

Bill of Reinforcing for One Headwall 15° Skew Span x Culvert Height

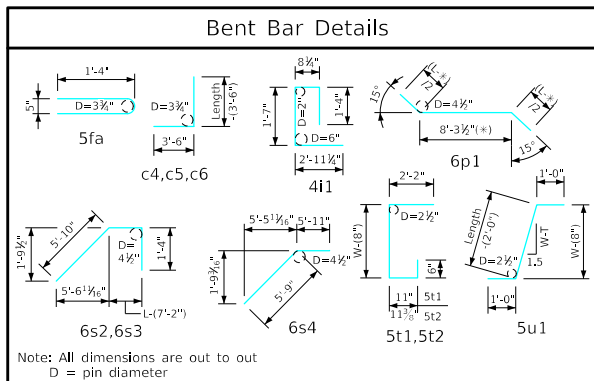
| Location | Shape | 8' x 10' | | | | 8' x 9' | | | | 8' x 8' | | | | 8' x 7' | | | | 8' x 6' | | | | 8' x 5' | | | | 8' x 4' | | | |
|-----------------------------------|--------------|----------|---------|-----------------------|-----|---------|---------|-----------------------|-----|---------|---------|------------------------|-----|---------|---------|-----------------------|-----|---------|---------|-----------------------|-----|---------|---------|-----------------------|-----|---------|---------|-----------------------|-----|
| | | Bar | No. | Length | Wt. | 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 | 5fa | 2 | 2'-10" | 6 |
| Wingwall, F.F.H. | | 5b1 | 2 | 35'-5" | 74 | 5b1 | 2 | 32'-4" | 67 | 5b1 | 2 | 29'-2" | 61 | 5b1 | 2 | 26'-1" | 54 | 5b1 | 2 | 23'-0" | 48 | 5b1 | 2 | 19'-10" | 41 | 5b1 | 2 | 16'-9" | 35 |
| Wingwall, F.F.H. | | 5b2 | 18 Var. | 2 Each 9'-2 to 34'-0 | 405 | 5b2 | 16 Var. | 2 Each 9'-2 to 30'-11 | 334 | 5b2 | 14 Var. | 2 Each 9'-2 to 27'-9 | 270 | 5b2 | 12 Var. | 2 Each 9'-2 to 24'-8 | 212 | 5b2 | 10 Var. | 2 Each 9'-2 to 21'-7 | 160 | 5b2 | 8 Var. | 2 Each 9'-2 to 18'-5 | 115 | 5b2 | 6 Var. | 2 Each 9'-2 to 15'-4 | 77 |
| Wingwall, B.F.H. | | 4b3 | 2 | 35'-6" | 47 | 4b3 | 2 | 32'-5" | 43 | 4b3 | 2 | 29'-3" | 39 | 4b3 | 2 | 26'-2" | 35 | 4b3 | 2 | 23'-1" | 31 | 4b3 | 2 | 19'-11" | 27 | 4b3 | 2 | 16'-10" | 22 |
| Wingwall, B.F.H. | | 4b4 | 16 Var. | 2 Each 12'-4 to 34'-1 | 248 | 4b4 | 14 Var. | 2 Each 12'-4 to 31'-0 | 203 | 4b4 | 12 Var. | 2 Each 12'-4 to 27'-11 | 161 | 4b4 | 10 Var. | 2 Each 12'-4 to 24'-9 | 124 | 4b4 | 8 Var. | 2 Each 12'-4 to 21'-8 | 91 | 4b4 | 6 Var. | 2 Each 12'-4 to 18'-6 | 62 | 4b4 | 4 Var. | 2 Each 12'-4 to 15'-5 | 37 |
| Wingwall, F.F.V. | | 4c1 | 64 Var. | 2 Each 2'-5 to 12'-5 | 317 | 4c1 | 58 Var. | 2 Each 2'-5 to 11'-5 | 268 | 4c1 | 68 Var. | 2 Each 2'-5 to 10'-5 | 291 | 4c1 | 60 Var. | 2 Each 2'-5 to 9'-5 | 237 | 4c1 | 52 Var. | 2 Each 2'-5 to 8'-6 | 190 | 4c1 | 34 Var. | 2 Each 2'-5 to 7'-7 | 114 | 4c1 | 26 Var. | 2 Each 2'-5 to 6'-3 | 75 |
| Wingwall, F.F.V. | | 4c2 | 24 Var. | 2 Each 9'-0 to 12'-7 | 173 | 4c2 | 16 Var. | 2 Each 9'-0 to 11'-3 | 108 | c2 | -- | -- | -- | c2 | -- | -- | -- | c2 | -- | -- | -- | c2 | -- | -- | -- | c2 | -- | -- | -- |
| Wingwall, F.F.V. (O) | | 4c3 | 2 | 12'-10" | 17 | 4c3 | 2 | 11'-10" | 16 | 4c3 | 2 | 10'-10" | 14 | 4c3 | 2 | 9'-10" | 13 | 4c3 | 2 | 8'-10" | 12 | 4c3 | 2 | 7'-10" | 10 | 4c3 | 2 | 6'-10" | 9 |
| Wingwall, F.F.V. (A) | | 4c3 | 2 | 12'-10" | 17 | 4c3 | 2 | 11'-10" | 16 | 4c3 | 2 | 10'-10" | 14 | 4c3 | 2 | 9'-10" | 13 | 4c3 | 2 | 8'-10" | 12 | 4c3 | 2 | 7'-10" | 10 | 4c3 | 2 | 6'-10" | 9 |
| Wingwall, B.F.V. | | 5c4 | 64 Var. | 2 Each 6'-1 to 16'-1 | 740 | 5c4 | 58 Var. | 2 Each 6'-1 to 15'-2 | 643 | 5c4 | 52 Var. | 2 Each 6'-1 to 14'-2 | 549 | 5c4 | 46 Var. | 2 Each 6'-1 to 13'-2 | 462 | 5c4 | 40 Var. | 2 Each 6'-1 to 12'-3 | 382 | 5c4 | 34 Var. | 2 Each 6'-1 to 11'-3 | 307 | 5c4 | 26 Var. | 2 Each 6'-1 to 10'-0 | 218 |
| Wingwall, B.F.V. (O) | | 5c5 | 1 | 16'-4" | 17 | 5c5 | 1 | 15'-4" | 16 | 5c5 | 1 | 14'-4" | 15 | 5c5 | 1 | 13'-4" | 14 | 5c5 | 1 | 12'-4" | 13 | 5c5 | 1 | 11'-4" | 12 | 5c5 | 1 | 10'-4" | 11 |
| Wingwall, B.F.V. (A) | | 5c5 | 2 | 16'-4" | 34 | 5c5 | 2 | 15'-4" | 32 | 5c5 | 2 | 14'-4" | 30 | 5c5 | 2 | 13'-4" | 28 | 5c5 | 2 | 12'-4" | 26 | 5c5 | 2 | 11'-4" | 24 | 5c5 | 2 | 10'-4" | 22 |
| Wingwall, B.F.V. | | 5c6 | 38 | 8'-6" | 337 | 5c6 | 30 | 8'-6" | 266 | 5c6 | 24 | 8'-6" | 213 | 5c6 | 18 | 8'-6" | 160 | 5c6 | 12 | 8'-6" | 106 | c6 | -- | -- | -- | c6 | -- | -- | |
| Apron, Longit., Bott. | | 4d1 | 9 | 35'-4" | 212 | 4d1 | 9 | 32'-3" | 194 | 4d1 | 9 | 29'-2" | 175 | 4d1 | 9 | 26'-0" | 156 | 4d1 | 9 | 22'-11" | 138 | 4d1 | 9 | 19'-10" | 119 | 4d1 | 9 | 16'-8" | 100 |
| Apron, Longit., Top | | 6f1 | 9 | 35'-4" | 478 | 6f1 | 9 | 32'-3" | 436 | 6f1 | 9 | 29'-2" | 394 | 6f1 | 9 | 26'-0" | 351 | 6f1 | 9 | 22'-11" | 310 | 6f1 | 9 | 19'-10" | 268 | 6f1 | 9 | 16'-8" | 225 |
| Parapet, Vertical | | 4i1 | 17 | 6'-7" | 75 | 4i1 | 17 | 6'-7" | 75 | 4i1 | 17 | 6'-7" | 75 | 4i1 | 17 | 6'-7" | 75 | 4i1 | 17 | 6'-7" | 75 | 4i1 | 17 | 6'-7" | 75 | 4i1 | 17 | 6'-7" | 75 |
| Parapet, Horiz. | | 7j1 | 4 | 9'-7" | 78 | 7j1 | 4 | 9'-7" | 78 | 7j1 | 4 | 9'-7" | 78 | 7j1 | 4 | 9'-5" | 77 | 7j1 | 4 | 9'-5" | 77 | 7j1 | 4 | 9'-5" | 77 | 7j1 | 4 | 9'-5" | 77 |
| Apron, Trans., Top | | 5m1 | 32 | 9'-10" | 328 | 5m1 | 29 | 9'-10" | 297 | 5m1 | 26 | 9'-10" | 267 | 5m1 | 23 | 9'-8" | 232 | 5m1 | 20 | 9'-8" | 202 | 5m1 | 16 | 9'-8" | 161 | 5m1 | 13 | 9'-8" | 131 |
| Apron, Trans., Top | | 5m2 | 2 Var. | 3'-6 to 7'-2 | 11 | 5m2 | 2 Var. | 3'-1 to 6'-10 | 10 | 5m2 | 2 Var. | 2'-8 to 6'-5 | 9 | 5m2 | 2 Var. | 2'-3 to 5'-11 | 9 | 5m2 | 1 | 5'-6 | 6 | 5m2 | 2 Var. | 5'-2 to 8'-10 | 15 | 5m2 | 2 Var. | 4'-9 to 8'-6 | 14 |
| Apron, Trans., Bott. | | 6m3 | 61 | 7'-5" | 680 | 6m3 | 55 | 6'-7" | 378 | 6m3 | 33 | 6'-7" | 227 | 6m3 | 22 | 6'-5" | 147 | 6m3 | 19 | 5'-8" | 72 | 6m3 | 16 | 5'-8" | 61 | 6m3 | 13 | 5'-8" | 49 |
| Curtain, Horiz. | | 6p1 | 6 | 10'-1" | 91 | 6p1 | 6 | 10'-1" | 91 | 6p1 | 6 | 10'-1" | 91 | 6p1 | 5 | 9'-11" | 74 | 6p1 | 5 | 9'-11" | 74 | 6p1 | 5 | 9'-11" | 74 | 6p1 | 5 | 9'-11" | 74 |
| Wing Slope, Both F. | | 6s1 | 4 | 30'-2" | 181 | 6s1 | 4 | 26'-11" | 162 | 6s1 | 4 | 23'-8" | 142 | 6s1 | 4 | 20'-5" | 123 | 6s1 | 4 | 17'-1" | 103 | 6s1 | 4 | 13'-10" | 83 | 6s1 | 4 | 10'-7" | 64 |
| Wing Slope, Both F. (O) | | 6s2 | 2 | 7'-10" | 24 | 6s2 | 2 | 7'-10" | 24 | 6s2 | 2 | 7'-10" | 24 | 6s2 | 2 | 7'-10" | 24 | 6s2 | 2 | 7'-10" | 24 | 6s2 | 2 | 7'-10" | 24 | 6s2 | 2 | 7'-10" | 24 |
| Wing Slope, Both F. (A) | | 6s3 | 2 | 8'-0" | 24 | 6s3 | 2 | 8'-0" | 24 | 6s3 | 2 | 8'-0" | 24 | 6s3 | 2 | 8'-0" | 24 | 6s3 | 2 | 8'-0" | 24 | 6s3 | 2 | 8'-0" | 24 | 6s3 | 2 | 8'-0" | 24 |
| Wing Slope, F.F. | | 6s4 | 2 | 11'-8" | 35 | 6s4 | 2 | 11'-8" | 35 | 6s4 | 2 | 11'-8" | 35 | 6s4 | 2 | 11'-8" | 35 | 6s4 | 2 | 11'-8" | 35 | 6s4 | 2 | 11'-8" | 35 | 6s4 | 2 | 11'-8" | 35 |
| Wing Slope, F.F. | | 6s5 | 2 | 27'-8" | 83 | 6s5 | 2 | 24'-5" | 73 | 6s5 | 2 | 21'-2" | 64 | 6s5 | 2 | 17'-11" | 54 | 6s5 | 2 | 14'-8" | 44 | 6s5 | 2 | 11'-4" | 34 | 6s5 | 2 | 8'-1" | 24 |
| Curtain, Vert. | | 5t1 | 9 | 7'-5" | 70 | 5t1 | 9 | 7'-2" | 67 | 5t1 | 9 | 6'-11" | 65 | 5t1 | 9 | 6'-8" | 63 | 5t1 | 9 | 6'-5" | 60 | 5t1 | 9 | 6'-5" | 60 | 5t1 | 9 | 6'-5" | 60 |
| Curtain, Vert. Ends | | 5t2 | 4 | 7'-5" | 31 | 5t2 | 4 | 7'-2" | 30 | 5t2 | 4 | 6'-11" | 29 | 5t2 | 4 | 6'-8" | 28 | 5t2 | 4 | 6'-5" | 27 | 5t2 | 4 | 6'-5" | 27 | 5t2 | 4 | 6'-5" | 27 |
| Bracket, Vert. | | 5u1 | 4 | 6'-1" | 25 | 5u1 | 4 | 5'-11" | 25 | 5u1 | 4 | 5'-8" | 24 | 5u1 | 4 | 5'-5" | 23 | 5u1 | 4 | 5'-3" | 22 | 5u1 | 4 | 5'-3" | 22 | 5u1 | 4 | 5'-3" | 22 |
| Estimated Quantities One Headwall | Reinl. Steel | 4858 LB | | | | 4017 LB | | | | 3386 LB | | | | 2853 LB | | | | 2370 LB | | | | 1887 LB | | | | 1546 LB | | | |
| | Concrete | 29.6 CY | | | | 26.0 CY | | | | 22.6 CY | | | | 18.3 CY | | | | 15.5 CY | | | | 13.0 CY | | | | 10.7 CY | | | |
| | Apron * | 14.8 | | | | 13.4 | | | | 12.1 | | | | 10.5 | | | | 9.2 | | | | 8.0 | | | | 6.9 | | | |

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.
 (A) - Indicates bar located at acute corner.
 (O) - Indicates bar located at obtuse corner.
 Refer to Sheet PWH 15-1-20 for acute and obtuse corner locations.

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.



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| LATEST REVISION DATE | <i>[Signature]</i> APPROVED BY BRIDGE ENGINEER | Standard Design - Single Reinforced Concrete Box Culverts Parallel Wing Headwalls July, 2020 Quantity Tabulation 8'-0" Span 15° Skew | PWH 15-9-20 | |
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