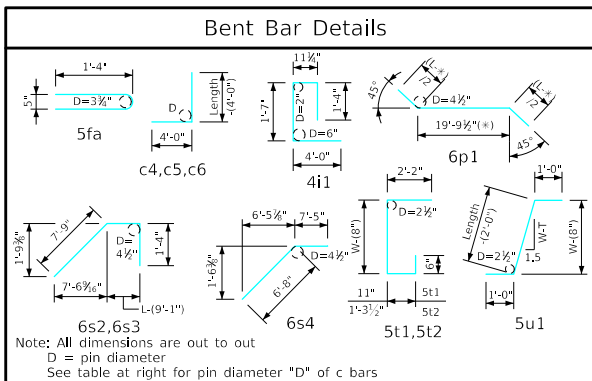


### Bill of Reinforcing for One Headwall 45° Skew Span x Culvert Height

Location	Shape	14' x 14'				14' x 13'				14' x 12'				14' x 11'				14' x 10'				14' x 9'				14' x 8'				14' 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	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				
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			
Wingwall, F.F.V.		5c1	122 Var.	2 Each	2'-9 to 16'-10"	1246	5c1	114 Var.	2 Each	2'-9 to 15'-11"	1110	5c1	104 Var.	2 Each	2'-9 to 14'-9"	949	5c1	96 Var.	2 Each	2'-9 to 13'-10"	830	4c1	88 Var.	2 Each	2'-9 to 12'-10"	458	4c1	80 Var.	2 Each	2'-9 to 11'-11"	392	4c1	94 Var.	2 Each	2'-9 to 10'-10"	426			
Wingwall, F.F.V.		5c2	66 Var.	2 Each	9'-2 to 16'-9"	892	5c2	58 Var.	2 Each	9'-2 to 15'-10"	756	5c2	50 Var.	2 Each	9'-2 to 14'-10"	626	5c2	42 Var.	2 Each	9'-2 to 13'-11"	506	4c2	32 Var.	2 Each	9'-2 to 12'-9"	234	4c2	24 Var.	2 Each	9'-2 to 11'-10"	168	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (O)		5c3	2	17'-2"	36	5c3	2	16'-2"	34	5c3	2	15'-2"	32	5c3	2	14'-2"	30	4c3	2	13'-2"	18	4c3	2	12'-2"	16	4c3	2	11'-2"	15	4c3	2	10'-2"	14						
Wingwall, F.F.V. (A)		5c3	3	17'-2"	54	5c3	3	16'-2"	51	5c3	3	15'-2"	47	5c3	3	14'-2"	44	4c3	3	13'-2"	26	4c3	3	12'-2"	24	4c3	3	11'-2"	22	4c3	3	10'-2"	20						
Wingwall, B.F.V.		7c4	122 Var.	2 Each	6'-11 to 21'-1"	3491	7c4	114 Var.	2 Each	6'-11 to 20'-1"	3146	7c4	104 Var.	2 Each	6'-11 to 18'-11"	2746	7c4	96 Var.	2 Each	6'-11 to 18'-0"	2445	7c4	88 Var.	2 Each	6'-11 to 17'-0"	2151	7c4	80 Var.	2 Each	6'-11 to 16'-1"	1880	6c4	70 Var.	2 Each	6'-11 to 14'-11"	1148			
Wingwall, B.F.V. (O)		7c5	1	21'-2"	43	7c5	1	20'-2"	41	7c5	1	19'-2"	39	7c5	1	18'-2"	37	7c5	1	17'-2"	35	7c5	1	16'-2"	33	6c5	1	15'-2"	23	6c5	1	14'-2"	21						
Wingwall, B.F.V. (A)		7c5	4	21'-2"	173	7c5	4	20'-2"	165	7c5	4	19'-2"	157	7c5	4	18'-2"	149	7c5	4	17'-2"	140	7c5	4	16'-2"	132	6c5	4	15'-2"	91	6c5	4	14'-2"	85						
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	15	64'-5"	670	4d1	15	60'-2"	627	4d1	15	55'-11"	585	4d1	15	51'-8"	542	4d1	15	47'-6"	500	4d1	15	43'-3"	458	4d1	15	39'-0"	391	4d1	15	34'-9"	348						
Apron, Longit., Top		6f1	15	64'-5"	1506	6f1	15	60'-2"	1410	6f1	15	55'-11"	1314	6f1	15	51'-8"	1218	6f1	15	47'-6"	1125	6f1	15	43'-3"	1029	6f1	15	39'-0"	879	6f1	15	34'-9"	783						
Parapet, Vertical		4i1	29	7'-10"	152	4i1	29	7'-10"	152	4i1	29	7'-10"	152	4i1	29	7'-10"	152	4i1	29	7'-10"	152	4i1	29	7'-10"	152	4i1	29	7'-10"	152	4i1	29	7'-10"	152						
Parapet, Horiz.		10j1	4	22'-4"	384	10j1	4	22'-4"	384	10j1	4	22'-4"	380	10j1	4	22'-1"	380	10j1	4	21'-8"	373	10j1	4	21'-8"	373	10j1	4	21'-8"	373	10j1	4	21'-5"	369						
Apron, Trans., Top		7m1	110	16'-4"	3672	7m1	101	16'-4"	3372	7m1	93	16'-2"	3073	7m1	84	16'-2"	2776	7m1	76	15'-10"	2460	7m1	67	15'-10"	2168	7m1	59	15'-10"	1909	6m1	50	15'-8"	1177						
Apron, Trans., Bott.		7m2	26 Var.	2'-3 to 14'-9"	452	7m2	26 Var.	2'-7 to 15'-1"	469	7m2	26 Var.	2'-3 to 14'-9"	452	7m2	26 Var.	2'-6 to 15'-0"	465	7m2	26 Var.	2'-1 to 14'-7"	443	7m2	26 Var.	2'-4 to 14'-10"	456	7m2	26 Var.	2'-1 to 14'-7"	443	6m2	26 Var.	2'-3 to 14'-9"	332						
Apron, Trans., Bott.		7m3	85	19'-11"	3460	6m3	79	19'-1"	2264	6m3	73	18'-11"	2074	6m3	67	18'-11"	1904	6m3	31	18'-5"	858	5m3	28	17'-11"	523	5m3	25	17'-8"	461	5m3	22	17'-5"	400						
Curtain, Horiz.		6p1	7	22'-1"	232	6p1	7	22'-1"	232	6p1	6	21'-11"	198	6p1	6	21'-7"	195	6p1	6	21'-7"	195	6p1	6	21'-7"	195	6p1	6	21'-7"	195	6p1	5	21'-5"	161						
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	20	8'-5"	176	5t1	20	8'-2"	170	5t1	20	7'-11"	165	5t1	20	7'-8"	160	5t1	20	7'-5"	155	5t1	20	7'-2"	149	5t1	20	6'-11"	144	5t1	20	6'-8"	139						
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	21,402 LB				18,134 LB				16,326 LB				14,775 LB				11,821 LB				10,279 LB				8,274 LB				6,629 LB									
	Concrete	102.1 CY				92.9 CY				80.9 CY				72.9 CY				60.3 CY				53.5 CY				47.1 CY				39.4 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	PWH 45-20 SHEET 1 OF 2
14'-0" Span	
45° Skew	