

Bill of Reinforcing for One Headwall 0° Skew Span x Culvert Height

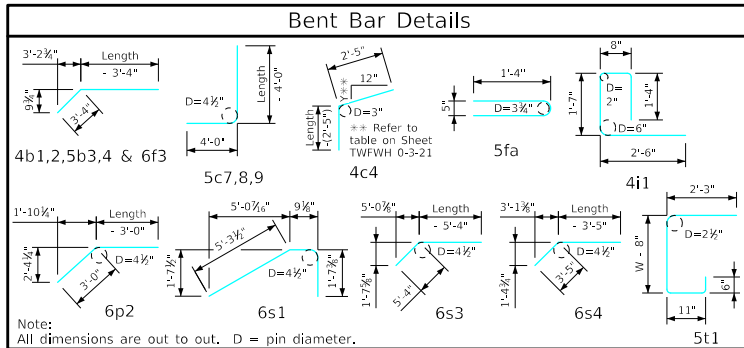
Bar	Location	Shape	12' x 12'			12' x 11'			12' x 10'			12' x 9'			12' x 8'			12' x 7'			Bar	
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.		
5fa	Fence Anchor (Galv.)		2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	5fa	
4b1	Wingwall, B.F.H.		2	41'-2"	58	2	38'-1"	51	2	35'-0"	47	2	31'-11"	43	2	28'-10"	39	2	25'-9"	34	4b1	
4b2	Wingwall, B.F.H.		20 Var.	2 Each 11'-11 to 39'-9	345	18 Var.	2 Each 11'-11 to 36'-8	292	16 Var.	2 Each 11'-11 to 33'-7	243	14 Var.	2 Each 11'-11 to 30'-6	198	12 Var.	2 Each 11'-11 to 27'-5	158	10 Var.	2 Each 11'-11 to 24'-4	121	4b2	
5b3	Wingwall, F.F.H.		2	41'-3"	91	2	38'-2"	80	2	35'-1"	73	2	32'-0"	67	2	28'-11"	60	2	25'-9"	54	5b3	
5b4	Wingwall, F.F.H.		22 Var.	2 Each 8'-10 to 39'-10	558	20 Var.	2 Each 8'-10 to 36'-9	475	18 Var.	2 Each 8'-11 to 33'-8	400	16 Var.	2 Each 8'-11 to 30'-7	330	14 Var.	2 Each 8'-11 to 27'-6	266	12 Var.	2 Each 8'-11 to 24'-4	208	5b4	
5b5	Interior Wall, Both F.H.		21 Var.	5'-2 to 27'-8	360	19 Var.	5'-3 to 25'-8	306	17 Var.	5'-3 to 23'-7	256	15 Var.	5'-3 to 21'-7	210	13 Var.	5'-4 to 19'-7	169	11 Var.	5'-5 to 17'-7	132	5b5	
4c1	Wingwall, F.F.V.		76 Var.	2 Each 2'-10 to 14'-10	448	70 Var.	2 Each 2'-10 to 13'-10	390	64 Var.	2 Each 2'-10 to 12'-11	337	58 Var.	2 Each 2'-10 to 11'-11	286	52 Var.	2 Each 2'-10 to 10'-11	239	46 Var.	2 Each 2'-10 to 10'-0	197	4c1	
4c2	Wingwall, F.F.V.		36 Var.	2 Each 9'-6 to 15'-0	295	30 Var.	2 Each 9'-6 to 14'-0	235	24 Var.	2 Each 9'-6 to 13'-1	181	18 Var.	2 Each 9'-6 to 12'-1	130	--	--	--	--	--	--	4c2	
4c3	Wingwall, F.F.V.		4	13'-9"	37	4	12'-9"	34	2	11'-9"	16	2	10'-9"	14	2	9'-9"	13	2	8'-9"	12	4c3	
4c4	Interior Wall, Both F.V.		2	4'-2"	6	2	4'-2"	6	2	4'-2"	6	2	4'-2"	6	2	4'-2"	6	2	4'-2"	6	4c4	
4c5	Interior Wall, Both F.V.		50 Var.	2'-0 to 12'-11	249	46 Var.	2'-0 to 11'-11	214	42 Var.	2'-0 to 10'-11	181	38 Var.	1'-11 to 9'-11	150	34 Var.	1'-11 to 8'-11	123	30 Var.	1'-11 to 7'-10	98	4c5	
5c6	Wingwall, B.F.V.		12 Var.	2 Each 4'-6 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	5c6	
5c7	Wingwall, B.F.V.		64 Var.	2 Each 8'-10 to 18'-10	923	58 Var.	2 Each 8'-10 to 17'-10	807	52 Var.	2 Each 8'-10 to 16'-11	698	46 Var.	2 Each 8'-10 to 15'-11	594	40 Var.	2 Each 8'-10 to 14'-11	495	34 Var.	2 Each 8'-10 to 14'-0	405	5c7	
5c8	Wingwall, B.F.V.		50	10'-6"	548	44	10'-6"	482	38	10'-6"	416	32	10'-6"	350	26	10'-6"	285	20	10'-6"	219	5c8	
5c9	Wingwall, B.F.V.		4	17'-9"	74	4	16'-9"	70	2	15'-9"	33	2	14'-9"	31	2	13'-9"	29	2	12'-9"	27	5c9	
4d1	Apron, Longit., Bott.		17	27'-11"	317	17	25'-11"	294	17	23'-11"	272	17	21'-11"	249	17	19'-11"	226	17	17'-11"	203	4d1	
4d2	Apron, Longit., Bott.		6	36'-3"	145	6	33'-2"	133	6	30'-1"	121	6	27'-0"	108	6	23'-11"	96	6	20'-10"	84	4d2	
6f1	Apron, Longit., Top		24	27'-11"	1006	24	25'-11"	934	24	23'-11"	862	24	21'-11"	790	24	19'-11"	718	24	17'-11"	646	6f1	
6f2	Apron, Longit., Top		16 Var.	2 Each 5'-10 to 24'-10	368	16 Var.	2 Each 3'-10 to 22'-10	320	14 Var.	2 Each 4'-6 to 20'-10	266	12 Var.	2 Each 5'-3 to 18'-10	217	10 Var.	2 Each 5'-11 to 16'-10	171	10 Var.	2 Each 3'-11 to 14'-10	141	6f2	
6f3	Apron, Longit., Top		2	41'-3"	131	2	38'-2"	115	2	35'-1"	105	2	32'-0"	96	2	28'-11"	87	2	25'-9"	77	6f3	
4i1	Parapet, Vertical		51	6'-1"	207	49	6'-1"	199	49	6'-1"	199	49	6'-1"	199	49	6'-1"	199	49	6'-1"	199	4i1	
7j1	Parapet, Horizontal		4	26'-8"	218	4	26'-5"	216	4	26'-2"	214	4	26'-2"	214	4	26'-2"	214	4	25'-11"	212	7j1	
6m1	Apron, Trans., Top		34 Var.	26'-10 to 39'-3	1687	31 Var.	26'-7 to 37'-10	1500	29 Var.	26'-4 to 36'-10	1376	26 Var.	26'-4 to 35'-9	1212	23 Var.	26'-4 to 34'-7	1052	21 Var.	26'-1 to 33'-7	941	6m1	
6m2	Apron, Trans., Bott.		24 Var.	20'-9 to 32'-3	955	22 Var.	20'-8 to 31'-2	856	20 Var.	20'-7 to 30'-1	761	18 Var.	20'-7 to 29'-1	671	16 Var.	20'-7 to 28'-1	585	14 Var.	20'-6 to 27'-0	499	6m2	
6p1	Curtain, Horizontal		4	25'-3"	152	4	25'-2"	151	4	25'-1"	151	4	25'-1"	151	4	25'-1"	151	4	25'-0"	150	6p1	
6p2	Curtain, Horizontal		8	18'-7"	223	8	17'-4"	208	8	16'-1"	193	8	14'-10"	178	8	13'-7"	163	8	12'-4"	148	6p2	
6s1	Wing Slope, Both F.		4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	6s1	
6s2	Wing Slope, Both F.		4	37'-1"	223	4	33'-10"	203	4	30'-7"	184	4	27'-4"	164	4	24'-1"	145	4	20'-10"	125	6s2	
6s3	Wing Slope, F.F.		2	43'-2"	137	2	39'-11"	120	2	36'-8"	110	2	33'-5"	100	2	30'-2"	91	2	26'-11"	81	6s3	
6s4	Interior Wall, Both F.		2	30'-3"	91	2	28'-0"	84	2	25'-9"	77	2	23'-6"	71	2	21'-4"	64	2	19'-1"	57	6s4	
5t1	Curtain, Vertical		41	8'-0"	342	39	7'-9"	315	37	7'-6"	289	35	7'-3"	265	33	7'-0"	241	31	6'-9"	218	5t1	
Estimated Quantities One Headwall			Reinf. Steel	10,292 LB			9188 LB			8165 LB			7192 LB			6183 LB			5392 LB			
			Concrete	88.2 CY			75.7 CY			64.7 CY			56.6 CY			46.4 CY			39.3 CY			
			Parapet Δ	2.8			2.7			2.6			2.6			2.6			2.5			
			Wingwalls	28.1			21.9			16.9			14.0			11.4			8.1			
			Apron =	57.3			51.1			45.2			40.0			32.4			28.7			

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.

Note: Weight of bars over 40'-0" long include an allowance of 2'-5" for lap. Lengths shown for bars over 40'-0" long do not include lap.

Headwall Notes:

- See Sheet TWFHWH G1-21 for General Notes, Specifications, and Design Stresses.
- 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 "d", "6f1" and "6f3" 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 - Twin Reinforced Concrete Box Culverts	
<h3>Flared Wing Headwalls</h3>			
February, 2021			
Quantity Tabulation 12'-0" Span 0° Skew		TWFHWH 0-4-21 Sheet 1 of 2	