

Floor Joist Spans—Residential Sleeping Areas

Revision Date: November 2015

2012 IRC Table R502.3.1(1) - Floor Joist Spans for Common Lumber Species

Residential Sleeping Areas, Live Load = 30 psf, L/Δ = 360^a

FLOOR JOIST SPACING (INCHES)	SPECIES AND GRADE		Dead Load = 10 psf				Dead Load = 20 psf			
			2 x 6	2 x 8	2 x 10	2 x 12	2 x 6	2 x 8	2 x 10	2 x 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
		#1	12- 0	15-10	20- 3	24- 8	12- 0	15- 7	19- 0	22- 0
		#2	11-10	15- 7	19-10	23- 0	11-6	14- 7	17- 9	20- 7
		#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
		#1	11- 7	15- 3	19- 5	23- 7	11- 7	15- 2	18- 6	21- 6
		#2	11- 0	14- 6	18- 6	22- 6	11- 0	14- 4	17- 6	20- 4
		#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
		#1	12- 0	15-10	20- 3	24- 8	12- 0	15-10	20- 3	24- 8
		#2	11-10	15- 7	19-10	24- 2	11-10	15- 7	18- 7	21- 9
		#3	10- 5	13- 3	15- 8	18- 8	9- 4	11- 11	14- 0	16- 8
	Spruce-Pine-Fir	SS	11- 7	15- 3	19- 5	23- 7	11- 7	15- 3	19- 5	23- 7
		#1	11- 3	14-11	19- 0	23- 0	11- 3	14- 7	17- 9	20- 7
		#2	11- 3	14-11	19- 0	23- 0	11- 3	14- 7	17- 9	20- 7
		#3	9- 8	12- 4	15- 0	17- 5	8- 8	11- 0	13- 5	15- 7

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			2 x 6	2 x 8	2 x 10	2 x 12	2 x 6	2 x 8	2 x 10	2 x 12
			Maximum Floor Joist Spans							
			Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.
16	Douglas Fir-Larch	SS	11- 4	15- 0	19- 1	23- 3	11- 4	15- 0	19- 1	23- 3
		#1	10-11	14- 5	18- 5	21- 4	10- 8	13- 6	16- 5	19- 1
		#2	10- 9	14- 1	17- 2	19-11	9- 11	12- 7	15- 5	17-10
		#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
		#1	10- 6	13-10	17- 8	20- 9	10- 4	13-1	16- 0	18- 7
		#2	10- 0	13- 2	16-10	19- 8	9- 10	12- 5	15-2	17- 7
		#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
		#1	10-11	14- 5	18- 5	22- 5	10-11	14- 5	17- 11	21- 4
		#2	10- 9	14- 2	18- 0	21- 1	10- 5	13- 6	16- 1	18- 10
		#3	9- 0	11- 6	13- 7	16- 2	8- 1	10- 3	12- 2	14- 6
	Spruce-Pine-Fir	SS	10- 6	13-10	17- 8	21- 6	10- 6	13-10	17- 8	21- 4
		#1	10- 3	13- 6	17- 2	19-11	9- 11	12- 7	15- 5	17-10
		#2	10- 3	13- 6	17- 2	19-11	9- 11	12- 7	15- 5	17-10
		#3	8- 5	10- 8	13- 0	15- 1	7- 6	9- 6	11- 8	13- 6

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			Maximum Floor Joist Spans							
			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	21-10
		#1	10- 4	13- 7	16- 9	19- 6	9- 8	12- 4	15- 0	17- 5
		#2	10- 1	12- 10	15- 8	18- 3	9- 1	11- 6	14- 1	16- 3
		#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
		#1	9- 10	13- 0	16- 4	19- 0	9- 6	12- 0	14- 8	17- 0
		#2	9- 5	12- 5	15- 6	17- 1	8- 11	11- 4	13- 10	16- 1
		#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
		#1	10- 4	13- 7	17- 4	21- 1	10- 4	13- 7	16- 4	19- 6
		#2	10- 1	13- 4	16- 5	19- 3	9- 6	12- 4	14- 8	17- 2
		#3	8- 3	10- 6	12- 5	14- 9	7- 4	9- 5	11- 1	13- 2
	Spruce-Pine-Fir	SS	9- 10	13- 0	16- 7	20- 2	9- 10	13- 0	16- 7	19- 6
		#1	9- 8	12- 9	15- 8	18- 3	9- 1	11- 6	14- 1	16- 3
		#2	9- 8	12- 9	15- 8	18- 3	9- 1	11- 6	14- 1	16- 3
		#3	7- 8	9- 9	11- 10	13- 9	6- 10	8- 8	10- 7	12- 4

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			Maximum Floor Joist Spans							
			Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.	Ft.-in.
24	Douglas Fir-Larch	SS	9-11	13- 1	16- 8	20- 3	9-11	13- 1	16- 2	18- 9
		#1	9- 7	12- 4	15- 0	17- 5	8- 8	11- 0	13- 5	15- 7
		#2	9- 1	11- 6	14- 1	16- 3	8- 1	10- 3	12- 7	14- 7
		#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
		#1	9- 2	12- 0	14- 8	17- 0	8- 6	10- 9	13- 1	15- 2
		#2	8- 9	11- 4	13- 10	16- 1	8- 0	10- 2	12- 5	14- 4
		#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
		#1	9- 7	12- 7	16- 1	19- 6	9- 7	12- 4	14- 7	17- 5
		#2	9- 4	12- 4	14- 8	17- 2	8- 6	11- 0	13- 1	15- 5
		#3	7- 4	9- 5	11- 1	13- 2	6- 7	8- 5	9- 11	11- 10
	Spruce-Pine-Fir	SS	9- 2	12- 1	15- 5	18- 9	9- 2	12- 1	15- 0	17- 5
		#1	8- 11	11- 6	14- 1	16- 3	8- 1	10- 3	12- 7	14- 7
		#2	8- 11	11- 6	14- 1	16- 3	8- 1	10- 3	12- 7	14- 7
		#3	6- 10	8- 8	10- 7	12- 4	6- 2	7- 9	9- 6	11- 0

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

a. Dead load limits for townhouses in Seismic Category C and all structures in Seismic Design Categories D₀, D₁, and D₂ shall be determined in accordance with Section

TABLE R301.5 - MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS (IN POUNDS PER SF)	
USE	LIVE LOADS
Uninhabitable attics without storage ^b	10
Uninhabitable attics with limited storage ^{b,g}	20
Habitable attics and attics served with fixed stairs	30
Balconies (exterior) and decks ^e	40
Fire escapes	40
Guardrails and handrails ^d	200 ^h
Guardrail in-fill components ^f	50 ^h
Passenger vehicle garages ^a	50 ^a
Rooms other than sleeping rooms	40
Sleeping rooms	30
Stairs	40 ^c

- a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.
- b. Uninhabitable attics without storage are those where the maximum clear height between joist and rafter is less than 42 inches, or where there are not two or more adjacent trusses with web configurations capable of accommodating an assumed rectangle 42 inches high by 24 inches in width, or greater, within the plane of the trusses. This live load need not be assumed to act concurrently with any other live load requirements.
- c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of 4 square inches, whichever produces the greater stresses.
- d. A single concentrated load applied in any direction at any point along the top.
- e. See Section R502.2.2 for decks attached to exterior walls.
- f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to 1 square foot. This load need not be assumed to act concurrently with any other live load requirement.
- g. Uninhabitable attics with limited storage are those where the maximum clear height between joists and rafters is 42 inches or greater, or where there are two or more adjacent trusses with the web configuration capable of accommodating an assumed rectangle 42 inches in height by 24 inches in width, or greater, within the plane of the trusses.
 The live load need only be applied to those portions of the joists or truss bottom chords where all of the following conditions are met:
 The attic area is accessible from an opening not less than 20 inches in width by 30 inches in length that is located where the clear height in the attic is a minimum of 30 inches.
 The slopes of the joists or truss bottom chords are no greater than 2 inches vertical to 12 inches horizontal.
 Required insulation depth is less than the joist or truss bottom chord member depth.
 The remaining portions of the joists or truss bottom chords shall be designed for a uniformly distributed concurrent live load of not less than 10 pounds per square foot.
- h. Glazing used in handrail assemblies and guards shall be designed with a safety factor of 4. The safety factor shall be applied to each of the concentrated loads applied to the top of the rail, and to the load on the in-fill components. These loads shall be determined independent of one another, and loads are assumed not to occur with any other live load.

Allowable joist spans (R502.3): Spans for floor joists shall be in accordance with Tables R502.3.1 (1) and R502.3.1 (2). For other grades and species and for other loading conditions, refer to the AF&PA Span Tables for Joists and Rafters.

Sleeping areas and attic joists (R502.3.1): Table R502.3.1(1) shall be used to determine the maximum allowable span of floor joists that support sleeping areas and *attics* that are accessed by means of a fixed stairway in accordance with Section R311.7 provided that the design live load does not exceed 30 pounds per square foot and the design dead load does not exceed 20 pounds per square foot. The allowable span of ceiling joists that support attics used for limited storage or no storage shall be determined in accordance with Section R802.4.

Floor Cantilevers (R502.3.3): Floor cantilever spans shall not exceed the nominal depth of the wood floor joist. Floor cantilevers constructed in accordance with Table R502.3.3 (1) shall be permitted when supporting a light frame bearing wall and roof only. Floor cantilevers supporting an exterior balcony are permitted to be constructed in accordance with Table R502.3.3 (2).

Table R502.3.1 (1) contains allowable floor joist spans for common lumber species and grades based on design loads and joist spacing. The table provides spans for dead loads of 10 or 20 pounds per square foot (psf). The weight of the floor joist is included in the 10 or 20 psf dead load.

The referenced standard may be used for grades and species of lumber not included in this table.

This table covers sleeping rooms where the design live load is 30 pounds per square foot. This includes attics with fixed stair access. It is important to identify use because attic space used as a bonus room, for example, could require use of a 40 pounds per square foot live load.

The span table accounts for a uniform load condition. It will also permit isolated concentrated loads such as non-bearing partitions offset from a support by a distance less than or equal to the joist depth. They may not support large concentrated loads such as ones that result from an entire kitchen utility wall or bathtubs parallel to joists. In such instances, additional joists and other adequate supports must be installed.

City of Republic

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The Planning and Development Department is made up of five full-time employees including a Planning and Development Director, Administrative Assistant, Principal Planner, Building Inspector, and Code Compliance Official. Our office is located at 204 North Main Street. The goal of the department is to serve the citizens of Republic through pursuance, guidance, and assistance in the development of the City. This is accomplished through marketing and strategic planning accompanied by oversight and enforcement of the City's Building Codes, Zoning Codes and Subdivision Regulations.



Planning and Development Department

