

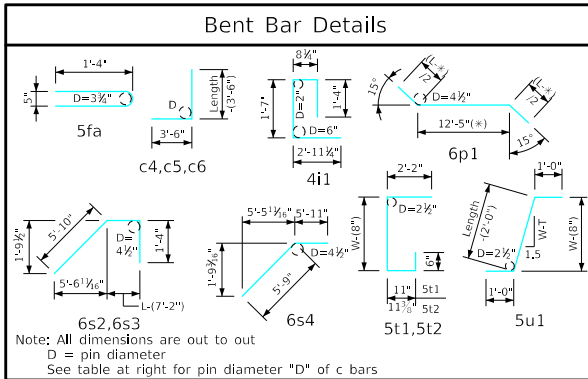
ENGLISH\FDS\DESIGNED\CULVERTS.DGN - PWH 15-7-20 S1 - THIS SHEET ISSUED 07-2020.

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

Location	Shape	12' x 12'				12' x 11'				12' x 10'				12' x 9'				12' x 8'				12' x 7'			
		Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	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	4'-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	22 Var.	2 Each 9'-2 to 40'-2	571	5b2	20 Var.	2 Each 37'-1	482	5b2	18 Var.	2 Each 34'-0	405	5b2	16 Var.	2 Each 30'-11	334	5b2	14 Var.	2 Each 27'-9	270	5b2	12 Var.	2 Each 24'-8	212
Wingwall, B.F.H.		4b3	2	4'-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	20 Var.	2 Each 12'-5 to 40'-4	356	4b4	18 Var.	2 Each 37'-3	299	4b4	16 Var.	2 Each 34'-1	248	4b4	14 Var.	2 Each 31'-0	203	4b4	12 Var.	2 Each 27'-11	161	4b4	10 Var.	2 Each 24'-9	124
Wingwall, F.F.V.		5c1	76 Var.	2 Each 14'-7	684	5c1	70 Var.	2 Each 13'-7	593	4c1	64 Var.	2 Each 12'-8	328	4c1	58 Var.	2 Each 11'-8	278	4c1	68 Var.	2 Each 10'-8	303	4c1	60 Var.	2 Each 9'-8	247
Wingwall, F.F.V.		5c2	36 Var.	2 Each 9'-3 to 14'-9	451	5c2	30 Var.	2 Each 13'-9	360	4c2	24 Var.	2 Each 12'-10	177	4c2	16 Var.	2 Each 11'-6	111	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (O)		5c3	2	15'-1"	31	5c3	2	14'-1"	29	4c3	2	13'-1"	17	4c3	2	12'-1"	16	4c3	2	11'-1"	15	4c3	2	10'-1"	13
Wingwall, F.F.V. (A)		5c3	2	15'-1"	31	5c3	2	14'-1"	29	4c3	2	13'-1"	17	4c3	2	12'-1"	16	4c3	2	11'-1"	15	4c3	2	10'-1"	13
Wingwall, B.F.V.		6c4	76 Var.	2 Each 6'-4 to 18'-3	1403	5c4	70 Var.	2 Each 17'-4	864	5c4	64 Var.	2 Each 16'-4	757	5c4	58 Var.	2 Each 15'-5	658	5c4	52 Var.	2 Each 14'-5	563	5c4	46 Var.	2 Each 13'-5	474
Wingwall, B.F.V. (O)		6c5	1	18'-7"	28	5c5	1	17'-7"	18	5c5	1	16'-7"	16	5c5	1	15'-7"	16	5c5	1	14'-7"	15	5c5	1	13'-7"	14
Wingwall, B.F.V. (A)		6c5	2	18'-7"	56	5c5	2	17'-7"	37	5c5	2	16'-7"	35	5c5	2	15'-7"	33	5c5	2	14'-7"	30	5c5	2	13'-7"	28
Wingwall, B.F.V.		6c6	50	8'-6"	638	5c6	44	8'-6"	390	5c6	38	8'-6"	337	5c6	30	8'-6"	266	5c6	24	8'-6"	213	5c6	18	8'-6"	160
Apron, LongR. Bott.		4d1	13	4'-7"	382	4d1	13	38'-5"	334	4d1	13	35'-4"	307	4d1	13	32'-3"	280	4d1	13	29'-2"	253	4d1	13	26'-0"	226
Apron, LongR. Top		6f1	13	4'-7"	859	6f1	13	38'-5"	750	6f1	13	35'-4"	690	6f1	13	32'-3"	630	6f1	13	29'-2"	570	6f1	13	26'-0"	508
Parapet, Vertical		4i1	25	6'-7"	110	4i1	25	6'-7"	110	4i1	25	6'-7"	110	4i1	25	6'-7"	110	4i1	25	6'-7"	110	4i1	25	6'-7"	110
Parapet, Horiz.		7j1	4	14'-1"	115	7j1	4	14'-1"	115	7j1	4	13'-9"	112	7j1	4	13'-9"	112	7j1	4	13'-9"	112	7j1	4	13'-7"	111
Apron, Trans., Top		5m1	50	14'-2"	739	5m1	46	14'-2"	680	5m1	42	13'-10"	606	5m1	38	13'-10"	548	5m1	33	13'-10"	476	5m1	29	13'-8"	413
Apron, Trans., Top		5m2	4 Var.	3'-7 to 12'-0	33	5m2	4 Var.	3'-3 to 11'-7	31	5m2	4 Var.	2'-8 to 11'-1	29	5m2	4 Var.	2'-3 to 10'-8	27	5m2	4 Var.	4'-8 to 13'-1	37	5m2	4 Var.	4'-3 to 12'-7	35
Apron, Trans., Bott.		5m3	73	11'-1"	844	5m3	67	11'-1"	775	6m3	31	11'-6"	535	5m3	28	10'-9"	314	5m3	25	10'-9"	280	5m3	22	10'-7"	243
Curtain, Horiz.		6p1	6	14'-7"	131	6p1	6	14'-7"	131	6p1	6	14'-3"	128	6p1	6	14'-3"	128	6p1	6	14'-3"	128	6p1	5	14'-1"	106
Wing Slope, Both F.		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'-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	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	13	7'-11"	107	5t1	13	7'-8"	104	5t1	13	7'-5"	101	5t1	13	7'-2"	97	5t1	13	6'-11"	94	5t1	13	6'-8"	90
Curtain, Vert. Ends		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	6'-7"	27	5u1	4	6'-5"	27	5u1	4	6'-2"	26	5u1	4	5'-11"	25	5u1	4	5'-9"	24	5u1	4	5'-6"	23
Estimated Quantities One Headwall	Reinf. Steel			8191 LB				6704 LB				5487 LB				4666 LB				4093 LB				3533 LB	
	Concrete	Parapet Δ	1.8			1.8				1.7				1.7				1.7			1.6				
	Concrete	Wingwalls	22.3		53.5 CY	19.1		48.0 CY	13.4		39.2 CY	11.2		34.8 CY	9.1		30.5 CY	6.5		25.3 CY	17.2				

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 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 12'-0" Span 15° Skew	PWH 15-7-20 SHEET 1 OF 2