



c Bar Pin Diameter	
Bar Size	D
5	3 3/4"
6	4 1/2"

Note: Weight of bars over 40'-0" long include an allowance of 2'-5" for lap.

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 18'-5 to 19'-11	115	5b2	6 Var.	2 Each 15'-4 to 16'-10	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 18'-6 to 19'-4	62	4b4	4 Var.	2 Each 15'-5 to 16'-2	37	
Interior Wall, Both F.H.	5b5	9 Var.	6'-11 to 22'-6	138	5b5	7 Var.	7'-1 to 19'-4	96	5b5	5 Var.	7'-4 to 16'-2	61	
Wingwall, F.F.V.	4c1	52 Var.	2 Each 2'-8 to 8'-9	198	4c1	34 Var.	2 Each 7'-10 to 11'-5	119	4c1	26 Var.	2 Each 6'-6 to 7'-10	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 11'-5 to 11'-5	407	5c4	36 Var.	2 Each 10'-6 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	--	--	--	
Interior Wall, Both F.V.	4c7	2	3'-10"	5	4c7	2	3'-10"	5	4c7	2	3'-10"	5	
Interior Wall, Both F.V.	4c8	37 Var.	1'-7 to 6'-2	96	4c8	31 Var.	1'-7 to 5'-3	71	4c8	25 Var.	1'-6 to 4'-3	48	
Interior Wall, Both F.V.	4c9	2	6'-7"	9	4c9	2	5'-7"	7	4c9	2	4'-7"	6	
Apron, Longit., Bott.	4d1	26	22'-11"	398	4d1	26	19'-10"	344	4d1	26	16'-8"	289	
Apron, Longit., Top	6f1	26	22'-11"	895	6f1	26	19'-10"	775	6f1	26	16'-8"	651	
Parapet, Vertical	4i1	49	6'-7"	215	4i1	49	6'-7"	215	4i1	49	6'-7"	215	
Parapet, Horiz.	7j1	4	26'-10"	219	7j1	4	26'-10"	219	7j1	4	26'-10"	219	
Apron, Trans., Top	5m1	23	26'-5"	634	5m1	19	26'-5"	523	5m1	15	26'-5"	413	
Apron, Trans., Top	5m2	8 Var.	4'-7 to 24'-2	120	5m2	8 Var.	4'-2 to 23'-9	116	5m2	8 Var.	3'-9 to 23'-5	113	
Apron, Trans., Bott.	4m3	19	23'-1"	293	4m3	21	23'-1"	324	4m3	13	23'-1"	200	
Curtain, Horiz.	6p1	5	27'-3"	205	6p1	5	27'-3"	205	6p1	5	27'-3"	205	
Wing Slope, Both F.	6s1	4	17'-1"	103	6s1	4	13'-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	
Interior Wall, Both F.	6s6	2	23'-7"	71	6s6	2	20'-4"	61	6s6	2	17'-1"	51	
Curtain, Vert.	5t1	26	6'-5"	174	5t1	26	6'-5"	174	5t1	26	6'-5"	174	
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	4847 LB				4219 LB				3494 LB			
	Concrete	Parapet Δ	2.6		2.6		2.6		2.6		2.6		
		Wingwalls	6.7		4.9		32.1		3.3		26.7		
		Apron =	28.4		24.6		20.8		20.8		20.8		

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 TWPWH 15-1-20 for acute and obtuse corner locations.

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	<p style="text-align: center;">Standard Design - Twin Reinforced Concrete Box Culverts</p> <h2 style="text-align: center;">Parallel Wing Headwalls</h2> <p style="text-align: center;">July, 2020</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Quantity Tabulation 12'-0" Span 15° Skew</td> <td style="width: 50%; border: none;">TWPWH 15-6-20 Sheet 2 of 2</td> </tr> </table>	Quantity Tabulation 12'-0" Span 15° Skew	TWPWH 15-6-20 Sheet 2 of 2
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