



## Inspection Services

Post Office Box 2570 • Waco, Texas 76702-2570 • [www.Waco-Texas.com](http://www.Waco-Texas.com)  
Code Enforcement (254) 750-5970 • New Construction (254) 750-5612

### RESIDENTIAL CONSTRUCTION GUIDELINE

All construction shall be in conformance with the 2012 Edition of the International Residential, Plumbing, Mechanical, Fuel/Gas codes, and 2011 National Electrical Code; City amendments and ordinances. The following is a general guideline of the procedures and building codes, but it is not intended to be considered as conclusive of all requirements.

Building permits shall be approved prior to any work commencing. One (1) copy of applicable plans must be submitted for approval. Sub-contractors (electrical, plumbing, and heating/air conditioning) must be licensed and are required to permit their own work. Appropriate permits are available at the Building Inspection Department office.

Various inspections are required during construction:

<b>Foundation</b>	Inspection of the foundation shall be made prior to the placing of concrete and after piers are set or trenches excavated, any required forms erected, and any required reinforcing steel in place and supported.
<b>Plumbing, Electrical, Heating/AC</b>	Rough inspection of plumbing, mechanical, gas, and electrical systems shall be made prior to covering or concealment before fixtures or appliances are set or installed, and prior to framing inspection.
<b>Framing</b>	Inspection of framing construction shall be made after all framing, roof, firestopping, draftstopping, bracing, wall ties, and fireplace are in place and after the plumbing, mechanical and electrical rough inspections are approved.
<b>Energy</b>	Energy compliance is to be inspected prior to sheetrock and at final inspection.
<b>Final</b>	Final inspection shall be made after the permitted work is complete and prior to occupancy.

All inspections are to be called into the Inspection request line at 254-750-5755 or placed in person at the Inspection office by 3:00 P.M. the day before the inspection is needed. Inspections are made during the hours of 9:00am until 12:00 p.m. and from 1:00 p.m. until 5:00p.m.

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The City of Waco is on the My-Gov Permitting System. For help with questions about getting set up on our system to track your inspections, please contact Michelle Weber, CSR, @ 254-750-5755.

## **APPLYING FOR RESIDENTIAL BUILDING PERMIT**

### **Carport or Patio Cover**

1. Have a dimensioned plot plan of the entire property showing placement of the new structure.
2. Show roof detail (Need engineering details on all components it using pre-fab components)
3. Show elevation
4. Show foundation or support

### **Interior Remodel**

1. Provide a floor plan showing work that will be done.

### **Room addition; Patio enclosure**

1. Have a dimensioned plot plan of the entire property
2. Show foundation plan and details of addition. If existing, note as such. Also note what type of foundation the existing structure has.
3. Show floor plan of addition and the immediate adjacent areas of the house. Label all room usages and denote all openings and all work to be done.
4. Show typical wall section
5. Roof plan and details. Show how new roof is to tie into existing.
6. Submit energy information for exterior doors, windows, and all insulation.
7. Show elevations of each side of the house where there is a change. Elevations are to show the entire existing house and the new addition as it will appear once the addition is complete.
8. A second story addition will also require a floor framing plan and details.

### **Detached Buildings - Over 200 s.f.**

1. Have a dimensioned plot plan of entire property
2. Show foundation plan and details
3. Show elevations of each side
4. Show typical wall section
5. Show roof plan and details

**NOTE: All detached, accessory buildings/structures used for human occupancy shall have the foundation system, regardless of the size, designed by a licensed, professional engineer in the state of Texas.**

### **Detached Buildings for Storage – Under 200 s.f.**

1. Have a dimensioned plot plan of entire property showing the location of the proposed building and the setbacks from the house, side and rear property lines.

### **Decks- 30" high and over**

1. Have a dimensioned plot plan of entire property
2. Show foundation plan and details
3. Show construction and flooring details

## 2012 INTERNATIONAL RESIDENTIAL CODE SYNOPSIS

### Code Section

- R317** Protection of wood and wood based products from decay shall be provided by the use of naturally durable wood or wood that is preservative-treated in accordance with AWP A U1.
- R317** All wood framing member that rest on concrete or masonry exterior foundation walls and are less than 8 inches from the exposed ground must be protected.
- R403** Wood sole plates at all exterior walls, wood sole plates of braced wall panels at building interiors and all wood sill plate shall be anchored to the foundation with  $\frac{1}{2}$  inch diameter anchor bolts spaced of maximum of 6 feet on center or approved shots and washers installed according to the ICC compliance report.
- R502** Spans for girders, floor joists, ceiling joists and rafters shall be in accordance with approved span tables. See revised span tables under separate attachment.
- R502** Joists shall be supported laterally at the ends to prevent rotation.
- R502** Notches in solid lumber joists, rafters, and beams shall not exceed one sixth of the depth of the member, or longer than one-third of the depth of the member and shall not be located in the middle one-third of the span. Notches at the ends of the member shall not exceed one-fourth the depth of the member. The tension side of members 4 inches or greater shall not be notched except at the ends of the members.
- R502** The diameter of holes bored shall not exceed one-third the depth of the member. Holes shall not be closer than 2 inches to the top or bottom of the member or to any other hole located in the member.
- R502** Joists framing from opposite side over a bearing support shall lap a minimum of 3 inches and shall be nailed together with a minimum three 10d face nails. Joist framing into the side of a wood girder shall be supported by approved framing anchors or on ledger strips not less than 2 inches by 2 inches.
- R802** When the header joist span exceeds 4 feet, the trimmer joists and the header joist shall be doubled and approved hangers shall be used for the header joist to trimmer joist connections when the header joist span exceeds 6 feet.
- R408** Access shall be provided to all under-floor space and shall be a minimum of 18 inches by 24 inches. Openings through a perimeter wall shall not be less than 16 inches by 24 inches.
- R408** Ventilation of crawl space area is 1 sq.ft. for each 150 sq.ft

- R503** The maximum allowable span for wood structural panels used as sub floor or roof decking is set forth in Table R503.2.1.1 (1)
- R602** Studs shall be a minimum No.3, standard or stud grade lumber. See exceptions for utility grade studs.
- R602** Approved end-jointed lumber identified by a grade mark of an approved lumber grading or inspection agency may be used interchangeably with solid-sawn members of the same species and grade.
- R602** Wood stud walls shall be capped with a double top plate installed to provide overlapping at corners and intersections with bearing partitions. End joints in top plates shall be offset at least 24 inches.
- R602** Intermittent braced wall panel construction can be 1"x4" wood or approved metal straps at 45 to 60 degrees, 3/8" wood structural panels, " structural fiberboard sheathing, or%" gypsum board, The length of braced wall panels must be a minimum of 48" or engineered panels.
- R602** Any stud in an exterior wall or bearing partition may be cut or notched to a depth not exceeding 25 percent of its width. Studs in nonbearing partitions may be notched to a depth not to exceed 40 percent of a single stud width. Any stud be bored or drilled, provided that the diameter of the resulting hole is no more than 60 percent of the stud width, the edge of the hole is no more than 5/8 "to the edge of the stud. Studs located in exterior walls or bearing partitions drilled over 40 percent and up to 60 percent shall also be doubled with no more than two successive doubled studs bored. Bored holes shall not be located in the same section as a cut or notch.
- R802** Rafters shall be framed to a ridge board or to each other with a gusset plate as a tie. The ridge board shall be at least 1 inch thick and not less in depth than the cut end of the rafter. At all valleys and hips there shall be a valley or hip rafter not less than 2 inch thick and not less in depth than the cut end of the rafter.
- R802** Ceiling joist and rafters shall be nailed to each other and the rafter shall be nailed to the top wall plate. Ceiling joists shall be continuous or securely joined where they meet over interior partitions and are nailed to adjacent rafter to provide a continuous tie across the building when such joists are parallel to the rafters.
- R802** Where ceiling joists are not parallel to rafters, rafter ties shall be installed. Rafter ties shall be a minimum of 2 inch by 4 inch.
- R802** Collar ties shall be connected in the upper third of the attic space and shall be a minimum of 1 inch by 4 inch spaced not more than 4 feet on center.
- R802** Purlins shall be sized no less than the required size of the rafters that they support. Purlins shall be supported by a minimum of 2"x4" braces and spaced not more than 4 feet on center.
- R802** Trussed rafters must be engineered and design data submitted.

- R302** Fireblocking shall be provided in wood-frame construction in the following locations:
- 1) In concealed spaces of stud walls and partitions, including furred spaces and parallel rows of studs or staggered studs vertically at the ceiling and floor levels and horizontally at intervals not exceeding 10 feet.
  - 2) At all interconnections between concealed vertical and horizontal spaces such as occur at soffits, drop ceilings and cove ceilings.
  - 3) In concealed spaces between stair stringers at the top and bottom of the run.
  - 4) At openings around vents, pipes, ducts, cables and wires at ceiling and floor level, with an approved material.
- R302** Fireblocking shall consist of 2" inch nominal lumber or other approved material.
- R703** Brick ties shall be not less than No 22 gage corrugated metal and shall be spaced not more than 24 inches on center horizontally and vertically and shall support not more than 2.67 square feet of wall area.
- R311** Stairways shall not be less than 36 inches in clear width and have not less than 6 feet 8 inches in headroom.
- R311** The maximum stair riser height shall be 7 3/4 inches and the minimum tread depth shall be 10 inches. A nosing not less than 3/4 inch but not more than 1 1/4 inches shall be provided on stairways with solid risers. (A nosing is not required where the tread depth is a minimum of 11 inches)
- R311** The width of each landing shall not be less than the width of the stairway served and shall have a minimum dimension of 36 inches measured in the direction of travel.
- R311** Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers. Handrail height shall be not less than 34 inches and not more than 38 inches measured vertically from the sloped plane adjoining the tread nosing.
- R312** Required guards shall not have openings from the walking surface to the require guard height which allow passage of a sphere 4 inches in diameter.
- R807** Attic access openings shall be located in a readily accessible location and not less than 22 inches by 30 inches with unobstructed headroom of 30 inches.
- R806** Attic ventilation shall be not less than 1/150 except that reduction to 1/300 is permitted provided that at least 50 percent and not more than 80 percent of the required ventilation area is provided by ventilators located in the upper portion of the area to be ventilated and at least 3 feet above the eave or cornice vents.
- R308** Safety glazing is required when a panel is within 24 inches of an exterior door and the bottom edge is less than 60 inches above the floor or walking surface.

- R308** Safety glazing is required in shower, bathtub enclosures and all glazing over bathtub or showers where the bottom edge is within 60 inches above any standing or walking surface.
- R303** Bathrooms, water closet compartments and other similar rooms shall be provided with an operable window of not less than 3 square feet, one-half of which must be openable or is vented by an approved device exhausted directly to the outside.
- P2801** Water heaters having an ignition source that are installed in garages shall be elevated such that the source of ignition is not less than 18 inches above the garage floor.
- R314** Smoke alarms must be installed in accordance with NFPA 72. Smoke alarms shall be installed in each sleeping room, outside each separate sleeping area in the immediate vicinity of the bedrooms, and on each additional story of the dwelling. When more than one smoke alarm is required, the alarm devices shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms.
- R315** Approved carbon monoxide alarms shall be installed outside of each separate sleeping area in the immediate vicinity of the bedrooms in dwelling units within which fuel-fired appliances are installed and in dwelling units that have attached garages.
- R315** Single station carbon monoxide alarms shall be listed as complying with UL.
- R302** Dwelling units in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than a 1-hour fire-resistance rating.

## **2012 ENERGY CONSERVATION CODE**

- 402 The building thermal envelope shall be durably sealed. It shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.
- 402 Window U factor must be a maximum of .40 with a maximum SHGC of .25. Wall insulation must be a minimum of R-13; R-38 min. in ceilings.
- 402 Approved computer programs such as ResCheck are accepted.

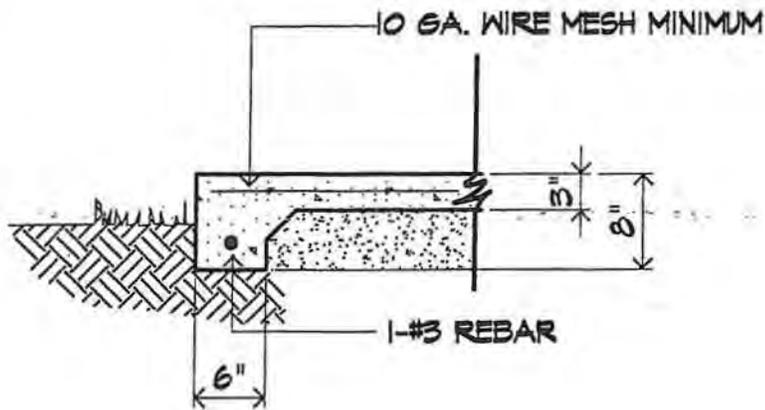
A permanent certificate shall be posted on or in the electrical distribution panel and shall not cover or obstruct the visibility of the required electrical labels. The certificate shall list the insulation installed in or on ceiling/roof, walls, floor, and ducts outside conditioned space; U-factors and SHGC of fenestration. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electrical furnace" or "baseboard electric heater" as appropriate.

## MINIMUM FOUNDATION REQUIREMENTS FOR RESIDENTIAL CONSTRUCTION

1. The details shown are minimum foundation requirements. Designs are based on the placement of footings and beams below undisturbed soil with a bearing capacity of 1500 p s f. See I.R.C. for soil bearing capacities greater than 1500 psf.
2. Foundations which are to be placed on expansive or with a P.I. of 15 or greater type soils, shall be investigated and designed by a registered Engineer.
3. Foundation reinforcement steel shall be minimum grade 40.
4. Corner bars shall be installed at all corners and at end of all interior beams. Corner bars shall be of # 5 rebar and shall extend at least 18" each way.
5. Foundation concrete shall have an ultimate compressive strength of not less than 2500 lbs psi. at 28 days.
6. All new foundations which are to connect to existing foundations shall be connected to the existing foundation by doweling reinforcing steel into the existing foundation and penetrating a minimum of 5".
7. Width of all beams must follow table for minimum width of concrete footings.
8. All exterior foundation footings shall be placed a minimum of 12" below undisturbed soil.
9. Exterior beams must have a minimum of 4 #5 reinforcing bars installed with 2 at top and 2 at bottom.
10. Interior beams must have a minimum of 2 #5 reinforcing bars.
11. Interior beams shall be spaced a maximum of 16' O.C. each way.
12. The foundation slab shall have a minimum reinforcing steel of #3 bars spaced a maximum of 16" each way and properly supported.
13. The foundation slab must have a 6" sand base covered with a 6 mil polyethylene vapor barrier.
14. The minimum foundation slab thickness is 4".
15. All piers and foundations must be inspected prior to pouring concrete. For foundation inspections, the forms must be set, steel tied and on chairs, with sand base and vapor barrier installed. All property lines shall be staked and string lines drawn.

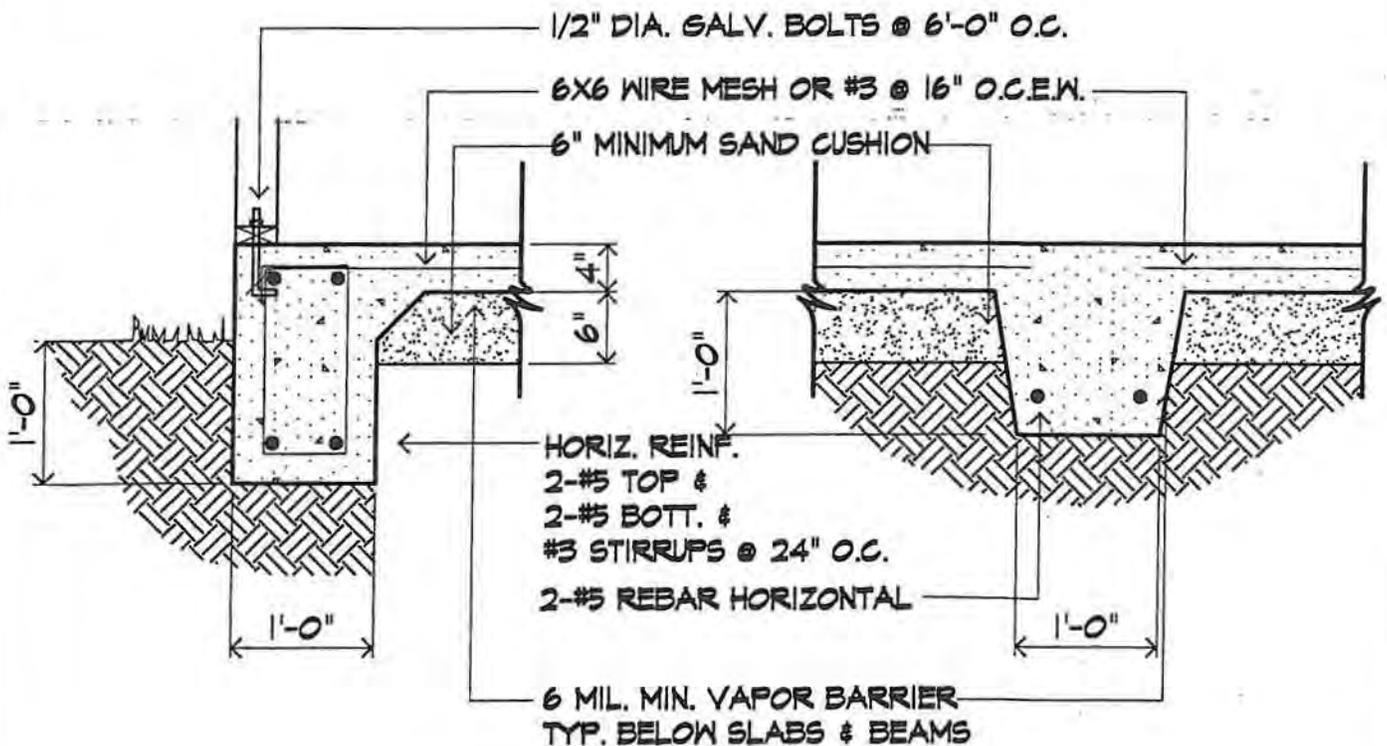
### NOTE

**An engineered foundation plan will be required for any addition to an existing house if the new foundation system differs from what is currently in place, i.e. existing pier and beam to slab addition, existing slab to pier and beam addition. If there is failure in the existing foundation system an engineered foundation plan will be required. An engineered foundation system will also be required for any detached structure that will be used for human occupancy.**



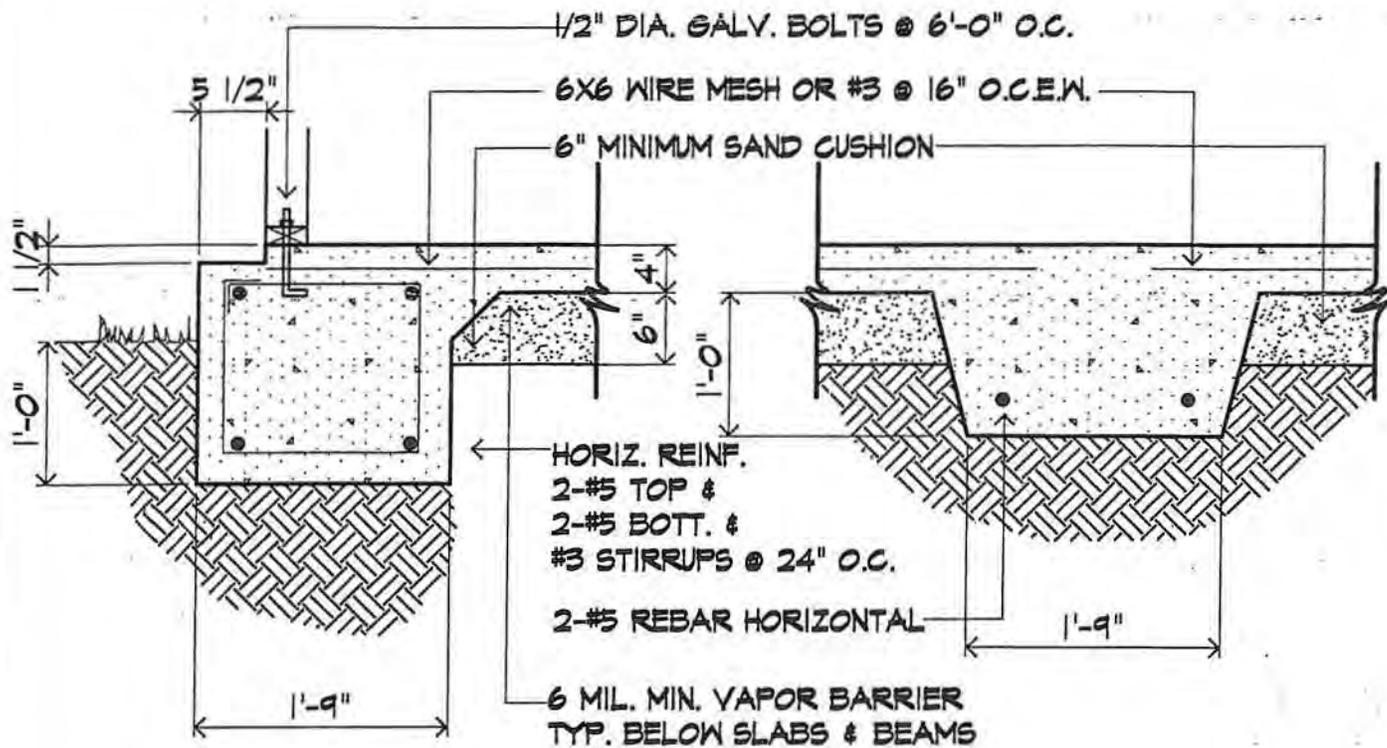
# 1 PATIO WITH OUT COVER OR STRUCTURE

3/4"=1'-0"



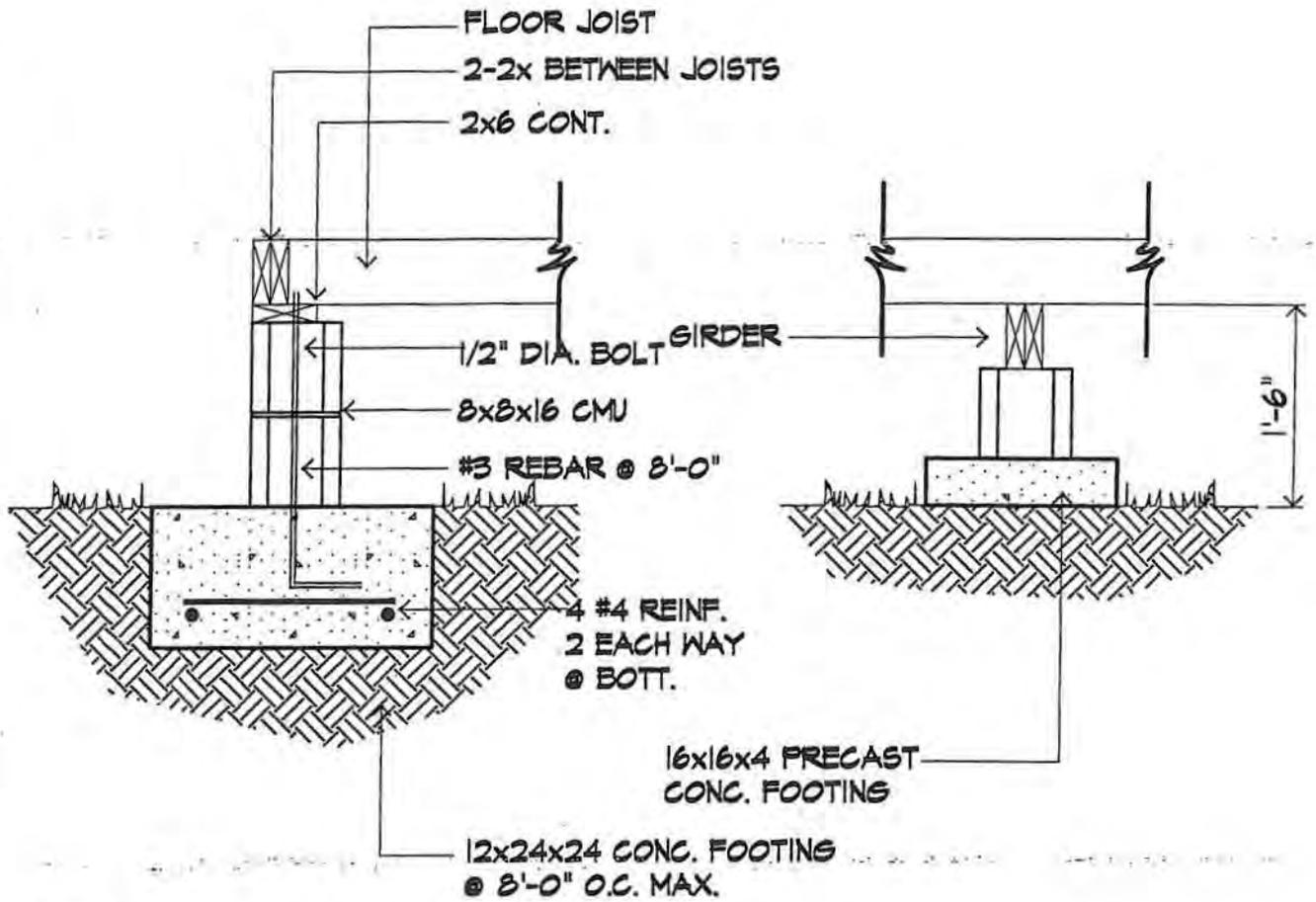
# 2 SINGLE STORY FRAME or SINGLE STORY BRICK

3/4"=1'-0"



### 3 TWO STORY BRICK

3/4"=1'-0"



NOTE:  
 WHEN CMU IS STACKED MORE THAN  
 THREE HIGH, CELLS SHALL BE FILLED  
 WITH CONCRETE.  
 TYP. EXTERIOR FOOTING

TYP. INTERIOR FOOTING

# 4 REPLACEMENT PIERS FOR EXISTING STRUCTURES

3/4" = 1'-0"

TABLE R802.5.1(1)  
 RAFTER SPANS FOR COMMON LUMBER SPECIES  
 (Roof live load=20 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 x 4	2 x 6	2 x 8	2 x 10	2 x 12	2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
		Maximum rafter spans <sup>a</sup>									
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch SS	11-6	18-0	23-9	Note b	Note b	11-6	18-0	23-5	Note b	Note b
	Douglas fir-larch #1	11-1	17-4	22-5	Note b	Note b	10-6	15-4	19-5	23-9	Note b
	Douglas fir-larch #2	10-10	16-7	21-0	25-8	Note b	9-10	14-4	18-2	22-3	25-9
	Douglas fir-larch #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Hem-fir SS	10-10	17-0	22-5	Note b	Note b	10-10	17-0	22-5	Note b	Note b
	Hem-fir #1	10-7	16-8	21-10	Note b	Note b	10-3	14-11	18-11	23-2	Note b
	Hem-fir #2	10-1	15-11	20-8	25-3	Note b	9-8	14-2	17-11	21-11	25-5
	Hem-fir #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Southern pine SS	11-3	17-8	23-4	Note b	Note b	11-3	17-8	23-4	Note b	Note b
	Southern pine #1	<del>11-10-10</del>	<del>17-4-17-0</del>	<del>22-11-22-5</del>	Note b	Note b	<del>11-10-6</del>	<del>17-3-15-8</del>	<del>21-9-19-10</del>	<del>25-10-23-2</del>	Note b
	Southern pine #2	<del>10-10-10-4</del>	<del>17-0-15-7</del>	<del>22-5-19-8</del>	Note b-23-5	Note b	<del>10-6-9-0</del>	<del>15-1-13-6</del>	<del>19-5-17-1</del>	<del>23-2-20-3</del>	Note b-23-10
	Southern pine #3	<del>9-1-8-0</del>	<del>13-6-11-9</del>	<del>17-2-14-10</del>	<del>20-3-18-0</del>	<del>24-1-21-4</del>	<del>7-11-6-11</del>	<del>11-8-10-2</del>	<del>14-10-12-10</del>	<del>17-6-15-7</del>	<del>20-11-18-6</del>
	Spruce-pine-fir SS	10-7	16-8	21-11	Note b	Note b	10-7	16-8	21-9	Note b	Note b
	Spruce-pine-fir #1	10-4	16-3	21-0	25-8	Note b	9-10	14-4	18-2	22-3	25-9
Spruce-pine-fir #2	10-4	16-3	21-0	25-8	Note b	9-10	14-4	18-2	22-3	25-9	
Spruce-pine-fir #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6	
16	Douglas fir-larch SS	10-5	16-4	21-7	Note b	Note b	10-5	16-0	20-3	24-9	Note b
	Douglas fir-larch #1	10-0	15-4	19-5	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch #2	9-10	14-4	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Douglas fir-larch #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Hem-fir SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	19-11	24-4	Note b
	Hem-fir #1	9-8	14-11	18-11	23-2	Note b	8-10	12-11	16-5	20-0	23-3
	Hem-fir #2	9-2	14-2	17-11	21-11	25-5	8-5	12-3	15-6	18-11	22-0
	Hem-fir #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Southern pine SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	Note b-25-7	Note b
	Southern pine #1	<del>10-0-9-10</del>	<del>15-9-15-6</del>	<del>20-10-19-10</del>	<del>25-10-23-2</del>	Note b	<del>10-0-9-1</del>	<del>15-0-13-7</del>	<del>18-10-17-2</del>	<del>22-4-20-1</del>	Note b-23-10
	Southern pine #2	<del>9-10-9-0</del>	<del>15-1-13-6</del>	<del>19-5-17-1</del>	<del>23-2-20-3</del>	Note b-23-10	<del>9-1-7-9</del>	<del>13-0-11-8</del>	<del>16-10-14-9</del>	<del>20-1-17-6</del>	<del>23-7-20-8</del>
	Southern pine #3	<del>7-11-6-11</del>	<del>11-8-10-2</del>	<del>14-10-12-10</del>	<del>17-6-15-7</del>	<del>20-11-18-6</del>	<del>6-10-6-0</del>	<del>10-1-8-10</del>	<del>12-10-11-2</del>	<del>15-2-13-6</del>	<del>18-1-16-0</del>
	Spruce-pine-fir SS	9-8	15-2	19-11	25-5	Note b	9-8	14-10	18-10	23-0	Note b
	Spruce-pine-fir #1	9-5	14-4	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4
Spruce-pine-fir #2	9-5	14-4	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4	
Spruce-pine-fir #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10	
19.2	Douglas fir-larch SS	9-10	15-5	20-4	25-11	Note b	9-10	14-7	18-6	22-7	Note b
	Douglas fir-larch #1	9-5	14-0	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch #2	8-11	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Douglas fir-larch #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Hem-fir SS	9-3	14-7	19-2	24-6	Note b	9-3	14-4	18-2	22-3	25-9
	Hem-fir #1	9-1	13-8	17-4	21-1	24-6	8-1	11-10	15-0	18-4	21-3
	Hem-fir #2	8-8	12-11	16-4	20-0	23-2	7-8	11-2	14-2	17-4	20-1
	Hem-fir #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Southern pine SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	<del>19-11-19-7</del>	<del>25-5-23-4</del>	Note b
	Southern pine #1	<del>9-5-9-3</del>	<del>14-10-14-3</del>	<del>19-7-18-1</del>	<del>23-7-21-2</del>	Note b-25-2	<del>9-3-8-4</del>	<del>13-8-12-4</del>	<del>17-2-15-8</del>	<del>20-5-18-4</del>	<del>24-4-21-9</del>
	Southern pine #2	<del>9-3-8-2</del>	<del>13-9-12-3</del>	<del>17-9-15-7</del>	<del>21-2-18-6</del>	<del>24-10-21-9</del>	<del>8-4-7-1</del>	<del>11-11-10-8</del>	<del>15-4-13-6</del>	<del>18-4-16-0</del>	<del>21-6-18-10</del>
	Southern pine #3	<del>7-3-6-4</del>	<del>10-8-9-4</del>	<del>13-7-11-9</del>	<del>16-0-14-3</del>	<del>19-1-16-10</del>	<del>6-3-5-6</del>	<del>9-3-8-1</del>	<del>11-9-10-2</del>	<del>13-10-12-4</del>	<del>16-6-14-7</del>
	Spruce-pine-fir SS	9-1	14-3	18-9	23-11	Note b	9-1	13-7	17-2	21-0	24-4
	Spruce-pine-fir #1	8-10	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
Spruce-pine-fir #2	8-10	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4	
Spruce-pine-fir #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5	

(continued)

TABLE R802.5.1(1)—continued  
**RAFTER SPANS FOR COMMON LUMBER SPECIES**  
 (Roof live load=20 psf, ceiling not attached to rafters, L/Δ = 180)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 × 4	2 × 6	2 × 8	2 × 10	2 × 12	2 × 4	2 × 6	2 × 8	2 × 10	2 × 12
		Maximum rafter spans <sup>a</sup>									
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
24	Douglas fir-larch SS	9-1	14-4	18-10	23-4	Note b	8-11	13-1	16-7	20-3	23-5
	Douglas fir-larch #1	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Douglas fir-larch #2	8-0	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Douglas fir-larch #3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Hem-fir SS	8-7	13-6	17-10	22-9	Note b	8-7	12-10	16-3	19-10	23-0
	Hem-fir #1	8-4	12-3	15-6	18-11	21-11	7-3	10-7	13-5	16-4	19-0
	Hem-fir #2	7-11	11-7	14-8	17-10	20-9	6-10	10-0	12-8	15-6	17-11
	Hem-fir #3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Southern pine SS	8-11	14-1	18-6	23-8	Note b	8-11	<del>14-1</del> 13-10	<del>18-6</del> 17-6	<del>22-1</del> 20-10	<del>Note b</del> 24-8
	Southern pine #1	<del>8-9</del> 8-7	<del>13-9</del> 12-9	<del>17-9</del> 16-2	<del>21-1</del> 18-11	<del>25-2</del> 22-6	<del>8-3</del> 7-5	<del>12-3</del> 11-1	<del>15-4</del> 14-0	<del>18-3</del> 16-5	<del>21-9</del> 19-6
	Southern pine #2	<del>8-7</del> 7-4	<del>12-3</del> 11-0	<del>15-10</del> 13-11	<del>18-11</del> 16-6	<del>22-2</del> 19-6	<del>7-5</del> 6-4	<del>10-8</del> 9-6	<del>13-9</del> 12-1	<del>16-5</del> 14-4	<del>19-3</del> 16-10
	Southern pine #3	<del>6-5</del> 5-8	<del>9-6</del> 8-4	<del>12-1</del> 10-6	<del>14-4</del> 12-9	<del>17-1</del> 15-1	<del>5-7</del> 4-11	<del>8-3</del> 7-3	<del>10-6</del> 9-1	<del>12-5</del> 11-0	<del>14-9</del> 13-1
	Spruce-pine-fir SS	8-5	13-3	17-5	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Spruce-pine-fir #1	8-0	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir #2	8-0	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir #3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

$H_C/H_R$	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:

$H_C$  = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.

$H_R$  = Height of roof ridge measured vertically above the top of the rafter support walls.

b. Span exceeds 26 feet in length.

TABLE R802.5.1(2)  
 RAFTER SPANS FOR COMMON LUMBER SPECIES  
 (Roof live load=20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
		2 x 4	2 x 6	2 x 8	2 x 10	2 x 12	2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
		Maximum rafter spans <sup>a</sup>									
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch SS	10-5	16-4	21-7	Note b	Note b	10-5	16-4	21-7	Note b	Note b
	Douglas fir-larch #1	10-0	15-9	20-10	Note b	Note b	10-0	15-4	19-5	23-9	Note b
	Douglas fir-larch #2	9-10	15-6	20-5	25-8	Note b	9-10	14-4	18-2	22-3	25-9
	Douglas fir-larch #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Hem-fir SS	9-10	15-6	20-5	Note b	Note b	9-10	15-6	20-5	Note b	Note b
	Hem-fir #1	9-8	15-2	19-11	25-5	Note b	9-8	14-11	18-11	23-2	Note b
	Hem-fir #2	9-2	14-5	19-0	24-3	Note b	9-2	14-2	17-11	21-11	25-5
	Hem-fir #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Southern pine SS	10-3	16-1	21-2	Note b	Note b	10-3	16-1	21-2	Note b	Note b
	Southern pine #1	<del>10-0-9-10</del>	<del>15-9-15-6</del>	<del>20-10-20-5</del>	Note b	Note b	<del>10-0-9-10</del>	<del>15-9-15-6</del>	<del>20-10-19-10</del>	<del>25-10-23-2</del>	Note b
	Southern pine #2	<del>9-10-9-5</del>	<del>15-6-14-9</del>	<del>20-5-19-6</del>	<del>Note b-23-5</del>	Note b	<del>9-10-9-0</del>	<del>15-1-13-6</del>	<del>19-5-17-1</del>	<del>23-2-20-3</del>	<del>Note b-23-10</del>
	Southern pine #3	<del>9-1-8-0</del>	<del>13-6-11-9</del>	<del>17-2-14-10</del>	<del>20-3-18-0</del>	<del>24-1-21-4</del>	<del>7-11-6-11</del>	<del>11-8-10-2</del>	<del>14-10-12-10</del>	<del>17-6-15-7</del>	<del>20-11-18-6</del>
	Spruce-pine-fir SS	9-8	15-2	19-11	25-5	Note b	9-8	15-2	19-11	25-5	Note b
	Spruce-pine-fir #1	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9
Spruce-pine-fir #2	9-5	14-9	19-6	24-10	Note b	9-5	14-4	18-2	22-3	25-9	
Spruce-pine-fir #3	8-7	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6	
16	Douglas fir-larch SS	9-6	14-11	19-7	25-0	Note b	9-6	14-11	19-7	24-9	Note b
	Douglas fir-larch #1	9-1	14-4	18-11	23-9	Note b	9-1	13-3	16-10	20-7	23-10
	Douglas fir-larch #2	8-11	14-1	18-2	22-3	25-9	8-6	12-5	15-9	19-3	22-4
	Douglas fir-larch #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Hem-fir SS	8-11	14-1	18-6	23-8	Note b	8-11	14-1	18-6	23-8	Note b
	Hem-fir #1	8-9	13-9	18-1	23-1	Note b	8-9	12-11	16-5	20-0	23-3
	Hem-fir #2	8-4	13-1	17-3	21-11	25-5	8-4	12-3	15-6	18-11	22-0
	Hem-fir #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10
	Southern pine SS	9-4	14-7	19-3	24-7	Note b	9-4	14-7	19-3	24-7	Note b
	Southern pine #1	<del>9-1-8-11</del>	<del>14-4-14-1</del>	<del>18-11-18-6</del>	<del>24-1-23-2</del>	Note b	<del>9-1-8-11</del>	<del>14-4-13-7</del>	<del>18-10-17-2</del>	<del>22-4-20-1</del>	<del>Note b-23-10</del>
	Southern pine #2	<del>8-11-8-7</del>	<del>14-1-13-5</del>	<del>18-6-17-1</del>	<del>23-2-20-3</del>	<del>Note b-23-10</del>	<del>8-11-7-9</del>	<del>13-0-11-8</del>	<del>16-10-14-9</del>	<del>20-1-17-6</del>	<del>23-7-20-8</del>
	Southern pine #3	<del>7-11-6-11</del>	<del>11-8-10-2</del>	<del>14-10-12-10</del>	<del>17-6-15-7</del>	<del>20-11-18-6</del>	<del>6-10-6-0</del>	<del>10-1-8-10</del>	<del>12-10-11-2</del>	<del>15-2-13-6</del>	<del>18-1-16-0</del>
	Spruce-pine-fir SS	8-9	13-9	18-1	23-1	Note b	8-9	13-9	18-1	23-0	Note b
	Spruce-pine-fir #1	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4
Spruce-pine-fir #2	8-7	13-5	17-9	22-3	25-9	8-6	12-5	15-9	19-3	22-4	
Spruce-pine-fir #3	7-5	10-10	13-9	16-9	19-6	6-5	9-5	11-11	14-6	16-10	
19.2	Douglas fir-larch SS	8-11	14-0	18-5	23-7	Note b	8-11	14-0	18-5	22-7	Note b
	Douglas fir-larch #1	8-7	13-6	17-9	21-8	25-2	8-4	12-2	15-4	18-9	21-9
	Douglas fir-larch #2	8-5	13-1	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Douglas fir-larch #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
	Hem-fir SS	8-5	13-3	17-5	22-3	Note b	8-5	13-3	17-5	22-3	25-9
	Hem-fir #1	8-3	12-11	17-1	21-1	24-6	8-1	11-10	15-0	18-4	21-3
	Hem-fir #2	7-10	12-4	16-3	20-0	23-2	7-8	11-2	14-2	17-4	20-1
	Hem-fir #3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5

(continued)

TABLE R802.5.1(2)—continued  
 RAFTER SPANS FOR COMMON LUMBER SPECIES  
 (Roof live load=20 psf, ceiling attached to rafters, L/Δ = 240)

RAFTER SPACING (Inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf					DEAD LOAD = 20 psf				
			2 x 4	2 x 6	2 x 8	2 x 10	2 x 12	2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
			Maximum rafter spans <sup>a</sup>									
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)	
19.2	Southern pine	SS	8-9	13-9	<del>18-1</del> 18-2	23-1	Note b	8-9	13-9	<del>18-1</del> 18-2	23-1	Note b
	Southern pine	#1	<del>8-7</del> 8-5	<del>13-6</del> 13-3	<del>17-9</del> 17-5	<del>22-8</del> 21-2	<del>Note b</del> 25-2	<del>8-7</del> 8-4	<del>13-6</del> 12-4	<del>17-2</del> 15-8	<del>20-5</del> 18-4	<del>24-4</del> 21-9
	Southern pine	#2	<del>8-5</del> 8-1	<del>13-3</del> 12-3	<del>17-5</del> 15-7	<del>21-2</del> 18-6	<del>24-10</del> 21-9	<del>8-4</del> 7-1	<del>11-11</del> 10-8	<del>15-4</del> 13-6	<del>18-4</del> 16-0	<del>21-6</del> 18-10
	Southern pine	#3	<del>7-3</del> 6-4	<del>10-8</del> 9-4	<del>13-7</del> 11-9	<del>16-0</del> 14-3	<del>19-1</del> 16-10	<del>6-3</del> 5-6	<del>9-3</del> 8-1	<del>11-9</del> 10-2	<del>13-10</del> 12-4	<del>16-6</del> 14-7
	Spruce-pine-fir	SS	8-3	12-11	17-1	21-9	Note b	8-3	12-11	17-1	21-0	24-4
	Spruce-pine-fir	#1	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#2	8-1	12-8	16-7	20-3	23-6	7-9	11-4	14-4	17-7	20-4
	Spruce-pine-fir	#3	6-9	9-11	12-7	15-4	17-9	5-10	8-7	10-10	13-3	15-5
24	Douglas fir-larch	SS	8-3	13-0	17-2	21-10	Note b	8-3	13-0	16-7	20-3	23-5
	Douglas fir-larch	#1	8-0	12-6	15-10	19-5	22-6	7-5	10-10	13-9	16-9	19-6
	Douglas fir-larch	#2	7-10	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Douglas fir-larch	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Hem-fir	SS	7-10	12-3	16-2	20-8	25-1	7-10	12-3	16-2	19-10	23-0
	Hem-fir	#1	7-8	12-0	15-6	18-11	21-11	7-3	10-7	13-5	16-4	19-0
	Hem-fir	#2	7-3	11-5	14-8	17-10	20-9	6-10	10-0	12-8	15-6	17-11
	Hem-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9
	Southern pine	SS	8-1	12-9	16-10	21-6	Note b	8-1	12-9	16-10	<del>21-6</del> 20-10	<del>Note b</del> 24-8
	Southern pine	#1	<del>8-0</del> 7-10	<del>12-6</del> 12-3	<del>16-6</del> 16-2	<del>21-1</del> 18-11	<del>25-2</del> 22-6	<del>8-0</del> 7-5	<del>12-3</del> 11-1	<del>15-4</del> 14-0	<del>18-3</del> 16-5	<del>21-9</del> 19-6
	Southern pine	#2	<del>7-10</del> 7-4	<del>12-3</del> 11-0	<del>15-10</del> 13-11	<del>18-11</del> 16-6	<del>22-2</del> 19-6	<del>7-5</del> 6-4	<del>10-8</del> 9-6	<del>13-9</del> 12-1	<del>16-5</del> 14-4	<del>19-3</del> 16-10
	Southern pine	#3	<del>6-5</del> 5-8	<del>9-6</del> 8-4	<del>12-1</del> 10-6	<del>14-4</del> 12-9	<del>17-1</del> 15-1	<del>5-7</del> 4-11	<del>8-3</del> 7-3	<del>10-6</del> 9-1	<del>12-5</del> 11-0	<del>14-9</del> 13-1
	Spruce-pine-fir	SS	7-8	12-0	15-10	20-2	24-7	7-8	12-0	15-4	18-9	21-9
	Spruce-pine-fir	#1	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#2	7-6	11-9	14-10	18-2	21-0	6-11	10-2	12-10	15-8	18-3
	Spruce-pine-fir	#3	6-1	8-10	11-3	13-8	15-11	5-3	7-8	9-9	11-10	13-9

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

- a. The tabulated rafter spans assume that ceiling joists are located at the bottom of the attic space or that some other method of resisting the outward push of the rafters on the bearing walls, such as rafter ties, is provided at that location. When ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the factors given below:

$H_c/H_R$	Rafter Span Adjustment Factor
1/3	0.67
1/4	0.76
1/5	0.83
1/6	0.90
1/7.5 or less	1.00

where:

$H_c$  = Height of ceiling joists or rafter ties measured vertically above the top of the rafter support walls.

$H_R$  = Height of roof ridge measured vertically above the top of the rafter support walls.

- b. Span exceeds 26 feet in length.

TABLE R502.3.1(2)  
 FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES  
 (Residential living areas, live load = 40 psf, L/Δ = 360)<sup>b</sup>

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
		(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	
12	Douglas fir-larch	SS	11-4	15-0	19-1	23-3	11-4	15-0	19-1	23-3
	Douglas fir-larch	#1	10-11	14-5	18-5	22-0	10-11	14-2	17-4	20-1
	Douglas fir-larch	#2	10-9	14-2	17-9	20-7	10-6	13-3	16-3	18-10
	Douglas fir-larch	#3	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3
	Hem-fir	SS	10-9	14-2	18-0	21-11	10-9	14-2	18-0	21-11
	Hem-fir	#1	10-6	13-10	17-8	21-6	10-6	13-10	16-11	19-7
	Hem-fir	#2	10-0	13-2	16-10	20-4	10-0	13-1	16-0	18-6
	Hem-fir	#3	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3
	Southern pine	SS	11-2	14-8	18-9	22-10	11-2	14-8	18-9	22-10
	Southern pine	#1	<u>10-11-10-9</u>	<u>14-5-14-2</u>	<u>18-5-18-0</u>	<u>22-5-21-11</u>	<u>10-11-10-9</u>	<u>14-5-14-2</u>	<u>18-5-16-11</u>	<u>22-5-20-1</u>
	Southern pine	#2	<u>10-9-10-3</u>	<u>14-2-13-6</u>	<u>18-0-16-2</u>	<u>21-9-19-1</u>	<u>10-9-9-10</u>	<u>14-2-12-6</u>	<u>16-11-14-9</u>	<u>19-10-17-5</u>
	Southern pine	#3	<u>9-4-8-2</u>	<u>11-11-10-3</u>	<u>14-0-12-6</u>	<u>16-8-14-9</u>	<u>8-6-7-5</u>	<u>10-10-9-5</u>	<u>12-10-11-5</u>	<u>15-3-13-6</u>
	Spruce-pine-fir	SS	10-6	13-10	17-8	21-6	10-6	13-10	17-8	21-6
	Spruce-pine-fir	#1	10-3	13-6	17-3	20-7	10-3	13-3	16-3	18-10
Spruce-pine-fir	#2	10-3	13-6	17-3	20-7	10-3	13-3	16-3	18-10	
Spruce-pine-fir	#3	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3	
16	Douglas fir-larch	SS	10-4	13-7	17-4	21-1	10-4	13-7	17-4	21-0
	Douglas fir-larch	#1	9-11	13-1	16-5	19-1	9-8	12-4	15-0	17-5
	Douglas fir-larch	#2	9-9	12-7	15-5	17-10	9-1	11-6	14-1	16-3
	Douglas fir-larch	#3	7-6	9-6	11-8	13-6	6-10	8-8	10-7	12-4
	Hem-fir	SS	9-9	12-10	16-5	19-11	9-9	12-10	16-5	19-11
	Hem-fir	#1	9-6	12-7	16-0	18-7	9-6	12-0	14-8	17-0
	Hem-fir	#2	9-1	12-0	15-2	17-7	8-11	11-4	13-10	16-1
	Hem-fir	#3	7-6	9-6	11-8	13-6	6-10	8-8	10-7	12-4
	Southern pine	SS	10-2	13-4	17-0	20-9	10-2	13-4	17-0	20-9
	Southern pine	#1	<u>9-11-9-9</u>	<u>13-1-12-10</u>	<u>16-9-16-1</u>	<u>20-4-19-1</u>	<u>9-11-9-9</u>	<u>13-1-12-7</u>	<u>16-4-14-8</u>	<u>19-6-17-5</u>
	Southern pine	#2	<u>9-9-9-4</u>	<u>12-10-11-10</u>	<u>16-1-14-0</u>	<u>18-10-16-6</u>	<u>9-6-8-6</u>	<u>12-4-10-10</u>	<u>14-8-12-10</u>	<u>17-2-15-1</u>
	Southern pine	#3	<u>8-1-7-1</u>	<u>10-3-8-11</u>	<u>12-2-10-10</u>	<u>14-6-12-10</u>	<u>7-4-6-5</u>	<u>9-5-8-2</u>	<u>11-1-9-10</u>	<u>13-2-11-8</u>
	Spruce-pine-fir	SS	9-6	12-7	16-0	19-6	9-6	12-7	16-0	19-6
	Spruce-pine-fir	#1	9-4	12-3	15-5	17-10	9-1	11-6	14-1	16-3
Spruce-pine-fir	#2	9-4	12-3	15-5	17-10	9-1	11-6	14-1	16-3	
Spruce-pine-fir	#3	7-6	9-6	11-8	13-6	6-10	8-8	10-7	12-4	

(continued)

TABLE R502.3.1(2)—continued  
 FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES  
 (Residential living areas, live load = 40 psf, L/Δ = 360)<sup>b</sup>

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
		(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	
19.2	Douglas fir-larch	SS	9-8	12-10	16-4	19-10	9-8	12-10	16-4	19-2
	Douglas fir-larch	#1	9-4	12-4	15-0	17-5	8-10	11-3	13-8	15-11
	Douglas fir-larch	#2	9-1	11-6	14-1	16-3	8-3	10-6	12-10	14-10
	Douglas fir-larch	#3	6-10	8-8	10-7	12-4	6-3	7-11	9-8	11-3
	Hem-fir	SS	9-2	12-1	15-5	18-9	9-2	12-1	15-5	18-9
	Hem-fir	#1	9-0	11-10	14-8	17-0	8-8	10-11	13-4	15-6
	Hem-fir	#2	8-7	11-3	13-10	16-1	8-2	10-4	12-8	14-8
	Hem-fir	#3	6-10	8-8	10-7	12-4	6-3	7-11	9-8	11-3
	Southern pine	SS	9-6	12-7	16-0	19-6	9-6	12-7	16-0	19-6
	Southern pine	#1	9-4-9-2	12-4-12-1	15-9-14-8	19-2-17-5	9-4-9-0	12-4-11-5	14-11-13-5	17-9-15-11
	Southern pine	#2	9-2-8-6	12-1-10-10	14-8-12-10	17-2-15-1	8-8-7-9	11-3-9-10	13-5-11-8	15-8-13-9
	Southern pine	#3	7-4-6-5	9-5-8-2	11-1-9-10	13-2-11-8	6-9-5-11	8-7-7-5	10-1-9-0	12-1-10-8
	Spruce-pine-fir	SS	9-0	11-10	15-1	18-4	9-0	11-10	15-1	17-9
	Spruce-pine-fir	#	8-9	11-6	14-1	16-3	8-3	10-6	12-10	14-10
Spruce-pine-fir	#2	8-9	11-6	14-1	16-3	8-3	10-6	12-10	14-10	
Spruce-pine-fir	#3	6-10	8-8	10-7	12-4	6-3	7-11	9-8	11-3	
24	Douglas fir-larch	SS	9-0	11-11	15-2	18-5	9-0	11-11	14-9	17-1
	Douglas fir-larch	#1	8-8	11-0	13-5	15-7	7-11	10-0	12-3	14-3
	Douglas fir-larch	#2	8-1	10-3	12-7	14-7	7-5	9-5	11-6	13-4
	Douglas fir-larch	#3	6-2	7-9	9-6	11-0	5-7	7-1	8-8	10-1
	Hem-fir	SS	8-6	11-3	14-4	17-5	8-6	11-3	14-4	16-10 <sup>a</sup>
	Hem-fir	#1	8-4	10-9	13-1	15-2	7-9	9-9	11-11	13-10
	Hem-fir	#2	7-11	10-2	12-5	14-4	7-4	9-3	11-4	13-1
	Hem-fir	#3	6-2	7-9	9-6	11-0	5-7	7-1	8-8	10-1
	Southern pine	SS	8-10	11-8	14-11	18-1	8-10	11-8	14-11	18-1-18-0
	Southern pine	#1	8-8-8-6	11-5-11-3	14-7-13-1	17-5-15-7	8-8-8-1	11-3-10-3	13-4-12-0	15-11-14-3
	Southern pine	#2	8-6-7-7	11-0-9-8	13-1-11-5	15-5-13-6	7-9-7-0	10-0-8-10	12-0-10-5	14-0-12-4
	Southern pine	#3	6-7-5-9	8-5-7-3	9-11-8-10	11-10-10-5	6-0-5-3	7-8-6-8	9-1-8-1	10-9-9-6
	Spruce-pine-fir	SS	8-4	11-0	14-0	17-0	8-4	11-0	13-8	15-11
	Spruce-pine-fir	#1	8-1	10-3	12-7	14-7	7-5	9-5	11-6	13-4
Spruce-pine-fir	#2	8-1	10-3	12-7	14-7	7-5	9-5	11-6	13-4	
Spruce-pine-fir	#3	6-2	7-9	9-6	11-0	5-7	7-1	8-8	10-1	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

Note: Check sources for availability of lumber in lengths greater than 20 feet.

a. End bearing length shall be increased to 2 inches.

b. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub>, and D<sub>2</sub> shall be determined in accordance with Section R301.2.2.2.1.

TABLE R502.3.1(1)  
 FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES  
 (Residential sleeping areas, live load = 30 psf, L/Δ = 360)<sup>a</sup>

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
		(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	
12	Douglas fir-larch	SS	12-6	16-6	21-0	25-7	12-6	16-6	21-0	25-7
	Douglas fir-larch	#1	12-0	15-10	20-3	24-8	12-0	15-7	19-0	22-0
	Douglas fir-larch	#2	11-10	15-7	19-10	23-0	11-6	14-7	17-9	20-7
	Douglas fir-larch	#3	9-8	12-4	15-0	17-5	8-8	11-0	13-5	15-7
	Hem-fir	SS	11-10	15-7	19-10	24-2	11-10	15-7	19-10	24-2
	Hem-fir	#1	11-7	15-3	19-5	23-7	11-7	15-2	18-6	21-6
	Hem-fir	#2	11-0	14-6	18-6	22-6	11-0	14-4	17-6	20-4
	Hem-fir	#3	9-8	12-4	15-0	17-5	8-8	11-0	13-5	15-7
	Southern pine	SS	12-3	16-2	20-8	25-1	12-3	16-2	20-8	25-1
	Southern pine	#1	<del>12-0-11-10</del>	<del>15-10-15-7</del>	<del>20-3-19-10</del>	<del>24-8-24-2</del>	<del>12-0-11-10</del>	<del>15-10-15-7</del>	<del>20-3-18-7</del>	<del>24-8-22-0</del>
	Southern pine	#2	<del>11-10-11-3</del>	<del>15-7-14-11</del>	<del>19-10-18-1</del>	<del>24-2-21-4</del>	<del>11-10-10-9</del>	<del>15-7-13-8</del>	<del>18-7-16-2</del>	<del>21-9-19-1</del>
	Southern pine	#3	<del>10-5-9-2</del>	<del>13-3-11-6</del>	<del>15-8-14-0</del>	<del>18-8-16-6</del>	<del>9-4-8-2</del>	<del>11-11-10-3</del>	<del>14-0-12-6</del>	<del>16-8-14-9</del>
	Spruce-pine-fir	SS	11-7	15-3	19-5	23-7	11-7	15-3	19-5	23-7
	Spruce-pine-fir	#1	11-3	14-11	19-0	23-0	11-3	14-7	17-9	20-7
	Spruce-pine-fir	#2	11-3	14-11	19-0	23-0	11-3	14-7	17-9	20-7
	Spruce-pine-fir	#3	9-8	12-4	15-0	17-5	8-8	11-0	13-5	15-7
16	Douglas fir-larch	SS	11-4	15-0	19-1	23-3	11-4	15-0	19-1	23-0
	Douglas fir-larch	#1	10-11	14-5	18-5	21-4	10-8	13-6	16-5	19-1
	Douglas fir-larch	#2	10-9	14-1	17-2	19-11	9-11	12-7	15-5	17-10
	Douglas fir-larch	#3	8-5	10-8	13-0	15-1	7-6	9-6	11-8	13-6
	Hem-fir	SS	10-9	14-2	18-0	21-11	10-9	14-2	18-0	21-11
	Hem-fir	#1	10-6	13-10	17-8	20-9	10-4	13-1	16-0	18-7
	Hem-fir	#2	10-0	13-2	16-10	19-8	9-10	12-5	15-2	17-7
	Hem-fir	#3	8-5	10-8	13-0	15-1	7-6	9-6	11-8	13-6
	Southern pine	SS	11-2	14-8	18-9	22-10	11-2	14-8	18-9	22-10
	Southern pine	#1	<del>10-11-10-9</del>	<del>14-5-14-2</del>	<del>18-5-18-0</del>	<del>22-5-21-4</del>	<del>10-11-10-9</del>	<del>14-5-13-9</del>	<del>17-11-16-1</del>	<del>21-4-19-1</del>
	Southern pine	#2	<del>10-9-10-3</del>	<del>14-2-13-3</del>	<del>18-0-15-8</del>	<del>21-1-18-6</del>	<del>10-5-9-4</del>	<del>13-6-11-10</del>	<del>16-1-14-0</del>	<del>18-10-16-6</del>
	Southern pine	#3	<del>9-0-7-11</del>	<del>11-6-10-10</del>	<del>13-7-12-1</del>	<del>16-2-14-4</del>	<del>8-1-7-1</del>	<del>10-3-8-11</del>	<del>12-2-10-10</del>	<del>14-6-12-10</del>
	Spruce-pine-fir	SS	10-6	13-10	17-8	21-6	10-6	13-10	17-8	21-4
	Spruce-pine-fir	#1	10-3	13-6	17-2	19-11	9-11	12-7	15-5	17-10
	Spruce-pine-fir	#2	10-3	13-6	17-2	19-11	9-11	12-7	15-5	17-10
	Spruce-pine-fir	#3	8-5	10-8	13-0	15-1	7-6	9-6	11-8	13-6

(continued)

TABLE R502.3.1(1)—continued  
 FLOOR JOIST SPANS FOR COMMON LUMBER SPECIES  
 (Residential sleeping areas, live load = 30 psf, L/Δ = 360)<sup>a</sup>

JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf				DEAD LOAD = 20 psf			
			2 × 6	2 × 8	2 × 10	2 × 12	2 × 6	2 × 8	2 × 10	2 × 12
			Maximum floor joist spans							
		(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	(ft - in.)	
19.2	Douglas fir-larch	SS	10-8	14-1	18-0	21-10	10-8	14-1	18-0	21-0
	Douglas fir-larch	#1	10-4	13-7	16-9	19-6	9-8	12-4	15-0	17-5
	Douglas fir-larch	#2	10-1	12-10	15-8	18-3	9-1	11-6	14-1	16-3
	Douglas fir-larch	#3	7-8	9-9	11-10	13-9	6-10	8-8	10-7	12-4
	Hem-fir	SS	10-1	13-4	17-0	20-8	10-1	13-4	17-0	20-7
	Hem-fir	#1	9-10	13-0	16-4	19-0	9-6	12-0	14-8	17-0
	Hem-fir	#2	9-5	12-5	15-6	17-1	8-11	11-4	13-10	16-1
	Hem-fir	#3	7-8	9-9	11-10	13-9	6-10	8-8	10-7	12-4
	Southern pine	SS	10-6	13-10	17-8	21-6	10-6	13-10	17-8	21-6
	Southern pine	#1	10-4-10-1	13-7-13-4	17-4-16-5	21-1-19-6	10-4-9-11	13-7-12-7	16-4-14-8	19-6-17-5
	Southern pine	#2	10-1-9-6	13-4-12-1	16-5-14-4	19-3-16-10	9-6-8-6	12-4-10-10	14-8-12-10	17-2-15-1
	Southern pine	#3	8-3-7-3	10-6-9-1	12-5-11-0	14-9-13-1	7-4-6-5	9-5-8-2	11-1-9-10	13-2-11-8
	Spruce-pine-fir	SS	9-10	13-0	16-7	20-2	9-10	13-0	16-7	19-6
	Spruce-pine-fir	#1	9-8	12-9	15-8	18-3	9-1	11-6	14-1	16-3
	Spruce-pine-fir	#2	9-8	12-9	15-8	18-3	9-1	11-6	14-1	16-3
	Spruce-pine-fir	#3	7-8	9-9	11-10	13-9	6-10	8-8	10-7	12-4
24	Douglas fir-larch	SS	9-11	13-1	16-8	20-3	9-11	13-1	16-2	18-9
	Douglas fir-larch	#1	9-7	12-4	15-0	17-5	8-8	11-0	13-5	15-7
	Douglas fir-larch	#2	9-1	11-6	14-1	16-3	8-1	10-3	12-7	14-7
	Douglas fir-larch	#3	6-10	8-8	10-7	12-4	6-2	7-9	9-6	11-0
	Hem-fir	SS	9-4	12-4	15-9	19-2	9-4	12-4	15-9	18-5
	Hem-fir	#1	9-2	12-0	14-8	17-0	8-6	10-9	13-1	15-2
	Hem-fir	#2	8-9	11-4	13-10	16-1	8-0	10-2	12-5	14-4
	Hem-fir	#3	6-10	8-8	10-7	12-4	6-2	7-9	9-6	11-0
	Southern pine	SS	9-9	12-10	16-5	19-11	9-9	12-10	16-5	19-11-19-8
	Southern pine	#1	9-7-9-4	12-7-12-4	16-1-14-8	19-6-17-5	9-7-8-10	12-4-11-3	14-7-13-1	17-5-15-7
	Southern pine	#2	9-4-8-6	12-4-10-10	14-8-12-10	17-2-15-1	8-6-7-7	11-0-9-8	13-1-11-5	15-5-13-6
	Southern pine	#3	7-4-6-5	9-5-8-2	11-1-9-10	13-2-11-8	6-7-5-9	8-5-7-3	9-11-8-10	11-10-10-5
	Spruce-pine-fir	SS	9-2	12-1	15-5	18-9	9-2	12-1	15-0	17-5
	Spruce-pine-fir	#1	8-11	11-6	14-1	16-3	8-1	10-3	12-7	14-7
	Spruce-pine-fir	#2	8-11	11-6	14-1	16-3	8-1	10-3	12-7	14-7
	Spruce-pine-fir	#3	6-10	8-8	10-7	12-4	6-2	7-9	9-6	11-0

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa.

Note: Check sources for availability of lumber in lengths greater than 20 feet.

a. Dead load limits for townhouses in Seismic Design Category C and all structures in Seismic Design Categories D<sub>0</sub>, D<sub>1</sub> and D<sub>2</sub> shall be determined in accordance with Section R301.2.2.2.1.

**R802.4 Allowable ceiling joist spans.** Spans for ceiling joists shall be in accordance with Tables R802.4(1) and R802.4(2). For other grades and species and for other loading conditions, refer to the AF&PA *Span Tables for Joists and Rafters*.

**R802.5 Allowable rafter spans.** Spans for rafters shall be in accordance with Tables R802.5.1(1) through R802.5.1(8). For other grades and species and for other loading conditions, refer to the AF&PA *Span Tables for Joists and Rafters*. The span of each rafter shall be measured along the horizontal projection of the rafter.

**R802.5.1 Purlins.** Installation of purlins to reduce the span of rafters is permitted as shown in Figure R802.5.1. Purlins shall be sized no less than the required size of the rafters that they support. Purlins shall be continuous and shall be supported by 2-inch by 4-inch (51 mm by 102 mm) braces installed to bearing walls at a slope not less than 45 degrees (0.785 rad) from the horizontal. The braces shall be spaced not more than 4 feet (1219 mm) on center and the unbraced length of braces shall not exceed 8 feet (2438 mm).

**TABLE R802.4(1)**  
**CEILING JOIST SPANS FOR COMMON LUMBER SPECIES**  
 (Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE	DEAD LOAD = 5 psf			
		2 x 4	2 x 6	2 x 8	2 x 10
		Maximum ceiling joist spans			
		(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch SS	13-2	20-8	Note a	Note a
	Douglas fir-larch #1	12-8	19-11	Note a	Note a
	Douglas fir-larch #2	12-5	19-6	25-8	Note a
	Douglas fir-larch #3	10-10	15-10	20-1	24-6
	Hem-fir SS	12-5	19-6	25-8	Note a
	Hem-fir #1	12-2	19-1	25-2	Note a
	Hem-fir #2	11-7	18-2	24-0	Note a
	Hem-fir #3	10-10	15-10	20-1	24-6
	Southern pine SS	12-11	20-3	Note a	Note a
	Southern pine #1	<del>12-8</del> 12-5	<del>19-11</del> 19-6	<del>Note a</del> 25-8	Note a
	Southern pine #2	<del>12-5</del> 11-10	<del>19-6</del> 18-8	<del>25-8</del> 24-7	Note a
	Southern pine #3	<del>11-6</del> 10-1	<del>17-0</del> 14-11	<del>21-8</del> 18-9	<del>25-7</del> 22-9
	Spruce-pine-fir SS	12-2	19-1	25-2	Note a
	Spruce-pine-fir #1	11-10	18-8	24-7	Note a
	Spruce-pine-fir #2	11-10	18-8	24-7	Note a
	Spruce-pine-fir #3	10-10	15-10	20-1	24-6
16	Douglas fir-larch SS	11-11	18-9	24-8	Note a
	Douglas fir-larch #1	11-6	18-1	23-10	Note a
	Douglas fir-larch #2	11-3	17-8	23-0	Note a
	Douglas fir-larch #3	9-5	13-9	17-5	21-3
	Hem-fir SS	11-3	17-8	23-4	Note a
	Hem-fir #1	11-0	17-4	22-10	Note a
	Hem-fir #2	10-6	16-6	21-9	Note a
	Hem-fir #3	9-5	13-9	17-5	21-3
	Southern pine SS	11-9	18-5	24-3	Note a
	Southern pine #1	<del>11-6</del> 11-3	<del>18-1</del> 17-8	<del>23-10</del> 23-4	Note a
	Southern pine #2	<del>11-3</del> 10-9	<del>17-8</del> 16-11	<del>23-4</del> 21-7	<del>Note a</del> 25-7
	Southern pine #3	<del>10-0</del> 8-9	<del>14-9</del> 12-11	<del>18-9</del> 16-3	<del>22-2</del> 19-9
	Spruce-pine-fir SS	11-0	17-4	22-10	Note a
	Spruce-pine-fir #1	10-9	16-11	22-4	Note a
	Spruce-pine-fir #2	10-9	16-11	22-4	Note a
	Spruce-pine-fir #3	9-5	13-9	17-5	21-3

(continued)

TABLE R802.4(1)—continued  
 CEILING JOIST SPANS FOR COMMON LUMBER SPECIES  
 (Uninhabitable attics without storage, live load = 10 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 5 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
19.2	Douglas fir-larch	SS	11-3	17-8	23-3	Note a
	Douglas fir-larch	#1	10-10	17-0	22-5	Note a
	Douglas fir-larch	#2	10-7	16-7	21-0	25-8
	Douglas fir-larch	#3	8-7	12-6	15-10	19-5
	Hem-fir	SS	10-7	16-8	21-11	Note a
	Hem-fir	#1	10-4	16-4	21-6	Note a
	Hem-fir	#2	9-11	15-7	20-6	25-3
	Hem-fir	#3	8-7	12-6	15-10	19-5
	Southern -pine	SS	11-0	17-4	22-10	Note a
	Southern pine	#1	<del>10-10</del> 10-7	<del>17-0</del> 16-8	<del>22-5</del> 22-0	Note a
	Southern pine	#2	<del>10-7</del> 10-2	<del>16-8</del> 15-7	<del>21-11</del> 19-8	Note a 23-5
	Southern pine	#3	<del>9-1</del> 8-0	<del>13-6</del> 11-9	<del>17-3</del> 14-10	<del>20-3</del> 18-0
	Spruce-pine-fir	SS	10-4	16-4	21-6	Note a
	Spruce-pine-fir	#1	10-2	15-11	21-0	25-8
Spruce-pine-fir	#2	10-2	15-11	21-0	25-8	
Spruce-pine-fir	#3	8-7	12-6	15-10	19-5	
24	Douglas fir-larch	SS	10-5	16-4	21-7	Note a
	Douglas fir-larch	#1	10-0	15-9	20-1	24-6
	Douglas fir-larch	#2	9-10	14-10	18-9	22-11
	Douglas fir-larch	#3	7-8	11-2	14-2	17-4
	Hem-fir	SS	9-10	15-6	20-5	Note a
	Hem-fir	#1	9-8	15-2	19-7	23-11
	Hem-fir	#2	9-2	14-5	18-6	22-7
	Hem-fir	#3	7-8	11-2	14-2	17-4
	Southern pine	SS	10-3	16-1	21-2	Note a
	Southern pine	#1	<del>10-0</del> 9-10	<del>15-9</del> 15-6	<del>20-10</del> 20-5	Note a 24-0
	Southern pine	#2	<del>9-10</del> 9-3	<del>15-6</del> 13-11	<del>20-1</del> 17-7	<del>23-11</del> 20-11
	Southern pine	#3	<del>8-2</del> 7-2	<del>12-0</del> 10-6	<del>15-4</del> 13-3	<del>18-1</del> 16-1
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5
	Spruce-pine-fir	#1	9-5	14-9	18-9	22-11
Spruce-pine-fir	#2	9-5	14-9	18-9	22-11	
Spruce-pine-fir	#3	7-8	11-2	14-2	17-4	

Check sources for availability of lumber in lengths greater than 20 feet.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.

a. Span exceeds 26 feet in length.

TABLE R802.4(2)  
 CEILING JOIST SPANS FOR COMMON LUMBER SPECIES  
 (Uninhabitable attics with limited storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
12	Douglas fir-larch	SS	10-5	16-4	21-7	Note a
	Douglas fir-larch	#1	10-0	15-9	20-1	24-6
	Douglas fir-larch	#2	9-10	14-10	18-9	22-11
	Douglas fir-larch	#3	7-8	11-2	14-2	17-4
	Hem-fir	SS	9-10	15-6	20-5	Note a
	Hem-fir	#1	9-8	15-2	19-7	23-11
	Hem-fir	#2	9-2	14-5	18-6	22-7
	Hem-fir	#3	7-8	11-2	14-2	17-4
	Southern pine	SS	10-3	16-1	21-2	Note a
	Southern pine	#1	<del>10-0</del> 9-10	<del>15-9</del> 15-6	<del>20-1</del> 20-5	<del>Note a</del> 24-0
	Southern pine	#2	<del>9-10</del> 9-3	<del>15-6</del> 13-11	<del>20-1</del> 17-7	<del>23-11</del> 20-11
	Southern pine	#3	<del>8-2</del> 7-2	<del>12-0</del> 10-6	<del>15-4</del> 13-3	<del>18-4</del> 16-1
	Spruce-pine-fir	SS	9-8	15-2	19-11	25-5
	Spruce-pine-fir	#1	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#2	9-5	14-9	18-9	22-11
	Spruce-pine-fir	#3	7-8	11-2	14-2	17-4
16	Douglas fir-larch	SS	9-6	14-11	19-7	25-0
	Douglas fir-larch	#1	9-1	13-9	17-5	21-3
	Douglas fir-larch	#2	8-9	12-10	16-3	19-10
	Douglas fir-larch	#3	6-8	9-8	12-4	15-0
	Hem-fir	SS	8-11	14-1	18-6	23-8
	Hem-fir	#1	8-9	13-5	16-10	20-8
	Hem-fir	#2	8-4	12-8	16-0	19-7
	Hem-fir	#3	6-8	9-8	12-4	15-0
	Southern pine	SS	9-4	14-7	19-3	24-7
	Southern pine	#1	<del>9-1</del> 8-11	<del>14-4</del> 14-0	<del>18-11</del> 17-9	<del>23-1</del> 20-9
	Southern pine	#2	<del>8-11</del> 8-0	<del>13-6</del> 12-0	<del>17-5</del> 15-3	<del>20-9</del> 18-1
	Southern pine	#3	<del>7-1</del> 6-2	<del>10-5</del> 9-2	<del>13-3</del> 11-6	<del>15-8</del> 14-0
	Spruce-pine-fir	SS	8-9	13-9	18-1	23-1
	Spruce-pine-fir	#1	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#2	8-7	12-10	16-3	19-10
	Spruce-pine-fir	#3	6-8	9-8	12-4	15-0

(continued)

TABLE R802.4(2)—continued  
 CEILING JOIST SPANS FOR COMMON LUMBER SPECIES  
 (Uninhabitable attics with limited storage, live load = 20 psf, L/Δ = 240)

CEILING JOIST SPACING (inches)	SPECIES AND GRADE		DEAD LOAD = 10 psf			
			2 × 4	2 × 6	2 × 8	2 × 10
			Maximum ceiling joist spans			
			(feet - inches)	(feet - inches)	(feet - inches)	(feet - inches)
19.2	Douglas fir-larch	SS	8-11	14-0	18-5	23-4
	Douglas fir-larch	#1	8-7	12-6	15-10	19-5
	Douglas fir-larch	#2	8-0	11-9	14-10	18-2
	Douglas fir-larch	#3	6-1	8-10	11-3	13-8
	Hem-fir	SS	8-5	13-3	17-5	22-3
	Hem-fir	#1	8-3	12-3	15-6	18-11
	Hem-fir	#2	7-10	11-7	14-8	17-10
	Hem-fir	#3	6-1	8-10	11-3	13-8
	Southern pine	SS	8-9	13-9	<del>18-1</del> 18-2	23-1
	Southern pine	#1	<del>8-7</del> 8-5	<del>13-6</del> 12-9	<del>17-9</del> 16-2	<del>21-1</del> 18-11
	Southern pine	#2	<del>8-5</del> 7-4	<del>12-3</del> 11-0	<del>15-10</del> 13-11	<del>18-11</del> 16-6
	Southern pine	#3	<del>6-5</del> 5-8	<del>9-6</del> 8-4	<del>12-1</del> 10-6	<del>14-4</del> 12-9
	Spruce-pine-fir	SS	8-3	12-11	17-1	21-8
	Spruce-pine-fir	#1	8-0	11-9	14-10	18-2
	Spruce-pine-fir	#2	8-0	11-9	14-10	18-2
	Spruce-pine-fir	#3	6-1	8-10	11-3	13-8
24	Douglas fir-larch	SS	8-3	13-0	17-1	20-11
	Douglas fir-larch	#1	7-8	11-2	14-2	17-4
	Douglas fir-larch	#2	7-2	10-6	13-3	16-3
	Douglas fir-larch	#3	5-5	7-11	10-0	12-3
	Hem-fir	SS	7-10	12-3	16-2	20-6
	Hem-fir	#1	7-6	10-11	13-10	16-11
	Hem-fir	#2	7-1	10-4	13-1	16-0
	Hem-fir	#3	5-5	7-11	10-0	12-3
	Southern pine	SS	8-1	12-9	16-10	21-6
	Southern pine	#1	<del>8-0</del> 7-8	<del>12-6</del> 11-5	<del>15-10</del> 14-6	<del>18-10</del> 16-11
	Southern pine	#2	<del>7-8</del> 6-7	<del>11-0</del> 9-10	<del>14-2</del> 12-6	<del>16-11</del> 14-9
	Southern pine	#3	<del>5-9</del> 5-1	<del>8-6</del> 7-5	<del>10-10</del> 9-5	<del>12-10</del> 11-5
	Spruce-pine-fir	SS	7-8	12-0	15-10	19-5
	Spruce-pine-fir	#1	7-2	10-6	13-3	16-3
	Spruce-pine-fir	#2	7-2	10-6	13-3	16-3
	Spruce-pine-fir	#3	5-5	7-11	10-0	12-3

Check sources for availability of lumber in lengths greater than 20 feet.  
 For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479kPa.  
 a. Span exceeds 26 feet in length.

**TABLE R502.5(1)**  
**GIRDER SPANS<sup>a,b</sup> AND HEADER SPANS<sup>a,b</sup> FOR EXTERIOR BEARING WALLS**  
 (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir<sup>b</sup> and required number of jack studs)

GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf) <sup>c</sup>																	
		30						50						70					
		Building width <sup>e</sup> (feet)																	
		20		28		36		20		28		36		20		28		36	
Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>		
Roof and ceiling	2-2 x 4	3-6	1	3-2	1	2-10	1	3-2	1	2-9	1	2-6	1	2-10	1	2-6	1	2-3	1
	2-2 x 6	5-5	1	4-8	1	4-2	1	4-8	1	4-1	1	3-8	2	4-2	1	3-8	2	3-3	2
	2-2 x 8	6-10	1	5-11	2	5-4	2	5-11	2	5-2	2	4-7	2	5-4	2	4-7	2	4-1	2
	2-2 x 10	8-5	2	7-3	2	6-6	2	7-3	2	6-3	2	5-7	2	6-6	2	5-7	2	5-0	2
	2-2 x 12	9-9	2	8-5	2	7-6	2	8-5	2	7-3	2	6-6	2	7-6	2	6-6	2	5-10	3
	3-2 x 8	8-4	1	7-5	1	6-8	1	7-5	1	6-5	2	5-9	2	6-8	1	5-9	2	5-2	2
	3-2 x 10	10-6	1	9-1	2	8-2	2	9-1	2	7-10	2	7-0	2	8-2	2	7-0	2	6-4	2
	3-2 x 12	12-2	2	10-7	2	9-5	2	10-7	2	9-2	2	8-2	2	9-5	2	8-2	2	7-4	2
	4-2 x 8	9-2	1	8-4	1	7-8	1	8-4	1	7-5	1	6-8	1	7-8	1	6-8	1	5-11	2
	4-2 x 10	11-8	1	10-6	1	9-5	2	10-6	1	9-1	2	8-2	2	9-5	2	8-2	2	7-3	2
4-2 x 12	14-1	1	12-2	2	10-11	2	12-2	2	10-7	2	9-5	2	10-11	2	9-5	2	8-5	2	
Roof, ceiling and one center-bearing floor	2-2 x 4	3-1	1	2-9	1	2-5	1	2-9	1	2-5	1	2-2	1	2-7	1	2-3	1	2-0	1
	2-2 x 6	4-6	1	4-0	1	3-7	2	4-1	1	3-7	2	3-3	2	3-9	2	3-3	2	2-11	2
	2-2 x 8	5-9	2	5-0	2	4-6	2	5-2	2	4-6	2	4-1	2	4-9	2	4-2	2	3-9	2
	2-2 x 10	7-0	2	6-2	2	5-6	2	6-4	2	5-6	2	5-0	2	5-9	2	5-1	2	4-7	3
	2-2 x 12	8-1	2	7-1	2	6-5	2	7-4	2	6-5	2	5-9	3	6-8	2	5-10	3	5-3	3
	3-2 x 8	7-2	1	6-3	2	5-8	2	6-5	2	5-8	2	5-1	2	5-11	2	5-2	2	4-8	2
	3-2 x 10	8-9	2	7-8	2	6-11	2	7-11	2	6-11	2	6-3	2	7-3	2	6-4	2	5-8	2
	3-2 x 12	10-2	2	8-11	2	8-0	2	9-2	2	8-0	2	7-3	2	8-5	2	7-4	2	6-7	2
	4-2 x 8	8-1	1	7-3	1	6-7	1	7-5	1	6-6	1	5-11	2	6-10	1	6-0	2	5-5	2
	4-2 x 10	10-1	1	8-10	2	8-0	2	9-1	2	8-0	2	7-2	2	8-4	2	7-4	2	6-7	2
4-2 x 12	11-9	2	10-3	2	9-3	2	10-7	2	9-3	2	8-4	2	9-8	2	8-6	2	7-7	2	
Roof, ceiling and one clear span floor	2-2 x 4	2-8	1	2-4	1	2-1	1	2-7	1	2-3	1	2-0	1	2-5	1	2-1	1	1-10	1
	2-2 x 6	3-11	1	3-5	2	3-0	2	3-10	2	3-4	2	3-0	2	3-6	2	3-1	2	2-9	2
	2-2 x 8	5-0	2	4-4	2	3-10	2	4-10	2	4-2	2	3-9	2	4-6	2	3-11	2	3-6	2
	2-2 x 10	6-1	2	5-3	2	4-8	2	5-11	2	5-1	2	4-7	3	5-6	2	4-9	2	4-3	3
	2-2 x 12	7-1	2	6-1	3	5-5	3	6-10	2	5-11	3	5-4	3	6-4	2	5-6	3	5-0	3
	3-2 x 8	6-3	2	5-5	2	4-10	2	6-1	2	5-3	2	4-8	2	5-7	2	4-11	2	4-5	2
	3-2 x 10	7-7	2	6-7	2	5-11	2	7-5	2	6-5	2	5-9	2	6-10	2	6-0	2	5-4	2
	3-2 x 12	8-10	2	7-8	2	6-10	2	8-7	2	7-5	2	6-8	2	7-11	2	6-11	2	6-3	2
	4-2 x 8	7-2	1	6-3	2	5-7	2	7-0	1	6-1	2	5-5	2	6-6	1	5-8	2	5-1	2
	4-2 x 10	8-9	2	7-7	2	6-10	2	8-7	2	7-5	2	6-7	2	7-11	2	6-11	2	6-2	2
4-2 x 12	10-2	2	8-10	2	7-11	2	9-11	2	8-7	2	7-8	2	9-2	2	8-0	2	7-2	2	
Roof, ceiling and two center-bearing floors	2-2 x 4	2-7	1	2-3	1	2-0	1	2-6	1	2-2	1	1-11	1	2-4	1	2-0	1	1-9	1
	2-2 x 6	3-9	2	3-3	2	2-11	2	3-8	2	3-2	2	2-10	2	3-5	2	3-0	2	2-8	2
	2-2 x 8	4-9	2	4-2	2	3-9	2	4-7	2	4-0	2	3-8	2	4-4	2	3-9	2	3-5	2
	2-2 x 10	5-9	2	5-1	2	4-7	3	5-8	2	4-11	2	4-5	3	5-3	2	4-7	3	4-2	3
	2-2 x 12	6-8	2	5-10	3	5-3	3	6-6	2	5-9	3	5-2	3	6-1	3	5-4	3	4-10	3
	3-2 x 8	5-11	2	5-2	2	4-8	2	5-9	2	5-1	2	4-7	2	5-5	2	4-9	2	4-3	2
	3-2 x 10	7-3	2	6-4	2	5-8	2	7-1	2	6-2	2	5-7	2	6-7	2	5-9	2	5-3	2
	3-2 x 12	8-5	2	7-4	2	6-7	2	8-2	2	7-2	2	6-5	3	7-8	2	6-9	2	6-1	3
	4-2 x 8	6-10	1	6-0	2	5-5	2	6-8	1	5-10	2	5-3	2	6-3	2	5-6	2	4-11	2
	4-2 x 10	8-4	2	7-4	2	6-7	2	8-2	2	7-2	2	6-5	2	7-7	2	6-8	2	6-0	2
4-2 x 12	9-8	2	8-6	2	7-8	2	9-5	2	8-3	2	7-5	2	8-10	2	7-9	2	7-0	2	
Roof, ceiling, and two clear span floors	2-2 x 4	2-1	1	1-8	1	1-6	2	2-0	1	1-8	1	1-5	2	2-0	1	1-8	1	1-5	2
	2-2 x 6	3-1	2	2-8	2	2-4	2	3-0	2	2-7	2	2-3	2	2-11	2	2-7	2	2-3	2
	2-2 x 8	3-10	2	3-4	2	3-0	3	3-10	2	3-4	2	2-11	3	3-9	2	3-3	2	2-11	3

(continued)

**TABLE R502.5(1)—continued**  
**GIRDER SPANS<sup>a,b</sup> AND HEADER SPANS<sup>a,b</sup> FOR EXTERIOR BEARING WALLS**  
 (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir<sup>b</sup> and required number of jack studs)

GIRDERS AND HEADERS SUPPORTING	SIZE	GROUND SNOW LOAD (psf) <sup>e</sup>																	
		30						50						70					
		Building width <sup>c</sup> (feet)																	
		20		28		36		20		28		36		20		28		36	
Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>		
Roof, ceiling, and two clear span floors	2-2 × 10	4-9	2	4-1	3	3-8	3	4-8	2	4-0	3	3-7	3	4-7	3	4-0	3	3-6	3
	2-2 × 12	5-6	3	4-9	3	4-3	3	5-5	3	4-8	3	4-2	3	5-4	3	4-7	3	4-1	4
	3-2 × 8	4-10	2	4-2	2	3-9	2	4-9	2	4-1	2	3-8	2	4-8	2	4-1	2	3-8	2
	3-2 × 10	5-11	2	5-1	2	4-7	3	5-10	2	5-0	2	4-6	3	5-9	2	4-11	2	4-5	3
	3-2 × 12	6-10	2	5-11	3	5-4	3	6-9	2	5-10	3	5-3	3	6-8	2	5-9	3	5-2	3
	4-2 × 8	5-7	2	4-10	2	4-4	2	5-6	2	4-9	2	4-3	2	5-5	2	4-8	2	4-2	2
	4-2 × 10	6-10	2	5-11	2	5-3	2	6-9	2	5-10	2	5-2	2	6-7	2	5-9	2	5-1	2
4-2 × 12	7-11	2	6-10	2	6-2	3	7-9	2	6-9	2	6-0	3	7-8	2	6-8	2	5-11	3	

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa.

- a. Spans are given in feet and inches.
- b. Tabulated values assume #2 grade lumber. Spans are based on minimum design properties for No. 2 Grade lumber of Douglas fir-larch, hem-fir, and spruce-pine-fir. No. 1 or better grade lumber shall be used for southern pine.
- c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.
- e. Use 30 psf ground snow load for cases in which ground snow load is less than 30 psf and the roof live load is equal to or less than 20 psf.

**TABLE R502.5(2)**  
**GIRDER SPANS<sup>a,b</sup> AND HEADER SPANS<sup>a,b</sup> FOR INTERIOR BEARING WALLS**  
 (Maximum spans for Douglas fir-larch, hem-fir, southern pine and spruce-pine-fir<sup>b</sup> and required number of jack studs)

HEADERS AND GIRDERS SUPPORTING	SIZE	BUILDING Width <sup>c</sup> (feet)					
		20		28		36	
		Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>	Span	NJ <sup>d</sup>
One floor only	2-2 × 4	3-1	1	2-8	1	2-5	1
	2-2 × 6	4-6	1	3-11	1	3-6	1
	2-2 × 8	5-9	1	5-0	2	4-5	2
	2-2 × 10	7-0	2	6-1	2	5-5	2
	2-2 × 12	8-1	2	7-0	2	6-3	2
	3-2 × 8	7-2	1	6-3	1	5-7	2
	3-2 × 10	8-9	1	7-7	2	6-9	2
	3-2 × 12	10-2	2	8-10	2	7-10	2
	4-2 × 8	9-0	1	7-8	1	6-9	1
	4-2 × 10	10-1	1	8-9	1	7-10	2
4-2 × 12	11-9	1	10-2	2	9-1	2	
Two floors	2-2 × 4	2-2	1	1-10	1	1-7	1
	2-2 × 6	3-2	2	2-9	2	2-5	2
	2-2 × 8	4-1	2	3-6	2	3-2	2
	2-2 × 10	4-11	2	4-3	2	3-10	3
	2-2 × 12	5-9	2	5-0	3	4-5	3
	3-2 × 8	5-1	2	4-5	2	3-11	2
	3-2 × 10	6-2	2	5-4	2	4-10	2
	3-2 × 12	7-2	2	6-3	2	5-7	3
	4-2 × 8	6-1	1	5-3	2	4-8	2
	4-2 × 10	7-2	2	6-2	2	5-6	2
4-2 × 12	8-4	2	7-2	2	6-5	2	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

- a. Spans are given in feet and inches.
- b. Tabulated values assume #2 grade lumber. Spans are based on minimum design properties for No. 2 Grade lumber of Douglas fir-larch, hem-fir, and spruce-pine-fir. No. 1 or better grade lumber shall be used for southern pine.
- c. Building width is measured perpendicular to the ridge. For widths between those shown, spans are permitted to be interpolated.
- d. NJ - Number of jack studs required to support each end. Where the number of required jack studs equals one, the header is permitted to be supported by an approved framing anchor attached to the full-height wall stud and to the header.