

ENGLISH\FDS\DESIGNED\CULVERTS.DGN - PWH 30-7-20 S1 - THIS SHEET ISSUED 07-2020.

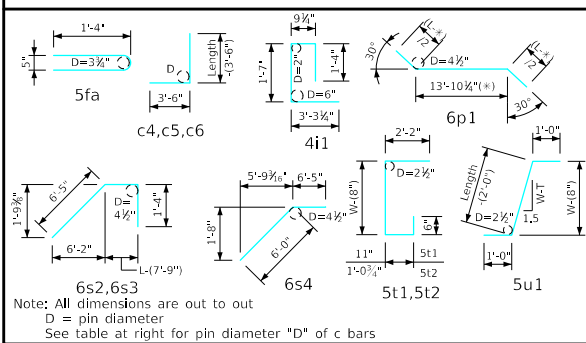
Bill of Reinforcing for One Headwall 30° Skew Span x Culvert Height

Location	Shape	12' x 12'				12' x 11'				12' x 10'				12' x 9'				12' x 8'				12' x 7'			
		Bar No.	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	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	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	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	20 Var.	2 Each 13'-9 to 44'-11"	398	4b4	18 Var.	2 Each 13'-9 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	86 Var.	2 Each 2'-8 to 14'-9"	781	5c1	78 Var.	2 Each 2'-8 to 13'-8"	664	4c1	72 Var.	2 Each 2'-8 to 12'-9"	371	4c1	64 Var.	2 Each 2'-8 to 11'-7"	305	4c1	76 Var.	2 Each 2'-8 to 10'-8"	338	4c1	68 Var.	2 Each 2'-8 to 9'-10"	284
Wingwall, F.F.V.		5c2	40 Var.	2 Each 9'-2 to 14'-8"	497	5c2	34 Var.	2 Each 9'-2 to 13'-9"	406	4c2	26 Var.	2 Each 9'-2 to 12'-7"	189	4c2	20 Var.	2 Each 9'-2 to 11'-9"	140	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	86 Var.	2 Each 6'-4 to 18'-6"	1604	5c4	78 Var.	2 Each 6'-4 to 17'-4"	963	5c4	72 Var.	2 Each 6'-4 to 16'-5"	854	5c4	64 Var.	2 Each 6'-4 to 15'-4"	723	5c4	58 Var.	2 Each 6'-4 to 14'-5"	628	5c4	50 Var.	2 Each 6'-4 to 13'-3"	511
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	3	18'-7"	84	5c5	3	17'-7"	55	5c5	3	16'-7"	52	5c5	3	15'-7"	49	5c5	3	14'-7"	46	5c5	3	13'-7"	43
Wingwall, B.F.V.		6c6	56	8'-6"	715	5c6	50	8'-6"	443	5c6	42	8'-6"	372	5c6	36	8'-6"	319	5c6	28	8'-6"	248	5c6	22	8'-6"	195
Apron, LongR. Bott.		4d1	13	46'-1"	421	4d1	13	42'-7"	391	4d1	13	39'-2"	340	4d1	13	35'-8"	310	4d1	13	32'-3"	280	4d1	13	28'-9"	250
Apron, LongR. Top		6f1	13	46'-1"	947	6f1	13	42'-7"	879	6f1	13	39'-2"	765	6f1	13	35'-8"	696	6f1	13	32'-3"	630	6f1	13	28'-9"	561
Parapet, Vertical		4i1	25	7'-0"	117	4i1	25	7'-0"	117	4i1	25	7'-0"	117	4i1	25	7'-0"	117	4i1	25	7'-0"	117	4i1	25	7'-0"	117
Parapet, Horiz.		7j1	4	15'-9"	129	7j1	4	15'-9"	129	7j1	4	15'-4"	125	7j1	4	15'-4"	125	7j1	4	15'-4"	125	7j1	4	15'-2"	124
Apron, Trans., Top		5m1	80	14'-2"	1182	5m1	73	14'-2"	1079	5m1	66	13'-10"	952	5m1	59	13'-10"	851	5m1	52	13'-10"	750	5m1	46	13'-8"	656
Apron, Trans., Top		5m2	13 Var.	2'-5 to 12'-10"	103	5m2	13 Var.	2'-6 to 12'-11"	105	5m2	13 Var.	2'-5 to 12'-10"	103	5m2	13 Var.	2'-6 to 12'-10"	104	5m2	13 Var.	2'-6 to 12'-11"	105	5m2	12 Var.	2'-6 to 12'-1"	91
Apron, Trans., Bott.		5m3	73	12'-9"	971	5m3	67	12'-9"	891	6m3	31	13'-1"	609	6m3	28	13'-1"	550	5m3	25	12'-4"	322	5m3	22	12'-2"	279
Curtain, Horiz.		6p1	6	16'-0"	144	6p1	6	16'-0"	144	6p1	6	15'-8"	141	6p1	6	15'-8"	141	6p1	6	15'-8"	141	6p1	5	15'-6"	116
Wing Slope, Both F.		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'-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
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	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	14	7'-11"	116	5t1	14	7'-8"	112	5t1	14	7'-2"	105	5t1	14	7'-2"	105	5t1	14	6'-11"	101	5t1	14	6'-8"	97
Curtain, Vert. Ends		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	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	9627 LB				7961 LB				6450 LB				5708 LB				4838 LB				4174 LB			
	Concrete	Parapet Δ	2.0			2.0				1.9				1.9				1.9				1.8			
	Wingwalls	24.8		59.5 CY	21.3		53.5 CY	15.0		43.8 CY	12.5		38.8 CY	10.2		34.0 CY	7.3		28.3 CY	19.2					

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.

Bent Bar Details



c Bar Pin Diameter	
Bar Size	D
5	3/8"
6	4/8"

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		PWH 30-7-20	
12'-0" Span		SHEET 1 OF 2	
30° Skew			