

ENGLISHLRFDDESIGNEDSINGLECULVERTS.DGN - PWH 15-10-20 - THIS SHEET ISSUED 07-2020.

### Bill of Reinforcing for One Headwall 15° 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.	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	29'-2"	61	5b1	2	26'-1"	54	5b1	2	23'-0"	48	5b1	2	19'-10"	41	5b1	2	16'-9"	35	5b1	2	13'-8"	29				
Wingwall, F.F.H.		5b2	14 Var.	2 Each 9'-2 to 27'-9	270	5b2	12 Var.	2 Each 9'-2 to 24'-8	212	5b2	10 Var.	2 Each 9'-2 to 21'-7	160	5b2	8 Var.	2 Each 9'-2 to 18'-5	115	5b2	6 Var.	2 Each 9'-2 to 15'-4	77	5b2	4 Var.	2 Each 9'-2 to 12'-3	45				
Wingwall, B.F.H.		4b3	2	29'-3"	39	4b3	2	26'-2"	35	4b3	2	23'-1"	31	4b3	2	19'-11"	27	4b3	2	16'-10"	22	4b3	2	13'-9"	18				
Wingwall, B.F.H.		4b4	12 Var.	2 Each 12'-4 to 27'-11	161	4b4	10 Var.	2 Each 12'-4 to 24'-9	124	4b4	8 Var.	2 Each 12'-4 to 21'-8	91	4b4	6 Var.	2 Each 12'-4 to 18'-6	62	4b4	4 Var.	2 Each 12'-4 to 15'-5	37	4b4	2	12'-4"	16				
Wingwall, F.F.V.		4c1	68 Var.	2 Each 2'-5 to 10'-5	291	4c1	60 Var.	2 Each 2'-5 to 9'-5	237	4c1	52 Var.	2 Each 2'-5 to 8'-6	190	4c1	34 Var.	2 Each 2'-5 to 7'-7	114	4c1	26 Var.	2 Each 2'-5 to 6'-3	75	4c1	20 Var.	2 Each 2'-5 to 5'-4	52				
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	52 Var.	2 Each 6'-1 to 14'-2	549	5c4	46 Var.	2 Each 6'-1 to 13'-2	462	5c4	40 Var.	2 Each 6'-1 to 12'-3	382	5c4	34 Var.	2 Each 6'-1 to 11'-3	307	5c4	26 Var.	2 Each 6'-1 to 10'-0	218	5c4	20 Var.	2 Each 6'-1 to 9'-0	157				
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	2	14'-4"	30	5c5	2	13'-4"	28	5c5	2	12'-4"	26	5c5	2	11'-4"	24	5c5	2	10'-4"	22	5c5	2	9'-4"	19				
Wingwall, B.F.V.		5c6	24	8'-6"	213	5c6	18	8'-6"	160	5c6	12	8'-6"	106	c6	--	--	--	c6	--	--	--	c6	--	--	--				
Apron, LongR. Bott.		4d1	7	29'-2"	136	4d1	7	26'-0"	122	4d1	7	22'-11"	107	4d1	7	19'-10"	93	4d1	7	16'-8"	78	4d1	7	13'-7"	64				
Apron, LongR. Top		6f1	7	29'-2"	307	6f1	7	26'-0"	273	6f1	7	22'-11"	241	6f1	7	19'-10"	209	6f1	7	16'-8"	175	6f1	7	13'-7"	143				
Parapet, Horiz.		4i1	13	6'-7"	57	4i1	13	6'-7"	57	4i1	13	6'-7"	57	4i1	13	6'-7"	57	4i1	13	6'-7"	57	4i1	13	6'-7"	57				
Parapet, Vert.		7j1	4	7'-7"	62	7j1	4	7'-4"	60	7j1	4	7'-4"	60	7j1	4	7'-4"	60	7j1	4	7'-4"	60	7j1	4	7'-4"	60				
Apron, Trans. Top		5m1	26	7'-10"	212	5m1	23	7'-8"	184	5m1	20	7'-8"	160	5m1	17	7'-8"	136	5m1	14	7'-8"	112	5m1	11	7'-8"	88				
Apron, Trans. Bott.		5m2	1	5'-5"	6	5m2	1	4'-11"	5	5m2	1	4'-6"	5	5m2	1	4'-2"	4	5m2	1	3'-9"	4	5m2	1	3'-4"	3				
Apron, Trans. Bott.		5m3	33	4'-6"	155	5m3	22	4'-4"	99	4m3	19	3'-7"	45	4m3	16	3'-7"	38	4m3	13	3'-7"	31	4m3	10	3'-7"	24				
Curtain, Horiz.		6p1	6	8'-0"	72	6p1	5	7'-10"	59	6p1	5	7'-10"	59	6p1	5	7'-10"	59	6p1	5	7'-10"	59	6p1	5	7'-10"	59				
Wing Slope, Both F.		6s1	4	23'-8"	142	6s1	4	20'-5"	123	6s1	4	17'-1"	103	6s1	4	13'-10"	83	6s1	4	10'-7"	64	6s1	4	7'-4"	44				
Wing Slope, Both F. (O)		6s2	2	7'-10"	24	6s2	2	7'-10"	24	6s2	2	7'-10"	24	6s2	2	7'-10"	24	6s2	2	7'-10"	24	6s2	2	7'-10"	24				
Wing Slope, Both F. (A)		6s3	2	8'-0"	24	6s3	2	8'-0"	24	6s3	2	8'-0"	24	6s3	2	8'-0"	24	6s3	2	8'-0"	24	6s3	2	8'-0"	24				
Wing Slope, F.F.		6s4	2	11'-8"	35	6s4	2	11'-8"	35	6s4	2	11'-8"	35	6s4	2	11'-8"	35	6s4	2	11'-8"	35	6s4	2	11'-8"	35				
Wing Slope, F.F.		6s5	2	21'-2"	64	6s5	2	17'-11"	54	6s5	2	14'-8"	44	6s5	2	11'-4"	34	6s5	2	8'-1"	24	6s5	2	4'-10"	15				
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	6'-11"	29	5t2	4	6'-8"	28	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	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	3062 LB				2577 LB				2137 LB				1680 LB				1364 LB				1104 LB							
	Concrete	Parapet Δ	1.2	20.3 CY	1.1	16.2 CY	1.1	13.7 CY	1.1	11.4 CY	1.1	9.2 CY	1.1	7.3 CY	1.1	4.7													
	Wingwalls	9.1	6.5		5.0		3.7		2.5		1.5																		
Apron *	10.0	8.6	7.6		6.6		5.6		4.7																				

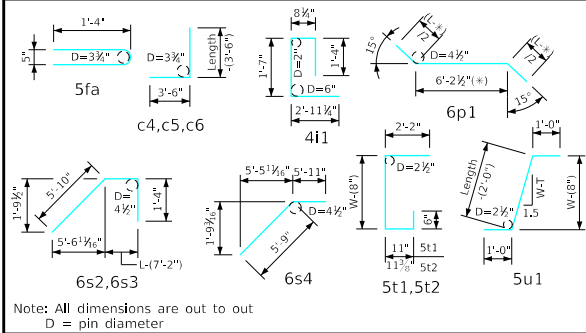
Δ Includes top of wingwall quantities.

\* 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 15-1-20 for acute and obtuse corner locations.

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

#### Bent Bar Details



#### 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 15° Skew
		PWH 15-10-20