

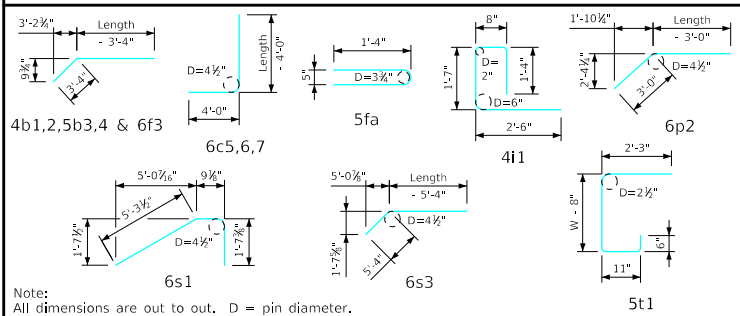
ENGLISH\FRDSIGNEDSINGLECULVERTS\FWH.DGN - FWH 0-7-21 S1 - THIS SHEET ISSUED 02-2021.

Bill of Reinforcing for One Headwall 0° Skew Span x Culvert Height

Bar	Location	Shape	12' x 12'			12' x 11'			12' x 10'			12' x 9'			12' x 8'			12' x 7'			Bar		
			No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.	No.	Length	Wt.			
5fa	Fence Anchor (Galv.)		2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	2	2'-10"	6	5fa		
4b1	Wingwall, B.F.H.		2	41'-2"	58	2	38'-1"	51	2	35'-0"	47	2	31'-11"	43	2	28'-10"	39	2	25'-9"	34	4b1		
4b2	Wingwall, F.F.H.		20 Var.	2 Each 11'-11 to 39'-9	345	18 Var.	2 Each 11'-11 to 36'-8	292	16 Var.	2 Each 11'-11 to 33'-7	243	14 Var.	2 Each 11'-11 to 30'-6	198	12 Var.	2 Each 11'-11 to 27'-5	158	10 Var.	2 Each 11'-11 to 24'-4	121	4b2		
5b3	Wingwall, F.F.H.		2	41'-3"	91	2	38'-2"	80	2	35'-1"	73	2	32'-0"	67	2	28'-11"	60	2	25'-9"	54	5b3		
5b4	Wingwall, F.F.H.		22 Var.	2 Each 8'-10 to 39'-10	558	20 Var.	2 Each 8'-10 to 36'-9	475	18 Var.	2 Each 8'-11 to 33'-8	400	16 Var.	2 Each 8'-11 to 30'-7	330	14 Var.	2 Each 8'-11 to 27'-6	266	12 Var.	2 Each 8'-11 to 24'-4	208	5b4		
4c1	Wingwall, F.F.V.		76 Var.	2 Each 2'-10 to 14'-10	448	70 Var.	2 Each 2'-10 to 13'-10	390	64 Var.	2 Each 2'-10 to 12'-11	337	58 Var.	2 Each 2'-10 to 11'-11	286	52 Var.	2 Each 2'-10 to 10'-11	239	46 Var.	2 Each 2'-10 to 10'-0	197	4c1		
4c2	Wingwall, F.F.V.		36 Var.	2 Each 9'-6 to 15'-0	295	30 Var.	2 Each 9'-6 to 14'-0	235	24 Var.	2 Each 9'-6 to 13'-1	181	18 Var.	2 Each 9'-6 to 12'-1	130	--	--	--	--	--	--	4c2		
4c3	Wingwall, F.F.V.		4	13'-9"	37	4	12'-9"	34	2	11'-9"	16	2	10'-9"	14	2	9'-9"	13	2	8'-9"	12	4c3		
5c4	Wingwall, B.F.V.		12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	12 Var.	2 Each 2'-10 to 4'-6	46	5c4		
6c5	Wingwall, B.F.V.		64 Var.	2 Each 8'-10 to 18'-10	1330	58 Var.	2 Each 8'-10 to 17'-10	1162	52 Var.	2 Each 8'-10 to 16'-11	1006	46 Var.	2 Each 8'-10 to 15'-11	855	40 Var.	2 Each 8'-10 to 14'-11	713	34 Var.	2 Each 8'-10 to 14'-0	583	6c5		
6c6	Wingwall, B.F.V.		46	10'-6"	725	40	10'-6"	631	34	10'-6"	536	28	10'-6"	442	22	10'-6"	347	16	10'-6"	252	6c6		
6c7	Wingwall, B.F.V.		4	17'-9"	107	4	16'-9"	101	2	15'-9"	47	2	14'-9"	44	2	13'-9"	41	2	12'-9"	38	6c7		
4d1	Apron, Longit., Bott.		9	27'-11"	168	9	25'-11"	156	9	23'-11"	144	9	21'-11"	132	9	19'-11"	120	9	17'-11"	108	4d1		
4d2	Apron, Longit., Bott.		6	36'-3"	145	6	33'-2"	133	6	30'-1"	121	6	27'-0"	108	6	23'-11"	96	6	20'-10"	84	4d2		
6f1	Apron, Longit., Top		11	27'-11"	461	11	25'-11"	428	11	23'-11"	395	11	21'-11"	362	11	19'-11"	329	11	17'-11"	296	6f1		
6f2	Apron, Longit., Top		16 Var.	2 Each 5'-10 to 24'-10	368	16 Var.	2 Each 3'-10 to 22'-10	320	14 Var.	2 Each 4'-6 to 20'-10	266	12 Var.	2 Each 5'-3 to 18'-10	217	10 Var.	2 Each 5'-11 to 16'-10	171	10 Var.	2 Each 3'-11 to 14'-10	141	6f2		
6f3	Apron, Longit., Top		2	41'-3"	131	2	38'-2"	115	2	35'-1"	105	2	32'-0"	96	2	28'-11"	87	2	25'-9"	77	6f3		
4i1	Parapet, Vertical		25	6'-1"	102	25	6'-1"	102	25	6'-1"	102	25	6'-1"	102	25	6'-1"	102	25	6'-1"	102	4i1		
7j1	Parapet, Horizontal		4	13'-8"	112	4	13'-6"	110	4	13'-4"	109	4	13'-4"	109	4	13'-4"	109	4	13'-2"	108	7j1		
6m1	Apron, Trans., Top		34 Var.	13'-10 to 26'-3	1023	31 Var.	13'-8 to 24'-11	898	29 Var.	13'-6 to 24'-0	817	26 Var.	13'-6 to 22'-11	711	23 Var.	13'-6 to 21'-9	609	21 Var.	13'-4 to 20'-10	539	6m1		
6m2	Apron, Trans., Bott.		24 Var.	7'-9 to 19'-3	487	22 Var.	7'-9 to 18'-3	430	20 Var.	7'-9 to 17'-3	376	18 Var.	7'-9 to 16'-3	324	16 Var.	7'-9 to 15'-3	276	14 Var.	7'-9 to 14'-3	231	6m2		
6p1	Curtain, Horizontal		4	12'-3"	74	4	12'-3"	74	4	12'-3"	74	4	12'-3"	74	4	12'-3"	74	4	12'-3"	74	6p1		
6p2	Curtain, Horizontal		8	18'-7"	223	8	17'-4"	208	8	16'-1"	193	8	14'-10"	178	8	13'-7"	163	8	12'-4"	148	6p2		
6s1	Wing Slope, Both F.		4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	4	7'-8"	46	6s1		
6s2	Wing Slope, Both F.		4	37'-1"	223	4	33'-10"	203	4	30'-7"	184	4	27'-4"	164	4	24'-1"	145	4	20'-10"	125	6s2		
6s3	Wing Slope, F.F.		2	43'-2"	137	2	39'-11"	120	2	36'-8"	110	2	33'-5"	100	2	30'-2"	91	2	26'-11"	81	6s3		
5t1	Curtain, Vertical		31	8'-0"	259	29	7'-9"	234	27	7'-6"	211	25	7'-3"	189	23	7'-0"	168	21	6'-9"	148	5t1		
Estimated Quantities One Headwall			Reinf. Steel			8005 LB			7080 LB			6191 LB			5373 LB			4514 LB			3859 LB		
			Concrete			63.9 CY			54.2 CY			45.6 CY			39.5 CY			33.7 CY			27.5 CY		

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. Lengths shown for bars over 40'-0" long do not include lap.

Bent Bar Details



Headwall Notes:

- See Sheet FWH G2-21 for General Notes, Specifications, and Design Stresses.
- 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 "d", "6f1" and "6f3" 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		
		Standard Design - Single Reinforced Concrete Box Culverts	
		Flared Wing Headwalls	
		February, 2021	
		Quantity Tabulation 12'-0" Span 0° Skew	FWH 0-7-21 Sheet 1 of 2