

ENGLISHLRFDDESIGNEDTWINCULVERTS.DGN - TWPWH 0-7-20 S2 - THIS SHEET ISSUED 07-2020.

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

Location	Shape	10' x 6'				10' x 5'				10' x 4'			
		Bar No.	Length	Wt.	Bar No.	Length	Wt.	Bar No.	Length	Wt.			
Fence Anchor (Galv.)		5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6
Wingwall, F.F.H.		5b1	2	22'-3"	46	5b1	2	19'-3"	40	5b1	2	16'-3"	34
Wingwall, F.F.H.		5b2	10 Var.	2 Each 8'-10 to 20'-10	155	5b2	8 Var.	2 Each 17'-10 to 17'-10	111	5b2	6 Var.	2 Each 8'-10 to 14'-10	74
Wingwall, B.F.H.		4b3	2	22'-3"	30	4b3	2	19'-3"	26	4b3	2	16'-3"	22
Wingwall, B.F.H.		4b4	8 Var.	2 Each 11'-10 to 20'-10	87	4b4	6 Var.	2 Each 17'-10 to 17'-10	59	4b4	4 Var.	2 Each 8'-10 to 14'-10	36
Interior Wall, Both F.H.		5b5	9 Var.	6'-7 to 21'-10	133	5b5	7 Var.	6'-9 to 18'-9	93	5b5	5 Var.	7'-1 to 15'-9	60
Wingwall, F.F.V.		4c1	50 Var.	2 Each 2'-7 to 8'-7	186	4c1	32 Var.	2 Each 7'-7 to 7'-7	109	4c1	26 Var.	2 Each 2'-7 to 6'-7	80
Wingwall, F.F.V.		c2	--	--	--	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (L)		4c3	2	9'-0"	12	4c3	2	8'-0"	11	4c3	2	7'-0"	9
Wingwall, F.F.V. (R)		4c3	2	9'-0"	12	4c3	2	8'-0"	11	4c3	2	7'-0"	9
Wingwall, B.F.V.		5c4	38 Var.	2 Each 6'-3 to 12'-3	367	5c4	32 Var.	2 Each 11'-3 to 11'-3	292	5c4	26 Var.	2 Each 6'-3 to 10'-3	224
Wingwall, B.F.V. (L)		5c5	2	12'-6"	26	5c5	2	11'-6"	24	5c5	2	10'-6"	22
Wingwall, B.F.V. (R)		5c5	2	12'-6"	26	5c5	2	11'-6"	24	5c5	2	10'-6"	22
Wingwall, B.F.V.		5c6	14	8'-6"	124	c6	--	--	--	c6	--	--	--
Interior Wall, Both F.V.		4c7	2	3'-9"	5	4c7	2	3'-9"	5	4c7	2	3'-9"	5
Interior Wall, Both F.V.		4c8	37 Var.	1'-6 to 6'-3	96	4c8	31 Var.	1'-6 to 5'-3	70	4c8	25 Var.	1'-5 to 4'-3	47
Interior Wall, Both F.V.		4c9	2	6'-6"	9	4c9	2	5'-6"	7	4c9	2	4'-6"	6
Apron, Longit., Bott.		4d1	22	22'-3"	327	4d1	22	19'-3"	283	4d1	22	16'-3"	239
Apron, Longit., Top		6f1	22	22'-3"	735	6f1	22	19'-3"	636	6f1	22	16'-3"	537
Parapet, Vertical		4i1	41	6'-5"	176	4i1	41	6'-5"	176	4i1	41	6'-5"	176
Parapet, Horizontal		7j1	4	21'-11"	179	7j1	4	21'-11"	179	7j1	4	21'-11"	179
Apron, Trans., Top		5m1	27	22'-5"	631	5m1	23	22'-5"	538	5m1	19	22'-5"	444
Apron, Trans., Top		m2	--	--	--	m2	--	--	--	m2	--	--	--
Apron, Trans., Batt.		4m3	19	18'-1"	230	4m3	16	18'-1"	193	4m3	13	18'-1"	157
Curtain, Horiz.		6p1	5	22'-5"	168	6p1	5	22'-5"	168	6p1	5	22'-5"	168
Wing Slope, Both F.		6s1	4	16'-9"	101	6s1	4	13'-7"	82	6s1	4	10'-5"	63
Wing Slope, Both F. (L)		6s2	2	7'-9"	23	6s2	2	7'-9"	23	6s2	2	7'-9"	23
Wing Slope, Both F. (R)		6s3	2	7'-9"	23	6s3	2	7'-9"	23	6s3	2	7'-9"	23
Wing Slope, F.F.		6s4	2	11'-5"	34	6s4	2	11'-5"	34	6s4	2	11'-5"	34
Wing Slope, F.F.		6s5	2	14'-2"	43	6s5	2	11'-0"	33	6s5	2	7'-10"	24
Interior Wall, Both F.		6s6	2	22'-10"	69	6s6	2	19'-8"	59	6s6	2	16'-7"	50
Curtain, Vert.		5t1	21	6'-5"	141	5t1	21	6'-5"	141	5t1	21	6'-5"	141
Curtain, Vert, Ends		5t2	4	6'-5"	27	5t2	4	6'-5"	27	5t2	4	6'-5"	27
Bracket, Vert.		5u1	4	5'-4"	22	5u1	4	5'-4"	22	5u1	4	5'-4"	22
Estimated Quantities One Headwall	Reinf. Steel	4249 LB				3505 LB				2963 LB			
	Concrete	Parapet Δ	2.2		2.2				2.2				
		Wingwalls	6.5	30.9 CY	4.7	26.2 CY	3.2	21.7 CY	3.2	21.7 CY	16.3		
		Apron →	22.2		19.3								

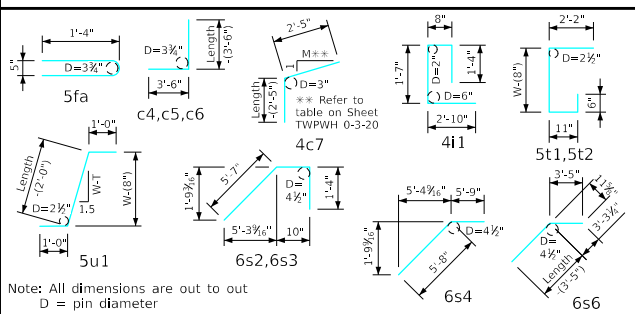
Δ Includes top of wingwall quantities.
 * Assumes apron and floor are equal thickness, adjust concrete quantities for transition where apron and floor thickness are not equal.
 (L) - Indicates bar located at left corner.
 (R) - Indicates bar located at right corner.
 Refer to Sheet TWPWH 0-1-20 for left and right corner locations.

Note: Weight of bars over 40'-0" long include an allowance of 2'-5" for lap.

Headwall Notes:

- 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 "4d1" and "6f1" 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.

Bent Bar Details



LATEST REVISION DATE	APPROVED BY BRIDGE ENGINEER	IOWADOT Highway Division	
		Standard Design - Twin Reinforced Concrete Box Culverts	
		Parallel Wing Headwalls	
		July, 2020	
Quantity Tabulation		TWPWH 0-7-20 Sheet 2 of 2	
10'-0" Span 0° Skew			