

ENGLISH\FDS\DESIGNED\CULVERTS.DGN - PWH 30-10-20 - THIS SHEET ISSUED 07-2020.

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

Location	Shape	6' x 8'				6' x 7'				6' x 6'				6' x 5'				6' x 4'				6' x 3'			
		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
Wingwall, F.F.H.		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	5b1	2	15'-0"	31
Wingwall, F.F.H.		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	5b2	4 Var.	2 Each 10'-0 to 13'-5"	49
Wingwall, B.F.H.		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	4b3	2	15'-3"	20
Wingwall, B.F.H.		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	4b4	2	13'-8"	18
Wingwall, F.F.V.		4c1	76 Var.	2 Each 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	4c1	24 Var.	2 Each 2'-5 to 5'-7"	64
Wingwall, F.F.V.		c2	--	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (O)		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	4c3	2	5'-10"	8
Wingwall, F.F.V. (A)		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	4c3	2	5'-10"	8
Wingwall, B.F.V.		5c4	58 Var.	2 Each 6'-1 to 14'-2"	613	5c4	50 Var.	2 Each 6'-1 to 13'-0"	498	5c4	44 Var.	2 Each 6'-1 to 12'-2"	419	5c4	36 Var.	2 Each 6'-1 to 11'-0"	321	5c4	30 Var.	2 Each 6'-1 to 10'-2"	254	5c4	24 Var.	2 Each 6'-1 to 9'-3"	192
Wingwall, B.F.V. (O)		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	5c5	1	9'-4"	10
Wingwall, B.F.V. (A)		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	5c5	3	9'-4"	29
Wingwall, B.F.V.		5c6	28	8'-6"	248	5c6	22	8'-6"	195	5c6	14	8'-6"	124	c6	--	--	--	c6	--	--	--	c6	--	--	--
Apron, LongR. Bott.		4d1	7	32'-3"	151	4d1	7	28'-9"	134	4d1	7	25'-4"	118	4d1	7	21'-10"	102	4d1	7	18'-4"	86	4d1	7	14'-11"	70
Apron, LongR. Top		6f1	7	32'-3"	339	6f1	7	28'-9"	302	6f1	7	25'-4"	266	6f1	7	21'-10"	230	6f1	7	18'-4"	193	6f1	7	14'-11"	157
Parapet, Vertical		4i1	13	7'-0"	61	4i1	13	7'-0"	61	4i1	13	7'-0"	61	4i1	13	7'-0"	61	4i1	13	7'-0"	61	4i1	13	7'-0"	61
Parapet, Horiz.		7j1	4	8'-5"	69	7j1	4	8'-3"	67	7j1	4	8'-3"	67	7j1	4	8'-3"	67	7j1	4	8'-3"	67	7j1	4	8'-3"	67
Apron, Trans., Top		5m1	28	7'-10"	229	5m1	25	7'-8"	200	5m1	21	7'-8"	168	5m1	18	7'-8"	144	5m1	14	7'-8"	112	5m1	11	7'-8"	88
Apron, Trans., Top		5m2	3 Var.	3'-0 to 6'-6"	15	5m2	3 Var.	2'-1 to 5'-7"	12	5m2	3 Var.	3'-0 to 6'-6"	15	5m2	3 Var.	2'-3 to 5'-9"	13	5m2	3 Var.	3'-2 to 6'-8"	15	5m2	3 Var.	2'-4 to 5'-10"	13
Apron, Trans., Bott.		5m3	49	5'-5"	277	5m3	29	5'-3"	159	5m3	25	5'-3"	137	4m3	16	4'-5"	47	4m3	13	4'-5"	38	4m3	10	4'-5"	30
Curtain, Horiz.		6p1	6	8'-9"	79	6p1	5	8'-7"	64	6p1	5	8'-7"	64	6p1	5	8'-7"	64	6p1	5	8'-7"	64	6p1	5	8'-7"	64
Wing Slope, Both F.		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	6s1	4	7'-11"	48
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
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
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
Wing Slope, F.F.		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	6s5	2	5'-5"	16
Curtain, Vert.		5t1	7	6'-11"	50	5t1	7	6'-8"	49	5t1	7	6'-5"	47	5t1	7	6'-5"	47	5t1	7	6'-5"	47	5t1	7	6'-5"	47
Curtain, Vert. Ends		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	5t2	4	6'-7"	27
Bracket, Vert.		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	5u1	4	5'-3"	22
Estimated Quantities One Headwall	Reinf. Steel	3507 LB				2906 LB				2440 LB				1823 LB				1515 LB				1233 LB			
	Parapet Δ	1.3				1.3				1.3				1.3				1.3				1.3			
	Concrete	10.2	22.6 CY			7.3	18.2 CY			5.6	15.3 CY			4.1	12.7 CY			2.8	10.4 CY			1.7	8.2 CY		
Apron *	11.1				9.6				8.4				7.3				6.3				5.2				

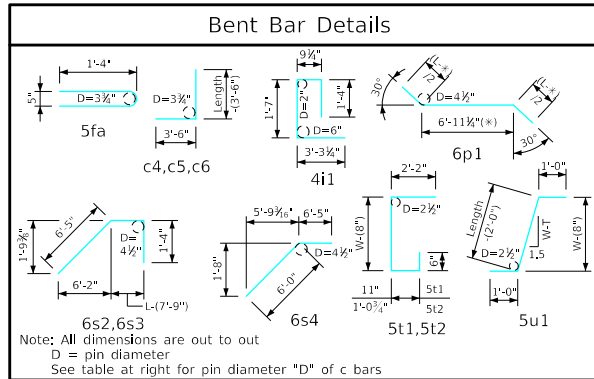
Δ Includes top of wingwall quantities.
 * Assumes apron and floor are equal thickness, adjust concrete quantities for transition where apron and floor thickness are not equal.

(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	 APPROVED BY BRIDGE ENGINEER	 Standard Design - Single Reinforced Concrete Box Culverts
		Parallel Wing Headwalls July, 2020
		Quantity Tabulation 6'-0" Span 30° Skew
		PWH 30-10-20