

ENGLISHRFDISIGNEDW/CULVERTSWH.DGN - TWFH 0-5-21 S2 - THIS SHEET ISSUED 02-2021.

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

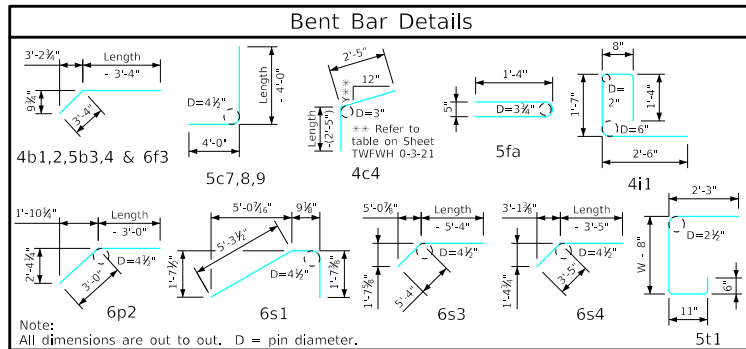
Bar	Location	Shape	10' x 6'			10' x 5'			10' x 4'			Bar
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	
5fa	Fence Anchor (Galv.)		2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	5fa
4b1	Wingwall, B.F.H.		30	22'-8"	30	2	19'-7"	26	2	16'-6"	22	4b1
4b2	Wingwall, B.F.H.		8 Var.	2 Each 11'-11" to 21'-3"	89	6 Var.	2 Each 11'-11" to 18'-2"	60	4 Var.	2 Each 11'-11" to 15'-1"	36	4b2
5b3	Wingwall, F.F.H.		2	22'-8"	47	2	19'-7"	41	2	16'-6"	34	5b3
5b4	Wingwall, F.F.H.		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.		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.		40 Var.	2 Each 2'-9" to 8'-11"	156	32 Var.	2 Each 2'-9" to 7'-8"	111	26 Var.	2 Each 2'-9" to 6'-8"	82	4c1
4c2	Wingwall, F.F.V.		--	--	--	--	--	--	--	--	--	4c2
4c3	Wingwall, F.F.V.		2	7'-8"	10	4	6'-8"	18	4	5'-8"	15	4c3
4c4	Interior Wall, Both F.V.		2	4'-1"	5	2	4'-1"	5	2	4'-0"	5	4c4
4c5	Interior Wall, Both F.V.		26 Var.	1'-10" to 6'-9"	75	22 Var.	1'-10" to 5'-9"	56	18 Var.	1'-10" to 4'-9"	40	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	5c6
5c7	Wingwall, B.F.V.		28 Var.	2 Each 8'-9" to 12'-11"	316	20 Var.	2 Each 8'-9" to 11'-8"	213	14 Var.	2 Each 8'-9" to 10'-8"	142	5c7
5c8	Wingwall, B.F.V.		14	10'-6"	153	--	--	--	--	--	--	5c8
5c9	Wingwall, B.F.V.		2	11'-8"	24	4	10'-8"	45	4	9'-8"	40	5c9
4d1	Apron, Longit., Bott.		13	15'-11"	138	13	13'-11"	121	13	11'-11"	103	4d1
4d2	Apron, Longit., Bott.		6	17'-8"	71	6	14'-7"	58	6	11'-6"	46	4d2
6f1	Apron, Longit., Top		20	15'-11"	478	20	13'-11"	418	20	11'-11"	358	6f1
6f2	Apron, Longit., Top		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	22'-8"	68	2	19'-7"	59	2	16'-6"	50	6f3
4i1	Parapet, Vertical		41	6'-1"	167	41	6'-1"	167	41	6'-1"	167	4i1
7j1	Parapet, Horizontal		4	21'-11"	179	4	21'-11"	179	4	21'-11"	179	7j1
6m1	Apron, Trans., Top		18 Var.	22'-1" to 28'-6"	684	15 Var.	22'-1" to 27'-4"	557	13 Var.	22'-1" to 26'-7"	475	6m1
6m2	Apron, Trans., Bott.		12 Var.	16'-6" to 22'-0"	347	10 Var.	16'-6" to 21'-0"	282	8 Var.	16'-6" to 20'-0"	219	6m2
6p1	Curtain, Horizontal		4	21'-0"	126	4	21'-0"	126	4	21'-0"	126	6p1
6p2	Curtain, Horizontal		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	6s1
6s2	Wing Slope, Both F.		4	17'-7"	106	4	14'-4"	86	4	11'-1"	67	6s2
6s3	Wing Slope, F.F.		2	23'-8"	71	2	20'-5"	61	2	17'-2"	52	6s3
6s4	Interior Wall, Both F.		2	16'-10"	51	2	14'-7"	44	2	12'-4"	37	6s4
5t1	Curtain, Vertical		27	6'-6"	183	25	6'-6"	169	23	6'-6"	156	5t1
Estimated Quantities One Headwall			Reinf. Steel	4165 LB		3373 LB		2816 LB				
			Concrete	2.2		2.2		2.2				
			Parapet Δ	6.2		4.5		3.1				
			Wingwalls	21.5	29.9 CY	18.3	25.0 CY	15.1	20.4 CY			
			Apron +									

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" 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	IOWA DOT Highway Division	
		Standard Design - Twin Reinforced Concrete Box Culverts	
Flared Wing Headwalls			
February, 2021			
Quantity Tabulation		TWFH	
10'-0" Span		0-5-21	
0° Skew		Sheet 2 of 2	