

ENGLISH\FDS\DESIGNED\CULVERTS.DGN - PWH 30-9-20 - THIS SHEET ISSUED 07-2020.

Bill of Reinforcing for One Headwall 30° Skew Span x Culvert Height

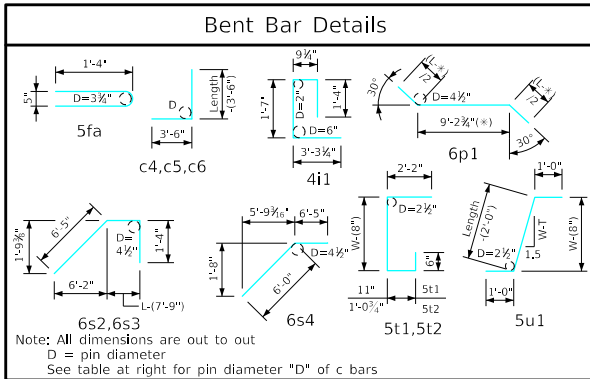
Location	Shape	8' x 10'				8' x 9'				8' x 8'				8' x 7'				8' x 6'				8' x 5'				8' x 4'			
		Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	Bar	No.	Length	Wt.
Fence Anchor (Galv.)		5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6
Wingwall, F.F.H.		5b1	2	39'-3"	82	5b1	2	35'-10"	75	5b1	2	32'-4"	67	5b1	2	28'-11"	60	5b1	2	25'-5"	53	5b1	2	22'-0"	46	5b1	2	18'-6"	39
Wingwall, F.F.H.		5b2	18 Var.	2 Each 10'-0 to 37'-8"	447	5b2	16 Var.	2 Each 10'-0 to 34'-3"	369	5b2	14 Var.	2 Each 10'-0 to 30'-9"	298	5b2	12 Var.	2 Each 10'-0 to 27'-4"	234	5b2	10 Var.	2 Each 10'-0 to 23'-10"	176	5b2	8 Var.	2 Each 10'-0 to 20'-5"	127	5b2	6 Var.	2 Each 10'-0 to 16'-11"	84
Wingwall, B.F.H.		4b3	2	39'-6"	53	4b3	2	36'-1"	48	4b3	2	32'-7"	44	4b3	2	29'-1"	39	4b3	2	25'-7"	34	4b3	2	22'-2"	30	4b3	2	18'-8"	25
Wingwall, B.F.H.		4b4	16 Var.	2 Each 13'-8 to 37'-11"	276	4b4	14 Var.	2 Each 13'-8 to 34'-5"	225	4b4	12 Var.	2 Each 13'-8 to 31'-0"	179	4b4	10 Var.	2 Each 13'-7 to 27'-6"	137	4b4	8 Var.	2 Each 13'-7 to 24'-0"	100	4b4	6 Var.	2 Each 13'-7 to 20'-7"	68	4b4	4 Var.	2 Each 13'-7 to 17'-1"	41
Wingwall, F.F.V.		4c1	72 Var.	2 Each 2'-5 to 12'-6"	359	4c1	64 Var.	2 Each 2'-5 to 11'-4"	294	4c1	76 Var.	2'-5 to 10'-5"	326	4c1	68 Var.	2 Each 2'-5 to 9'-7"	273	4c1	58 Var.	2 Each 2'-5 to 8'-6"	211	4c1	36 Var.	2 Each 2'-5 to 7'-4"	117	4c1	30 Var.	2 Each 2'-5 to 6'-5"	89
Wingwall, F.F.V.		4c2	26 Var.	2 Each 8'-11 to 12'-4"	185	4c2	20 Var.	2 Each 8'-11 to 11'-6"	136	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	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, B.F.V.		6c4	72 Var.	2 Each 6'-1 to 16'-2"	1203	5c4	64 Var.	2 Each 6'-1 to 15'-1"	706	5c4	58 Var.	6'-1 to 14'-2"	613	5c4	50 Var.	6'-1 to 13'-0"	498	5c4	44 Var.	6'-1 to 12'-2"	419	5c4	36 Var.	6'-1 to 11'-0"	321	5c4	30 Var.	6'-1 to 10'-2"	254
Wingwall, B.F.V. (O)		6c5	1	16'-4"	25	5c5	1	15'-4"	16	5c5	1	14'-4"	15	5c5	1	13'-4"	14	5c5	1	12'-4"	13	5c5	1	11'-4"	12	5c5	1	10'-4"	11
Wingwall, B.F.V. (A)		6c5	3	16'-4"	74	5c5	3	15'-4"	48	5c5	3	14'-4"	45	5c5	3	13'-4"	42	5c5	3	12'-4"	39	5c5	3	11'-4"	35	5c5	3	10'-4"	32
Wingwall, B.F.V.		6c6	42	8'-6"	536	5c6	36	8'-6"	319	5c6	28	8'-6"	248	5c6	22	8'-6"	195	5c6	14	8'-6"	124	c6	--	--	--	--	--	--	
Apron, Longit., Bott.		4d1	9	39'-2"	235	4d1	9	35'-8"	214	4d1	9	32'-3"	194	4d1	9	28'-9"	173	4d1	9	25'-4"	152	4d1	9	21'-10"	131	4d1	9	18'-4"	110
Apron, Longit., Top		6f1	9	39'-2"	529	6f1	9	35'-8"	482	6f1	9	32'-3"	436	6f1	9	28'-9"	389	6f1	9	25'-4"	342	6f1	9	21'-10"	295	6f1	9	18'-4"	248
Parapet, Vertical		4i1	17	7'-0"	79	4i1	17	7'-0"	79	4i1	17	7'-0"	79	4i1	17	7'-0"	79	4i1	17	7'-0"	79	4i1	17	7'-0"	79	4i1	17	7'-0"	79
Parapet, Horiz.		7j1	4	10'-9"	88	7j1	4	10'-9"	88	7j1	4	10'-9"	88	7j1	4	10'-7"	87	7j1	4	10'-7"	87	7j1	4	10'-7"	87	7j1	4	10'-7"	87
Apron, Trans., Top		5m1	35	9'-10"	359	5m1	31	9'-10"	318	5m1	37	9'-10"	379	5m1	24	9'-8"	242	5m1	21	9'-8"	212	5m1	17	9'-8"	171	5m1	14	9'-8"	141
Apron, Trans., Top		5m2	4 Var.	2'-2 to 7'-4"	20	5m2	4 Var.	3'-1 to 8'-3"	24	5m2	5 Var.	2'-8 to 7'-11"	28	5m2	4 Var.	3'-1 to 8'-4"	24	5m2	4 Var.	2'-4 to 7'-6"	21	5m2	4 Var.	3'-3 to 8'-5"	24	5m2	4 Var.	2'-5 to 7'-8"	21
Apron, Trans., Bott.		6m3	61	8'-6"	779	5m3	55	7'-9"	445	5m3	33	7'-9"	267	5m3	22	7'-6"	172	4m3	19	6'-9"	86	4m3	16	6'-9"	72	4m3	13	6'-9"	59
Curtain, Horiz.		6p1	6	11'-0"	99	6p1	6	11'-0"	99	6p1	6	11'-0"	99	6p1	5	10'-10"	81	6p1	5	10'-10"	81	6p1	5	10'-10"	81	6p1	5	10'-10"	81
Wing Slope, Both F.		6s1	4	33'-2"	199	6s1	4	29'-6"	177	6s1	4	25'-11"	156	6s1	4	22'-4"	134	6s1	4	18'-8"	112	6s1	4	15'-1"	91	6s1	4	11'-6"	69
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	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	6s3	2	8'-9"	26	6s3	2	8'-9"	26	6s3	2	8'-9"	26
Wing Slope, F.F.		6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37
Wing Slope, F.F.		6s5	2	30'-8"	92	6s5	2	27'-1"	81	6s5	2	23'-5"	70	6s5	2	19'-10"	60	6s5	2	16'-3"	49	6s5	2	12'-8"	38	6s5	2	9'-0"	27
Curtain, Vert.		5t1	10	7'-5"	77	5t1	10	7'-2"	75	5t1	10	6'-11"	72	5t1	10	6'-8"	70	5t1	10	6'-5"	67	5t1	10	6'-5"	67	5t1	10	6'-5"	67
Curtain, Vert. Ends		5t2	4	7'-7"	32	5t2	4	7'-4"	31	5t2	4	7'-1"	30	5t2	4	6'-10"	29	5t2	4	6'-7"	27	5t2	4	6'-7"	27	5t2	4	6'-7"	27
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	5981 LB				4500 LB				3870 LB				3175 LB				2624 LB				2055 LB				1725 LB			
	Concrete	32.9 CY				28.9 CY				25.2 CY				20.4 CY				17.3 CY				14.5 CY				11.8 CY			
	Parapet Δ	1.5				1.5				1.5				1.4				1.4				1.4				1.4			
	Wingwalls	15.0				12.5				10.2				7.3				5.6				4.1				2.8			
	Apron *	16.4				14.9				13.5				11.7				10.3				9.0				7.6			

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 30-1-20 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

8'-0" Span

30° Skew

PWH 30-9-20

APPROVED BY BRIDGE ENGINEER