

**PRESCRIPTIVE TABLES**  
FOR  
**SELECTION OF SUPPORT ELEMENTS FOR  
BEAMS, GIRDERS, AND HEADERS**

**30 PSF ROOF SNOW LOAD**

FOR USE WITH  
**2018 NORTH CAROLINA RESIDENTIAL CODE**

**FEBRUARY 2018**



## 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 30 psf. Table packages are also available for roof snow loads of 20 psf, 50 psf, and 70 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 30 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 28-inch-wide by 8-inch-thick continuous footing is required to support the header reactions (Maximum Column Load = 8003 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 30 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 6896 pounds (refer to Figure 13, *Roof, Ceiling, and Two Center-Bearing Floors*) and that 4 (four) jack studs are required for a 4.5-inch-thick header and 3 (three) jack studs are required for a 6-inch-thick header. Table 1.1 indicates that a 28-inch-wide by 10-inch-thick continuous footing is required to support the header reactions (Maximum Column Load = 9674 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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**TABLE 1.1: MAXIMUM COLUMN LOAD ON CONTINUOUS CAST-IN-PLACE CONCRETE FOOTING AT EXTERIOR WALL  
LIGHT-FRAME CONSTRUCTION / ROOF SNOW LOAD = 30 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	1130	7389	10701	14014						
	10	1130	7633	11094	14555	18016					
	12	1130	7854	11458	15063	18667	22271				
	14	1130	8054	11795	15537	19278	23020	26761			
	16	1130	8231	12104	15978	19851	23724	27598	31471		
	18	1130	8386	12385	16385	20385	24384	28384	32383	36383	
	20	1130	8519	12639	16759	20879	25000	29120	33240	37361	41481
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)	8	1580	4876	8189	11502						
	10	1580	4970	8431	11893	15354					
	12	1580	5042	8646	12250	15854	19458				
	14	1580	5091	8833	12574	16316	20057	23799			
	16	1580	5118	8992	12865	16738	20612	24485	28358		
	18	1580	5123	9123	13123	17122	21122	25121	29121	33120	
	20	1580	5106	9226	13347	17467	21587	25708	29828	33948	38068
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)	8	2030	2364	5676	8989						
	10	2030	2308	5769	9230	12691					
	12	2030	2229	5833	9438	13042	16646				
	14	2030	2129	5870	9612	13353	17095	20836			
	16	2030	2006	5879	9753	13626	17499	21373	25246		
	18	2030	1861	5860	9860	13860	17859	21859	25858	29858	
	20	2030	1694	5814	9934	14054	18175	22295	26415	30536	34656
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)	8	2060	2196	5509	8822						
	10	2060	2130	5591	9053	12514					
	12	2060	2042	5646	9250	12854	16458				
	14	2060	1931	5673	9414	13156	16897	20639			
	16	2060	1798	5672	9545	13418	17292	21165	25038		
	18	2060	1643	5643	9643	13642	17642	21641	25641	29640	
	20	2060	1466	5586	9707	13827	17947	22068	26188	30308	34428
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)	8	2870	-	986	4299						
	10	2870	-	799	4260	7721					
	12	2870	-	583	4188	7792	11396				
	14	2870	-	340	4082	7823	11565	15306			
	16	2870	-	69	3943	7816	11689	15563	19436		
	18	2870	-	-	3770	7770	11769	15769	19768	23768	
	20	2870	-	-	3564	7684	11805	15925	20045	24166	28286
ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)	8	2540	-	2829	6142						
	10	2540	-	2751	6213	9674					
	12	2540	-	2646	6250	9854	13458				
	14	2540	-	2513	6254	9996	13737	17479			
	16	2540	-	2352	6225	10098	13972	17845	21718		
	18	2540	-	2163	6163	10162	14162	18161	22161	26160	
	20	2540	-	1946	6067	10187	14307	18428	22548	26668	30788
ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)	8	3710	-	-	-						
	10	3710	-	-	-	2751					
	12	3710	-	-	-	2542	6146				
	14	3710	-	-	-	2293	6035	9776			
	16	3710	-	-	-	2006	5879	9753	13626		
	18	3710	-	-	-	1680	5679	9679	13678	17678	
	20	3710	-	-	-	1314	5435	9555	13675	17796	21916

**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 = 30 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	1130	14833	20007	25181						
	10	1130	15521	20955	26388	31822					
	12	1130	16188	21875	27563	33250	38938				
	14	1130	16831	22767	28703	34639	40575	46511			
	16	1130	17453	23632	29811	35990	42169	48348	54526		
	18	1130	18053	24469	30885	37301	43718	50134	56550	62966	
20	1130	18630	25278	31926	38574	45222	51870	58518	65166	71814	
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)	8	1580	12321	17494	22668						
	10	1580	12859	18292	23726	29159					
	12	1580	13375	19063	24750	30438	36125				
	14	1580	13869	19805	25741	31677	37613	43549			
	16	1580	14341	20519	26698	32877	39056	45235	51414		
	18	1580	14790	21206	27623	34039	40455	46871	53288	59704	
20	1580	15217	21865	28513	35161	41809	48458	55106	61754	68402	
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)	8	2030	9808	14982	20156						
	10	2030	10196	15630	21063	26497					
	12	2030	10563	16250	21938	27625	33313				
	14	2030	10906	16842	22778	28714	34650	40586			
	16	2030	11228	17407	23586	29765	35944	42123	48301		
	18	2030	11528	17944	24360	30776	37193	43609	50025	56441	
20	2030	11805	18453	25101	31749	38397	45045	51693	58341	64989	
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)	8	2060	9641	14814	19988						
	10	2060	10019	15452	20886	26319					
	12	2060	10375	16063	21750	27438	33125				
	14	2060	10709	16645	22581	28517	34453	40389			
	16	2060	11021	17199	23378	29557	35736	41915	48094		
	18	2060	11310	17726	24143	30559	36975	43391	49808	56224	
20	2060	11577	18225	24873	31521	38169	44818	51466	58114	64762	
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)	8	2870	5118	10292	15466						
	10	2870	5226	10660	16093	21527					
	12	2870	5313	11000	16688	22375	28063				
	14	2870	5376	11312	17248	23184	29120	35056			
	16	2870	5418	11597	17776	23955	30134	36313	42491		
	18	2870	5438	11854	18270	24686	31103	37519	43935	50351	
20	2870	5435	12083	18731	25379	32027	38675	45323	51971	58619	
ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)	8	2540	6961	12134	17308						
	10	2540	7179	12612	18046	23479					
	12	2540	7375	13063	18750	24438	30125				
	14	2540	7549	13485	19421	25357	31293	37229			
	16	2540	7701	13879	20058	26237	32416	38595	44774		
	18	2540	7830	14246	20663	27079	33495	39911	46328	52744	
20	2540	7937	14585	21233	27881	34529	41178	47826	54474	61122	
ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)	8	3710	428	5602	10776						
	10	3710	256	5690	11123	16557					
	12	3710	63	5750	11438	17125	22813				
	14	3710	-	5782	11718	17654	23590	29526			
	16	3710	-	5787	11966	18145	24324	30503	36681		
	18	3710	-	5764	12180	18596	25013	31429	37845	44261	
20	3710	-	5713	12361	19009	25657	32305	38953	45601	52249	

**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 = 30 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	1130	22278	29313	36348						
	10	1130	23410	30816	38222	45627					
	12	1130	24521	32292	40063	47833	55604				
	14	1130	25609	33740	41870	50000	58131	66261			
	16	1130	26675	35160	43644	52129	60613	69098	77582		
	18	1130	27719	36552	45385	54218	63051	71884	80717	89550	
	20	1130	28741	37917	47093	56268	65444	74620	83796	92972	102148
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)	8	1580	19765	26800	33835						
	10	1580	20748	28153	35559	42965					
	12	1580	21708	29479	37250	45021	52792				
	14	1580	22647	30777	38908	47038	55168	63299			
	16	1580	23563	32047	40532	49016	57501	65985	74469		
	18	1580	24457	33290	42123	50955	59788	68621	77454	86287	
	20	1580	25328	34504	43680	52856	62032	71208	80383	89559	98735
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)	8	2030	17253	24288	31323						
	10	2030	18085	25491	32897	40302					
	12	2030	18896	26667	34438	42208	49979				
	14	2030	19684	27815	35945	44075	52206	60336			
	16	2030	20450	28935	37419	45904	54388	62873	71357		
	18	2030	21194	30027	38860	47693	56526	65359	74192	83025	
	20	2030	21916	31092	40268	49443	58619	67795	76971	86147	95323
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)	8	2060	17085	24120	31155						
	10	2060	17908	25313	32719	40125					
	12	2060	18708	26479	34250	42021	49792				
	14	2060	19487	27617	35748	43878	52008	60139			
	16	2060	20243	28727	37212	45696	54181	62665	71149		
	18	2060	20977	29810	38643	47475	56308	65141	73974	82807	
	20	2060	21688	30864	40040	49216	58392	67568	76743	85919	95095
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)	8	2870	12563	19598	26633						
	10	2870	13115	20521	27927	35332					
	12	2870	13646	21417	29188	36958	44729				
	14	2870	14154	22285	30415	38545	46676	54806			
	16	2870	14640	23125	31609	40094	48578	57063	65547		
	18	2870	15104	23937	32770	41603	50436	59269	68102	76935	
	20	2870	15546	24722	33898	43073	52249	61425	70601	79777	88953
ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)	8	2540	14405	21440	28475						
	10	2540	15068	22473	29879	37285					
	12	2540	15708	23479	31250	39021	46792				
	14	2540	16327	24457	32588	40718	48848	56979			
	16	2540	16923	25407	33892	42376	50861	59345	67829		
	18	2540	17497	26330	35163	43995	52828	61661	70494	79327	
	20	2540	18048	27224	36400	45576	54752	63928	73103	82279	91455
ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)	8	3710	7873	14908	21943						
	10	3710	8145	15551	22957	30362					
	12	3710	8396	16167	23938	31708	39479				
	14	3710	8624	16755	24885	33015	41146	49276			
	16	3710	8830	17315	25799	34284	42768	51253	59737		
	18	3710	9014	17847	26680	35513	44346	53179	62012	70845	
	20	3710	9176	18352	27528	36703	45879	55055	64231	73407	82583

**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 = 30 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	1550	5267	8580	11893	15205					
	10	1550	5384	8845	12307	15768	19229				
	12	1550	5479	9083	12688	16292	19896	23500			
	14	1550	5552	9293	13035	16777	20518	24260	28001		
	16	1550	5603	9476	13349	17223	21096	24969	28843	32716	
	18	1550	5631	9630	13630	17630	21629	25629	29628	33628	37628
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)	8	2000	2754	6067	9380	12693					
	10	2000	2722	6183	9644	13105	16567				
	12	2000	2667	6271	9875	13479	17083	20688			
	14	2000	2589	6331	10073	13814	17556	21297	25039		
	16	2000	2490	6363	10237	14110	17983	21857	25730	29603	
	18	2000	2368	6368	10368	14367	18367	22366	26366	30365	34365
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)	8	2450	242	3555	6868	10180					
	10	2450	59	3520	6982	10443	13904				
	12	2450	-	3458	7063	10667	14271	17875			
	14	2450	-	3368	7110	10852	14593	18335	22076		
	16	2450	-	3251	7124	10998	14871	18744	22618	26491	
	18	2450	-	3105	7105	11105	15104	19104	23103	27103	31103
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)	8	2840	-	1377	4690	8003					
	10	2840	-	1213	4674	8135	11597				
	12	2840	-	1021	4625	8229	11833	15438			
	14	2840	-	801	4543	8284	12026	15767	19509		
	16	2840	-	553	4427	8300	12173	16047	19920	23793	
	18	2840	-	278	4278	8277	12277	16276	20276	24275	28275
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)	8	3650	-	-	168	3480					
	10	3650	-	-	-	3343	6804				
	12	3650	-	-	-	3167	6771	10375			
	14	3650	-	-	-	2952	6693	10435	14176		
	16	3650	-	-	-	2698	6571	10444	14318	18191	
	18	3650	-	-	-	2405	6404	10404	14403	18403	22403
ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)	8	3680	-	-	0	3313					
	10	3680	-	-	-	3165	6627				
	12	3680	-	-	-	2979	6583	10188			
	14	3680	-	-	-	2754	6496	10237	13979		
	16	3680	-	-	-	2490	6363	10237	14110	17983	
	18	3680	-	-	-	2187	6187	10186	14186	18185	22185
ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)	8	4850	-	-	-	-					
	10	4850	-	-	-	-					
	12	4850	-	-	-	-		2875			
	14	4850	-	-	-	-		2535	6276		
	16	4850	-	-	-	-		2144	6018	9891	
	18	4850	-	-	-	-		1704	5703	9703	13703
20	4850	-	-	-	-		1213	5334	9454	13574	

**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 = 30 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	1550	12711	17885	23059	28233					
	10	1550	13273	18707	24140	29573	35007				
	12	1550	13813	19500	25188	30875	36563	42250			
	14	1550	14330	20266	26202	32138	38074	44010	49946		
	16	1550	14825	21004	27183	33361	39540	45719	51898	58077	
	18	1550	15298	21714	28130	34546	40963	47379	53795	60211	66628
20	1550	15748	22396	29044	35692	42340	48988	55636	62284	68933	
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)	8	2000	10199	15373	20547	25721					
	10	2000	10611	16044	21478	26911	32344				
	12	2000	11000	16688	22375	28063	33750	39438			
	14	2000	11367	17303	23239	29175	35111	41047	46983		
	16	2000	11712	17891	24070	30249	36428	42607	48786	54964	
	18	2000	12035	18451	24868	31284	37700	44116	50533	56949	63365
20	2000	12336	18984	25632	32280	38928	45576	52224	58872	65520	
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)	8	2450	7686	12860	18034	23208					
	10	2450	7948	13382	18815	24248	29682				
	12	2450	8188	13875	19563	25250	30938	36625			
	14	2450	8405	14341	20277	26213	32149	38085	44021		
	16	2450	8600	14779	20958	27136	33315	39494	45673	51852	
	18	2450	8773	15189	21605	28021	34438	40854	47270	53686	60103
20	2450	8923	15571	22219	28867	35515	42163	48811	55459	62108	
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)	8	2840	5509	10683	15857	21031					
	10	2840	5641	11074	16508	21941	27374				
	12	2840	5750	11438	17125	22813	28500	34188			
	14	2840	5837	11773	17709	23645	29581	35517	41453		
	16	2840	5902	12081	18260	24439	30618	36797	42976	49154	
	18	2840	5945	12361	18778	25194	31610	38026	44443	50859	57275
20	2840	5966	12614	19262	25910	32558	39206	45854	52502	59150	
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)	8	3650	986	6160	11334	16508					
	10	3650	848	6282	11715	17148	22582				
	12	3650	688	6375	12063	17750	23438	29125			
	14	3650	505	6441	12377	18313	24249	30185	36121		
	16	3650	300	6479	12658	18836	25015	31194	37373	43552	
	18	3650	73	6489	12905	19321	25738	32154	38570	44986	51403
20	3650	-	6471	13119	19767	26415	33063	39711	46359	53008	
ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)	8	3680	819	5993	11167	16341					
	10	3680	671	6104	11538	16971	22404				
	12	3680	500	6188	11875	17563	23250	28938			
	14	3680	307	6243	12179	18115	24051	29987	35923		
	16	3680	92	6271	12450	18629	24808	30987	37166	43344	
	18	3680	-	6271	12688	19104	25520	31936	38353	44769	51185
20	3680	-	6244	12892	19540	26188	32836	39484	46132	52780	
ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)	8	4850	-	-	4634	9808					
	10	4850	-	-	4615	10048	15482				
	12	4850	-	-	4563	10250	15938	21625			
	14	4850	-	-	4477	10413	16349	22285	28221		
	16	4850	-	-	4358	10536	16715	22894	29073	35252	
	18	4850	-	-	4205	10621	17038	23454	29870	36286	42703
20	4850	-	-	4019	10667	17315	23963	30611	37259	43908	

**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 = 30 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	1550	20156	27638	34226	41261					
	10	1550	21162	28568	35973	43379	50785				
	12	1550	22146	29917	37688	45458	53229	61000			
	14	1550	23108	31238	39368	47499	55629	63760	71890		
	16	1550	24047	32531	41016	49500	57985	66469	74954	83438	
	18	1550	24964	33797	42630	51463	60296	69129	77962	86795	95628
	20	1550	25859	35035	44211	53387	62563	71738	80914	90090	99266
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 2)	8	2000	17643	24678	31713	38748					
	10	2000	18499	25905	33311	40717	48122				
	12	2000	19333	27104	34875	42646	50417	58188			
	14	2000	20145	28275	36406	44536	52667	60797	68928		
	16	2000	20934	29419	37903	46388	54872	63357	71841	80326	
	18	2000	21702	30535	39368	48200	57033	65866	74699	83532	92365
	20	2000	22447	31623	40798	49974	59150	68326	77502	86678	95853
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 3)	8	2450	15131	22166	29201	36236					
	10	2450	15837	23243	30648	38054	45460				
	12	2450	16521	24292	32063	39833	47604	55375			
	14	2450	17183	25313	33443	41574	49704	57835	65965		
	16	2450	17822	26306	34791	43275	51760	60244	68729	77213	
	18	2450	18439	27272	36105	44938	53771	62604	71437	80270	89103
	20	2450	19034	28210	37386	46562	55738	64913	74089	83265	92441
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 4)	8	2840	12953	19988	27023	34058					
	10	2840	13529	20935	28341	35747	43152				
	12	2840	14083	21854	29625	37396	45167	52938			
	14	2840	14615	22745	30876	39006	47137	55267	63398		
	16	2840	15124	23609	32093	40578	49062	57547	66031	74516	
	18	2840	15612	24445	33278	42110	50943	59776	68609	77442	86275
	20	2840	16077	25253	34428	43604	52780	61956	71132	80308	89483
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 5)	8	3650	8431	15466	22501	29536					
	10	3650	8737	16143	23548	30954	38360				
	12	3650	9021	16792	24563	32333	40104	47875			
	14	3650	9283	17413	25543	33674	41804	49935	58065		
	16	3650	9522	18006	26491	34975	43460	51944	60429	68913	
	18	3650	9739	18572	27405	36238	45071	53904	62737	71570	80403
	20	3650	9934	19110	28286	37462	46638	55813	64989	74165	83341
ROOF, CEILING AND THREE CENTER-BEARING FLOORS (FIGURE 6)	8	3680	8263	15298	22333	29368					
	10	3680	8559	15965	23371	30777	38182				
	12	3680	8833	16604	24375	32146	39917	47688			
	14	3680	9085	17215	25346	33476	41607	49737	57868		
	16	3680	9314	17799	26283	34768	43252	51737	60221	68706	
	18	3680	9522	18355	27188	36020	44853	53686	62519	71352	80185
	20	3680	9707	18883	28058	37234	46410	55586	64762	73938	83113
ROOF, CEILING AND THREE CLEAR-SPAN FLOORS (FIGURE 7)	8	4850	1731	8766	15801	22836					
	10	4850	1637	9043	16448	23854	31260				
	12	4850	1521	9292	17063	24833	32604	40375			
	14	4850	1383	9513	17643	25774	33904	42035	50165		
	16	4850	1222	9706	18191	26675	35160	43644	52129	60613	
	18	4850	1039	9872	18705	27538	36371	45204	54037	62870	71703
	20	4850	834	10010	19186	28362	37538	46713	55889	65065	74241

**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	50 psf (30 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))

<b>1 (ONE) STORY</b>			
<b>FLOOR AREA SUPPORTED (SQ. FT.)</b>	<b>PIER (W X L)</b>	<b>FOOTING (W X L X T)</b>	<b>TOTAL ALLOWABLE LOAD (LB.)</b>
50	8" x 16"	1'-4" x 2'-0" x 8"	<b>2500</b>
100	8" x 16"	1'-4" x 2'-0" x 8"	<b>5000</b>
150	8" x 16"	2'-0" x 2'-0" x 8"	<b>7500</b>
200	8" x 16"	2'-4" x 2'-4" x 10"	<b>10000</b>
250	-	-	-
300	-	-	-
<b>2 (TWO) STORY</b>			
<b>FLOOR AREA SUPPORTED (SQ. FT.)</b>	<b>PIER (W X L)</b>	<b>FOOTING (W X L X T)</b>	<b>TOTAL ALLOWABLE LOAD (LB.)</b>
50	8" x 16"	1'-4" x 2'-6" x 8"	<b>4500</b>
100	8" x 16"	2'-0" x 2'-0" x 10"	<b>9000</b>
150	16" x 16"	2'-8" x 2'-8" x 10"	<b>13500</b>
200	16" x 16"	3'-0" x 3'-0" x 10"	<b>18000</b>
250	16" x 16"	3'-4" x 3'-4" x 1'-0"	<b>22500</b>
300	16" x 16"	3'-8" x 3'-8" x 1'-0"	<b>27000</b>
<b>3 (THREE) STORY</b>			
<b>FLOOR AREA SUPPORTED (SQ. FT.)</b>	<b>PIER (W X L)</b>	<b>FOOTING (W X L X T)</b>	<b>TOTAL ALLOWABLE LOAD (LB.)</b>
50	8" x 16"	1'-4" x 2'-6" x 8"	<b>6500</b>
100	16" x 16"	2'-6" x 2'-6" x 10"	<b>13000</b>
150	16" x 16"	3'-0" x 3'-0" x 10"	<b>19500</b>
200	16" x 16"	4'-0" x 4'-0" x 1'-0"	<b>26000</b>
250	16" x 24"	4'-0" x 4'-0" x 1'-0"	<b>32500</b>
300	16" x 24"	4'-6" x 4'-6" x 1'-0"	<b>39000</b>

**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)

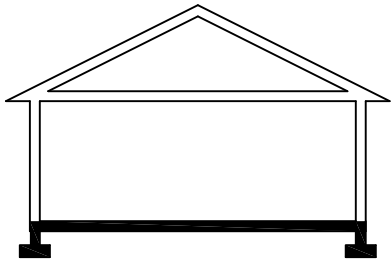


FIGURE 1: ROOF AND CEILING OVER SLAB-ON-GRADE

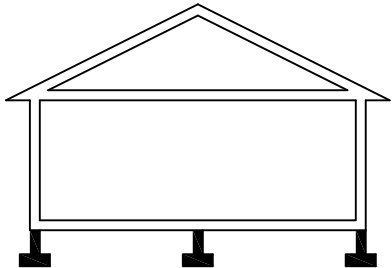


FIGURE 2: ROOF, CEILING AND ONE CENTER-BEARING FLOOR

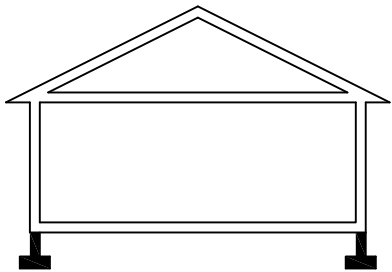


FIGURE 3: ROOF, CEILING AND ONE CLEAR-SPAN FLOOR

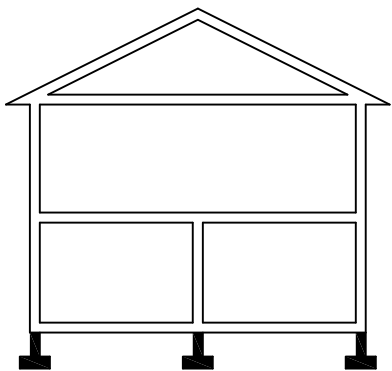


FIGURE 4: ROOF, CEILING AND TWO CENTER-BEARING FLOORS

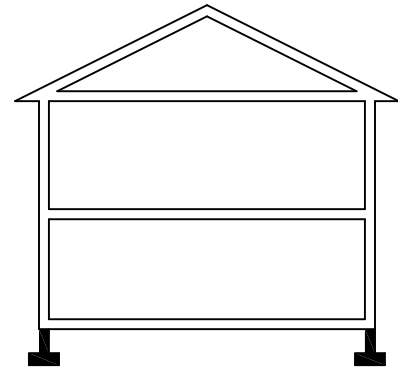


FIGURE 5: ROOF, CEILING AND TWO CLEAR-SPAN FLOORS

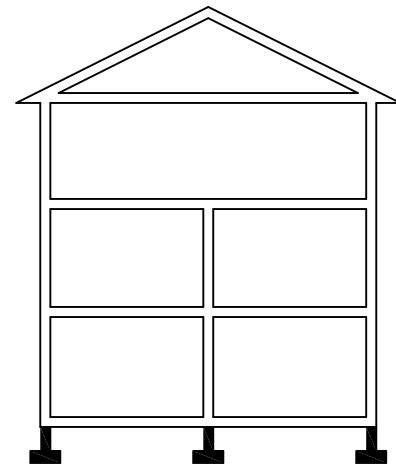


FIGURE 6: ROOF, CEILING AND THREE CENTER-BEARING FLOORS

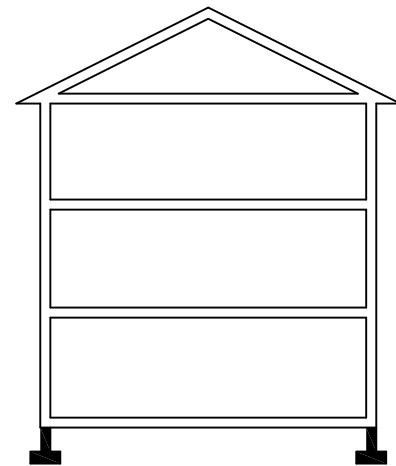
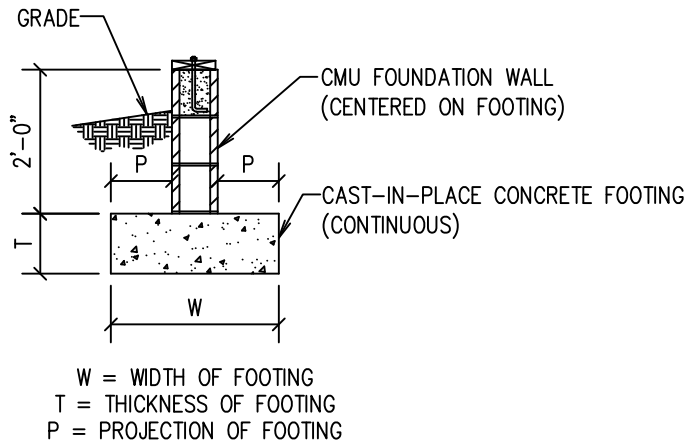
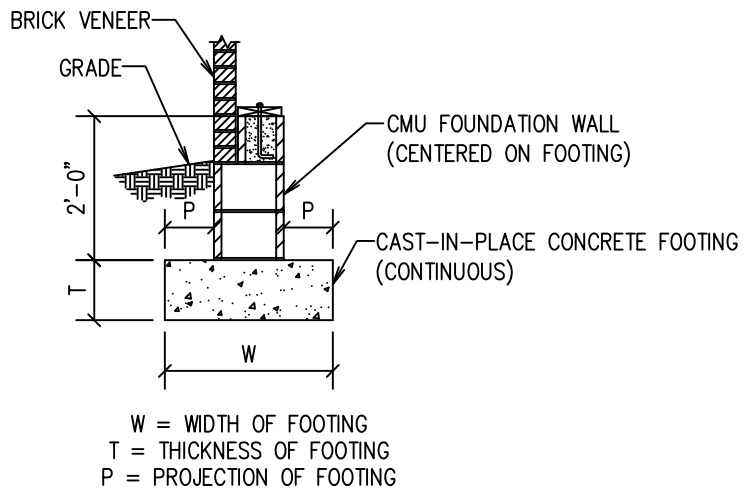


FIGURE 7: ROOF, CEILING AND THREE CLEAR-SPAN FLOORS



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



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))

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

**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 = 30 PSF, ROOF SNOW LOAD = 30 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	30	10	0	800	800	1	1	1
	0	0	0	36	4	40	10	30	10	30	10	30	10	0	800	1600	1	1	1
	0	0	0	36	6	40	10	30	10	30	10	30	10	0	800	2400	2	2	1
	0	0	0	36	8	40	10	30	10	30	10	30	10	0	800	3200	2	2	2
	0	0	0	36	10	40	10	30	10	30	10	30	10	0	800	4000	3	3	2
	0	0	0	36	12	40	10	30	10	30	10	30	10	0	800	4800	3	3	2
	0	0	0	36	14	40	10	30	10	30	10	30	10	0	800	5600	4	4	3
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 11)	0	18	0	36	2	40	10	30	10	30	10	30	10	108	1268	1268	1	1	1
	0	18	0	36	4	40	10	30	10	30	10	30	10	108	1268	2536	2	2	1
	0	18	0	36	6	40	10	30	10	30	10	30	10	108	1268	3804	3	3	2
	0	18	0	36	8	40	10	30	10	30	10	30	10	108	1268	5072	4	3	2
	0	18	0	36	10	40	10	30	10	30	10	30	10	108	1268	6340	4	4	3
	0	18	0	36	12	40	10	30	10	30	10	30	10	108	1268	7608			3
	0	18	0	36	14	40	10	30	10	30	10	30	10	108	1268	8876			4
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 12)	0	36	0	36	2	40	10	30	10	30	10	30	10	108	1628	1628	1	1	1
	0	36	0	36	4	40	10	30	10	30	10	30	10	108	1628	3256	2	2	2
	0	36	0	36	6	40	10	30	10	30	10	30	10	108	1628	4884	3	3	2
	0	36	0	36	8	40	10	30	10	30	10	30	10	108	1628	6512	4	4	3
	0	36	0	36	10	40	10	30	10	30	10	30	10	108	1628	8140			3
	0	36	0	36	12	40	10	30	10	30	10	30	10	108	1628	9768			4
	0	36	0	36	14	40	10	30	10	30	10	30	10	108	1628	11396			
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 13)	0	18	18	36	2	40	10	30	10	30	10	30	10	204	1724	1724	2	1	1
	0	18	18	36	4	40	10	30	10	30	10	30	10	204	1724	3448	3	2	2
	0	18	18	36	6	40	10	30	10	30	10	30	10	204	1724	5172	4	3	2
	0	18	18	36	8	40	10	30	10	30	10	30	10	204	1724	6896		4	3
	0	18	18	36	10	40	10	30	10	30	10	30	10	204	1724	8620			4
	0	18	18	36	12	40	10	30	10	30	10	30	10	204	1724	10344			4
	0	18	18	36	14	40	10	30	10	30	10	30	10	204	1724	12068			
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 14)	0	36	36	36	2	40	10	30	10	30	10	30	10	204	2444	2444	2	2	1
	0	36	36	36	4	40	10	30	10	30	10	30	10	204	2444	4888	3	3	2
	0	36	36	36	6	40	10	30	10	30	10	30	10	204	2444	7332			3
	0	36	36	36	8	40	10	30	10	30	10	30	10	204	2444	9776			4
	0	36	36	36	10	40	10	30	10	30	10	30	10	204	2444	12220			
	0	36	36	36	12	40	10	30	10	30	10	30	10	204	2444	14664			
	0	36	36	36	14	40	10	30	10	30	10	30	10	204	2444	17108			
0	36	36	36	16	40	10	30	10	30	10	30	10	204	2444	19552				

**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 (L.B.)	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
TWO FLOORS (FIGURE 16)	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
	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
THREE FLOORS (FIGURE 17)	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			
	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
THREE FLOORS (FIGURE 17)	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	40 psf (30 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 = 30 PSF, ROOF SNOW LOAD = 30 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)	1 - 2x8	4.500	1080	1	3.833	1227	1	3.417	1367	1
	1 - 2x10	5.667	1360	1	4.917	1573	1	4.333	1733	1
	1 - 2x12	6.917	1660	1	5.917	1893	2	5.250	2100	2
	2 - 2x4	3.500	840	1	3.167	1013	1	2.833	1133	1
	2 - 2x6	5.417	1300	1	4.667	1493	1	4.167	1667	1
	2 - 2x8	6.833	1640	1	5.917	1893	2	5.333	2133	2
	2 - 2x10	8.417	2020	2	7.250	2320	2	6.500	2600	2
	2 - 2x12	9.750	2340	2	8.417	2693	2	7.500	3000	2
	3 - 2x8	8.333	2000	1	7.417	2373	1	6.667	2667	1
	3 - 2x10	10.500	2520	1	9.083	2907	2	8.167	3267	2
	3 - 2x12	12.167	2920	2	10.583	3387	2	9.417	3767	2
	4 - 2x8	9.167	2200	1	8.333	2667	1	7.667	3067	1
4 - 2x10	11.667	2800	1	10.500	3360	1	9.417	3767	2	
4 - 2x12	14.083	3380	1	12.167	3893	2	10.917	4367	2	
ROOF, CEILING AND ONE CENTER-BEARING FLOOR (FIGURE 11)	1 - 2x8	3.917	1543	1	3.417	1756	1	3.000	1902	1
	1 - 2x10	5.000	1970	2	4.333	2227	2	3.833	2430	2
	1 - 2x12	5.833	2298	2	4.750	2442	2	4.167	2642	2
	2 - 2x4	3.083	1215	1	2.750	1414	1	2.417	1532	1
	2 - 2x6	4.500	1773	1	4.000	2056	1	3.583	2272	2
	2 - 2x8	5.750	2266	2	5.000	2570	2	4.500	2853	2
	2 - 2x10	7.000	2758	2	6.167	3170	2	5.500	3487	2
	2 - 2x12	8.083	3185	2	7.083	3641	2	6.417	4068	2
	3 - 2x8	7.167	2824	1	6.250	3213	2	5.667	3593	2
	3 - 2x10	8.750	3448	2	7.667	3941	2	6.917	4385	2
	3 - 2x12	10.167	4006	2	8.917	4583	2	8.000	5072	2
	4 - 2x8	8.083	3185	1	7.250	3727	1	6.583	4174	1
4 - 2x10	10.083	3973	1	8.833	4540	2	8.000	5072	2	
4 - 2x12	11.750	4630	2	10.250	5269	2	9.250	5865	2	
ROOF, CEILING AND ONE CLEAR-SPAN FLOOR (FIGURE 12)	1 - 2x8	3.500	1729	1	3.000	1962	1	2.667	2171	1
	1 - 2x10	4.500	2223	1	3.833	2507	1	3.250	2646	1
	1 - 2x12	5.500	2717	1	4.167	2725	2	3.250	2646	2
	2 - 2x4	2.667	1317	1	2.333	1526	1	2.083	1696	1
	2 - 2x6	3.917	1935	1	3.417	2235	2	3.000	2442	2
	2 - 2x8	5.000	2470	2	4.333	2834	2	3.833	3120	2
	2 - 2x10	6.083	3005	2	5.250	3434	2	4.667	3799	2
	2 - 2x12	7.083	3499	2	6.083	3978	3	5.417	4409	3
	3 - 2x8	6.250	3088	2	5.417	3543	2	4.833	3934	2
	3 - 2x10	7.583	3746	2	6.583	4305	2	5.917	4816	2
	3 - 2x12	8.833	4364	2	7.667	5014	2	6.833	5562	2
	4 - 2x8	7.167	3540	1	6.250	4088	2	5.583	4545	2
4 - 2x10	8.750	4323	2	7.583	4959	2	6.833	5562	2	
4 - 2x12	10.167	5022	2	8.833	5777	2	7.917	6444	2	
ROOF, CEILING AND TWO CENTER-BEARING FLOORS (FIGURE 13)	2 - 2x4	2.583	1400	1	2.250	1580	1	2.000	1724	1
	2 - 2x6	3.750	2033	2	3.250	2282	2	2.917	2514	2
	2 - 2x8	4.750	2575	2	4.167	2925	2	3.750	3233	2
	2 - 2x10	5.750	3117	2	5.083	3568	2	4.583	3951	3
	2 - 2x12	6.667	3614	2	5.833	4095	3	5.250	4526	3
	3 - 2x8	5.917	3207	2	5.167	3627	2	4.667	4023	2
	3 - 2x10	7.250	3930	2	6.333	4446	2	5.667	4885	2
	3 - 2x12	8.417	4562	2	7.333	5148	2	6.583	5675	2
	4 - 2x8	6.833	3703	1	6.000	4212	2	5.417	4669	2
	4 - 2x10	8.333	4516	2	7.333	5148	2	6.583	5675	2
4 - 2x12	9.667	5240	2	8.500	5967	2	7.667	6609	2	
ROOF, CEILING AND TWO CLEAR-SPAN FLOORS (FIGURE 14)	2 - 2x4	2.083	1546	1	1.667	1637	1	1.500	1833	2
	2 - 2x6	3.083	2288	2	2.667	2619	2	2.333	2851	2
	2 - 2x8	3.833	2844	2	3.333	3273	2	3.000	3666	3
	2 - 2x10	4.750	3525	2	4.083	4010	3	3.667	4481	3
	2 - 2x12	5.500	4081	3	4.750	4665	3	4.250	5194	3
	3 - 2x8	4.833	3586	2	4.167	4092	2	3.750	4583	2
	3 - 2x10	5.917	4390	2	5.083	4992	2	4.583	5600	3
	3 - 2x12	6.833	5070	2	5.917	5810	3	5.333	6517	3
	4 - 2x8	5.583	4143	2	4.833	4746	2	4.333	5295	2
	4 - 2x10	6.833	5070	2	5.917	5810	2	5.250	6416	2
4 - 2x12	7.917	5874	2	6.833	6710	2	6.167	7536	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
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	40 psf (30 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.

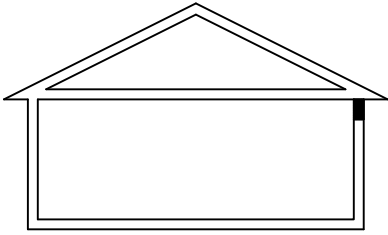


FIGURE 10: ROOF AND CEILING

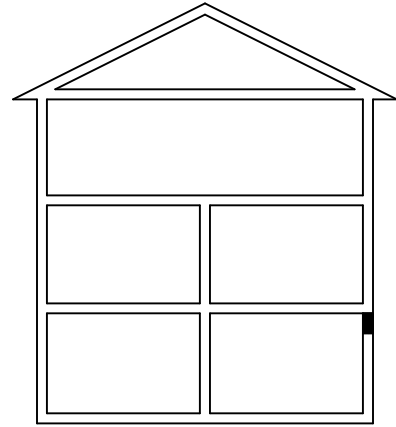


FIGURE 13: ROOF, CEILING AND TWO CENTER-BEARING FLOORS

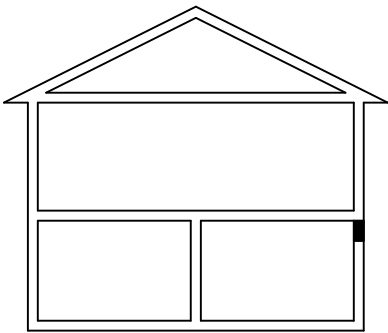


FIGURE 11: ROOF, CEILING AND ONE CENTER-BEARING FLOOR

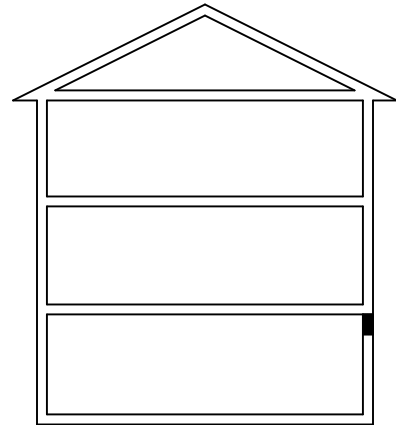


FIGURE 14: ROOF, CEILING AND TWO CLEAR-SPAN FLOORS

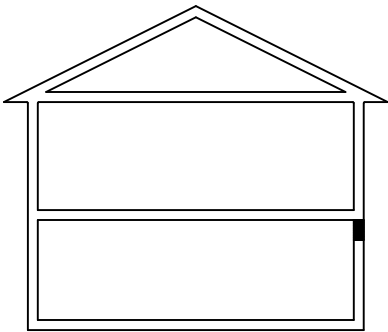


FIGURE 12: ROOF, CEILING AND ONE CLEAR-SPAN FLOOR

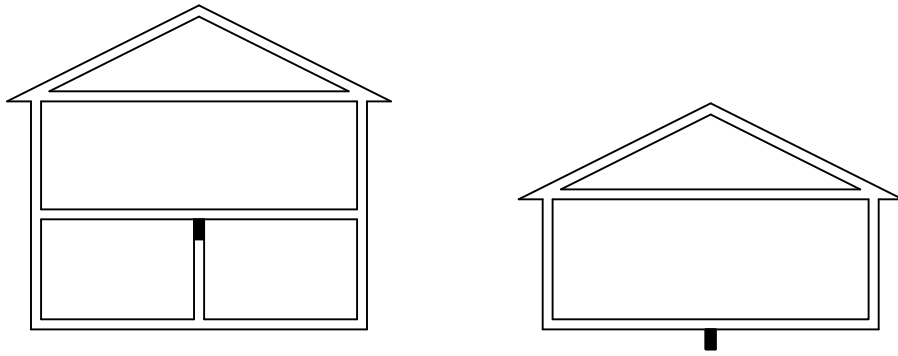


FIGURE 15: ONE FLOOR ONLY

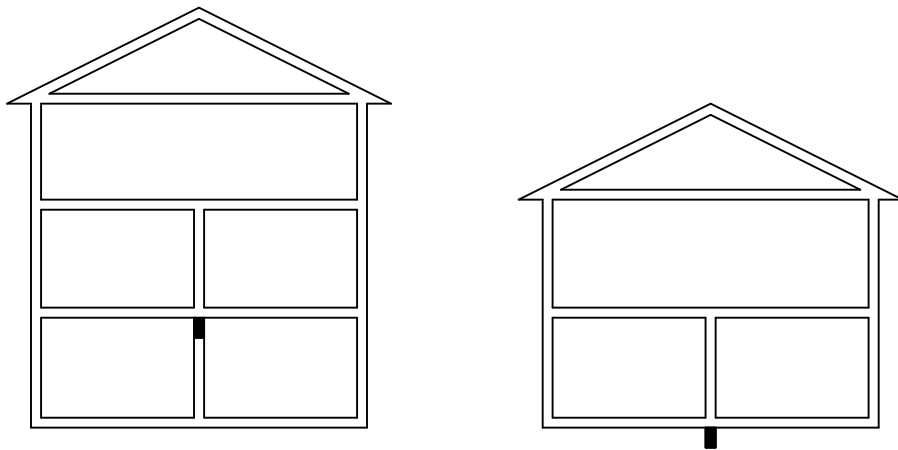


FIGURE 16: TWO FLOORS

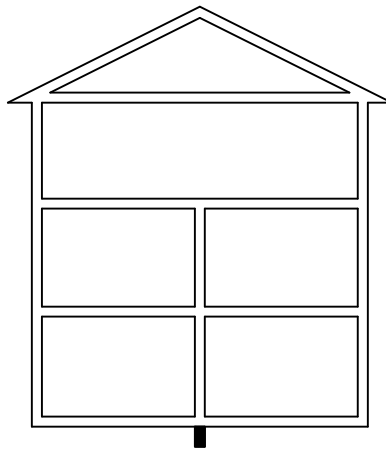


FIGURE 17: THREE FLOORS

# **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)

<b>(2) 2x6 WITH PLATE INDICATED</b>										
<b>PLATE SIZE / (BEAM WEIGHT PER FOOT)</b>										
<b>BEAM SPAN, L (FT.)</b>	<b>1/4" x 5" PLATE (8 PLF)</b>		<b>3/8" x 5" PLATE (10 PLF)</b>		<b>1/2" x 5" PLATE (13 PLF)</b>		<b>5/8" x 5" PLATE (15 PLF)</b>		<b>3/4" x 5" PLATE (17 PLF)</b>	
	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>
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
<b>(2) 2x8 WITH PLATE INDICATED</b>										
<b>PLATE SIZE / (BEAM WEIGHT PER FOOT)</b>										
<b>BEAM SPAN, L (FT.)</b>	<b>1/4" x 7" PLATE (11 PLF)</b>		<b>3/8" x 7" PLATE (14 PLF)</b>		<b>1/2" x 7" PLATE (17 PLF)</b>		<b>5/8" x 7" PLATE (20 PLF)</b>		<b>3/4" x 7" PLATE (23 PLF)</b>	
	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>
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
<b>(2) 2x10 WITH PLATE INDICATED</b>										
<b>PLATE SIZE / (BEAM WEIGHT PER FOOT)</b>										
<b>BEAM SPAN, L (FT.)</b>	<b>1/4" x 9" PLATE (14 PLF)</b>		<b>3/8" x 9" PLATE (18 PLF)</b>		<b>1/2" x 9" PLATE (22 PLF)</b>		<b>5/8" x 9" PLATE (26 PLF)</b>		<b>3/4" x 9" PLATE (30 PLF)</b>	
	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>
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
<b>(2) 2x12 WITH PLATE INDICATED</b>										
<b>PLATE SIZE / (BEAM WEIGHT PER FOOT)</b>										
<b>BEAM SPAN, L (FT.)</b>	<b>1/4" x 11" PLATE (18 PLF)</b>		<b>3/8" x 11" PLATE (22 PLF)</b>		<b>1/2" x 11" PLATE (27 PLF)</b>		<b>5/8" x 11" PLATE (32 PLF)</b>		<b>3/4" x 11" PLATE (36 PLF)</b>	
	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>	<b>LOAD (PLF)</b>	<b>END REACTION (LB.)</b>
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.