Bill of Reinforcing for One Headwall 30° Skew Span x Culvert Height

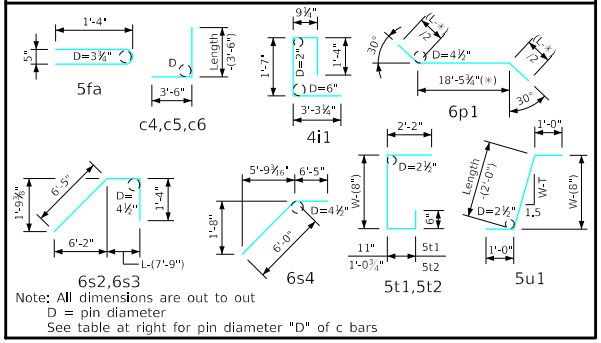
Location	Shape	16' x 6' Bar	No.	Length	Wt.	16' x 5' Bar	No.	Length	Wt.	16' x 4' Bar	No.	Length	Wt.
Fence Anchor (Galv.)		5fa	2	2'-10	6	5fa	2	2'-10	6	5fa	2	2'-10	6
Wingwall, F.F.H.		5b1	2	25'-5	53	5b1	2	22'-0	46	5b1	2	18'-6	39
Wingwall, F.F.H.		5b2	10 Var.	2 Each 10'-0 to 23'-10	176	5b2	8 Var.	2 Each 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
Wingwall, F.F.V.		4c1	58 Var.	2 Each 2'-10 to 8'-11	228	4c1	36 Var.	2 Each 2'-10 to 7'-9	127	4c1	30 Var.	2 Each 2'-10 to 6'-10	97
Wingwall, F.F.V.		c2	--	--	--	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (O)		4c3	2	9'-3	12	4c3	2	8'-3	11	4c3	2	7'-3	10
Wingwall, F.F.V. (A)		4c3	2	9'-3	12	4c3	2	8'-3	11	4c3	2	7'-3	10
Wingwall, B.F.V.		5c4	44 Var.	2 Each 6'-6 to 12'-7	438	6c4	48 Var.	2 Each 6'-6 to 11'-6	649	6c4	40 Var.	2 Each 6'-6 to 10'-8	516
Wingwall, B.F.V. (O)		5c5	1	12'-9	13	6c5	1	11'-9	18	6c5	1	10'-9	16
Wingwall, B.F.V. (A)		5c5	3	12'-9	40	6c5	3	11'-9	53	6c5	3	10'-9	48
Wingwall, B.F.V.		5c6	14	8'-6	124	c6	--	--	--	c6	--	--	--
Apron, Longit., Bott.		4d1	17	25'-4	288	4d1	17	21'-10	248	4d1	17	18'-4	208
Apron, Longit., Top		6f1	17	25'-4	647	6f1	17	21'-10	557	6f1	17	18'-4	468
Parapet, Vertical		4i1	33	7'-0	154	4i1	33	7'-0	154	4i1	33	7'-0	154
Parapet, Horiz.		9j1	4	19'-9	269	9j1	4	19'-9	269	9j1	4	19'-9	269
Apron, Trans., Top		5m1	36	17'-8	663	5m1	29	17'-8	534	5m1	22	17'-8	405
Apron, Trans., Top		5m2	18 Var.	2'-0 to 16'-8	175	5m2	18 Var.	2'-1 to 16'-9	177	5m2	18 Var.	2'-1 to 16'-10	178
Apron, Trans., Bott.		4m3	19	16'-0	203	4m3	16	16'-6	176	4m3	13	16'-6	143
Curtain, Horiz.		6p1	5	20'-1	151	6p1	5	20'-1	151	6p1	5	20'-1	151
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
Curtain, Vert.		5t1	19	6'-5	127	5t1	19	6'-5	127	5t1	19	6'-5	127
Curtain, Vert, Ends		5t2	4	6'-7	27	5t2	4	6'-7	27	5t2	4	6'-7	27
Bracket, Vert.		5u1	4	5'-5	23	5u1	4	5'-5	23	5u1	4	5'-5	23
Estimated Quantities One Headwall	Reinf. Steel			4212 LB				3806 LB				3229 LB	
	Concrete	Parapet Δ	2.1	31.3 CY		2.1	26.6 CY			2.1	22.1 CY		
		Wingwalls	5.6			4.1				2.8			
		Apron ✳	23.6			20.4				17.2			

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.
(0) - Indicates bar located at obtuse corner.
Refer to Sheet PWH 30-1-20 for acute and obtuse corner locations.

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

Bent Bar Details



Note: All dimensions are out to out
D = pin diameter
See table at right for pin diameter "D" of c bars

c Bar Pin Diameter	
Bar Size	D
5	3¾"
6	4½"
7	5⅜"

Headwall Notes:

1. This headwall is based on a 3:1 slope normal to centerline of roadway.
2. The sides of the apron are to be formed to ensure correct line and grade.
3. 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.
4. 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.
5. Concrete quantities are estimated from back of parapet.
6. 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.
7. 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
16'-0" Span
30° Skew

PWH 30-5-20
SHEET 2 OF 2

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