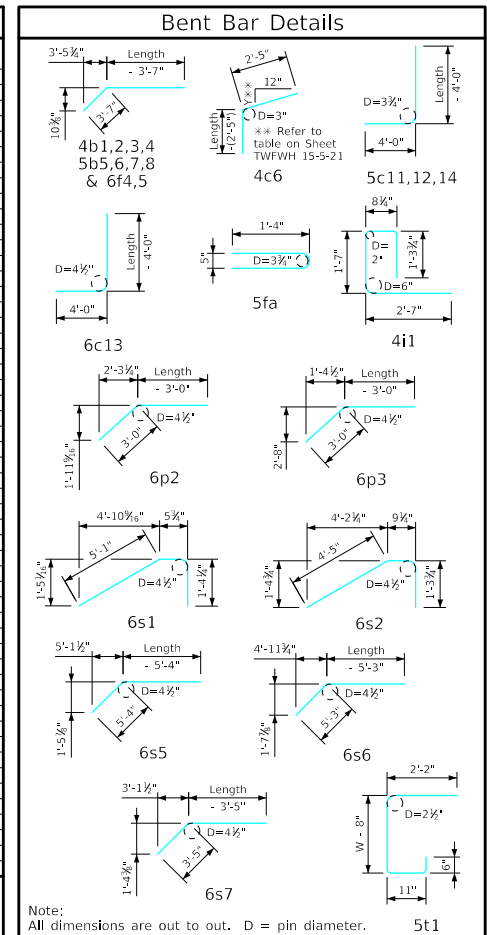


Bill of Reinforcing for One Headwall 15° Skew Span x Culvert Height												
Bar	Location	Shape	8' x 6'			8' x 5'			8' x 4'			Bar
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	
5fa	Fence Anchor (Galv.)		2	2'-10	6	2	2'-10	6	2	2'-10	6	5fa
4b1	Wingwall, B.F.H. Long		1	25'-1	17	1	21'-7	14	1	18'-2	12	4b1
4b2	Wingwall, B.F.H. Short		1	22'-4	15	1	19'-4	13	1	16'-4	11	4b2
4b3	Wingwall, B.F.H. Long		4 Var.	13'-2 to 23'-6	49	3 Var.	13'-2 to 20'-1	33	2 Var.	13'-2 to 16'-7	20	4b3
4b4	Wingwall, B.F.H. Short		4 Var.	11'-11 to 20'-11	44	3 Var.	11'-11 to 17'-11	30	2 Var.	11'-11 to 14'-11	18	4b4
5b5	Wingwall, F.F.H. Long		1	25'-1	26	1	21'-8	23	1	18'-3	19	5b5
5b6	Wingwall, F.F.H. Short		1	22'-4	23	1	19'-4	20	1	16'-4	17	5b6
5b7	Wingwall, F.F.H. Long		5 Var.	9'-10 to 23'-6	87	4 Var.	9'-10 to 20'-1	62	3 Var.	9'-9 to 16'-8	41	5b7
5b8	Wingwall, F.F.H. Short		5 Var.	9'-0 to 21'-0	78	4 Var.	9'-0 to 18'-0	56	3 Var.	9'-0 to 15'-0	38	5b8
5b9	Interior Wall, Both F.H.		9 Var.	5'-9 to 16'-1	102	7 Var.	5'-10 to 14'-0	72	5 Var.	6'-0 to 11'-10	47	5b9
4c1	Wingwall, F.F.V. Long		22 Var.	2'-8 to 8'-10	85	18 Var.	2'-8 to 7'-8	62	15 Var.	2'-8 to 6'-9	47	4c1
4c2	Wingwall, F.F.V. Short		19 Var.	2'-8 to 8'-8	72	16 Var.	2'-8 to 7'-8	55	13 Var.	2'-8 to 6'-8	41	4c2
4c3	Wingwall, F.F.V. Long		--	--	--	--	--	--	--	--	--	4c3
4c4	Wingwall, F.F.V. Short		--	--	--	--	--	--	--	--	--	4c4
4c5	Wingwall, F.F.V. Long		1	7'-7	5	2	6'-7	9	1	5'-7	7	4c5
4c6	Wingwall, F.F.V. Short		2	7'-7	10	2	6'-7	9	2	5'-7	7	4c6
4c7	Interior Wall, Both F.V.		2	4'-0	3	2	4'-0	5	2	3'-11	5	4c7
4c8	Interior Wall, Both F.V.		24 Var.	1'-9 to 6'-2	63	20 Var.	1'-9 to 5'-3	47	16 Var.	1'-8 to 4'-3	32	4c8
5c9	Wingwall, B.F.V. Long		9 Var.	2'-8 to 5'-0	36	9 Var.	2'-8 to 5'-0	36	9 Var.	2'-8 to 5'-0	36	5c9
5c10	Wingwall, B.F.V. Short		6 Var.	2'-8 to 4'-4	22	6 Var.	2'-8 to 4'-4	22	6 Var.	2'-8 to 4'-4	22	5c10
5c11	Wingwall, B.F.V. Long		13 Var.	9'-4 to 12'-10	150	9 Var.	9'-4 to 11'-8	99	6 Var.	9'-4 to 10'-9	63	5c11
5c12	Wingwall, B.F.V. Short		13 Var.	8'-8 to 12'-8	145	10 Var.	8'-8 to 11'-8	106	7 Var.	8'-8 to 10'-8	71	5c12
6c13	Wingwall, B.F.V. Long		7	10'-6	110	--	--	--	--	--	--	6c13
6c13	Wingwall, B.F.V. Short		6	10'-6	95	--	--	--	--	--	--	6c13
5c14	Wingwall, B.F.V. Long		1	11'-7	12	2	10'-7	22	1	9'-7	10	5c14
5c14	Wingwall, B.F.V. Short		2	11'-7	24	2	10'-7	22	2	9'-7	20	5c14
4d1	Apron, Longit., Bott.		11	16'-5	121	11	14'-4	105	11	12'-4	91	4d1
4d2	Apron, Longit., Bott. Long		3	19'-8	39	3	16'-3	33	3	12'-10	26	4d2
4d3	Apron, Longit., Bott. Short		3	17'-5	35	3	14'-5	29	3	11'-5	23	4d3
6f1	Apron, Longit., Top		16	16'-5	395	16	14'-4	344	16	12'-4	296	6f1
6f2	Apron, Longit., Top Long		4 Var.	5'-6 to 13'-2	56	3 Var.	5'-11 to 11'-1	38	2 Var.	6'-5 to 9'-0	23	6f2
6f3	Apron, Longit., Top Short		4 Var.	4'-5 to 13'-3	53	3 Var.	5'-3 to 11'-2	37	2 Var.	6'-2 to 9'-1	23	6f3
6f4	Apron, Longit., Top Long		1	25'-1	38	1	21'-8	33	1	18'-3	27	6f4
6f5	Apron, Longit., Top Short		1	22'-4	34	1	19'-4	29	1	16'-4	25	6f5
4l1	Parapet, Vertical		33	6'-2	136	33	6'-2	136	33	6'-2	136	4l1
7j1	Parapet, Horizontal		4	18'-6	151	4	18'-6	151	4	18'-6	151	7j1
6m1	Apron, Trans., Top		4 Var.	18'-9 to 19'-4	114	4 Var.	18'-9 to 19'-4	114	4 Var.	18'-9 to 19'-4	114	6m1
6m2	Apron, Trans., Top		12 Var.	19'-7 to 23'-8	390	9 Var.	19'-7 to 22'-7	285	6 Var.	19'-7 to 21'-5	185	6m2
6m3	Apron, Trans., Top		6 Var.	4'-6 to 17'-7	100	6 Var.	4'-8 to 17'-8	101	6 Var.	4'-9 to 17'-10	102	6m3
6m4	Apron, Trans., Bott.		12 Var.	12'-11 to 18'-10	286	10 Var.	12'-11 to 17'-9	230	8 Var.	12'-11 to 16'-8	178	6m4
6p1	Curtain, Horizontal		4	17'-7	106	4	17'-7	106	4	17'-7	106	6p1
6p2	Curtain, Horizontal, Long		4	12'-8	76	4	11'-2	67	4	9'-8	58	6p2
6p3	Curtain, Horizontal, Short		4	10'-2	61	4	9'-1	55	4	7'-11	48	6p3
6s1	Wing Slope, Both F., Long		2	6'-11	21	2	6'-11	21	2	6'-11	21	6s1
6s2	Wing Slope, Both F., Short		2	6'-6	20	2	6'-6	20	2	6'-6	20	6s2
6s3	Wing Slope, Both F., Long		2	19'-10	60	2	16'-3	49	2	12'-8	38	6s3
6s4	Wing Slope, Both F., Short		2	17'-11	54	2	14'-9	44	2	11'-7	35	6s4
6s5	Wing Slope, F.F. Long		1	25'-0	38	1	21'-5	32	1	17'-10	27	6s5
6s6	Wing Slope, F.F. Short		1	22'-8	34	1	19'-6	29	1	16'-4	25	6s6
6s7	Interior Wall, Both F.H.		2	17'-1	51	2	14'-9	44	2	12'-6	38	6s7
5t1	Curtain, Vertical		22	6'-5	147	20	6'-5	134	18	6'-5	120	5t1
Estimated Quantities			Reinf. Steel			3096 LB			2529 LB			
Concrete			Parapet Δ			2.1			3.3			
			Wingwalls			6.6			18.5			
			Apron *			18.8			15.1			
			27.5 CY			4.9			22.9 CY			
			15.9			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 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", "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 - Twin Reinforced Concrete Box Culverts

**Flared Wing Headwalls**

February, 2021

Quantity Tabulation	TWFH
8'-0" Span	15-8-21
15° Skew	Sheet 2 of 2