

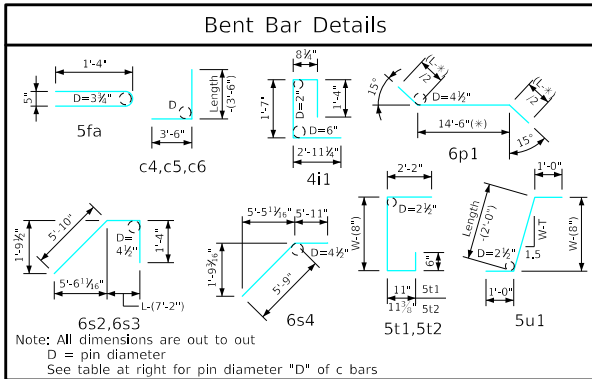
ENGLISH\FRDS\DESIGNED\CULVERTS.DGN - PWH 15-6-20 S1 - THIS SHEET ISSUED 07-2020.

### Bill of Reinforcing for One Headwall 15° Skew Span x Culvert Height

Location	Shape	14' x 14'				14' x 13'				14' x 12'				14' x 11'				14' x 10'				14' x 9'				14' x 8'				14' 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	47'-10"	105	5b1	2	44'-9"	98	5b1	2	41'-7"	92	5b1	2	38'-6"	80	5b1	2	35'-5"	74	5b1	2	32'-4"	67	5b1	2	29'-2"	61	5b1	2	26'-1"	54
Wingwall, F.F.H.		5b2	26 Var.	2 Each 9'-2 to 46'-5	769	5b2	24 Var.	2 Each 9'-2 to 43'-4	667	5b2	22 Var.	2 Each 9'-2 to 40'-2	571	5b2	20 Var.	2 Each 9'-2 to 37'-1	482	5b2	18 Var.	2 Each 9'-2 to 34'-0	405	5b2	16 Var.	2 Each 9'-2 to 30'-11	334	5b2	14 Var.	2 Each 9'-2 to 27'-9	270	5b2	12 Var.	2 Each 9'-2 to 24'-8	212
Wingwall, B.F.H.		4b3	2	48'-0"	67	4b3	2	44'-11"	63	4b3	2	41'-9"	59	4b3	2	38'-8"	52	4b3	2	35'-6"	47	4b3	2	32'-5"	43	4b3	2	29'-3"	39	4b3	2	26'-2"	35
Wingwall, B.F.H.		4b4	24 Var.	2 Each 12'-5 to 46'-7	483	4b4	22 Var.	2 Each 12'-5 to 43'-6	417	4b4	20 Var.	2 Each 12'-5 to 40'-4	356	4b4	18 Var.	2 Each 12'-5 to 37'-3	299	4b4	16 Var.	2 Each 12'-4 to 34'-1	248	4b4	14 Var.	2 Each 12'-4 to 31'-0	203	4b4	12 Var.	2 Each 12'-4 to 27'-11	161	4b4	10 Var.	2 Each 12'-4 to 24'-9	124
Wingwall, F.F.V.		5c1	90 Var.	2 Each 2'-9 to 16'-11	923	5c1	82 Var.	2 Each 2'-9 to 15'-8	788	5c1	76 Var.	2 Each 2'-9 to 14'-8	690	5c1	70 Var.	2 Each 2'-9 to 13'-8	599	4c1	64 Var.	2 Each 2'-9 to 12'-9	331	4c1	58 Var.	2 Each 2'-9 to 11'-9	281	4c1	68 Var.	2 Each 2'-9 to 10'-9	307	4c1	60 Var.	2 Each 2'-9 to 9'-9	251
Wingwall, F.F.V.		5c2	48 Var.	2 Each 9'-4 to 16'-9	653	5c2	42 Var.	2 Each 9'-4 to 15'-10	551	5c2	36 Var.	2 Each 9'-4 to 14'-10	454	5c2	30 Var.	2 Each 9'-4 to 13'-10	362	4c2	24 Var.	2 Each 9'-4 to 12'-11	178	4c2	16 Var.	2 Each 9'-4 to 11'-7	112	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (O)		5c3	2	17'-2"	36	5c3	2	16'-2"	34	5c3	2	15'-2"	32	5c3	2	14'-2"	30	4c3	2	13'-2"	18	4c3	2	12'-2"	16	4c3	2	11'-2"	15	4c3	2	10'-2"	14
Wingwall, F.F.V. (A)		5c3	2	17'-2"	36	5c3	2	16'-2"	34	5c3	2	15'-2"	32	5c3	2	14'-2"	30	4c3	2	13'-2"	18	4c3	2	12'-2"	16	4c3	2	11'-2"	15	4c3	2	10'-2"	14
Wingwall, B.F.V.		6c4	90 Var.	2 Each 6'-5 to 20'-7	1825	6c4	82 Var.	2 Each 6'-5 to 19'-4	1586	6c4	76 Var.	2 Each 6'-5 to 18'-4	1413	5c4	70 Var.	2 Each 6'-5 to 17'-5	1250	5c4	64 Var.	2 Each 6'-5 to 16'-5	762	5c4	58 Var.	2 Each 6'-5 to 15'-6	663	5c4	52 Var.	2 Each 6'-5 to 14'-6	567	5c4	46 Var.	2 Each 6'-5 to 13'-6	478
Wingwall, B.F.V. (O)		6c5	1	20'-8"	31	6c5	1	19'-8"	30	6c5	1	18'-8"	28	5c5	1	17'-8"	26	5c5	1	16'-8"	17	5c5	1	15'-8"	16	5c5	1	14'-8"	15	5c5	1	13'-8"	14
Wingwall, B.F.V. (A)		6c5	2	20'-8"	62	6c5	2	19'-8"	59	6c5	2	18'-8"	56	5c5	2	17'-8"	52	5c5	2	16'-8"	35	5c5	2	15'-8"	33	5c5	2	14'-8"	31	5c5	2	13'-8"	29
Wingwall, B.F.V.		7c6	62	9'-6"	1204	6c6	56	8'-6"	715	6c6	50	8'-6"	638	5c6	44	8'-6"	566	5c6	38	8'-6"	390	5c6	32	8'-6"	266	5c6	24	8'-6"	213	5c6	18	8'-6"	160
Apron, Longit., Bott.		4d1	15	47'-9"	503	4d1	15	44'-8"	472	4d1	15	41'-7"	441	4d1	15	38'-5"	385	4d1	15	35'-4"	354	4d1	15	32'-3"	323	4d1	15	29'-2"	292	4d1	15	26'-0"	261
Apron, Longit., Top		6f1	15	47'-9"	1130	6f1	15	44'-8"	1061	6f1	15	41'-7"	991	6f1	15	38'-5"	866	6f1	15	35'-4"	796	6f1	15	32'-3"	727	6f1	15	29'-2"	657	6f1	15	26'-0"	586
Parapet, Vertical		4i1	29	6'-7"	128	4i1	29	6'-7"	128	4i1	29	6'-7"	128	4i1	29	6'-7"	128	4i1	29	6'-7"	128	4i1	29	6'-7"	128	4i1	29	6'-7"	128	4i1	29	6'-7"	128
Parapet, Horiz.		9j1	4	16'-4"	222	9j1	4	16'-4"	222	9j1	4	16'-2"	220	9j1	4	16'-2"	220	9j1	4	15'-10"	215	9j1	4	15'-10"	215	9j1	4	15'-10"	215	9j1	4	15'-8"	213
Apron, Trans., Top		5m1	87	16'-4"	1482	5m1	80	16'-4"	1363	5m1	74	16'-2"	1248	5m1	68	16'-2"	1147	5m1	62	15'-10"	1024	5m1	56	15'-10"	925	5m1	49	15'-10"	809	5m1	43	15'-8"	703
Apron, Trans., Top		5m2	7 Var.	2'-9 to 13'-11	61	5m2	8 Var.	2'-3 to 15'-4	73	5m2	7 Var.	3'-8 to 14'-11	68	5m2	7 Var.	3'-4 to 14'-6	65	5m2	7 Var.	2'-9 to 13'-11	61	5m2	7 Var.	2'-4 to 13'-7	58	5m2	8 Var.	2'-0 to 15'-0	71	5m2	7 Var.	3'-4 to 14'-7	65
Apron, Trans., Bott.		6m3	85	14'-1"	1798	6m3	79	14'-1"	1671	5m3	73	13'-2"	1002	6m3	34	13'-11"	711	6m3	31	13'-7"	632	5m3	28	12'-10"	375	5m3	25	12'-10"	335	5m3	22	12'-8"	291
Curtain, Horiz.		6p1	7	16'-9"	176	6p1	7	16'-9"	176	6p1	6	16'-7"	149	6p1	6	16'-3"	146	6p1	6	16'-3"	146	6p1	6	16'-3"	146	6p1	6	16'-3"	146	6p1	5	16'-1"	121
Wing Slope, Both F.		6s1	4	43'-3"	274	6s1	4	39'-11"	240	6s1	4	36'-8"	220	6s1	4	33'-5"	201	6s1	4	30'-2"	181	6s1	4	26'-11"	162	6s1	4	23'-8"	142	6s1	4	20'-5"	123
Wing Slope, Both F. (O)		6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23	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	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	6s4	2	11'-8"	35	6s4	2	11'-8"	35
Wing Slope, F.F.		6s5	2	40'-9"	130	6s5	2	37'-6"	113	6s5	2	34'-2"	103	6s5	2	30'-11"	93	6s5	2	27'-8"	83	6s5	2	24'-5"	73	6s5	2	21'-2"	64	6s5	2	17'-11"	54
Curtain, Vert.		5t1	15	8'-5"	132	5t1	15	8'-2"	128	5t1	15	7'-11"	124	5t1	15	7'-8"	120	5t1	15	7'-5"	116	5t1	15	7'-2"	112	5t1	15	6'-11"	108	5t1	15	6'-8"	104
Curtain, Vert. Ends		5t2	4	8'-5"	35	5t2	4	8'-2"	34	5t2	4	7'-11"	33	5t2	4	7'-8"	32	5t2	4	7'-5"	31	5t2	4	7'-2"	30	5t2	4	6'-11"	29	5t2	4	6'-8"	28
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	12,383 LB				10,840 LB				9264 LB				7481 LB				6352 LB				5438 LB				4803 LB				4174 LB			
	Concrete	74.7 CY				68.1 CY				59.4 CY				53.4 CY				44.1 CY				39.2 CY				34.5 CY				28.8 CY			
	Apron *	41.0				38.3				35.1				32.3				28.9				26.2				23.6				20.6			

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 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.



#### 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	14'-0" Span 15° Skew	PWH 15-6-20 SHEET 1 OF 2