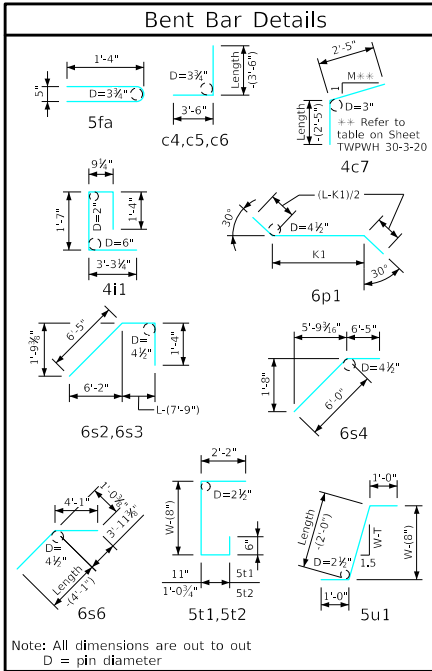


ENGLISHLRFD\DESIGN\CULVERTS.DGN - TWPWH 30-7-20 52 - THIS SHEET ISSUED 07-2020



### Bill of Reinforcing for One Headwall 30° 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	25'-5	53	5b1	2	22'-0	46	5b1	2	18'-6	39	
Wingwall, F.F.H.	5b2	10 Var.	2 Each 10'-0 to 23'-10	176	5b2	8 Var.	2 Each 10'-0 to 20'-5	127	5b2	6 Var.	2 Each 10'-0 to 16'-11	84	
Wingwall, B.F.H.	4b3	2	25'-7	34	4b3	2	22'-2	30	4b3	2	18'-8	25	
Wingwall, B.F.H.	4b4	8 Var.	2 Each 13'-7 to 24'-0	100	4b4	6 Var.	2 Each 13'-7 to 20'-7	68	4b4	4 Var.	2 Each 13'-7 to 17'-1	41	
Interior Wall, Both F.H.	5b5	9 Var.	7'-7 to 24'-10	152	5b5	7 Var.	7'-9 to 21'-4	106	5b5	5 Var.	8'-1 to 17'-10	68	
Wingwall, F.F.V.	4c1	58 Var.	2 Each 2'-7 to 8'-8	218	4c1	36 Var.	2 Each 2'-7 to 7'-6	121	4c1	30 Var.	2 Each 2'-7 to 6'-7	92	
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	44 Var.	2 Each 6'-3 to 12'-4	426	5c4	48 Var.	2 Each 6'-3 to 11'-3	438	5c4	30 Var.	2 Each 6'-3 to 10'-4	259	
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	3	12'-6	39	5c5	3	11'-6	36	5c5	3	10'-6	33	
Wingwall, B.F.V.	5c6	14	8'-6	124	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	42 Var.	1'-5 to 6'-3	108	4c8	35 Var.	1'-5 to 5'-3	78	4c8	28 Var.	1'-5 to 4'-2	52	
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	25'-4	372	4d1	22	21'-10	321	4d1	22	18'-4	269	
Apron, Longit., Top	6f1	22	25'-4	837	6f1	22	21'-10	721	6f1	22	18'-4	606	
Parapet, Vertical	4i1	41	7'-0	192	4i1	41	7'-0	192	4i1	41	7'-0	192	
Parapet, Horiz.	7j1	4	25'-3	206	7j1	4	25'-3	206	7j1	4	25'-3	206	
Apron, Trans., Top	5m1	23	22'-5	538	5m1	18	22'-5	421	5m1	13	22'-5	304	
Apron, Trans., Top	5m2	15 Var.	2'-2 to 20'-4	176	5m2	15 Var.	2'-8 to 20'-11	184	5m2	15 Var.	3'-2 to 21'-4	192	
Apron, Trans., Bott.	4m3	19	21'-6	273	4m3	16	21'-6	230	4m3	13	21'-6	187	
Curtain, Horiz.	6p1	5	25'-7	192	6p1	5	25'-7	192	6p1	5	25'-7	192	
Wing Slope, Both F.	6s1	4	18'-8	112	6s1	4	15'-1	91	6s1	4	11'-6	69	
Wing Slope, Both F. (O)	6s2	2	8'-4	25	6s2	2	8'-4	25	6s2	2	8'-4	25	
Wing Slope, Both F. (A)	6s3	2	8'-9	26	6s3	2	8'-9	26	6s3	2	8'-9	26	
Wing Slope, F.F.	6s4	2	12'-5	37	6s4	2	12'-5	37	6s4	2	12'-5	37	
Wing Slope, F.F.	6s5	2	16'-3	49	6s5	2	12'-8	38	6s5	2	9'-0	27	
Interior Wall, Both F.	6s6	2	25'-11	78	6s6	2	22'-4	67	6s6	2	18'-9	56	
Curtain, Vert.	5t1	24	6'-5	161	5t1	24	6'-5	161	5t1	24	6'-5	161	
Curtain, Vert. Ends	5t2	4	6'-7	27	5t2	4	6'-7	27	5t2	4	6'-7	27	
Bracket, Vert.	5u1	4	5'-4	22	5u1	4	5'-4	22	5u1	4	5'-4	22	
Estimated Quantities One Headwall	Reinf. Steel	4810 LB				4063 LB				3337 LB			
	Concrete	Parapet Δ	2.5		2.5		2.5		2.5		2.5		
		Wingwalls	7.5	35.6 CY	5.4	30.1 CY	3.7	25.0 CY	3.7	25.0 CY	3.7	25.0 CY	
		Apron =	25.6		22.2		18.8		18.8		18.8		

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 30-1-20 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

30° Skew

TWPWH

30-7-20

Sheet 2 of 2