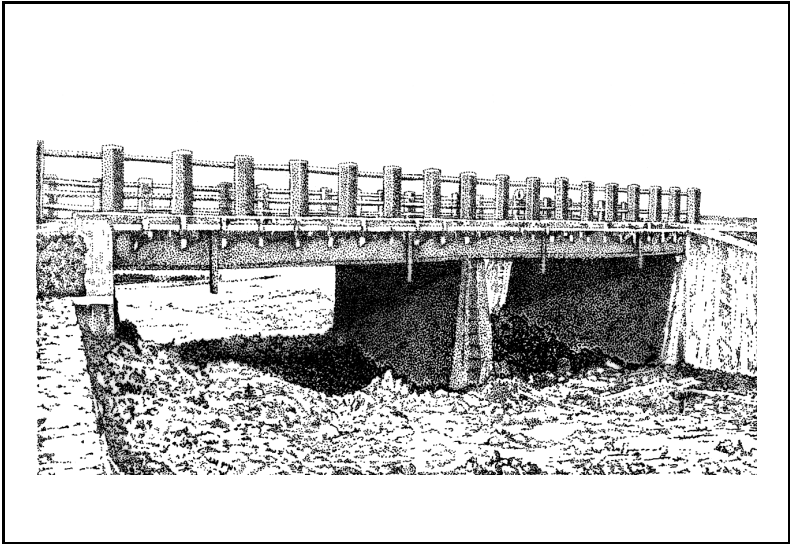


Rapid Field Classification Booklet



1 July 2006

HEADQUARTERS, DEPARTMENT OF THE ARMY

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RAPID FIELD CLASSIFICATION BOOKLET

Purpose. Bridge and vehicle classification allows vehicle operators to avoid bridge failure due to overloading. Vehicle operators may drive across bridges without restrictions if their vehicles' class numbers are less than or equal to the bridge class number. *Field Manual (FM) 5-170* shows classifications for standard vehicles and the procedure for classifying vehicles. Refer to *FM 3-34.343* for a complete discussion of bridge classification procedures. **This GTA provides a rapid field method of establishing bridge capacity in the field, but only as a temporary measure. An analytical classification must be performed as soon as possible in order to actually classify the bridge and post a classification sign.**

Bridge Signs. All classified vehicles and bridges in the theater of operations require classification signs. Bridge signs are circular with a yellow background and black inscriptions. Sign diameters are a minimum of 16 inches for one-lane bridges and 20 inches for two-lane bridges. A two-lane bridge classification sign has two numbers, side by side (*Figure 1*). The number on the left is the bridge classification when both lanes are in service simultaneously. The number on the right indicates the classification if the bridge is carrying one-way traffic and the vehicles proceed along the centerline of the bridge. For bridges with separate classifications for wheeled and tracked vehicles (dual classification), use a special circular sign that indicates both classifications (*Figure 2, page 2*). Classify bridges greater than class 50 as dual-classification bridges. Use a separate rectangular sign, if necessary, to show bridge width limitations (*Figure 1*).

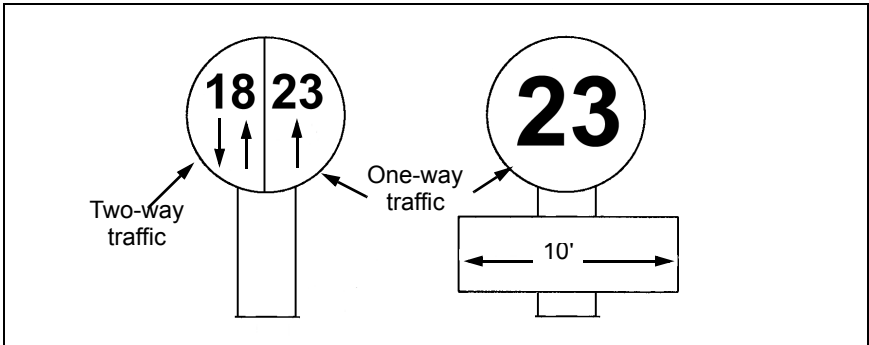


Figure 1. Bridge Classification Signs

Width and Height Restrictions. *Table 1, page 2*, lists width restrictions for bridges. If a one-lane bridge does not meet width requirements, post a rectangular warning sign under the classification sign showing the actual clear width. For a two-lane bridge, downgrade the two-way classification to the highest class for which it qualifies (one-way classification is not affected). If the minimum overhead clearance is less than 15 feet 6 inches, post a sign with the limited clearance.

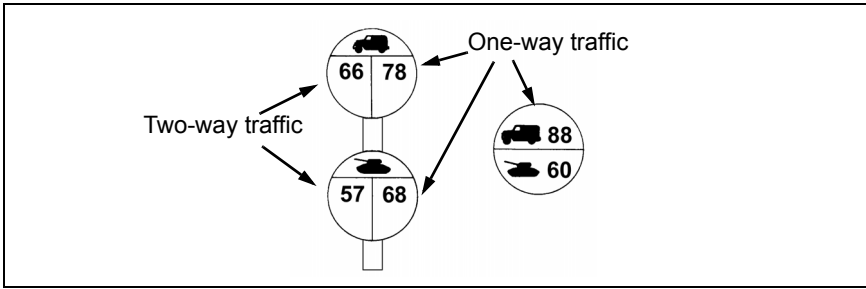


Figure 2. Dual-Classification Signs

Table 1. Minimum Roadway Widths (Curb-to-Curb)

| Roadway Width (b _r) | Bridge Classification | |
|---|-----------------------|-----------------|
| | One-Way Traffic | Two-Way Traffic |
| 9' - 10'11" (2.75 m - 3.34 m) | 12 | 0 |
| 11' - 13'1" (3.35 m - 3.99 m) | 30 | 0 |
| 13'2" - 14'8" (4 m - 4.49 m) | 60 | 0 |
| 14'9" - 16'4" (4.5 m - 4.99 m) | 100 | 0 |
| 16'5" - 18' (-) (5 m - 5.4 m) | 150 | 0 |
| 18' - 23'11" (5.5 m - 7.2 m) | 150 | 30 |
| 24' - 26'11" (7.3 m - 8.1 m) | 150 | 60 |
| 27' - 31'11" (8.2 m - 9.7 m) | 150 | 100 |
| Over 32' (9.8 m) | 150 | 150 |
| Minimum overhead clearance of all classes is 15 feet (4.5 meters) | | |

Notations and Classification Procedures. Figure 3 lists notations used in the following figures and tables. Figures 4 through 8, pages 4 through 8, illustrate rapid field classification procedures for several bridges. Figures 9 through 12, pages 22 through 25, provide information on types of classification. Figure 13, page 26, provides information on profile factors for arch bridges. Tables 2 and 3, pages 9 through 11, provide data on stringer properties. Tables 4 and 5, pages 12 through 19, provide data on wheeled- and tracked-vehicle moment and shear. Tables 6 and 7, page 20 and 21, provide information on profile and arch factors. Table 8, page 27, provides a subset of military load classifications for common vehicles and vehicle combinations.

| | | | |
|-----------|---|-----------|--|
| b | stringer width, in inches | N_1 | effective number of stringers for one-lane traffic |
| b_d | concrete slab width, in feet | N_2 | effective number of stringers for two-lane traffic |
| b_e | effective slab width, in feet | PLC | provisional load classification |
| b_{e1} | effective slab width for one-lane traffic, in feet | R | rise of arch, in feet |
| b_{e2} | effective slab width for two-lane traffic, in feet | S_b | actual brace spacing, in feet |
| b_r | curb-to-curb roadway width, in feet | S_s | center-to-center stringer spacing, in inches |
| d | stringer depth, in inches | t_c | crown thickness, in feet |
| d_f | depth of fill, in feet | t_d | deck thickness, in inches |
| F_y | yield stress | t_{eff} | effective deck thickness, in inches |
| ksi | kips per square inch | t_f | flange thickness, in inches |
| L | span length, in feet | t_w | web thickness, in inches |
| L_c | maximum brace spacing, in feet | T_1 | one-lane, tracked-vehicle classification |
| m | moment capacity per stringer, in ft-kips | T_2 | two-lane, tracked-vehicle classification |
| m_{DL} | dead load bending moment per stringer, in ft-kips | v | shear capacity per stringer, in kips |
| m_{LL} | live load bending moment per stringer, in ft-kips | v_{DL} | dead load shear per stringer, in kips |
| M_{LL} | live load bending moment per lane, in ft-kips | V_{DL} | dead load shear for entire span, in kips |
| M_{LL1} | live load bending moment for one-lane traffic, in ft-kips | v_{LL} | live load shear per stringer, in kips |
| M_{LL2} | live load bending moment for two-lane traffic, in ft-kips | V_{LL} | live load shear per lane, in kips |
| N_b | number of braces | W_s | stringer weight, in lbs/ft |
| N_L | number of lanes | W_1 | one-lane, wheeled-vehicle classification |
| N_S | number of string | W_2 | two-lane, wheeled-vehicle classification |

Figure 3. Notations

| | | |
|--|----------------|--------------------------------------|
| Map sheet | Grid | Date |
| Recon officer/NCO | Unit | |
| Bridge dimensions | | Stringer dimensions |
| L _____ ft | | Timber: (Table 2, page 9) |
| b_r _____ ft | | b _____ in |
| N_L _____ (2 if $b_r \geq 18$ ft) | | d _____ in |
| N_s _____ | | Steel: Type _____ (Table 3, page 10) |
| S_s _____ in | | d _____ in |
| N_b _____ | | b _____ in |
| S_b _____ ft | t_w _____ in | |
| Deck: Single-layer, multilayer, or laminated | t_f _____ in | |
| t_d _____ in | | |

Procedure

1. m _____
 - a. Timber: Use 0.73(m) (see Table 2 for m)
 - b. Steel: Use 0.83(m) (see Table 3 for m)
2. W_s _____ (Table 3). Omit this step for timber stringer.
3. m_{DL} _____
 - a. Timber: $m_{DL} = 0.0000434L^2[(b)(d)+(t_d)(S_s)]$
 - b. Steel: $m_{DL} = 0.00013L^2[W_s+0.347(t_d)(S_s)]$
4. m_{LL} _____
 - a. Timber: $m - m_{DL}$
 - b. Steel: $\frac{m - m_{DL}}{1.15}$
5. N_1 _____ $\left(\frac{60}{S_s}\right) + 1$
6. N_2 _____ 0.375 N_s ; calculate only if $b_r \geq 18$ ft
7. M_{LL1} _____ (N_1) m_{LL}
8. M_{LL2} _____ (smaller of N_1 or N_2) m_{LL}
9. Moment classification (Table 4, page 12):
 T_1 _____ T_2 _____ W_1 _____ W_2 _____
10. Do not perform Steps 10-14 for steel stringer bridge.
 v _____ Use 0.63(v) (see Table 2 for v)
11. v_{DL} _____, where $v_{DL} = \frac{0.000174L[(b)(d)+(t_d)(S_s)]}{}$
12. v_{LL} _____ ($v - v_{DL}$)
13. V_{LL} _____ 5.33(v_{LL}) $\frac{\text{smaller of } N_1 \text{ or } N_2}{(\text{smaller of } N_1 \text{ or } N_2) + 1}$
14. Shear classification (Table 5, page 16):
 T_1 _____ T_2 _____ W_1 _____ W_2 _____
15. Width classification (Table 1, page 2):
 T_1 _____ T_2 _____ W_1 _____ W_2 _____
16. Deck classification (Figure 9, page 22):
 T_1 _____ T_2 _____ W_1 _____ W_2 _____
 - a. Single layer: $t_{eff} = t_d$
 - b. Multilayer: $t_{eff} = t_d - 2''$
 - c. Laminated: $t_{eff} = t_d$

Use $S_s = 0.75(S_s)$ for laminated decks.
17. $N_{b(required)}$ _____
 - a. Timber: 3 required if $d \geq 2(b)$
 - b. Steel: $\left(\frac{L}{L_c}\right) + 1$ (L_c in Table 3)
Add braces if $N_b < N_{b(required)}$

| | | | | |
|----------------------------------|-------|-------|-------|-------|
| 18. Final classification: | | | | |
| Moment (Step 9) | T_1 | T_2 | W_1 | W_2 |
| Shear (Step 14) | _____ | _____ | _____ | _____ |
| Width (Step 15) | _____ | _____ | _____ | _____ |
| Deck (Step 16) | _____ | _____ | _____ | _____ |
| Final | _____ | _____ | _____ | _____ |

Figure 4. Timber or Steel Stringer Bridge With Timber Deck

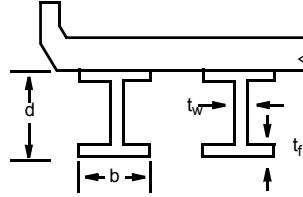
Map sheet
Recon officer/NCO

Grid
Unit

Date

Bridge dimensions

L _____ ft
 b_r _____ ft
 N_L _____ (2 if $b_r \geq 18$ ft)
 N_s _____
 S_s _____ in
 t_d _____ in (Do not include the wearing surface.)



Stringer dimensions

Type: _____ (Table 3, page 10)
 b _____ in
 d _____ in
 t_f _____ in
 t_w _____ in

Procedure

1. m _____ Use $0.83(m)$ (see Table 3 for m)
2. W_s _____ (Table 3)
3. m_{DL} _____ $0.00013L^2[W_s + (t_d)(S_s)]$
4. m_{LL} _____ $\frac{m - m_{DL}}{1.15}$
5. N_1 _____ $\frac{60}{S_s} - 1$
6. N_2 _____ $0.375N_s$; calculate only if $b_r \geq 18$ ft
7. M_{LL1} _____ $(N_1)m_{LL}$
8. M_{LL2} _____ (smaller of N_1 or N_2) m_{LL}
9. Moment classification (Table 4, page 12):
 T_1 _____ T_2 _____ W_1 _____ W_2 _____
10. Width classification (Table 1, page 2)
 T_1 _____ T_2 _____ W_1 _____ W_2 _____
11. Deck classification:
 a. $t_d < 5$ in: Class 40
 b. $t_d \geq 5$ in: Class 150

12. Final classification:

Moment (Step 9)
 Width (Step 10)
 Deck (Step 11)
Final

| | T_1 | T_2 | W_1 | W_2 |
|-----------------|-------|-------|-------|-------|
| Moment (Step 9) | | | | |
| Width (Step 10) | | | | |
| Deck (Step 11) | | | | |
| Final | | | | |

Figure 5. Steel Stringer Bridge With Concrete Deck

Map sheet
Recon officer/NCO

Grid
Unit

Date

Bridge dimensions

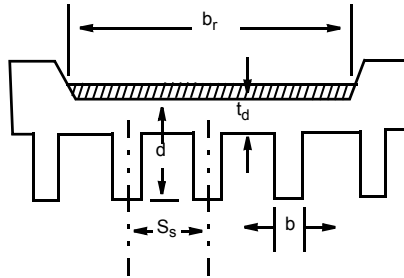
L _____ ft

b_r _____ ft

t_d _____ in (Do not include the wearing surface.)

N_s _____

S_s _____ in



Stringer dimensions

b _____ in

d _____ in

Procedure

1. m _____ $0.0116(S_s)(d^2)$
2. m_{DL} _____ $0.00013 L^2[(b)(d) + (t_d)(S_s)]$
3. m_{LL} _____ $\frac{m - m_{DL}}{1.15}$
4. N_1 _____ $\frac{60}{S_s} + 1$
5. N_2 _____ $0.375N_s$; calculate only if $b_r \geq 18$ ft
6. M_{LL1} _____ $(N_1)m_{LL}$
7. M_{LL2} _____ (smaller of N_1 or N_2) m_{LL}
8. Moment classification (Table 4, page 12):
 T_1 _____ T_2 _____ W_1 _____ W_2 _____
9. Width classification (Table 1, page 2):
 T_1 _____ T_2 _____ W_1 _____ W_2 _____

10. Final classification:

Moment (Step 8)

Width (Step 9)

Final

| | T_1 | T_2 | W_1 | W_2 |
|-----------------|-------|-------|-------|-------|
| Moment (Step 8) | | | | |
| Width (Step 9) | | | | |
| Final | | | | |

Figure 6. Reinforced Concrete T-Beam With Asphalt Wearing Surface

Map sheet _____
 Recon officer/NCO _____

Grid _____
 Unit _____

Date _____

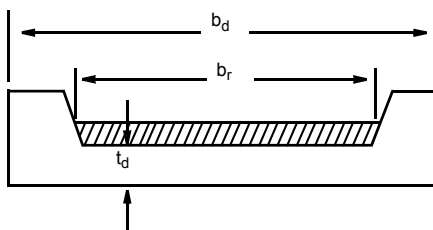
Bridge dimensions

L _____ ft

b_d _____ ft

b_r _____ ft

t_d _____ in (Do not include the wearing surface.)



Procedure

1. m_{LL} _____ (Figure 10, page 23)

2. b_e _____

a. One lane:

$$b_{e1} = \frac{L}{0.75 + \frac{L}{b_d}}$$

b. Two lane:

$$b_{e2} = \frac{L}{0.25 + \frac{2L}{b_d}}$$

(Calculate b_{e2} only if $b_r \geq 18$ ft)

3. M_{LL1} _____ (b_{e1}) m_{LL}

4. M_{LL2} _____ (b_{e2}) m_{LL}

5. Moment classification (Table 4, page 12):

T_1 _____ T_2 _____ W_1 _____ W_2 _____

6. Width classification (Table 1, page 2):

T_1 _____ T_2 _____ W_1 _____ W_2 _____

7. **Final classification:**

Moment (Step 5)

Width (Step 6)

Final

| | T_1 | T_2 | W_1 | W_2 |
|-----------------|-------|-------|-------|-------|
| Moment (Step 5) | | | | |
| Width (Step 6) | | | | |
| Final | | | | |

Figure 7. Reinforced Concrete-Slab Bridge With Asphalt Wearing Surface

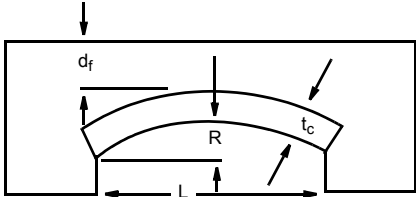
| | | | | |
|--|---|----------------|----------------|----------------|
| Map sheet Recon officer/NCO | Grid Unit | Date | | |
| Bridge dimensions | | | | |
| L _____ ft |  | | | |
| t_c _____ ft | | | | |
| d_f _____ ft | | | | |
| b_r _____ ft | | | | |
| R _____ ft | | | | |
| Procedure | | | | |
| 1. PLC _____ (Figure 11, page 24) | 3. Classification of arch factors: | | | |
| 2. Arch factors: | T_1 _____ (PLC x product of factors 2b through 2h) | | | |
| a. Span-to-rise ratio ($SR = \frac{L}{R}$) _____ | T_2 _____ ($0.9T_1$) | | | |
| b. Profile factors (Table 6, page 20) _____ | W_1 _____ (Figure 12, page 25) | | | |
| c. Material factors (Table 7, page 20) _____ | W_2 _____ (Figure 12) | | | |
| d. Joint factors (Table 7) _____ | 4. Width classification (Table 1, page 2): | | | |
| e. Deformations (Table 7) _____ | T_1 _____ T_2 _____ W_1 _____ W_2 _____ | | | |
| f. Crack factors (Table 7) _____ | | | | |
| g. Abutment size factors (Table 7) _____ | | | | |
| h. Abutment fault factors (Table 7) _____ | | | | |
| 5. Final classification: | | | | |
| Factors (Step 3) | T ₁ | T ₂ | W ₁ | W ₂ |
| Width (Step 4) | | | | |
| Final | | | | |

Figure 8. Masonry Arch Bridge

Table 2. Properties of Timber Stringers

| Rectangular Stringers | | | | Rectangular Stringers | | | |
|---------------------------------------|--------------------------|-----------------------|----------------------------------|---|--------------------------|-----------------------|----------------------------------|
| Nominal Size (b x d, in) ¹ | m (ft-kips) ² | v (kips) ³ | L _m (ft) ⁴ | Nominal Size (b x d, in) ¹ | m (ft-kips) ² | v (kips) ³ | L _m (ft) ⁴ |
| 4 x 6 | 4.80 | 2.40 | 7.14 | 16 x 16 | 136.50 | 25.60 | 19.10 |
| 4 x 8 | 8.53 | 3.20 | 9.50 | 16 x 18 | 172.80 | 28.80 | 21.50 |
| 4 x 10* | 13.33 | 4.00 | 11.90 | 16 x 20 | 213.00 | 32.00 | 23.80 |
| 4 x 12* | 19.20 | 4.80 | 14.30 | 16 x 22 | 258.00 | 35.20 | 26.20 |
| 6 x 8 | 12.80 | 4.40 | 9.50 | 16 x 24 | 307.00 | 38.40 | 28.60 |
| 6 x 10 | 20.00 | 6.00 | 11.90 | 18 x 18 | 194.40 | 32.40 | 21.50 |
| 6 x 12 | 28.80 | 7.20 | 14.30 | 18 x 20 | 240.00 | 36.00 | 23.80 |
| 6 x 14* | 39.20 | 8.40 | 16.70 | 18 x 22 | 290.00 | 39.60 | 26.20 |
| 6 x 16* | 51.20 | 9.60 | 19.10 | 18 x 24 | 346.00 | 43.20 | 28.60 |
| 6 x 18* | 64.80 | 10.80 | 21.50 | Round stringers (nominal size is diameter) | | | |
| 8 x 8 | 17.07 | 6.40 | 11.90 | | | | |
| 8 x 10 | 26.70 | 8.00 | 11.90 | 8 | 10.05 | 5.70 | 9.50 |
| 8 x 12 | 38.40 | 9.60 | 14.30 | 9 | 14.31 | 7.20 | 10.70 |
| 8 x 14 | 52.30 | 11.20 | 16.70 | 10 | 19.63 | 8.80 | 11.90 |
| 8 x 16 | 68.30 | 12.80 | 19.10 | 11 | 26.10 | 10.60 | 13.10 |
| 8 x 18* | 86.40 | 14.40 | 21.50 | 12 | 33.90 | 12.70 | 14.30 |
| 8 x 20* | 106.70 | 16.40 | 23.80 | 13 | 43.10 | 15.00 | 15.50 |
| 8 x 22* | 129.10 | 17.60 | 26.20 | 14 | 53.90 | 17.40 | 16.70 |
| 8 x 24* | 153.60 | 19.20 | 28.60 | 15 | 67.50 | 20.20 | 17.80 |
| 10 x 10 | 33.30 | 10.00 | 11.90 | 16 | 80.40 | 22.60 | 19.10 |
| 10 x 12 | 48.00 | 12.00 | 14.30 | 17 | 98.20 | 26.00 | 20.20 |
| 10 x 14 | 65.30 | 14.00 | 16.70 | 18 | 114.50 | 28.60 | 21.50 |
| 10 x 16 | 85.30 | 16.00 | 19.10 | 19 | 137.10 | 32.40 | 22.60 |
| 10 x 18 | 108.00 | 18.00 | 21.50 | 20 | 157.10 | 35.40 | 23.80 |
| 10 x 20 | 133.30 | 20.00 | 23.80 | 21 | 185.20 | 39.60 | 24.90 |
| 10 x 22* | 161.30 | 22.00 | 26.20 | 22 | 209.00 | 42.70 | 26.20 |
| 10 x 24* | 192.00 | 24.00 | 28.60 | 23 | 243.00 | 47.60 | 27.30 |
| 12 x 12 | 57.60 | 14.40 | 14.30 | 24 | 271.00 | 50.80 | 28.60 |
| 12 x 14 | 78.40 | 16.80 | 16.70 | 25 | 312.00 | 56.20 | 29.70 |
| 12 x 16 | 102.40 | 19.20 | 19.10 | 26 | 351.00 | 60.80 | 30.90 |
| 12 x 18 | 129.60 | 21.60 | 21.50 | 27 | 393.00 | 65.60 | 32.10 |
| 12 x 20 | 160.00 | 24.00 | 23.80 | 28 | 439.00 | 70.50 | 33.30 |
| 12 x 22 | 193.60 | 26.40 | 26.20 | 29 | 487.00 | 75.60 | 34.50 |
| 12 x 24 | 230.00 | 28.80 | 28.60 | 30 | 540.00 | 81.00 | 35.70 |
| 14 x 14 | 81.50 | 19.60 | 16.70 | 31 | 595.00 | 86.40 | 36.80 |
| 14 x 16 | 119.50 | 22.40 | 19.10 | 32 | 655.00 | 92.10 | 38.00 |
| 14 x 18 | 151.20 | 25.20 | 21.50 | 33 | 718.00 | 98.00 | 39.20 |
| 14 x 20 | 186.70 | 28.00 | 23.80 | 34 | 786.00 | 104.00 | 40.40 |
| 14 x 22 | 226.00 | 30.80 | 26.20 | 35 | 857.00 | 110.20 | 41.60 |
| 14 x 24 | 269.00 | 33.60 | 28.60 | 36 | 933.00 | 116.60 | 42.80 |

NOTES:

* A minimum of three lateral braces is required.

¹If d > 2b, bracing is required at the midspan and at both ends.

²Moment capacity for rectangular stringers not listed is $\frac{b(d^2)}{30}$. Moment capacity for round stringers not listed is 0.02(d³).

³Shear capacity for rectangular stringers not listed is $\frac{b(d)}{10}$. Shear capacity for round stringers not listed is 0.09(d²).

⁴Maximum span length for stringers not listed is 1.19d.

Table 3. Properties of Steel Stringers $(F_y = 36 \text{ ksi}, f_b = 27 \text{ ksi}, f_v = 16.5 \text{ ksi})$

| Nominal Size | d (in) | W_s (lbs/ft) | b (in) | t_f (in) | t_w (in) | m (ft-kips) | v (kips) | L_m (ft) | L_c (ft) |
|--------------|-----------|-------------------|-----------|---------------|---------------|----------------|-------------|---------------|---------------|
| W39x211 | 39.250 | 211 | 11.750 | 1.438 | 0.75 | 1,770 | 450 | 100 | 12.4 |
| W37x206 | 36.750 | 206 | 11.750 | 1.438 | 0.75 | 1,656 | 425 | 95 | 12.4 |
| W36x300 | 36.750 | 300 | 16.625 | 1.688 | 0.94 | 2,486 | 520 | 94 | 17.6 |
| W36x194 | 36.500 | 194 | 12.125 | 1.250 | 0.81 | 1,492 | 431 | 93 | 12.8 |
| W36x182 | 36.375 | 182 | 12.125 | 1.187 | 0.75 | 1,397 | 406 | 93 | 12.8 |
| W36x170 | 36.125 | 170 | 12.000 | 1.125 | 1.06 | 1,302 | 381 | 92 | 12.7 |
| W36x160 | 36.000 | 160 | 12.000 | 1.000 | 1.06 | 1,217 | 365 | 92 | 12.7 |
| W36x230 | 35.875 | 230 | 16.500 | 1.250 | 0.75 | 1,879 | 421 | 91 | 17.4 |
| W36x150 | 35.875 | 150 | 12.000 | 0.937 | 0.62 | 1,131 | 350 | 91 | 12.7 |
| W36x201 | 35.375 | 201 | 11.750 | 1.438 | 0.75 | 1,545 | 402 | 90 | 12.4 |
| W33x196 | 33.375 | 196 | 11.750 | 1.438 | 0.75 | 1,433 | 377 | 85 | 12.4 |
| W33x220 | 33.250 | 220 | 15.750 | 1.250 | 0.81 | 1,661 | 392 | 85 | 16.6 |
| W33x141 | 33.250 | 141 | 11.500 | 0.937 | 0.62 | 1,005 | 313 | 85 | 12.1 |
| W33x130 | 33.125 | 130 | 11.500 | 0.875 | 0.56 | 911 | 300 | 85 | 12.1 |
| W33x200 | 33.000 | 200 | 15.575 | 1.125 | 0.56 | 1,506 | 362 | 84 | 16.6 |
| W31x180 | 31.500 | 180 | 11.750 | 1.312 | 0.75 | 1,327 | 327 | 80 | 12.4 |
| W30x124 | 30.125 | 124 | 10.500 | 0.937 | 0.68 | 797 | 273 | 77 | 11.1 |
| W30x116 | 30.000 | 116 | 10.500 | 0.875 | 0.62 | 738 | 263 | 76 | 11.1 |
| W30x108 | 29.875 | 108 | 10.500 | 0.750 | 0.56 | 672 | 255 | 76 | 11.1 |
| W30x175 | 29.500 | 175 | 11.750 | 1.312 | 0.56 | 1,156 | 304 | 75 | 12.4 |
| W27x171 | 27.500 | 171 | 11.750 | 1.312 | 0.68 | 1,059 | 282 | 70 | 12.4 |
| W27x102 | 27.125 | 102 | 10.000 | 0.812 | 0.68 | 599 | 217 | 69 | 10.6 |
| W27x94 | 26.875 | 94 | 10.000 | 0.750 | 0.50 | 546 | 205 | 68 | 10.6 |
| W26x157 | 25.500 | 157 | 11.750 | 1.250 | 0.50 | 915 | 237 | 65 | 12.4 |
| W24x94 | 24.250 | 94 | 9.000 | 0.875 | 0.62 | 497 | 191 | 62 | 9.5 |
| W24x84 | 24.125 | 84 | 9.000 | 0.750 | 0.50 | 442 | 174 | 61 | 9.5 |
| W24x100 | 24.000 | 100 | 12.000 | 0.750 | 0.50 | 560 | 173 | 61 | 12.7 |
| S24x120 | 24.000 | 120 | 8.000 | 1.125 | 0.50 | 564 | 286 | 61 | 8.4 |
| S24x106 | 24.000 | 106 | 7.875 | 1.125 | 1.18 | 527 | 224 | 61 | 8.3 |
| S24x80 | 24.000 | 80 | 7.000 | 0.875 | 0.62 | 391 | 183 | 61 | 7.4 |
| W24x76 | 23.875 | 76 | 9.000 | 0.687 | 0.50 | 394 | 163 | 61 | 9.5 |
| W24x153 | 23.625 | 153 | 11.750 | 0.250 | 0.43 | 828 | 217 | 60 | 12.4 |
| S24x134 | 23.625 | 134 | 8.500 | 1.250 | 0.62 | 634 | 283 | 60 | 9.0 |
| S22x75 | 22.000 | 75 | 7.000 | 0.812 | 0.81 | 308 | 168 | 56 | 7.4 |
| W21x139 | 21.625 | 139 | 11.750 | 1.187 | 0.50 | 699 | 198 | 55 | 12.4 |
| S21x112 | 21.625 | 112 | 7.875 | 1.187 | 0.62 | 495 | 238 | 55 | 8.3 |
| W21x73 | 21.250 | 73 | 8.250 | 0.750 | 0.75 | 338 | 148 | 54 | 8.7 |
| W21x68 | 21.125 | 68 | 8.250 | 0.687 | 0.50 | 315 | 140 | 54 | 8.7 |
| W21x62 | 21.000 | 62 | 8.250 | 0.625 | 0.43 | 284 | 130 | 53 | 8.7 |
| S20x85 | 20.000 | 85 | 7.125 | 0.937 | 0.37 | 337 | 195 | 51 | 7.5 |
| S20x65 | 20.000 | 65 | 6.500 | 0.812 | 0.68 | 245 | 132 | 51 | 6.9 |
| W20x134 | 19.625 | 134 | 11.750 | 1.187 | 0.43 | 621 | 177 | 50 | 12.4 |
| W18x60 | 18.250 | 60 | 7.500 | 0.687 | 0.62 | 243 | 115 | 46 | 7.9 |
| S18x86 | 18.250 | 86 | 7.000 | 1.000 | 0.43 | 326 | 184 | 46 | 7.4 |
| W18x55 | 18.125 | 55 | 7.500 | 0.625 | 0.37 | 220 | 108 | 46 | 7.9 |
| S18x80 | 18.000 | 80 | 8.000 | 0.937 | 0.50 | 292 | 133 | 46 | 8.4 |
| W18x50 | 18.000 | 50 | 7.500 | 0.562 | 0.37 | 200 | 99 | 46 | 7.9 |
| S18x55 | 18.000 | 55 | 6.000 | 0.687 | 0.50 | 199 | 126 | 46 | 6.3 |
| S18x122 | 17.750 | 122 | 11.750 | 1.062 | 0.56 | 648 | 145 | 45 | 12.4 |

Table 3. Properties of Steel Stringers (continued) $(F_y = 36 \text{ ksi}, f_b = 27 \text{ ksi}, f_v = 16.5 \text{ ksi})$

| Nominal Size | d (in) | W_s (lbs/ft) | b (in) | t_f (in) | t_w (in) | m (ft-kips) | v (kips) | L_m (ft) | L_c (ft) |
|--------------|-----------|-------------------|-----------|---------------|---------------|----------------|-------------|---------------|---------------|
| S18x62 | 17.750 | 62 | 6.875 | 0.750 | 0.37 | 238 | 100 | 45 | 7.3 |
| S18x77 | 17.750 | 77 | 6.625 | 0.937 | 0.62 | 281 | 163 | 45 | 7.0 |
| W16x112 | 16.750 | 112 | 11.750 | 1.000 | 0.56 | 450 | 136 | 42 | 12.4 |
| S16x70 | 16.750 | 70 | 6.500 | 0.937 | 0.62 | 238 | 146 | 42 | 6.9 |
| W16x50 | 16.250 | 50 | 7.125 | 0.625 | 0.37 | 181 | 94 | 41 | 7.5 |
| W16x45 | 16.125 | 45 | 7.000 | 0.562 | 0.37 | 163 | 85 | 41 | 7.4 |
| W16x64 | 16.000 | 64 | 8.500 | 0.687 | 0.43 | 234 | 106 | 40 | 9.0 |
| W16x40 | 16.000 | 40 | 7.000 | 0.500 | 0.31 | 145 | 75 | 40 | 7.4 |
| S16x50 | 16.000 | 50 | 6.000 | 0.687 | 0.43 | 155 | 105 | 40 | 6.3 |
| W16x36 | 15.875 | 36 | 7.000 | 0.437 | 0.31 | 127 | 74 | 40 | 7.4 |
| W16x110 | 15.750 | 110 | 11.750 | 1.000 | 0.56 | 345 | 127 | 40 | 12.4 |
| S16x62 | 15.750 | 62 | 6.125 | 0.875 | 0.56 | 200 | 129 | 40 | 6.5 |
| S16x45 | 15.750 | 45 | 5.375 | 0.625 | 0.43 | 150 | 104 | 40 | 5.7 |
| W15x103 | 15.000 | 103 | 11.750 | 0.937 | 0.56 | 369 | 121 | 38 | 12.4 |
| S15x56 | 15.000 | 56 | 5.875 | 0.812 | 0.50 | 173 | 110 | 38 | 6.2 |
| S15x43 | 15.000 | 43 | 5.500 | 0.625 | 0.43 | 132 | 93 | 38 | 5.8 |
| W14x101 | 14.250 | 101 | 11.750 | 0.937 | 0.56 | 344 | 114 | 36 | 12.4 |
| S14x40 | 14.250 | 40 | 5.375 | 0.375 | 0.37 | 119 | 83 | 36 | 5.7 |
| S14x51 | 14.125 | 51 | 5.625 | 0.750 | 0.50 | 150 | 104 | 36 | 5.9 |
| S14x70 | 14.000 | 70 | 8.000 | 0.937 | 0.43 | 204 | 87 | 35 | 8.4 |
| S14x57 | 14.000 | 57 | 6.000 | 0.875 | 0.50 | 153 | 101 | 35 | 6.3 |
| W14x34 | 14.000 | 34 | 6.750 | 0.437 | 0.31 | 121 | 78 | 35 | 7.1 |
| W14x30 | 13.875 | 30 | 6.750 | 0.375 | 0.25 | 109 | 61 | 35 | 7.1 |
| W14x92 | 13.375 | 92 | 11.750 | 0.875 | 0.50 | 297 | 96 | 34 | 12.4 |
| S14x46 | 13.375 | 46 | 5.375 | 0.687 | 0.50 | 126 | 99 | 34 | 5.7 |
| S13x35 | 13.000 | 35 | 5.000 | 0.625 | 0.37 | 85 | 72 | 33 | 5.3 |
| S13x41 | 12.625 | 41 | 5.125 | 0.687 | 0.37 | 108 | 104 | 32 | 5.4 |
| W12x36 | 12.250 | 36 | 6.625 | 0.565 | 0.31 | 103 | 56 | 31 | 7.0 |
| S12x65 | 12.000 | 65 | 8.000 | 0.937 | 0.43 | 182 | 73 | 30 | 8.4 |
| W12x27 | 12.000 | 27 | 6.500 | 0.375 | 0.25 | 76 | 44 | 30 | 6.9 |
| S12x50 | 12.000 | 50 | 5.500 | 0.687 | 0.68 | 113 | 120 | 30 | 5.8 |
| S12x32 | 12.000 | 32 | 5.000 | 0.562 | 0.37 | 81 | 62 | 30 | 5.3 |
| S12x34 | 11.250 | 34 | 4.750 | 0.625 | 0.43 | 81 | 72 | 28 | 5.0 |
| W11x76 | 11.000 | 76 | 11.000 | 0.812 | 0.50 | 202 | 67 | 28 | 11.6 |
| S10x29 | 10.625 | 29 | 4.750 | 0.562 | 0.31 | 67 | 48 | 27 | 5.0 |
| W10x25 | 10.125 | 25 | 5.750 | 0.437 | 0.25 | 59 | 38 | 25 | 6.1 |
| S10x40 | 10.000 | 40 | 6.000 | 0.687 | 0.37 | 92 | 53 | 25 | 6.3 |
| S10x35 | 10.000 | 35 | 5.000 | 0.500 | 0.62 | 65 | 88 | 25 | 5.3 |
| S10x25 | 10.000 | 25 | 4.625 | 0.500 | 0.31 | 55 | 46 | 25 | 4.9 |
| W10x21 | 9.875 | 21 | 5.750 | 0.312 | 0.25 | 48 | 36 | 25 | 6.1 |
| W10x59 | 9.250 | 59 | 9.500 | 0.687 | 0.43 | 132 | 56 | 23 | 10.0 |
| S9x25 | 9.500 | 25 | 4.500 | 0.500 | 0.31 | 51 | 43 | 24 | 4.8 |
| S9x50 | 9.000 | 50 | 7.000 | 0.812 | 0.37 | 103 | 45 | 23 | 7.4 |
| S8x35 | 8.000 | 35 | 6.000 | 0.625 | 0.31 | 65 | 34 | 20 | 6.3 |
| S8x28 | 8.000 | 28 | 5.000 | 0.562 | 0.31 | 49 | 35 | 20 | 5.3 |
| W8x31 | 8.000 | 31 | 8.000 | 0.437 | 0.31 | 61 | 33 | 20 | 8.4 |
| W8x44 | 7.875 | 44 | 7.875 | 0.625 | 0.75 | 81 | 40 | 20 | 8.3 |
| W7x35 | 7.125 | 35 | 7.125 | 0.562 | 0.37 | 58 | 37 | 18 | 7.5 |
| W6x31 | 6.250 | 31 | 6.250 | 0.562 | 0.37 | 45 | 31 | 16 | 6.6 |

Table 4. Wheeled- and Tracked-Vehicle Moment (M_{LL} in kip-feet)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | | |
|-------|---------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----------|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 25 | 30 |
| 4 | W | 4.96 | 7.44 | 9.92 | 12.40 | 14.88 | 17.92 | 21.40 | 25.60 | 30.00 | 41.00 | 52.20 |
| | T | 2.64 | 6.00 | 9.92 | 14.00 | 18.00 | 22.10 | 25.90 | 29.90 | 34.00 | 44.00 | 54.00 |
| 8 | W | 10.96 | 16.44 | 21.90 | 27.40 | 32.90 | 38.30 | 43.60 | 49.30 | 54.80 | 71.00 | 93.60 |
| | T | 4.88 | 11.04 | 19.04 | 27.00 | 35.00 | 43.10 | 50.90 | 59.00 | 66.80 | 87.00 | 106.80 |
| 12 | W | 16.00 | 24.00 | 32.00 | 40.00 | 48.00 | 56.00 | 64.00 | 72.00 | 80.80 | 112.50 | 145.20 |
| | T | 5.44 | 12.00 | 21.30 | 33.00 | 44.90 | 57.10 | 69.10 | 81.00 | 92.80 | 123.00 | 153.00 |
| 16 | W | 20.00 | 30.00 | 40.00 | 50.00 | 60.00 | 70.00 | 80.00 | 92.50 | 105.20 | 144.00 | 184.20 |
| | T | 7.12 | 15.96 | 28.50 | 44.00 | 60.00 | 75.90 | 91.80 | 108.00 | 124.00 | 164.00 | 204.00 |
| 20 | W | 22.00 | 33.00 | 44.00 | 55.00 | 70.80 | 87.40 | 104.00 | 121.00 | 137.60 | 188.50 | 241.00 |
| | T | 8.88 | 20.00 | 35.50 | 55.00 | 74.90 | 94.90 | 114.90 | 135.00 | 154.80 | 205.00 | 255.00 |
| 24 | W | 24.00 | 36.00 | 48.00 | 64.00 | 83.30 | 102.80 | 122.60 | 142.20 | 162.00 | 223.00 | 285.00 |
| | T | 10.64 | 24.00 | 42.70 | 66.00 | 90.00 | 114.00 | 137.90 | 162.00 | 186.00 | 246.00 | 306.00 |
| 30 | W | 26.70 | 40.40 | 53.90 | 70.40 | 91.70 | 113.10 | 134.70 | 156.60 | 178.00 | 246.00 | 316.00 |
| | T | 10.88 | 24.50 | 43.70 | 68.20 | 97.40 | 127.40 | 157.40 | 187.60 | 218.00 | 293.00 | 367.00 |
| 40 | W | 34.00 | 51.00 | 68.00 | 85.00 | 108.30 | 133.80 | 159.40 | 185.00 | 210.00 | 277.00 | 359.00 |
| | T | 13.36 | 30.00 | 53.30 | 83.40 | 120.00 | 158.90 | 200.00 | 240.00 | 280.00 | 380.00 | 480.00 |
| 50 | W | 40.00 | 60.00 | 80.00 | 100.00 | 125.00 | 154.30 | 183.70 | 213.00 | 243.00 | 320.00 | 415.00 |
| | T | 15.36 | 34.60 | 61.60 | 96.20 | 138.50 | 187.60 | 237.00 | 288.00 | 338.00 | 463.00 | 587.00 |
| 60 | W | 46.00 | 69.00 | 92.00 | 115.00 | 138.00 | 170.00 | 205.00 | 240.00 | 276.00 | 365.00 | 474.00 |
| | T | 17.12 | 38.50 | 68.60 | 107.20 | 154.30 | 210.00 | 270.00 | 330.00 | 390.00 | 540.00 | 690.00 |
| 70 | W | 51.00 | 76.40 | 101.90 | 127.40 | 157.90 | 198.20 | 239.00 | 280.00 | 322.00 | 426.00 | 557.00 |
| | T | 18.64 | 42.00 | 74.70 | 116.60 | 168.00 | 229.00 | 298.00 | 368.00 | 438.00 | 613.00 | 787.00 |
| 80 | W | 56.00 | 84.00 | 112.00 | 140.00 | 180.50 | 227.00 | 273.00 | 320.00 | 368.00 | 486.00 | 636.00 |
| | T | 20.00 | 45.00 | 80.00 | 125.00 | 180.00 | 245.00 | 320.00 | 400.00 | 480.00 | 680.00 | 880.00 |
| 90 | W | 60.00 | 90.00 | 120.00 | 151.80 | 203.00 | 225.00 | 308.00 | 360.00 | 414.00 | 547.00 | 716.00 |
| | T | 21.20 | 47.60 | 84.60 | 132.40 | 190.60 | 259.00 | 339.00 | 427.00 | 518.00 | 743.00 | 967.00 |
| 100 | W | 64.00 | 96.00 | 128.00 | 160.00 | 203.00 | 259.00 | 317.00 | 375.00 | 434.00 | 581.00 | 765.00 |
| | T | 22.20 | 50.00 | 89.00 | 138.80 | 199.90 | 272.00 | 356.00 | 450.00 | 550.00 | 800.00 | 1,050.00 |
| 120 | W | 72.00 | 108.00 | 144.00 | 180.00 | 243.00 | 311.00 | 380.00 | 450.00 | 520.00 | 697.00 | 918.00 |
| | T | 24.00 | 54.00 | 96.00 | 150.00 | 216.00 | 294.00 | 384.00 | 486.00 | 600.00 | 900.00 | 1,200.00 |
| 150 | W | 84.00 | 126.00 | 168.00 | 210.00 | 253.00 | 331.00 | 410.00 | 491.00 | 572.00 | 777.00 | 1,032.00 |
| | T | 25.00 | 56.30 | 100.00 | 156.20 | 225.00 | 306.00 | 400.00 | 506.00 | 625.00 | 975.00 | 1,350.00 |

NOTES:

1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the moment value (in kip-feet) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 4. Wheeled- and Tracked-Vehicle Moment (M_{LL} in kip-feet) (continued)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | |
|-------|---------------------|--------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | 35 | 40 | 45 | 50 | 55 | 60 | 70 | 80 | 90 | 100 |
| 4 | W | 63.70 | 75.20 | 86.40 | 97.00 | 108.90 | 120.00 | 142.80 | 164.80 | 187.20 | 210.00 |
| | T | 63.70 | 73.80 | 83.70 | 94.00 | 103.40 | 114.00 | 134.40 | 153.60 | 174.60 | 194.00 |
| 8 | W | 116.20 | 138.40 | 161.10 | 183.00 | 206.00 | 228.00 | 273.00 | 318.00 | 364.00 | 408.00 |
| | T | 126.70 | 147.20 | 167.40 | 187.00 | 207.00 | 227.00 | 267.00 | 307.00 | 347.00 | 386.00 |
| 12 | W | 180.60 | 218.00 | 256.00 | 293.00 | 331.00 | 368.00 | 444.00 | 518.00 | 592.00 | 668.00 |
| | T | 182.70 | 213.00 | 243.00 | 273.00 | 303.00 | 332.00 | 393.00 | 453.00 | 513.00 | 572.00 |
| 16 | W | 229.00 | 275.00 | 321.00 | 367.00 | 414.00 | 460.00 | 552.00 | 645.00 | 736.00 | 830.00 |
| | T | 244.00 | 284.00 | 324.00 | 364.00 | 404.00 | 444.00 | 524.00 | 603.00 | 684.00 | 764.00 |
| 20 | W | 299.00 | 359.00 | 419.00 | 479.00 | 539.00 | 599.00 | 718.00 | 838.00 | 958.00 | 1,078.00 |
| | T | 305.00 | 355.00 | 405.00 | 455.00 | 505.00 | 554.00 | 655.00 | 755.00 | 855.00 | 954.00 |
| 24 | W | 353.00 | 422.00 | 492.00 | 562.00 | 633.00 | 702.00 | 843.00 | 982.00 | 1,121.00 | 1,262.00 |
| | T | 366.00 | 426.00 | 486.00 | 546.00 | 606.00 | 666.00 | 785.00 | 906.00 | 1,026.00 | 1,146.00 |
| 30 | W | 398.00 | 482.00 | 567.00 | 652.00 | 737.00 | 822.00 | 991.00 | 1,162.00 | 1,130.00 | 1,500.00 |
| | T | 442.00 | 518.00 | 592.00 | 667.00 | 743.00 | 817.00 | 967.00 | 1,117.00 | 1,267.00 | 1,418.00 |
| 40 | W | 442.00 | 553.00 | 671.00 | 788.00 | 905.00 | 1,022.00 | 1,257.00 | 1,493.00 | 1,728.00 | 1,962.00 |
| | T | 580.00 | 680.00 | 780.00 | 880.00 | 980.00 | 1,080.00 | 1,280.00 | 1,480.00 | 1,679.00 | 1,880.00 |
| 50 | W | 511.00 | 656.00 | 800.00 | 945.00 | 1,090.00 | 1,235.00 | 1,525.00 | 1,814.00 | 2,100.00 | 2,390.00 |
| | T | 713.00 | 838.00 | 962.00 | 1,087.00 | 1,212.00 | 1,338.00 | 1,588.00 | 1,837.00 | 2,090.00 | 2,340.00 |
| 60 | W | 584.00 | 740.00 | 914.00 | 1,089.00 | 1,263.00 | 1,438.00 | 1,786.00 | 2,140.00 | 2,490.00 | 2,840.00 |
| | T | 840.00 | 990.00 | 1,140.00 | 1,290.00 | 1,440.00 | 1,590.00 | 1,890.00 | 2,190.00 | 2,490.00 | 2,790.00 |
| 70 | W | 688.00 | 856.00 | 1,057.00 | 1,257.00 | 1,458.00 | 1,658.00 | 2,060.00 | 2,460.00 | 2,870.00 | 3,270.00 |
| | T | 963.00 | 1,138.00 | 1,312.00 | 1,478.00 | 1,662.00 | 1,837.00 | 2,190.00 | 2,540.00 | 2,890.00 | 3,240.00 |
| 80 | W | 786.00 | 936.00 | 1,103.00 | 1,332.00 | 1,561.00 | 1,790.00 | 2,250.00 | 2,710.00 | 3,170.00 | 3,630.00 |
| | T | 1,080.00 | 1,280.00 | 1,480.00 | 1,680.00 | 1,880.00 | 2,080.00 | 2,480.00 | 2,880.00 | 3,280.00 | 3,680.00 |
| 90 | W | 884.00 | 1,053.00 | 1,242.00 | 1,499.00 | 1,757.00 | 2,010.00 | 2,530.00 | 3,050.00 | 3,560.00 | 4,080.00 |
| | T | 1,193.00 | 1,418.00 | 1,643.00 | 1,867.00 | 2,090.00 | 2,320.00 | 2,770.00 | 3,220.00 | 3,670.00 | 4,120.00 |
| 100 | W | 953.00 | 1,140.00 | 1,328.00 | 1,543.00 | 1,828.00 | 2,110.00 | 2,690.00 | 3,260.00 | 3,830.00 | 4,410.00 |
| | T | 1,300.00 | 1,550.00 | 1,800.00 | 2,050.00 | 2,300.00 | 2,550.00 | 3,050.00 | 3,550.00 | 4,050.00 | 4,550.00 |
| 120 | W | 1,143.00 | 1,368.00 | 1,593.00 | 1,851.00 | 2,195.00 | 2,540.00 | 3,230.00 | 3,910.00 | 4,600.00 | 5,290.00 |
| | T | 1,500.00 | 1,800.00 | 2,100.00 | 2,400.00 | 2,700.00 | 3,000.00 | 3,600.00 | 4,200.00 | 4,800.00 | 5,400.00 |
| 150 | W | 1,297.00 | 1,562.00 | 1,827.00 | 2,092.00 | 2,405.00 | 2,830.00 | 3,670.00 | 4,520.00 | 5,560.00 | 6,210.00 |
| | T | 1,725.00 | 2,100.00 | 2,478.00 | 2,850.00 | 3,230.00 | 3,600.00 | 4,350.00 | 5,100.00 | 5,850.00 | 6,600.00 |

NOTES:

1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the moment value (in kip-feet) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 4. Wheeled- and Tracked-Vehicle Moment (M_{LL} in kip-feet) (continued)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | |
|-------|---------------------|--------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| | | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |
| 4 | W | 233 | 254 | 278 | 270 | 321 | 346 | 367 | 389 | 414 | 428 |
| | T | 213 | 233 | 255 | 274 | 294 | 314 | 333 | 353 | 391 | 428 |
| 8 | W | 453 | 499 | 543 | 588 | 633 | 678 | 724 | 767 | 813 | 880 |
| | T | 427 | 468 | 507 | 546 | 588 | 627 | 666 | 706 | 775 | 852 |
| 12 | W | 744 | 818 | 892 | 969 | 1,044 | 1,117 | 1,193 | 1,267 | 1,341 | 1,416 |
| | T | 634 | 694 | 754 | 812 | 873 | 934 | 993 | 1,051 | 1,136 | 1,248 |
| 16 | W | 922 | 1,015 | 1,108 | 1,198 | 1,293 | 1,386 | 1,476 | 1,570 | 1,661 | 1,752 |
| | T | 845 | 924 | 1,004 | 1,084 | 1,164 | 1,245 | 1,323 | 1,404 | 1,516 | 1,664 |
| 20 | W | 1,199 | 1,318 | 1,438 | 1,557 | 1,677 | 1,798 | 1,918 | 2,040 | 2,160 | 2,280 |
| | T | 1,054 | 1,154 | 1,256 | 1,355 | 1,455 | 1,555 | 1,656 | 1,753 | 1,896 | 2,080 |
| 24 | W | 1,401 | 1,543 | 1,682 | 1,823 | 1,962 | 2,100 | 2,240 | 2,380 | 2,520 | 2,660 |
| | T | 1,265 | 1,385 | 1,505 | 1,627 | 1,746 | 1,866 | 1,986 | 2,110 | 2,280 | 2,500 |
| 30 | W | 1,670 | 1,841 | 2,010 | 2,180 | 2,350 | 2,520 | 2,690 | 2,860 | 3,030 | 3,200 |
| | T | 1,566 | 1,718 | 1,867 | 2,020 | 2,170 | 2,310 | 2,470 | 2,620 | 2,790 | 3,070 |
| 40 | W | 2,200 | 2,430 | 2,670 | 2,900 | 3,140 | 3,370 | 3,610 | 3,840 | 4,080 | 4,310 |
| | T | 2,080 | 2,280 | 2,480 | 2,680 | 2,880 | 3,080 | 3,280 | 3,480 | 3,680 | 4,050 |
| 50 | W | 2,680 | 2,970 | 3,260 | 3,550 | 3,840 | 4,130 | 4,420 | 4,710 | 5,000 | 5,290 |
| | T | 2,590 | 2,840 | 3,090 | 3,340 | 3,590 | 3,840 | 4,090 | 4,340 | 4,590 | 5,020 |
| 60 | W | 3,190 | 3,540 | 3,880 | 4,230 | 4,580 | 4,930 | 5,280 | 5,630 | 5,990 | 6,330 |
| | T | 3,090 | 3,390 | 3,690 | 4,000 | 4,290 | 4,590 | 4,890 | 5,190 | 5,490 | 5,970 |
| 70 | W | 3,670 | 4,070 | 4,470 | 4,880 | 5,280 | 5,680 | 6,080 | 6,490 | 6,890 | 7,290 |
| | T | 3,590 | 3,940 | 4,290 | 4,640 | 4,990 | 5,340 | 5,690 | 6,040 | 6,390 | 6,900 |
| 80 | W | 4,090 | 4,550 | 5,010 | 5,460 | 5,930 | 6,380 | 6,840 | 7,300 | 7,760 | 8,820 |
| | T | 4,080 | 4,480 | 4,880 | 5,280 | 5,680 | 6,080 | 6,480 | 6,880 | 7,280 | 7,810 |
| 90 | W | 4,600 | 5,110 | 5,630 | 6,150 | 6,670 | 7,180 | 7,700 | 8,220 | 8,730 | 9,250 |
| | T | 4,570 | 5,020 | 5,470 | 5,920 | 6,370 | 6,820 | 7,270 | 7,720 | 8,170 | 8,700 |
| 100 | W | 4,980 | 5,560 | 6,130 | 6,710 | 7,280 | 7,860 | 8,430 | 9,000 | 9,580 | 10,160 |
| | T | 5,050 | 5,550 | 6,050 | 6,550 | 7,050 | 7,550 | 8,050 | 8,550 | 9,050 | 9,570 |
| 120 | W | 5,980 | 6,670 | 7,360 | 8,050 | 8,740 | 9,430 | 10,120 | 10,810 | 11,500 | 12,180 |
| | T | 6,000 | 6,600 | 7,200 | 7,800 | 8,400 | 9,000 | 9,600 | 10,200 | 10,800 | 11,400 |
| 150 | W | 7,060 | 7,910 | 8,760 | 9,600 | 10,450 | 11,300 | 12,150 | 13,000 | 13,850 | 14,700 |
| | T | 7,350 | 8,100 | 8,850 | 9,600 | 10,350 | 11,100 | 11,850 | 12,600 | 13,350 | 14,100 |

NOTES:

1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the moment value (in kip-feet) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 4. Wheeled- and Tracked-Vehicle Moment (M_{LL} in kip-feet) (continued)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | |
|-------|---------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 |
| 4 | W | 491 | 532 | 579 | 619 | 665 | 733 | 799 | 868 | 934 | 1,002 |
| | T | 466 | 502 | 538 | 586 | 645 | 707 | 767 | 823 | 887 | 948 |
| 8 | W | 966 | 1,052 | 1,136 | 1,224 | 1,310 | 1,414 | 1,550 | 1,686 | 1,821 | 1,956 |
| | T | 924 | 1,003 | 1,076 | 1,162 | 1,285 | 1,404 | 1,523 | 1,641 | 1,763 | 1,884 |
| 12 | W | 1,491 | 1,593 | 1,734 | 1,877 | 2,020 | 2,160 | 2,310 | 2,450 | 2,660 | 2,890 |
| | T | 1,361 | 1,474 | 1,587 | 1,704 | 1,855 | 2,040 | 2,220 | 2,400 | 2,580 | 2,750 |
| 16 | W | 1,848 | 1,958 | 2,130 | 2,390 | 2,490 | 2,660 | 2,840 | 3,020 | 3,290 | 3,570 |
| | T | 1,814 | 1,967 | 2,120 | 2,270 | 2,480 | 2,710 | 2,950 | 3,200 | 3,430 | 3,680 |
| 20 | W | 2,400 | 2,540 | 2,770 | 3,000 | 3,230 | 3,460 | 3,690 | 3,920 | 4,270 | 4,630 |
| | T | 2,270 | 2,460 | 2,650 | 2,840 | 3,100 | 3,400 | 3,690 | 3,990 | 4,290 | 4,600 |
| 24 | W | 2,800 | 2,970 | 3,240 | 3,500 | 3,700 | 4,040 | 4,310 | 4,580 | 4,990 | 5,410 |
| | T | 2,720 | 2,950 | 3,170 | 3,400 | 3,720 | 4,070 | 4,430 | 4,790 | 5,160 | 5,510 |
| 30 | W | 3,370 | 3,590 | 3,910 | 4,240 | 4,570 | 4,890 | 5,220 | 5,550 | 6,020 | 6,530 |
| | T | 3,350 | 3,630 | 3,910 | 4,200 | 4,510 | 4,960 | 5,410 | 5,860 | 6,310 | 6,760 |
| 40 | W | 4,550 | 4,780 | 5,140 | 5,590 | 6,040 | 6,490 | 6,940 | 7,400 | 7,850 | 8,310 |
| | T | 4,430 | 4,800 | 5,180 | 5,560 | 5,940 | 6,520 | 7,120 | 7,720 | 8,320 | 8,920 |
| 50 | W | 5,580 | 5,870 | 6,370 | 6,930 | 7,480 | 8,030 | 8,590 | 9,150 | 9,710 | 10,270 |
| | T | 5,490 | 5,950 | 6,430 | 6,900 | 7,380 | 8,040 | 8,790 | 9,540 | 10,290 | 11,040 |
| 60 | W | 6,680 | 7,030 | 7,410 | 8,070 | 8,740 | 9,410 | 10,050 | 10,760 | 11,430 | 12,110 |
| | T | 6,530 | 7,090 | 7,650 | 8,220 | 8,800 | 9,510 | 10,410 | 11,310 | 12,210 | 13,110 |
| 70 | W | 7,690 | 8,100 | 8,500 | 9,260 | 10,030 | 10,800 | 11,570 | 12,350 | 13,130 | 13,910 |
| | T | 7,550 | 8,200 | 8,860 | 9,530 | 10,200 | 10,940 | 11,990 | 13,040 | 14,090 | 15,140 |
| 80 | W | 8,680 | 9,140 | 9,600 | 10,180 | 11,060 | 11,940 | 12,830 | 13,720 | 14,610 | 15,500 |
| | T | 8,550 | 9,300 | 10,060 | 10,810 | 11,580 | 12,340 | 13,520 | 14,720 | 15,920 | 17,120 |
| 90 | W | 9,770 | 10,290 | 10,810 | 11,450 | 12,450 | 13,440 | 14,430 | 15,440 | 16,440 | 17,440 |
| | T | 9,530 | 10,380 | 11,220 | 12,080 | 12,940 | 13,800 | 15,010 | 16,360 | 17,710 | 19,060 |
| 100 | W | 10,730 | 11,300 | 11,880 | 12,450 | 13,480 | 14,580 | 15,690 | 16,800 | 17,910 | 19,030 |
| | T | 10,500 | 11,440 | 12,380 | 13,330 | 14,280 | 15,230 | 16,450 | 17,950 | 19,450 | 21,000 |
| 120 | W | 12,870 | 13,570 | 14,260 | 14,940 | 16,170 | 17,490 | 18,820 | 20,200 | 21,500 | 22,800 |
| | T | 12,380 | 13,500 | 14,630 | 15,760 | 16,910 | 18,050 | 19,200 | 21,000 | 22,800 | 24,600 |
| 150 | W | 15,550 | 16,400 | 17,250 | 18,100 | 19,300 | 20,900 | 22,500 | 24,200 | 25,800 | 27,500 |
| | T | 14,910 | 16,320 | 17,720 | 19,140 | 20,600 | 22,000 | 23,400 | 24,700 | 27,200 | 29,400 |

NOTES:

1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the moment value (in kip-feet) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 5. Wheeled- and Tracked-Vehicle Shear (V_{LL} in kips)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | |
|-------|---------------------|--------------------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| | | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 25 |
| 4 | W | 5.00 | 5.00 | 5.26 | 5.60 | 5.84 | 6.28 | 6.62 | 6.88 | 7.10 | 7.48 |
| | T | 2.66 | 4.00 | 5.00 | 5.60 | 6.00 | 6.28 | 6.50 | 6.66 | 6.80 | 7.04 |
| 8 | W | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.26 | 12.00 | 12.60 | 13.68 |
| | T | 4.92 | 7.38 | 9.50 | 10.80 | 11.66 | 12.28 | 12.76 | 13.12 | 13.40 | 13.92 |
| 12 | W | 16.00 | 16.00 | 16.00 | 16.00 | 16.66 | 17.14 | 18.26 | 19.12 | 19.80 | 21.04 |
| | T | 5.34 | 8.00 | 10.66 | 13.20 | 15.00 | 16.28 | 17.24 | 18.00 | 18.60 | 19.68 |
| 16 | W | 20.00 | 20.00 | 20.00 | 20.80 | 21.66 | 22.28 | 23.50 | 24.44 | 25.20 | 26.56 |
| | T | 7.12 | 10.66 | 14.22 | 17.60 | 20.00 | 21.72 | 23.00 | 24.00 | 24.80 | 26.24 |
| 20 | W | 22.00 | 22.66 | 25.50 | 27.20 | 28.34 | 29.14 | 30.76 | 32.00 | 33.00 | 34.80 |
| | T | 8.88 | 13.34 | 17.78 | 22.00 | 25.00 | 27.14 | 28.76 | 30.00 | 31.00 | 32.80 |
| 24 | W | 24.00 | 26.66 | 30.00 | 32.00 | 33.34 | 34.28 | 36.26 | 37.78 | 39.00 | 41.20 |
| | T | 11.06 | 16.00 | 21.34 | 26.40 | 30.00 | 32.56 | 34.50 | 36.00 | 37.20 | 39.36 |
| 30 | W | 27.00 | 29.34 | 33.00 | 35.20 | 36.66 | 37.72 | 40.00 | 41.78 | 43.20 | 45.76 |
| | T | 10.92 | 16.36 | 21.82 | 27.28 | 32.50 | 36.44 | 39.38 | 41.66 | 43.50 | 46.80 |
| 40 | W | 34.00 | 34.66 | 39.00 | 41.60 | 43.34 | 44.58 | 45.50 | 47.78 | 49.60 | 53.44 |
| | T | 13.34 | 20.00 | 26.66 | 33.34 | 40.00 | 45.72 | 50.00 | 53.34 | 56.00 | 60.80 |
| 50 | W | 40.00 | 40.00 | 45.00 | 48.00 | 50.00 | 51.42 | 52.50 | 55.12 | 57.20 | 63.20 |
| | T | 15.38 | 23.08 | 30.76 | 38.46 | 46.16 | 53.56 | 59.38 | 63.88 | 67.50 | 74.00 |
| 60 | W | 46.00 | 46.00 | 49.50 | 54.00 | 57.00 | 59.14 | 60.76 | 62.88 | 65.40 | 71.04 |
| | T | 17.14 | 25.72 | 34.28 | 42.86 | 51.44 | 60.00 | 67.50 | 73.34 | 78.00 | 86.40 |
| 70 | W | 51.00 | 51.00 | 57.76 | 63.00 | 66.50 | 69.00 | 70.88 | 73.50 | 76.66 | 82.32 |
| | T | 18.66 | 28.00 | 37.34 | 46.66 | 56.00 | 65.34 | 74.38 | 81.66 | 87.50 | 98.00 |
| 80 | W | 56.00 | 56.00 | 66.00 | 72.00 | 76.00 | 78.86 | 81.00 | 84.00 | 87.60 | 94.08 |
| | T | 20.00 | 30.00 | 40.00 | 50.00 | 60.00 | 70.00 | 80.00 | 88.88 | 96.00 | 108.80 |
| 90 | W | 60.00 | 63.00 | 74.26 | 81.00 | 85.50 | 88.72 | 91.12 | 94.50 | 98.56 | 105.84 |
| | T | 21.18 | 31.76 | 42.36 | 52.94 | 63.52 | 74.12 | 84.70 | 95.00 | 103.50 | 118.80 |
| 100 | W | 64.00 | 64.00 | 75.00 | 84.00 | 90.00 | 94.28 | 97.50 | 100.00 | 105.00 | 114.00 |
| | T | 22.22 | 33.34 | 44.44 | 55.56 | 66.66 | 77.78 | 88.88 | 100.00 | 110.00 | 128.00 |
| 120 | W | 72.00 | 72.00 | 90.00 | 100.80 | 108.00 | 113.14 | 77.00 | 120.00 | 126.00 | 136.80 |
| | T | 24.00 | 36.00 | 48.00 | 60.00 | 72.00 | 84.00 | 96.00 | 108.00 | 120.00 | 144.00 |
| 150 | W | 84.00 | 84.00 | 94.50 | 109.20 | 119.00 | 126.00 | 131.26 | 135.34 | 140.80 | 155.04 |
| | T | 25.00 | 37.50 | 50.00 | 62.50 | 75.00 | 87.50 | 100.00 | 112.50 | 125.00 | 156.00 |

NOTES:

1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the shear value (in kips) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 5. Wheeled- and Tracked-Vehicle Shear (V_{LL} in kips) (continued)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | | |
|-------|---------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 70 | 80 | 90 | 100 |
| 4 | W | 7.74 | 7.92 | 8.06 | 8.16 | 8.24 | 8.30 | 8.36 | 8.46 | 8.52 | 8.58 | 8.62 |
| | T | 7.20 | 7.32 | 7.40 | 7.46 | 7.52 | 7.56 | 7.60 | 7.66 | 7.70 | 7.74 | 7.76 |
| 8 | W | 14.40 | 14.92 | 15.30 | 15.60 | 15.84 | 16.04 | 16.20 | 16.46 | 16.66 | 16.80 | 16.92 |
| | T | 14.26 | 14.52 | 14.70 | 14.84 | 14.96 | 15.06 | 15.14 | 15.26 | 15.36 | 15.42 | 15.48 |
| 12 | W | 21.86 | 22.46 | 22.90 | 23.24 | 23.52 | 23.74 | 24.26 | 25.08 | 25.70 | 26.18 | 26.56 |
| | T | 20.40 | 20.92 | 21.30 | 21.60 | 21.84 | 22.04 | 22.20 | 22.46 | 22.64 | 22.80 | 22.92 |
| 16 | W | 27.46 | 28.12 | 28.60 | 28.98 | 29.28 | 29.52 | 29.74 | 30.68 | 31.48 | 32.08 | 32.58 |
| | T | 27.20 | 27.88 | 28.40 | 28.80 | 29.12 | 29.38 | 29.60 | 29.94 | 30.20 | 30.40 | 30.56 |
| 20 | W | 36.00 | 36.86 | 37.50 | 38.00 | 38.40 | 38.72 | 39.00 | 39.94 | 40.96 | 41.74 | 42.36 |
| | T | 34.00 | 34.86 | 35.50 | 36.00 | 36.40 | 36.72 | 37.00 | 37.44 | 37.76 | 38.00 | 38.20 |
| 24 | W | 42.66 | 43.72 | 44.50 | 45.12 | 45.60 | 46.00 | 46.34 | 46.92 | 48.06 | 48.94 | 49.64 |
| | T | 40.80 | 41.84 | 42.60 | 43.20 | 43.68 | 44.08 | 44.40 | 44.92 | 45.30 | 45.60 | 45.84 |
| 30 | W | 47.46 | 48.68 | 49.60 | 50.32 | 51.20 | 52.72 | 54.00 | 56.00 | 57.50 | 58.66 | 59.60 |
| | T | 49.00 | 50.56 | 51.76 | 52.66 | 53.40 | 54.00 | 54.50 | 55.28 | 55.88 | 56.34 | 56.70 |
| 40 | W | 57.86 | 61.02 | 63.40 | 65.24 | 66.72 | 68.84 | 70.94 | 74.22 | 76.70 | 78.62 | 80.16 |
| | T | 64.00 | 66.28 | 68.00 | 69.34 | 70.40 | 71.28 | 72.00 | 73.14 | 74.00 | 74.66 | 75.20 |
| 50 | W | 69.34 | 73.72 | 77.00 | 80.62 | 84.16 | 87.06 | 89.46 | 93.26 | 96.10 | 98.32 | 100.08 |
| | T | 78.34 | 81.44 | 83.76 | 85.56 | 87.00 | 88.18 | 89.16 | 90.72 | 91.88 | 92.78 | 93.50 |
| 60 | W | 79.86 | 84.18 | 90.90 | 94.58 | 97.52 | 99.92 | 102.86 | 108.18 | 112.16 | 115.24 | 117.72 |
| | T | 92.00 | 96.00 | 99.00 | 101.34 | 103.20 | 104.72 | 106.00 | 108.00 | 109.50 | 110.66 | 111.20 |
| 70 | W | 91.94 | 98.80 | 103.96 | 107.96 | 111.16 | 113.78 | 116.44 | 122.80 | 127.58 | 131.28 | 134.26 |
| | T | 105.00 | 110.00 | 113.76 | 116.66 | 119.00 | 120.92 | 122.50 | 125.00 | 126.88 | 128.34 | 129.50 |
| 80 | W | 98.40 | 106.52 | 113.20 | 118.40 | 122.56 | 125.96 | 128.80 | 133.26 | 139.40 | 144.36 | 148.32 |
| | T | 117.34 | 123.44 | 128.00 | 131.56 | 134.40 | 136.72 | 138.66 | 141.72 | 144.00 | 145.78 | 147.20 |
| 90 | W | 110.70 | 119.82 | 127.36 | 133.20 | 137.88 | 141.70 | 144.90 | 149.92 | 156.82 | 162.40 | 166.86 |
| | T | 129.00 | 136.28 | 141.76 | 146.00 | 149.40 | 152.18 | 154.50 | 158.14 | 160.88 | 163.00 | 164.70 |
| 100 | W | 120.04 | 129.14 | 138.00 | 144.88 | 150.40 | 154.90 | 158.66 | 164.58 | 169.38 | 176.12 | 181.50 |
| | T | 140.00 | 148.56 | 155.00 | 160.00 | 164.00 | 167.28 | 170.00 | 174.28 | 177.50 | 180.00 | 182.00 |
| 120 | W | 144.04 | 154.98 | 165.60 | 173.86 | 180.48 | 185.88 | 190.40 | 197.48 | 203.20 | 211.40 | 217.80 |
| | T | 160.00 | 171.42 | 180.00 | 186.66 | 192.00 | 196.36 | 200.00 | 205.80 | 210.00 | 213.40 | 216.00 |
| 150 | W | 165.96 | 171.32 | 178.90 | 191.52 | 202.40 | 210.80 | 218.00 | 229.40 | 243.20 | 254.00 | 262.60 |
| | T | 180.00 | 197.14 | 210.00 | 220.00 | 228.00 | 234.60 | 240.00 | 248.60 | 255.00 | 260.00 | 264.00 |

NOTES:

1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the shear value (in kips) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 5. Wheeled- and Tracked-Vehicle Shear (V_{LL} in kips) (continued)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | |
|-------|---------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 110 | 120 | 130 | 140 | 150 | 160 | 170 | 180 | 190 | 200 |
| 4 | W | 8.66 | 9.04 | 9.66 | 10.26 | 10.78 | 11.22 | 11.62 | 11.98 | 12.30 | 12.58 |
| | T | 7.88 | 8.54 | 9.12 | 9.60 | 10.02 | 10.40 | 10.72 | 11.02 | 11.28 | 11.52 |
| 8 | W | 17.02 | 17.50 | 18.56 | 19.80 | 20.88 | 21.82 | 22.66 | 23.40 | 24.06 | 24.66 |
| | T | 15.66 | 16.94 | 18.10 | 19.08 | 19.94 | 20.70 | 21.36 | 21.96 | 22.48 | 22.96 |
| 12 | W | 26.88 | 27.14 | 27.54 | 28.42 | 30.26 | 32.08 | 33.72 | 35.18 | 36.48 | 37.66 |
| | T | 23.04 | 24.40 | 26.20 | 27.78 | 29.12 | 30.30 | 31.34 | 32.26 | 33.10 | 33.84 |
| 16 | W | 33.00 | 33.30 | 33.78 | 34.82 | 37.10 | 39.34 | 41.38 | 43.18 | 44.82 | 46.28 |
| | T | 30.70 | 32.54 | 34.96 | 37.02 | 38.82 | 40.40 | 41.78 | 43.02 | 44.12 | 45.12 |
| 20 | W | 42.88 | 43.30 | 43.90 | 45.26 | 48.24 | 51.16 | 53.78 | 56.14 | 58.24 | 60.12 |
| | T | 38.38 | 40.66 | 43.70 | 46.28 | 48.54 | 50.50 | 52.24 | 53.78 | 55.16 | 56.40 |
| 24 | W | 50.22 | 50.70 | 51.42 | 53.02 | 56.56 | 59.96 | 63.02 | 65.74 | 67.34 | 70.36 |
| | T | 46.06 | 48.80 | 52.44 | 55.54 | 58.24 | 60.60 | 62.68 | 64.54 | 66.18 | 67.68 |
| 30 | W | 60.36 | 61.00 | 61.90 | 63.82 | 67.84 | 71.96 | 74.72 | 79.06 | 82.06 | 84.76 |
| | T | 57.00 | 59.10 | 63.70 | 67.72 | 71.20 | 74.26 | 76.94 | 79.34 | 81.48 | 83.40 |
| 40 | W | 81.42 | 82.46 | 83.36 | 85.72 | 88.48 | 93.50 | 98.72 | 103.68 | 108.12 | 112.12 |
| | T | 75.64 | 77.78 | 83.70 | 89.14 | 93.86 | 98.00 | 101.64 | 104.88 | 107.78 | 110.40 |
| 50 | W | 101.52 | 102.74 | 103.76 | 106.92 | 110.58 | 116.80 | 123.20 | 129.24 | 134.66 | 139.52 |
| | T | 94.08 | 96.16 | 103.08 | 110.00 | 116.00 | 121.26 | 125.88 | 130.00 | 133.68 | 137.00 |
| 60 | W | 119.74 | 121.42 | 122.86 | 124.82 | 127.14 | 134.36 | 141.98 | 149.48 | 156.34 | 162.52 |
| | T | 112.36 | 114.28 | 121.84 | 130.28 | 137.60 | 144.00 | 149.64 | 154.66 | 159.16 | 163.20 |
| 70 | W | 136.70 | 138.72 | 140.44 | 142.70 | 147.76 | 153.30 | 161.98 | 170.62 | 178.62 | 185.78 |
| | T | 130.46 | 132.22 | 140.00 | 150.00 | 158.66 | 166.26 | 172.94 | 178.88 | 184.20 | 189.00 |
| 80 | W | 151.56 | 154.26 | 156.56 | 158.52 | 163.42 | 168.70 | 175.90 | 185.24 | 194.86 | 203.60 |
| | T | 148.36 | 150.00 | 157.70 | 169.14 | 179.20 | 187.78 | 195.54 | 202.40 | 208.60 | 214.20 |
| 90 | W | 170.50 | 173.54 | 176.12 | 178.32 | 183.84 | 189.78 | 197.70 | 208.40 | 219.20 | 229.00 |
| | T | 166.08 | 167.64 | 175.12 | 187.72 | 199.20 | 209.20 | 218.20 | 226.00 | 233.00 | 239.40 |
| 100 | W | 185.90 | 189.58 | 192.70 | 195.36 | 200.00 | 207.00 | 213.80 | 224.40 | 235.80 | 247.00 |
| | T | 183.64 | 185.18 | 192.30 | 205.80 | 218.60 | 230.00 | 240.00 | 248.80 | 256.80 | 264.00 |
| 120 | W | 223.00 | 227.60 | 231.20 | 234.40 | 240.00 | 248.40 | 256.40 | 269.20 | 283.00 | 296.40 |
| | T | 218.20 | 220.00 | 226.20 | 240.00 | 256.00 | 270.00 | 282.40 | 293.40 | 303.20 | 312.00 |
| 150 | W | 269.60 | 275.40 | 280.40 | 284.60 | 289.60 | 299.60 | 309.60 | 320.60 | 336.40 | 352.60 |
| | T | 267.20 | 270.00 | 274.00 | 285.80 | 304.00 | 322.60 | 338.80 | 353.40 | 366.40 | 378.00 |

NOTES:

1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the shear value (in kips) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 5. Wheeled- and Tracked-Vehicle Shear (V_{LL} in kips) (continued)

| Class | Wheeled/ Tracked | Span Length (feet) | | | | | | | | | |
|-------|---------------------|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | 210 | 220 | 230 | 240 | 250 | 260 | 270 | 280 | 290 | 300 |
| 4 | W | 12.84 | 13.08 | 13.40 | 13.92 | 14.44 | 14.94 | 15.38 | 15.80 | 16.18 | 16.54 |
| | T | 11.74 | 12.10 | 12.62 | 13.10 | 13.54 | 13.94 | 14.32 | 14.66 | 14.98 | 15.28 |
| 8 | W | 25.20 | 25.68 | 26.20 | 27.06 | 28.08 | 29.08 | 30.00 | 30.86 | 31.66 | 32.40 |
| | T | 23.40 | 24.06 | 25.10 | 26.04 | 26.92 | 27.74 | 28.48 | 29.18 | 29.84 | 30.44 |
| 12 | W | 38.72 | 39.70 | 40.58 | 41.38 | 42.12 | 43.00 | 44.30 | 45.82 | 47.34 | 48.76 |
| | T | 34.52 | 35.16 | 36.46 | 37.94 | 39.32 | 40.56 | 41.74 | 42.82 | 43.82 | 44.76 |
| 16 | W | 47.60 | 48.80 | 49.88 | 50.90 | 51.82 | 52.86 | 54.44 | 56.32 | 58.20 | 59.96 |
| | T | 46.02 | 46.86 | 48.62 | 50.60 | 52.42 | 54.10 | 55.64 | 57.08 | 58.42 | 59.68 |
| 20 | W | 61.82 | 63.38 | 64.80 | 66.10 | 67.30 | 68.64 | 70.72 | 73.16 | 75.60 | 77.88 |
| | T | 57.52 | 58.58 | 60.78 | 63.24 | 65.52 | 67.62 | 69.56 | 71.36 | 73.04 | 74.60 |
| 24 | W | 72.34 | 74.14 | 75.80 | 77.30 | 78.68 | 80.28 | 82.72 | 85.58 | 88.42 | 91.08 |
| | T | 69.02 | 70.30 | 72.94 | 75.90 | 78.62 | 81.14 | 83.46 | 85.62 | 87.64 | 89.52 |
| 30 | W | 87.20 | 89.42 | 91.44 | 93.30 | 95.00 | 96.96 | 99.82 | 103.20 | 106.68 | 109.92 |
| | T | 85.14 | 86.72 | 88.94 | 92.62 | 96.12 | 99.34 | 102.34 | 105.10 | 107.68 | 110.10 |
| 40 | W | 115.74 | 119.02 | 122.02 | 124.76 | 127.30 | 129.64 | 132.42 | 135.40 | 139.62 | 144.08 |
| | T | 112.76 | 114.90 | 117.40 | 122.00 | 126.72 | 131.08 | 135.12 | 138.86 | 142.34 | 145.60 |
| 50 | W | 143.92 | 147.92 | 151.58 | 154.94 | 158.02 | 160.86 | 164.38 | 168.22 | 173.46 | 178.96 |
| | T | 140.00 | 142.72 | 145.48 | 150.62 | 156.60 | 162.12 | 167.22 | 171.96 | 176.38 | 180.50 |
| 60 | W | 168.12 | 173.20 | 177.84 | 182.10 | 186.02 | 189.64 | 192.98 | 197.20 | 201.84 | 207.74 |
| | T | 166.86 | 170.18 | 173.30 | 178.58 | 185.76 | 192.46 | 198.66 | 204.40 | 209.80 | 214.80 |
| 70 | W | 192.26 | 198.16 | 203.60 | 208.40 | 213.00 | 217.20 | 221.20 | 226.00 | 231.20 | 237.80 |
| | T | 193.34 | 197.28 | 200.80 | 206.20 | 214.20 | 222.20 | 229.40 | 236.20 | 242.60 | 248.60 |
| 80 | W | 211.40 | 218.40 | 225.00 | 231.00 | 236.40 | 241.40 | 246.20 | 250.60 | 256.20 | 262.00 |
| | T | 219.20 | 224.00 | 228.20 | 233.40 | 242.00 | 251.00 | 259.60 | 267.40 | 274.80 | 281.60 |
| 90 | W | 237.80 | 245.80 | 253.20 | 259.80 | 266.00 | 271.60 | 277.00 | 281.80 | 288.20 | 294.80 |
| | T | 245.20 | 250.40 | 255.20 | 260.20 | 269.00 | 279.40 | 289.00 | 298.00 | 306.40 | 314.20 |
| 100 | W | 257.20 | 266.40 | 274.80 | 282.60 | 289.60 | 296.20 | 302.20 | 307.80 | 313.60 | 321.20 |
| | T | 370.40 | 276.40 | 281.80 | 287.00 | 295.40 | 307.00 | 317.80 | 327.80 | 337.20 | 346.00 |
| 120 | W | 308.60 | 319.60 | 329.80 | 339.00 | 347.60 | 355.40 | 362.80 | 369.40 | 376.40 | 385.40 |
| | T | 320.00 | 327.20 | 334.00 | 340.00 | 348.00 | 360.00 | 373.40 | 385.80 | 397.20 | 408.00 |
| 150 | W | 368.20 | 382.40 | 395.54 | 407.20 | 418.20 | 428.80 | 437.60 | 446.20 | 454.20 | 463.00 |
| | T | 388.60 | 398.20 | 407.00 | 415.00 | 422.60 | 432.60 | 446.80 | 462.80 | 478.00 | 492.00 |

NOTES:
1. If the span length falls between two lengths listed in this table, use the column pertaining to the longer of the two.
2. If the shear value (in kips) falls between two MLC rows, use the row pertaining to the lower and therefore more conservative MLC.

Table 6. Profile Factors

| Profile | Factor | Remarks |
|----------------------------------|---------------------------------|---|
| For a span-to-rise ratio up to 4 | 1.0 | For a given load, a flat arch of steeper profile (although it has a very large rise) may fail due to the crown's action as a smaller, flatter arch. |
| For a span-to rise ratio over 4 | See <i>Figure 13</i> , page 26. | |

Table 7. Arch Factors

| Material | | | Factor |
|---|---|--|---|
| Granite, white stone, and built-in course masonry | | | 1.50 |
| Concrete or blue engineering bricks | | | 1.20 |
| Good limestone masonry and building blocks | | | 1.00 |
| Poor masonry or brick (any kind) | | | 0.50 |
| Joint Factors | | | |
| Joint | | | Factor |
| Thin joints (1/10 inch or less) | | | 1.25 |
| Normal joints (width to 1/4 inch, pointed mortar) | | | 1.00 |
| Normal joints (unpointed mortar) | | | 0.90 |
| Joints over 1/4 inch wide (irregular good mortar) | | | 0.80 |
| Joints over 1/14 inch wide (mortar containing voids deeper than 1/10 of the ring thickness) | | | 0.70 |
| Joints 1/2 inch or more wide (poor mortar) | | | 0.50 |
| Deformations | | | |
| Condition | Adjustment | Comment | |
| The rise over the affected portion is always positive | Span-to-rise ratio of affected portion to whole arch applied | Arch ring deformation may be due to partial failure of the ring (usually accompanied by a sag in the parapet) or movement at the abutment. | |
| A flat section of profile exists | Maximum: class = 12 | | |
| A portion of the ring is sagging | Maximum: class = 5 (if the fill at the crown exceeds 18 inches) | | |
| Abutment Size Factors | | | |
| Abutment | | Factor | Comment |
| Both abutments are satisfactory | | 1.00 | An abutment may be regarded as inadequate to resist the full thrust of the arch if— <ul style="list-style-type: none"> • The bridge is on a narrow embankment, particularly if the approaches slope steeply up to the bridge. • The bridge is on an embanked curve. • The abutment walls are very short and suggest little solid fill behind the arch. |
| One abutment is unsatisfactory | | 0.95 | |
| Both abutments are unsatisfactory | | 0.90 | |
| Both abutments are massive (clay fill suspected) | | 0.70 | |
| Arch is supported on one abutment and one pier | | 0.90 | |
| Arch is carried on two piers | | 0.80 | |

Table 7. Arch Factors (continued)

| Abutment Fault Factors | | |
|---|----------------------|---|
| Type of Fault | Factor | |
| Inward movement of one abutment | 0.75-0.50 | |
| Outward spread of abutment | 100.00-0.50 | |
| Vertical settlement of one abutment | 0.90-0.50 | |
| Crack Factors | | |
| Type of Crack | Factor | Note |
| Longitudinal cracks within 2 feet of the edge of the arch, wider than 1/4 inch and longer than 1/10 of the span, in bridges that are— <ul style="list-style-type: none"> • Wider than 20 feet between parapets. • Narrower than 20 feet between parapets. | 1.00 0.70 | This type of longitudinal crack is due to an outward force on the spandrel walls caused by a lateral spread of the fill. |
| Longitudinal cracks in the middle third of the bridge with— <ul style="list-style-type: none"> • One small crack under 1/8 inch wide and shorter than 1/10 of the span. • Three or more small cracks as above. • One large crack wider than 1/4 inch and longer than 1/10 of the span. | 1.00 0.50 0.50 | This type of longitudinal crack is due to varying amounts of subsidence found along the length of the abutment. Large cracks are danger signs indicating that the arch ring has broken up into narrower, independent rings. |
| Lateral and diagonal cracks less than 1/8 inch wide and shorter than 1/10 of the arch width | 1.00 | Lateral cracks are usually found near the quarter points and result from permanent deformation of the arch, which may be caused by partial collapse of the arch or by abutment movement. |
| Lateral and diagonal cracks wider than 1/4 inch and longer than 1/10 of the arch width: Restrict load class to 12 or to the calculated class using all other applicable factors, whichever is less. | | Diagonal cracks, usually starting near the sides of the arch near the spring lines and propagating toward the center of the arch at the crown, are probably due to the subsiding of one or both of the abutments. This indicates that the bridge is in a dangerous condition. |
| Cracks between the arch ring and spandrel or parapet wall greater than 1/10 of the span due to the fill spread | 0.90 | This type of crack is due to spreading of the fill pushing the wall outward or the movement of a flexible ring away from a stiff fill, so that the two act independently. The latter type of failure often produces cracks in the spandrel wall near the quarter points. |
| Cracks between the arch ring and spandrel or parapet wall due to a dropped ring: Reclassify from the nomograph, taking the crown thickness as that of the ring alone. | | |

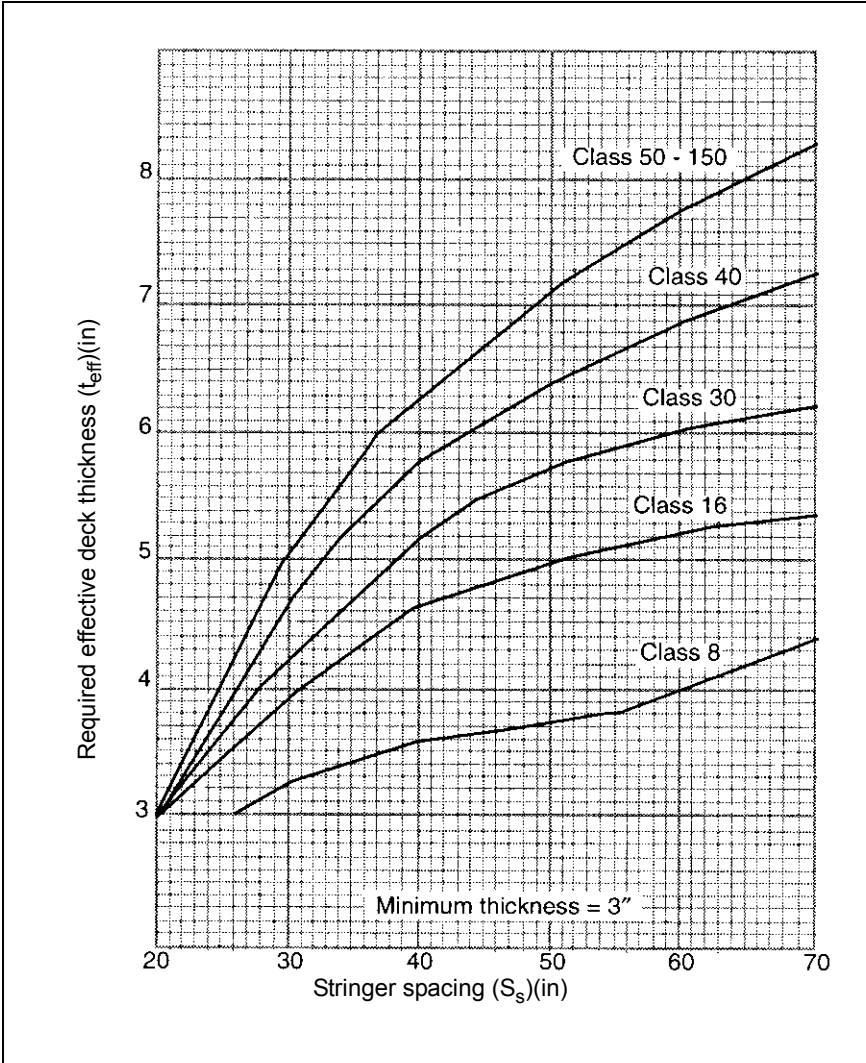


Figure 9. Timber Deck Classification

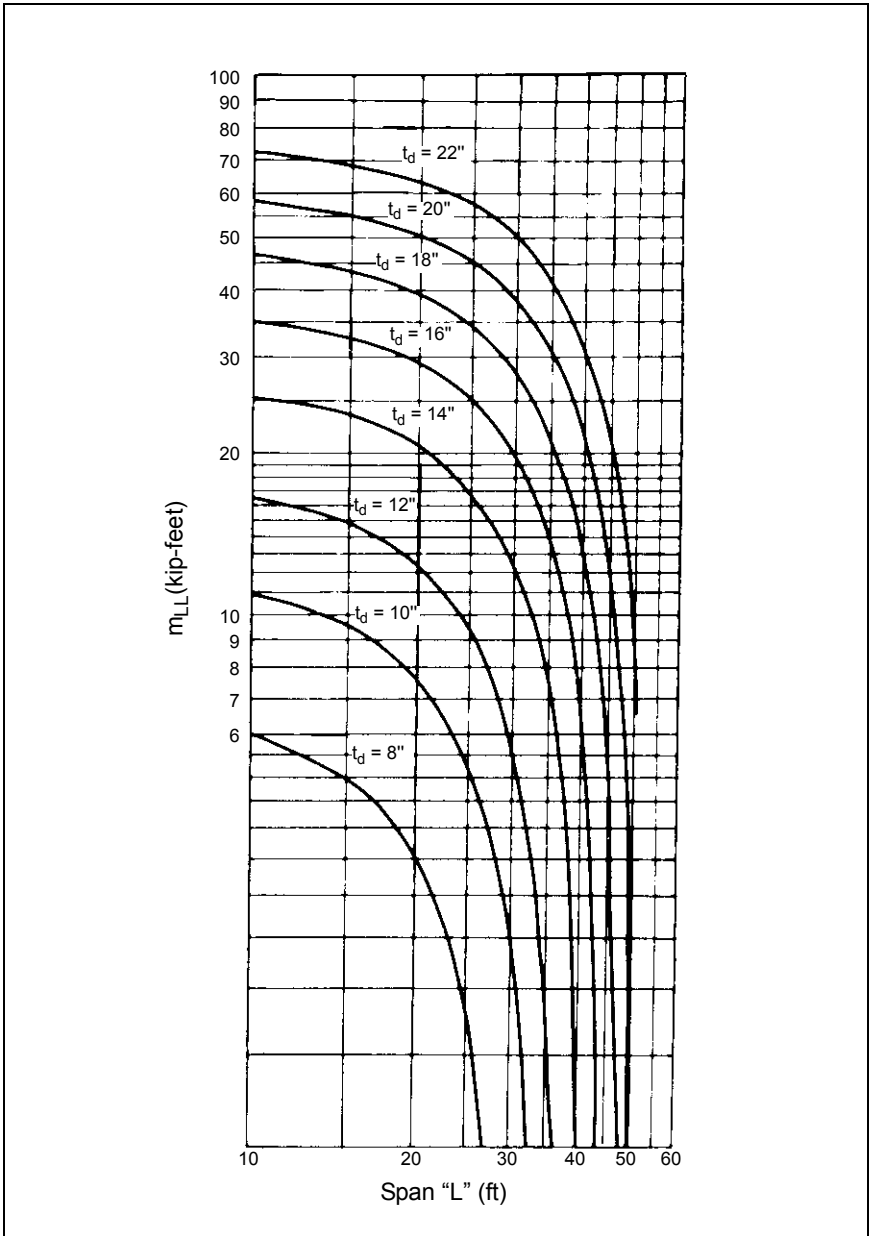


Figure 10. Live Load Moment for a 12-Inch Reinforced Concrete Strip

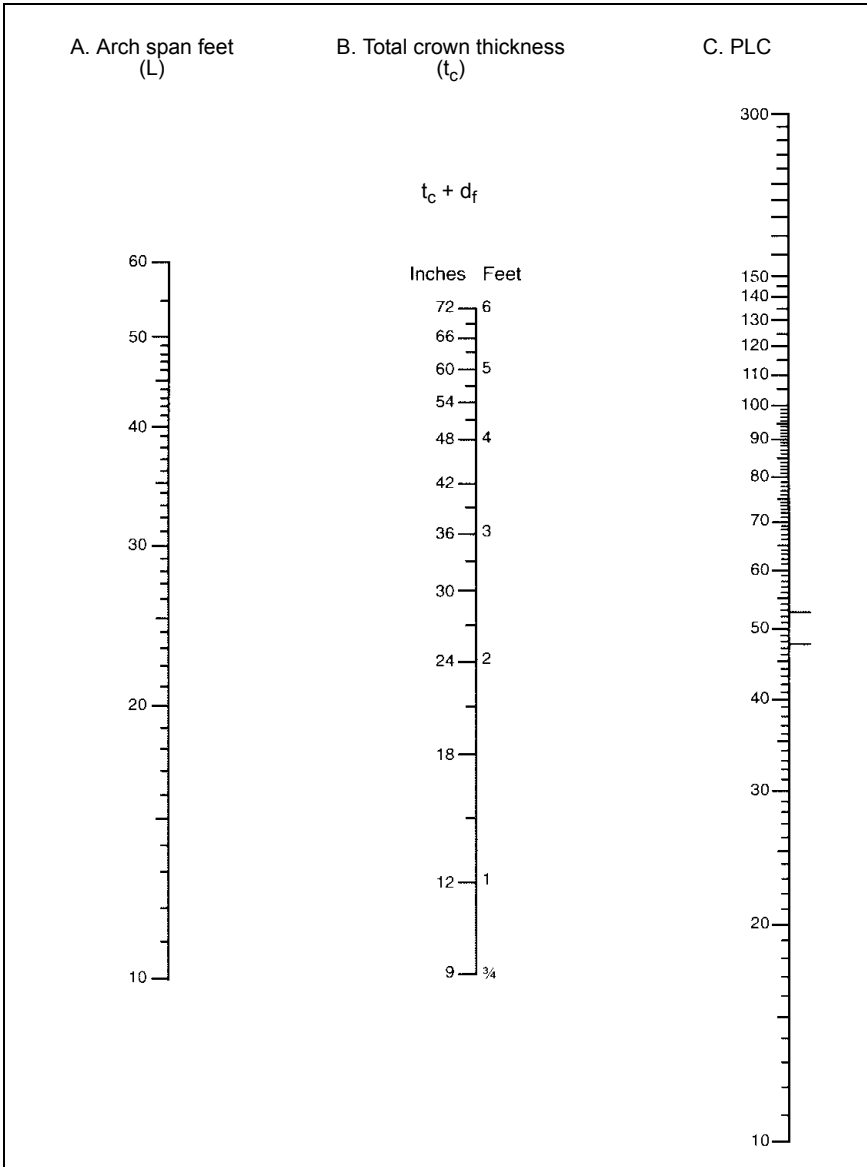


Figure 11. Masonry Arch Provisional Load Classification (PLC)

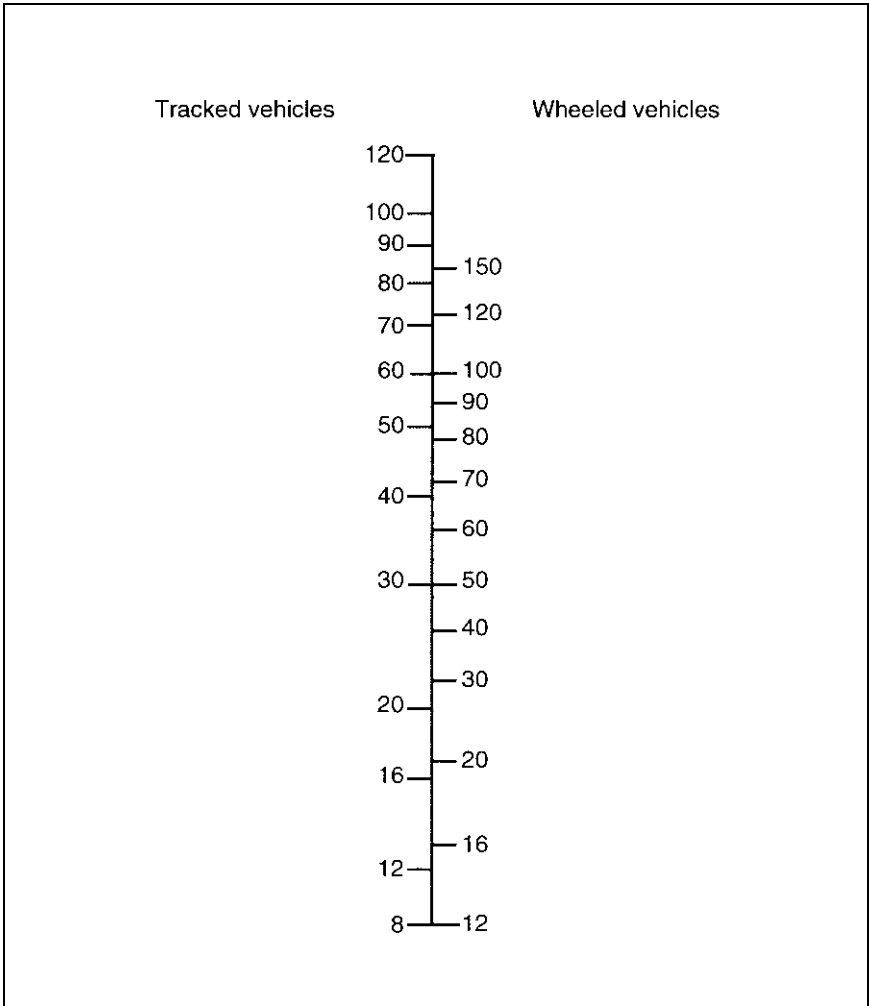


Figure 12. Bridge Class

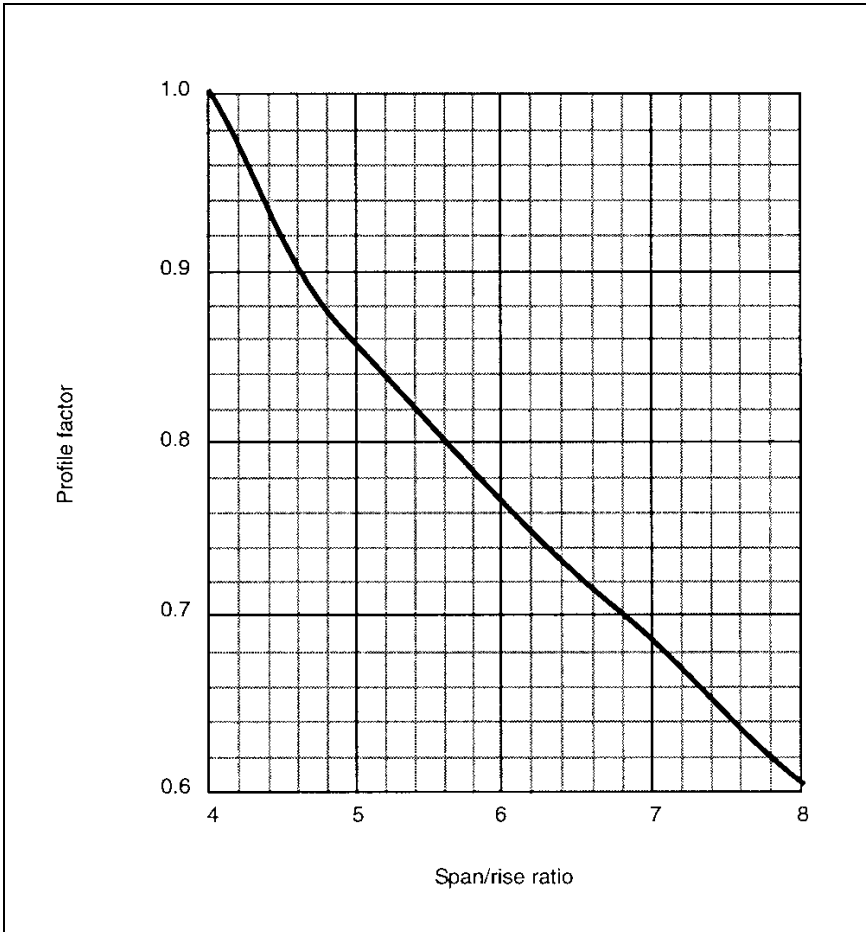


Figure 13. Profile Factors for Arch Bridges

Table 8. Military Load Classification Chart

| Model | Item Description | LIN | MLC Empty | MLC Loaded |
|----------------|--|----------------------------|-----------|------------|
| AVLB | AVLB, M60 chassis | | 43 | 58 |
| CCE 130G | Grader, road | G74783 | 18 | 18 |
| D7 | Dozer, w/blade, w/winch | W76816 | 19 | 23 |
| FLU-419 | Small-emplacement excavator tractor | T34437 | 9 | 9 |
| LMTV | Trailer, cargo, 2.5-ton | Z36068 | <3 | 4 |
| M1000 | HET trailer | S70859 | 18 | * |
| M1070 | HET | T59048 | 18 | * |
| M1070 & M1000 | HET w/ Trailer | | 31 | * |
| M1070 & M1000 | HET w/ Trailer and M1A1 tank | | | 96 |
| M1070 & M1000 | HET w/ Trailer and M1A1 tank w/ Minefield Clearing Blade | | | 101 |
| M1074 | PLS w/crane | T41067 | 25 | 41 |
| M1076 | PLS trailer | T93761 | 8 | 26 |
| M1078 | Truck, cargo, 4x4 LMTV w/equipment w/ or w/o winch | T60081 | 9 | 12 |
| M109 A4/A5 | Howitzer, 155 mm, SP | K57667 | 28 | 28 |
| M110A2 | Howitzer, heavy, SP, 8-in. | K56981 | 28 | 31 |
| M113A2/A3; M58 | Carrier, personnel, Wolf (M113-based) | D12087 C18284 G87229 | 13 | 13 |
| M149A2 | Trailer, tank, water | W98825 | 2 | 4 |
| M1A1 | Tank, combat, 120-mm, w/o heavy armor kit | T13168 | 70 | 70 |
| M1A1 | Tank w/minefield clearing blade | | 79 | 79 |
| M1A1 | Tank w/roller | | 88 | 88 |
| M1A2 | Tank, combat, 120-mm, w/o heavy armor kit | T13305 | 70 | 70 |
| M2 | Cavalry fighting vehicle | J81750 | 21 | 25 |
| M200A1 | Chassis, trailer, 2.5-ton | E02807 | <3 | 5 |
| M2A1 | Infantry/TOW/cavalry fighting vehicle | F40307 | 23 | 30 |
| M2A2 | Infantry/TOW/cavalry fighting vehicle | F40375 | 27 | 33 |
| M3 | Cavalry fighting vehicle | C76335 | 21 | 25 |
| M35A2 | Truck, cargo, 2.5-ton, 6x6, w/equipment | X40009 | 6 | 7 |
| M54 series | Truck, cargo, 5-ton 6x6, w/winch, w/equipment | X40831 X40968 | 9 | 19 |
| M548 | Carrier, cargo, 6-ton | D11049 | 7 | 13 |
| M577A1 | Carrier, command post | D11538 | 11 | 12 |
| M88A1 | Vehicle (medium), recovery | ME1377 | 56 | 56 |

Table 8. Military Load Classification Chart (continued)

| Model | Item Description | LIN | MLC Empty | MLC Loaded |
|--------------|---|------------|------------------|-------------------|
| M9 ACE | ACE | MB0589 | 17 | 30 |
| M929A2 | Truck, dump, 5-ton | X43708 | 10 | 16 |
| M977 | Truck, cargo (HEMTT) | T39518 | 18 | 28 |
| M978 | Truck, tanker (HEMTT) | T58161 | 18 | 25 |
| M981 | Fire support vehicle | C12155 | 14 | 14 |
| M992 | Carrier, ammo, tracked vehicle | C10908 | 22 | 29 |
| M997 | Truck, ambulance litter, 4x4 | T38844 | <3 | 4 |
| M998 series | Truck, utility, cargo, troop carrier, 1.25-ton, (HMMWV) | T61494 | <3 | 4 |

* The MLC is determined by the equipment being hauled.

Model: This field relates to the model description for an NSN. Vehicles contained in the table are sorted alphabetically and numerically by their model number.

LIN: This is a six-character alphanumeric identification assigned to a generic nomenclature to describe collectively all NSN items possessing the functional capability expressed by the LIN description. When multiple LINs are listed, the MLC of the heaviest vehicle is given in the MLC column.

This is only a partial listing of the MLC table. For a more complete listing, refer to <http://www.wood.army.mil>, Center for Lessons Learned.

