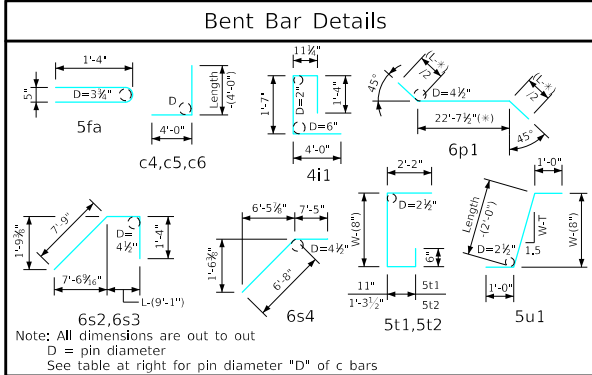


ENGLISHLRFDDESIGNEDSINGLECULVERTS.DGN - PWH 45-5-20 S2 - THIS SHEET ISSUED 07-2020.

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

Location	Shape	16' x 6'				16' x 5'				16' 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 7'-0" 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'-10" to 9'-0"	285	4c1	46 Var.	2 Each 2'-10" to 8'-0"	166	4c1	36 Var.	2 Each 2'-10" to 6'-10"	116				
Wingwall, F.F.V.		c2	--	--	--	c2	--	--	--	c2	--	--	--				
Wingwall, F.F.V. (O)		4c3	2	9'-3"	12	4c3	2	8'-3"	11	4c3	2	7'-3"	10				
Wingwall, F.F.V. (A)		4c3	3	9'-3"	19	4c3	3	8'-3"	17	4c3	3	7'-3"	15				
Wingwall, B.F.V.		6c4	54 Var.	2 Each 7'-0" to 13'-1"	814	6c4	90 Var.	2 Each 7'-0" to 12'-2"	1295	6c4	72 Var.	2 Each 7'-0" to 11'-1"	978				
Wingwall, B.F.V. (O)		6c5	1	13'-3"	20	6c5	1	12'-3"	18	6c5	1	11'-3"	17				
Wingwall, B.F.V. (A)		6c5	4	13'-3"	80	6c5	4	12'-3"	74	6c5	4	11'-3"	68				
Wingwall, B.F.V.		6c6	16	9'-0"	216	6c6	--	--	--	6c6	--	--	--				
Apron, Longit. Bott.		4d1	17	30'-6"	346	4d1	17	26'-3"	298	4d1	17	22'-0"	250				
Apron, Longit. Top		6f1	17	30'-6"	779	6f1	17	26'-3"	670	6f1	17	22'-0"	562				
Parapet, Vertical		4i1	33	7'-10"	173	4i1	33	7'-10"	173	4i1	33	7'-10"	173				
Parapet, Horiz.		10j1	4	24'-3"	417	10j1	4	24'-3"	417	10j1	4	24'-3"	417				
Apron, Trans., Top		6m1	40	17'-8"	1061	6m1	31	17'-8"	823	6m1	23	17'-8"	610				
Apron, Trans., Top		6m2	30 Var.	2'-0" to 16'-6"	417	6m2	30 Var.	2'-0" to 16'-9"	428	6m2	30 Var.	2'-0" to 16'-6"	417				
Apron, Trans., Bott.		5m3	19	20'-3"	401	5m3	16	20'-3"	338	5m3	13	20'-3"	275				
Curtain, Horiz.		6p1	5	24'-3"	182	6p1	5	24'-3"	182	6p1	5	24'-3"	182				
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	23	6'-5"	154	5t1	23	6'-5"	154	5t1	23	6'-5"	154				
Curtain, Vert. Ends		5t2	4	6'-10"	29	5t2	4	6'-10"	29	5t2	4	6'-10"	29				
Bracket, Vert.		5u1	4	5'-5"	23	5u1	4	5'-5"	23	5u1	4	5'-5"	23				
Estimated Quantities One Headwall	Reinf. Steel		6165 LB				5701 LB				4743 LB						
	Concrete	Parapet Δ	2.6					2.6					2.6				
		Wingwalls	6.8	38.3 CY				5.0	32.6 CY				3.4	27.0 CY			
	Apron *	28.9					25.0					21.0					

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	
		16'-0" Span	
		45° Skew	
			PWH 45-5-20 SHEET 2 OF 2