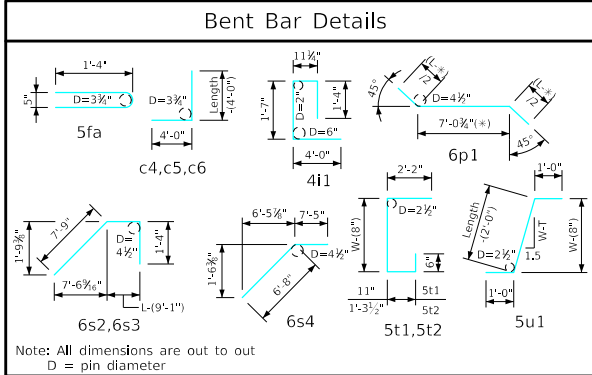


ENGLISHLRFDDESIGNEDSINGLECULVERTS.DGN - PWH 45-11-20 - THIS SHEET ISSUED 07-2020.

Bill of Reinforcing for One Headwall 45° Skew Span x Culvert Height																						
Location	Shape	5' x 6'				5' x 5'				5' x 4'				5' x 3'								
		Bar	No.	Length	Wt.	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	5fa	2	2'-10"	6					
Wingwall, F,F,H.		5b1	2	30'-9"	64	5b1	2	26'-6"	55	5b1	2	22'-3"	46	5b1	2	18'-0"	38					
Wingwall, F,F,H.		5b2	10 Var.	2 Each 11'-9 to 28'-9	211	5b2	8 Var.	2 Each 11'-9 to 24'-6	151	5b2	6 Var.	2 Each 11'-9 to 20'-3	100	5b2	4 Var.	2 Each 11'-9 to 16'-0	58					
Wingwall, B,F,H.		4b3	2	31'-0"	41	4b3	2	26'-9"	36	4b3	2	22'-6"	30	4b3	2	18'-3"	24					
Wingwall, B,F,H.		4b4	8 Var.	2 Each 16'-4 to 29'-1	121	4b4	6 Var.	2 Each 16'-4 to 24'-10	82	4b4	4 Var.	2 Each 16'-4 to 20'-7	49	4b4	2	16'-4"	22					
Wingwall, F,F,V.		4c1	72 Var.	2 Each 2'-5 to 8'-7	265	4c1	46 Var.	2 Each 2'-5 to 7'-7	154	4c1	36 Var.	2 Each 2'-5 to 6'-5	106	4c1	28 Var.	2 Each 2'-5 to 5'-5	73					
Wingwall, F,F,V.		c2	-	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--					
Wingwall, F,F,V, (O)		4c3	2	8'-10"	12	4c3	2	7'-10"	10	4c3	2	6'-10"	9	4c3	2	5'-10"	8					
Wingwall, F,F,V, (A)		4c3	3	8'-10"	18	4c3	3	7'-10"	16	4c3	3	6'-10"	14	4c3	3	5'-10"	12					
Wingwall, B,F,V.		5c4	54 Var.	2 Each 6'-7 to 12'-8	542	5c4	46 Var.	2 Each 6'-7 to 11'-9	440	5c4	36 Var.	2 Each 6'-7 to 10'-7	322	5c4	28 Var.	2 Each 6'-7 to 9'-8	237					
Wingwall, B,F,V, (O)		5c5	1	12'-10"	13	5c5	1	11'-10"	12	5c5	1	10'-10"	11	5c5	1	9'-10"	10					
Wingwall, B,F,V, (A)		5c5	4	12'-10"	54	5c5	4	11'-10"	49	5c5	4	10'-10"	45	5c5	4	9'-10"	41					
Wingwall, B,F,V.		5c6	16	9'-0"	150	c6	--	--	--	c6	--	--	--	c6	--	--	--					
Apron, Longit. Bott.		4d1	6	30'-6"	122	4d1	6	26'-3"	105	4d1	6	22'-0"	88	4d1	6	17'-9"	71					
Apron, Longit. Top		6f1	6	30'-6"	275	6f1	6	26'-3"	237	6f1	6	22'-0"	198	6f1	6	17'-9"	160					
Parapet, Vertical		4i1	11	7'-10"	58	4i1	11	7'-10"	58	4i1	11	7'-10"	58	4i1	11	7'-10"	58					
Parapet, Horiz.		9j1	4	8'-8"	118	9j1	4	8'-8"	118	9j1	4	8'-8"	118	9j1	4	8'-8"	118					
Apron, Trans., Top		5m1	26	6'-8"	181	5m1	21	6'-8"	146	5m1	17	6'-8"	118	5m1	13	6'-8"	90					
Apron, Trans., Top		5m2	4 Var.	2'-0 to 5'-0	15	5m2	4 Var.	2'-9 to 5'-9	18	5m2	4 Var.	2'-6 to 5'-6	17	5m2	4 Var.	2'-3 to 5'-3	16					
Apron, Trans., Bott.		5m3	19	4'-8"	92	5m3	16	4'-8"	78	5m3	13	4'-8"	63	5m3	10	4'-8"	49					
Curtain, Horiz.		6p1	5	8'-8"	65	6p1	5	8'-8"	65	6p1	5	8'-8"	65	6p1	5	8'-8"	65					
Wing Slope, Both F.		6s1	4	22'-2"	133	6s1	4	17'-9"	107	6s1	4	13'-5"	81	6s1	4	9'-1"	55					
Wing Slope, Both F, (O)		6s2	2	9'-8"	29	6s2	2	9'-8"	29	6s2	2	9'-8"	29	6s2	2	9'-8"	29					
Wing Slope, Both F, (A)		6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31	6s3	2	10'-5"	31					
Wing Slope, F,F.		6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42	6s4	2	14'-1"	42					
Wing Slope, F,F.		6s5	2	19'-8"	59	6s5	2	15'-4"	46	6s5	2	11'-0"	33	6s5	2	6'-7"	20					
Curtain, Vert.		5t1	8	6'-5"	54	5t1	8	6'-5"	54	5t1	8	6'-5"	54	5t1	8	6'-5"	54					
Curtain, Vert. Ends		5t2	4	6'-10"	29	5t2	4	6'-10"	29	5t2	4	6'-10"	29	5t2	4	6'-10"	29					
Bracket, Vert.		5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22	5u1	4	5'-3"	22					
Estimated Quantities One Headwall	Reinf. Steel	Parapet Δ	1.4	2822 LB				1.4	2196 LB				1.4	1784 LB				1.4	1438 LB			
	Concrete	Wingwalls	6.8	17.4 CY				5.0	14.4 CY				3.4	11.6 CY				2.1	9.1 CY			
		Apron *	9.2					8.0					6.8					5.6				

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.
 (A) - Indicates bar located at acute corner.
 (O) - Indicates bar located at obtuse corner.
 Refer to Sheet PWH 45-1-20 for acute and obtuse 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.

LATEST REVISION DATE	APPROVED BY BRIDGE ENGINEER	IOWADOT Highway Division	
		Standard Design - Single Reinforced Concrete Box Culverts	
		Parallel Wing Headwalls	
		July, 2020	
		Quantity Tabulation	PWH
		5'-0" Span	45-11-20
		45° Skew	