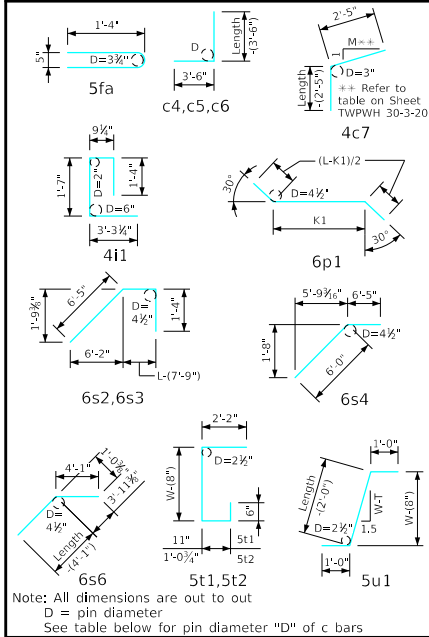


ENGLISHLRFDDESIGNEDTWINCULVERTS.DGN - TWPWH 30-6-20 S1 - THIS SHEET ISSUED 07-20-2020

Bent Bar Details



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

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

Location	Shape	12' x 12'				12' x 11'				12' x 10'				12' x 9'				12' x 8'				12' x 7'			
		Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.	Bar No.	No.	Length	Wt.
Fence Anchor (Galv.)	5fa	2	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6	5fa	2	2'-10"	6
Wingwall, F.F.H.	5b1	2	2	46'-2"	101	5b1	2	42'-9"	94	5b1	2	39'-3"	82	5b1	2	35'-10"	75	5b1	2	32'-4"	67	5b1	2	28'-11"	60
Wingwall, F.F.H.	5b2	22	2	Each 10'-0" to 44'-7"	636	5b2	20	2	Each 10'-0" to 41'-2"	539	5b2	18	2	Each 10'-0" to 37'-8"	447	5b2	16	2	Each 10'-0" to 34'-3"	369	5b2	14	2	Each 10'-0" to 30'-9"	298
Wingwall, B.F.H.	4b3	2	2	46'-6"	65	4b3	2	43'-1"	61	4b3	2	39'-6"	53	4b3	2	36'-1"	48	4b3	2	32'-7"	44	4b3	2	29'-1"	39
Wingwall, B.F.H.	4b4	20	2	Each 13'-9" to 44'-11"	398	4b4	18	2	Each 13'-9" to 41'-6"	335	4b4	16	2	Each 13'-8" to 37'-11"	276	4b4	14	2	Each 13'-8" to 34'-5"	225	4b4	12	2	Each 13'-7" to 31'-0"	179
Interior Wall, Both F.H.	5b5	21	2	7'-4" to 45'-8"	588	5b5	19	2	7'-5" to 42'-2"	496	5b5	17	2	7'-4" to 38'-9"	409	5b5	15	2	7'-5" to 35'-3"	334	5b5	13	2	7'-5" to 31'-9"	266
Wingwall, F.F.V.	5c1	86	2	Each 2'-8" to 14'-9"	781	5c1	78	2	Each 2'-8" to 13'-8"	664	4c1	72	2	Each 2'-8" to 12'-9"	537	4c1	64	2	Each 2'-8" to 11'-7"	405	4c1	76	2	Each 2'-8" to 10'-8"	338
Wingwall, F.F.V.	5c2	40	2	Each 9'-2" to 14'-8"	497	5c2	34	2	Each 9'-2" to 13'-9"	406	4c2	26	2	Each 9'-2" to 12'-7"	289	4c2	20	2	Each 9'-2" to 11'-9"	140	c2	--	--	--	--
Wingwall, F.F.V. (O)	5c3	2	2	15'-1"	31	5c3	2	14'-1"	29	4c3	2	13'-1"	17	4c3	2	12'-1"	16	4c3	2	11'-1"	15	4c3	2	10'-1"	13
Wingwall, F.F.V. (A)	5c3	2	2	15'-1"	31	5c3	2	14'-1"	29	4c3	2	13'-1"	17	4c3	2	12'-1"	16	4c3	2	11'-1"	15	4c3	2	10'-1"	13
Wingwall, B.F.V.	6c4	86	2	Each 6'-4" to 18'-6"	1604	5c4	78	2	Each 6'-4" to 17'-4"	963	5c4	72	2	Each 6'-4" to 16'-5"	854	5c4	64	2	Each 6'-4" to 15'-4"	723	5c4	58	2	Each 6'-4" to 14'-5"	628
Wingwall, B.F.V. (O)	6c5	1	1	18'-7"	28	5c5	1	17'-7"	18	5c5	1	16'-7"	17	5c5	1	15'-7"	16	5c5	1	14'-7"	15	5c5	1	13'-7"	14
Wingwall, B.F.V. (A)	6c5	3	3	18'-7"	84	5c5	3	17'-7"	55	5c5	3	16'-7"	52	5c5	3	15'-7"	49	5c5	3	14'-7"	46	5c5	3	13'-7"	43
Wingwall, B.F.V.	6c6	56	5	8'-6"	715	5c6	50	5	8'-6"	443	5c6	42	5	8'-6"	372	5c6	36	5	8'-6"	319	5c6	28	5	8'-6"	248
Interior Wall, Both F.V	4c7	2	2	3'-10"	5	4c7	2	3'-10"	5	4c7	2	3'-10"	5	4c7	2	3'-10"	5	4c7	2	3'-10"	5	4c7	2	3'-10"	5
Interior Wall, Both F.V	4c8	83	2	1'-7" to 12'-3"	383	4c8	76	2	1'-7" to 11'-3"	326	4c8	69	2	1'-7" to 10'-3"	273	4c8	62	2	1'-7" to 9'-3"	224	4c8	55	2	1'-7" to 8'-2"	179
Interior Wall, Both F.V	4c9	2	2	12'-7"	17	4c9	2	11'-7"	15	4c9	2	10'-7"	14	4c9	2	9'-7"	13	4c9	2	8'-7"	11	4c9	2	7'-7"	10
Apron, Longit., Bott.	4d1	26	46	46'-1"	842	4d1	26	42'-7"	782	4d1	26	39'-2"	680	4d1	26	35'-8"	619	4d1	26	32'-3"	560	4d1	26	28'-9"	499
Apron, Longit., Top	6f1	26	46	46'-1"	1894	6f1	26	42'-7"	1757	6f1	26	39'-2"	1530	6f1	26	35'-8"	1393	6f1	26	32'-3"	1259	6f1	26	28'-9"	1123
Parapet, Vertical	4i1	51	7	7'-0"	238	4i1	51	7'-0"	238	4i1	49	7'-0"	229	4i1	49	7'-0"	229	4i1	49	7'-0"	229	4i1	49	7'-0"	229
Parapet, Horiz.	7j1	4	4	30'-9"	251	7j1	4	30'-9"	251	7j1	4	30'-2"	247	7j1	4	30'-2"	247	7j1	4	30'-2"	247	7j1	4	29'-11"	245
Apron, Trans., Top	5m1	73	27	2'-2"	2068	5m1	66	27	2'-2"	1870	5m1	59	27	2'-2"	1641	5m1	52	27	2'-2"	1446	5m1	45	27	2'-2"	1252
Apron, Trans., Top	5m2	28	2	2'-0" to 25'-5"	400	5m2	28	2	2'-1" to 25'-6"	403	5m2	27	2	2'-0" to 25'-3"	394	5m2	28	2	2'-0" to 25'-4"	399	5m2	28	2	2'-0" to 25'-5"	400
Apron, Trans., Bott.	5m3	73	27	2'-10"	2119	5m3	67	27	2'-10"	1945	6m3	31	27	2'-11"	1300	6m3	28	27	2'-11"	1174	5m3	25	27	2'-2"	708
Curtain, Horiz.	6p1	6	6	31'-0"	279	6p1	6	31'-0"	279	6p1	6	30'-6"	275	6p1	6	30'-6"	275	6p1	6	30'-6"	275	6p1	5	30'-2"	227
Wing Slope, Both F.	6s1	4	4	40'-4"	257	6s1	4	36'-9"	221	6s1	4	33'-2"	199	6s1	4	29'-6"	177	6s1	4	25'-11"	156	6s1	4	22'-4"	134
Wing Slope, Both F. (O)	6s2	2	2	8'-3"	25	6s2	2	8'-3"	25	6s2	2	8'-4"	25	6s2	2	8'-4"	25	6s2	2	8'-4"	25	6s2	2	8'-4"	25
Wing Slope, Both F. (A)	6s3	2	2	8'-9"	26	6s3	2	8'-9"	26	6s3	2	8'-9"	26	6s3	2	8'-9"	26	6s3	2	8'-9"	26	6s3	2	8'-9"	26
Wing Slope, F.F.	6s4	2	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37	6s4	2	12'-5"	37
Wing Slope, F.F.	6s5	2	2	37'-11"	114	6s5	2	34'-3"	103	6s5	2	30'-8"	92	6s5	2	27'-1"	81	6s5	2	23'-5"	70	6s5	2	19'-10"	60
Interior Wall, Both F.	6s6	2	2	47'-5"	150	6s6	2	43'-10"	139	6s6	2	40'-4"	128	6s6	2	36'-9"	110	6s6	2	33'-1"	99	6s6	2	29'-7"	89
Curtain, Vert.	5t1	29	7	7'-11"	239	5t1	29	7'-8"	232	5t1	29	7'-5"	224	5t1	29	7'-2"	217	5t1	29	6'-11"	209	5t1	29	6'-8"	202
Curtain, Vert, Ends	5t2	4	4	8'-1"	34	5t2	4	7'-10"	33	5t2	4	7'-7"	32	5t2	4	7'-4"	31	5t2	4	7'-1"	30	5t2	4	6'-10"	29
Bracket, Vert.	5u1	4	4	6'-7"	27	5u1	4	6'-5"	27	5u1	4	6'-2"	26	5u1	4	5'-11"	25	5u1	4	5'-9"	24	5u1	4	5'-6"	23
Estimated Quantities One Headwall	Reinf. Steel	14,970 LB				12,852 LB				10,539 LB				9394 LB				7966 LB				6921 LB			
	Concrete	99.0 CY				89.3 CY				74.3 CY				66.0 CY				58.2 CY				48.9 CY			

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	APPROVED BY BRIDGE ENGINEER	IOWADOT Highway Division	
		Standard Design - Twin Reinforced Concrete Box Culverts	
		Parallel Wing Headwalls	
		July, 2020	
Quantity Tabulation		TWPWH	
12'-0" Span		30-6-20	
30° Skew		Sheet 1 of 2	