

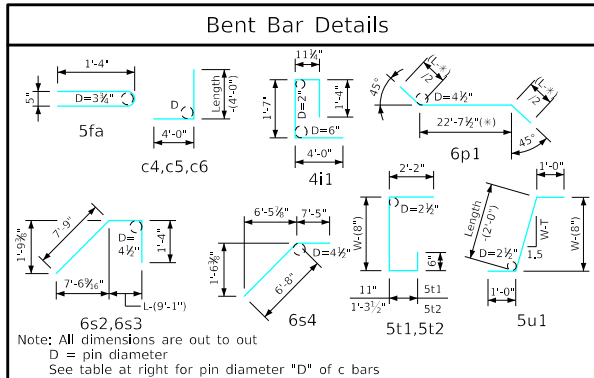
Bill of Reinforcing for One Headwall 45° Skew Span x Culvert Height

Location	Shape	16' x 14'				16' x 13'				16' x 12'				16' x 11'				16' x 10'				16' x 9'				16' x 8'				16' x 7'			
		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
Wingwall, F.F.H.		5b1	2	64'-8"	140	5b1	2	60'-5"	131	5b1	2	56'-2"	122	5b1	2	51'-11"	113	5b1	2	47'-8"	104	5b1	2	43'-5"	96	5b1	2	39'-2"	82	5b1	2	34'-11"	73
Wingwall, F.F.H.		5b2	24 Var.	2 Each 11'-9 to 62'-8	1039	5b2	24 Var.	2 Each 11'-9 to 58'-5	903	5b2	22 Var.	2 Each 11'-9 to 54'-2	776	5b2	20 Var.	2 Each 11'-9 to 49'-11	658	5b2	18 Var.	2 Each 11'-9 to 45'-9	550	5b2	16 Var.	2 Each 11'-9 to 41'-6	449	5b2	14 Var.	2 Each 11'-9 to 37'-3	358	5b2	12 Var.	2 Each 11'-9 to 33'-0	280
Wingwall, B.F.H.		4b3	2	65'-3"	90	4b3	2	61'-1"	85	4b3	2	56'-9"	79	4b3	2	52'-6"	73	4b3	2	48'-1"	67	4b3	2	43'-10"	62	4b3	2	39'-7"	53	4b3	2	35'-3"	47
Wingwall, B.F.H.		4b4	24 Var.	2 Each 16'-8 to 63'-4	661	4b4	22 Var.	2 Each 16'-8 to 59'-1	573	4b4	20 Var.	2 Each 16'-7 to 54'-9	489	4b4	18 Var.	2 Each 16'-7 to 50'-6	413	4b4	16 Var.	2 Each 16'-5 to 46'-1	340	4b4	14 Var.	2 Each 16'-5 to 41'-10	276	4b4	12 Var.	2 Each 16'-5 to 37'-7	216	4b4	10 Var.	2 Each 16'-4 to 33'-3	166
Wingwall, F.F.V.		5c1	122 Var.	2 Each 2'-10 to 16'-11	1257	5c1	114 Var.	2 Each 2'-10 to 16'-0	1120	5c1	104 Var.	2 Each 2'-10 to 14'-10	958	5c1	96 Var.	2 Each 2'-10 to 13'-11	839	4c1	88 Var.	2 Each 2'-10 to 12'-11	463	4c1	80 Var.	2 Each 2'-10 to 12'-0	396	4c1	94 Var.	2 Each 2'-10 to 10'-11	432	4c1	82 Var.	2 Each 2'-10 to 9'-11	349
Wingwall, F.F.V.		5c2	66 Var.	2 Each 9'-3 to 16'-10	898	5c2	58 Var.	2 Each 9'-3 to 15'-11	761	5c2	50 Var.	2 Each 9'-3 to 14'-11	630	5c2	42 Var.	2 Each 9'-3 to 14'-0	509	4c2	32 Var.	2 Each 9'-3 to 12'-10	236	4c2	24 Var.	2 Each 9'-3 to 11'-11	170	c2	--	--	--	c2	--	--	
Wingwall, F.F.V. (O)		5c3	2	17'-3"	36	5c3	2	16'-3"	34	5c3	2	15'-3"	32	5c3	2	14'-3"	30	4c3	2	13'-3"	18	4c3	2	12'-3"	16	4c3	2	11'-3"	15	4c3	2	10'-3"	14
Wingwall, F.F.V. (A)		5c3	3	17'-3"	54	5c3	3	16'-3"	51	5c3	3	15'-3"	48	5c3	3	14'-3"	45	4c3	3	13'-3"	27	4c3	3	12'-3"	25	4c3	3	11'-3"	23	4c3	3	10'-3"	21
Wingwall, B.F.V.		7c4	122 Var.	2 Each 7'-0 to 21'-2	3512	7c4	114 Var.	2 Each 7'-0 to 20'-2	3165	7c4	104 Var.	2 Each 7'-0 to 19'-0	2763	7c4	96 Var.	2 Each 7'-0 to 18'-1	2461	7c4	88 Var.	2 Each 7'-0 to 17'-1	2166	7c4	80 Var.	2 Each 7'-0 to 16'-2	1894	6c4	70 Var.	2 Each 7'-0 to 15'-0	1157	6c4	62 Var.	2 Each 7'-0 to 14'-1	982
Wingwall, B.F.V. (O)		7c5	1	21'-3"	43	7c5	1	20'-3"	41	7c5	1	19'-3"	39	7c5	1	18'-3"	37	7c5	1	17'-3"	35	7c5	1	16'-3"	33	6c5	1	15'-3"	23	6c5	1	14'-3"	21
Wingwall, B.F.V. (A)		7c5	4	21'-3"	174	7c5	4	20'-3"	166	7c5	4	19'-3"	157	7c5	4	18'-3"	149	7c5	4	17'-3"	141	7c5	4	16'-3"	133	6c5	4	15'-3"	92	6c5	4	14'-3"	86
Wingwall, B.F.V.		8c6	84	9'-6"	2131	7c6	76	9'-0"	1398	7c6	68	9'-0"	1251	7c6	60	9'-0"	1104	7c6	50	9'-0"	920	7c6	42	9'-0"	773	6c6	34	9'-0"	460	6c6	26	9'-0"	351
Apron, Longit., Bott.		4d1	17	64'-5"	759	4d1	17	60'-2"	711	4d1	17	55'-11"	662	4d1	17	51'-8"	614	4d1	17	47'-6"	567	4d1	17	43'-3"	519	4d1	17	39'-0"	443	4d1	17	34'-9"	395
Apron, Longit., Top		6f1	17	64'-5"	1707	6f1	17	60'-2"	1598	6f1	17	55'-11"	1489	6f1	17	51'-8"	1381	6f1	17	47'-6"	1275	6f1	17	43'-3"	1166	6f1	17	39'-0"	996	6f1	17	34'-9"	887
Parapet, Vertical		4i1	33	7'-10"	173	4i1	33	7'-10"	173	4i1	33	7'-10"	173	4i1	33	7'-10"	173	4i1	33	7'-10"	173	4i1	33	7'-10"	173	4i1	33	7'-10"	173	4i1	33	7'-10"	173
Parapet, Horiz.		10j1	4	25'-2"	433	10j1	4	25'-2"	433	10j1	4	24'-11"	429	10j1	4	24'-11"	429	10j1	4	24'-6"	422	10j1	4	24'-6"	422	10j1	4	24'-6"	422	10j1	4	24'-3"	417
Apron, Trans., Top		7m1	108	18'-4"	4047	7m1	99	18'-4"	3710	7m1	91	18'-2"	3379	7m1	82	18'-2"	3045	7m1	74	17'-10"	2697	7m1	65	17'-10"	2369	7m1	57	17'-10"	2078	6m1	48	17'-8"	1274
Apron, Trans., Bott.		7m2	30 Var.	2'-3 to 16'-9	583	7m2	30 Var.	2'-7 to 17'-1	603	7m2	30 Var.	2'-3 to 16'-9	583	7m2	30 Var.	2'-6 to 17'-0	598	7m2	30 Var.	2'-1 to 16'-7	572	7m2	30 Var.	2'-4 to 16'-10	588	7m2	30 Var.	2'-1 to 16'-7	572	6m2	30 Var.	2'-3 to 16'-9	428
Apron, Trans., Bott.		6m3	85	22'-2"	2830	6m3	79	21'-11"	2601	6m3	73	21'-8"	2376	6m3	67	21'-8"	2180	6m3	31	21'-3"	989	5m3	28	20'-9"	606	5m3	25	20'-5"	532	5m3	22	20'-3"	465
Curtain, Horiz.		6p1	7	24'-11"	262	6p1	7	24'-11"	262	6p1	6	24'-9"	223	6p1	6	24'-9"	223	6p1	6	24'-5"	220	6p1	6	24'-5"	220	6p1	6	24'-5"	220	6p1	5	24'-3"	182
Wing Slope, Both F.		6s1	4	57'-0"	357	6s1	4	52'-8"	331	6s1	4	48'-4"	305	6s1	4	43'-11"	278	6s1	4	39'-7"	238	6s1	4	35'-3"	212	6s1	4	30'-10"	185	6s1	4	26'-6"	159
Wing Slope, Both F. (O)		6s2	2	9'-4"	28	6s2	2	9'-4"	28	6s2	2	9'-5"	28	6s2	2	9'-5"	28	6s2	2	9'-7"	29	6s2	2	9'-7"	29	6s2	2	9'-7"	29	6s2	2	9'-8"	29
Wing Slope, Both F. (A)		6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31
Wing Slope, F.F.		6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42
Wing Slope, F.F.		6s5	2	54'-7"	171	6s5	2	50'-2"	158	6s5	2	45'-10"	145	6s5	2	41'-6"	132	6s5	2	37'-2"	112	6s5	2	32'-9"	98	6s5	2	28'-5"	85	6s5	2	24'-1"	72
Curtain, Vert.		5t1	23	8'-5"	202	5t1	23	8'-2"	196	5t1	23	7'-11"	190	5t1	23	7'-8"	184	5t1	23	7'-5"	178	5t1	23	7'-2"	172	5t1	23	6'-11"	166	5t1	23	6'-8"	160
Curtain, Vert. Ends		5t2	4	8'-10"	37	5t2	4	8'-7"	36	5t2	4	8'-4"	35	5t2	4	8'-1"	34	5t2	4	7'-10"	33	5t2	4	7'-7"	32	5t2	4	7'-4"	31	5t2	4	7'-1"	30
Bracket, Vert.		5u1	4	7'-1"	30	5u1	4	6'-10"	29	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
Estimated Quantities One Headwall	Reinf. Steel	21,733 LB				19,376 LB				17,468 LB				15,836 LB				12,677 LB				11,033 LB				8,946 LB				7,163 LB			
	Concrete	112.1 CY				102.3 CY				89.5 CY				80.8 CY				67.5 CY				60.1 CY				53.0 CY				44.7 CY			

Δ Includes top of wingwall quantities.
 * Assumes apron and floor are equal thickness, adjust concrete quantities for transition where apron and floor thickness are not equal.

(A) - Indicates bar located at acute corner.
 (O) - Indicates bar located at obtuse corner.
 Refer to Sheet PWH 45-1-20 for acute and obtuse corner locations.

Note: Weight of bars over 40'-0" long include an allowance of 2'-5" for lap.



Headwall Notes:

- This headwall is based on a 3:1 slope normal to centerline of roadway.
- The sides of the apron are to be formed to ensure correct line and grade.
- All apron 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'-5" 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'-5" beyond back of parapet. The "length" column reflects total number of feet necessary to meet these requirements.
- Dimensions are in feet and inches unless otherwise noted.

LATEST REVISION DATE		Standard Design - Single Reinforced Concrete Box Culverts
	Parallel Wing Headwalls	
	July, 2020	
	Quantity Tabulation 16'-0" Span 45° Skew	PWH 45-5-20 SHEET 1 OF 2