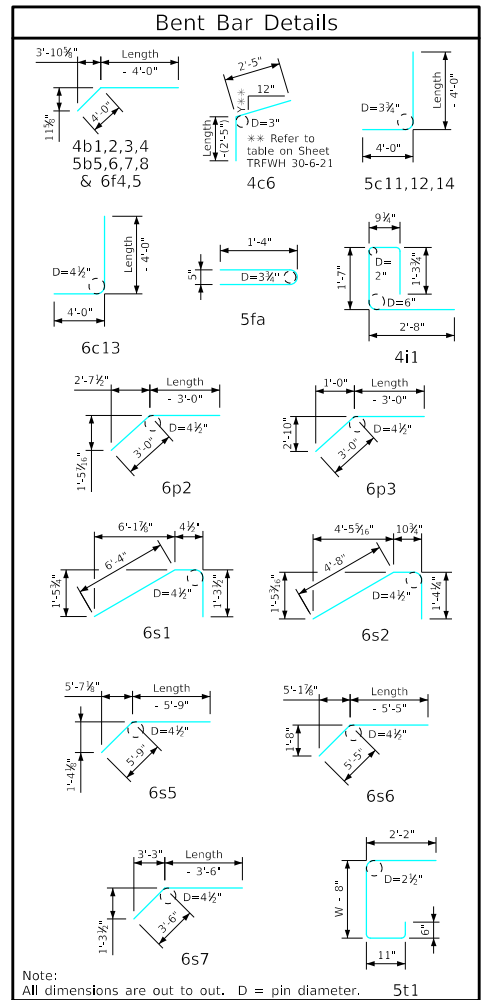


Bill of Reinforcing for One Headwall 30° Skew Span x Culvert Height														
Bar	Location	Shape	12' x 7'			12' x 6'			12' x 5'			12' x 4'		
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.
5fa	Fence Anchor (Galv.)		2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6
4b1	Wingwall, B.F.H, Long		1	34'-4"	23	1	30'-2"	20	1	26'-0"	17	1	21'-10"	15
4b2	Wingwall, B.F.H, Short		1	26'-7"	18	1	23'-6"	16	1	20'-5"	14	1	17'-3"	12
4b3	Wingwall, B.F.H, Long		5 Var.	15'-8" to 32'-5"	80	4 Var.	15'-8" to 28'-3"	59	3 Var.	15'-8" to 24'-1"	40	2 Var.	15'-8" to 19'-10"	24
4b4	Wingwall, B.F.H, Short		5 Var.	12'-10" to 25'-3"	64	4 Var.	12'-10" to 22'-1"	47	3 Var.	12'-9" to 19'-0"	32	2 Var.	12'-9" to 15'-10"	19
5b5	Wingwall, F.F.H, Long		1	34'-5"	36	1	30'-2"	31	1	26'-0"	27	1	21'-10"	23
5b6	Wingwall, F.F.H, Short		1	26'-8"	28	1	23'-6"	25	1	20'-5"	21	1	17'-4"	18
5b7	Wingwall, F.F.H, Long		6 Var.	11'-7" to 32'-5"	138	5 Var.	11'-7" to 28'-3"	104	4 Var.	11'-7" to 24'-1"	74	3 Var.	11'-7" to 19'-11"	49
5b8	Wingwall, F.F.H, Short		6 Var.	9'-9" to 25'-3"	110	5 Var.	9'-9" to 22'-1"	83	4 Var.	9'-9" to 19'-0"	60	3 Var.	9'-8" to 15'-11"	40
5b9	Interior Wall, Both F.H.		22 Var.	2 Each 6'-1" to 19'-10"	297	18 Var.	2 Each 6'-2" to 17'-6"	222	14 Var.	2 Each 6'-3" to 15'-2"	156	10 Var.	2 Each 6'-6" to 12'-10"	101
4c1	Wingwall, F.F.V, Long		31 Var.	2'-10" to 10'-0"	133	26 Var.	2'-10" to 8'-10"	101	22 Var.	2'-10" to 7'-10"	78	18 Var.	2'-10" to 6'-11"	59
4c2	Wingwall, F.F.V, Short		23 Var.	2'-10" to 9'-11"	98	20 Var.	2'-10" to 8'-11"	78	17 Var.	2'-10" to 8'-0"	62	14 Var.	2'-10" to 7'-0"	46
4c3	Wingwall, F.F.V, Long		--	--	--	--	--	--	--	--	--	--	--	--
4c4	Wingwall, F.F.V, Short		--	--	--	--	--	--	--	--	--	--	--	--
4c5	Wingwall, F.F.V, Long		1	8'-9"	6	2	7'-9"	10	2	6'-9"	9	2	5'-9"	8
4c5	Wingwall, F.F.V, Short		1	8'-9"	6	1	7'-9"	5	1	6'-9"	5	1	5'-9"	4
4c6	Interior Wall, Both F.V.		4	4'-2"	11	4	4'-1"	11	4	4'-1"	11	4	4'-1"	11
4c7	Interior Wall, Both F.V.		64 Var.	2 Each 1'-11" to 7'-6"	201	54 Var.	2 Each 1'-11" to 6'-6"	152	44 Var.	2 Each 1'-10" to 5'-5"	117	36 Var.	2 Each 1'-10" to 4'-6"	76
4c8	Interior Wall, Both F.V.		4	7'-7"	20	4	6'-7"	18	4	5'-7"	15	4	4'-7"	12
5c9	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	11 Var.	2'-10" to 5'-3"	46
5c10	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	5 Var.	2'-10" to 4'-2"	18
5c11	Wingwall, B.F.V, Long		20 Var.	9'-6" to 14'-0"	245	15 Var.	9'-6" to 12'-10"	175	11 Var.	9'-6" to 11'-10"	122	7 Var.	9'-6" to 10'-11"	75
5c12	Wingwall, B.F.V, Short		18 Var.	8'-6" to 13'-11"	210	15 Var.	8'-6" to 12'-11"	168	12 Var.	8'-6" to 12'-0"	128	9 Var.	8'-6" to 11'-0"	92
6c13	Wingwall, B.F.V, Long		13	10'-6"	205	8	10'-6"	126	--	--	--	--	--	--
6c13	Wingwall, B.F.V, Short		10	10'-6"	158	7	10'-6"	110	--	--	--	--	--	--
5c14	Wingwall, B.F.V, Long		1	12'-9"	13	2	11'-9"	25	2	10'-9"	22	2	9'-9"	20
5c14	Wingwall, B.F.V, Short		1	12'-9"	13	1	11'-9"	12	1	10'-9"	11	1	9'-9"	10
4d1	Apron, Longit., Bott.		25	20'-4"	340	25	18'-1"	302	25	15'-9"	263	25	13'-5"	224
4d2	Apron, Longit., Bott. Long		3	27'-11"	56	3	23'-9"	48	3	19'-7"	39	3	15'-4"	31
4d3	Apron, Longit., Bott. Short		3	21'-8"	43	3	18'-7"	37	3	15'-5"	31	3	12'-4"	25
4d1	Apron, Longit., Top		37	20'-4"	1130	37	18'-1"	1005	37	15'-9"	875	37	13'-5"	746
6f1	Apron, Longit., Top Long		6 Var.	5'-3" to 16'-11"	100	5 Var.	5'-3" to 14'-7"	74	4 Var.	5'-3" to 12'-4"	53	3 Var.	5'-3" to 10'-0"	34
6f3	Apron, Longit., Top Short		4 Var.	7'-9" to 17'-2"	75	4 Var.	5'-5" to 14'-10"	61	3 Var.	6'-2" to 12'-6"	42	2 Var.	7'-0" to 10'-3"	26
6f4	Apron, Longit., Top Long		1	34'-5"	52	1	30'-2"	45	1	26'-0"	39	1	21'-10"	33
6f5	Apron, Longit., Top Short		1	26'-8"	40	1	23'-6"	35	1	20'-5"	31	1	17'-4"	26
4i1	Parapet, Vertical		75	6'-4"	317	75	6'-4"	317	75	6'-4"	317	75	6'-4"	317
7j1	Parapet, Horizontal		4	44'-7"	383	4	44'-7"	383	4	44'-7"	383	4	44'-7"	383
6m1	Apron, Trans., Top		10 Var.	41'-8" to 43'-4"	675	7 Var.	41'-8" to 42'-9"	469	4 Var.	41'-8" to 42'-3"	267	1	41'-8"	66
6m2	Apron, Trans., Top		6 Var.	30'-6" to 37'-0"	304	9 Var.	26'-6" to 36'-10"	428	12 Var.	22'-6" to 36'-9"	534	15 Var.	18'-6" to 36'-8"	621
6m3	Apron, Trans., Top		22 Var.	5'-11" to 29'-4"	582	19 Var.	5'-3" to 25'-4"	436	16 Var.	4'-7" to 21'-4"	311	13 Var.	3'-11" to 17'-4"	207
6m4	Apron, Trans., Bott.		14 Var.	38'-3" to 47'-2"	938	12 Var.	38'-3" to 45'-9"	790	10 Var.	38'-3" to 44'-5"	646	8 Var.	38'-3" to 43'-1"	507
6p1	Curtain, Horizontal		4	43'-5"	274	4	43'-5"	274	4	43'-5"	274	4	43'-5"	274
6p2	Curtain, Horizontal, Long		4	18'-0"	108	4	16'-0"	96	4	13'-11"	84	4	11'-11"	72
6p3	Curtain, Horizontal, Short		4	10'-9"	65	4	9'-8"	58	4	8'-8"	52	4	7'-7"	46
6s1	Wing Slope, Both F., Long		2	8'-0"	24	2	8'-0"	24	2	8'-0"	24	2	8'-0"	24
6s2	Wing Slope, Both F., Short		2	6'-11"	21	2	6'-11"	21	2	6'-11"	21	2	6'-11"	21
6s3	Wing Slope, Both F., Long		2	27'-5"	82	2	23'-2"	70	2	19'-10"	57	2	14'-7"	44
6s4	Wing Slope, Both F., Short		2	21'-8"	65	2	18'-4"	55	2	15'-1"	45	2	11'-10"	36
6s5	Wing Slope, F.F, Long		1	33'-7"	90	1	29'-3"	84	1	25'-0"	78	1	20'-8"	66
6s6	Wing Slope, F.F, Short		1	26'-11"	60	1	23'-8"	56	1	20'-5"	51	1	17'-1"	42
6s7	Interior Wall, Both F.H.		4	20'-10"	125	4	18'-4"	110	4	15'-10"	95	4	13'-4"	80
5t1	Curtain, Vertical		48	6'-8"	334	45	6'-5"	301	43	6'-5"	288	41	6'-5"	274
Estimated Quantities One Headwall			Reinf. Steel 8406 LB			7187 LB			5921 LB			4958 LB		
Concrete			4.1			4.1			4.1			4.1		
Wingwalls			11.6			8.9			6.5			4.4		
Apron *			47.8			40.9			34.9			29.2		
			63.5 CY			53.9 CY			45.5 CY			37.7 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.
 "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 12'-0" Span 30° Skew	TRFWH 30-7-21 Sheet 2 of 2