

### Bill of Reinforcing for One Headwall 30° 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.															
5fa	Fence Anchor (Galv.)	[Symbol]	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, Long	[Symbol]	1	55'-2"	38	1	51'-0"	36	1	46'-10"	33	1	42'-8"	30	1	38'-6"	26	4b1															
4b2	Wingwall, B.F.H, Short	[Symbol]	1	42'-2"	30	1	39'-1"	26	1	36'-0"	24	1	32'-10"	22	1	29'-9"	20	4b2															
4b3	Wingwall, B.F.H, Long	[Symbol]	10 Var.	15'-8" to 53'-3"	237	9 Var.	15'-8" to 49'-1"	199	8 Var.	15'-8" to 44'-11"	165	7 Var.	15'-8" to 40'-9"	134	6 Var.	15'-8" to 36'-7"	105	5 Var.	15'-8" to 32'-5"	80	4b3												
4b4	Wingwall, B.F.H, Short	[Symbol]	10 Var.	12'-11" to 40'-9"	181	9 Var.	12'-11" to 37'-8"	152	8 Var.	12'-11" to 34'-7"	127	7 Var.	12'-10" to 31'-5"	103	6 Var.	12'-10" to 28'-4"	82	5 Var.	12'-10" to 25'-3"	64	4b4												
5b5	Wingwall, F.F.H, Long	[Symbol]	1	55'-3"	60	1	51'-1"	56	1	46'-11"	51	1	42'-9"	47	1	38'-7"	40	1	34'-5"	36	5b5												
5b6	Wingwall, F.F.H, Short	[Symbol]	1	42'-3"	47	1	39'-2"	41	1	36'-0"	38	1	32'-11"	34	1	29'-9"	31	1	26'-8"	28	5b6												
5b7	Wingwall, F.F.H, Long	[Symbol]	11 Var.	11'-7" to 53'-4"	382	10 Var.	11'-7" to 49'-1"	324	9 Var.	11'-7" to 44'-11"	270	8 Var.	11'-7" to 40'-9"	221	7 Var.	11'-7" to 36'-7"	176	6 Var.	11'-7" to 32'-5"	138	5b7												
5b8	Wingwall, F.F.H, Short	[Symbol]	11 Var.	9'-10" to 40'-10"	293	10 Var.	9'-10" to 37'-9"	248	9 Var.	9'-10" to 34'-7"	208	8 Var.	9'-10" to 31'-6"	172	7 Var.	9'-9" to 28'-4"	139	6 Var.	9'-9" to 25'-3"	110	5b8												
4c1	Wingwall, F.F.W, Long	[Symbol]	51 Var.	2'-10" to 14'-10"	301	47 Var.	2'-10" to 13'-10"	262	43 Var.	2'-10" to 12'-11"	226	39 Var.	2'-10" to 11'-11"	192	35 Var.	2'-10" to 11'-0"	162	31 Var.	2'-10" to 10'-0"	133	4c1												
4c2	Wingwall, F.F.W, Short	[Symbol]	38 Var.	2'-10" to 14'-9"	223	35 Var.	2'-10" to 13'-9"	194	32 Var.	2'-10" to 12'-10"	167	29 Var.	2'-10" to 11'-10"	142	26 Var.	2'-10" to 10'-10"	119	23 Var.	2'-10" to 9'-11"	98	4c2												
4c3	Wingwall, F.F.W, Long	[Symbol]	23 Var.	9'-8" to 14'-11"	189	19 Var.	9'-8" to 14'-0"	150	15 Var.	9'-8" to 13'-0"	114	11 Var.	9'-8" to 12'-1"	80	--	--	--	--	--	--	4c3												
4c4	Wingwall, F.F.W, Short	[Symbol]	18 Var.	9'-5" to 14'-11"	146	15 Var.	9'-5" to 13'-11"	117	12 Var.	9'-5" to 12'-11"	90	9 Var.	9'-5" to 12'-0"	64	--	--	--	--	--	--	4c4												
4c5	Wingwall, F.F.W, Long	[Symbol]	2	13'-9"	18	2	12'-9"	17	2	11'-9"	16	2	10'-9"	14	2	9'-9"	13	1	8'-9"	11	4c5												
4c5	Wingwall, F.F.W, Short	[Symbol]	2	13'-9"	18	2	12'-9"	17	2	11'-9"	16	2	10'-9"	14	2	9'-9"	13	1	8'-9"	11	4c5												
5c6	Wingwall, B.F.V, Long	[Symbol]	11 Var.	2'-10" to 5'-3"	46	11 Var.	2'-10" to 5'-3"	46	11 Var.	2'-10" to 5'-3"	46	11 Var.	2'-10" to 5'-3"	46	11 Var.	2'-10" to 5'-3"	46	11 Var.	2'-10" to 5'-3"	46	5c6												
5c7	Wingwall, B.F.V, Short	[Symbol]	5 Var.	2'-10" to 4'-2"	18	5 Var.	2'-10" to 4'-2"	18	5 Var.	2'-10" to 4'-2"	18	5 Var.	2'-10" to 4'-2"	18	5 Var.	2'-10" to 4'-2"	18	5 Var.	2'-10" to 4'-2"	18	5c7												
6c8	Wingwall, B.F.V, Long	[Symbol]	40 Var.	9'-6" to 18'-10"	851	36 Var.	9'-6" to 17'-10"	739	32 Var.	9'-6" to 16'-11"	635	28 Var.	9'-6" to 15'-11"	534	24 Var.	9'-6" to 15'-0"	442	20 Var.	9'-6" to 14'-0"	353	6c8												
6c9	Wingwall, B.F.V, Short	[Symbol]	33 Var.	8'-6" to 18'-9"	675	30 Var.	8'-6" to 17'-9"	591	27 Var.	8'-6" to 16'-10"	514	24 Var.	8'-6" to 15'-10"	439	21 Var.	8'-6" to 14'-10"	368	18 Var.	8'-6" to 13'-11"	303	6c9												
6c10	Wingwall, B.F.V, Long	[Symbol]	31	10'-6"	489	27	10'-6"	426	23	10'-6"	363	19	10'-6"	300	15	10'-6"	237	11	10'-6"	172	6c10												
6c10	Wingwall, B.F.V, Short	[Symbol]	23	10'-6"	363	20	10'-6"	315	17	10'-6"	268	14	10'-6"	221	11	10'-6"	173	8	10'-6"	126	6c10												
6c11	Wingwall, B.F.V, Long	[Symbol]	2	17'-9"	53	2	16'-9"	50	2	15'-9"	47	1	14'-9"	42	1	13'-9"	41	1	12'-9"	39	6c11												
6c11	Wingwall, B.F.V, Short	[Symbol]	2	17'-9"	53	2	16'-9"	50	2	15'-9"	47	1	14'-9"	42	1	13'-9"	41	1	12'-9"	39	6c11												
4d1	Apron, Longit., Bott.	[Symbol]	9	31'-11"	192	9	29'-7"	178	9	27'-3"	164	9	25'-0"	150	9	22'-8"	136	9	20'-4"	122	4d1												
4d2	Apron, Longit., Bott, Long	[Symbol]	3	48'-9"	103	3	44'-7"	94	3	40'-5"	86	3	36'-3"	73	3	32'-1"	64	3	27'-11"	56	4d2												
4d3	Apron, Longit., Bott, Short	[Symbol]	3	37'-3"	75	3	34'-2"	68	3	31'-0"	62	3	27'-11"	56	3	24'-9"	50	3	21'-8"	43	4d3												
6f1	Apron, Longit., Top	[Symbol]	11	31'-11"	527	11	29'-7"	489	11	27'-3"	450	11	25'-0"	413	11	22'-8"	374	11	20'-4"	336	6f1												
6f2	Apron, Longit., Top Long	[Symbol]	11 Var.	5'-4" to 28'-6"	279	10 Var.	5'-4" to 26'-2"	237	9 Var.	5'-4" to 23'-10"	197	8 Var.	5'-4" to 21'-7"	162	7 Var.	5'-3" to 19'-3"	129	6 Var.	5'-3" to 16'-11"	100	6f2												
6f3	Apron, Longit., Top Short	[Symbol]	8 Var.	7'-0" to 28'-8"	214	7 Var.	7'-9" to 26'-5"	180	7 Var.	9'-5" to 24'-1"	155	6 Var.	6'-2" to 21'-9"	126	5 Var.	6'-11" to 19'-6"	99	4 Var.	7'-9" to 17'-2"	75	6f3												
6f4	Apron, Longit., Top Long	[Symbol]	1	55'-3"	87	1	51'-1"	80	1	46'-11"	74	1	42'-9"	68	1	38'-7"	58	1	34'-5"	52	6f4												
6f5	Apron, Longit., Top Short	[Symbol]	1	42'-3"	67	1	39'-2"	59	1	36'-0"	54	1	32'-11"	49	1	29'-9"	45	1	26'-8"	40	6f5												
4i1	Parapet, Vertical	[Symbol]	25	6'-4"	106	25	6'-4"	106	25	6'-4"	106	25	6'-4"	106	25	6'-4"	106	25	6'-4"	106	4i1												
7j1	Parapet, Horizontal	[Symbol]	4	15'-9"	129	4	15'-7"	127	4	15'-4"	125	4	15'-4"	125	4	15'-4"	125	4	15'-2"	124	7j1												
6m1	Apron, Trans., Top	[Symbol]	6 Var.	14'-10" to 15'-9"	138	6 Var.	14'-8" to 15'-7"	136	6 Var.	14'-6" to 15'-5"	135	6 Var.	14'-6" to 15'-5"	135	6 Var.	14'-6" to 15'-5"	135	6 Var.	14'-4" to 15'-3"	133	6m1												
6m2	Apron, Trans., Top	[Symbol]	29 Var.	16'-0" to 26'-6"	926	26 Var.	15'-10" to 25'-3"	802	23 Var.	15'-8" to 23'-11"	684	20 Var.	15'-8" to 22'-10"	578	17 Var.	15'-8" to 21'-8"	477	14 Var.	15'-6" to 20'-5"	378	6m2												
6m3	Apron, Trans., Top	[Symbol]	9 Var.	8'-7" to 17'-6"	176	9 Var.	7'-11" to 16'-9"	167	9 Var.	7'-2" to 16'-0"	157	9 Var.	6'-5" to 15'-4"	147	9 Var.	5'-10" to 14'-8"	139	9 Var.	5'-1" to 13'-11"	128	6m3												
6m4	Apron, Trans., Bott.	[Symbol]	24 Var.	8'-10" to 24'-6"	601	22 Var.	8'-10" to 23'-2"	529	20 Var.	8'-10" to 21'-9"	459	18 Var.	8'-10" to 20'-5"	395	16 Var.	8'-10" to 19'-1"	335	14 Var.	8'-10" to 17'-8"	279	6m4												
6p1	Curtain, Horizontal	[Symbol]	4	14'-0"	84	4	14'-0"	84	4	14'-0"	84	4	14'-0"	84	4	14'-0"	84	4	14'-0"	84	6p1												
6p2	Curtain, Horizontal, Long	[Symbol]	4	28'-0"	168	4	26'-0"	144	4	24'-0"	144	4	22'-0"	132	4	20'-0"	120	4	18'-0"	108	6p2												
6p3	Curtain, Horizontal, Short	[Symbol]	4	15'-11"	96	4	14'-11"	90	4	13'-10"	83	4	12'-10"	77	4	11'-9"	71	4	10'-9"	65	6p3												
6s1	Wing Slope, Both F., Long	[Symbol]	2	8'-0"	24	2	8'-0"	24	2	8'-0"	24	2	8'-0"	24	2	8'-0"	24	2	8'-0"	24	6s1												
6s2	Wing Slope, Both F., Short	[Symbol]	2	6'-11"	21	2	6'-11"	21	2	6'-11"	21	2	6'-11"	21	2	6'-11"	21	2	6'-11"	21	6s2												
6s3	Wing Slope, Both F., Long	[Symbol]	2	48'-11"	154	2	44'-7"	141	2	40'-4"	128	2	36'-0"	118	2	31'-9"	95	2	27'-5"	82	6s3												
6s4	Wing Slope, Both F., Short	[Symbol]	2	38'-0"	114	2	34'-9"	104	2	31'-6"	95	2	28'-2"	85	2	24'-11"	75	2	21'-8"	65	6s4												
6s5	Wing Slope, F.F, Long	[Symbol]	1	59'-0"	86	1	50'-9"	80	1	46'-5"	73	1	42'-2"	67	1	37'-10"	57	1	33'-7"	50	6s5												
6s6	Wing Slope, F.F, Short	[Symbol]	1	43'-3"	69	1	40'-0"	60	1	36'-8"	55	1	33'-5"	50	1	30'-2"	45	1	26'-10"	40	6s6												
5t1	Curtain, Vertical	[Symbol]	36	7'-11"	297	35	7'-8"	280	32	7'-5"	248	30	7'-2"	224	27	6'-11"	195	24	6'-8"	167	5t1												
	Estimated Quantities One Headwall		Reinf. Steel		9450 LB	8372 LB		7352 LB		6347 LB		5331 LB		4481 LB																			
			Concrete	Parapet Δ	2.1	Wingwalls	26.1	Apron *	49.1	77.3 CY	2.0	20.5	43.1	1.9	37.5	65.6 CY	1.9	15.8	32.6	55.2 CY	1.9	13.2	28.0	47.7 CY	1.9	10.7	23.5	40.6 CY	1.8	7.7	33.0 CY		

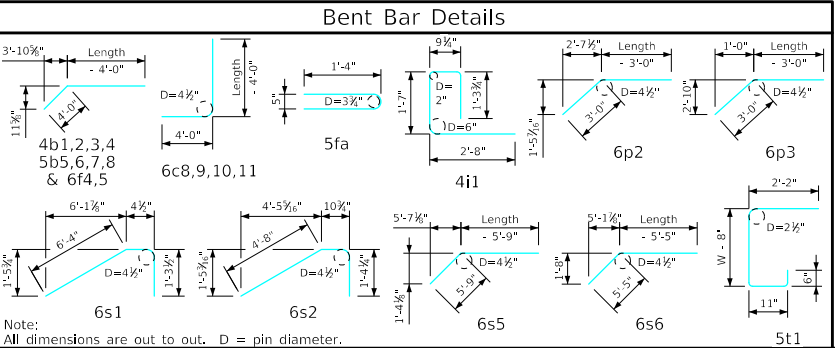
Δ Includes top of wingwall quantities.  
 \* Assumes apron and floor are equal thickness, adjust concrete quantities for transition where apron and floor thickness are not equal.

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.

"Short" Denotes Short Wingwall  
 "Long" Denotes Long Wingwall

#### 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" and "s" estimated to extend 2'-5" beyond back of parapet (into end of barrel). Longitudinal bars "d", "6f1", "6f4" and "6f5" 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	AUGUST 2022	<p>Standard Design - Single Reinforced Concrete Box Culverts</p> <p>Flared Wing Headwalls</p> <p>February, 2021</p> <p>Quantity Tabulation</p> <p>12'-0" Span</p> <p>30° Skew</p>	FWH 30-8-21	
APPROVED BY BRIDGE ENGINEER	[Signature]			Sheet 1 of 2