

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

Bar	Location	Shape	12' x 6'			12' x 5'			12' 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. Long		1	30'-2"	20	1	26'-0"	17	1	21'-10"	15	4b1		
4b2	Wingwall, B.F.H. Short		1	23'-6"	16	1	20'-5"	14	1	17'-3"	12	4b2		
4b3	Wingwall, B.F.H. Long		4 Var.	15'-8" to 28'-3"	59	3 Var.	15'-8" to 24'-1"	40	2 Var.	15'-8" to 19'-10"	24	4b3		
4b4	Wingwall, B.F.H. Short		4 Var.	12'-10" to 22'-1"	47	3 Var.	12'-9" to 19'-0"	32	2 Var.	12'-9" to 15'-10"	19	4b4		
5b5	Wingwall, F.F.H. Long		1	30'-2"	31	1	26'-0"	27	1	21'-10"	23	5b5		
5b6	Wingwall, F.F.H. Short		1	23'-6"	25	1	20'-5"	21	1	17'-4"	18	5b6		
5b7	Wingwall, F.F.H. Long		5 Var.	11'-7" to 28'-3"	104	4 Var.	11'-7" to 24'-1"	74	3 Var.	11'-7" to 19'-11"	49	5b7		
5b8	Wingwall, F.F.H. Short		5 Var.	9'-9" to 22'-1"	83	4 Var.	9'-9" to 19'-0"	60	3 Var.	9'-8" to 15'-11"	40	5b8		
4c1	Wingwall, F.F.V. Long		26 Var.	2'-10" to 8'-10"	101	22 Var.	2'-10" to 7'-10"	78	18 Var.	2'-10" to 6'-11"	59	4c1		
4c2	Wingwall, F.F.V. Short		20 Var.	2'-10" to 8'-11"	78	17 Var.	2'-10" to 8'-0"	62	14 Var.	2'-10" to 7'-0"	46	4c2		
4c3	Wingwall, F.F.V. Long		--	--	--	--	--	--	--	--	--	4c3		
4c4	Wingwall, F.F.V. Short		--	--	--	--	--	--	--	--	--	4c4		
4c5	Wingwall, F.F.V. Long		2	7'-9"	10	2	6'-9"	9	2	5'-9"	8	4c5		
4c5	Wingwall, F.F.V. Short		1	7'-9"	5	1	6'-9"	5	1	5'-9"	4	4c5		
5c6	Wingwall, B.F.V. Long		11 Var.	2'-10" to 5'-3"	46	11 Var.	2'-10" to 5'-3"	46	11 Var.	2'-10" to 5'-3"	46	5c6		
5c7	Wingwall, B.F.V. Short		5 Var.	2'-10" to 4'-2"	18	5 Var.	2'-10" to 4'-2"	18	5 Var.	2'-10" to 4'-2"	18	5c7		
6c8	Wingwall, B.F.V. Long		15 Var.	9'-6" to 12'-10"	252	11 Var.	9'-6" to 11'-10"	176	7 Var.	9'-6" to 10'-11"	107	6c8		
6c9	Wingwall, B.F.V. Short		15 Var.	8'-6" to 12'-11"	241	12 Var.	8'-6" to 12'-0"	185	9 Var.	8'-6" to 11'-0"	132	6c9		
6c10	Wingwall, B.F.V. Long		--	--	--	--	--	--	--	--	--	6c10		
6c10	Wingwall, B.F.V. Short		--	--	--	--	--	--	--	--	--	6c10		
6c11	Wingwall, B.F.V. Long		2	11'-9"	35	2	10'-9"	32	2	9'-9"	29	6c11		
6c11	Wingwall, B.F.V. Short		1	11'-9"	18	1	10'-9"	16	1	9'-9"	15	6c11		
4d1	Apron, LongR., Bott.		9	18'-1"	109	9	15'-9"	95	9	13'-5"	81	4d1		
4d2	Apron, LongL., Bott. Long		3	23'-9"	48	3	19'-7"	39	3	15'-4"	31	4d2		
4d3	Apron, LongL., Bott. Short		3	18'-7"	37	3	15'-5"	31	3	12'-4"	25	4d3		
6f1	Apron, LongL., Top		11	18'-1"	299	11	15'-9"	260	11	13'-5"	222	6f1		
6f2	Apron, LongL., Top Long		5 Var.	5'-3" to 14'-7"	74	4 Var.	5'-3" to 12'-4"	53	3 Var.	5'-3" to 10'-0"	34	6f2		
6f3	Apron, LongL., Top Short		4 Var.	5'-5" to 14'-10"	61	3 Var.	6'-2" to 12'-6"	42	2 Var.	7'-0" to 10'-3"	26	6f3		
6f4	Apron, LongL., Top Long		1	30'-2"	45	1	26'-0"	39	1	21'-10"	33	6f4		
6f5	Apron, LongL., Top Short		1	23'-6"	35	1	20'-5"	31	1	17'-4"	26	6f5		
4i1	Parapet, Vertical		25	6'-4"	106	25	6'-4"	106	25	6'-4"	106	4i1		
7j1	Parapet, Horizontal		4	15'-2"	124	4	15'-2"	124	4	15'-2"	124	7j1		
6m1	Apron, Trans., Top		6 Var.	14'-4" to 15'-3"	133	6 Var.	14'-4" to 15'-3"	133	6 Var.	14'-4" to 15'-3"	133	6m1		
6m2	Apron, Trans., Top		10 Var.	15'-6" to 18'-11"	258	7 Var.	15'-6" to 17'-9"	175	4 Var.	15'-6" to 16'-8"	97	6m2		
6m3	Apron, Trans., Top		9 Var.	5'-6" to 14'-5"	135	9 Var.	4'-10" to 13'-9"	126	9 Var.	4'-2" to 13'-1"	117	6m3		
6m4	Apron, Trans., Bott.		12 Var.	8'-10" to 16'-4"	227	10 Var.	8'-10" to 15'-0"	179	8 Var.	8'-10" to 13'-7"	135	6m4		
6p1	Curtain, Horizontal		4	14'-0"	84	4	14'-0"	84	4	14'-0"	84	6p1		
6p2	Curtain, Horizontal, Long		4	16'-0"	96	4	13'-11"	84	4	11'-11"	72	6p2		
6p3	Curtain, Horizontal, Short		4	9'-8"	58	4	8'-8"	52	4	7'-7"	46	6p3		
6s1	Wing Slope, Both F., Long		2	8'-0"	24	2	8'-0"	24	2	8'-0"	24	6s1		
6s2	Wing Slope, Both F., Short		2	6'-11"	21	2	6'-11"	21	2	6'-11"	21	6s2		
6s3	Wing Slope, Both F., Long		2	23'-2"	70	2	18'-10"	57	2	14'-7"	44	6s3		
6s4	Wing Slope, Both F., Short		2	18'-4"	55	2	15'-1"	45	2	11'-10"	36	6s4		
6s5	Wing Slope, F.F. Long		1	29'-3"	44	1	25'-0"	38	1	20'-8"	31	6s5		
6s6	Wing Slope, F.F. Short		1	23'-7"	35	1	20'-4"	31	1	17'-0"	26	6s6		
5t1	Curtain, Vertical		22	8'-5"	147	20	8'-5"	134	18	6'-5"	120	5t1		
Estimated Quantities One Headwall			Reinf. Steel			3520 LB			2921 LB			2364 LB		
			Concrete			27.2 CY			22.3 CY			17.8 CY		
			Parapet Δ			1.8			1.8			1.8		
			Wingwalls			5.9			4.3			2.9		
			Apron *			19.5			16.2			13.1		

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.

"Short" Denotes Short Wingwall
 "Long" Denotes Long Wingwall

- #### Headwall Notes:
- See Sheet FW 30-8-21 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", "6f4" and "6f5" 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 - Single Reinforced Concrete Box Culverts	
		Flared Wing Headwalls	
		February, 2021	
Quantity Tabulation		FWH 30-8-21	Sheet 2 of 2
12'-0" Span 30° Skew			

