

































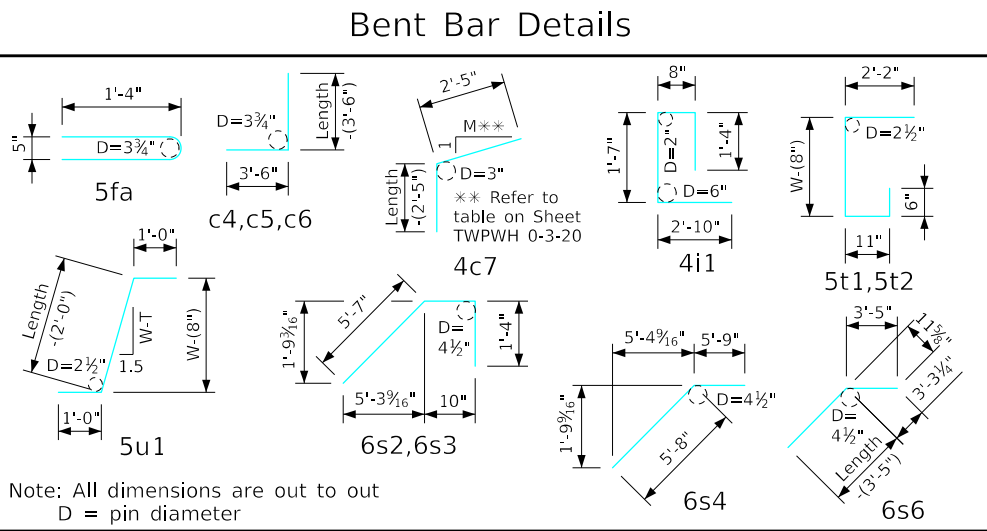


ENGLISHLRFDSIGNEDTWINCULVERTS.DGN - TWPVH 0-8-20 - THIS SHEET ISSUED 07-2020.

Bill of Reinforcing for One Headwall 0° Skew Span x Culvert Height																														
Location		Shape	8' x 10'				8' x 9'				8' x 8'				8' x 7'				8' x 6'				8' x 5'				8' x 4'			
			Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	Bar	No.	Length	Wt.	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	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	34'-3	71	5b1	2	31'-3	65	5b1	2	28'-3	59	5b1	2	25'-3	53	5b1	2	22'-3	46	5b1	2	19'-3	40	5b1	2	16'-3	34
Wingwall, F.F.H.			5b2	18 Var.	2 Each 8'-10 to 32'-10	391	5b2	16 Var.	8'-10 to 29'-10	323	5b2	14 Var.	8'-10 to 26'-10	260	5b2	12 Var.	8'-10 to 23'-10	204	5b2	10 Var.	8'-10 to 20'-10	155	5b2	8 Var.	8'-10 to 17'-10	111	5b2	6 Var.	8'-10 to 14'-10	74
Wingwall, B.F.H.			4b3	2	34'-3	46	4b3	2	31'-3	42	4b3	2	28'-3	38	4b3	2	25'-3	34	4b3	2	22'-3	30	4b3	2	19'-3	26	4b3	2	16'-3	22
Wingwall, B.F.H.			4b4	16 Var.	2 Each 11'-10 to 32'-10	239	4b4	14 Var.	11'-10 to 29'-10	195	4b4	12 Var.	11'-10 to 26'-10	155	4b4	10 Var.	11'-10 to 23'-10	119	4b4	8 Var.	11'-10 to 20'-10	87	4b4	6 Var.	11'-10 to 17'-10	59	4b4	4 Var.	11'-10 to 14'-10	36
Interior Wall, Both F.H.			5b5	17 Var.	6'-4 to 33'-10	356	5b5	15 Var.	6'-4 to 30'-10	291	5b5	13 Var.	6'-5 to 27'-10	232	5b5	11 Var.	6'-6 to 24'-10	180	5b5	9 Var.	6'-7 to 21'-10	133	5b5	7 Var.	6'-9 to 18'-9	93	5b5	5 Var.	7'-1 to 15'-9	60
Wingwall, F.F.V.			4c1	62 Var.	2 Each 2'-5 to 12'-5	307	4c1	56 Var.	2'-5 to 11'-5	259	4c1	66 Var.	2'-5 to 10'-5	283	4c1	58 Var.	2'-5 to 9'-5	229	4c1	50 Var.	2'-5 to 8'-5	181	4c1	32 Var.	2'-5 to 7'-5	105	4c1	26 Var.	2'-5 to 6'-5	77
Wingwall, F.F.V.			4c2	24 Var.	2 Each 8'-11 to 12'-7	172	4c2	18 Var.	8'-11 to 11'-7	123	c2	--	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (L)			4c3	2	12'-10	17	4c3	2	11'-10	16	4c3	2	10'-10	14	4c3	2	9'-10	13	4c3	2	8'-10	12	4c3	2	7'-10	10	4c3	2	6'-10	9
Wingwall, F.F.V. (R)			4c3	2	12'-10	17	4c3	2	11'-10	16	4c3	2	10'-10	14	4c3	2	9'-10	13	4c3	2	8'-10	12	4c3	2	7'-10	10	4c3	2	6'-10	9
Wingwall, B.F.V.			5c4	62 Var.	2 Each 6'-1 to 16'-1	717	5c4	56 Var.	2 Each 6'-1 to 15'-1	618	5c4	50 Var.	2 Each 6'-1 to 14'-1	526	5c4	44 Var.	2 Each 6'-1 to 13'-1	440	5c4	38 Var.	2 Each 6'-1 to 12'-1	360	5c4	32 Var.	2 Each 6'-1 to 11'-1	286	5c4	26 Var.	2 Each 6'-1 to 10'-1	219
Wingwall, B.F.V. (L)			5c5	2	16'-4	34	5c5	2	15'-4	32	5c5	2	14'-4	30	5c5	2	13'-4	28	5c5	2	12'-4	26	5c5	2	11'-4	24	5c5	2	10'-4	22
Wingwall, B.F.V. (R)			5c5	2	16'-4	34	5c5	2	15'-4	32	5c5	2	14'-4	30	5c5	2	13'-4	28	5c5	2	12'-4	26	5c5	2	11'-4	24	5c5	2	10'-4	22
Wingwall, B.F.V.			5c6	38	8'-6	337	5c6	32	8'-6	284	5c6	26	8'-6	231	5c6	20	8'-6	177	5c6	14	8'-6	124	c6	--	--	--	c6	--	--	--
Interior Wall, Both F.V			4c7	2	3'-7	5	4c7	2	3'-7	5	4c7	2	3'-7	5	4c7	2	3'-7	5	4c7	2	3'-7	5	4c7	2	3'-7	5	4c7	2	3'-7	5
Interior Wall, Both F.V			4c8	61 Var.	1'-4 to 10'-1	233	4c8	55 Var.	1'-4 to 9'-1	191	4c8	49 Var.	1'-4 to 8'-1	154	4c8	43 Var.	1'-4 to 7'-1	121	4c8	37 Var.	1'-4 to 6'-1	92	4c8	31 Var.	1'-4 to 5'-1	66	4c8	25 Var.	1'-3 to 4'-1	45
Interior Wall, Both F.V			4c9	2	10'-4	14	4c9	2	9'-4	12	4c9	2	8'-4	11	4c9	2	7'-4	10	4c9	2	6'-4	8	4c9	2	5'-4	7	4c9	2	4'-4	6
Apron, Longit., Bott.			4d1	18	34'-3	412	4d1	18	31'-3	376	4d1	18	28'-3	340	4d1	18	25'-3	304	4d1	18	22'-3	268	4d1	18	19'-3	231	4d1	18	16'-3	195
Apron, Longit., Top			6f1	18	34'-3	926	6f1	18	31'-3	845	6f1	18	28'-3	764	6f1	18	25'-3	683	6f1	18	22'-3	602	6f1	18	19'-3	520	6f1	18	16'-3	439
Parapet, Vertical			4i1	33	6'-5	141	4i1	33	6'-5	141	4i1	33	6'-5	141	4i1	33	6'-5	141	4i1	33	6'-5	141	4i1	33	6'-5	141	4i1	33	6'-5	141
Parapet, Horizontal			7j1	4	18'-2	149	7j1	4	18'-2	149	7j1	4	18'-2	149	7j1	4	17'-11	146	7j1	4	17'-11	146	7j1	4	17'-11	146	7j1	4	17'-11	146
Apron, Trans., Top			5m1	32	18'-8	623	5m1	29	18'-8	565	5m1	26	18'-8	506	5m1	23	18'-5	442	5m1	20	18'-5	384	5m1	17	18'-5	327	5m1	14	18'-5	269
Apron, Trans., Top			m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--
Apron, Trans., Bott.			5m3	61	15'-1	960	5m3	55	15'-1	865	5m3	33	15'-1	519	5m3	22	14'-10	340	4m3	19	14'-1	179	4m3	16	14'-1	151	4m3	13	14'-1	122
Curtain, Horiz.			6p1	6	18'-8	168	6p1	6	18'-8	168	6p1	6	18'-8	168	6p1	5	18'-5	138	6p1	5	18'-5	138	6p1	5	18'-5	138	6p1	5	18'-5	138
Wing Slope, Both F.			6s1	4	29'-5	177	6s1	4	26'-3	158	6s1	4	23'-1	139	6s1	4	19'-11	120	6s1	4	16'-9	101	6s1	4	13'-7	82	6s1	4	10'-5	63
Wing Slope, Both F. (L)			6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23	6s2	2	7'-9	23
Wing Slope, Both F. (R)			6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23	6s3	2	7'-9	23
Wing Slope, F.F.			6s4	2	11'-5	34	6s4	2	11'-5	34	6s4	2	11'-5	34	6s4	2	11'-5	34	6s4	2	11'-5	34	6s4	2	11'-5	34	6s4	2	11'-5	34
Wing Slope, F.F.			6s5	2	26'-10	81	6s5	2	23'-8	71	6s5	2	20'-6	62	6s5	2	17'-4	52	6s5	2	14'-2	43	6s5	2	11'-0	33	6s5	2	7'-10	24
Interior Wall, Both F.			6s6	2	35'-6	107	6s6	2	32'-4	97	6s6	2	29'-2	88	6s6	2	26'-0	78	6s6	2	22'-10	69	6s6	2	19'-8	59	6s6	2	16'-7	50
Curtain, Vert.			5t1	17	7'-5	132	5t1	17	7'-2	127	5t1	17	6'-11	123	5t1	17	6'-8	118	5t1	17	6'-5	114	5t1	17	6'-5	114	5t1	17	6'-5	114
Curtain, Vert. Ends			5t2	4	7'-5	31	5t2	4	7'-2	30	5t2	4	6'-11	29	5t2	4	6'-8	28	5t2	4	6'-5	27	5t2	4	6'-5	27	5t2	4	6'-5	27
Bracket, Vert.			5u1	4	6'-1	25	5u1	4	5'-11	25	5u1	4	5'-8	24	5u1	4	5'-5	23	5u1	4	5'-3	22	5u1	4	5'-3	22	5u1	4	5'-3	22
Estimated Quantities One Headwall	Reinf. Steel		7008 LB				6207 LB				5180 LB				4353 LB				3617 LB				2943 LB				2476 LB			
	Concrete	Parapet Δ	2.0	46.0 CY		2.0	40.5 CY			2.0	35.4 CY			1.9	29.1 CY			1.9	24.8 CY			1.9	20.9 CY			1.9	17.3 CY			
		Wingwalls	17.9			14.8				12.0				8.5				6.5				4.7				3.2				
		Apron *	26.1			23.7				21.4				18.7				16.4				14.3				12.2				



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.

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

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.

(L) - Indicates bar located at left corner.
(R) - Indicates bar located at right corner.
Refer to Sheet TWPVH 0-1-20 for left and right corner locations.</