

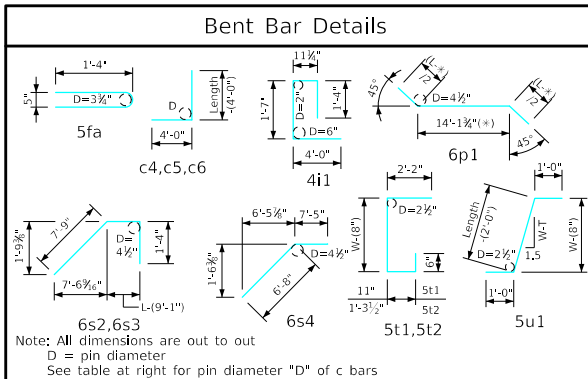
ENGLISHLRFDDESIGNEDSINGLECULVERTS.DGN - PWH 45-8-20 S2 - THIS SHEET ISSUED 07-2020.

Bill of Reinforcing for One Headwall 45° 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	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'-7" to 8'-9"	273	4c1	46 Var.	2 Each 2'-7" to 7'-9"	159	4c1	36 Var.	2 Each 2'-7" to 6'-7"	110				
Wingwall, F.F.V.		c2	--	--	--	c2	--	--	--	c2	--	--	--				
Wingwall, F.F.V. (O)		4c3	2	9'-0"	12	4c3	2	8'-0"	11	4c3	2	7'-0"	9				
Wingwall, F.F.V. (A)		4c3	3	9'-0"	18	4c3	3	8'-0"	16	4c3	3	7'-0"	14				
Wingwall, B.F.V.		5c4	54 Var.	2 Each 6'-9" to 12'-10"	551	6c4	60 Var.	2 Each 6'-9" to 11'-10"	837	6c4	48 Var.	2 Each 6'-9" to 10'-10"	634				
Wingwall, B.F.V. (O)		5c5	1	13'-0"	14	6c5	1	12'-0"	18	6c5	1	11'-0"	17				
Wingwall, B.F.V. (A)		5c5	4	13'-0"	54	6c5	4	12'-0"	72	6c5	4	11'-0"	66				
Wingwall, B.F.V.		5c6	16	9'-0"	150	c6	--	--	--	c6	--	--	--				
Apron, Longit. Bott.		4d1	11	30'-6"	224	4d1	11	26'-3"	193	4d1	11	22'-0"	162				
Apron, Longit. Top		6f1	11	30'-6"	504	6f1	11	26'-3"	434	6f1	11	22'-0"	363				
Parapet, Vertical		4i1	21	7'-10"	110	4i1	21	7'-10"	110	4i1	21	7'-10"	110				
Parapet, Horiz.		9j1	4	15'-9"	214	9j1	4	15'-9"	214	9j1	4	15'-9"	214				
Apron, Trans., Top		5m1	46	11'-8"	560	5m1	37	11'-8"	450	5m1	29	11'-8"	353				
Apron, Trans., Top		5m2	18 Var.	2'-0" to 10'-6"	117	5m2	18 Var.	2'-3" to 10'-9"	122	5m2	18 Var.	2'-0" to 10'-6"	117				
Apron, Trans., Bott.		5m3	19	11'-9"	233	5m3	16	11'-9"	196	5m3	13	11'-9"	159				
Curtain, Horiz.		6p1	5	15'-9"	118	6p1	5	15'-9"	118	6p1	5	15'-9"	118				
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	15	6'-5"	100	5t1	15	6'-5"	100	5t1	15	6'-5"	100				
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		4040 LB				3686 LB				3044 LB						
	Concrete	Parapet Δ	2.0					2.0					2.0				
		Wingwalls	6.8	25.6 CY				5.0	21.5 CY				3.4	17.7 CY			
	Apron *	16.8					14.5					12.3					

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.
 (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 10'-0" Span 45° Skew	PWH 45-8-20 SHEET 2 OF 2