

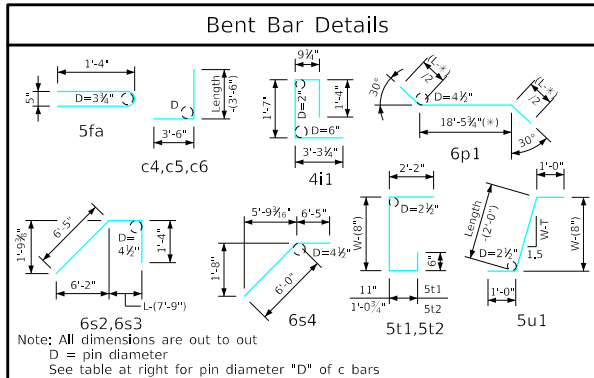
**Bill of Reinforcing for One Headwall 30° Skew Span x Culvert Height**

Location	Shape	16' x 14'				16' x 13'				16' x 12'				16' x 11'				16' x 10'				16' x 9'				16' x 8'				16' 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	53'-2"	116	5b1	2	49'-8"	109	5b1	2	46'-2"	101	5b1	2	42'-9"	94	5b1	2	39'-3"	82	5b1	2	35'-10"	75	5b1	2	32'-4"	67	5b1	2	28'-11"	60			
Wingwall, F,F,H.		5b2	24 Var.	2 Each 10'-0 to 51'-7	855	5b2	24 Var.	2 Each 10'-0 to 48'-1	742	5b2	22 Var.	2 Each 10'-0 to 44'-7	636	5b2	20 Var.	2 Each 10'-0 to 41'-2	539	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			
Wingwall, B,F,H.		4b3	2	53'-6"	75	4b3	2	50'-1"	70	4b3	2	46'-6"	65	4b3	2	43'-1"	61	4b3	2	39'-6"	53	4b3	2	36'-1"	48	4b3	2	32'-7"	44	4b3	2	29'-1"	39			
Wingwall, B,F,H.		4b4	24 Var.	2 Each 13'-10 to 51'-11	540	4b4	22 Var.	2 Each 13'-10 to 48'-5	467	4b4	20 Var.	2 Each 13'-9 to 44'-11	398	4b4	18 Var.	2 Each 13'-8 to 41'-6	335	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			
Wingwall, F,F,V.		5c1	100 Var.	2 Each 2'-10 to 17'-0	1034	5c1	92 Var.	2 Each 2'-10 to 15'-10	896	5c1	86 Var.	2 Each 2'-10 to 14'-11	796	5c1	78 Var.	2 Each 2'-10 to 13'-10	678	4c1	72 Var.	2 Each 2'-10 to 12'-11	379	4c1	64 Var.	2 Each 2'-10 to 11'-9	312	4c1	76 Var.	2 Each 2'-10 to 10'-10	347	4c1	68 Var.	2 Each 2'-10 to 10'-0	291			
Wingwall, F,F,V.		5c2	54 Var.	2 Each 9'-4 to 16'-10	737	5c2	48 Var.	2 Each 9'-4 to 16'-0	634	5c2	40 Var.	2 Each 9'-4 to 14'-10	504	5c2	34 Var.	2 Each 9'-4 to 13'-11	412	4c2	26 Var.	2 Each 9'-4 to 12'-9	192	4c2	20 Var.	2 Each 9'-4 to 11'-11	142	c2	--	--	--	c2	--	--	--			
Wingwall, F,F,V. (O)		5c3	2	17'-3"	36	5c3	2	16'-3"	34	5c3	2	15'-3"	32	5c3	2	14'-3"	30	4c3	2	13'-3"	18	4c3	2	12'-3"	16	4c3	2	11'-3"	15	4c3	2	10'-3"	14			
Wingwall, F,F,V. (A)		5c3	2	17'-3"	36	5c3	2	16'-3"	34	5c3	2	15'-3"	32	5c3	2	14'-3"	30	4c3	2	13'-3"	18	4c3	2	12'-3"	16	4c3	2	11'-3"	15	4c3	2	10'-3"	14			
Wingwall, B,F,V.		6c4	100 Var.	2 Each 6'-6 to 20'-8	2040	6c4	92 Var.	2 Each 6'-6 to 19'-6	1796	6c4	86 Var.	2 Each 6'-6 to 18'-8	1625	6c4	78 Var.	2 Each 6'-6 to 17'-6	1406	6c4	72 Var.	2 Each 6'-6 to 16'-7	1248	5c4	64 Var.	2 Each 6'-6 to 15'-6	734	5c4	58 Var.	2 Each 6'-6 to 14'-7	638	5c4	50 Var.	2 Each 6'-6 to 13'-5	519			
Wingwall, B,F,V. (O)		6c5	1	20'-9"	31	6c5	1	19'-9"	30	6c5	1	18'-9"	28	6c5	1	17'-9"	27	6c5	1	16'-9"	25	5c5	1	15'-9"	16	5c5	1	14'-9"	15	5c5	1	13'-9"	14			
Wingwall, B,F.V. (A)		6c5	3	20'-9"	93	6c5	3	19'-9"	89	6c5	3	18'-9"	84	6c5	3	17'-9"	80	6c5	3	16'-9"	75	5c5	3	15'-9"	49	5c5	3	14'-9"	46	5c5	3	13'-9"	43			
Wingwall, B,F.V.		7c6	70	9'-6"	1359	6c6	64	8'-6"	817	6c6	56	8'-6"	715	6c6	50	8'-6"	638	6c6	42	8'-6"	536	5c6	36	8'-6"	319	5c6	28	8'-6"	248	5c6	22	8'-6"	195			
Apron, Longit., Bott.		4d1	17	53'-0"	629	4d1	17	49'-7"	591	4d1	17	46'-1"	551	4d1	17	42'-7"	511	4d1	17	39'-2"	445	4d1	17	35'-8"	405	4d1	17	32'-3"	366	4d1	17	28'-9"	326			
Apron, Longit., Top		6f1	17	53'-0"	1415	6f1	17	49'-7"	1328	6f1	17	46'-1"	1238	6f1	17	42'-7"	1149	6f1	17	39'-2"	1000	6f1	17	35'-8"	911	6f1	17	32'-3"	823	6f1	17	28'-9"	734			
Parapet, Vertical		4i1	33	7'-0"	154	4i1	33	7'-0"	154	4i1	33	7'-0"	154	4i1	33	7'-0"	154	4i1	33	7'-0"	154	4i1	33	7'-0"	154	4i1	33	7'-0"	154	4i1	33	7'-0"	154			
Parapet, Horiz.		9j1	4	20'-7"	280	9j1	4	20'-7"	280	9j1	4	20'-4"	277	9j1	4	20'-4"	277	9j1	4	20'-0"	272	9j1	4	20'-0"	272	9j1	4	20'-0"	272	9j1	4	19'-9"	269			
Apron, Trans., Top		6m1	92	18'-4"	2533	6m1	85	18'-4"	2341	6m1	78	18'-2"	2128	5m1	71	18'-2"	1345	5m1	64	17'-10"	1190	5m1	57	17'-10"	1060	5m1	50	17'-10"	930	5m1	43	17'-8"	792			
Apron, Trans., Top		6m2	17 Var.	2'-8 to 16'-7	246	6m2	17 Var.	2'-9 to 16'-7	247	6m2	17 Var.	2'-9 to 16'-7	247	5m2	17 Var.	2'-9 to 16'-8	172	5m2	17 Var.	2'-9 to 16'-6	170	5m2	17 Var.	2'-9 to 16'-7	171	5m2	17 Var.	2'-10 to 16'-8	173	5m2	17 Var.	2'-9 to 16'-8	172			
Apron, Trans., Bott.		6m3	85	18'-4"	2341	6m3	79	18'-4"	2175	5m3	73	17'-4"	1320	6m3	34	18'-1"	923	6m3	31	17'-9"	826	5m3	28	16'-11"	494	5m3	25	16'-11"	441	5m3	22	16'-9"	246			
Curtain, Horiz.		6p1	7	20'-9"	218	6p1	7	20'-9"	218	6p1	6	20'-7"	185	6p1	6	20'-3"	182	6p1	6	20'-3"	182	6p1	6	20'-3"	182	6p1	6	20'-3"	182	6p1	5	20'-1"	151			
Wing Slope, Both F.		6s1	4	47'-7"	300	6s1	4	43'-11"	278	6s1	4	40'-4"	257	6s1	4	36'-9"	221	6s1	4	33'-2"	199	6s1	4	29'-6"	177	6s1	4	25'-11"	156	6s1	4	22'-4"	134			
Wing Slope, Both F. (O)		6s2	2	8'-2"	25	6s2	2	8'-2"	25	6s2	2	8'-3"	25	6s2	2	8'-3"	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	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	6s4	2	12'-5"	37			
Wing Slope, F.F.		6s5	2	45'-1"	143	6s5	2	41'-6"	132	6s5	2	37'-11"	114	6s5	2	34'-3"	103	6s5	2	30'-8"	92	6s5	2	27'-1"	81	6s5	2	23'-5"	70	6s5	2	19'-10"	60			
Curtain, Vert.		5t1	19	8'-5"	167	5t1	19	8'-2"	162	5t1	19	7'-11"	157	5t1	19	7'-8"	152	5t1	19	7'-5"	147	5t1	19	7'-2"	142	5t1	19	6'-11"	137	5t1	19	6'-8"	132			
Curtain, Vert. Ends		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	5t2	4	6'-10"	29			
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	Parapet Δ	2.5	15,538 LB	2.5	13,782 LB	2.4	11,800 LB	2.4	9,676 LB	2.2	8,178 LB	2.2	6,520 LB	2.2	5,764 LB	2.1	4,876 LB																		
	Concrete	Wingwalls	35.4	91.6 CY	31.0	83.6 CY	24.8	73.2 CY	21.3	66.1 CY	15.0	55.1 CY	12.5	49.1 CY	10.2	43.3 CY	7.3	36.5 CY																		
	Apron *		53.7		50.1		46.0		42.4		37.9		34.4		30.9		27.1																			

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.



Bar Size	D
5	3 3/4"
6	4 1/2"
7	5 1/2"

**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 <b>Parallel Wing Headwalls</b> July, 2020 Quantity Tabulation 16'-0" Span 30° Skew	PWH 30-5-20 SHEET 1 OF 2	
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