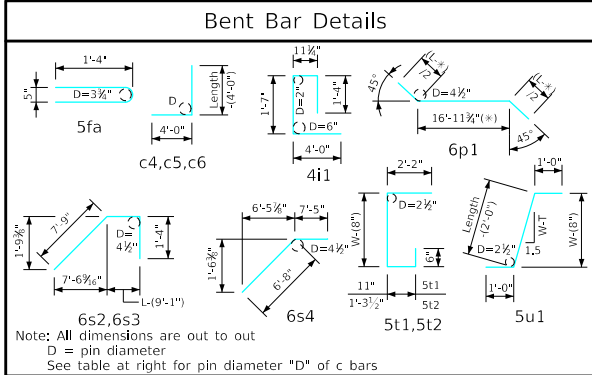


ENGLISHLRFDDESIGNEDSINGLECULVERTS.DGN - PWH 45-7-20 S2 - THIS SHEET ISSUED 07-2020.

Bill of Reinforcing for One Headwall 45° Skew Span x Culvert Height

Location	Shape	12' x 6'				12' x 5'				12' 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	30'-9"	64	5b1	2	26'-6"	55	5b1	2	22'-3"	46
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
Wingwall, B.F.H.		4b3	2	31'-0"	41	4b3	2	26'-9"	36	4b3	2	22'-6"	30
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
Wingwall, F.F.V.		4c1	72 Var.	2 Each 2'-8" to 8'-10"	277	4c1	46 Var.	2 Each 2'-8" to 7'-10"	161	4c1	36 Var.	2 Each 2'-8" to 6'-8"	112
Wingwall, F.F.V.		c2	--	--	--	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (O)		4c3	2	9'-1"	12	4c3	2	8'-1"	11	4c3	2	7'-1"	9
Wingwall, F.F.V. (A)		4c3	3	9'-1"	18	4c3	3	8'-1"	16	4c3	3	7'-1"	14
Wingwall, B.F.V.		5c4	54 Var.	2 Each 6'-10" to 12'-11"	556	6c4	60 Var.	2 Each 6'-10" to 11'-11"	845	6c4	48 Var.	2 Each 6'-10" to 10'-11"	640
Wingwall, B.F.V. (O)		5c5	1	13'-1"	14	6c5	1	12'-1"	18	6c5	1	11'-1"	17
Wingwall, B.F.V. (A)		5c5	4	13'-1"	55	6c5	4	12'-1"	73	6c5	4	11'-1"	67
Wingwall, B.F.V.		5c6	16	9'-0"	150	c6	--	--	--	c6	--	--	--
Apron, Longit., Bott.		4d1	13	30'-6"	265	4d1	13	26'-3"	228	4d1	13	22'-0"	191
Apron, Longit., Top		6f1	13	30'-6"	596	6f1	13	26'-3"	513	6f1	13	22'-0"	430
Parapet, Vertical		4i1	25	7'-10"	131	4i1	25	7'-10"	131	4i1	25	7'-10"	131
Parapet, Horiz.		9j1	4	18'-7"	253	9j1	4	18'-7"	253	9j1	4	18'-7"	253
Apron, Trans., Top		5m1	44	13'-8"	627	5m1	35	13'-8"	499	5m1	27	13'-8"	385
Apron, Trans., Top		5m2	22 Var.	2'-0" to 12'-6"	166	5m2	22 Var.	2'-3" to 12'-9"	172	5m2	22 Var.	2'-0" to 12'-6"	166
Apron, Trans., Bott.		5m3	19	14'-7"	289	5m3	16	14'-7"	243	5m3	13	14'-7"	198
Curtain, Horiz.		6p1	5	18'-7"	140	6p1	5	18'-7"	140	6p1	5	18'-7"	140
Wing Slope, Both F.		6s1	4	22'-2"	133	6s1	4	17'-9"	107	6s1	4	13'-5"	81
Wing Slope, Both F. (O)		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
Wing Slope, F.F.		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
Curtain, Vert.		5t1	17	6'-5"	114	5t1	17	6'-5"	114	5t1	17	6'-5"	114
Curtain, Vert. Ends		5t2	4	6'-10"	29	5t2	4	6'-10"	29	5t2	4	6'-10"	29
Bracket, Vert.		5u1	4	5'-4"	22	5u1	4	5'-4"	22	5u1	4	5'-4"	22
Estimated Quantities One Headwall	Reinf. Steel	4451 LB				4053 LB				3365 LB			
	Concrete	Parapet Δ	2.2		2.2		2.2		2.2		2.2		
		Wingwalls	6.8	29.5 CY	5.0	25.0 CY	3.4	15.0	15.0	20.6 CY			
		Apron *	20.5		17.8								

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 45-7-20
		12'-0" Span	SHEET 2 OF 2
		45° Skew	