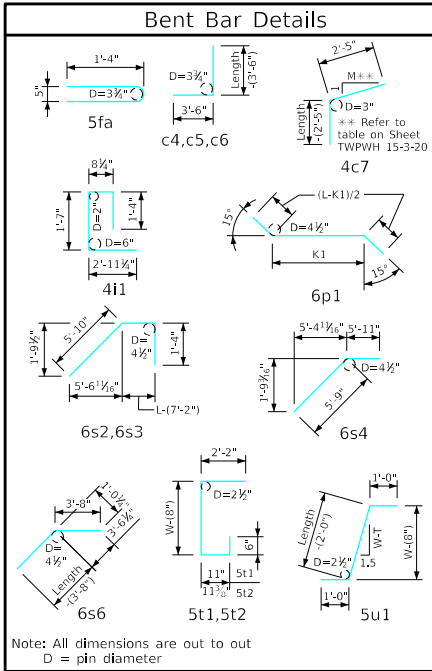


ENGLISHLRFD\DESIGNEDTWINCULVERTS.DGN - TWPWH 15-7-20 52 - THIS SHEET ISSUED 07-2020



Bill of Reinforcing for One Headwall 15° 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	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 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 18'-6 to 19'-4	62	4b4	4 Var.	2 Each 12'-4 to 15'-5	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'-7 to 8'-8	195	4c1	34 Var.	2 Each 7'-9 to 19'-4	117	4c1	26 Var.	2 Each 2'-7 to 6'-5	78	
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	2	9'-0"	12	4c3	2	8'-0"	11	4c3	2	7'-0"	9	
Wingwall, B.F.V.	5c4	40 Var.	2 Each 6'-3 to 12'-5	389	5c4	34 Var.	2 Each 11'-5 to 11'-5	313	5c4	26 Var.	2 Each 6'-3 to 10'-2	223	
Wingwall, B.F.V. (O)	5c5	1	12'-6"	13	5c5	1	11'-6"	12	5c5	1	10'-6"	11	
Wingwall, B.F.V. (A)	5c5	2	12'-6"	26	5c5	2	11'-6"	24	5c5	2	10'-6"	22	
Wingwall, B.F.V.	5c6	12	8'-6"	106	c6	--	--	--	c6	--	--	--	
Interior Wall, Both F.V.	4c7	2	3'-9"	5	4c7	2	3'-9"	5	4c7	2	3'-9"	5	
Interior Wall, Both F.V.	4c8	37 Var.	1'-6 to 6'-1	94	4c8	31 Var.	1'-6 to 5'-2	69	4c8	25 Var.	1'-5 to 4'-2	47	
Interior Wall, Both F.V.	4c9	2	6'-6"	9	4c9	2	5'-6"	7	4c9	2	4'-6"	6	
Apron, Longit., Bott.	4d1	22	22'-11"	337	4d1	22	19'-10"	291	4d1	22	16'-8"	245	
Apron, Longit., Top	6f1	22	22'-11"	757	6f1	22	19'-10"	655	6f1	22	16'-8"	551	
Parapet, Vertical	4i1	41	6'-7"	180	4i1	41	6'-7"	180	4i1	41	6'-7"	180	
Parapet, Horiz.	7j1	4	22'-8"	185	7j1	4	22'-8"	185	7j1	4	22'-8"	185	
Apron, Trans., Top	5m1	24	22'-5"	561	5m1	19	22'-5"	444	5m1	15	22'-5"	351	
Apron, Trans., Top	5m2	7 Var.	2'-7 to 19'-4	80	5m2	8 Var.	2'-2 to 21'-9	100	5m2	7 Var.	4'-7 to 21'-5	95	
Apron, Trans., Bott.	4m3	19	18'-11"	240	4m3	16	18'-11"	202	4m3	13	18'-11"	164	
Curtain, Horiz.	6p1	5	23'-1"	173	6p1	5	23'-1"	173	6p1	5	23'-1"	173	
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	22	6'-5"	147	5t1	22	6'-5"	147	5t1	22	6'-5"	147	
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	4345 LB				3603 LB				3010 LB			
	Concrete	Parapet Δ	2.3		2.3		2.3		2.3		2.3		
		Wingwalls	6.7		4.9		27.1		3.3		22.5		
		Apron =	23.0		19.9		16.9		16.9		16.9		

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

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

Standard Design - Twin Reinforced Concrete Box Culverts

Parallel Wing Headwalls

July, 2020

Quantity Tabulation
10'-0" Span
15° Skew

TWPWH
15-7-20
Sheet 2 of 2

APPROVED BY BRIDGE ENGINEER