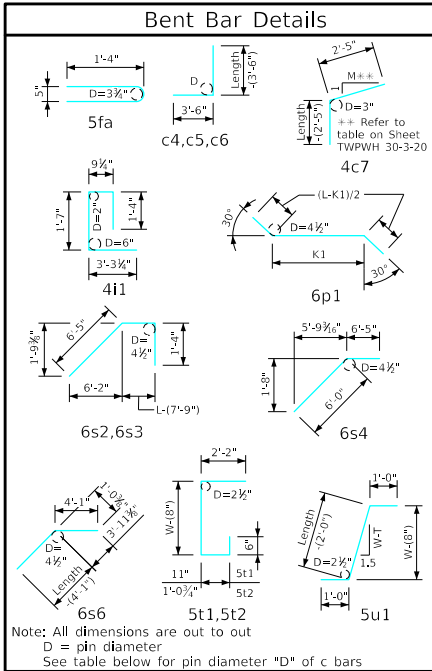


ENGLISHLRFD\DESIGN\CULVERTS.DGN - TWPWH 30-6-20 52 - THIS SHEET ISSUED 07-2020



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 30° 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	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'-8 to 8'-9	221	4c1	36 Var.	2 Each 2'-8 to 7'-7	123	4c1	30 Var.	2 Each 2'-8 to 6'-8	94
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	44 Var.	2 Each 6'-4 to 12'-5	430	5c4	48 Var.	2 Each 6'-4 to 11'-4	442	5c4	40 Var.	2 Each 6'-4 to 10'-6	351
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	3	12'-7	39	5c5	3	11'-7	36	5c5	3	10'-7	33
Wingwall, B.F.V.		5c6	14	8'-6	124	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	42 Var.	1'-6 to 6'-4	110	4c8	35 Var.	1'-6 to 5'-4	80	4c8	28 Var.	1'-6 to 4'-3	54
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	25'-4	440	4d1	26	21'-10	379	4d1	26	18'-4	318
Apron, Longit., Top		6f1	26	25'-4	989	6f1	26	21'-10	853	6f1	26	18'-4	716
Parapet, Vertical		4i1	49	7'-0	229	4i1	49	7'-0	229	4i1	49	7'-0	229
Parapet, Horiz.		7j1	4	29'-11	245	7j1	4	29'-11	245	7j1	4	29'-11	245
Apron, Trans., Top		5m1	31	26'-5	854	5m1	24	26'-5	661	5m1	17	26'-5	468
Apron, Trans., Top		5m2	28 Var.	2'-0 to 25'-5	400	5m2	28 Var.	2'-1 to 25'-6	403	5m2	28 Var.	2'-2 to 25'-6	404
Apron, Trans., Bott.		4m3	19	26'-1	331	4m3	21	26'-1	366	4m3	13	26'-1	227
Curtain, Horiz.		6p1	5	30'-2	227	6p1	5	30'-2	227	6p1	5	30'-2	227
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	29	6'-5	194	5t1	29	6'-5	194	5t1	29	6'-5	194
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	Reinf. Steel	5781 LB				5000 LB				4152 LB			
One Headwall	Concrete	Parapet Δ	2.9	42.0 CY	Parapet Δ	2.9	35.7 CY	Parapet Δ	2.9	29.8 CY	Parapet Δ	2.9	
	Wingwalls	7.5	Wingwalls		5.4	Wingwalls		3.7					
	Apron =	31.6	Apron =		27.4	Apron =		23.2					

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

12'-0" Span

30° Skew

TWPWH

30-6-20

Sheet 2 of 2