



# BUILDING IN ALASKA

HCM-00752

**TABLE 1. ALLOWABLE LOADS FOR ROUND TIMBER**  
Axel R. Carlson, Extension Engineer Emeritus

| (D)       | (A)                     | (P)            | (Z)                                | (I)                               | Span (Feet) (L)                   |       |       |       |       |       |       |       |       |      |      |      |      |      |
|-----------|-------------------------|----------------|------------------------------------|-----------------------------------|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|
|           |                         |                |                                    |                                   | 6                                 | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15   | 16   | 17   | 18   | 19   |
| Dia. (In) | Area (In <sup>2</sup> ) | Weight (Lb/ft) | Section Modulus (In <sup>3</sup> ) | Moment Inertia (In <sup>4</sup> ) | Load (Pounds per Lineal Foot) (W) |       |       |       |       |       |       |       |       |      |      |      |      |      |
| 6         | 28.2                    | 5.5            | 21.1                               | 63.6                              | 523                               | 329   | 221   | 1556  | 113   | 84    | 65    | 51    | 41    | 33   | 27   | 23   | 19   | 16   |
| 7         | 38.5                    | 7.5            | 33.7                               | 117.9                             | 970                               | 611   | 409   | 281   | 209   | 157   | 121   | 95    | 76    | 62   | 51   | 42   | 35   | 30   |
| 8         | 50.3                    | 9.8            | 50.2                               | 201.1                             | 1655                              | 1042  | 698   | 490   | 357   | 268   | 206   | 162   | 130   | 105  | 87   | 72   | 61   | 52   |
| 9         | 63.6                    | 12.4           | 71.6                               | 322.1                             | 2651                              | 1669  | 1118  | 785   | 572   | 430   | 331   | 260   | 208   | 169  | 139  | 116  | 98   | 83   |
| 10        | 78.5                    | 15.3           | 98.1                               | 490.9                             | 4040                              | 2544  | 1704  | 1171  | 872   | 655   | 505   | 397   | 318   | 258  | 213  | 177  | 149  | 127  |
| 11        | 95.0                    | 18.5           | 130.7                              | 718.7                             | 5915                              | 3725  | 2495  | 1752  | 1277  | 959   | 739   | 581   | 465   | 378  | 311  | 260  | 219  | 186  |
| 12        | 113.1                   | 22.1           | 169.7                              | 1017.9                            | 8377                              | 5275  | 3534  | 2482  | 1809  | 1359  | 1047  | 823   | 659   | 536  | 441  | 368  | 310  | 263  |
| 13        | 132.7                   | 25.9           | 215.7                              | 1402.0                            | 11539                             | 7266  | 4968  | 3418  | 2492  | 1872  | 1442  | 1134  | 908   | 738  | 608  | 507  | 427  | 363  |
| 14        | 153.9                   | 30.3           | 269.4                              | 1885.7                            | 13081                             | 9771  | 6547  | 4598  | 3352  | 2518  | 1940  | 1525  | 1221  | 993  | 818  | 682  | 574  | 488  |
| 15        | 176.7                   | 34.5           | 331.3                              | 2485.1                            | 15019                             | 12080 | 8628  | 6060  | 4417  | 3319  | 2556  | 2010  | 1610  | 1309 | 1078 | 899  | 757  | 644  |
| 16        | 201.1                   | 39.2           | 402.1                              | 3217.0                            | 17093                             | 14651 | 11170 | 7985  | 5719  | 4296  | 3309  | 2603  | 2084  | 1694 | 1396 | 1164 | 980  | 833  |
| 17        | 227.0                   | 44.3           | 482.3                              | 4099.8                            | 19295                             | 16534 | 14235 | 9997  | 7288  | 5474  | 4217  | 3317  | 2655  | 2159 | 1779 | 1483 | 1249 | 1062 |
| 18        | 254.5                   | 49.6           | 572.6                              | 5153.0                            | 21632                             | 18542 | 16224 | 12566 | 9160  | 6882  | 5301  | 4169  | 3338  | 2714 | 2236 | 1864 | 1570 | 1335 |
| 19        | 283.5                   | 55.3           | 673.4                              | 6397.1                            | 24097                             | 20655 | 18073 | 15600 | 11372 | 8544  | 6581  | 5176  | 4144  | 3369 | 2776 | 2314 | 1950 | 1658 |
| 20        | 314.1                   | 61.2           | 785.4                              | 7854.0                            | 26698                             | 22884 | 20023 | 17799 | 13962 | 10490 | 8080  | 6355  | 5088  | 4137 | 3408 | 2841 | 2394 | 2036 |
| 21        | 346.4                   | 67.6           | 909.2                              | 9546.6                            | 29444                             | 25237 | 22083 | 19629 | 16971 | 12751 | 9821  | 7724  | 6185  | 5028 | 4103 | 3454 | 2910 | 2474 |
| 22        | 380.1                   | 74.1           | 1045.4                             | 11499.0                           | 32308                             | 27691 | 24231 | 21539 | 19385 | 15358 | 11830 | 9304  | 7449  | 6057 | 4990 | 4160 | 3505 | 2980 |
| 23        | 415.5                   | 81.0           | 1194.5                             | 13736.7                           | 35317                             | 30272 | 26456 | 23545 | 21190 | 16300 | 14132 | 11115 | 8899  | 7235 | 5962 | 4970 | 4187 | 3526 |
| 24        | 452.4                   | 88.2           | 1357.2                             | 16286.0                           | 38454                             | 32960 | 28890 | 25636 | 23072 | 17748 | 16755 | 13178 | 10551 | 8578 | 7068 | 5893 | 4964 | 4221 |

Notes:

(1)  $A = \frac{\pi D^2}{4}$  (2)  $P = \frac{A \times 28}{144} = 0.195 A$  (3)  $Z = \frac{D^3}{32}$  (4)  $I = \frac{D^4}{64}$  (5) Deflection ( $\Delta$ ) =  $\frac{5 \times 1728 \times W L^4}{384 E I} = \frac{12 L}{360}$  (6)  $E = 1,200,000$

(7) Load (W) above dotted line is based on deflection ( $\Delta$ ) of 1/360, such that  $W_{d1} = 1778 I/L^3$ .

(8) Load (W) includes weight (P) of log beam.

(9) Use minimum or top diameter (D) of log. If shape of log beam is altered, use minimum dimension or calculate new moment or inertia (I).

(10) Load (W) below dotted line is based on vertical shear or compression,  $C_f = 255$ , p.s.f., perpendicular to grain, such that  $W = 2C_f A/L$ .



**TABLE 2. ALLOWABLE LOADS FOR ROUND TIMBER**

**Axel R. Carlson**  
Retired Extension Engineer

| (D)       | (A)                     | (P)            | (Z)                                | (I)                               | Span (Feet) (L)                   |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-----------|-------------------------|----------------|------------------------------------|-----------------------------------|-----------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|           |                         |                |                                    |                                   | 20                                | 21   | 22   | 23   | 24   | 25   | 26   | 27   | 28   | 29   | 30   | 31   | 32   | 33   |
| Dia. (In) | Area (In <sup>2</sup> ) | Weight (Lb/ft) | Section Modulus (In <sup>3</sup> ) | Moment Inertia (In <sup>4</sup> ) | Load (Pounds per Lineal Feet) (W) |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 8         | 50.3                    | 9.8            | 50.2                               | 201.1                             | 44                                | 38   | 33   | 29   | 25   | 22   | 20   | 18   | 16   | 14   | 13   | 12   | 11   | 10   |
| 9         | 63.6                    | 12.4           | 71.6                               | 322.1                             | 71                                | 61   | 53   | 47   | 46   | 36   | 32   | 29   | 26   | 23   | 21   | 19   | 17   | 16   |
| 10        | 78.5                    | 15.3           | 98.1                               | 490.2                             | 109                               | 94   | 81   | 71   | 63   | 55   | 49   | 44   | 39   | 35   | 32   | 29   | 26   | 24   |
| 11        | 95.0                    | 18.5           | 130.7                              | 718.7                             | 158                               | 137  | 119  | 105  | 92   | 80   | 72   | 64   | 58   | 52   | 47   | 42   | 38   | 36   |
| 12        | 113.1                   | 22.1           | 169.7                              | 1017.9                            | 226                               | 195  | 169  | 148  | 130  | 115  | 102  | 91   | 82   | 74   | 67   | 60   | 55   | 50   |
| 13        | 132.7                   | 25.9           | 215.7                              | 1402.0                            | 311                               | 269  | 234  | 204  | 180  | 159  | 141  | 126  | 113  | 102  | 92   | 83   | 76   | 69   |
| 14        | 153.9                   | 30.3           | 269.4                              | 1885.7                            | 419                               | 361  | 314  | 275  | 242  | 214  | 190  | 170  | 152  | 137  | 124  | 112  | 102  | 93   |
| 15        | 176.7                   | 34.9           | 331.3                              | 2485.1                            | 522                               | 477  | 414  | 363  | 319  | 282  | 250  | 224  | 201  | 181  | 163  | 148  | 134  | 122  |
| 16        | 201.1                   | 39.2           | 402.1                              | 3217.0                            | 614                               | 617  | 537  | 470  | 413  | 366  | 325  | 290  | 260  | 234  | 211  | 191  | 174  | 159  |
| 17        | 227.0                   | 44.3           | 482.3                              | 4099.8                            | 711                               | 787  | 684  | 599  | 527  | 466  | 414  | 370  | 332  | 298  | 269  | 244  | 222  | 202  |
| 18        | 254.5                   | 49.6           | 572.6                              | 5153.0                            | 814                               | 909  | 786  | 752  | 662  | 586  | 521  | 465  | 417  | 375  | 339  | 307  | 279  | 254  |
| 19        | 283.5                   | 55.3           | 673.4                              | 6397.1                            | 921                               | 1228 | 1068 | 934  | 822  | 727  | 647  | 577  | 518  | 466  | 421  | 381  | 347  | 316  |
| 20        | 314.1                   | 61.2           | 785.4                              | 7854.0                            | 1045                              | 1507 | 1311 | 1147 | 1010 | 893  | 794  | 709  | 636  | 572  | 517  | 468  | 426  | 388  |
| 21        | 346.4                   | 67.6           | 909.2                              | 9546.6                            | 1181                              | 1832 | 1593 | 1394 | 1227 | 1086 | 965  | 862  | 773  | 695  | 628  | 569  | 517  | 472  |
| 22        | 380.1                   | 74.1           | 1045.4                             | 11499.0                           | 1325                              | 2107 | 1919 | 1680 | 1478 | 1308 | 1163 | 1038 | 931  | 838  | 757  | 686  | 623  | 568  |
| 23        | 415.5                   | 81.0           | 1194.5                             | 13726.7                           | 1475                              | 2636 | 2293 | 2007 | 1766 | 1562 | 1389 | 1240 | 1112 | 1001 | 904  | 819  | 745  | 679  |
| 24        | 452.4                   | 88.2           | 1357.2                             | 16286.0                           | 1619                              | 3216 | 2719 | 2379 | 2094 | 1852 | 1647 | 1470 | 1310 | 1187 | 1072 | 971  | 883  | 805  |
| 25        | 450.7                   | 95.7           | 1534.0                             | 19174.8                           | 1761                              | 3680 | 3201 | 2801 | 2465 | 2181 | 1939 | 1731 | 1552 | 1397 | 1262 | 1144 | 1040 | 948  |
| 26        | 530.5                   | 103.5          | 1725.5                             | 22431.7                           | 1909                              | 4306 | 3745 | 3277 | 2884 | 2552 | 2268 | 2026 | 1816 | 1635 | 1476 | 1338 | 1216 | 1109 |
| 27        | 572.6                   | 111.7          | 1932.4                             | 26087.1                           | 2057                              | 5007 | 4355 | 3811 | 3354 | 2968 | 2638 | 2356 | 2117 | 1901 | 1717 | 1556 | 1415 | 1290 |
| 28        | 615.8                   | 120.1          | 2155.1                             | 30171.9                           | 2204                              | 5791 | 5037 | 4408 | 3880 | 3432 | 3051 | 2725 | 2443 | 2199 | 1986 | 1800 | 1636 | 1492 |
| 29        | 660.5                   | 128.8          | 2394.4                             | 34718.6                           | 2351                              | 6664 | 5796 | 5072 | 4464 | 3950 | 3511 | 3135 | 2811 | 2530 | 2285 | 2071 | 1883 | 1717 |
| 30        | 705.9                   | 137.8          | 2650.7                             | 39760.8                           | 2498                              | 7632 | 6638 | 5809 | 5113 | 4523 | 4021 | 3591 | 3220 | 2898 | 2617 | 2372 | 2157 | 1966 |

**Notes:**

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- (7) Load (W) above dotted line is based on deflection ( $\Delta$ ) of 1/360, such that  $W \Delta = 1778 \text{ l/L}^3$ .
- (8) Load (W) includes weight (P) of log beam.
- (9) Use minimum or top diameter (D) of log. If shape of log beam is altered, use minimum dimension or calculate new moment or inertia (I).
- (10) Load (W) below dotted line is based on vertical shear or compression,  $C_L = 255$  p.s.f. perpendicular to grain, such that  $W = 2C_L A/L$ .

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