1403	6c3	70 VAR	2 EACH 6'-417'-3	1240	6c3	64 VAR	2 EACH 6'-416'-4	1089	5c3	58 VAR	2 EACH 6'-415'-4	655	5c3	52 VAR	2 EACH 6'-414'-5	563	5c3	46 VAR	2 EACH 6'-413'-5	474	5c3	40 VAR	2 EACH 6'-412'-5	391	5c3	34 VAR	2 EACH 6'-411'-6	316	6c3	26 VAR	2 EACH 6'-410'-2	322	
WINGWALL, B.F.V. (O)	6c4	1	18'-6	28	6c4	1	17'-6	26	6c4	2	16'-6	50	5c4	2	15'-6	32	5c4	2	14'-6	30	5c4	2	13'-6	28	5c4	2	12'-6	26	5c4	2	11'-6	24	6c4	2	10'-6	32	
WINGWALL, B.F.V. (A)	6c4	2	18'-6	56	6c4	2	17'-6	53	6c4	2	16'-6	50	5c4	2	15'-6	32	5c4	2	14'-6	30	5c4	2	13'-6	28	5c4	2	12'-6	26	5c4	2	11'-6	24	6c4	2	10'-6	32	
WINGWALL, B.F.V.	6c5	50	8'-6	638	6c5	46	8'-6	587	6c5	42	8'-6	536	5c5	36	8'-6	319	5c5	34	8'-6	301	5c5	30	8'-6	266	5c5	26	8'-6	231	5c5	22	8'-2	187	c5	-	-		
APRON, LONGIT., BOT.	4d1	11	4'-2	317	4d1	11	38'-1	280	4d1	11	35'-0	257	4d1	11	31'-10	234	4d1	11	28'-9	211	4d1	11	25'-8	189	4d1	11	22'-6	165	4d1	11	19'-5	143	4d1	11	16'-4	120	
APRON, LONGIT., TOP	6f1	13	4'-2	843	6f1	13	38'-1	744	6f1	13	35'-0	683	6f1	13	31'-10	622	6f1	13	28'-9	561	6f1	13	25'-8	501	6f1	13	22'-6	439	6f1	13	19'-5	379	6f1	13	16'-4	319	
PARAPET, VERTICAL	4i1	25	6'-7	110	4i1	25	6'-7	110	4i1	25	6'-7	110	4i1	25	6'-7	110	4i1	25	6'-7	110	4i1	25	6'-7	110	4i1	25	6'-7	110	4i1	25	6'-7	110	4i1	25	6'-7	110	
PARAPET, HORIZ.	7j1	4	14'-2	116	7j1	4	14'-2	116	7j1	4	13'-10	113	7j1	4	13'-10	113	7j1	4	13'-10	113	7j1	4	13'-8	112	7j1	4	13'-8	112	7j1	4	13'-8	112	7j1	4	13'-8	112	
APRON, TRANS., TOP	6m1	50	14'-2	1064	6m1	46	14'-2	979	6m1	42	13'-10	873	6m1	38	13'-10	790	6m1	34	13'-10	706	6m1	30	13'-8	616	6m1	26	13'-8	534	6m1	21	13'-8	431	6m1	17	13'-8	349	
APRON, TRANS., TOP	6m2	4 VAR	4'-212'-6	50	6m2	4 VAR	3'-912'-2	48	6m2	4 VAR	3'-211'-7	44	6m2	4 VAR	2'-1011'-2	42	6m2	4 VAR	2'-510'-10	40	6m2	3 VAR	4'-910'-4	34	6m2	3 VAR	4'-49'-11	32	6m2	4 VAR	3'-1112'-4	49	6m2	4 VAR	3'-611'-11	46	
APRON, TRANS., BOT.	5m3	73	11'-5	869	6m3	34	12'-3	626	6m3	31	11'-11	555	5m3	28	11'-1	324	4m3	25	10'-2	170	4m3	22	10'-0	147	4m3	19	10'-0	127	4m3	16	10'-0	107	4m3	13	10'-0	87	
CURTAIN, HORIZ.	6p1	6	14'-7	131	6p1	6	14'-7	131	6p1	6	14'-3	128	6p1	6	14'-3	128	6p1	5	14'-1	106	6p1	5	14'-1	106	6p1	5	14'-1	106	6p1	5	14'-1	106	6p1	5	14'-1	106	
WING SLOPE, BOTH F.	6s1	4	36'-9	221	6s1	4	33'-5	201	6s1	4	30'-2	181	6s1	4	26'-11	162	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	
WING SLOPE, BOTH F. (O)	6s2	2	7'-10	24	6s2	2	7'-10	24	6s2	2	7'-11	24	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'-1	24	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	6s4	2	11'-3	34	6s4	2	11'-3	34	6s4	2	11'-3	34	
WING SLOPE, F.F. (O)	6s5	2	34'-5	103	6s5	2	31'-2	94	6s5	2	27'-11	84	6s5	2	24'-8	74	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	
CURTAIN, VERT.	5t1	13	7'-11	107	5t1	13	7'-8	104	5t1	13	7'-5	101	5t1	13	7'-2	97	5t1	13	6'-11	94	5t1	13	6'-8	90	5t1	13	6'-5	87	5t1	13	6'-5	87	5t1	13	6'-5	87	
CURTAIN, VERT., ENDS	5t2	4	7'-11	33	5t2	4	7'-8	32	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'-5	27	5t2	4	6'-5	27	
BRACKET, VERT.	5u1	4	6'-8	28	5u1	4	6'-5	27	5u1	4	6'-2	26	5u1	4	6'-0	25	5u1	4	5'-9	24	5u1	4	5'-7	23	5u1	4	5'-4	22	5u1	4	5'-4	22	5u1	4	5'-4	22	

ESTIMATED QUANTITIES ONE HEADWALL	REINF. STEEL	8734 LBS.		7345 LBS.		6595 LBS.		5013 LBS.		4348 LBS.		3660 LBS.		3178 LBS.		2718 LBS.		2217 LBS.	
		PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.	PARAPET Δ	CU.YD.
CONCRETE		1.7	53.4	1.7	47.9	1.6	39.2	1.6	34.8	1.6	30.5	1.5	25.4	1.5	21.6	1.5	18.3	1.5	15.1
	WINGWALLS	22.5		19.3		13.6		11.4		9.3		6.7		5.1		3.8		2.6	
	APRON	29.2		26.9		24.0		21.8		19.6		17.2		15.0		13.0		11.0	

Δ INCLUDES TOP OF WINGWALL QUANTITIES. (A) - INDICATES BAR LOCATED AT ACUTE CORNER. (O) - INDICATES BAR LOCATED AT OBTUSE CORNER. NOTE: WEIGHT OF BARS OVER 40'-0 LONG INCLUDE AN ALLOWANCE OF 2'-0 FOR LAP. REFER TO SHEET PWH 15-1-12 FOR ACUTE AND OBTUSE CORNER LOCATIONS.

### HEADWALL NOTES:

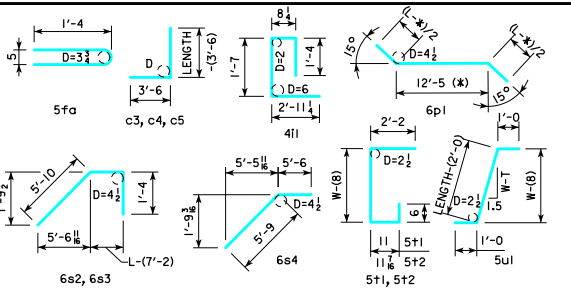
THIS HEADWALL IS BASED ON A 3:1 SLOPE NORMAL TO CENTERLINE OF ROADWAY. THE SIDES OF THE FOOTING ARE TO BE FORMED TO INSURE CORRECT LINE AND GRADE. ALL EXPOSED CORNERS OF 90° OR SHARPER ARE TO BE FILLETED WITH A 3" DRESSED AND BEVELED STRIP. ALL REINFORCING IS TO BE SECURELY WIRED IN PLACE BEFORE THE 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.

### BENT BAR DETAILS



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

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

LATEST REVISION DATE  
0