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# Stair Builders Handbook

*By T. W. LOVE*



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## Chapter 1

# STAIRWAY DESIGN AND CONSTRUCTION

This book has all the information necessary to design and construct the right frame staircase for any job. The tables in this handbook give precise dimensions for treads and risers for every rise between 3 feet and 12 feet and for every riser height from 6 inches to 8¼ inches. These tables will be invaluable in selecting a riser height and tread width that meet job requirements for total rise and total run, angle of incline, head room and length of carriage. The craftsman will also find here complete information on quantity of materials and settings for the steel square. Every stairway in

this handbook uses the most widely accepted relation between riser and tread: Riser height plus tread width equals 17½ inches.

Chapter 2 explains the basic principles of stair design and construction and Chapter 3 shows how stairs are actually constructed. Chapter 4 covers layout and fitting of newel posts and hand rails. Chapter 5 defines the terms used in the tables and shows how the tables are used in practice.

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|  |                       |                      |                      |                      |                      |                      |                      |                      |                      |                      |                     |
|--|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|---------------------|
| <b>FLOOR TO FLOOR RISE</b>                       | 3'0"                  | 3'0"                 | 3' $\frac{1}{8}$ "   | 3' $\frac{1}{8}$ "   | 3' $\frac{1}{2}$ "   | 3' $\frac{1}{2}$ "   | 3' $\frac{3}{8}$ "   | 3' $\frac{3}{8}$ "   | 3' $\frac{1}{2}$ "   | 3' $\frac{1}{2}$ "   |                     |
| <b>NUMBER OF RISERS</b>                          | 5                     | 6                    | 5                    | 6                    | 5                    | 6                    | 5                    | 6                    | 5                    | 6                    |                     |
| <b>HEIGHT OF EACH RISER</b>                      | 7 $\frac{3}{16}$ "    | 6"                   | 7 $\frac{1}{4}$ "    | 6"                   | 7 $\frac{1}{4}$ "    | 6 $\frac{1}{16}$ "   | 7 $\frac{1}{4}$ "    | 6 $\frac{1}{16}$ "   | 7 $\frac{5}{16}$ "   | 6 $\frac{1}{16}$ "   |                     |
| <b>TOTAL HEIGHT OF RISERS</b>                    | 2'11 $\frac{5}{16}$ " | 3'                   | 3' $\frac{1}{4}$ "   | 3'                   | 3' $\frac{1}{2}$ "   | 3' $\frac{3}{8}$ "   | 3' $\frac{1}{4}$ "   | 3' $\frac{3}{8}$ "   | 3' $\frac{2}{16}$ "  | 3' $\frac{3}{8}$ "   |                     |
| <b>RISERS OVERAGE (+) OR UNDERAGE (-)</b>        | - $\frac{1}{16}$ "    | 0                    | + $\frac{1}{8}$ "    | - $\frac{1}{8}$ "    | 0                    | + $\frac{1}{8}$ "    | - $\frac{1}{8}$ "    | 0                    | + $\frac{1}{16}$ "   | - $\frac{1}{8}$ "    |                     |
| <b>NUMBER OF TREADS</b>                          | 4                     | 5                    | 4                    | 5                    | 4                    | 5                    | 4                    | 5                    | 4                    | 5                    |                     |
| <b>WIDTH OF EACH TREAD</b>                       | 10 $\frac{5}{16}$ "   | 11 $\frac{1}{2}$ "   | 10 $\frac{1}{4}$ "   | 11 $\frac{1}{2}$ "   | 10 $\frac{1}{2}$ "   | 11 $\frac{7}{16}$ "  | 10 $\frac{1}{2}$ "   | 11 $\frac{7}{16}$ "  | 10 $\frac{3}{8}$ "   | 11 $\frac{7}{16}$ "  |                     |
| <b>TOTAL RUN OF STAIRWAY</b>                     | 3'5 $\frac{1}{4}$ "   | 4'9 $\frac{1}{2}$ "  | 3'5"                 | 4'9 $\frac{1}{2}$ "  | 3'5"                 | 4'9 $\frac{3}{16}$ " | 3'5"                 | 4'9 $\frac{3}{16}$ " | 3'4 $\frac{3}{4}$ "  | 4'9 $\frac{3}{16}$ " |                     |
| <b>MAXIMUM RUN WITH 6'-8" HEADROOM</b>           | 1'9 $\frac{7}{8}$ "   | 1'11"                | 1'8 $\frac{1}{2}$ "  | 1'11"                | 1'8 $\frac{1}{2}$ "  | 1'10 $\frac{7}{8}$ " | 1'8 $\frac{1}{2}$ "  | 1'10 $\frac{7}{8}$ " | 1'8 $\frac{3}{8}$ "  | 1'10 $\frac{7}{8}$ " |                     |
| <b>ANGLE OF INCLINE</b>                          | 34°53'                | 27°33'               | 35°16'               | 27°33'               | 35°16'               | 27°56'               | 35°16'               | 27°56'               | 35°40'               | 27°56'               |                     |
| <b>LENGTH OF CARRIAGE</b>                        | 4'2 $\frac{2}{32}$ "  | 5'4 $\frac{3}{32}$ " | 4'2 $\frac{7}{32}$ " | 5'4 $\frac{3}{32}$ " | 4'2 $\frac{7}{32}$ " | 5'4 $\frac{2}{32}$ " | 4'2 $\frac{7}{32}$ " | 5'4 $\frac{2}{32}$ " | 4'2 $\frac{3}{32}$ " | 5'4 $\frac{2}{32}$ " |                     |
| <b>L. F. OF RISER PER INCH OF STAIRWAY WIDTH</b> | .416                  | .5                   | .416                 | .5                   | .416                 | .5                   | .416                 | .5                   | .416                 | .5                   |                     |
| <b>L. F. OF TREAD PER INCH OF STAIRWAY WIDTH</b> | .333                  | .416                 | .333                 | .416                 | .333                 | .416                 | .333                 | .416                 | .333                 | .416                 |                     |
| <b>FRAMING SQUARE SETTINGS FOR CARRIAGE CUTS</b> | <b>TONGUE</b>         | 7 $\frac{3}{16}$ "   | 6"                   | 7 $\frac{1}{4}$ "    | 6"                   | 7 $\frac{1}{4}$ "    | 6 $\frac{1}{16}$ "   | 7 $\frac{1}{4}$ "    | 6 $\frac{1}{16}$ "   | 7 $\frac{5}{16}$ "   | 6 $\frac{1}{16}$ "  |
|  | <b>BODY</b>           | 10 $\frac{3}{16}$ "  | 11 $\frac{1}{2}$ "   | 10 $\frac{1}{4}$ "   | 11 $\frac{1}{2}$ "   | 10 $\frac{1}{4}$ "   | 11 $\frac{7}{16}$ "  | 10 $\frac{1}{4}$ "   | 11 $\frac{7}{16}$ "  | 10 $\frac{3}{8}$ "   | 11 $\frac{7}{16}$ " |

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|  |                        |                        |                      |                       |                         |
|--|------------------------|------------------------|----------------------|-----------------------|-------------------------|
| <b>FLOOR TO FLOOR RISE</b>                       | 12'                    | 12'                    | 12'                  | 12'                   | 12'                     |
| <b>NUMBER OF RISERS</b>                          | 20                     | 21                     | 22                   | 23                    | 24                      |
| <b>HEIGHT OF EACH RISER</b>                      | 7 $\frac{3}{16}$ "     | 6 $\frac{7}{8}$ "      | 6 $\frac{3}{16}$ "   | 6 $\frac{1}{4}$ "     | 6"                      |
| <b>TOTAL HEIGHT OF RISERS</b>                    | 11'11 $\frac{3}{4}$ "  | 12' $\frac{3}{8}$ "    | 12' $\frac{3}{8}$ "  | 11'11 $\frac{3}{4}$ " | 12'                     |
| <b>RISERS OVERAGE (+) OR UNDERAGE (-)</b>        | - $\frac{1}{4}$ "      | + $\frac{3}{8}$ "      | + $\frac{3}{8}$ "    | - $\frac{1}{4}$ "     | 0                       |
| <b>NUMBER OF TREADS</b>                          | 19                     | 20                     | 21                   | 22                    | 23                      |
| <b>WIDTH OF EACH TREAD</b>                       | 10 $\frac{5}{16}$ "    | 10 $\frac{5}{8}$ "     | 10 $\frac{15}{16}$ " | 11 $\frac{1}{4}$ "    | 11 $\frac{1}{2}$ "      |
| <b>TOTAL RUN OF STAIRWAY</b>                     | 16'3 $\frac{5}{16}$ "  | 17'8 $\frac{1}{2}$ "   | 19'1 $\frac{1}{8}$ " | 20'7 $\frac{1}{2}$ "  | 22' $\frac{1}{2}$ "     |
| <b>WELL OPENING FOR 6'-8" HEADROOM</b>           | 11'6 $\frac{3}{2}$ "   | 11'10 $\frac{3}{16}$ " | 13'2 $\frac{7}{8}$ " | 14'7 $\frac{1}{2}$ "  | 15'5 $\frac{1}{2}$ "    |
| <b>ANGLE OF INCLINE</b>                          | 34°53'                 | 32°54'                 | 30°58'               | 29°3'                 | 27°33'                  |
| <b>LENGTH OF CARRIAGE</b>                        | 19'10 $\frac{7}{16}$ " | 21'1 $\frac{3}{4}$ "   | 22'3 $\frac{7}{8}$ " | 23'7 $\frac{3}{8}$ "  | 24'10 $\frac{11}{16}$ " |
| <b>L. F. OF RISER PER INCH OF STAIRWAY WIDTH</b> | 1.666                  | 1.75                   | 1.833                | 1.916                 | 2.0                     |
| <b>L. F. OF TREAD PER INCH OF STAIRWAY WIDTH</b> | 1.583                  | 1.666                  | 1.75                 | 1.833                 | 1.916                   |
| <b>FRAMING SQUARE SETTINGS FOR CARRIAGE CUTS</b> | <b>TONGUE</b>          | 7 $\frac{3}{16}$ "     | 6 $\frac{7}{8}$ "    | 6 $\frac{3}{16}$ "    | 6 $\frac{1}{4}$ "       |
|  | <b>BODY</b>            | 10 $\frac{5}{16}$ "    | 10 $\frac{5}{8}$ "   | 10 $\frac{15}{16}$ "  | 11 $\frac{1}{4}$ "      |

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