

ENGLISH\RFDSIGNED\WIND\CVLVERTSFWH.DGN - TWFH 0-6-21 - THIS SHEET ISSUED 02-2021.

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

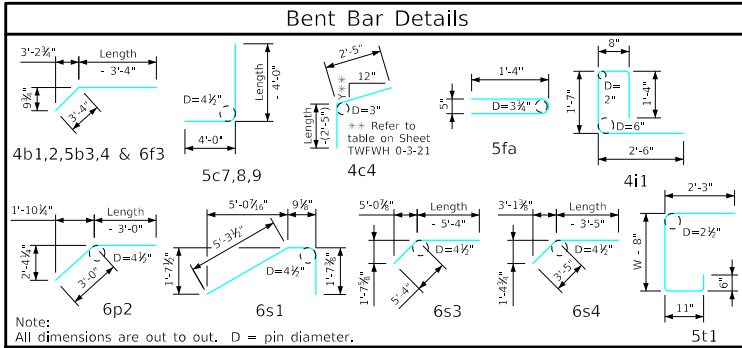
Bar	Location	Shape	8' x 10'			8' x 9'			8' x 8'			8' x 7'			8' x 6'			8' x 5'			8' x 4'			Bar	
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.		
5fa	Fence Anchor (Galv.)		2	2'-10	6	2	2'-10	6	2	2'-10	6	2	2'-10	6	2	2'-10	6	2	2'-10	6	2	2'-10	6	5fa	
4b1	Wingwall, B.F.H.		2	35'-0	47	2	31'-11	43	2	28'-10	39	2	25'-9	34	2	22'-8	30	2	19'-7	26	2	16'-6	22	4b1	
4b2	Wingwall, B.F.H.		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	8 Var.	2 Each 11'-11 to 21'-3	89	6 Var.	2 Each 11'-11 to 18'-2	60	4 Var.	2 Each 11'-11 to 15'-1	36	4b2	
5b3	Wingwall, F.F.H.		2	35'-1	73	2	32'-0	67	2	28'-11	60	2	25'-9	54	2	22'-8	47	2	19'-7	41	2	16'-6	34	5b3	
5b4	Wingwall, F.F.H.		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	10 Var.	2 Each 8'-11 to 21'-3	157	8 Var.	2 Each 8'-11 to 18'-2	113	6 Var.	2 Each 8'-11 to 15'-1	75	5b4	
5b5	Interior Wall, Both F.H.		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	9 Var.	5'-5 to 15'-7	99	7 Var.	5'-7 to 13'-7	70	5 Var.	5'-9 to 11'-6	45	5b5	
4c1	Wingwall, F.F.V.		64 Var.	2 Each 2'-8 to 12'-9	330	58 Var.	2 Each 2'-8 to 11'-9	279	52 Var.	2 Each 2'-8 to 10'-9	233	46 Var.	2 Each 2'-8 to 9'-10	192	40 Var.	2 Each 2'-8 to 8'-10	154	32 Var.	2 Each 2'-8 to 7'-7	110	26 Var.	2 Each 2'-8 to 6'-7	80	4c1	
4c2	Wingwall, F.F.V.		24 Var.	2 Each 9'-4 to 12'-1	178	18 Var.	2 Each 9'-4 to 11'-1	128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4c2	
4c3	Wingwall, F.F.V.		2	11'-7	15	2	10'-7	14	2	9'-7	13	2	8'-7	11	2	7'-7	10	4	6'-7	18	4	5'-7	15	4c3	
4c4	Interior Wall, Both F.V.		2	4'-0	5	2	4'-0	5	2	4'-0	5	2	4'-0	5	2	4'-0	5	2	4'-0	5	2	3'-11	5	4c4	
4c5	Interior Wall, Both F.V.		42 Var.	1'-10 to 10'-9	177	38 Var.	1'-9 to 9'-9	146	34 Var.	1'-9 to 8'-9	119	30 Var.	1'-9 to 7'-8	94	26 Var.	1'-9 to 6'-8	73	22 Var.	1'-9 to 5'-8	54	18 Var.	1'-9 to 4'-8	39	4c5	
5c6	Wingwall, B.F.V.		12 Var.	2 Each 2'-8 to 4'-4	44	12 Var.	2 Each 2'-8 to 4'-4	44	12 Var.	2 Each 2'-8 to 4'-4	44	12 Var.	2 Each 2'-8 to 4'-4	44	12 Var.	2 Each 2'-8 to 4'-4	44	12 Var.	2 Each 2'-8 to 4'-4	44	12 Var.	2 Each 2'-8 to 4'-4	44	5c6	
5c7	Wingwall, B.F.V.		52 Var.	2 Each 8'-8 to 16'-9	689	46 Var.	2 Each 8'-8 to 15'-9	586	40 Var.	2 Each 8'-8 to 14'-9	488	34 Var.	2 Each 8'-8 to 13'-10	399	28 Var.	2 Each 8'-8 to 12'-10	314	20 Var.	2 Each 8'-8 to 11'-7	211	14 Var.	2 Each 8'-8 to 10'-7	141	5c7	
5c8	Wingwall, B.F.V.		38	10'-6	416	32	10'-6	350	26	10'-6	285	20	10'-6	219	14	10'-6	153	--	--	--	--	--	--	5c8	
5c9	Wingwall, B.F.V.		2	15'-7	33	2	14'-7	30	2	13'-7	28	2	12'-7	26	2	11'-7	24	4	10'-7	44	4	9'-7	40	5c9	
4d1	Apron, Longit., Bott.		11	23'-11	176	11	21'-11	161	11	19'-11	146	11	17'-11	132	11	15'-11	117	11	13'-11	102	11	11'-11	88	4d1	
4d2	Apron, Longit., Bott.		6	30'-1	121	6	27'-0	108	6	23'-11	96	6	20'-10	84	6	17'-8	71	6	14'-7	58	6	11'-6	46	4d2	
6f1	Apron, Longit., Top		16	23'-11	575	16	21'-11	527	16	19'-11	479	16	17'-11	431	16	15'-11	383	16	13'-11	334	16	11'-11	286	6f1	
6f2	Apron, Longit., Top		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	8 Var.	2 Each 4'-7 to 12'-10	105	6 Var.	2 Each 5'-4 to 10'-10	73	4 Var.	2 Each 6'-1 to 8'-10	45	6f2	
6f3	Apron, Longit., Top		2	35'-1	105	2	32'-0	96	2	28'-11	87	2	25'-9	77	2	22'-8	68	2	19'-7	59	2	16'-6	50	6f3	
4i1	Parapet, Vertical		33	6'-1	134	33	6'-1	134	33	6'-1	134	33	6'-1	134	33	6'-1	134	33	6'-1	134	33	6'-1	134	4i1	
7j1	Parapet, Horizontal		4	18'-2	149	4	18'-2	149	4	18'-2	149	4	17'-11	146	4	17'-11	146	4	17'-11	146	4	17'-11	146	7j1	
6m1	Apron, Trans., Top		29 Var.	18'-4 to 28'-10	1027	26 Var.	18'-4 to 27'-9	900	23 Var.	18'-4 to 26'-7	776	21 Var.	18'-1 to 25'-7	689	18 Var.	18'-1 to 24'-6	576	15 Var.	18'-1 to 23'-4	467	13 Var.	18'-1 to 22'-7	397	6m1	
6m2	Apron, Trans., Bott.		20 Var.	12'-7 to 22'-1	521	18 Var.	12'-7 to 21'-1	455	16 Var.	12'-7 to 20'-1	393	14 Var.	12'-6 to 19'-0	331	12 Var.	12'-6 to 18'-0	275	10 Var.	12'-6 to 17'-0	222	8 Var.	12'-6 to 16'-0	171	6m2	
6p1	Curtain, Horizontal		4	17'-1	103	4	17'-1	103	4	17'-1	103	4	17'-0	102	4	17'-0	102	4	17'-0	102	4	17'-0	102	6p1	
6p2	Curtain, Horizontal		8	16'-1	193	8	14'-10	178	8	13'-7	163	8	12'-4	148	8	11'-1	133	8	9'-10	118	8	8'-7	103	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	4	7'-8	46	6s1	
6s2	Wing Slope, Both F.		4	30'-7	184	4	27'-4	164	4	24'-1	145	4	20'-10	125	4	17'-7	106	4	14'-4	86	4	11'-1	67	6s2	
6s3	Wing Slope, F.F.		2	36'-8	110	2	33'-5	100	2	30'-2	91	2	26'-11	81	2	23'-8	71	2	20'-5	61	2	17'-2	52	6s3	
6s4	Interior Wall, Both F.		2	25'-9	77	2	23'-6	71	2	21'-4	64	2	19'-1	57	2	16'-10	51	2	14'-7	44	2	12'-4	37	6s4	
5t1	Curtain, Vertical		31	7'-6	242	29	7'-3	219	27	7'-0	197	25	6'-9	176	23	6'-6	156	21	6'-6	142	19	6'-6	129	5t1	
Estimated Quantities One Headwall			Reinf. Steel	6941 LB			6064 LB			5153 LB			4445 LB			3745 LB			2996 LB			2481 LB			
			Concrete	53.7 CY			45.1 CY			37.9 CY			30.5 CY			26.1 CY			21.6 CY			17.6 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 nearest 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" and "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	<b>IOWA DOT Highway Division</b>	
		Standard Design - Twin Reinforced Concrete Box Culverts	
		Flared Wing Headwalls	
		February, 2021	
		Quantity Tabulation 8'-0" Span 0° Skew	TWFH 0-6-21