

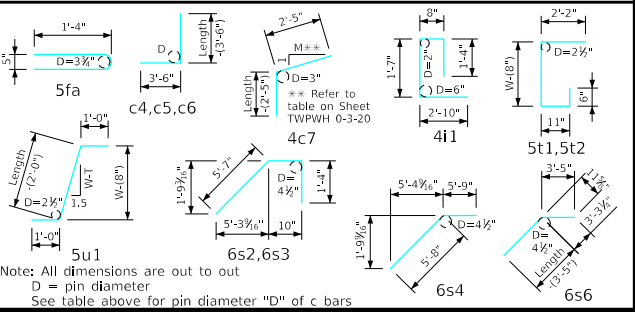
ENGLISHDESIGNEDTWINCULVERTS.DGN - TWPWH 0-7-20 S1 - THIS SHEET ISSUED 07-2020.

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

Location	Shape	10' x 12'				10' x 11'				10' x 10'				10' x 9'				10' x 8'				10' x 7'			
		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
Wingwall, F.F.H.		5b1	2	40'-3"	89	5b1	2	37'-3"	78	5b1	2	34'-3"	71	5b1	2	31'-3"	65	5b1	2	28'-3"	59	5b1	2	25'-3"	53
Wingwall, F.F.H.		5b2	22 Var.	2 Each 8'-10 to 38'-10	547	5b2	20 Var.	2 Each 8'-10 to 35'-10	466	5b2	18 Var.	2 Each 8'-10 to 32'-10	391	5b2	16 Var.	2 Each 8'-10 to 29'-10	323	5b2	14 Var.	2 Each 8'-10 to 26'-10	260	5b2	12 Var.	2 Each 8'-10 to 23'-10	204
Wingwall, B.F.H.		4b3	2	40'-3"	57	4b3	2	37'-3"	50	4b3	2	34'-3"	46	4b3	2	31'-3"	42	4b3	2	28'-3"	38	4b3	2	25'-3"	34
Wingwall, B.F.H.		4b4	20 Var.	2 Each 11'-10 to 38'-10	338	4b4	18 Var.	2 Each 11'-10 to 35'-10	287	4b4	16 Var.	2 Each 11'-10 to 32'-10	239	4b4	14 Var.	2 Each 11'-10 to 29'-10	195	4b4	12 Var.	2 Each 11'-10 to 26'-10	155	4b4	10 Var.	2 Each 11'-10 to 23'-10	119
Interior Wall, Both F.H.		5b5	21 Var.	6'-3 to 39'-10	505	5b5	19 Var.	6'-3 to 36'-10	427	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
Wingwall, F.F.V.		5c1	74 Var.	2 Each 2'-7 to 14'-7	662	5c1	68 Var.	2 Each 2'-7 to 13'-7	573	4c1	62 Var.	2 Each 2'-7 to 12'-7	314	4c1	56 Var.	2 Each 2'-7 to 11'-7	265	4c1	66 Var.	2 Each 2'-7 to 10'-7	290	4c1	58 Var.	2 Each 2'-7 to 9'-7	236
Wingwall, F.F.V.		5c2	36 Var.	2 Each 9'-1 to 14'-9	447	5c2	30 Var.	2 Each 9'-1 to 13'-9	357	4c2	24 Var.	2 Each 9'-1 to 12'-9	175	4c2	18 Var.	2 Each 9'-1 to 11'-9	125	c2	--	--	--	c2	--	--	--
Wingwall, F.F.V. (L)		5c3	2	15'-0"	31	5c3	2	14'-0"	29	4c3	2	13'-0"	17	4c3	2	12'-0"	16	4c3	2	11'-0"	15	4c3	2	10'-0"	13
Wingwall, F.F.V. (R)		5c3	2	15'-0"	31	5c3	2	14'-0"	29	4c3	2	13'-0"	17	4c3	2	12'-0"	16	4c3	2	11'-0"	15	4c3	2	10'-0"	13
Wingwall, B.F.V.		6c4	74 Var.	2 Each 6'-3 to 18'-3	1362	5c4	68 Var.	2 Each 6'-3 to 17'-3	833	5c4	62 Var.	2 Each 6'-3 to 16'-3	727	5c4	56 Var.	2 Each 6'-3 to 15'-3	628	5c4	50 Var.	2 Each 6'-3 to 14'-3	535	5c4	44 Var.	2 Each 6'-3 to 13'-3	447
Wingwall, B.F.V. (L)		6c5	2	18'-6"	56	5c5	2	17'-6"	37	5c5	2	16'-6"	34	5c5	2	15'-6"	32	5c5	2	14'-6"	30	5c5	2	13'-6"	28
Wingwall, B.F.V. (R)		6c5	2	18'-6"	56	5c5	2	17'-6"	37	5c5	2	16'-6"	34	5c5	2	15'-6"	32	5c5	2	14'-6"	30	5c5	2	13'-6"	28
Wingwall, B.F.V.		6c6	50	8'-6"	638	5c6	44	8'-6"	390	5c6	38	8'-6"	337	5c6	32	8'-6"	284	5c6	26	8'-6"	231	5c6	20	8'-6"	177
Interior Wall, Both F.V		4c7	2	3'-9"	5	4c7	2	3'-9"	5	4c7	2	3'-9"	5	4c7	2	3'-9"	5	4c7	2	3'-9"	5	4c7	2	3'-9"	5
Interior Wall, Both F.V		4c8	73 Var.	1'-6 to 12'-3	335	4c8	67 Var.	1'-6 to 11'-3	285	4c8	61 Var.	1'-6 to 10'-3	239	4c8	55 Var.	1'-6 to 9'-3	197	4c8	49 Var.	1'-6 to 8'-3	160	4c8	43 Var.	1'-6 to 7'-3	126
Interior Wall, Both F.V		4c9	2	12'-6"	17	4c9	2	11'-6"	15	4c9	2	10'-6"	14	4c9	2	9'-6"	13	4c9	2	8'-6"	11	4c9	2	7'-6"	10
Apron, Longit., Bott.		4d1	22	40'-3"	627	4d1	22	37'-3"	547	4d1	22	34'-3"	503	4d1	22	31'-3"	459	4d1	22	28'-3"	415	4d1	22	25'-3"	371
Apron, Longit., Top		6f1	22	40'-3"	1410	6f1	22	37'-3"	1231	6f1	22	34'-3"	1132	6f1	22	31'-3"	1033	6f1	22	28'-3"	933	6f1	22	25'-3"	834
Parapet, Vertical		4i1	43	6'-5"	184	4i1	43	6'-5"	184	4i1	41	6'-5"	176	4i1	41	6'-5"	176	4i1	41	6'-5"	176	4i1	41	6'-5"	176
Parapet, Horizontal		7j1	4	22'-8"	185	7j1	4	22'-8"	185	7j1	4	22'-2"	181	7j1	4	22'-2"	181	7j1	4	22'-2"	181	7j1	4	21'-11"	179
Apron, Trans., Top		5m1	51	23'-2"	1232	5m1	47	23'-2"	1136	5m1	43	22'-8"	1017	5m1	39	22'-8"	922	5m1	35	22'-8"	827	5m1	31	22'-5"	725
Apron, Trans., Top		m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--
Apron, Trans., Bott.		5m3	73	19'-7"	1491	5m3	67	19'-7"	1369	6m3	31	19'-11"	927	5m3	28	19'-1"	557	5m3	25	19'-1"	498	5m3	22	18'-10"	432
Curtain, Horiz.		6p1	6	23'-2"	209	6p1	6	23'-2"	209	6p1	6	22'-8"	204	6p1	6	22'-8"	204	6p1	6	22'-8"	204	6p1	6	22'-5"	168
Wing Slope, Both F.		6s1	4	35'-8"	214	6s1	4	32'-7"	196	6s1	4	29'-5"	177	6s1	4	26'-3"	158	6s1	4	23'-1"	139	6s1	4	19'-11"	120
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
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
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
Wing Slope, F.F.		6s5	2	33'-2"	100	6s5	2	30'-0"	90	6s5	2	26'-10"	81	6s5	2	23'-8"	71	6s5	2	20'-6"	62	6s5	2	17'-4"	52
Interior Wall, Both F.		6s6	2	41'-10"	133	6s6	2	38'-8"	116	6s6	2	35'-6"	107	6s6	2	32'-4"	97	6s6	2	29'-2"	88	6s6	2	26'-0"	78
Curtain, Vert.		5t1	22	7'-11"	182	5t1	22	7'-8"	176	5t1	21	7'-5"	162	5t1	21	7'-2"	157	5t1	21	6'-11"	151	5t1	21	6'-8"	146
Curtain, Vert. Ends		5t2	4	7'-11"	33	5t2	4	7'-8"	32	5t2	4	7'-5"	31	5t2	4	7'-2"	30	5t2	4	6'-11"	29	5t2	4	6'-8"	28
Bracket, Vert.		5u1	4	6'-7"	27	5u1	4	6'-4"	26	5u1	4	6'-2"	26	5u1	4	5'-11"	25	5u1	4	5'-8"	24	5u1	4	5'-6"	23
Estimated Quantities One Headwall	Reinf. Steel	11,289 LB				9481 LB				7826 LB				6685 LB				5679 LB				5091 LB			
	Concrete	Parapet Δ	2.5			2.5				2.3			2.3			2.3			2.3			2.2			
		Wingwalls	30.0		75.6 CY	25.6		67.9 CY	17.9		55.7 CY	14.8		49.3 CY	12.0		43.3 CY	8.5		36.1 CY	29.0				
		Apron *	43.1			39.8			35.3																

c Bar Pin Diameter	
Bar Size	D
5	3 3/8"
6	4 1/2"

Bent Bar Details



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 TWPWH 0-1-20 for left and right corner locations.

LATEST REVISION DATE	
	Standard Design - Twin Reinforced Concrete Box Culverts
	Parallel Wing Headwalls
	July, 2020
Quantity Tabulation	TWPWH
10'-0" Span	0-7-20
0° Skew	Sheet 1 of 2