

ENGLISHLRFDSIGNEDTRIPLECULVERTS.DGN - TRPWH 0-6-20 S1 - THIS SHEET ISSUED 07-2020.

Bill of Reinforcing for One Headwall 0° Skew Span x Culvert Height																											
Location	Shape	12' x 12'				12' x 11'				12' x 10'				12' x 9'				12' x 8'				12' 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	42 Var.	2 Each 6'-3 to 39'-10	1009	5b5	38 Var.	2 Each 6'-3 to 36'-10	854	5b5	34 Var.	2 Each 6'-4 to 33'-10	712	5b5	30 Var.	2 Each 6'-4 to 30'-10	581	5b5	26 Var.	2 Each 6'-5 to 27'-10	464	5b5	22 Var.	2 Each 6'-6 to 24'-10	359		
Wingwall, F.F.V.		5c1	74 Var.	2 Each 2'-8 to 14'-8	669	5c1	68 Var.	2 Each 2'-8 to 13'-8	579	4c1	62 Var.	2 Each 2'-8 to 12'-8	318	4c1	56 Var.	2 Each 2'-8 to 11'-8	268	4c1	66 Var.	2 Each 2'-8 to 10'-8	294	4c1	58 Var.	2 Each 2'-8 to 9'-8	239		
Wingwall, F.F.V.		5c2	36 Var.	2 Each 9'-2 to 14'-10	451	5c2	30 Var.	2 Each 9'-2 to 13'-10	360	4c2	24 Var.	2 Each 9'-2 to 12'-10	176	4c2	18 Var.	2 Each 9'-2 to 11'-10	126	c2	--	--	--	c2	--	--	--		
Wingwall, F.F.V. (L)		5c3	2	15'-1	31	5c3	2	14'-1	29	4c3	2	13'-1	17	4c3	2	12'-1	16	4c3	2	11'-1	15	4c3	2	10'-1	13		
Wingwall, F.F.V. (R)		5c3	2	15'-1	31	5c3	2	14'-1	29	4c3	2	13'-1	17	4c3	2	12'-1	16	4c3	2	11'-1	15	4c3	2	10'-1	13		
Wingwall, B.F.V.		6c4	74 Var.	2 Each 6'-4 to 18'-4	1371	5c4	68 Var.	2 Each 6'-4 to 17'-4	839	5c4	62 Var.	2 Each 6'-4 to 16'-4	733	5c4	56 Var.	2 Each 6'-4 to 15'-4	633	5c4	50 Var.	2 Each 6'-4 to 14'-4	539	5c4	44 Var.	2 Each 6'-4 to 13'-4	451		
Wingwall, B.F.V. (L)		6c5	2	18'-7	56	5c5	2	17'-7	37	5c5	2	16'-7	35	5c5	2	15'-7	33	5c5	2	14'-7	30	5c5	2	13'-7	28		
Wingwall, B.F.V. (R)		6c5	2	18'-7	56	5c5	2	17'-7	37	5c5	2	16'-7	35	5c5	2	15'-7	33	5c5	2	14'-7	30	5c5	2	13'-7	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	4	3'-10	10	4c7	4	3'-10	10	4c7	4	3'-10	10	4c7	4	3'-10	10	4c7	4	3'-10	10	4c7	4	3'-10	10		
Interior Wall, Both F.V		4c8	146 Var.	2 Each 1'-7 to 12'-4	679	4c8	134 Var.	2 Each 1'-7 to 11'-4	578	4c8	122 Var.	2 Each 1'-7 to 10'-4	486	4c8	110 Var.	2 Each 1'-7 to 9'-4	401	4c8	98 Var.	2 Each 1'-7 to 8'-4	325	4c8	86 Var.	2 Each 1'-7 to 7'-4	256		
Interior Wall, Both F.V		4c9	4	12'-7	34	4c9	4	11'-7	31	4c9	4	10'-7	28	4c9	4	9'-7	26	4c9	4	8'-7	23	4c9	4	7'-7	20		
Apron, Longit., Bott.		4d1	39	40'-3	1112	4d1	39	37'-3	970	4d1	39	34'-3	892	4d1	39	31'-3	814	4d1	39	28'-3	736	4d1	39	25'-3	658		
Apron, Longit., Top		6f1	39	40'-3	2499	6f1	39	37'-3	2182	6f1	39	34'-3	2006	6f1	39	31'-3	1831	6f1	39	28'-3	1655	6f1	39	25'-3	1479		
Parapet, Vertical		4i1	77	6'-5	330	4i1	77	6'-5	330	4i1	75	6'-5	321	4i1	75	6'-5	321	4i1	75	6'-5	321	4i1	75	6'-5	321		
Parapet, Horizontal		7j1	4	39'-8	324	7j1	4	39'-8	324	7j1	4	39'-0	319	7j1	4	39'-0	319	7j1	4	39'-0	319	7j1	4	38'-8	316		
Apron, Trans., Top		5m1	51	40'-2	2265	5m1	47	40'-2	2087	5m1	43	39'-6	1772	5m1	39	39'-6	1607	5m1	35	39'-6	1442	5m1	31	39'-2	1266		
Apron, Trans., Top		m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--	m2	--	--	--		
Apron, Trans., Bott.		5m3	73	36'-7	2785	5m3	67	36'-7	2556	6m3	31	36'-9	1711	5m3	28	35'-11	1049	5m3	25	35'-11	937	5m3	22	35'-7	816		
Curtain, Horiz.		6p1	6	40'-2	384	6p1	6	40'-2	384	6p1	6	39'-6	356	6p1	6	39'-6	356	6p1	6	39'-6	356	6p1	5	39'-2	294		
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	4	41'-10	266	6s6	4	38'-8	232	6s6	4	35'-6	213	6s6	4	32'-4	194	6s6	4	29'-2	175	6s6	4	26'-0	156		
Curtain, Vert.		5t1	39	7'-11	322	5t1	39	7'-8	312	5t1	38	7'-5	294	5t1	38	7'-2	284	5t1	38	6'-11	274	5t1	38	6'-8	264		
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'-5	27	5u1	4	6'-2	26	5u1	4	5'-11	25	5u1	4	5'-9	24	5u1	4	5'-6	23		
Estimated Quantities One Headwall	Reinf. Steel		16,813 LB				14,462 LB				11,936 LB				10,197 LB				9043 LB				7883 LB				
	Concrete	Parapet Δ	3.7	119.9 CY				3.7	108.2 CY				3.6	90.8 CY				3.6	71.3 CY				3.5	60.3 CY			
		Wingwalls	38.5					32.8					22.9	18.9	15.2	10.7											
		Apron *	77.7					71.7					64.3	58.4	52.5	46.1											

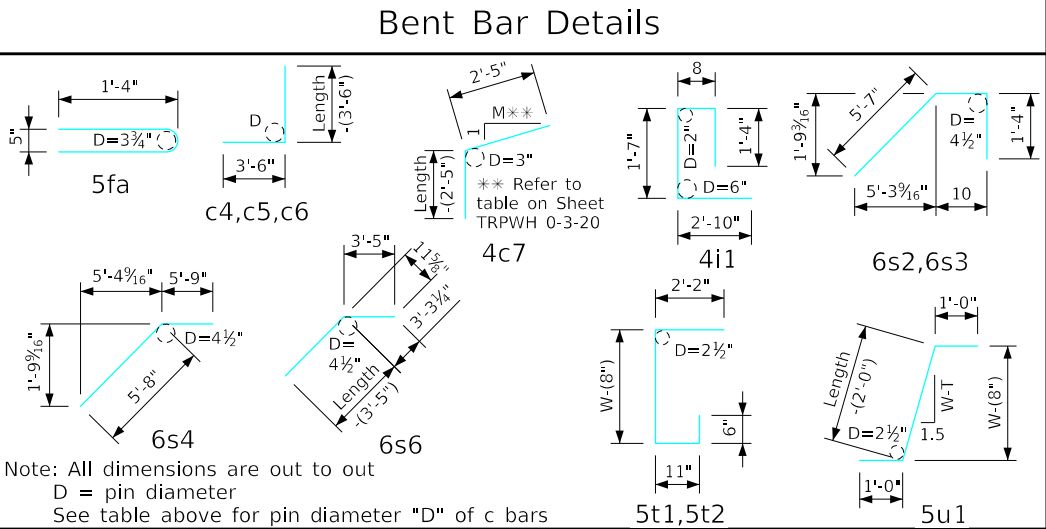
Note: Weight of bars over 40'-0" long include an allowance of 2'-5" for lap.

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.

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

Headwall Notes:

1. This headwall is based on a 3:1 slope normal to centerline of roadway.
2. The sides of the apron are to be formed to ensure correct line and grade.
3. 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.
4. 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.
5. Concrete quantities are estimated from back of parapet.
6. 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.
7. Dimensions are in feet and inches unless otherwise noted.



Standard Design - Triple Reinforced Concrete Box Culverts

Parallel Wing Headwalls

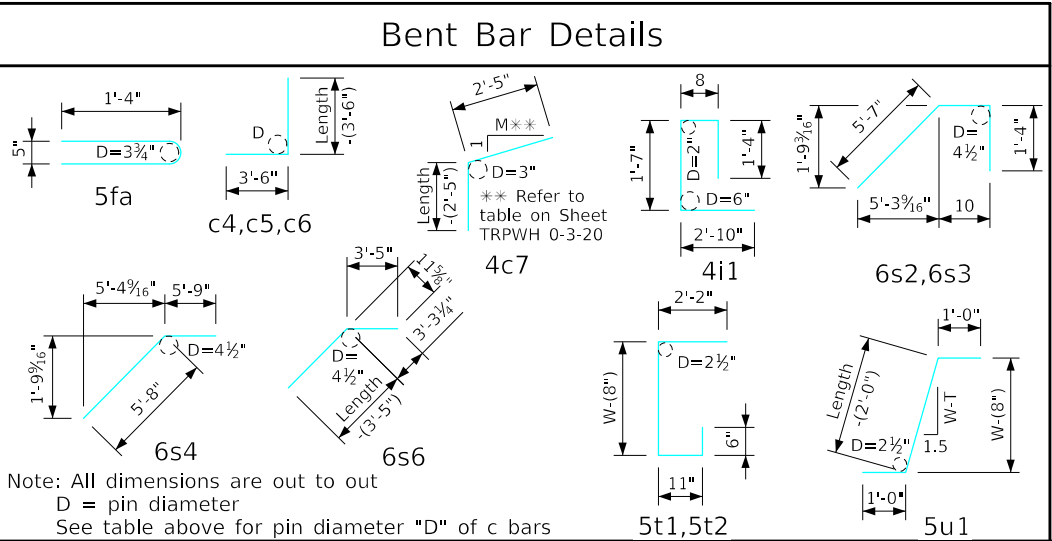
July, 2020

Quantity Tabulation
12'-0" Span
0° Skew

TRPWH
0-6-20
Sheet 1 of 2

ENGLISHLRFDSIGNEDTRIPLECULVERTS.DGN - TRPWH 0-6-20 S2 - THIS SHEET ISSUED 07-2020.

c Bar Pin Diameter	
Bar Size	D
5	3¾"
6	4½"



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

Headwall Notes:

1. This headwall is based on a 3:1 slope normal to centerline of roadway.
2. The sides of the apron are to be formed to ensure correct line and grade.
3. 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.
4. 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.
5. Concrete quantities are estimated from back of parapet.
6. 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.
7. Dimensions are in feet and inches unless otherwise noted.

Bill of Reinforcing for One Headwall 0° Skew Span x Culvert Height															
Location		Shape	12' x 6'				12' x 5'				12' x 4'				
			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	
Wingwall, F.F.H.			5b1	2	22'-3	46	5b1	2	19'-3	40	5b1	2	16'-3	34	
Wingwall, F.F.H.			5b2	10 Var.	2 Each 8'-10 to 20'-10	155	5b2	8 Var.	2 Each 8'-10 to 17'-10	111	5b2	6 Var.	2 Each 8'-10 to 14'-10	74	
Wingwall, B.F.H.			4b3	2	22'-3	30	4b3	2	19'-3	26	4b3	2	16'-3	22	
Wingwall, B.F.H.			4b4	8 Var.	2 Each 11'-10 to 20'-10	87	4b4	6 Var.	2 Each 11'-10 to 17'-10	59	4b4	4 Var.	2 Each 11'-10 to 14'-10	36	
Interior Wall, Both F.H.			5b5	18 Var.	2 Each 6'-7 to 21'-10	267	5b5	14 Var.	2 Each 6'-9 to 18'-9	186	5b5	10 Var.	2 Each 7'-1 to 15'-9	119	
Wingwall, F.F.V.			4c1	50 Var.	2 Each 2'-8 to 8'-8	189	4c1	32 Var.	2 Each 2'-8 to 7'-8	110	4c1	26 Var.	2 Each 2'-8 to 6'-8	81	
Wingwall, F.F.V.			c2	--	--	--	c2	--	--	--	c2	--	--	--	
Wingwall, F.F.V. (L)			4c3	2	9'-1	12	4c3	2	8'-1	11	4c3	2	7'-1	9	
Wingwall, F.F.V. (R)			4c3	2	9'-1	12	4c3	2	8'-1	11	4c3	2	7'-1	9	
Wingwall, B.F.V.			5c4	38 Var.	2 Each 6'-4 to 12'-4	370	5c4	42 Var.	2 Each 6'-4 to 11'-4	387	5c4	26 Var.	2 Each 6'-4 to 10'-4	226	
Wingwall, B.F.V. (L)			5c5	2	12'-7	26	5c5	2	11'-7	24	5c5	2	10'-7	22	
Wingwall, B.F.V. (R)			5c5	2	12'-7	26	5c5	2	11'-7	24	5c5	2	10'-7	22	
Wingwall, B.F.V.			5c6	14	8'-6	124	c6	--	--	--	c6	--	--	--	
Interior Wall, Both F.V			4c7	4	3'-10	10	4c7	4	3'-10	10	4c7	4	3'-10	10	
Interior Wall, Both F.V			4c8	74 Var.	2 Each 1'-7 to 6'-4	196	4c8	62 Var.	2 Each 1'-7 to 5'-4	143	4c8	50 Var.	2 Each 1'-6 to 4'-4	97	
Interior Wall, Both F.V			4c9	4	6'-7	18	4c9	4	5'-7	15	4c9	4	4'-7	12	
Apron, Longit., Bott.			4d1	39	22'-3	580	4d1	39	19'-3	502	4d1	39	16'-3	423	
Apron, Longit., Top			6f1	39	22'-3	1303	6f1	39	19'-3	1128	6f1	39	16'-3	952	
Parapet, Vertical			4i1	75	6'-5	321	4i1	75	6'-5	321	4i1	75	6'-5	321	
Parapet, Horizontal			7j1	4	38'-8	316	7j1	4	38'-8	316	7j1	4	38'-8	316	
Apron, Trans., Top			5m1	27	39'-2	1103	5m1	23	39'-2	940	5m1	19	39'-2	776	
Apron, Trans., Top			m2	--	--	--	m2	--	--	--	m2	--	--	--	
Apron, Trans., Bott.			4m3	19	34'-10	442	4m3	21	34'-10	489	4m3	13	34'-10	302	
Curtain, Horiz.			6p1	5	39'-2	294	6p1	5	39'-2	294	6p1	5	39'-2	294	
Wing Slope, Both F.			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	
Wing Slope, Both F. (R)			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	
Wing Slope, F.F.			6s5	2	14'-2	43	6s5	2	11'-0	33	6s5	2	7'-10	24	
Interior Wall, Both F.			6s6	4	22'-10	137	6s6	4	19'-8	118	6s6	4	16'-7	100	
Curtain, Vert.			5t1	38	6'-5	254	5t1	38	6'-5	254	5t1	38	6'-5	254	
Curtain, Vert. Ends			5t2	4	6'-5	27	5t2	4	6'-5	27	5t2	4	6'-5	27	
Bracket, Vert.			5u1	4	5'-4	22	5u1	4	5'-4	22	5u1	4	5'-4	22	
Estimated Quantities One Headwall	Reinf. Steel		6597 LB				5769 LB				4733 LB				
	Concrete	Parapet Δ	3.5	51.9 CY				3.5	44.3 CY				3.5	36.9 CY	
		Wingwalls	8.1					5.9					3.9		
		Apron *	40.3					34.9					29.5		

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.

(L) - Indicates bar located at left corner.

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

LATEST REVISION DATE

APPROVED BY BRIDGE ENGINEER

Standard Design - Triple Reinforced Concrete Box Culverts
Parallel Wing Headwalls
July, 2020

Quantity Tabulation
12'-0" Span
0° Skew

TRPWH
0-6-20
Sheet 2 of 2