

ENGLISH\FDSIGNED\W\CULVERTS\FWH.DGN - TWFH 0-5-21 S1 - THIS SHEET ISSUED 02-2021.

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

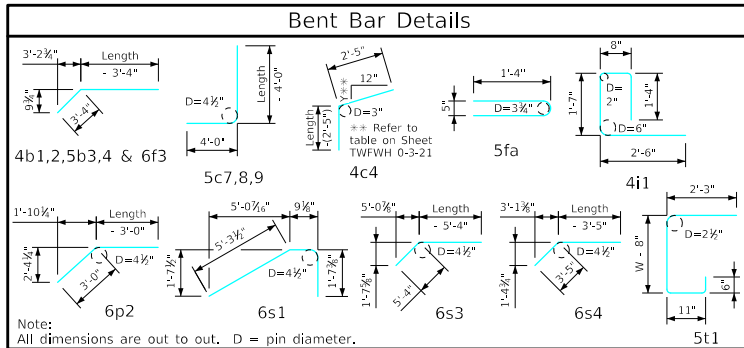
Bar	Location	Shape	10' x 12'			10' x 11'			10' x 10'			10' x 9'			10' x 8'			10' x 7'			Bar	
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.		
5fa	Fence Anchor (Galv.)		2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	5fa	
4b1	Wingwall, B.F.H.		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'-9 to 14'-9	444	70 Var.	2 Each 2'-9 to 13'-9	386	64 Var.	2 Each 2'-9 to 12'-10	333	58 Var.	2 Each 2'-9 to 11'-10	283	52 Var.	2 Each 2'-9 to 10'-10	236	46 Var.	2 Each 2'-9 to 9'-11	195	4c1	
4c2	Wingwall, F.F.V.		36 Var.	2 Each 9'-5 to 14'-11	293	30 Var.	2 Each 9'-5 to 13'-11	234	24 Var.	2 Each 9'-5 to 13'-0	180	18 Var.	2 Each 9'-5 to 12'-0	129	--	--	--	--	--	--	4c2	
4c3	Wingwall, F.F.V.		4	13'-8"	37	4	12'-8"	34	2	11'-8"	16	2	10'-8"	14	2	9'-8"	13	2	8'-8"	12	4c3	
4c4	Interior Wall, Both F.V.		2	4'-1"	5	2	4'-1"	5	2	4'-1"	5	2	4'-1"	5	2	4'-1"	5	2	4'-1"	5	4c4	
4c5	Interior Wall, Both F.V.		50 Var.	1'-11 to 12'-10	246	46 Var.	1'-11 to 11'-10	211	42 Var.	1'-11 to 10'-10	179	38 Var.	1'-10 to 9'-10	148	34 Var.	1'-10 to 8'-10	121	30 Var.	1'-10 to 7'-9	96	4c5	
5c6	Wingwall, B.F.V.		12 Var.	2 Each 2'-9 to 4'-5	45	12 Var.	2 Each 2'-9 to 4'-5	45	12 Var.	2 Each 2'-9 to 4'-5	45	12 Var.	2 Each 2'-9 to 4'-5	45	12 Var.	2 Each 2'-9 to 4'-5	45	12 Var.	2 Each 2'-9 to 4'-5	45	5c6	
5c7	Wingwall, B.F.V.		64 Var.	2 Each 8'-9 to 18'-9	918	58 Var.	2 Each 8'-9 to 17'-9	802	52 Var.	2 Each 8'-9 to 16'-10	694	46 Var.	2 Each 8'-9 to 15'-10	590	40 Var.	2 Each 8'-9 to 14'-10	492	34 Var.	2 Each 8'-9 to 13'-11	402	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'-8"	74	4	16'-8"	70	2	15'-8"	33	2	14'-8"	31	2	13'-8"	29	2	12'-8"	26	5c9	
4d1	Apron, Longit., Bott.		15	27'-11"	280	13	25'-11"	225	13	23'-11"	208	13	21'-11"	190	13	19'-11"	173	13	17'-11"	156	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		20	27'-11"	839	20	25'-11"	779	20	23'-11"	718	20	21'-11"	658	20	19'-11"	598	20	17'-11"	538	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		43	6'-1"	175	41	6'-1"	167	41	6'-1"	167	41	6'-1"	167	41	6'-1"	167	41	6'-1"	167	4i1	
7j1	Parapet, Horizontal		4	22'-8"	185	4	22'-5"	183	4	22'-2"	181	4	22'-2"	181	4	22'-2"	181	4	21'-11"	179	7j1	
6m1	Apron, Trans., Top		34 Var.	22'-10 to 35'-3	1483	31 Var.	22'-7 to 33'-10	1313	29 Var.	22'-4 to 32'-10	1201	26 Var.	22'-4 to 31'-9	1056	23 Var.	22'-4 to 30'-7	914	21 Var.	22'-1 to 29'-7	815	6m1	
6m2	Apron, Trans., Bott.		24 Var.	16'-9 to 28'-3	811	22 Var.	16'-8 to 27'-2	724	20 Var.	16'-7 to 26'-1	641	18 Var.	16'-7 to 25'-1	563	16 Var.	16'-7 to 24'-1	489	14 Var.	16'-6 to 23'-0	415	6m2	
6p1	Curtain, Horizontal		4	21'-3"	128	4	21'-2"	127	4	21'-1"	127	4	21'-1"	127	4	21'-1"	127	4	21'-0"	126	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		39	8'-0"	325	37	7'-9"	299	35	7'-6"	274	33	7'-3"	250	31	7'-0"	226	29	6'-9"	204	5t1	
Estimated Quantities One Headwall			Reinf. Steel	9618 LB			8525 LB			7545 LB			6621 LB			5662 LB			4914 LB			
			Concrete	80.3 CY			68.4 CY			58.1 CY			50.6 CY			42.8 CY			34.7 CY			

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 TWFH 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
Flared Wing Headwalls		
February, 2021		
Quantity Tabulation 10'-0" Span 0° Skew		TWFH 0-5-21 Sheet 1 of 2