



DEPARTMENT OF COMMUNITY DEVELOPMENT

Kristal Deininger - Administrator

HELPFUL BUILDING GUIDELINES

DETACHED GARAGE With Optional Habitable Space Above

HOW TO USE THIS GUIDE:

This guide has been designed to assist the do-it-yourselfer to create a construction plan to build a simple detached garage with option habitable space above using conventional constructions methods compliant with the 2012 IRC Code. Non-conventional constructed garages will require a design professional.

1. **COMPLETE THIS BUILDING GUIDE** by filling in the blanks on page four and five and indicate which construction details will be used.
2. **SUBMITTAL REQUIREMENTS** to be completed/fulfilled as required by the Community Development Department
3. **NOW YOU ARE READY TO APPLY FOR YOUR BUILDING PERMIT.** Submittal of all the required documents will help determine compliance with the building code, zoning ordinance and applicable laws.
4. **INSPECTIONS.** As stated in the Submittal Requirements a 24 hour advance notice to the Community Development Department is required for inspections. Inspections required are listed, but not limited to those on the on the *Required Inspection Brochure*.

Remember **YOU** are responsible to call for the inspections.

If you are unsure during the construction process please contact our Department for assistance.



DISCLAIMER: This handout has been created by Tazewell County Community Development to assist with code compliance under the 2012 International Residential Code and is not intended to cover all circumstances. For further questions please check with the Department.



Building Planning

R302.5 Dwelling/garage opening/penetration protection.

Openings and penetrations through the walls or ceilings separating the dwelling from the garage shall be in accordance with Sections R302.5.1 through R302.5.3.

R302.5.1 Opening protection. Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 13/8 inches (35 mm) in thickness, solid or honeycomb-core steel doors not less than 13/8 inches (35 mm) thick, or 20-minute fire-rated doors, equipped with a self closing device.

R302.5.2 Duct penetration. Ducts in the garage and ducts penetrating the walls or ceilings separating the *dwelling* from the garage shall be constructed of a minimum No. 26gage (0.48 mm) sheet steel or other *approved* material and shall have no openings into the garage.

R302.5.3 Other penetrations. Penetrations through the separation required in Section R302.6 shall be protected as required by Section R302.11, Item 4.

R302.6 Dwelling/garage fire separation. The garage shall be separated as required by Table R302.6. Openings in garage walls shall comply with Section R302.5. This provision does not apply to garage walls that are perpendicular to the adjacent *dwelling unit* wall.

R302.7 Under-stair protection. Enclosed accessible space under stairs shall have walls, under-stair surface and any soffits protected on the enclosed side with 1/2-inch (12.7 mm) gypsum board.

**TABLE R302.6
DWELLING/GARAGE SEPARATION**

SEPARATION	MATERIAL
From the residence and attics	Not less than 1/2-inch gypsum board or equivalent applied to the garage side
From all habitable rooms above the garage	Not less than 5/8-inch Type X gypsum board or equivalent
Structure(s) supporting floor/ceiling assemblies used for separation required by this section	Not less than 1/2-inch gypsum board or equivalent
Garages located less than 3 feet from a dwelling unit on the same lot	Not less than 1/2-inch gypsum board or equivalent applied to the interior side of exterior walls that are within this area

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



SECTION R310 EMERGENCY ESCAPE AND RESCUE OPENINGS

R310.1 Emergency escape and rescue required. *Basements*, habitable attics and every sleeping room shall have at least one operable emergency escape and rescue opening. Where *basements* contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) measured from the finished floor to the bottom of the clear opening. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with Section R310.3. The net clear opening dimensions required by this section shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with Section R310.2. Emergency escape and rescue openings shall open directly into a public way, or to a *yard* or court that opens to a public way.

Exception: *Basements* used only to house mechanical *equipment* and not exceeding total floor area of 200 square feet (18.58 m²).

R310.1.1 Minimum opening area. All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.530 m²).

Exception: *Grade* floor openings shall have a minimum net clear opening of 5 square feet (0.465 m²).

R310.1.2 Minimum opening height. The minimum net clear opening height shall be 24 inches (610 mm).

R310.1.3 Minimum opening width. The minimum net clear opening width shall be 20 inches (508 mm).

R310.1.4 Operational constraints. Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys, tools or special knowledge.

SECTION R314 SMOKE ALARMS

R314.3 Location. Smoke alarms shall be installed in the following locations:

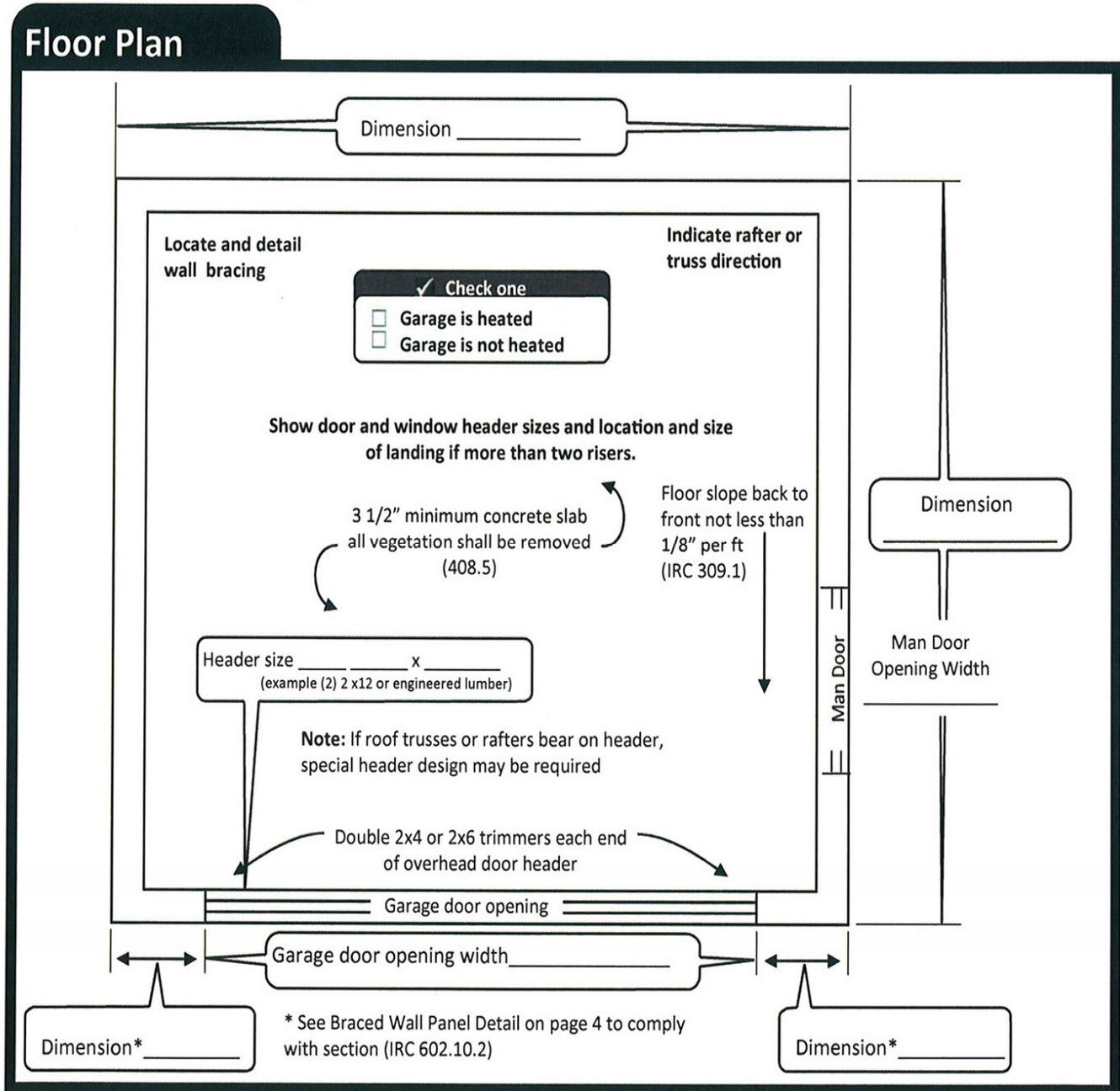
1. In each sleeping room.
2. Outside each separate sleeping area in the immediate vicinity of the bedrooms.
3. On each additional *story* of the *dwelling*, including *basements* and habitable attics but not including crawl spaces and uninhabitable *attics*. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

SECTION R315 CARBON MONOXIDE ALARMS

R315.1 Carbon monoxide alarms. For new construction, an approved carbon monoxide alarm 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.

Detached Garage With Optional Habitable Space Above

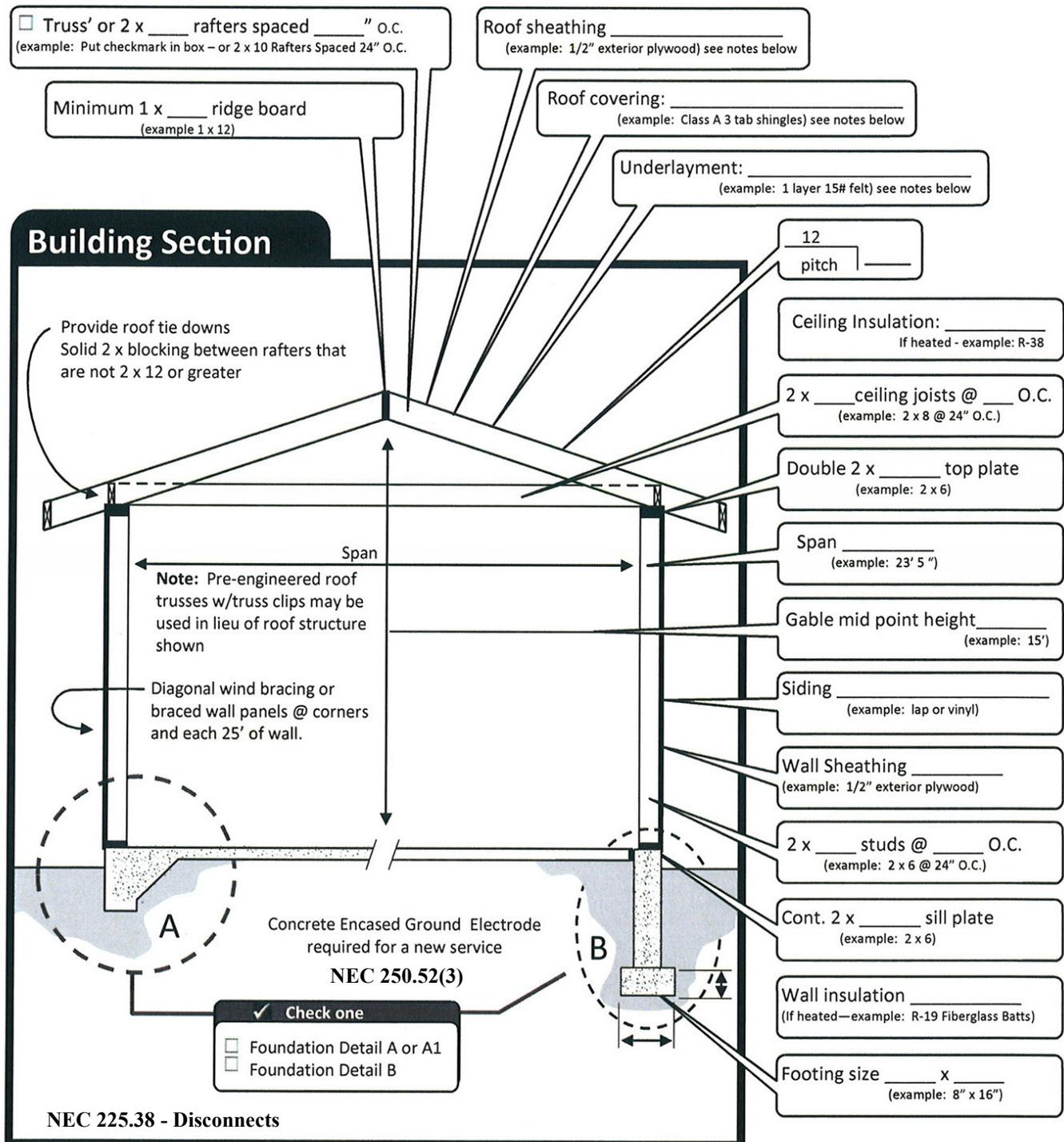
Note: Heated garages may require special provisions.



NOTES - Concrete Slab

- All sod and vegetation must be removed.
- If fill is required under slab it must be compacted sand or gravel.
- Floating slab from Detail A and A1 shall be monolithically poured.
- Welded wire fabric or equivalent in slab.
- Minimum 12" perimeter footing (all four sides at least 12" below grade) (IRC 403.1.4).
- Concrete floor or curb to be 6" min. above grade (IRC 404.1.6).

Detached Garage With Optional Habitable Space Above

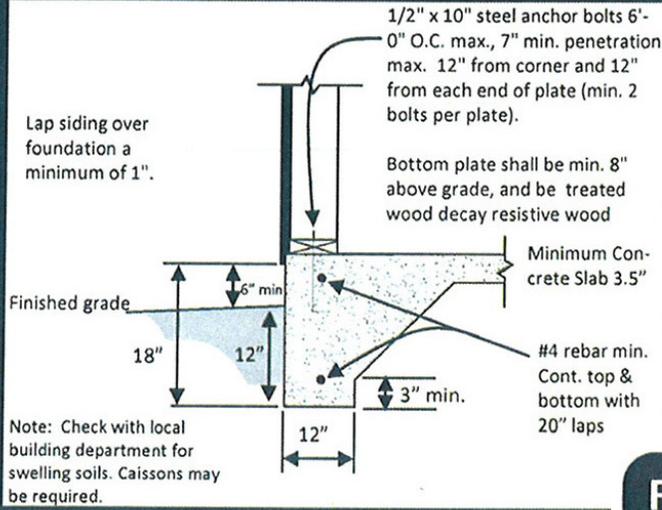


Notes:

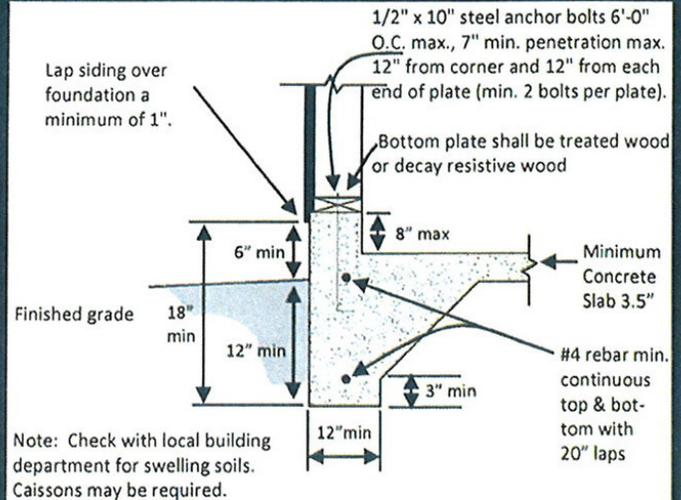
- Roof sheathing shall be a minimum of 3/8" plywood, for non-veneer OSB/WB 7/16" is the minimum. Sheathing spanning 16" or 24" on center, structural clips must be provided at the center point of each span (table R503.2.1.1 (1)d).
- For roofs with slopes less than 4:12, follow manufacturer's instructions for low slope application of roofing material.
- Shingles must be rated for 90 MPH and over 15# felt.
- Heated buildings require ice dam barrier applied inside of roof/wall junction.
- Hurricane straps, rafter ties or other tie downs shall be used to attach all roof rafters or trusses to top plates. When double top plates are used, straps or ties must attach to both plates.

Detached Garage With Optional Habitable Space Above

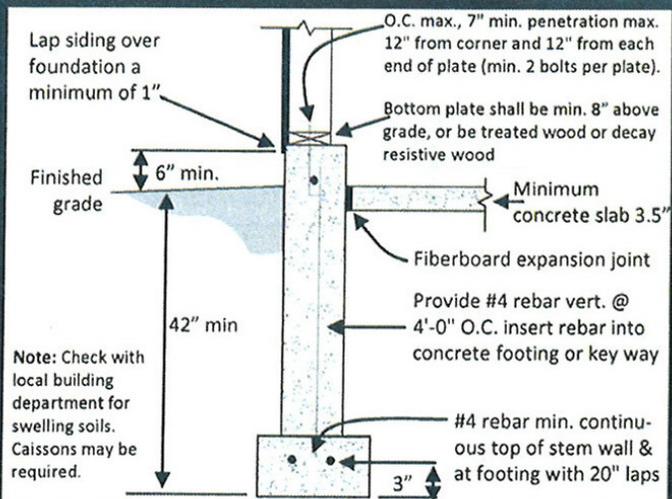
Foundation Detail A



Foundation Detail A1

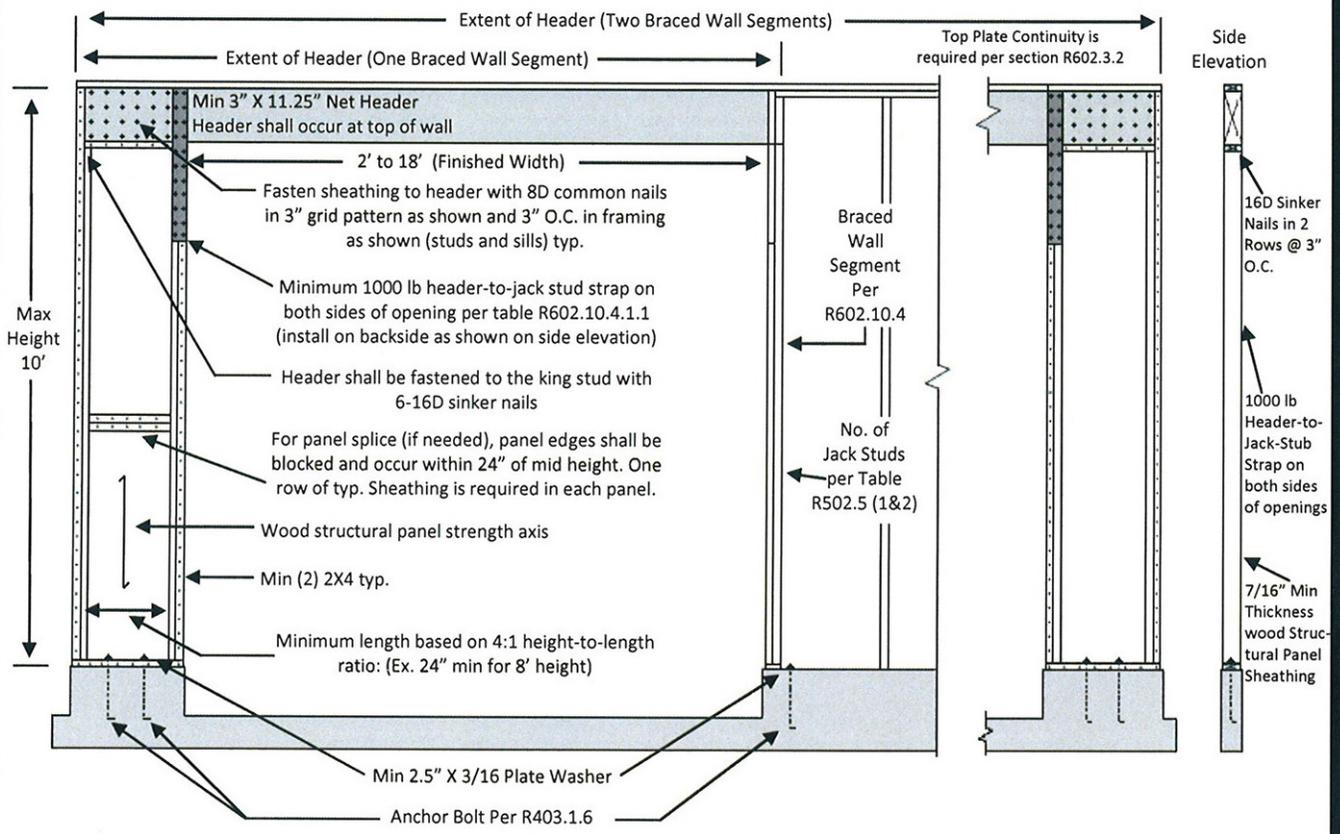


Foundation Detail B



Detached Garage With Optional Habitable Space Above

Braced Wall Panel Detail



IRC FIGURE R602.10.6.3

CONSTRUCTION PROJECT NOTES:

Detached Garage With Optional Habitable Space Above

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

Joist Spacing (inches)	Species and Grade	Dead Load = 20 psf			
		2 x 6	2 x 8	2 x 10	2 x 12
		Maximum Floor Joist Spans			
		(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)
12	Douglas fir-larch SS	11' - 4"	15' - 0"	19' - 1"	23' - 3"
	Douglas fir-larch #1	10' - 11"	14' - 2"	17' - 4"	20' - 1"
	Douglas fir-larch #2	10' - 6"	13' - 3"	16' - 3"	18' - 10"
	Douglas fir-larch #3	7' - 11"	10' - 0"	12' - 3"	14' - 3"
	Hem-fir SS	10' - 9"	14' - 2"	18' - 0"	21' - 11"
	Hem-fir #1	10' - 6"	13' - 10"	16' - 11"	19' - 7"
	Hem-fir #2	10' - 0"	13' - 1"	16' - 0"	18' - 6"
	Hem-fir #3	7' - 11"	10' - 0"	12' - 3"	14' - 3"
	Southern Pine SS	11' - 2"	14' - 8"	18' - 9"	22' - 10"
	Southern Pine #1	10' - 11"	14' - 5"	18' - 5"	22' - 5"
	Southern Pine #2	10' - 9"	14' - 2"	16' - 11"	19' - 10"
	Southern Pine #3	8' - 6"	10' - 10"	12' - 10"	15' - 3"
	Spruce -pine-fir SS	10' - 6"	13' - 10"	17' - 8"	21' - 6"
	Spruce -pine-fir #1	10' - 3"	13' - 3"	16' - 3"	18' - 10"
	Spruce -pine-fir #2	10' - 3"	13' - 2"	16' - 3"	18' - 10"
	Spruce -pine-fir #3	7' - 11"	10' - 0"	12' - 3"	14' - 3"
16	Douglas fir-larch SS	10' - 4"	13' - 7"	17' - 4"	21' - 0"
	Douglas fir-larch #1	9' - 8"	12' - 4"	15' - 0"	17' - 5"
	Douglas fir-larch #2	9' - 1"	11' - 6"	14' - 1"	16' - 3"
	Douglas fir-larch #3	6' - 10"	8' - 8"	10' - 7"	12' - 4"
	Hem-fir SS	9' - 9"	12' - 10"	16' - 5"	19' - 11"
	Hem-fir #1	9' - 6"	12' - 0"	14' - 8"	17' - 0"
	Hem-fir #2	8' - 11"	11' - 4"	13' - 10"	16' - 1"
	Hem-fir #3	6' - 10"	8' - 8"	10' - 7"	12' - 4"
	Southern Pine SS	10' - 2"	13' - 4"	17' - 0"	20' - 9"
	Southern Pine #1	9' - 11"	13' - 1"	16' - 4"	19' - 6"
	Southern Pine #2	9' - 6"	12' - 4"	14' - 8"	17' - 2"
	Southern Pine #3	7' - 4"	9' - 5"	11' - 1"	13' - 2"
	Spruce -pine-fir SS	9' - 6"	12' - 7"	16' - 0"	19' - 6"
	Spruce -pine-fir #1	9' - 1"	11' - 6"	14' - 1"	16' - 3"
	Spruce -pine-fir #2	9' - 1"	11' - 6"	14' - 1"	16' - 3"
	Spruce -pine-fir #3	6' - 10"	8' - 8"	10' - 7"	12' - 4"
19.2	Douglas fir-larch SS	9' - 8"	12' - 10"	16' - 4"	19' - 2"
	Douglas fir-larch #1	8' - 10"	11' - 3"	13' - 8"	15' - 11"
	Douglas fir-larch #2	8' - 3"	10' - 6"	12' - 10"	14' - 10"
	Douglas fir-larch #3	6' - 3"	7' - 11"	9' - 8"	11' - 3"
	Hem-fir SS	9' - 2"	12' - 1"	15' - 5"	18' - 9"
	Hem-fir #1	8' - 8"	10' - 11"	13' - 4"	15' - 6"
	Hem-fir #2	8' - 2"	10' - 4"	12' - 8"	14' - 8"
	Hem-fir #3	6' - 3"	7' - 11"	9' - 8"	11' - 3"
	Southern Pine SS	9' - 6"	12' - 7"	16' - 0"	19' - 6"
	Southern Pine #1	9' - 4"	12' - 4"	14' - 11"	17' - 9"
	Southern Pine #2	8' - 8"	11' - 3"	13' - 5"	15' - 8"
	Southern Pine #3	6' - 9"	8' - 7"	10' - 1"	12' - 1"
	Spruce -pine-fir SS	9' - 0"	11' - 10"	15' - 1"	17' - 9"
	Spruce -pine-fir #1	8' - 3"	10' - 6"	12' - 10"	14' - 10"
	Spruce -pine-fir #2	8' - 3"	10' - 6"	12' - 10"	14' - 10"
	Spruce -pine-fir #3	6' - 3"	7' - 11"	8' - 8"	11' - 3"
24	Douglas fir-larch SS	9' - 0"	11' - 11"	14' - 9"	17' - 1"
	Douglas fir-larch #1	7' - 11"	10' - 0"	12' - 3"	14' - 3"
	Douglas fir-larch #2	7' - 5"	9' - 5"	11' - 6"	13' - 4"
	Douglas fir-larch #3	5' - 7"	7' - 1"	8' - 8"	10' - 1"
	Hem-fir SS	8' - 6"	11' - 3"	14' - 4"	16' - 10"
	Hem-fir #1	7' - 9"	9' - 9"	11' - 11"	13' - 10"
	Hem-fir #2	7' - 4"	9' - 3"	11' - 4"	13' - 1"
	Hem-fir #3	5' - 7"	7' - 1"	8' - 8"	10' - 1"
	Southern Pine SS	8' - 10"	11' - 8"	14' - 11"	18' - 1"
	Southern Pine #1	8' - 8"	11' - 3"	13' - 4"	15' - 11"
	Southern Pine #2	7' - 9"	10' - 0"	12' - 0"	14' - 0"
	Southern Pine #3	6' - 0"	7' - 8"	9' - 1"	10' - 9"
	Spruce -pine-fir SS	8' - 4"	11' - 0"	13' - 8"	15' - 11"
	Spruce -pine-fir #1	7' - 5"	9' - 5"	11' - 6"	13' - 4"
	Spruce -pine-fir #2	7' - 5"	9' - 5"	11' - 6"	13' - 4"
	Spruce -pine-fir #3	5' - 7"	7' - 1"	8' - 8"	10' - 1"

Detached Garage With Optional Habitable Space Above

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 × 4	2 × 6	2 × 8	2 × 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	12-8	19-11	Note a	Note a
	Southern pine	#2	12-5	19-6	25-8	Note a
	Southern pine	#3	11-6	17-0	21-8	25-7
	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	11-6	18-1	23-1	Note a
	Southern pine	#2	11-3	17-8	23-4	Note a
	Southern pine	#3	10-0	14-9	18-9	22-2
	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
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	10-10	17-0	22-5	Note a
	Southern pine	#2	10-7	16-8	21-11	Note a
	Southern pine	#3	9-1	13-6	17-2	20-3
	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	10-0	15-9	20-10	Note a
	Southern pine	#2	9-10	15-6	20-1	23-11
	Southern pine	#3	8-2	12-0	15-4	18-1
	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.

Detached Garage With Optional Habitable Space Above

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	10-0	15-9	20-10	Note a
	Southern pine	#2	9-10	15-6	20-1	23-11
	Southern pine	#3	8-2	12-0	15-4	18-1
	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	9-1	14-4	18-11	23-1
	Southern pine	#2	8-11	13-6	17-5	20-9
	Southern pine	#3	7-1	10-5	13-3	15-8
	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

Detached Garage With Optional Habitable Space Above

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	18-1	23-1
	Southern pine	#1	8-7	13-6	17-9	21-1
	Southern pine	#2	8-5	12-3	15-10	18-11
	Southern pine	#3	6-5	9-6	12-1	14-4
	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	8-0	12-6	15-10	18-10
	Southern pine	#2	7-8	11-0	14-2	16-11
	Southern pine	#3	5-9	8-6	10-10	12-10
	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.

**Detached Garage
With Optional Habitable Space Above**

**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 = 20 psf				
		2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
		Maximum Rafter Spans				
		(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)
12	Douglas fir-larch SS	11' - 6"	18' - 0"	23' - 5"	Note b	Note b
	Douglas fir-larch #1	10' - 6"	15' - 4"	19' - 5"	23' - 9"	Note b
	Douglas fir-larch #2	9' - 10"	14' - 4"	18' - 2"	22' - 3"	25' - 9"
	Douglas fir-larch #3	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"
	Hem-fir SS	10' - 10"	17' - 0"	22' - 5"	Note b	Note b
	Hem-fir #1	10' - 3"	14' - 11"	18' - 11"	23' - 2"	Note b
	Hem-fir #2	9' - 8"	14' - 2"	17' - 11"	21' - 11"	25' - 5"
	Hem-fir #3	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"
	Southern Pine SS	11' - 3"	17' - 8"	23' - 4"	Note b	Note b
	Southern Pine #1	11' - 1"	17' - 3"	21' - 9"	25' - 10"	Note b
	Southern Pine #2	10' - 6"	15' - 1"	19' - 5"	23' - 2"	Note b
	Southern Pine #3	7' - 11"	11' - 8"	14' - 10"	17' - 6"	20' - 11"
	Spruce -pine-fir SS	10' - 7"	16' - 8"	21' - 9"	Note b	Note b
	Spruce -pine-fir #1	9' - 10"	14' - 4"	18' - 2"	22' - 3"	25' - 9"
	Spruce -pine-fir #2	9' - 10"	14' - 4"	18' - 2"	22' - 3"	25' - 9"
Spruce -pine-fir #3	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"	
16	Douglas fir-larch SS	10' - 5"	16' - 0"	20' - 3"	24' - 9"	Note b
	Douglas fir-larch #1	9' - 1"	13' - 3"	16' - 10"	20' - 7"	23' - 10"
	Douglas fir-larch #2	8' - 6"	12' - 5"	15' - 9"	19' - 3"	22' - 4"
	Douglas fir-larch #3	6' - 5"	9' - 5"	11' - 11"	14' - 6"	16' - 10"
	Hem-fir SS	9' - 10"	15' - 6"	19' - 11"	24' - 4"	Note b
	Hem-fir #1	8' - 10"	12' - 11"	16' - 5"	20' - 0"	23' - 3"
	Hem-fir #2	8' - 5"	12' - 3"	15' - 6"	18' - 11"	22' - 0"
	Hem-fir #3	6' - 5"	9' - 5"	11' - 11"	14' - 6"	16' - 10"
	Southern Pine SS	10' - 3"	16' - 1"	21' - 2"	Note b	Note b
	Southern Pine #1	10' - 0"	15' - 0"	18' - 10"	22' - 4"	Note b
	Southern Pine #2	9' - 1"	13' - 0"	16' - 10"	20' - 1"	23' - 7"
	Southern Pine #3	6' 10"	10' - 1"	12' - 10"	15' - 2"	18' - 1"
	Spruce -pine-fir SS	9' - 8"	14' - 10"	18' - 10"	23' - 0"	Note b
	Spruce -pine-fir #1	8' - 6"	12' - 5"	15' - 9"	19' - 3"	22' - 4"
	Spruce -pine-fir #2	8' - 6"	12' - 5"	15' - 9"	19' - 3"	22' - 4"
Spruce -pine-fir #3	6' - 5"	9' - 5"	11' - 11"	14' - 6"	16' - 10"	
19.2	Douglas fir-larch SS	9' - 10"	14' - 7"	18' - 6"	22' - 7"	Note b
	Douglas fir-larch #1	8' - 4"	12' - 2"	15' - 4"	18' - 9"	21' - 10"
	Douglas fir-larch #2	7' - 9"	11' - 4"	14' - 4"	17' - 7"	20' - 4"
	Douglas fir-larch #3	5' - 10"	8' - 7"	10' - 10"	13' - 3"	15' - 5"
	Hem-fir SS	9' - 3"	14' - 4"	18' - 2"	22' - 3"	25' - 9"
	Hem-fir #1	8' - 1"	11' - 10"	15' - 0"	18' - 4"	21' - 3"
	Hem-fir #2	7' - 8"	11' - 2"	14' - 2"	17' - 4"	20' - 1"
	Hem-fir #3	5' - 10"	8' - 7"	10' - 10"	13' - 3"	15' - 5"
	Southern Pine SS	9' - 8"	15' - 2"	19' - 11"	25' - 5"	Note b
	Southern Pine #1	9' - 3"	13' - 8"	17' - 2"	20' - 5"	24' - 4"
	Southern Pine #2	8' - 4"	11' - 11"	15' - 4"	18' - 4"	21' - 6"
	Southern Pine #3	6' - 3"	9' - 3"	11' - 9"	13' - 10"	16' - 6"
	Spruce -pine-fir SS	9' - 1"	13' - 7"	17' - 2"	21' - 0"	24' - 4"
	Spruce -pine-fir #1	7' - 9"	11' - 4"	14' - 4"	17' - 7"	20' - 4"
	Spruce -pine-fir #2	7' - 9"	11' - 4"	14' - 4"	17' - 7"	20' - 4"
Spruce -pine-fir #3	5' - 10"	8' - 7"	10' - 10"	13' - 3"	15' - 5"	

**Detached Garage
With Optional Habitable Space Above**

**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 = 20 psf				
		2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
		Maximum Rafter Spans				
		(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)
24	Douglas fir-larch SS	8' - 11"	13' - 1"	16' - 7"	20' - 3"	23' - 5"
	Douglas fir-larch #1	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"
	Douglas fir-larch #2	6' - 11"	10' - 2"	12' - 10"	15' - 8"	18' - 3"
	Douglas fir-larch #3	5' - 3"	7' - 8"	9' - 9"	11' - 10"	13' - 9"
	Hem-fir SS	8' - 7"	12' - 10"	16' - 3"	19' - 10"	23' - 0"
	Hem-fir #1	7' - 3"	10' - 7"	13' - 5"	16' - 4"	19' - 0"
	Hem-fir #2	6' - 10"	10' - 0"	12' - 8"	15' - 6"	17' - 11"
	Hem-fir #3	5' - 3"	7' - 8"	9' - 9"	11' - 10"	13' - 9"
	Southern Pine SS	8' - 11"	14' - 1"	18' - 6"	22' - 11"	Note b
	Southern Pine #1	8' - 3"	12' - 3"	15' - 4"	18' - 3"	21' - 9"
	Southern Pine #2	7' - 5"	10' - 8"	13' - 9"	16' - 5"	19' - 3"
	Southern Pine #3	5' - 7"	8' - 3"	10' - 6"	12' - 5"	14' - 9"
	Spruce -pine-fir SS	8' - 4"	12' - 2"	15' - 4"	18' - 9"	21' - 9"
	Spruce -pine-fir #1	6' - 11"	10' - 2"	12' - 10"	15' - 8"	18' - 3"
	Spruce -pine-fir #2	6' - 11"	10' - 2"	12' - 10"	15' - 8"	18' - 3"
	Spruce -pine-fir #3	5' - 3"	7' - 8"	9' - 9"	11' - 10"	13' - 9"

**Detached Garage
With Optional Habitable Space Above**

**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 = 20 psf				
			2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
			Maximum Rafter Spans				
			(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)
12	Douglas fir-larch	SS	10' - 5"	16' - 4"	21' - 7"	Note b	Note b
	Douglas fir-larch	#1	10' - 0"	15' - 4"	19' - 5"	23' - 9"	Note b
	Douglas fir-larch	#2	9' - 10"	14' - 4"	18' - 2"	22' - 3"	25' - 9"
	Douglas fir-larch	#3	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"
	Hem-fir	SS	9' - 10"	15' - 6"	20' - 5"	Note b	Note b
	Hem-fir	#1	9' - 8"	14' - 11"	18' - 11"	23' - 2"	Note b
	Hem-fir	#2	9' - 2"	14' - 2"	17' - 11"	21' - 11"	25' - 5"
	Hem-fir	#3	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"
	Southern Pine	SS	10' - 3"	16' - 1"	21' - 2"	Note b	Note b
	Southern Pine	#1	10' - 0"	15' - 9"	20' - 10"	25' - 10"	Note b
	Southern Pine	#2	9' - 10"	15' - 1"	19' - 5"	23' - 2"	Note b
	Southern Pine	#3	7' - 11"	11' - 8"	14' - 10"	17' - 6"	20' - 11"
	Spruce -pine-fir	SS	9' - 8"	15' - 2"	19' - 11"	25' - 5"	Note b
	Spruce -pine-fir	#1	9' - 5"	14' - 4"	18' - 2"	22' - 3"	25' - 9"
	Spruce -pine-fir	#2	9' - 5"	14' - 4"	18' - 2"	22' - 3"	25' - 9"
	Spruce -pine-fir	#3	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"
16	Douglas fir-larch	SS	9' - 6"	14' - 11"	19' - 7"	24' - 9"	Note b
	Douglas fir-larch	#1	9' - 1"	13' - 3"	16' - 10"	20' - 7"	23' - 10"
	Douglas fir-larch	#2	8' - 6"	12' - 5"	15' - 9"	19' - 3"	22' - 4"
	Douglas fir-larch	#3	6' - 5"	9' - 5"	11' - 11"	14' - 6"	16' - 10"
	Hem-fir	SS	8' - 11"	14' - 1"	18' - 6"	23' - 8"	Note b
	Hem-fir	#1	8' - 9"	12' - 11"	16' - 5"	20' - 0"	23' - 3"
	Hem-fir	#2	8' - 4"	12' - 3"	15' - 6"	18' - 11"	22' - 0"
	Hem-fir	#3	6' - 5"	9' - 5"	11' - 11"	14' - 6"	16' - 10"
	Southern Pine	SS	9' - 4"	14' - 7"	19' - 3"	24' - 7"	Note b
	Southern Pine	#1	9' - 1"	14' - 4"	18' - 10"	22' - 4"	Note b
	Southern Pine	#2	8' - 11"	13' - 0"	16' - 10"	20' - 1"	23' - 7"
	Southern Pine	#3	6' - 10"	10' - 1"	12' - 10"	15' - 2"	18' - 1"
	Spruce -pine-fir	SS	8' - 9"	13' - 9"	18' - 1"	23' - 0"	Note b
	Spruce -pine-fir	#1	8' - 6"	12' - 5"	15' - 9"	19' - 3"	22' - 4"
	Spruce -pine-fir	#2	8' - 6"	12' - 5"	15' - 9"	19' - 3"	22' - 4"
	Spruce -pine-fir	#3	6' - 5"	9' - 5"	11' - 11"	14' - 6"	16' - 10"
19.2	Douglas fir-larch	SS	8' - 11"	14' - 0"	18' - 5"	22' - 7"	Note b
	Douglas fir-larch	#1	8' - 4"	12' - 2"	15' - 4"	18' - 9"	21' - 9"
	Douglas fir-larch	#2	7' - 9"	11' - 4"	14' - 4"	17' - 7"	20' - 4"
	Douglas fir-larch	#3	5' - 10"	8' - 7"	10' - 10"	13' - 3"	15' - 5"
	Hem-fir	SS	8' - 5"	13' - 3"	17' - 5"	22' - 3"	25' - 9"
	Hem-fir	#1	8' - 1"	11' - 10"	15' - 0"	18' - 4"	21' - 3"
	Hem-fir	#2	7' - 8"	11' - 2"	14' - 2"	17' - 4"	20' - 1"
	Hem-fir	#3	5' - 10"	8' - 7"	10' - 10"	13' - 3"	15' - 5"

**Detached Garage
With Optional Habitable Space Above**

**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 = 20 psf				
			2 x 4	2 x 6	2 x 8	2 x 10	2 x 12
			Maximum Rafter Spans				
			(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)	(feets - inches)
19.2	Southern Pine	SS	8' - 9"	13' - 9"	18' - 1"	23' - 1"	Note b
	Southern Pine	#1	8' - 7"	13' - 6"	17' - 2"	20' - 5"	24' - 4"
	Southern Pine	#2	8' - 4"	11' - 11"	15' - 4"	18' - 4"	21' - 6"
	Southern Pine	#3	6' - 3"	9' - 3"	11' - 9"	13' - 10"	16' - 6"
	Spruce-pine-fir	SS	8' - 3"	12' - 11"	17' - 1"	21' - 0"	24' - 4"
	Spruce-pine-fir	#1	7' - 9"	11' - 4"	14' - 4"	17' - 7"	20' - 4"
	Spruce-pine-fir	#2	7' - 9"	11' - 4"	14' - 4"	17' - 7"	20' - 4"
	Spruce-pine-fir	#3	5' - 10"	8' - 7"	10' - 10"	13' - 3"	15' - 4"
24	Douglas fir-larch	SS	8' - 3"	13' - 0"	16' - 7"	20' - 3"	23' - 5"
	Douglas fir-larch	#1	7' - 5"	10' - 10"	13' - 9"	16' - 9"	19' - 6"
	Douglas fir-larch	#2	6' - 11"	10' - 2"	12' - 10"	15' - 8"	18' - 3"
	Douglas fir-larch	#3	5' - 3"	7' - 8"	9' - 9"	11' - 10"	13' - 9"
	Hem-fir	SS	7' - 10"	12' - 2"	16' - 2"	19' - 10"	23' - 0"
	Hem-fir	#1	7' - 3"	10' - 7"	13' - 5"	16' - 4"	19' - 0"
	Hem-fir	#2	6' - 10"	10' - 0"	12' - 8"	15' - 6"	17' - 11"
	Hem-fir	#3	5' - 3"	7' - 8"	9' - 9"	11' - 10"	13' - 9"
	Southern Pine	SS	8' - 1"	12' - 9"	16' - 10"	21' - 6"	Note b
	Southern Pine	#1	8' - 0"	12' - 3"	15' - 4"	18' - 3"	21' - 9"
	Southern Pine	#2	7' - 5"	10' - 8"	13' - 9"	16' - 5"	19' - 3"
	Southern Pine	#3	5' - 7"	8' - 3"	10' - 6"	12' - 5"	14' - 9"
	Spruce -pine-fir	SS	7' - 8"	12' - 0"	15' - 4"	18' - 9"	21' - 9"
	Spruce -pine-fir	#1	6' - 11"	10' - 2"	12' - 10"	15' - 8"	18' - 3"
	Spruce -pine-fir	#2	6' - 11"	10' - 2"	12' - 10"	15' - 8"	18' - 3"
	Spruce -pine-fir	#3	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_e	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_e = Height of roof ridge measured vertically above the top of the rafter support walls.

b. Span exceeds 26 feet in length.