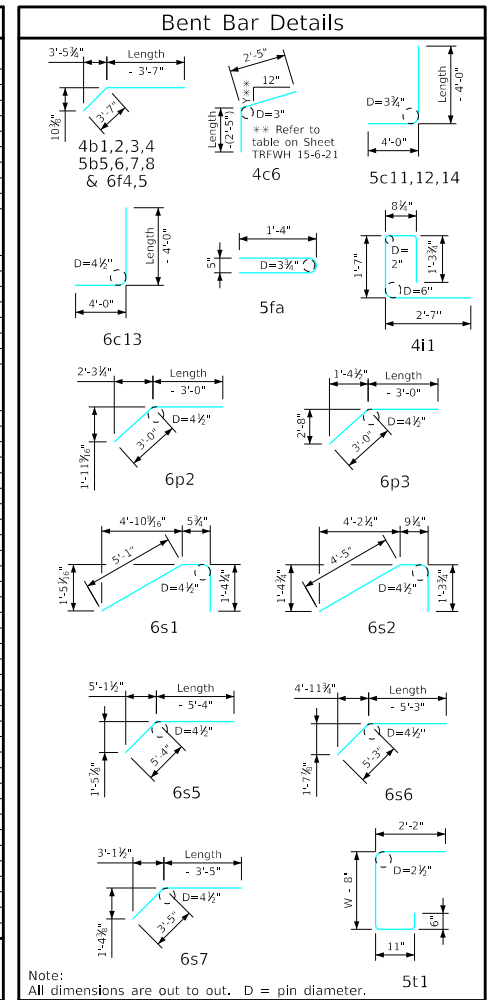


Bill of Reinforcing for One Headwall 15° Skew Span x Culvert Height																	
Bar	Location	Shape	10' x 7'			10' x 6'			10' x 5'			10' x 4'					
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.			
5fa	Fence Anchor (Galv.)		2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6			
4b1	Wingwall, B.F.H, Long		1	28'-6"	19	1	25'-1"	17	1	21'-7"	14	1	18'-2"	12			
4b2	Wingwall, B.F.H, Short		1	25'-4"	17	1	22'-4"	15	1	19'-4"	13	1	16'-4"	11			
4b3	Wingwall, B.F.H, Long		5 Var.	13'-2 to 26'-11	67	4 Var.	13'-2 to 23'-6	49	3 Var.	13'-2 to 20'-1	33	2 Var.	13'-2 to 16'-7	20			
4b4	Wingwall, B.F.H, Short		5 Var.	11'-11 to 23'-11	60	4 Var.	11'-11 to 20'-11	44	3 Var.	11'-11 to 17'-11	30	2 Var.	11'-11 to 14'-11	18			
5b5	Wingwall, F.F.H, Long		1	28'-6"	30	1	25'-1"	26	1	21'-8"	23	1	18'-3"	19			
5b6	Wingwall, F.F.H, Short		1	25'-4"	26	1	22'-4"	23	1	19'-4"	20	1	16'-4"	17			
5b7	Wingwall, F.F.H, Long		6 Var.	9'-10 to 26'-11	115	5 Var.	9'-10 to 23'-6	87	4 Var.	9'-10 to 20'-1	62	3 Var.	9'-9 to 16'-8	41			
5b8	Wingwall, F.F.H, Short		6 Var.	9'-0 to 24'-0	103	5 Var.	9'-0 to 21'-0	78	4 Var.	9'-0 to 18'-0	56	3 Var.	9'-0 to 15'-0	38			
5b9	Interior Wall, Both F.V.		22 Var.	2 Each 5'-8 to 18'-2	273	18 Var.	2 Each 5'-9 to 16'-1	205	14 Var.	2 Each 5'-10 to 14'-0	145	10 Var.	2 Each 6'-0 to 11'-10	93			
4c1	Wingwall, F.F.V, Long		25 Var.	2'-9 to 9'-9	104	22 Var.	2'-9 to 8'-11	86	18 Var.	2'-9 to 7'-9	63	15 Var.	2'-9 to 6'-10	48			
4c2	Wingwall, F.F.V, Short		22 Var.	2'-9 to 9'-9	92	19 Var.	2'-9 to 8'-9	73	16 Var.	2'-9 to 7'-9	56	13 Var.	2'-9 to 6'-9	41			
4c3	Wingwall, F.F.V, Long		--	--	--	--	--	--	--	--	--	--	--	--			
4c4	Wingwall, F.F.V, Short		--	--	--	--	--	--	--	--	--	--	--	--			
4c5	Wingwall, F.F.V, Long		2	8'-8"	12	1	7'-8"	5	2	6'-8"	9	1	5'-8"	4			
4c5	Wingwall, F.F.V, Short		2	8'-8"	12	1	7'-8"	10	2	6'-8"	9	2	5'-8"	8			
4c6	Interior Wall, Both F.V.		4	4'-1"	11	4	4'-1"	11	4	4'-1"	11	4	4'-0"	11			
4c7	Interior Wall, Both F.V.		56 Var.	2 Each 1'-10 to 7'-3	170	48 Var.	2 Each 1'-10 to 6'-3	130	40 Var.	2 Each 1'-10 to 5'-4	96	32 Var.	2 Each 1'-9 to 4'-4	65			
4c8	Interior Wall, Both F.V.		4	7'-6"	20	4	6'-6"	17	4	5'-6"	15	4	4'-6"	12			
5c9	Wingwall, B.F.V, Long		9 Var.	2'-9 to 5'-1	37	9 Var.	2'-9 to 5'-1	37	9 Var.	2'-9 to 5'-1	37	9 Var.	2'-9 to 5'-1	37			
5c10	Wingwall, B.F.V, Short		6 Var.	2'-9 to 4'-5	22	6 Var.	2'-9 to 4'-5	22	6 Var.	2'-9 to 4'-5	22	6 Var.	2'-9 to 4'-5	22			
5c11	Wingwall, B.F.V, Long		16 Var.	9'-5 to 13'-9	193	13 Var.	9'-5 to 12'-11	151	9 Var.	9'-5 to 11'-9	99	6 Var.	9'-5 to 10'-10	63			
5c12	Wingwall, B.F.V, Short		16 Var.	8'-9 to 13'-9	188	13 Var.	8'-9 to 12'-9	146	10 Var.	8'-9 to 11'-9	107	7 Var.	8'-9 to 10'-9	71			
6c13	Wingwall, B.F.V, Long		10	10'-6"	158	7	10'-6"	110	--	--	--	--	--	--			
6c13	Wingwall, B.F.V, Short		9	10'-6"	142	6	10'-6"	95	--	--	--	--	--	--			
5c14	Wingwall, B.F.V, Long		2	12'-8"	26	1	11'-8"	12	2	10'-8"	22	1	9'-8"	10			
5c14	Wingwall, B.F.V, Short		2	12'-8"	26	2	11'-8"	24	2	10'-8"	22	2	9'-8"	20			
4d1	Apron, Longit., Bott.		21	18'-6"	260	21	16'-5"	230	21	14'-4"	201	21	12'-4"	173			
4d2	Apron, Longit., Bott, Long		3	23'-1"	46	3	19'-8"	39	3	16'-3"	33	3	12'-10"	26			
4d3	Apron, Longit., Bott, Short		3	20'-5"	41	3	17'-5"	35	3	14'-5"	29	3	11'-5"	23			
6f1	Apron, Longit., Top		31	18'-6"	861	31	16'-5"	764	31	14'-4"	667	31	12'-4"	574			
6f2	Apron, Longit., Top Long		4 Var.	7'-7 to 15'-3	69	4 Var.	5'-6 to 13'-2	56	3 Var.	5'-11 to 11'-1	38	2 Var.	6'-5 to 9'-0	23			
6f3	Apron, Longit., Top Short		4 Var.	6'-7 to 15'-4	66	4 Var.	4'-5 to 13'-3	53	3 Var.	5'-3 to 11'-2	37	2 Var.	6'-2 to 9'-1	23			
6f4	Apron, Longit., Top Long		1	28'-6"	43	1	25'-1"	38	1	21'-8"	33	1	18'-3"	27			
6f5	Apron, Longit., Top Short		1	25'-4"	38	1	22'-4"	34	1	19'-4"	29	1	16'-4"	25			
4f1	Parapet, Vertical		63	6'-2"	260	63	6'-2"	260	63	6'-2"	260	63	6'-2"	260			
7j1	Parapet, Horizontal		4	33'-9"	276	4	33'-9"	276	4	33'-9"	276	4	33'-9"	276			
6m1	Apron, Trans., Top		7 Var.	34'-0 to 35'-2	364	7 Var.	34'-0 to 35'-2	364	7 Var.	34'-0 to 35'-2	364	7 Var.	34'-0 to 35'-2	364			
6m2	Apron, Trans., Top		9 Var.	35'-5 to 38'-5	499	6 Var.	35'-5 to 37'-4	328	3 Var.	35'-5 to 36'-2	161	1	35'-5	53			
6m3	Apron, Trans., Top		11 Var.	6'-1 to 32'-2	316	11 Var.	6'-2 to 32'-4	318	12 Var.	3'-8 to 32'-5	325	11 Var.	3'-9 to 29'-11	278			
6m4	Apron, Trans., Bott.		14 Var.	28'-2 to 35'-2	666	12 Var.	28'-2 to 34'-1	561	10 Var.	28'-2 to 33'-1	460	8 Var.	28'-2 to 31'-11	361			
6p1	Curtain, Horizontal		4	32'-10"	197	4	32'-10"	197	4	32'-10"	197	4	32'-10"	197			
6p2	Curtain, Horizontal, Long		4	14'-2"	85	4	12'-8"	76	4	11'-2"	67	4	9'-8"	58			
6p3	Curtain, Horizontal, Short		4	11'-3"	68	4	10'-2"	61	4	9'-1"	55	4	7'-11"	48			
6s1	Wing Slope, Both F., Long		2	6'-11"	21	2	6'-11"	21	2	6'-11"	21	2	6'-11"	21			
6s2	Wing Slope, Both F., Short		2	6'-6"	20	2	6'-6"	20	2	6'-6"	20	2	6'-6"	20			
6s3	Wing Slope, Both F., Long		2	23'-5"	70	2	19'-10"	60	2	16'-3"	49	2	12'-8"	38			
6s4	Wing Slope, Both F., Short		2	21'-1"	63	2	17'-11"	54	2	14'-9"	44	2	11'-7"	35			
6s5	Wing Slope, F.F, Long		1	28'-7"	43	1	25'-0"	38	1	21'-5"	32	1	17'-10"	27			
6s6	Wing Slope, F.F, Short		1	25'-4"	39	1	22'-8"	34	1	19'-6"	29	1	16'-4"	25			
6s7	Interior Wall, Both F.V.		4	19'-4"	116	4	17'-1"	103	4	14'-9"	89	4	12'-6"	75			
5t1	Curtain, Vertical		36	6'-8"	250	34	6'-5"	228	32	6'-5"	214	30	6'-5"	201			
Estimated Quantities One Headwall			Reinf. Steel			Concrete			Parapet Δ			Wingwalls			Apron *		
			6706 LB			48.9 CY			3.2			10.3			35.4		
			5777 LB			41.3 CY			7.9			30.2			25.8		
			4700 LB			34.8 CY			5.8			21.6			28.7 CY		



Note: All dimensions are out to out. D = pin diameter.

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 TRFWH 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

IOWADOT Highway Division
 Standard Design - Triple Reinforced Concrete Box Culverts
Flared Wing Headwalls
 February, 2021
 Quantity Tabulation
 10'-0" Span
 15° Skew
 TRFWH
 15-8-21
 Sheet 2 of 2