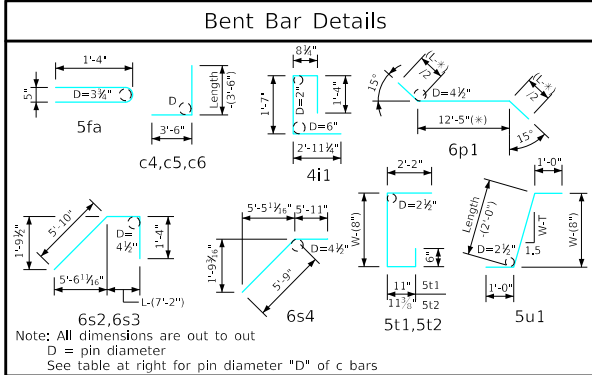


ENGLISHLRFDDESIGNEDSINGLECULVERTS.DGN - PWH 15-7-20 S2 - THIS SHEET ISSUED 07-2020.

Bill of Reinforcing for One Headwall 15° 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	23'-0"	48	5b1	2	19'-10"	41	5b1	2	16'-9"	35				
Wingwall, F.F.H.		5b2	10 Var.	2 Each 9'-2 to 21'-7	160	5b2	8 Var.	2 Each 9'-2 to 18'-5	115	5b2	6 Var.	2 Each 9'-2 to 15'-4	77				
Wingwall, B.F.H.		4b3	2	23'-1"	31	4b3	2	19'-11"	27	4b3	2	16'-10"	22				
Wingwall, B.F.H.		4b4	8 Var.	2 Each 12'-4 to 21'-8	91	4b4	6 Var.	2 Each 12'-4 to 18'-6	62	4b4	4 Var.	2 Each 12'-4 to 15'-5	37				
Wingwall, F.F.V.		4c1	52 Var.	2 Each 2'-8 to 8'-9	198	4c1	34 Var.	2 Each 2'-8 to 7'-10	119	4c1	26 Var.	2 Each 2'-8 to 6'-6	80				
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	2	9'-1"	12	4c3	2	8'-1"	11	4c3	2	7'-1"	9				
Wingwall, B.F.V.		5c4	40 Var.	2 Each 6'-4 to 12'-6	393	5c4	44 Var.	2 Each 6'-4 to 11'-5	407	5c4	36 Var.	2 Each 6'-4 to 10'-6	316				
Wingwall, B.F.V. (O)		5c5	1	12'-7"	13	5c5	1	11'-7"	12	5c5	1	10'-7"	11				
Wingwall, B.F.V. (A)		5c5	2	12'-7"	26	5c5	2	11'-7"	24	5c5	2	10'-7"	22				
Wingwall, B.F.V.		5c6	12	8'-6"	106	c6	--	--	--	c6	--	--	--				
Apron, Longit. Bott.		4d1	13	22'-11"	199	4d1	13	19'-10"	172	4d1	13	16'-8"	145				
Apron, Longit. Top		6f1	13	22'-11"	447	6f1	13	19'-10"	387	6f1	13	16'-8"	325				
Parapet, Vertical		4i1	25	6'-7"	110	4i1	25	6'-7"	110	4i1	25	6'-7"	110				
Parapet, Horiz.		7j1	4	13'-7"	111	7j1	4	13'-7"	111	7j1	4	13'-7"	111				
Apron, Trans., Top		5m1	25	13'-8"	356	5m1	21	13'-8"	299	5m1	17	13'-8"	242				
Apron, Trans., Top		5m2	4 Var.	3'-9 to 12'-2	33	5m2	4 Var.	3'-5 to 11'-10	32	5m2	4 Var.	3'-0 to 11'-5	30				
Apron, Trans., Bott.		4m3	19	9'-10"	125	4m3	21	9'-10"	138	4m3	13	9'-10"	85				
Curtain, Horiz.		6p1	5	14'-1"	106	6p1	5	14'-1"	106	6p1	5	14'-1"	106				
Wing Slope, Both F.		6s1	4	17'-1"	103	6s1	4	17'-10"	83	6s1	4	10'-7"	64				
Wing Slope, Both F. (O)		6s2	2	7'-10"	24	6s2	2	7'-10"	24	6s2	2	7'-10"	24				
Wing Slope, Both F. (A)		6s3	2	8'-0"	24	6s3	2	8'-0"	24	6s3	2	8'-0"	24				
Wing Slope, F.F.		6s4	2	11'-8"	35	6s4	2	11'-8"	35	6s4	2	11'-8"	35				
Wing Slope, F.F.		6s5	2	14'-8"	44	6s5	2	11'-4"	34	6s5	2	8'-1"	24				
Curtain, Vert.		5t1	13	6'-5"	87	5t1	13	6'-5"	87	5t1	13	6'-5"	87				
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		2949 LB				2526 LB				2085 LB						
	Concrete	Parapet Δ	1.6					1.6					1.6				
		Wingwalls	5.0	21.6 CY				3.7	18.3 CY				2.5	15.1 CY			
	Apron *	15.0					13.0					11.0					

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 15-1-20 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 12'-0" Span 15° Skew	PWH 15-7-20 SHEET 2 OF 2