

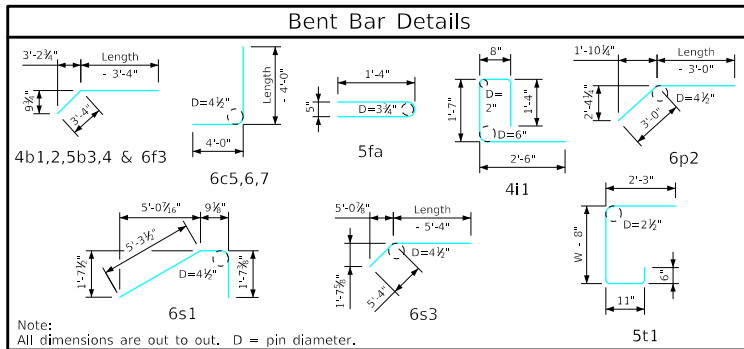
ENGLISHRFDISIGNEDSINGLECVLVERTSFWH.DGN - FW 0-9-21 - THIS SHEET ISSUED 02-2021.

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

Bar	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.	No.	Length	Wt.	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	2	2'-10"	6	2	2'-10"	6	5fa
4b1	Wingwall, B.F.H.		2	35'-0"	47	2	31'-11"	43	2	28'-10"	39	2	25'-9"	34	2	22'-8"	30	2	19'-7"	26	2	16'-6"	22	4b1			
4b2	Wingwall, B.F.H.		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	8 Var.	2 Each 11'-11" to 21'-3"	89	6 Var.	2 Each 11'-11" to 18'-2"	60	4 Var.	2 Each 11'-11" to 15'-1"	36	4b2			
5b3	Wingwall, F.F.H.		2	35'-1"	73	2	32'-0"	67	2	28'-11"	60	2	25'-9"	54	2	22'-8"	47	2	19'-7"	41	2	16'-6"	34	5b3			
5b4	Wingwall, F.F.H.		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	10 Var.	2 Each 8'-11" to 21'-3"	157	8 Var.	2 Each 8'-11" to 18'-2"	113	6 Var.	2 Each 8'-11" to 15'-1"	75	5b4			
4c1	Wingwall, F.F.V.		64 Var.	2 Each 2'-8" to 12'-9"	330	58 Var.	2 Each 2'-8" to 11'-9"	279	52 Var.	2 Each 2'-8" to 10'-9"	233	46 Var.	2 Each 2'-8" to 9'-10"	192	40 Var.	2 Each 2'-8" to 8'-10"	154	32 Var.	2 Each 2'-8" to 7'-7"	110	26 Var.	2 Each 2'-8" to 6'-7"	80	4c1			
4c2	Wingwall, F.F.V.		24 Var.	2 Each 9'-4" to 12'-11"	178	18 Var.	2 Each 9'-4" to 11'-11"	128	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	4c2		
4c3	Wingwall, F.F.V.		2	11'-7"	15	2	10'-7"	14	2	9'-7"	13	2	8'-7"	11	2	7'-7"	10	4	6'-7"	18	4	5'-7"	15	4c3			
5c4	Wingwall, B.F.V.		12 Var.	2 Each 2'-8" to 4'-4"	44	12 Var.	2 Each 2'-8" to 4'-4"	44	12 Var.	2 Each 2'-8" to 4'-4"	44	12 Var.	2 Each 2'-8" to 4'-4"	44	12 Var.	2 Each 2'-8" to 4'-4"	44	12 Var.	2 Each 2'-8" to 4'-4"	44	12 Var.	2 Each 2'-8" to 4'-4"	44	5c4			
6c5	Wingwall, B.F.V.		52 Var.	2 Each 8'-8" to 16'-9"	993	46 Var.	2 Each 8'-8" to 15'-9"	843	40 Var.	2 Each 8'-8" to 14'-9"	703	34 Var.	2 Each 8'-8" to 13'-10"	575	28 Var.	2 Each 8'-8" to 12'-10"	452	20 Var.	2 Each 8'-8" to 11'-7"	304	14 Var.	2 Each 8'-8" to 10'-7"	202	6c5			
6c6	Wingwall, B.F.V.		34	10'-6"	536	28	10'-6"	442	22	10'-6"	347	16	10'-6"	252	--	--	--	--	--	--	--	--	--	--	6c6		
6c7	Wingwall, B.F.V.		2	15'-7"	47	2	14'-7"	44	2	13'-7"	41	2	12'-7"	38	2	11'-7"	35	4	10'-7"	64	4	9'-7"	58	6c7			
4d1	Apron, Longit., Bott.		5	23'-11"	80	5	21'-11"	73	5	19'-11"	67	5	17'-11"	60	5	15'-11"	53	5	13'-11"	46	5	11'-11"	40	4d1			
4d2	Apron, Longit., Bott.		6	30'-1"	121	6	27'-0"	108	6	23'-11"	96	6	20'-10"	84	6	17'-8"	71	6	14'-7"	58	6	11'-6"	46	4d2			
6f1	Apron, Longit., Top		7	23'-11"	251	7	21'-11"	230	7	19'-11"	209	7	17'-11"	188	7	15'-11"	167	7	13'-11"	146	7	11'-11"	125	6f1			
6f2	Apron, Longit., Top		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	8 Var.	2 Each 4'-7" to 12'-10"	105	6 Var.	2 Each 5'-4" to 10'-10"	73	4 Var.	2 Each 6'-1" to 8'-10"	45	6f2			
6f3	Apron, Longit., Top		2	35'-1"	105	2	32'-0"	96	2	28'-11"	87	2	25'-9"	77	2	22'-8"	68	2	19'-7"	59	2	16'-6"	50	6f3			
4i1	Parapet, Vertical		17	6'-1"	69	17	6'-1"	69	17	6'-1"	69	17	6'-1"	69	17	6'-1"	69	17	6'-1"	69	17	6'-1"	69	4i1			
7j1	Parapet, Horizontal		4	9'-4"	76	4	9'-4"	76	4	9'-4"	76	4	9'-2"	75	4	9'-2"	75	4	9'-2"	75	4	9'-2"	75	7j1			
6m1	Apron, Trans., Top		29 Var.	9'-6" to 20'-0"	642	26 Var.	9'-6" to 18'-11"	555	23 Var.	9'-6" to 17'-9"	471	21 Var.	9'-4" to 16'-10"	413	18 Var.	9'-4" to 15'-9"	339	15 Var.	9'-4" to 14'-7"	269	13 Var.	9'-4" to 13'-10"	226	6m1			
6m2	Apron, Trans., Bott.		20 Var.	3'-9" to 13'-3"	255	18 Var.	3'-9" to 12'-3"	216	16 Var.	3'-9" to 11'-3"	180	14 Var.	3'-9" to 10'-3"	147	12 Var.	3'-9" to 9'-3"	117	10 Var.	3'-9" to 8'-3"	90	8 Var.	3'-9" to 7'-3"	66	6m2			
6p1	Curtain, Horizontal		4	8'-3"	50	4	8'-3"	50	4	8'-3"	50	4	8'-3"	50	4	8'-3"	50	4	8'-3"	50	4	8'-3"	50	6p1			
6p2	Curtain, Horizontal		8	16'-1"	193	8	14'-10"	178	8	13'-7"	163	8	12'-4"	148	8	11'-1"	133	8	9'-10"	118	8	8'-7"	103	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	4	7'-8"	46	6s1			
6s2	Wing Slope, Both F.		4	30'-7"	184	4	27'-4"	164	4	24'-1"	145	4	20'-10"	125	4	17'-7"	106	4	14'-4"	86	4	11'-1"	67	6s2			
6s3	Wing Slope, F.F.		2	36'-8"	110	2	33'-5"	100	2	30'-2"	91	2	26'-11"	81	2	23'-8"	71	2	20'-5"	61	2	17'-2"	52	6s3			
5t1	Curtain, Vertical		23	7'-6"	180	21	7'-3"	159	19	7'-0"	139	17	6'-9"	120	15	6'-6"	102	13	6'-6"	88	11	6'-6"	75	5t1			
			Reinf. Steel			5540 LB			4775 LB			3970 LB			3359 LB			2596 LB			2120 LB			1707 LB			
			Concrete			38.7 CY			33.3 CY			28.2 CY			22.6 CY			18.5 CY			15.2 CY			12.0 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.



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	FWH 0-9-21
		8'-0" Span	
		0° Skew	