# PRESCRIPTIVE TABLES

FOR

# SELECTION OF SUPPORT ELEMENTS FOR BEAMS, GIRDERS, AND HEADERS

## 70 PSF ROOF SNOW LOAD

FOR USE WITH

## 2018 NORTH CAROLINA RESIDENTIAL CODE

**FEBRUARY 2018**

SBCA™ CAROLINAS
STRUCTURAL BUILDING COMPONENTS ASSOCIATION OF THE CAROLINAS
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## FOREWORD

The following tables are updated versions of tables that were originally issued in September of 2003. The tables are based on, and intended for use with, the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments). The following tables are intended for use with structures subject to a maximum roof snow load of 70 psf. Table packages are also available for roof snow loads of 20 psf, 30 psf, and 50 psf.

The tables are intended as a practical tool to assist contractors in:

1. Selecting footing widths.
2. Determining the number of wood studs required to support the end reactions of beams, girders, and/or headers.

The values presented in the tables were derived from the minimum design criteria, maximum span conditions, and allowable loads published in the 2018 North Carolina Residential Code. The section(s) of the 2018 North Carolina Residential Code used in the development of the tabulated values is noted on each table.

Structural elements that exceed the prescriptive limitations of the 2018 North Carolina Residential Code and/or these tables, must be designed in accordance with accepted engineering practice by a registered design professional.

Example Problem:

A 4.5-inch-thick header (3-2x plies) with an end reaction of 6400 pounds is located in the first story exterior wall of a 28-foot-wide, two-story house with center bearing floors and exterior brick veneer. The load bearing value of the soil is 2000 psf and the roof snow load is 70 psf. Determine the quantity of jack studs and the minimum footing width required to support the reaction at each end of the header.

Solution:

Table 2.1 indicates that 4 (four) jack studs are required at each end of the header (Maximum End Reaction = 7040 pounds with a 4.5-inch-thick header). Table 1.4 indicates that a 32-inch-wide by 10-inch-thick continuous footing is required to support the header reactions (Maximum Column Load = 7337 pounds; refer to Figure 4, *Roof, Ceiling and Two Center-Bearing Floors*). Note that Table 1.4 is based on a 36-foot-wide house.

Example Problem:

A header with a span of 8 feet is located in the first story exterior wall of a 34-foot-wide, three-story house with center bearing floors and wood exterior cladding. The load bearing value of the soil is 2000 psf and the roof snow load is 70 psf. Determine the quantity of jack studs and the minimum footing width required to support the reaction at each end of the header.

Solution:

Table 2.2 indicates that the header has an end reaction of 10,096 pounds (refer to Figure 13, *Roof, Ceiling, and Two Center-Bearing Floors*) and that 4 (four) jack studs are required for a 6-inch-thick header. Table 1.1 indicates that a 36-inch-wide by 14-inch-thick continuous footing is required to support the header reactions (Maximum Column Load = 12,739 pounds; refer to Figure 6, *Roof, Ceiling, and Three Center-Bearing Floors).* Note that both Table 2.2 and Table 1.1 are based on a 36-foot-wide house.

Example Problem:

An interior beam is required to support a uniform load of 600 plf over a span of 8 feet. Select an appropriate wood beam for the load and span specified and determine the quantity of jack studs required to support each end of the beam.

Solution:

Table 3.1 indicates that a 3-ply 2x10 spruce-pine-fir beam is required to support a load of 600 plf over a span of 8 feet (Allowable Load = 643 plf). Table 3.1 also indicates, for a 3-ply 2x10 with a uniform load of 643 plf and a span of 8 feet, an end reaction of 2572 pounds. Using this reaction, Table 2.1 indicates that 2 jack studs are required to support each end of the beam (Maximum End Reaction = 3520 pounds with a 4.5-inch-thick header).

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## FOOTING TABLES



## JACK STUD TABLES



## BEAM TABLES

# FOOTING TABLES

**TABLE 1.1: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL**
**LIGHT-FRAME CONSTRUCTION / ROOF SNOW LOAD = 70 PSF**
**(Reference: 2018 North Carolina Residential Code Section 403.1.1)**

| *LOAD BEARING VALUE OF SOIL (PSF)* | | | *2000* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *FOOTING WIDTH, W (IN.)* | | | *16* | *20* | *24* | *28* | *32* | *36* | *40* | *44* | *48* |
| *FOUNDATION WALL SUPPORTING* | *FOOTING THICKNESS, T (IN.)* | *WALL LOAD ON FOOTING (PLF)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* |
| *ROOF AND CEILING OVER SLAB-ON-GRADE (FIGURE 1)* | **8** | 1850 | 3369 | 6681 | 9994 | | | | | | |
| | **10** | 1850 | 3373 | 6834 | 10295 | 13756 | | | | | |
| | **12** | 1850 | 3354 | 6958 | 10563 | 14167 | 17771 | | | | |
| | **14** | 1850 | 3314 | 7055 | 10797 | 14538 | 18280 | 22021 | | | |
| | **16** | 1850 | 3251 | 7124 | 10998 | 14871 | 18744 | 22618 | 26491 | | |
| | **18** | 1850 | 3166 | 7165 | 11165 | 15165 | 19164 | 23164 | 27163 | 31163 | |
| | **20** | 1850 | 3059 | 7179 | 11299 | 15419 | 19540 | 23660 | 27780 | 31901 | 36021 |
| *ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)* | **8** | 2300 | 856 | 4169 | 7482 | | | | | | |
| | **10** | 2300 | 710 | 4171 | 7633 | 11094 | | | | | |
| | **12** | 2300 | 542 | 4146 | 7750 | 11354 | 14958 | | | | |
| | **14** | 2300 | 351 | 4093 | 7834 | 11576 | 15317 | 19059 | | | |
| | **16** | 2300 | 138 | 4012 | 7885 | 11758 | 15632 | 19505 | 23378 | | |
| | **18** | 2300 | - | 3903 | 7903 | 11902 | 15902 | 19901 | 23901 | 27900 | |
| | **20** | 2300 | - | 3766 | 7887 | 12007 | 16127 | 20248 | 24368 | 28488 | 32608 |
| *ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)* | **8** | 2750 | - | 1656 | 4969 | | | | | | |
| | **10** | 2750 | - | 1509 | 4970 | 8431 | | | | | |
| | **12** | 2750 | - | 1333 | 4938 | 8542 | 12146 | | | | |
| | **14** | 2750 | - | 1130 | 4872 | 8613 | 12355 | 16096 | | | |
| | **16** | 2750 | - | 899 | 4773 | 8646 | 12519 | 16393 | 20266 | | |
| | **18** | 2750 | - | 640 | 4640 | 8640 | 12639 | 16639 | 20638 | 24638 | |
| | **20** | 2750 | - | 354 | 4474 | 8594 | 12715 | 16835 | 20955 | 25076 | 29196 |
| *ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)* | **8** | 2780 | - | 1489 | 4802 | | | | | | |
| | **10** | 2780 | - | 1331 | 4793 | 8254 | | | | | |
| | **12** | 2780 | - | 1146 | 4750 | 8354 | 11958 | | | | |
| | **14** | 2780 | - | 933 | 4674 | 8416 | 12157 | 15899 | | | |
| | **16** | 2780 | - | 692 | 4565 | 8438 | 12312 | 16185 | 20058 | | |
| | **18** | 2780 | - | 423 | 4423 | 8422 | 12422 | 16421 | 20421 | 24420 | |
| | **20** | 2780 | - | 126 | 4247 | 8367 | 12487 | 16608 | 20728 | 24848 | 28968 |
| *ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)* | **8** | 3590 | - | - | 279 | | | | | | |
| | **10** | 3590 | - | - | - | 3461 | | | | | |
| | **12** | 3590 | - | - | - | 3292 | 6896 | | | | |
| | **14** | 3590 | - | - | - | 3083 | 6825 | 10566 | | | |
| | **16** | 3590 | - | - | - | 2836 | 6709 | 10583 | 14456 | | |
| | **18** | 3590 | - | - | - | 2550 | 6549 | 10549 | 14548 | 18548 | |
| | **20** | 3590 | - | - | - | 2224 | 6345 | 10465 | 14585 | 18706 | 22826 |
| *ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)* | **8** | 3260 | - | - | 2122 | | | | | | |
| | **10** | 3260 | - | - | 1953 | 5414 | | | | | |
| | **12** | 3260 | - | - | 1750 | 5354 | 8958 | | | | |
| | **14** | 3260 | - | - | 1514 | 5256 | 8997 | 12739 | | | |
| | **16** | 3260 | - | - | 1245 | 5118 | 8992 | 12865 | 16738 | | |
| | **18** | 3260 | - | - | 943 | 4942 | 8942 | 12941 | 16941 | 20940 | |
| | **20** | 3260 | - | - | 607 | 4727 | 8847 | 12968 | 17088 | 21208 | 25328 |
| *ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)* | **8** | 4430 | - | - | - | | | | | | |
| | **10** | 4430 | - | - | - | - | | | | | |
| | **12** | 4430 | - | - | - | - | 1646 | | | | |
| | **14** | 4430 | - | - | - | - | 1295 | 5036 | | | |
| | **16** | 4430 | - | - | - | - | 899 | 4773 | 8646 | | |
| | **18** | 4430 | - | - | - | - | 459 | 4459 | 8458 | 12458 | |
| | **20** | 4430 | - | - | - | - | - | 4095 | 8215 | 12336 | 16456 |

**NOTES:**

1. Refer to Table Notes on page 1.7 for additional information.
2. Refer to Figures 1 through 9 on pages 1.10 and 1.11 for additional information.

**TABLE 1.2: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL**
**LIGHT-FRAME CONSTRUCTION / ROOF SNOW LOAD = 70 PSF**
**(Reference: 2018 North Carolina Residential Code Section 403.1.1)**

| *LOAD BEARING VALUE OF SOIL (PSF)* | | | *3000* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *FOOTING WIDTH, W (IN.)* | | | *16* | *20* | *24* | *28* | *32* | *36* | *40* | *44* | *48* |
| *FOUNDATION WALL SUPPORTING* | *FOOTING THICKNESS, T (IN.)* | *WALL LOAD ON FOOTING (PLF)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* |
| *ROOF AND CEILING OVER SLAB-ON-GRADE (FIGURE 1)* | **8** | 1850 | 10813 | 15987 | 21161 | | | | | | |
| | **10** | 1850 | 11261 | 16695 | 22128 | 27562 | | | | | |
| | **12** | 1850 | 11688 | 17375 | 23063 | 28750 | 34438 | | | | |
| | **14** | 1850 | 12091 | 18027 | 23963 | 29899 | 35835 | 41771 | | | |
| | **16** | 1850 | 12473 | 18652 | 24831 | 31010 | 37189 | 43368 | 49546 | | |
| | **18** | 1850 | 12833 | 19249 | 25665 | 32081 | 38498 | 44914 | 51330 | 57746 | |
| | **20** | 1850 | 13170 | 19818 | 26466 | 33114 | 39762 | 46410 | 53058 | 59706 | 66354 |
| *ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)* | **8** | 2300 | 8301 | 13474 | 18648 | | | | | | |
| | **10** | 2300 | 8599 | 14032 | 19466 | 24899 | | | | | |
| | **12** | 2300 | 8875 | 14563 | 20250 | 25938 | 31625 | | | | |
| | **14** | 2300 | 9129 | 15065 | 21001 | 26937 | 32873 | 38809 | | | |
| | **16** | 2300 | 9361 | 15539 | 21718 | 27897 | 34076 | 40255 | 46434 | | |
| | **18** | 2300 | 9570 | 15986 | 22403 | 28819 | 35235 | 41651 | 48068 | 54484 | |
| | **20** | 2300 | 9757 | 16405 | 23053 | 29701 | 36349 | 42998 | 49646 | 56294 | 62942 |
| *ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)* | **8** | 2750 | 5788 | 10962 | 16136 | | | | | | |
| | **10** | 2750 | 5936 | 11370 | 16803 | 22237 | | | | | |
| | **12** | 2750 | 6063 | 11750 | 17438 | 23125 | 28813 | | | | |
| | **14** | 2750 | 6166 | 12102 | 18038 | 23974 | 29910 | 35846 | | | |
| | **16** | 2750 | 6248 | 12427 | 18606 | 24785 | 30964 | 37143 | 43321 | | |
| | **18** | 2750 | 6308 | 12724 | 19140 | 25556 | 31973 | 38389 | 44805 | 51221 | |
| | **20** | 2750 | 6345 | 12993 | 19641 | 26289 | 32937 | 39585 | 46233 | 52881 | 59529 |
| *ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)* | **8** | 2780 | 5621 | 10794 | 15968 | | | | | | |
| | **10** | 2780 | 5759 | 11192 | 16626 | 22059 | | | | | |
| | **12** | 2780 | 5875 | 11563 | 17250 | 22938 | 28625 | | | | |
| | **14** | 2780 | 5969 | 11905 | 17841 | 23777 | 29713 | 35649 | | | |
| | **16** | 2780 | 6041 | 12219 | 18398 | 24577 | 30756 | 36935 | 43114 | | |
| | **18** | 2780 | 6090 | 12506 | 18923 | 25339 | 31755 | 38171 | 44588 | 51004 | |
| | **20** | 2780 | 6117 | 12765 | 19413 | 26061 | 32709 | 39358 | 46006 | 52654 | 59302 |
| *ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)* | **8** | 3590 | 1098 | 6272 | 11446 | | | | | | |
| | **10** | 3590 | 966 | 6400 | 11833 | 17267 | | | | | |
| | **12** | 3590 | 813 | 6500 | 12188 | 17875 | 23563 | | | | |
| | **14** | 3590 | 636 | 6572 | 12508 | 18444 | 24380 | 30316 | | | |
| | **16** | 3590 | 438 | 6617 | 12796 | 18975 | 25154 | 31333 | 37511 | | |
| | **18** | 3590 | 218 | 6634 | 13050 | 19466 | 25883 | 32299 | 38715 | 45131 | |
| | **20** | 3590 | - | 6623 | 13271 | 19919 | 26567 | 33215 | 39863 | 46511 | 53159 |
| *ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)* | **8** | 3260 | 2941 | 8114 | 13288 | | | | | | |
| | **10** | 3260 | 2919 | 8352 | 13786 | 19219 | | | | | |
| | **12** | 3260 | 2875 | 8563 | 14250 | 19938 | 25625 | | | | |
| | **14** | 3260 | 2809 | 8745 | 14681 | 20617 | 26553 | 32489 | | | |
| | **16** | 3260 | 2721 | 8899 | 15078 | 21257 | 27436 | 33615 | 39794 | | |
| | **18** | 3260 | 2610 | 9026 | 15443 | 21859 | 28275 | 34691 | 41108 | 47524 | |
| | **20** | 3260 | 2477 | 9125 | 15773 | 22421 | 29069 | 35718 | 42366 | 49014 | 55662 |
| *ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)* | **8** | 4430 | - | 1582 | 6756 | | | | | | |
| | **10** | 4430 | - | 1430 | 6863 | 12297 | | | | | |
| | **12** | 4430 | - | 1250 | 6938 | 12625 | 18313 | | | | |
| | **14** | 4430 | - | 1042 | 6978 | 12914 | 18850 | 24786 | | | |
| | **16** | 4430 | - | 807 | 6986 | 13165 | 19344 | 25523 | 31701 | | |
| | **18** | 4430 | - | 544 | 6960 | 13376 | 19793 | 26209 | 32625 | 39041 | |
| | **20** | 4430 | - | 253 | 6901 | 13549 | 20197 | 26845 | 33493 | 40141 | 46789 |

**NOTES:**

1. Refer to Table Notes on page 1.7 for additional information.
2. Refer to Figures 1 through 9 on pages 1.10 and 1.11 for additional information.

**TABLE 1.3: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL**
**LIGHT-FRAME CONSTRUCTION / ROOF SNOW LOAD = 70 PSF**
**(Reference: 2018 North Carolina Residential Code Section 403.1.1)**

| *LOAD BEARING VALUE OF SOIL (PSF)* | | | *4000* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *FOOTING WIDTH, W (IN.)* | | | *16* | *20* | *24* | *28* | *32* | *36* | *40* | *44* | *48* |
| *FOUNDATION WALL SUPPORTING* | *FOOTING THICKNESS, T (IN.)* | *WALL LOAD ON FOOTING (PLF)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* |
| *ROOF AND CEILING OVER SLAB-ON-GRADE (FIGURE 1)* | **8** | 1850 | 18258 | 25293 | 32328 | | | | | | |
| | **10** | 1850 | 19150 | 26556 | 33962 | 41367 | | | | | |
| | **12** | 1850 | 20021 | 27792 | 35563 | 43333 | 51104 | | | | |
| | **14** | 1850 | 20869 | 29000 | 37130 | 45260 | 53391 | 61521 | | | |
| | **16** | 1850 | 21695 | 30180 | 38664 | 47149 | 55633 | 64118 | 72602 | | |
| | **18** | 1850 | 22499 | 31332 | 40165 | 48998 | 57831 | 66664 | 75497 | 84330 | |
| | **20** | 1850 | 23281 | 32457 | 41633 | 50808 | 59984 | 69160 | 78336 | 87512 | 96688 |
| *ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)* | **8** | 2300 | 15745 | 22780 | 29815 | | | | | | |
| | **10** | 2300 | 16488 | 23893 | 31299 | 38705 | | | | | |
| | **12** | 2300 | 17208 | 24979 | 32750 | 40521 | 48292 | | | | |
| | **14** | 2300 | 17907 | 26037 | 34168 | 42298 | 50428 | 58559 | | | |
| | **16** | 2300 | 18583 | 27067 | 35552 | 44036 | 52521 | 61005 | 69489 | | |
| | **18** | 2300 | 19237 | 28070 | 36903 | 45735 | 54568 | 63401 | 72234 | 81067 | |
| | **20** | 2300 | 19868 | 29044 | 38220 | 47396 | 56572 | 65748 | 74923 | 84099 | 93275 |
| *ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)* | **8** | 2750 | 13233 | 20268 | 27303 | | | | | | |
| | **10** | 2750 | 13825 | 21231 | 28637 | 36042 | | | | | |
| | **12** | 2750 | 14396 | 22167 | 29938 | 37708 | 45479 | | | | |
| | **14** | 2750 | 14944 | 23075 | 31205 | 39335 | 47466 | 55596 | | | |
| | **16** | 2750 | 15470 | 23955 | 32439 | 40924 | 49408 | 57893 | 66377 | | |
| | **18** | 2750 | 15974 | 24807 | 33640 | 42473 | 51306 | 60139 | 68972 | 77805 | |
| | **20** | 2750 | 16456 | 25632 | 34808 | 43983 | 53159 | 62335 | 71511 | 80687 | 89863 |
| *ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)* | **8** | 2780 | 13065 | 20100 | 27135 | | | | | | |
| | **10** | 2780 | 13648 | 21053 | 28459 | 35865 | | | | | |
| | **12** | 2780 | 14208 | 21979 | 29750 | 37521 | 45292 | | | | |
| | **14** | 2780 | 14747 | 22877 | 31008 | 39138 | 47268 | 55399 | | | |
| | **16** | 2780 | 15263 | 23747 | 32232 | 40716 | 49201 | 57685 | 66169 | | |
| | **18** | 2780 | 15757 | 24590 | 33423 | 42255 | 51088 | 59921 | 68754 | 77587 | |
| | **20** | 2780 | 16228 | 25404 | 34580 | 43756 | 52932 | 62108 | 71283 | 80459 | 89635 |
| *ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)* | **8** | 3590 | 8543 | 15578 | 22613 | | | | | | |
| | **10** | 3590 | 8855 | 16261 | 23667 | 31072 | | | | | |
| | **12** | 3590 | 9146 | 16917 | 24688 | 32458 | 40229 | | | | |
| | **14** | 3590 | 9414 | 17545 | 25675 | 33805 | 41936 | 50066 | | | |
| | **16** | 3590 | 9660 | 18145 | 26629 | 35114 | 43598 | 52083 | 60567 | | |
| | **18** | 3590 | 9884 | 18717 | 27550 | 36383 | 45216 | 54049 | 62882 | 71715 | |
| | **20** | 3590 | 10086 | 19262 | 28438 | 37613 | 46789 | 55965 | 65141 | 74317 | 83493 |
| *ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)* | **8** | 3260 | 10385 | 17420 | 24455 | | | | | | |
| | **10** | 3260 | 10808 | 18213 | 25619 | 33025 | | | | | |
| | **12** | 3260 | 11208 | 18979 | 26750 | 34521 | 42292 | | | | |
| | **14** | 3260 | 11587 | 19717 | 27848 | 35978 | 44108 | 52239 | | | |
| | **16** | 3260 | 11943 | 20427 | 28912 | 37396 | 45881 | 54365 | 62849 | | |
| | **18** | 3260 | 12277 | 21110 | 29943 | 38775 | 47608 | 56441 | 65274 | 74107 | |
| | **20** | 3260 | 12588 | 21764 | 30940 | 40116 | 49292 | 58468 | 67643 | 76819 | 85995 |
| *ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)* | **8** | 4430 | 3853 | 10888 | 17923 | | | | | | |
| | **10** | 4430 | 3885 | 11291 | 18697 | 26102 | | | | | |
| | **12** | 4430 | 3896 | 11667 | 19438 | 27208 | 34979 | | | | |
| | **14** | 4430 | 3884 | 12015 | 20145 | 28275 | 36406 | 44536 | | | |
| | **16** | 4430 | 3850 | 12335 | 20819 | 29304 | 37788 | 46273 | 54757 | | |
| | **18** | 4430 | 3794 | 12627 | 21460 | 30293 | 39126 | 47959 | 56792 | 65625 | |
| | **20** | 4430 | 3716 | 12892 | 22068 | 31243 | 40419 | 49595 | 58771 | 67947 | 77123 |

**NOTES:**

1. Refer to Table Notes on page 1.7 for additional information.
2. Refer to Figures 1 through 9 on pages 1.10 and 1.11 for additional information.

**TABLE 1.4: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL**
**LIGHT-FRAME CONSTRUCTION WITH BRICK VENEER / ROOF SNOW LOAD = 70 PSF**
**(Reference: 2018 North Carolina Residential Code Section 403.1.1)**

| *LOAD BEARING VALUE OF SOIL (PSF)* | | | *2000* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *FOOTING WIDTH, W (IN.)* | | | *16* | *20* | *24* | *28* | *32* | *36* | *40* | *44* | *48* |
| *FOUNDATION WALL SUPPORTING* | *FOOTING THICKNESS, T (IN.)* | *WALL LOAD ON FOOTING (PLF)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* |
| *ROOF AND CEILING OVER SLAB-ON-GRADE (FIGURE 1)* | **8** | 2270 | 1247 | 4560 | 7873 | 11185 | | | | | |
| | **10** | 2270 | 1124 | 4585 | 8047 | 11508 | 14969 | | | | |
| | **12** | 2270 | 979 | 4583 | 8188 | 11792 | 15396 | 19000 | | | |
| | **14** | 2270 | 812 | 4553 | 8295 | 12037 | 15778 | 19520 | 23261 | | |
| | **16** | 2270 | 622 | 4496 | 8369 | 12243 | 16116 | 19989 | 23863 | 27736 | |
| | **18** | 2270 | 411 | 4410 | 8410 | 12410 | 16409 | 20409 | 24408 | 28408 | 32408 |
| | **20** | 2270 | 177 | 4297 | 8418 | 12538 | 16658 | 20778 | 24899 | 29019 | 33139 |
| *ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)* | **8** | 2720 | - | 2047 | 5360 | 8673 | | | | | |
| | **10** | 2720 | - | 1923 | 5384 | 8845 | 12307 | | | | |
| | **12** | 2720 | - | 1771 | 5375 | 8979 | 12583 | 16188 | | | |
| | **14** | 2720 | - | 1591 | 5333 | 9074 | 12816 | 16557 | 20299 | | |
| | **16** | 2720 | - | 1383 | 5257 | 9130 | 13003 | 16877 | 20750 | 24623 | |
| | **18** | 2720 | - | 1148 | 5148 | 9147 | 13147 | 17146 | 21146 | 25145 | 29145 |
| | **20** | 2720 | - | 885 | 5005 | 9125 | 13246 | 17366 | 21486 | 25606 | 29727 |
| *ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)* | **8** | 3170 | - | - | 2848 | 6160 | | | | | |
| | **10** | 3170 | - | - | 2722 | 6183 | 9644 | | | | |
| | **12** | 3170 | - | - | 2563 | 6167 | 9771 | 13375 | | | |
| | **14** | 3170 | - | - | 2370 | 6112 | 9853 | 13595 | 17336 | | |
| | **16** | 3170 | - | - | 2144 | 6018 | 9891 | 13764 | 17638 | 21511 | |
| | **18** | 3170 | - | - | 1885 | 5885 | 9884 | 13884 | 17883 | 21883 | 25883 |
| | **20** | 3170 | - | - | 1593 | 5713 | 9833 | 13953 | 18074 | 22194 | 26314 |
| *ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)* | **8** | 3560 | - | - | 670 | 3983 | | | | | |
| | **10** | 3560 | - | - | 414 | 3875 | 7337 | | | | |
| | **12** | 3560 | - | - | 125 | 3729 | 7333 | 10938 | | | |
| | **14** | 3560 | - | - | - | 3544 | 7286 | 11027 | 14769 | | |
| | **16** | 3560 | - | - | - | 3320 | 7193 | 11067 | 14940 | 18813 | |
| | **18** | 3560 | - | - | - | 3057 | 7057 | 11056 | 15056 | 19055 | 23055 |
| | **20** | 3560 | - | - | - | 2755 | 6876 | 10996 | 15116 | 19236 | 23357 |
| *ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)* | **8** | 4370 | - | - | - | - | | | | | |
| | **10** | 4370 | - | - | - | - | 2544 | | | | |
| | **12** | 4370 | - | - | - | - | 2271 | 5875 | | | |
| | **14** | 4370 | - | - | - | - | 1953 | 5695 | 9436 | | |
| | **16** | 4370 | - | - | - | - | 1591 | 5464 | 9338 | 13211 | |
| | **18** | 4370 | - | - | - | - | 1184 | 5184 | 9183 | 13183 | 17183 |
| | **20** | 4370 | - | - | - | - | 733 | 4853 | 8974 | 13094 | 17214 |
| *ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)* | **8** | 4400 | - | - | - | - | | | | | |
| | **10** | 4400 | - | - | - | - | 2367 | | | | |
| | **12** | 4400 | - | - | - | - | 2083 | 5688 | | | |
| | **14** | 4400 | - | - | - | - | 1756 | 5497 | 9239 | | |
| | **16** | 4400 | - | - | - | - | 1383 | 5257 | 9130 | 13003 | |
| | **18** | 4400 | - | - | - | - | 967 | 4966 | 8966 | 12965 | 16965 |
| | **20** | 4400 | - | - | - | - | 506 | 4626 | 8746 | 12866 | 16987 |
| *ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)* | **8** | 5570 | - | - | - | - | | | | | |
| | **10** | 5570 | - | - | - | - | - | | | | |
| | **12** | 5570 | - | - | - | - | - | - | | | |
| | **14** | 5570 | - | - | - | - | - | - | 1536 | | |
| | **16** | 5570 | - | - | - | - | - | - | 1038 | 4911 | |
| | **18** | 5570 | - | - | - | - | - | - | 483 | 4483 | 8483 |
| | **20** | 5570 | - | - | - | - | - | - | - | 3994 | 8114 |

**NOTES:**

1. Refer to Table Notes on page 1.7 for additional information.
2. Refer to Figures 1 through 9 on pages 1.10 and 1.11 for additional information.

**TABLE 1.5: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL**
**LIGHT-FRAME CONSTRUCTION WITH BRICK VENEER / ROOF SNOW LOAD = 70 PSF**
**(Reference: 2018 North Carolina Residential Code Section 403.1.1)**

| *LOAD BEARING VALUE OF SOIL (PSF)* | | | *3000* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *FOOTING WIDTH, W (IN.)* | | | *16* | *20* | *24* | *28* | *32* | *36* | *40* | *44* | *48* |
| *FOUNDATION WALL SUPPORTING* | *FOOTING THICKNESS, T (IN.)* | *WALL LOAD ON FOOTING (PLF)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* |
| *ROOF AND CEILING OVER SLAB-ON-GRADE (FIGURE 1)* | **8** | 2270 | 8691 | 13865 | 19039 | 24213 | | | | | |
| | **10** | 2270 | 9013 | 14447 | 19880 | 25313 | 30747 | | | | |
| | **12** | 2270 | 9313 | 15000 | 20688 | 26375 | 32063 | 37750 | | | |
| | **14** | 2270 | 9590 | 15526 | 21462 | 27398 | 33334 | 39270 | 45206 | | |
| | **16** | 2270 | 9845 | 16024 | 22203 | 28381 | 34560 | 40739 | 46918 | 53097 | |
| | **18** | 2270 | 10078 | 16494 | 22910 | 29326 | 35743 | 42159 | 48575 | 54991 | 61408 |
| | **20** | 2270 | 10288 | 16936 | 23584 | 30232 | 36880 | 43528 | 50176 | 56824 | 63473 |
| *ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)* | **8** | 2720 | 6179 | 11353 | 16527 | 21701 | | | | | |
| | **10** | 2720 | 6351 | 11784 | 17218 | 22651 | 28084 | | | | |
| | **12** | 2720 | 6500 | 12188 | 17875 | 23563 | 29250 | 34938 | | | |
| | **14** | 2720 | 6627 | 12563 | 18499 | 24435 | 30371 | 36307 | 42243 | | |
| | **16** | 2720 | 6732 | 12911 | 19090 | 25269 | 31448 | 37627 | 43806 | 49984 | |
| | **18** | 2720 | 6815 | 13231 | 19648 | 26064 | 32480 | 38896 | 45313 | 51729 | 58145 |
| | **20** | 2720 | 6876 | 13524 | 20172 | 26820 | 33468 | 40116 | 46764 | 53412 | 60060 |
| *ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)* | **8** | 3170 | 3666 | 8840 | 14014 | 19188 | | | | | |
| | **10** | 3170 | 3688 | 9122 | 14555 | 19988 | 25422 | | | | |
| | **12** | 3170 | 3688 | 9375 | 15063 | 20750 | 26438 | 32125 | | | |
| | **14** | 3170 | 3665 | 9601 | 15537 | 21473 | 27409 | 33345 | 39281 | | |
| | **16** | 3170 | 3620 | 9799 | 15978 | 22156 | 28335 | 34514 | 40693 | 46872 | |
| | **18** | 3170 | 3553 | 9969 | 16385 | 22801 | 29218 | 35634 | 42050 | 48466 | 54883 |
| | **20** | 3170 | 3463 | 10111 | 16759 | 23407 | 30055 | 36703 | 43351 | 49999 | 56648 |
| *ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)* | **8** | 3560 | 1489 | 6663 | 11837 | 17011 | | | | | |
| | **10** | 3560 | 1381 | 6814 | 12248 | 17681 | 23114 | | | | |
| | **12** | 3560 | 1250 | 6938 | 12625 | 18313 | 24000 | 29688 | | | |
| | **14** | 3560 | 1097 | 7033 | 12969 | 18905 | 24841 | 30777 | 36713 | | |
| | **16** | 3560 | 922 | 7101 | 13280 | 19459 | 25638 | 31817 | 37996 | 44174 | |
| | **18** | 3560 | 725 | 7141 | 13558 | 19974 | 26390 | 32806 | 39223 | 45639 | 52055 |
| | **20** | 3560 | 506 | 7154 | 13802 | 20450 | 27098 | 33746 | 40394 | 47042 | 53690 |
| *ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)* | **8** | 4370 | - | 2140 | 7314 | 12488 | | | | | |
| | **10** | 4370 | - | 2022 | 7455 | 12888 | 18322 | | | | |
| | **12** | 4370 | - | 1875 | 7563 | 13250 | 18938 | 24625 | | | |
| | **14** | 4370 | - | 1701 | 7637 | 13573 | 19509 | 25445 | 31381 | | |
| | **16** | 4370 | - | 1499 | 7678 | 13856 | 20035 | 26214 | 32393 | 38572 | |
| | **18** | 4370 | - | 1269 | 7685 | 14101 | 20518 | 26934 | 33350 | 39766 | 46183 |
| | **20** | 4370 | - | 1011 | 7659 | 14307 | 20955 | 27603 | 34251 | 40899 | 47548 |
| *ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)* | **8** | 4400 | - | 1973 | 7147 | 12321 | | | | | |
| | **10** | 4400 | - | 1844 | 7278 | 12711 | 18144 | | | | |
| | **12** | 4400 | - | 1688 | 7375 | 13063 | 18750 | 24438 | | | |
| | **14** | 4400 | - | 1503 | 7439 | 13375 | 19311 | 25247 | 31183 | | |
| | **16** | 4400 | - | 1291 | 7470 | 13649 | 19828 | 26007 | 32186 | 38364 | |
| | **18** | 4400 | - | 1051 | 7468 | 13884 | 20300 | 26716 | 33133 | 39549 | 45965 |
| | **20** | 4400 | - | 784 | 7432 | 14080 | 20728 | 27376 | 34024 | 40672 | 47320 |
| *ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)* | **8** | 5570 | - | - | 614 | 5788 | | | | | |
| | **10** | 5570 | - | - | 355 | 5788 | 11222 | | | | |
| | **12** | 5570 | - | - | 63 | 5750 | 11438 | 17125 | | | |
| | **14** | 5570 | - | - | - | 5673 | 11609 | 17545 | 23481 | | |
| | **16** | 5570 | - | - | - | 5556 | 11735 | 17914 | 24093 | 30272 | |
| | **18** | 5570 | - | - | - | 5401 | 11818 | 18234 | 24650 | 31066 | 37483 |
| | **20** | 5570 | - | - | - | 5207 | 11855 | 18503 | 25151 | 31799 | 38448 |

**NOTES:**

1. Refer to Table Notes on page 1.7 for additional information.
2. Refer to Figures 1 through 9 on pages 1.10 and 1.11 for additional information.

**TABLE 1.6: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL**
**LIGHT-FRAME CONSTRUCTION WITH BRICK VENEER / ROOF SNOW LOAD = 70 PSF**
**(Reference: 2018 North Carolina Residential Code Section 403.1.1)**

| *LOAD BEARING VALUE OF SOIL (PSF)* | | | *4000* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *FOOTING WIDTH, W (IN.)* | | | *16* | *20* | *24* | *28* | *32* | *36* | *40* | *44* | *48* |
| *FOUNDATION WALL SUPPORTING* | *FOOTING THICKNESS, T (IN.)* | *WALL LOAD ON FOOTING (PLF)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* | *MAXIMUM COLUMN LOAD (LB.)* |
| *ROOF AND CEILING OVER SLAB-ON-GRADE (FIGURE 1)* | **8** | 2270 | 16136 | 23618 | 30206 | 37241 | | | | | |
| | **10** | 2270 | 16902 | 24308 | 31713 | 39119 | 46525 | | | | |
| | **12** | 2270 | 17646 | 25417 | 33188 | 40958 | 48729 | 56500 | | | |
| | **14** | 2270 | 18368 | 26498 | 34628 | 42759 | 50889 | 59020 | 67150 | | |
| | **16** | 2270 | 19067 | 27551 | 36036 | 44520 | 53005 | 61489 | 69974 | 78458 | |
| | **18** | 2270 | 19744 | 28577 | 37410 | 46243 | 55076 | 63909 | 72742 | 81575 | 90408 |
| | **20** | 2270 | 20399 | 29575 | 38751 | 47927 | 57103 | 66278 | 75454 | 84630 | 93806 |
| *ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)* | **8** | 2720 | 13623 | 20658 | 27693 | 34728 | | | | | |
| | **10** | 2720 | 14239 | 21645 | 29051 | 36457 | 43862 | | | | |
| | **12** | 2720 | 14833 | 22604 | 30375 | 38146 | 45917 | 53688 | | | |
| | **14** | 2720 | 15405 | 23535 | 31666 | 39796 | 47927 | 56057 | 64188 | | |
| | **16** | 2720 | 15954 | 24439 | 32923 | 41408 | 49892 | 58377 | 66861 | 75346 | |
| | **18** | 2720 | 16482 | 25315 | 34148 | 42980 | 51813 | 60646 | 69479 | 78312 | 87145 |
| | **20** | 2720 | 16987 | 26163 | 35338 | 44514 | 53690 | 62866 | 72042 | 81218 | 90393 |
| *ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)* | **8** | 3170 | 11111 | 18146 | 25181 | 32216 | | | | | |
| | **10** | 3170 | 11577 | 18983 | 26388 | 33794 | 41200 | | | | |
| | **12** | 3170 | 12021 | 19792 | 27563 | 35333 | 43104 | 50875 | | | |
| | **14** | 3170 | 12443 | 20573 | 28703 | 36834 | 44964 | 53095 | 61225 | | |
| | **16** | 3170 | 12842 | 21326 | 29811 | 38295 | 46780 | 55264 | 63749 | 72233 | |
| | **18** | 3170 | 13219 | 22052 | 30885 | 39718 | 48551 | 57384 | 66217 | 75050 | 83883 |
| | **20** | 3170 | 13574 | 22750 | 31926 | 41102 | 50278 | 59453 | 68629 | 77805 | 86981 |
| *ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)* | **8** | 3560 | 8933 | 15968 | 23003 | 30038 | | | | | |
| | **10** | 3560 | 9269 | 16675 | 24081 | 31487 | 38892 | | | | |
| | **12** | 3560 | 9583 | 17354 | 25125 | 32896 | 40667 | 48438 | | | |
| | **14** | 3560 | 9875 | 18005 | 26136 | 34266 | 42397 | 50527 | 58658 | | |
| | **16** | 3560 | 10144 | 18629 | 27113 | 35598 | 44082 | 52567 | 61051 | 69536 | |
| | **18** | 3560 | 10392 | 19225 | 28058 | 36890 | 45723 | 54556 | 63389 | 72222 | 81055 |
| | **20** | 3560 | 10617 | 19793 | 28968 | 38144 | 47320 | 56496 | 65672 | 74848 | 84023 |
| *ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)* | **8** | 4370 | 4411 | 11446 | 18481 | 25516 | | | | | |
| | **10** | 4370 | 4477 | 11883 | 19288 | 26694 | 34100 | | | | |
| | **12** | 4370 | 4521 | 12292 | 20063 | 27833 | 35604 | 43375 | | | |
| | **14** | 4370 | 4543 | 12673 | 20803 | 28934 | 37064 | 45195 | 53325 | | |
| | **16** | 4370 | 4542 | 13026 | 21511 | 29995 | 38480 | 46964 | 55449 | 63933 | |
| | **18** | 4370 | 4519 | 13352 | 22185 | 31018 | 39851 | 48684 | 57517 | 66350 | 75183 |
| | **20** | 4370 | 4474 | 13650 | 22826 | 32002 | 41178 | 50353 | 59529 | 68705 | 77881 |
| *ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)* | **8** | 4400 | 4243 | 11278 | 18313 | 25348 | | | | | |
| | **10** | 4400 | 4299 | 11705 | 19111 | 26517 | 33922 | | | | |
| | **12** | 4400 | 4333 | 12104 | 19875 | 27646 | 35417 | 43188 | | | |
| | **14** | 4400 | 4345 | 12475 | 20606 | 28736 | 36867 | 44997 | 53128 | | |
| | **16** | 4400 | 4334 | 12819 | 21303 | 29788 | 38272 | 46757 | 55241 | 63726 | |
| | **18** | 4400 | 4302 | 13135 | 21968 | 30800 | 39633 | 48466 | 57299 | 66132 | 74965 |
| | **20** | 4400 | 4247 | 13423 | 22598 | 31774 | 40950 | 50126 | 59302 | 68478 | 77653 |
| *ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)* | **8** | 5570 | - | 4746 | 11781 | 18816 | | | | | |
| | **10** | 5570 | - | 4783 | 12188 | 19594 | 27000 | | | | |
| | **12** | 5570 | - | 4792 | 12563 | 20333 | 28104 | 35875 | | | |
| | **14** | 5570 | - | 4773 | 12903 | 21034 | 29164 | 37295 | 45425 | | |
| | **16** | 5570 | - | 4726 | 13211 | 21695 | 30180 | 38664 | 47149 | 55633 | |
| | **18** | 5570 | - | 4652 | 13485 | 22318 | 31151 | 39984 | 48817 | 57650 | 66483 |
| | **20** | 5570 | - | 4550 | 13726 | 22902 | 32078 | 41253 | 50429 | 59605 | 68781 |

**NOTES:**

1. Refer to Table Notes on page 1.7 for additional information.
2. Refer to Figures 1 through 9 on pages 1.10 and 1.11 for additional information.

# TABLES 1.1 THROUGH 1.6: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL

**TABLE NOTES**:

1. To use Tables 1.1 through 1.6:
    a. Select the table for the appropriate Load Bearing Value of Soil and exterior wall finish (without brick veneer or with brick veneer).
    b. Select the row corresponding to the configuration of the structure (number of floors supported on foundation).
    c. Select a footing width and thickness within that row that has a corresponding maximum column load equal to or greater than the required column load.
2. Tables 1.1 through 1.6 are for use with one- and two-family residential structures constructed in accordance with the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments).
3. Tables 1.1 through 1.6 are for use with one- and two-family residential structures in Seismic Design Category A, B, or C.
4. Footing sizes indicated in Tables 1.1 through 1.6 have been evaluated for the effects of gravity loads only. The inclusion of lateral loads due to wind or seismic forces in the footing designs is beyond the scope of these tables.
5. Footing sizes in the shaded area of Tables 1.1 through 1.6 are not in compliance with the minimum size requirements of the 2018 North Carolina Residential Code, Section R403.1.1.
6. Maximum column loads and footing sizes indicated in Tables 1.1 through 1.6 are based on the following design criteria and assumptions:
    a. House is 36-feet wide, both with and without a load-bearing center wall that carries half of the tributary floor framing, as indicated in the table headings.
    b. House is built over 2-foot crawl space, unless noted otherwise on table.
    c. House has 10-foot floor-to-floor heights. Tables 1.1 through 1.6 may be used for wall heights less than or equal to 10 feet.
    d. Foundations are plain cast-in-place concrete footings constructed in accordance with Chapter 4 of the 2018 North Carolina Residential Code.
    e. Foundation wall consists of minimum 8-inch hollow CMU laid in running bond and is constructed in accordance with the 2018 North Carolina Residential Code.
    f. Foundation wall is 24-inches high and is centered on the footing, as shown in Figures 8 and 9 on Page 1.11.
    g. Design loads:
        i. First Floor — 50 psf (40 psf live load, 10 psf dead load)
        ii. Second Floor — 40 psf (30 psf live load, 10 psf dead load)
        iii. Third Floor — 40 psf (30 psf live load, 10 psf dead load)
        iv. Roof — 90 psf (70 psf snow load, 20 psf dead load)
        v. Footing (self-weight) — 150 pcf (normal weight concrete)
        vi. Soil (self-weight) — 120 pcf
        vii. 8-inch CMU — 55 psf
        viii. 12-inch CMU — 85 psf
        ix. Exterior Wood-frame Wall — 12 psf
        x. Exterior Wood-frame Wall With Brick Veneer — 48 psf
    h. Habitable attics are considered a supported floor.
7. Refer to Figures 1 through 9 on pages 1.10 and 1.11 for additional information.
8. Footing sizes listed in Tables 1.1 through 1.6 with no column load are not adequate for the load bearing value of the soil indicated with the assumptions and design loads listed above taken into consideration.
9. Maximum column loads indicated in Tables 1.1 through 1.6 are based on the requirements for concrete footings in Section R403.1.1 of the 2018 North Carolina Residential Code and the calculated soil bearing pressure with the assumptions listed above taken into consideration. The evaluation of the masonry foundation wall is not included in the tables and the assumed masonry foundation wall described above may not be in compliance with the 2018 North Carolina Residential Code in all cases. The masonry foundation wall must be evaluated for the applied column load(s) as required by the provisions of the 2018 North Carolina Residential Code.

## TABLE 1.7: PIER AND FOOTING SIZES FOR SUPPORT OF INTERIOR GIRDERS

**(Reference: 2018 North Carolina Residential Code Table R403.1(2))**

| *1 (ONE) STORY* | | | |
|---|---|---|---|
| ***FLOOR AREA SUPPORTED (SQ. FT.)*** | ***PIER (W X L)*** | ***FOOTING (W X L X T)*** | ***TOTAL ALLOWABLE LOAD (LB.)*** |
| 50 | 8" x 16" | 1'-4" x 2'-0" x 8" | **2500** |
| 100 | 8" x 16" | 1'-4" x 2'-0" x 8" | **5000** |
| 150 | 8" x 16" | 2'-0" x 2'-0" x 8" | **7500** |
| 200 | 8" x 16" | 2'-4" x 2'-4" x 10" | **10000** |
| 250 | - | - | - |
| 300 | - | - | - |

| *2 (TWO) STORY* | | | |
|---|---|---|---|
| ***FLOOR AREA SUPPORTED (SQ. FT.)*** | ***PIER (W X L)*** | ***FOOTING (W X L X T)*** | ***TOTAL ALLOWABLE LOAD (LB.)*** |
| 50 | 8" x 16" | 1'-4" x 2'-6" x 8" | **4500** |
| 100 | 8" x 16" | 2'-0" x 2'-0" x 10" | **9000** |
| 150 | 16" x 16" | 2'-8" x 2'-8" x 10" | **13500** |
| 200 | 16" x 16" | 3'-0" x 3'-0" x 10" | **18000** |
| 250 | 16" x 16" | 3'-4" x 3'-4" x 1'-0" | **22500** |
| 300 | 16" x 16" | 3'-8" x 3'-8" x 1'-0" | **27000** |

| *3 (THREE) STORY* | | | |
|---|---|---|---|
| ***FLOOR AREA SUPPORTED (SQ. FT.)*** | ***PIER (W X L)*** | ***FOOTING (W X L X T)*** | ***TOTAL ALLOWABLE LOAD (LB.)*** |
| 50 | 8" x 16" | 1'-4" x 2'-6" x 8" | **6500** |
| 100 | 16" x 16" | 2'-6" x 2'-6" x 10" | **13000** |
| 150 | 16" x 16" | 3'-0" x 3'-0" x 10" | **19500** |
| 200 | 16" x 16" | 4'-0" x 4'-0" x 1'-0" | **26000** |
| 250 | 16" x 24" | 4'-0" x 4'-0" x 1'-0" | **32500** |
| 300 | 16" x 24" | 4'-6" x 4'-6" x 1'-0" | **39000** |

**NOTES:**

1. Refer to Table Notes on page 1.9 for additional information.

# TABLE 1.7: PIER AND FOOTING SIZES FOR SUPPORT OF INTERIOR GIRDERS

**TABLE NOTES**:

1. Table 1.7 expands on the data presented in Table 403.1(2) of the 2018 North Carolina Residential Code to include the *Total Allowable Load* that may be applied to the pier.
2. Table 1.7 is for use with one- and two-family residential structures constructed in accordance with the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments).
3. Table 1.7 is for use with one- and two-family residential structures in Seismic Design Category A, B, or C.
4. Tabulated pier sizes are based on hollow CMU (concrete masonry unit) piers capped with 4 inches of solid masonry or concrete for 1 (one) story houses, 8 inches of solid masonry or concrete for 2 (two), 2½ (two-and-one-half) and 3 (three) story houses, or the cavities of the top course of masonry may be filled with concrete or grout.
5. Piers shall be constructed with Type S mortar.
6. Tabulated pier sizes are minimums. For height/thickness limitations see Section R606.7 of the North Carolina Residential Code.
7. Center of pier shall bear in the middle one-third of the footing.
8. Footing sizes are based on 2000 psf allowable soil bearing pressure and concrete with a minimum specified compression strength of 2500 psi.
9. Footings shall be full thickness over the entire area of the footing.
10. Girders must have full bearing on the piers.
11. The tabulated *Total Allowable Load* values represent the maximum load that may be applied to the corresponding tabulated masonry piers and are based on the preceding notes and the following design criteria and assumptions:
    a. Structure is constructed with dimensional framing lumber in accordance with the 2018 North Carolina Residential Code.
    b. Piers are concrete masonry piers constructed in accordance with Section R606 of the North Carolina Residential Code.
    c. Footings are plain cast-in-place concrete footings constructed in accordance with Chapter 4 of the 2018 North Carolina Residential Code.
    d. Piers and footings are located at the interior of the structure (not at the exterior walls).
    e. Piers and footings support only floor loads (not roof loads).
    f. Tabulated *Floor Area Supported* is the tributary area of each floor level supported by the corresponding pier and footing.
    g. Design loads:
        i. First Floor — 50 psf (40 psf live load, 10 psf dead load)
        ii. Second Floor — 40 psf (30 psf live load, 10 psf dead load)
        iii. Third Floor — 40 psf (30 psf live load, 10 psf dead load)

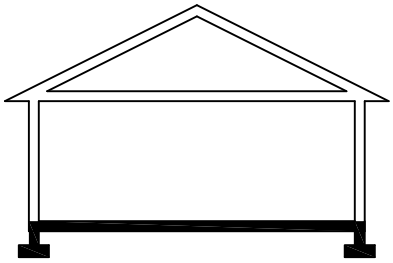


FIGURE 1: ROOF AND CEILING OVER SLAB-ON-GRADE

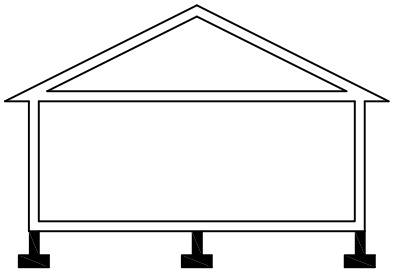


FIGURE 2: ROOF, CEILING AND ONE CENTER-BEARING FLOOR

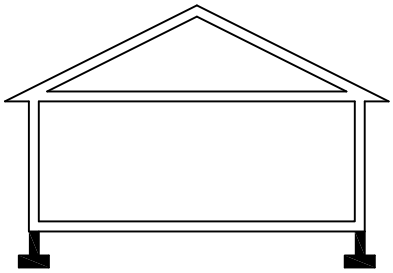


FIGURE 3: ROOF, CEILING AND ONE CLEAR-SPAN FLOOR

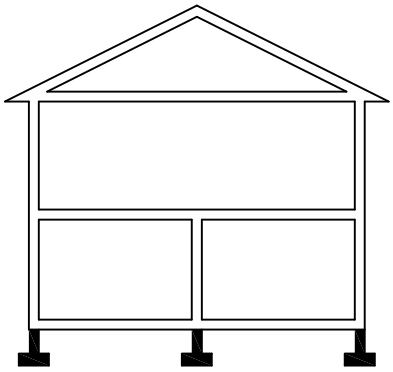


FIGURE 4: ROOF, CEILING AND TWO CENTER-BEARING FLOORS

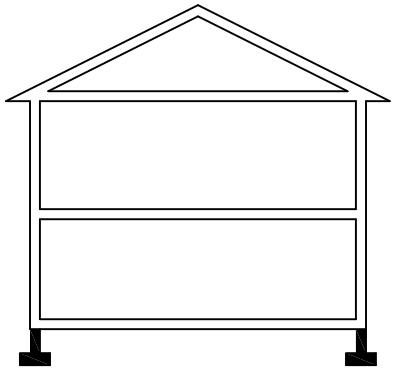


FIGURE 5: ROOF, CEILING AND TWO CLEAR-SPAN FLOORS

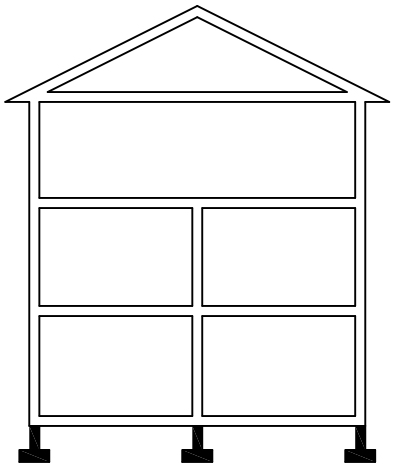


FIGURE 6: ROOF, CEILING AND THREE CENTER-BEARING FLOORS

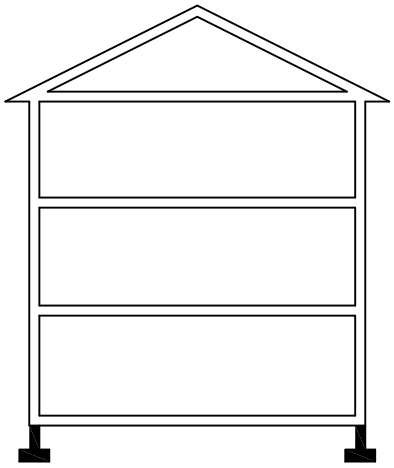
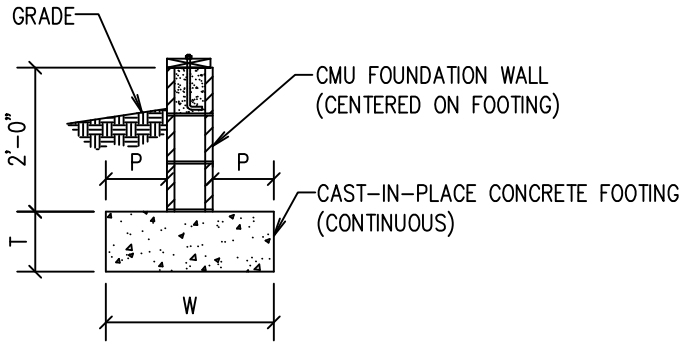


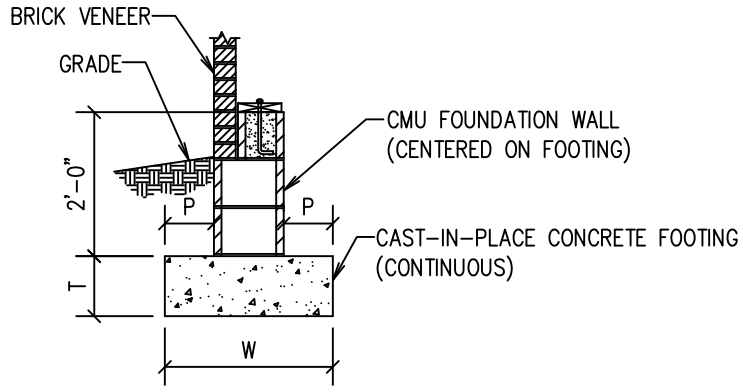
FIGURE 7: ROOF, CEILING AND THREE CLEAR-SPAN FLOORS




W = WIDTH OF FOOTING
T = THICKNESS OF FOOTING
P = PROJECTION OF FOOTING

FOOTING PROJECTION P SHALL BE NOT LESS THAN 2 INCHES AND SHALL NOT EXCEED FOOTING THICKNESS T

FIGURE 8: CONCRETE FOOTING WITH CMU FOUNDATION WALL FOR LIGHT FRAME CONSTRUCTION




W = WIDTH OF FOOTING
T = THICKNESS OF FOOTING
P = PROJECTION OF FOOTING

FOOTING PROJECTION P SHALL BE NOT LESS THAN 2 INCHES AND SHALL NOT EXCEED FOOTING THICKNESS T

FIGURE 9: CONCRETE FOOTING WITH CMU FOUNDATION WALL FOR LIGHT FRAME CONSTRUCTION WITH BRICK VENEER

# JACK STUD TABLES

## TABLE 2.1: MAXIMUM HEADER / GIRDER END REACTION FOR SPECIFIED NUMBER OF JACK STUDS AND HEADER THICKNESS

**(Reference: 2018 North Carolina Residential Code Section R502.5 and Table R602.7(1))**

| *HEADER THICKNESS* | *3" (2-2x)* | *4.5" (3-2X)* | *6" (4-2x)* |
|---|---|---|---|
| *NUMBER OF JACK STUDS* | *MAXIMUM END REACTION (LB.)* | *MAXIMUM END REACTION (LB.)* | *MAXIMUM END REACTION (LB.)* |
| **1** | **1660** | **1760** | **2760** |
| **2** | **3320** | **3520** | **5520** |
| **3** | **4980** | **5280** | **8280** |
| **4** | **6640** | **7040** | **11040** |

**NOTES:**

1. Refer to Table Notes on page 2.2 for additional information.

# TABLE 2.1: MAXIMUM HEADER / GIRDER END REACTION FOR SPECIFIED NUMBER OF JACK STUDS AND HEADER THICKNESS

**TABLE NOTES**:

1. Table 2.1 provides the maximum header or girder reaction for a given number of jack studs and a given header or girder thickness (number of nominal 2x plies).
2. Table 2.1 is for use with one- and two-family residential structures constructed in accordance with the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments).
3. Table 2.1 is for use with one- and two-family residential structures in Seismic Design Category A, B, or C.
4. Jack studs must be a minimum of 2x nominal thickness and have a width at least equal to the width of the wall studs. Wall stud heights shall be in accordance with Table R602.3(5).
5. Tabulated values assume #2 grade lumber and Douglas fir-larch, hem-fir, southern pine and/or spruce-pine-fir lumber species.
6. Tabulated values are derived from the maximum spans and required number of jack studs listed in Tables R602.7(1) and R602.7(2), and the minimum design loads specified in Section R301 of the 2018 North Carolina Residential Code. Refer to Tables 2.4 and 2.5 on pages 2.6 and 2.7 for additional information.
7. Support for header and girder ends must provide a continuous load path from the bearing to the foundation.
8. For header and girder reactions greater than the tabulated values, the structural elements supporting the header or girder must be designed in accordance with accepted engineering practice by a registered design professional.

## TABLE 2.2: LOAD CHART FOR END REACTIONS OF GIRDERS AND HEADERS IN EXTERIOR BEARING WALLS

**GROUND SNOW LOAD = 70 PSF, ROOF SNOW LOAD = 70 PSF**

**(Reference: 2018 North Carolina Residential Code Section R502.5 and Table R602.7(1))**

***BUILDING WIDTH = 36 FT.***

| *GIRDERS AND HEADERS SUPPORTING* | *1st FLOOR SPAN (FT.)* | *2nd FLOOR SPAN (FT.)* | *3rd FLOOR SPAN (FT.)* | *ROOF SPAN (FT.)* | *HEADER / GIRDER SPAN (FT.)* | *1st FLOOR LIVE (PSF)* | *1st FLOOR DEAD (PSF)* | *2nd FLOOR LIVE (PSF)* | *2nd FLOOR DEAD (PSF)* | *3rd FLOOR LIVE (PSF)* | *3rd FLOOR DEAD (PSF)* | *ROOF LIVE / SNOW (PSF)* | *ROOF DEAD (PSF)* | *WALL LOAD (PLF)* | *HEADER / GIRDER LOAD (PLF)* | *HEADER END REACTION (LB.)* | *NJ* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | *HEADER THICKNESS* | | |
| | | | | | | | | | | | | | | | | | *3" (2-2x)* | *4.5" (3-2x)* | *6" (4-2x)* |
| *ROOF AND CEILING (FIGURE 10)* | 0 | 0 | 0 | 36 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **1600** | 1 | 1 | 1 |
| | 0 | 0 | 0 | 36 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **3200** | 2 | 2 | 2 |
| | 0 | 0 | 0 | 36 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **4800** | 3 | 3 | 2 |
| | 0 | 0 | 0 | 36 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **6400** | 4 | 4 | 3 |
| | 0 | 0 | 0 | 36 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **8000** | | | 3 |
| | 0 | 0 | 0 | 36 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **9600** | | | 4 |
| | 0 | 0 | 0 | 36 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **11200** | | | |
| | 0 | 0 | 0 | 36 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 0 | **1600** | **12800** | | | |
| *ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 11)* | 0 | 18 | 0 | 36 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **2068** | 2 | 2 | 1 |
| | 0 | 18 | 0 | 36 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **4136** | 3 | 3 | 2 |
| | 0 | 18 | 0 | 36 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **6204** | 4 | 4 | 3 |
| | 0 | 18 | 0 | 36 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **8272** | | | 3 |
| | 0 | 18 | 0 | 36 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **10340** | | | 4 |
| | 0 | 18 | 0 | 36 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **12408** | | | |
| | 0 | 18 | 0 | 36 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **14476** | | | |
| | 0 | 18 | 0 | 36 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2068** | **16544** | | | |
| *ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 12)* | 0 | 36 | 0 | 36 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **2428** | 2 | 2 | 1 |
| | 0 | 36 | 0 | 36 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **4856** | 3 | 3 | 2 |
| | 0 | 36 | 0 | 36 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **7284** | | | 3 |
| | 0 | 36 | 0 | 36 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **9712** | | | 4 |
| | 0 | 36 | 0 | 36 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **12140** | | | |
| | 0 | 36 | 0 | 36 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **14568** | | | |
| | 0 | 36 | 0 | 36 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **16996** | | | |
| | 0 | 36 | 0 | 36 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 108 | **2428** | **19424** | | | |
| *ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 13)* | 0 | 18 | 18 | 36 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **2524** | 2 | 2 | 1 |
| | 0 | 18 | 18 | 36 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **5048** | 4 | 3 | 2 |
| | 0 | 18 | 18 | 36 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **7572** | | | 3 |
| | 0 | 18 | 18 | 36 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **10096** | | | 4 |
| | 0 | 18 | 18 | 36 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **12620** | | | |
| | 0 | 18 | 18 | 36 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **15144** | | | |
| | 0 | 18 | 18 | 36 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **17668** | | | |
| | 0 | 18 | 18 | 36 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **2524** | **20192** | | | |
| *ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 14)* | 0 | 36 | 36 | 36 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **3244** | 2 | 2 | 2 |
| | 0 | 36 | 36 | 36 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **6488** | 4 | 4 | 3 |
| | 0 | 36 | 36 | 36 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **9732** | | | 4 |
| | 0 | 36 | 36 | 36 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **12976** | | | |
| | 0 | 36 | 36 | 36 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **16220** | | | |
| | 0 | 36 | 36 | 36 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **19464** | | | |
| | 0 | 36 | 36 | 36 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **22708** | | | |
| | 0 | 36 | 36 | 36 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 70 | 10 | 204 | **3244** | **25952** | | | |

**NOTES:**

1. Refer to Table Notes on page 2.5 for additional information.
2. Refer to Figures 10 through 14 on page 2.9 for additional information.

## TABLE 2.3: LOAD CHART FOR END REACTIONS OF GIRDERS AND HEADERS IN INTERIOR BEARING WALLS

**(Reference: 2018 North Carolina Residential Code Section R502.5 and Table R602.7(2))**

***BUILDING WIDTH = 36 FT.***

| *GIRDERS AND HEADERS SUPPORTING* | *1st FLOOR SPAN (FT.)* | *2nd FLOOR SPAN (FT.)* | *3rd FLOOR SPAN (FT.)* | *ROOF SPAN (FT.)* | *HEADER / GIRDER SPAN (FT.)* | *1st FLOOR LIVE (PSF)* | *1st FLOOR DEAD (PSF)* | *2nd FLOOR LIVE (PSF)* | *2nd FLOOR DEAD (PSF)* | *3rd FLOOR LIVE (PSF)* | *3rd FLOOR DEAD (PSF)* | *ROOF LIVE / SNOW (PSF)* | *ROOF DEAD (PSF)* | *WALL LOAD (PLF)* | *HEADER / GIRDER LOAD (PLF)* | *END REACTION (LB.)* | *NJ HEADER THICKNESS* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | *3" (2-2x)* | *4.5" (3-2x)* | *6" (4-2x)* |
| *ONE FLOOR ONLY (FIGURE 15)* | 18 | 0 | 0 | 0 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **900** | 1 | 1 | 1 |
| | 18 | 0 | 0 | 0 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **1800** | 2 | 2 | 1 |
| | 18 | 0 | 0 | 0 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **2700** | 2 | 2 | 1 |
| | 18 | 0 | 0 | 0 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **3600** | 3 | 3 | 2 |
| | 18 | 0 | 0 | 0 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **4500** | 3 | 3 | 2 |
| | 18 | 0 | 0 | 0 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **5400** | 4 | 4 | 2 |
| | 18 | 0 | 0 | 0 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **6300** | 4 | 4 | 3 |
| | 18 | 0 | 0 | 0 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 0 | **900** | **7200** | | | 3 |
| *TWO FLOORS (FIGURE 16)* | 18 | 18 | 0 | 0 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **1700** | 2 | 1 | 1 |
| | 18 | 18 | 0 | 0 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **3400** | 3 | 2 | 2 |
| | 18 | 18 | 0 | 0 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **5100** | 4 | 3 | 2 |
| | 18 | 18 | 0 | 0 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **6800** | | 4 | 3 |
| | 18 | 18 | 0 | 0 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **8500** | | | 4 |
| | 18 | 18 | 0 | 0 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **10200** | | | 4 |
| | 18 | 18 | 0 | 0 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **11900** | | | |
| | 18 | 18 | 0 | 0 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 80 | **1700** | **13600** | | | |
| *THREE FLOORS (FIGURE 17)* | 18 | 18 | 18 | 0 | 2 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **2492** | 2 | 2 | 1 |
| | 18 | 18 | 18 | 0 | 4 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **4984** | 4 | 3 | 2 |
| | 18 | 18 | 18 | 0 | 6 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **7476** | | | 3 |
| | 18 | 18 | 18 | 0 | 8 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **9968** | | | 4 |
| | 18 | 18 | 18 | 0 | 10 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **12460** | | | |
| | 18 | 18 | 18 | 0 | 12 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **14952** | | | |
| | 18 | 18 | 18 | 0 | 14 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **17444** | | | |
| | 18 | 18 | 18 | 0 | 16 | 40 | 10 | 30 | 10 | 30 | 10 | 20 | 10 | 152 | **2492** | **19936** | | | |

**NOTES:**

1. Refer to Table Notes on page 2.5 for additional information.
2. Refer to Figures 15 through 17 on page 2.10 for additional information.

# TABLES 2.2 AND 2.3: LOAD CHART FOR END REACTIONS OF GIRDERS AND HEADERS IN EXTERIOR AND INTERIOR BEARING WALLS

**TABLE NOTES**:

1. Tables 2.2 and 2.3 provide a summary of header/girder loads and reactions for several header/girder spans and loading conditions. Tables 2.2 and 2.3 also provide the number of jack studs required to support each end of the header/girder for each of the spans and loading conditions.
2. Tables 2.2 and 2.3 are for use with one- and two-family residential structures constructed in accordance with the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments).
3. Tables 2.2 and 2.3 are for use with one- and two-family residential structures in Seismic Design Category A, B, or C.
4. NJ = Number of jack studs required to support each end of the header/girder.
5. Jack studs must be a minimum of 2x nominal thickness and have a width at least equal to the width of the wall studs. Wall stud heights shall be in accordance with Table R602.3(5).
6. Tabulated values assume #2 grade lumber and Douglas fir-larch, hem-fir, southern pine and/or spruce-pine-fir lumber species.
7. Tabulated values are derived from the maximum spans and required number of jack studs listed in Tables R602.7(1) and R602.7(2), and the minimum design loads specified in Section R301 of the 2018 North Carolina Residential Code. Refer to Table 2.1 on page 2.1 and Tables 2.4 and 2.5 on pages 2.6 and 2.7 for additional information.
8. The header/girder reactions and the number of jack studs required to support the headers/girders indicated in Tables 2.2 and 2.3 are based on the following design criteria and assumptions:
    a. 36-foot wide house with 2-foot roof overhang, both with and without a load-bearing center wall that carries half of the tributary floor framing, as indicated in the table headings.
    b. Story heights:
        i. First Story 10 feet
        ii. Second Story 9 feet
        iii. Third Story 8 feet
    c. Design loads:
        i. First Floor 50 psf (40 psf live load, 10 psf dead load)
        ii. Second Floor 40 psf (30 psf live load, 10 psf dead load)
        iii. Third Floor 40 psf (30 psf live load, 10 psf dead load)
        iv. Roof 80 psf (70 psf snow load, 10 psf dead load)
        v. Exterior Wood-frame Wall 12 psf
        vi. Interior Wood-frame Wall 8 psf
    d. Habitable attics are considered a supported floor.
    e. Headers and girders in interior bearing walls support only floor loads (not roof loads).
9. Refer to Figures 10 through 17 on pages 2.9 and 2.10 for additional information.
10. Support for header and girder ends must provide a continuous load path from the bearing to the foundation.
11. Where the number of jack studs required to support the header/girder is not listed on Tables 2.2 and 2.3 (shaded areas of table), the structural elements supporting the header/girder must be designed in accordance with accepted engineering practice by a registered design professional.

## TABLE 2.4: REACTIONS OF GIRDERS AND HEADERS IN EXTERIOR BEARING WALLS

**GROUND SNOW LOAD = 70 PSF, ROOF SNOW LOAD = 70 PSF**

**(Reference: 2018 North Carolina Residential Code Section R502.5 and Table R602.7(1))**

| GIRDERS AND HEADERS SUPPORTING | GIRDER / HEADER SIZE | BUILDING WIDTH = 20 FT. | | | BUILDING WIDTH = 28 FT. | | | BUILDING WIDTH = 36 FT. | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | SPAN (FT.) | END REACTION (LB.) | NJ | SPAN (FT.) | END REACTION (LB.) | NJ | SPAN (FT.) | END REACTION (LB.) | NJ |
| ROOF AND CEILING (FIGURE 10) | 2 - 2x4 | 2.833 | 1360 | 1 | 2.500 | 1600 | 1 | 2.250 | 1800 | 1 |
| | 2 - 2x6 | 4.167 | 2000 | 1 | 3.667 | 2347 | 2 | 3.250 | 2600 | 2 |
| | 2 - 2x8 | 5.333 | 2560 | 2 | 4.583 | 2933 | 2 | 4.083 | 3266 | 2 |
| | 2 - 2x10 | 6.500 | 3120 | 2 | 5.583 | 3573 | 2 | 5.000 | 4000 | 2 |
| | 2 - 2x12 | 7.500 | 3600 | 2 | 6.500 | 4160 | 2 | 5.833 | 4666 | 3 |
| | 3 -2x8 | 6.670 | 3202 | 1 | 5.750 | 3680 | 2 | 5.167 | 4134 | 2 |
| | 3 - 2x10 | 8.167 | 3920 | 2 | 7.000 | 4480 | 2 | 6.333 | 5066 | 2 |
| | 3 - 2x12 | 9.417 | 4520 | 2 | 8.167 | 5227 | 2 | 7.333 | 5866 | 2 |
| | 4 - 2x8 | 7.667 | 3680 | 1 | 6.667 | 4267 | 1 | 5.917 | 4734 | 2 |
| | 4 - 2x10 | 9.417 | 4520 | 2 | 8.167 | 5227 | 2 | 7.250 | 5800 | 2 |
| | 4 - 2x12 | 10.917 | 5240 | 2 | 9.417 | 6027 | 2 | 8.417 | 6734 | 2 |
| ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 11) | 2 - 2x4 | 2.583 | 1638 | 1 | 2.250 | 1877 | 1 | 2.000 | 2068 | 1 |
| | 2 - 2x6 | 3.750 | 2378 | 2 | 3.250 | 2711 | 2 | 2.917 | 3016 | 2 |
| | 2 - 2x8 | 4.750 | 3012 | 2 | 4.167 | 3475 | 2 | 3.750 | 3878 | 2 |
| | 2 - 2x10 | 5.750 | 3646 | 2 | 5.083 | 4239 | 2 | 4.583 | 4739 | 3 |
| | 2 - 2x12 | 6.667 | 4227 | 2 | 5.833 | 4865 | 3 | 5.250 | 5429 | 3 |
| | 3 -2x8 | 5.917 | 3751 | 2 | 5.167 | 4309 | 2 | 4.667 | 4826 | 2 |
| | 3 - 2x10 | 7.250 | 4597 | 2 | 6.333 | 5282 | 2 | 5.667 | 5860 | 2 |
| | 3 - 2x12 | 8.417 | 5336 | 2 | 7.333 | 6116 | 2 | 6.583 | 6807 | 2 |
| | 4 - 2x8 | 6.833 | 4332 | 1 | 6.000 | 5004 | 2 | 5.417 | 5601 | 2 |
| | 4 - 2x10 | 8.333 | 5283 | 2 | 7.333 | 6116 | 2 | 6.583 | 6807 | 2 |
| | 4 - 2x12 | 9.667 | 6129 | 2 | 8.500 | 7089 | 2 | 7.583 | 7841 | 2 |
| ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 12) | 2 - 2x4 | 2.417 | 1774 | 1 | 2.083 | 2029 | 1 | 1.833 | 2225 | 1 |
| | 2 - 2x6 | 3.500 | 2569 | 2 | 3.083 | 3003 | 2 | 2.750 | 3339 | 2 |
| | 2 - 2x8 | 4.500 | 3303 | 2 | 3.917 | 3815 | 2 | 3.500 | 4249 | 2 |
| | 2 - 2x10 | 5.500 | 4037 | 2 | 4.750 | 4627 | 2 | 4.250 | 5160 | 3 |
| | 2 - 2x12 | 6.333 | 4648 | 2 | 5.500 | 5357 | 3 | 5.000 | 6070 | 3 |
| | 3 -2x8 | 5.583 | 4098 | 2 | 4.917 | 4789 | 2 | 4.417 | 5362 | 2 |
| | 3 - 2x10 | 6.833 | 5015 | 2 | 6.000 | 5844 | 2 | 5.333 | 6474 | 2 |
| | 3 - 2x12 | 7.917 | 5811 | 2 | 6.917 | 6737 | 2 | 6.250 | 7588 | 2 |
| | 4 - 2x8 | 6.500 | 4771 | 1 | 5.667 | 5520 | 2 | 5.083 | 6171 | 2 |
| | 4 - 2x10 | 7.917 | 5811 | 2 | 6.917 | 6737 | 2 | 6.167 | 7487 | 2 |
| | 4 - 2x12 | 9.167 | 6729 | 2 | 8.000 | 7792 | 2 | 7.167 | 8701 | 2 |
| ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 13) | 2 - 2x4 | 2.333 | 1824 | 1 | 2.000 | 2044 | 1 | 1.750 | 2209 | 1 |
| | 2 - 2x6 | 3.417 | 2672 | 2 | 3.000 | 3066 | 2 | 2.667 | 3366 | 2 |
| | 2 - 2x8 | 4.333 | 3388 | 2 | 3.750 | 3833 | 2 | 3.417 | 4312 | 2 |
| | 2 - 2x10 | 5.250 | 4106 | 2 | 4.583 | 4684 | 3 | 4.167 | 5259 | 3 |
| | 2 - 2x12 | 6.083 | 4757 | 3 | 5.333 | 5450 | 3 | 4.833 | 6099 | 3 |
| | 3 -2x8 | 5.417 | 4236 | 2 | 4.750 | 4855 | 2 | 4.250 | 5364 | 2 |
| | 3 - 2x10 | 6.583 | 5148 | 2 | 5.750 | 5877 | 2 | 5.250 | 6626 | 2 |
| | 3 - 2x12 | 7.667 | 5996 | 2 | 6.750 | 6899 | 2 | 6.083 | 7677 | 3 |
| | 4 - 2x8 | 6.250 | 4888 | 2 | 5.500 | 5621 | 2 | 4.917 | 6205 | 2 |
| | 4 - 2x10 | 7.583 | 5930 | 2 | 6.667 | 6814 | 2 | 6.000 | 7572 | 2 |
| | 4 - 2x12 | 8.833 | 6907 | 2 | 7.750 | 7921 | 2 | 7.000 | 8834 | 2 |
| ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 14) | 2 - 2x4 | 2.000 | 1964 | 1 | 1.667 | 2170 | 1 | 1.417 | 2298 | 2 |
| | 2 - 2x6 | 2.917 | 2864 | 2 | 2.583 | 3363 | 2 | 2.250 | 3650 | 2 |
| | 2 - 2x8 | 3.750 | 3683 | 2 | 3.250 | 4232 | 2 | 2.917 | 4731 | 3 |
| | 2 - 2x10 | 4.583 | 4501 | 3 | 4.000 | 5208 | 3 | 3.500 | 5677 | 3 |
| | 2 - 2x12 | 5.333 | 5237 | 3 | 4.583 | 5967 | 3 | 4.083 | 6623 | 4 |
| | 3 -2x8 | 4.667 | 4583 | 2 | 4.083 | 5316 | 2 | 3.667 | 5948 | 2 |
| | 3 - 2x10 | 5.750 | 5647 | 2 | 4.917 | 6402 | 2 | 4.417 | 7164 | 3 |
| | 3 - 2x12 | 6.667 | 6547 | 2 | 5.750 | 7487 | 3 | 5.167 | 8381 | 3 |
| | 4 - 2x8 | 5.417 | 5319 | 2 | 4.667 | 6076 | 2 | 4.167 | 6759 | 2 |
| | 4 - 2x10 | 6.583 | 6465 | 2 | 5.750 | 7487 | 2 | 5.083 | 8245 | 2 |
| | 4 - 2x12 | 7.667 | 7529 | 2 | 6.667 | 8680 | 2 | 5.917 | 9597 | 3 |

**NOTES:**

1. Refer to Table Notes on page 2.8 for additional information.
2. Refer to Figures 10 through 14 on page 2.9 for additional information.

## TABLE 2.5: REACTIONS OF GIRDERS AND HEADERS IN INTERIOR BEARING WALLS

**(Reference: 2018 North Carolina Residential Code Section R502.5 and Table R602.7(2))**

| *GIRDERS AND HEADERS SUPPORTING* | *GIRDER / HEADER SIZE* | *BUILDING WIDTH = 20 FT.* | | | *BUILDING WIDTH = 28 FT.* | | | *BUILDING WIDTH = 36 FT.* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | *SPAN (FT.)* | *END REACTION (LB.)* | *NJ* | *SPAN (FT.)* | *END REACTION (LB.)* | *NJ* | *SPAN (FT.)* | *END REACTION (LB.)* | *NJ* |
| *ONE FLOOR ONLY (FIGURE 15)* | 2 - 2x4 | 3.083 | 771 | 1 | 2.667 | 933 | 1 | 2.417 | 1088 | 1 |
| | 2 - 2x6 | 4.500 | 1125 | 1 | 3.917 | 1371 | 1 | 3.500 | 1575 | 1 |
| | 2 - 2x8 | 5.750 | 1438 | 1 | 5.000 | 1750 | 2 | 4.417 | 1988 | 2 |
| | 2 - 2x10 | 7.000 | 1750 | 2 | 6.083 | 2129 | 2 | 5.417 | 2438 | 2 |
| | 2 - 2x12 | 8.083 | 2021 | 2 | 7.000 | 2450 | 2 | 6.250 | 2813 | 2 |
| | 3 -2x8 | 7.167 | 1792 | 1 | 6.250 | 2188 | 1 | 5.583 | 2512 | 2 |
| | 3 - 2x10 | 8.750 | 2188 | 1 | 7.583 | 2654 | 2 | 6.750 | 3038 | 2 |
| | 3 - 2x12 | 10.167 | 2542 | 2 | 8.833 | 3092 | 2 | 7.833 | 3525 | 2 |
| | 4 - 2x8 | 9.000 | 2250 | 1 | 7.667 | 2683 | 1 | 6.750 | 3038 | 1 |
| | 4 - 2x10 | 10.083 | 2521 | 1 | 8.750 | 3063 | 1 | 7.833 | 3525 | 2 |
| | 4 - 2x12 | 11.750 | 2938 | 1 | 10.167 | 3558 | 2 | 9.083 | 4087 | 2 |
| *TWO FLOORS (FIGURE 16)* | 2 - 2x4 | 2.167 | 1062 | 1 | 1.833 | 1228 | 1 | 1.583 | 1346 | 1 |
| | 2 - 2x6 | 3.167 | 1552 | 2 | 2.750 | 1843 | 2 | 2.417 | 2054 | 2 |
| | 2 - 2x8 | 4.083 | 2001 | 2 | 3.500 | 2345 | 2 | 3.167 | 2692 | 2 |
| | 2 - 2x10 | 4.917 | 2409 | 2 | 4.250 | 2848 | 2 | 3.833 | 3258 | 3 |
| | 2 - 2x12 | 5.750 | 2818 | 2 | 5.000 | 3350 | 3 | 4.417 | 3754 | 3 |
| | 3 -2x8 | 5.083 | 2491 | 2 | 4.417 | 2959 | 2 | 3.917 | 3329 | 2 |
| | 3 - 2x10 | 6.167 | 3022 | 2 | 5.333 | 3573 | 2 | 4.833 | 4108 | 2 |
| | 3 - 2x12 | 7.167 | 3512 | 2 | 6.250 | 4188 | 2 | 5.417 | 4604 | 3 |
| | 4 - 2x8 | 6.083 | 2981 | 1 | 5.250 | 3518 | 2 | 4.667 | 3967 | 2 |
| | 4 - 2x10 | 7.167 | 3512 | 2 | 6.167 | 4132 | 2 | 5.500 | 4675 | 2 |
| | 4 - 2x12 | 8.333 | 4083 | 2 | 7.167 | 4802 | 2 | 6.417 | 5454 | 2 |

**NOTES:**

1. Refer to Table Notes on page 2.8 for additional information.
2. Refer to Figures 15 through 17 on page 2.10 for additional information.

# TABLES 2.4 AND 2.5: REACTIONS OF GIRDERS AND HEADERS IN EXTERIOR AND INTERIOR BEARING WALLS

**TABLE NOTES**:

1. Tables 2.4 and 2.5 expand on the data presented in Table R602.7(1) and Table R602.7(2) of the 2018 North Carolina Residential Code to include the reactions of the headers/girders listed in the tables. The tabulated reactions are based on the design criteria and assumptions described in the following notes.
2. Tables 2.4 and 2.5 are for use with one- and two-family residential structures constructed in accordance with the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments).
3. Tables 2.4 and 2.5 are for use with one- and two-family residential structures in Seismic Design Category A, B, or C.
4. NJ = Number of jack studs required to support each end of the header/girder.
5. Jack studs must be a minimum of 2x nominal thickness and have a width at least equal to the width of the wall studs. Wall stud heights shall be in accordance with Table R602.3(5).
6. Tabulated values assume #2 grade lumber and Douglas fir-larch, hem-fir, southern pine and/or spruce-pine-fir lumber species.
7. Tabulated reactions are derived from the minimum design loads specified in Section R301 of the 2018 North Carolina Residential Code.
8. The header/girder reactions tabulated in Tables 2.4 and 2.5 are based on the following design criteria and assumptions:
    a. House with 2-foot roof overhang, both with and without a load-bearing center wall that carries half of the tributary floor framing, as indicated in the table headings. Width of house as indicated in the table headings.
    b. Story heights:
        i. First Story 10 feet
        ii. Second Story 9 feet
        iii. Third Story 8 feet
    c. Design loads:
        i. First Floor 50 psf (40 psf live load, 10 psf dead load)
        ii. Second Floor 40 psf (30 psf live load, 10 psf dead load)
        iii. Third Floor 40 psf (30 psf live load, 10 psf dead load)
        iv. Roof 80 psf (70 psf snow load, 10 psf dead load)
        v. Exterior Wood-frame Wall 12 psf
        vi. Interior Wood-frame Wall 8 psf
    d. Habitable attics are considered a supported floor.
    e. Headers and girders in interior bearing walls support only floor loads (not roof loads).
9. Refer to Figures 10 through 17 on pages 2.9 and 2.10 for additional information.

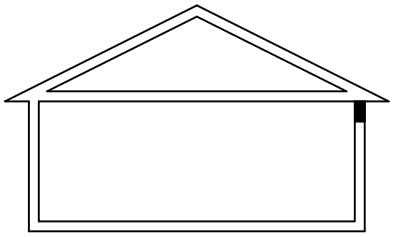


FIGURE 10: ROOF AND CEILING

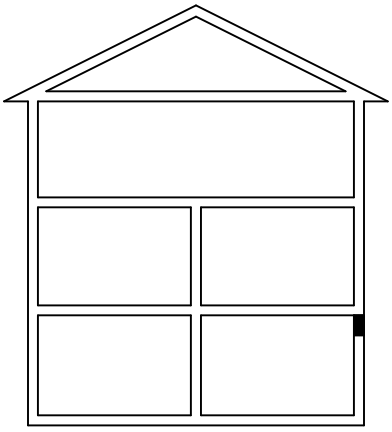


FIGURE 13: ROOF, CEILING AND TWO CENTER–BEARING FLOORS

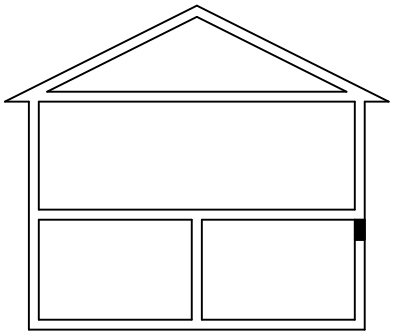


FIGURE 11: ROOF, CEILING AND ONE CENTER–BEARING FLOOR

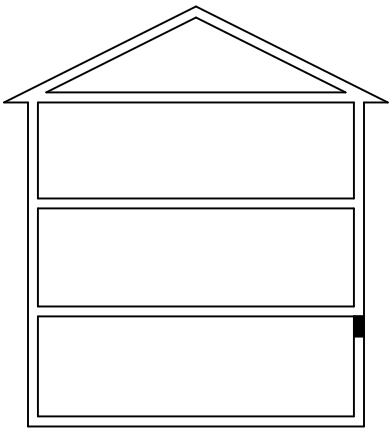


FIGURE 14: ROOF, CEILING AND TWO CLEAR–SPAN FLOORS

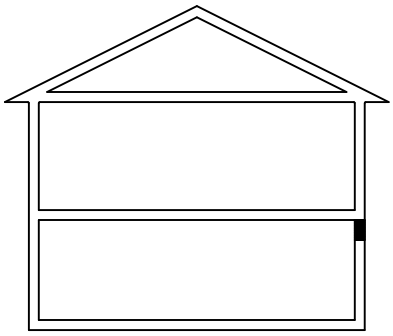


FIGURE 12: ROOF, CEILING AND ONE CLEAR–SPAN FLOOR

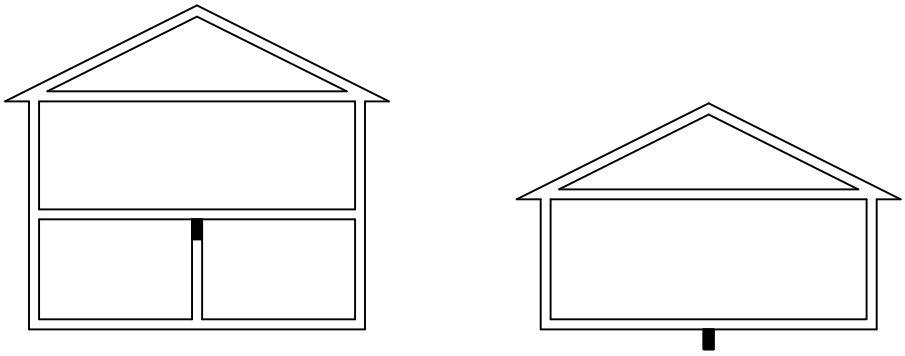


FIGURE 15: ONE FLOOR ONLY

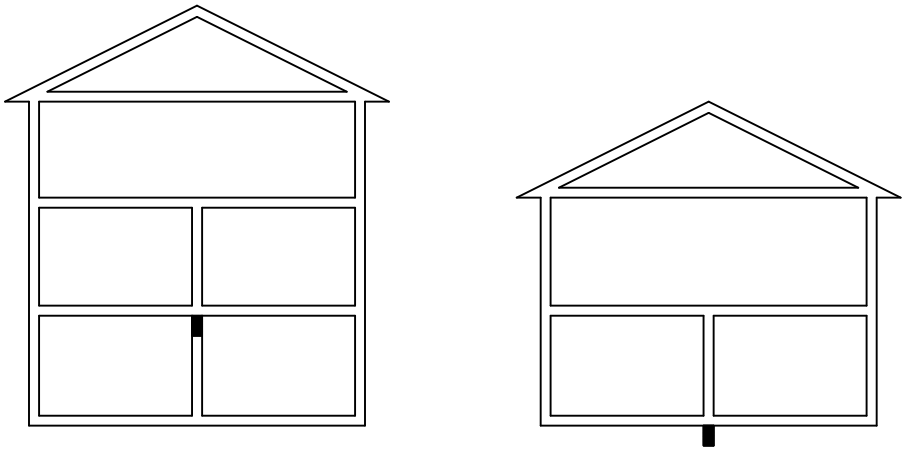


FIGURE 16: TWO FLOORS

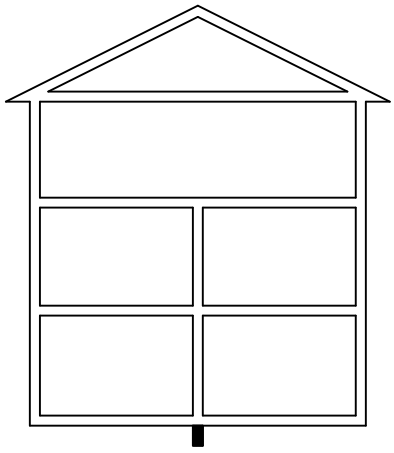


FIGURE 17: THREE FLOORS

# BEAM TABLES

## TABLE 3.1: WOOD BEAMS AND GIRDERS ALLOWABLE LOADS AND CORRESPONDING REACTIONS

**(Reference: 2018 North Carolina Residential Code Table W-1)**

### 2x8 (1-1/2" x 7-1/4")

| BEAM / GIRDER SPAN, L (FT.) | SPRUCE-PINE-FIR | | | | | | SOUTHERN PINE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2-PLY | | 3-PLY | | 4-PLY | | 2-PLY | | 3-PLY | | 4-PLY | |
| | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) |
| **3** | 1305 | 1958 | 1956 | 2934 | 2610 | 3915 | 1692 | 2538 | 2538 | 3807 | 3383 | 5075 |
| **4** | 979 | 1958 | 1468 | 2936 | 1958 | 3916 | 1013 | 2026 | 1519 | 3038 | 2026 | 4052 |
| **5** | 736 | 1840 | 1104 | 2760 | 1472 | 3680 | 648 | 1620 | 972 | 2430 | 1296 | 3240 |
| **6** | 511 | 1533 | 767 | 2301 | 1022 | 3066 | 450 | 1350 | 675 | 2025 | 900 | 2700 |
| **7** | 375 | 1313 | 563 | 1971 | 751 | 2629 | 331 | 1159 | 496 | 1736 | 661 | 2314 |
| **8** | 287 | 1148 | 431 | 1724 | 575 | 2300 | 253 | 1012 | 380 | 1520 | 506 | 2024 |
| **9** | 227 | 1022 | 341 | 1535 | 454 | 2043 | 200 | 900 | 300 | 1350 | 400 | 1800 |
| **10** | 184 | 920 | 276 | 1380 | 368 | 1840 | 162 | 810 | 243 | 1215 | 324 | 1620 |
| **12** | 114 | 684 | 172 | 1032 | 228 | 1368 | 113 | 678 | 169 | 1014 | 225 | 1350 |
| **14** | 72 | 504 | 108 | 756 | 144 | 1008 | 72 | 504 | 108 | 756 | 144 | 1008 |

### 2x10 (1-1/2" x 9-1/4")

| BEAM / GIRDER SPAN, L (FT.) | SPRUCE-PINE-FIR | | | | | | SOUTHERN PINE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2-PLY | | 3-PLY | | 4-PLY | | 2-PLY | | 3-PLY | | 4-PLY | |
| | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) |
| **3** | 1665 | 2498 | 2498 | 3747 | 3330 | 4995 | 2158 | 3237 | 3238 | 4857 | 4317 | 6476 |
| **4** | 1249 | 2498 | 1873 | 3746 | 2498 | 4996 | 1426 | 2852 | 2139 | 4278 | 2852 | 5704 |
| **5** | 999 | 2498 | 1499 | 3748 | 1998 | 4995 | 913 | 2283 | 1369 | 3423 | 1825 | 4563 |
| **6** | 763 | 2289 | 1144 | 3432 | 1525 | 4575 | 634 | 1902 | 951 | 2853 | 1268 | 3804 |
| **7** | 560 | 1960 | 840 | 2940 | 1120 | 3920 | 466 | 1631 | 698 | 2443 | 931 | 3259 |
| **8** | 429 | 1716 | 643 | 2572 | 858 | 3432 | 357 | 1428 | 535 | 2140 | 713 | 2852 |
| **9** | 339 | 1526 | 508 | 2286 | 678 | 3051 | 282 | 1269 | 423 | 1904 | 563 | 2534 |
| **10** | 275 | 1375 | 412 | 2060 | 549 | 2745 | 228 | 1140 | 342 | 1710 | 456 | 2280 |
| **12** | 191 | 1146 | 286 | 1716 | 381 | 2286 | 158 | 948 | 238 | 1428 | 317 | 1902 |
| **14** | 140 | 980 | 210 | 1470 | 280 | 1960 | 116 | 812 | 175 | 1225 | 233 | 1631 |

### 2x12 (1-1/2" x 11-1/4")

| BEAM / GIRDER SPAN, L (FT.) | SPRUCE-PINE-FIR | | | | | | SOUTHERN PINE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2-PLY | | 3-PLY | | 4-PLY | | 2-PLY | | 3-PLY | | 4-PLY | |
| | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) |
| **3** | 2025 | 3038 | 3038 | 4557 | 4050 | 6075 | 2625 | 3938 | 3938 | 5907 | 5250 | 7875 |
| **4** | 1519 | 3038 | 2278 | 4556 | 3038 | 6076 | 1969 | 3938 | 2953 | 5906 | 3938 | 7876 |
| **5** | 1215 | 3038 | 1823 | 4558 | 2430 | 6075 | 1266 | 3165 | 1898 | 4745 | 2531 | 6328 |
| **6** | 1013 | 3039 | 1519 | 4557 | 2025 | 6075 | 879 | 2637 | 1318 | 3954 | 1756 | 5268 |
| **7** | 753 | 2636 | 1130 | 3955 | 1507 | 5275 | 646 | 2261 | 969 | 3392 | 1291 | 4519 |
| **8** | 577 | 2308 | 856 | 3424 | 1154 | 4616 | 494 | 1976 | 742 | 2968 | 989 | 3956 |
| **9** | 456 | 2052 | 684 | 3078 | 911 | 4100 | 391 | 1760 | 586 | 2637 | 781 | 3515 |
| **10** | 369 | 1845 | 554 | 2770 | 738 | 3690 | 316 | 1580 | 475 | 2375 | 633 | 3165 |
| **12** | 256 | 1536 | 385 | 2310 | 513 | 3078 | 220 | 1320 | 330 | 1980 | 439 | 2634 |
| **14** | 188 | 1316 | 283 | 1981 | 377 | 2639 | 161 | 1127 | 242 | 1694 | 323 | 2261 |

**NOTES:**

1. Refer to Table Notes on page 3.2 for additional information.

# TABLE 3.1: WOOD BEAMS AND GIRDERS ALLOWABLE LOADS AND CORRESPONDING REACTIONS

**TABLE NOTES**:

1. Table 3.1 expands on the data presented in Table W-1 of the 2018 North Carolina Residential Code to include the reactions of the beams and girders for the spans and loads listed in the table. The tabulated reactions were determined by multiplying the span by the corresponding allowable load and dividing by 2.
2. Table 3.1 is for use with one- and two-family residential structures constructed in accordance with the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments).
3. Table 3.1 is for use with one- and two-family residential structures in Seismic Design Category A, B, or C.
4. Lumber grade is #2 intended for an in-service moisture content of 19% or less.
5. Deflection is limited to L/360.
6. Load duration factor used in calculations is 1.0.
7. Adequate bearing and lateral support for the member must be provided. Support for the member ends must provide a continuous load path from the bearing to the foundation.
8. Values tabulated are for spruce-pine-fir, not spruce-pine-fir (south). Values tabulated for southern pine are based on design values published by the American Wood Council in an addendum to NDS dated March 2013.
9. Span, L, is clear span. Effective span for bending and deflection is clear span plus 3 inches.
10. For beam and girder loads and/or spans greater than the tabulated values, the beam or girder must be designed in accordance with accepted engineering practice by a registered design professional.

## TABLE 3.2: FLITCH PLATE BEAMS ALLOWABLE LOADS AND CORRESPONDING REACTIONS

**(Reference: 2018 North Carolina Residential Code Table W-2)**

### *(2) 2x6 WITH PLATE INDICATED*

| BEAM SPAN, L (FT.) | PLATE SIZE / (BEAM WEIGHT PER FOOT) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" x 5" PLATE (8 PLF) | | 3/8" x 5" PLATE (10 PLF) | | 1/2" x 5" PLATE (13 PLF) | | 5/8" x 5" PLATE (15 PLF) | | 3/4" x 5" PLATE (17 PLF) | |
| | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) |
| **6** | 643 | 1929 | 825 | 2475 | 1006 | 3018 | 1188 | 3564 | 1370 | 4110 |
| **7** | 473 | 1656 | 606 | 2121 | 739 | 2587 | 873 | 3056 | 1006 | 3521 |
| **8** | 362 | 1448 | 464 | 1856 | 566 | 2264 | 668 | 2672 | 771 | 3084 |
| **9** | 272 | 1224 | 348 | 1566 | 425 | 1913 | 502 | 2259 | 579 | 2606 |
| **10** | 198 | 990 | 254 | 1270 | 310 | 1550 | 366 | 1830 | 422 | 2110 |
| **11** | 149 | 820 | 191 | 1051 | 233 | 1282 | 275 | 1513 | 317 | 1744 |
| **12** | 115 | 690 | 147 | 882 | 179 | 1074 | 212 | 1272 | 244 | 1464 |

### *(2) 2X8 WITH PLATE INDICATED*

| BEAM SPAN, L (FT.) | PLATE SIZE / (BEAM WEIGHT PER FOOT) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" x 7" PLATE (11 PLF) | | 3/8" x 7" PLATE (14 PLF) | | 1/2" x 7" PLATE (17 PLF) | | 5/8" x 7" PLATE (20 PLF) | | 3/4" x 7" PLATE (23 PLF) | |
| | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) |
| **6** | 1150 | 3450 | 1499 | 4497 | 1849 | 5547 | 2199 | 6597 | 2549 | 7647 |
| **7** | 845 | 2958 | 1102 | 3857 | 1359 | 4757 | 1615 | 5653 | 1872 | 6552 |
| **8** | 647 | 2588 | 843 | 3372 | 1040 | 4160 | 1237 | 4948 | 1434 | 5736 |
| **9** | 511 | 2300 | 666 | 2997 | 822 | 3699 | 977 | 4397 | 1133 | 5099 |
| **10** | 414 | 2070 | 540 | 2700 | 666 | 3330 | 792 | 3960 | 917 | 4585 |
| **11** | 342 | 4372 | 446 | 6556 | 550 | 8743 | 654 | 4991 | 758 | 7487 |
| **12** | 287 | 3996 | 375 | 5996 | 462 | 7992 | 550 | 3652 | 637 | 5476 |
| **13** | 230 | 3434 | 300 | 5148 | 369 | 6863 | 439 | 2853 | 509 | 4280 |
| **14** | 184 | 2800 | 240 | 4200 | 296 | 5600 | 352 | 2330 | 408 | 3490 |
| **15** | 150 | 1125 | 195 | 1463 | 240 | 1800 | 286 | 2145 | 331 | 2483 |
| **16** | 123 | 984 | 161 | 1288 | 198 | 1584 | 236 | 1888 | 273 | 2184 |

### *(2) 2x10 WITH PLATE INDICATED*

| BEAM SPAN, L (FT.) | PLATE SIZE / (BEAM WEIGHT PER FOOT) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" x 9" PLATE (14 PLF) | | 3/8" x 9" PLATE (18 PLF) | | 1/2" x 9" PLATE (22 PLF) | | 5/8" x 9" PLATE (26 PLF) | | 3/4" x 9" PLATE (30 PLF) | |
| | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) |
| **6** | 1642 | 4926 | 2145 | 6435 | 2649 | 7947 | 3153 | 9459 | 3657 | 10971 |
| **7** | 1206 | 4221 | 1576 | 5516 | 1946 | 6811 | 2317 | 8110 | 2687 | 9405 |
| **8** | 923 | 3692 | 1207 | 4828 | 1490 | 5960 | 1774 | 7096 | 2057 | 8228 |
| **9** | 730 | 3285 | 954 | 4293 | 1177 | 5297 | 1401 | 6305 | 1625 | 7313 |
| **10** | 591 | 2955 | 772 | 3860 | 954 | 4770 | 1135 | 5675 | 1317 | 6585 |
| **11** | 488 | 6075 | 638 | 9114 | 788 | 12150 | 938 | 7875 | 1088 | 11814 |
| **12** | 410 | 5317 | 536 | 7973 | 662 | 10633 | 788 | 6892 | 914 | 10336 |
| **13** | 350 | 4860 | 457 | 7292 | 564 | 9720 | 672 | 5064 | 779 | 7592 |
| **14** | 302 | 4559 | 394 | 6836 | 487 | 9113 | 579 | 3956 | 672 | 5931 |
| **15** | 263 | 3765 | 343 | 5650 | 424 | 7535 | 504 | 3230 | 585 | 4845 |
| **16** | 231 | 6075 | 302 | 9114 | 373 | 12150 | 443 | 7875 | 514 | 11814 |
| **17** | 204 | 5317 | 267 | 7973 | 330 | 10633 | 393 | 6892 | 456 | 10336 |
| **18** | 182 | 4860 | 238 | 7292 | 294 | 9720 | 350 | 5064 | 406 | 7592 |
| **19** | 155 | 1473 | 203 | 1929 | 250 | 2375 | 298 | 2831 | 345 | 3278 |
| **20** | 133 | 1330 | 174 | 1740 | 214 | 2140 | 255 | 2550 | 296 | 2960 |

### *(2) 2x12 WITH PLATE INDICATED*

| BEAM SPAN, L (FT.) | PLATE SIZE / (BEAM WEIGHT PER FOOT) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/4" x 11" PLATE (18 PLF) | | 3/8" x 11" PLATE (22 PLF) | | 1/2" x 11" PLATE (27 PLF) | | 5/8" x 11" PLATE (32 PLF) | | 3/4" x 11" PLATE (36 PLF) | |
| | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) | LOAD (PLF) | END REACTION (LB.) |
| **6** | 2297 | 6891 | 3006 | 9018 | 3715 | 11145 | 4425 | 13275 | 5134 | 15402 |
| **7** | 1688 | 5908 | 2209 | 7732 | 2730 | 9555 | 3251 | 11379 | 3772 | 13202 |
| **8** | 1292 | 5168 | 1691 | 6764 | 2090 | 8360 | 2489 | 9956 | 2888 | 11552 |
| **9** | 1021 | 4595 | 1336 | 6012 | 1651 | 7430 | 1966 | 8847 | 2282 | 10269 |
| **10** | 827 | 4135 | 1082 | 5410 | 1338 | 6690 | 1593 | 7965 | 1848 | 9240 |
| **11** | 683 | 6075 | 894 | 9114 | 1105 | 12150 | 1316 | 7875 | 1527 | 11814 |
| **12** | 574 | 5317 | 752 | 7973 | 929 | 10633 | 1106 | 6892 | 1283 | 10336 |
| **13** | 489 | 4860 | 640 | 7292 | 791 | 9720 | 943 | 5064 | 1094 | 7592 |
| **14** | 422 | 4559 | 552 | 6836 | 682 | 9113 | 813 | 3956 | 943 | 5931 |
| **15** | 367 | 3765 | 481 | 5650 | 594 | 7535 | 708 | 3230 | 821 | 4845 |
| **16** | 323 | 2584 | 423 | 3384 | 522 | 4176 | 622 | 4976 | 722 | 5776 |
| **17** | 286 | 2431 | 374 | 3179 | 463 | 3936 | 551 | 4684 | 639 | 5432 |
| **18** | 255 | 2295 | 334 | 3006 | 413 | 3717 | 492 | 4428 | 570 | 5130 |
| **19** | 229 | 6075 | 300 | 9114 | 371 | 12150 | 441 | 7875 | 512 | 11814 |
| **20** | 207 | 5317 | 271 | 7973 | 334 | 10633 | 398 | 6892 | 462 | 10336 |
| **21** | 188 | 4860 | 245 | 7292 | 303 | 9720 | 361 | 5064 | 419 | 7592 |
| **22** | 171 | 4559 | 224 | 6836 | 276 | 9113 | 329 | 3956 | 382 | 5931 |
| **23** | 156 | 3765 | 205 | 5650 | 253 | 7535 | 301 | 3230 | 349 | 4845 |
| **24** | 140 | 1680 | 183 | 2196 | 226 | 2712 | 269 | 3228 | 312 | 3744 |

**NOTES:**

1. Refer to Table Notes on page 3.4 for additional information.

# TABLE 3.2: FLITCH PLATE BEAMS ALLOWABLE LOADS AND CORRESPONDING REACTIONS

**TABLE NOTES**:

1. Table 3.2 expands on the data presented in Table W-2 of the 2018 North Carolina Residential Code to include the reactions of the beams for the spans and loads listed in the table. The tabulated reactions were determined by multiplying the span by the corresponding allowable load and dividing by 2.
2. Table 3.2 is for use with one- and two-family residential structures constructed in accordance with the 2018 North Carolina Residential Code (2015 International Residential Code with North Carolina amendments).
3. Table 3.2 is for use with one- and two-family residential structures in Seismic Design Category A, B, or C.
4. Lumber species and grade is #2 southern pine or #2 spruce-pine-fir intended for an in-service moisture content of 19% or less.
5. Southern pine lumber design values were published by the American Wood Council in an addendum to NDS dated March 2013.
6. Tabulated values are based on ASTM A36 structural steel plate.
7. Deflection is limited to L/360.
8. Load duration factor used in calculations is 1.0.
9. Adequate bearing and lateral support for the member must be provided. Support for the member ends must provide a continuous load path from the bearing to the foundation.
10. Wood side plates and steel flitch plates shall be continuous throughout the span.
11. Span, L, is center-to-center of supports.
12. For beam and girder loads and/or spans greater than the tabulated values, the beam or girder must be designed in accordance with accepted engineering practice by a registered design professional.