

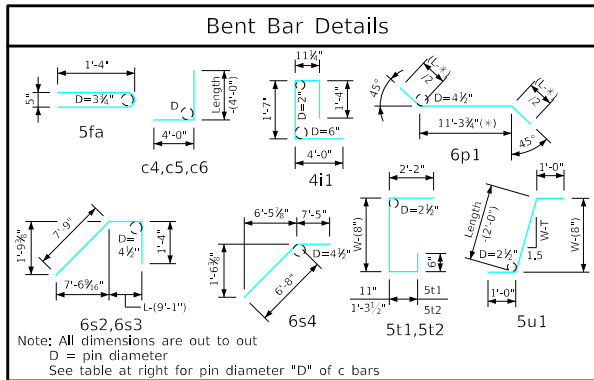
ENGLISH\FDS\DESIGNED\CULVERTS.DGN - PWH 45-9-20 - THIS SHEET ISSUED 07-2020.

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

Location	Shape	8' x 10'				8' x 9'				8' x 8'				8' x 7'				8' x 6'				8' x 5'				8' 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.
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
Wingwall, F.F.H.		5b1	2	47'-8"	104	5b1	2	43'-5"	96	5b1	2	39'-2"	82	5b1	2	34'-11"	73	5b1	2	30'-9"	64	5b1	2	26'-6"	55	5b1	2	22'-3"	46
Wingwall, F.F.H.		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	5b2	10 Var.	2 Each 11'-9 to 28'-9	211	5b2	8 Var.	2 Each 11'-9 to 24'-6	151	5b2	6 Var.	2 Each 11'-9 to 20'-3	100
Wingwall, B.F.H.		4b3	2	48'-1"	67	4b3	2	43'-10"	62	4b3	2	39'-7"	53	4b3	2	35'-3"	47	4b3	2	31'-0"	41	4b3	2	26'-9"	36	4b3	2	22'-6"	30
Wingwall, B.F.H.		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	4b4	8 Var.	2 Each 16'-4 to 29'-1	121	4b4	6 Var.	2 Each 16'-4 to 24'-10	82	4b4	4 Var.	2 Each 16'-4 to 20'-7	49
Wingwall, F.F.V.		4c1	88 Var.	2 Each 2'-5 to 12'-6	438	4c1	80 Var.	2 Each 2'-5 to 11'-7	374	4c1	94 Var.	2 Each 2'-5 to 10'-6	406	4c1	82 Var.	2 Each 2'-5 to 9'-6	326	4c1	72 Var.	2 Each 2'-5 to 8'-7	265	4c1	46 Var.	2 Each 2'-5 to 7'-7	154	4c1	36 Var.	2 Each 2'-5 to 6'-5	106
Wingwall, F.F.V.		4c2	32 Var.	2 Each 8'-10 to 12'-5	227	4c2	24 Var.	2 Each 8'-10 to 11'-6	163	c2	--	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (O)		4c3	2	12'-10"	17	4c3	2	11'-10"	16	4c3	2	10'-10"	14	4c3	2	9'-10"	13	4c3	2	8'-10"	12	4c3	2	7'-10"	10	4c3	2	6'-10"	9
Wingwall, F.F.V. (A)		4c3	3	12'-10"	26	4c3	3	11'-10"	24	4c3	3	10'-10"	22	4c3	3	9'-10"	20	4c3	3	8'-10"	18	4c3	3	7'-10"	16	4c3	3	6'-10"	14
Wingwall, B.F.V.		5c4	88 Var.	2 Each 6'-7 to 16'-8	1067	5c4	80 Var.	2 Each 6'-7 to 15'-9	932	5c4	70 Var.	2 Each 6'-7 to 14'-7	773	5c4	62 Var.	2 Each 6'-7 to 13'-8	655	5c4	54 Var.	2 Each 6'-7 to 12'-9	542	5c4	60 Var.	2 Each 6'-7 to 11'-8	571	5c4	48 Var.	2 Each 6'-7 to 10'-8	432
Wingwall, B.F.V. (O)		5c5	1	16'-10"	18	5c5	1	15'-10"	17	5c5	1	14'-10"	15	5c5	1	13'-10"	14	5c5	1	12'-10"	13	5c5	1	11'-10"	12	5c5	1	10'-10"	11
Wingwall, B.F.V. (A)		5c5	4	16'-10"	70	5c5	4	15'-10"	66	5c5	4	14'-10"	62	5c5	4	13'-10"	58	5c5	4	12'-10"	54	5c5	4	11'-10"	49	5c5	4	10'-10"	45
Wingwall, B.F.V.		6c6	50	9'-0"	676	6c6	42	9'-0"	568	6c6	34	9'-0"	460	6c6	26	9'-0"	352	6c6	16	9'-0"	244	6c6	16	9'-0"	150	6c6	--	--	--
Apron, Longit., Bott.		4d1	9	47'-6"	300	4d1	9	43'-3"	275	4d1	9	39'-0"	234	4d1	9	34'-9"	209	4d1	9	30'-6"	183	4d1	9	26'-3"	158	4d1	9	22'-0"	132
Apron, Longit., Top		6f1	9	47'-6"	675	6f1	9	43'-3"	617	6f1	9	39'-0"	527	6f1	9	34'-9"	470	6f1	9	30'-6"	412	6f1	9	26'-3"	355	6f1	9	22'-0"	297
Parapet, Vertical		4i1	17	7'-10"	89	4i1	17	7'-10"	89	4i1	17	7'-10"	89	4i1	17	7'-10"	89	4i1	17	7'-10"	89	4i1	17	7'-10"	89	4i1	17	7'-10"	89
Parapet, Horiz.		9j1	4	13'-2"	179	9j1	4	13'-2"	179	9j1	4	13'-2"	179	9j1	4	12'-11"	176	9j1	4	12'-11"	176	9j1	4	12'-11"	176	9j1	4	12'-11"	176
Apron, Trans., Top		5m1	82	9'-10"	841	5m1	73	9'-10"	749	5m1	65	9'-10"	667	5m1	56	9'-8"	565	5m1	48	9'-8"	484	5m1	26	9'-8"	262	5m1	21	9'-8"	212
Apron, Trans., Top		5m2	14 Var.	2'-1 to 8'-7	78	5m2	14 Var.	2'-4 to 8'-10	82	5m2	14 Var.	2'-1 to 8'-7	78	5m2	14 Var.	2'-3 to 8'-9	80	5m2	14 Var.	2'-0 to 8'-6	77	5m2	10 Var.	2'-0 to 8'-9	56	5m2	9 Var.	2'-3 to 8'-3	49
Apron, Trans., Bott.		5m3	61	9'-2"	583	5m3	55	9'-2"	526	6m3	25	9'-11"	372	5m3	22	8'-11"	205	5m3	19	8'-11"	177	5m3	16	8'-11"	149	5m3	13	8'-11"	121
Curtain, Horiz.		6p1	6	13'-1"	118	6p1	6	13'-1"	118	6p1	6	13'-1"	118	6p1	5	12'-11"	97	6p1	5	12'-11"	97	6p1	5	12'-11"	97	6p1	5	12'-11"	97
Wing Slope, Both F.		6s1	4	39'-7"	238	6s1	4	35'-3"	212	6s1	4	30'-10"	185	6s1	4	26'-6"	159	6s1	4	22'-2"	133	6s1	4	17'-9"	107	6s1	4	13'-5"	81
Wing Slope, Both F. (O)		6s2	2	9'-7"	29	6s2	2	9'-7"	29	6s2	2	9'-7"	29	6s2	2	9'-8"	29	6s2	2	9'-8"	29	6s2	2	9'-8"	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
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
Wing Slope, F.F.		6s5	2	37'-2"	112	6s5	2	32'-9"	98	6s5	2	28'-5"	85	6s5	2	24'-1"	72	6s5	2	19'-8"	59	6s5	2	15'-4"	46	6s5	2	11'-0"	33
Curtain, Vert.		5t1	12	7'-5"	93	5t1	12	7'-2"	90	5t1	12	6'-11"	87	5t1	12	6'-8"	83	5t1	12	6'-5"	80	5t1	12	6'-5"	80	5t1	12	6'-5"	80
Curtain, Vert. Ends		5t2	4	7'-10"	33	5t2	4	7'-7"	32	5t2	4	7'-4"	31	5t2	4	7'-1"	30	5t2	4	6'-10"	29	5t2	4	6'-10"	29	5t2	4	6'-10"	29
Bracket, Vert.		5u1	4	6'-1"	25	5u1	4	5'-11"	25	5u1	4	5'-8"	24	5u1	4	5'-5"	23	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22
Estimated Quantities One Headwall	Reinf. Steel	7072 LB				6243 LB				5104 LB				4262 LB				3617 LB				2870 LB				2368 LB			
	Concrete	40.3 CY				35.4 CY				30.7 CY				24.9 CY				21.0 CY				17.6 CY				14.4 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 45-9-20
8'-0" Span	
45° Skew	