



Bureau of
Development
Services FROM CONCEPT
TO CONSTRUCTION

SOLAR WORKSHEET

Preview and prepare for the solar permit application questions on DevHub with this worksheet.

You'll have to assess the construction of the roof.

Print this worksheet and bring it to your project site to take notes.

There are two sections

1. Firefighter Access and Escape

- This is required for all solar permit applications.

2. Prescriptive Path Eligibility

- Not needed if you're taking the engineered path.

*This worksheet is **optional** and **not required** for you to apply.*

This worksheet is meant to provide general guidance.

Refer to the **Oregon Structural Specialty Code Section 3111 Solar Energy Systems** for comprehensive details and requirements.

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Site Address

Section 1: Firefighter Access and Escape

Required for all solar permit applications.

Is the solar array located on a non-occupied accessory structure that is separated from occupied structures by a 6-foot minimum separation distance or by a minimum two-hour fire rated assembly?

YES - **STOP!** Firefighter pathways are not required. You have completed this section.

NO - Follow the **General Requirements:**

On your plans, provide a 36" wide pathway along three sides of the solar roof, located over a structurally supported area. Refer to **Figure 1** and **Figure 3**.

- Any roof with a slope greater than 2:12 cannot use the bottom roof edge as a pathway.
- Pathways and solar panels shall be located outside 12" of the low point of a valley.
- If the array is greater than 150 feet in length or width, additional 36" wide intermediate pathways and cutouts are required. See code for details.
- If the roof has smoke and/or heat vents, a 36" pathway shall be provided to and around each vent.

Don't have enough space for a 36" wide pathway? Continue to determine if you qualify for an exception.

Reduced Access and Escape Pathway

- | | | |
|------------------------------|-----------------------------|--|
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | Is the roof slope greater than 2:12? |
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | Is the array area 1,000 sq. ft. or less? |
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | Is there an intersecting adjacent roof without a PV array? |
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | Is the array 150 feet or less in length or width? |

If "**NO**" to any of the questions above, **STOP!** Provide the **general requirements** of a 36" wide pathway on three sides.

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Section 1: Firefighter Access and Escape, continued

If **"YES"** to all of the questions in the section above, continue.

Is the array 25% or less of the roof area*?

- YES Provide a 12" pathway along each side of any horizontal ridge.
- NO Provide a 12" pathway along each side of any horizontal ridge and a minimum of one 36" pathway from ridge to eave over a structurally supported area.

***"Roof area"** is the square footage of the roof measured in plan view (viewed from the top) separated by firewalls or exterior walls. Roof areas share a common attic or fire area below.

You have completed the Firefighter Access and Escape.
Continue onto Section 2: Prescriptive Path Eligibility.

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Section 2: Prescriptive Path Eligibility

System Information

YES

NO

Is this a ballasted roof system?

Continue if you answered "NO" to the question above. If "YES", STOP! Take the engineered path.

YES

NO

Is the weight of the PV modules and racking less than 4.5 pounds per square foot?

YES

NO

Is the module parallel to the plane of the roof with a height 18" or less above the roof at any point?

Continue if you answered "YES" to the two questions above. If "NO", STOP! Take the engineered path.

Roof Construction

If you answer "NO" at any point, STOP! Take the engineered path.

YES

NO

Is the roofing material metal, single layer wood shingle, or not more than two layers of composition shingle?

YES

NO

Is this conventional light framed wood construction?

Continue if you answered "YES" to all the questions above.

Roof Framing Type

Select the type that applies to your project

Pre-engineered trusses, continue.

Roof rafters using conventional sawn lumber, continue.

Other, STOP! Take the engineered path.

SOLAR WORKSHEET

Section 2: Prescriptive Path Eligibility continued

If You Selected Pre-Engineered Trusses

 YES NO

Are the pre-engineered roof trusses spaced at 24" on center (o.c.) maximum?

If "YES", continue to "**Structural Support and Attachments**" on page 6.

If "NO", take the engineered path.

If You Selected Roof Rafters Using Conventional Sawn Lumber

If "NO" to any of the questions below, STOP! Take the engineered path.

 YES NO

Use the **OSSC Table 2308.7.2(1)** (page 12-13) to determine if the allowable span accordingly is greater than or equal to your actual roof rafter span.

Your roof rafter size: _____ x _____

Your roof rafter spacing: _____ inches o.c.

Your grade and species of wood*:

*If you do not know the grade and species, default to "Douglas Fir-Larch #2".

Refer to **Figure 3** for illustration of the span length.

Your roof rafter span: _____ feet

 YES NO

The roof framing consists of roof rafters and ceiling joists running parallel to the rafters in "A" frame configuration with a ridge board and/or collar tie at the ridge.

 YES NO

The slope of the rafter is greater than 3 units vertical and 12 units horizontal.

Continue on next page.

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Section 2: Prescriptive Path Eligibility continued

Continued from previous page.

Roof Rafters Using Conventional Sawn Lumber, continued

- | | | |
|------------------------------|-----------------------------|---|
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | The ceiling joists and roof rafters are at the same spacing and connected where they intersect. |
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | The ceiling joist/rafter bears on top of the rafter support walls (top plate) and are attached to the roof rafters. If the ceiling joists do not bear on top of the top plate and are raised above the top plate, the framing could still be considered prescriptive; however, the roof rafter spans will need to be adjusted in accordance with adjustment factors from OSSC Table 2308.7.2(1) and Figure 3. In this case, please contact plan reviewers if you need assistance. |
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | If the rafter is supported along its span by an intermediate brace or pony wall, and the intermediate brace or pony wall is used to reduce the span of the rafter, then the brace/pony wall shall bear directly on a bearing wall below. |
| <input type="checkbox"/> YES | <input type="checkbox"/> NO | Do all hip and valley rafters that are impacted by the solar panel installation have: |
| <input type="checkbox"/> N/A | | <ul style="list-style-type: none">• minimum 2x members with the depth not less than the cut end of typical roof rafter;• support at the ridge, and;• support at an intermediate point if typical roof rafters require intermediate support to comply with roof rafter tables. |

If **"YES" to ALL** the questions above, continue to **"Structural Support and Attachments"** on the next page.

SOLAR WORKSHEET

Section 2: Prescriptive Path Eligibility continued

Structural Support and Attachments

If you answer "NO" at any point, STOP! Take the engineered path.

 YES NO

Is the racking support positively attached to the roof structural components/blocking in accordance with the manufacturer's recommendations?

 YES NO

Is the spacing of the attachments to the roof structural components/blocking

- less than or equal to 48" o.c. in any direction, and;
- no greater than 24" o.c. when the attachments are located within 3 feet of the roof edge, eave or ridge?

Are you working with a standing seam metal roof?

NO - STOP! You have **completed** the Prescriptive Path Eligibility. If you answered "YES" to the questions above, select the "**Prescriptive Pathway**" when applying on DevHub.

YES - Continue:

For Standing Seam Metal Roofs Only

If you answer "NO" at any point, STOP! Take the engineered path.

 YES NO

Is the metal panel 26 gage or heavier?

 YES NO

Is the metal roofing panel width less than or equal to 18 inches?

 YES NO

Is the metal panel installed over minimum ½" nominal wood structural panels substrate and attached to the wood panels with at least #10 screws at 24" o.c.?

 YES NO

Are the ½" nominal wood structural panels attached to structural framing with a minimum of 8d nails at 6" o.c. at panel edges and 12" o.c. field nailing?

Continue on next page.

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Section 2: Prescriptive Path Eligibility continued

For Standing Seam Metal Roofs Only

If you answer "NO" at any point, STOP! Take the engineered path.

 YES NO

Are the solar panels attached to the standing seam metal deck with clamps that are spaced not less than 24" o.c. nor greater than 60" o.c. along the seam?

 YES NO

Are the solar panels attached to the standing seam metal deck with clamps that are spaced perpendicular to the seam such that the area calculated by multiplying the spacing along the seam by spacing perpendicular to the seam does not exceed 10 sq. ft.?

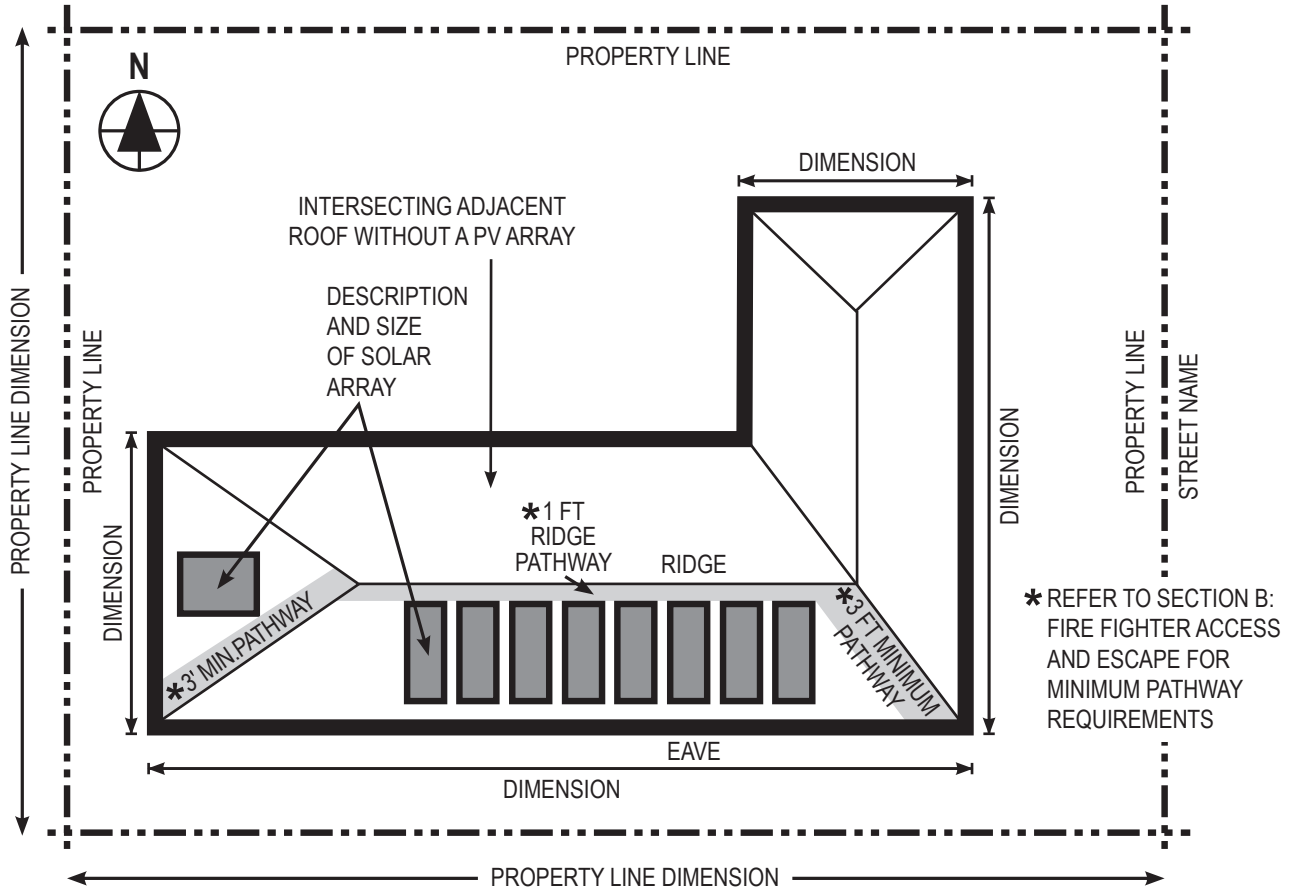
Did you answer "YES" to ALL the questions above? If yes, take the "**Prescriptive Pathway**" when you apply on DevHub.

You have completed the Prescriptive Path Eligibility.

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Figures and Tables

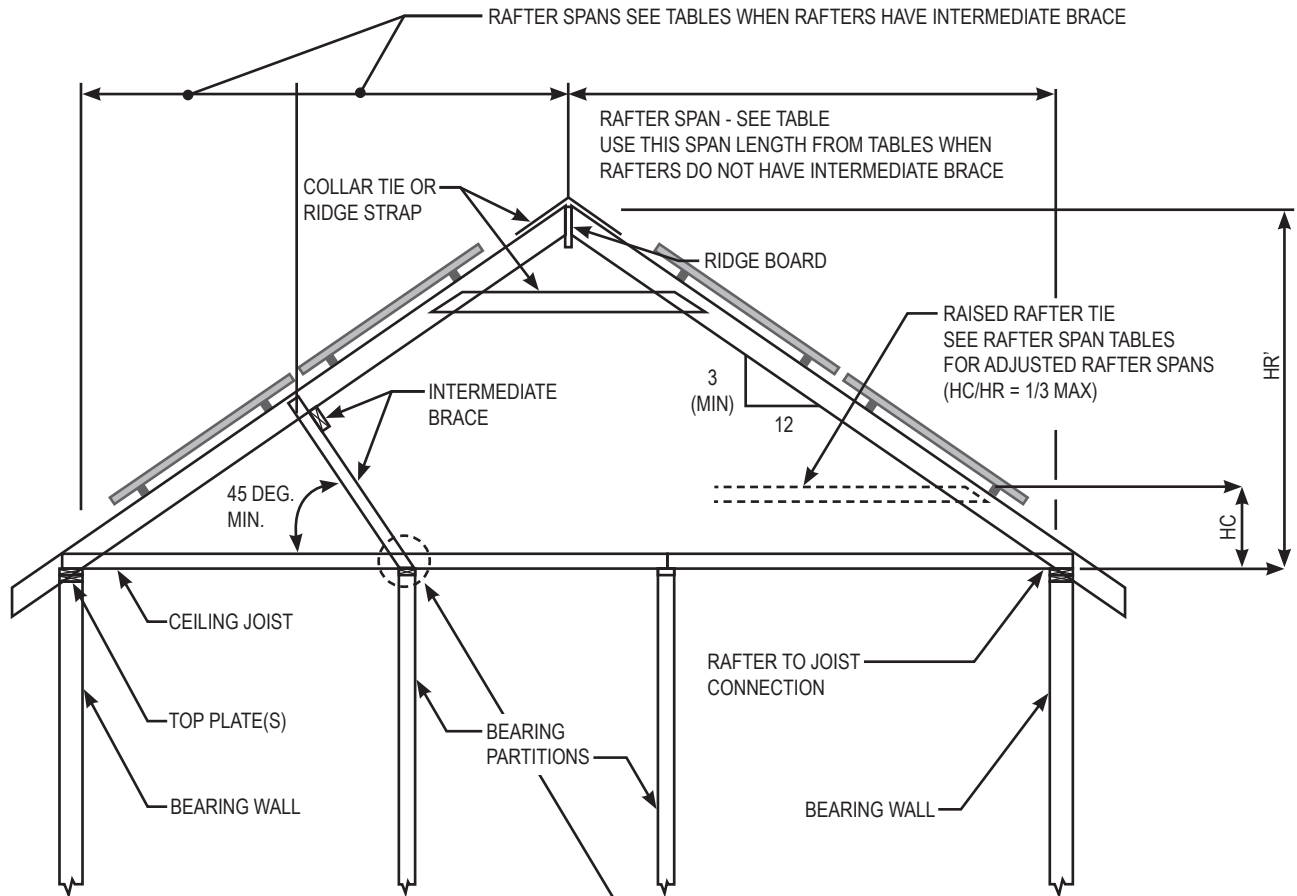
FIGURE 1
SAMPLE SITE PLAN



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Figures and Tables

**FIGURE 3
SAMPLE ROOF CROSS SECTION**



For SI: 1 inch = 25.4 mm, 1 foot = 305 mm, 1 degree = 0.018 rad.

Note: Where ceiling joists run perpendicular to the rafter, rafter ties shall be installed in accordance with Section R802.3.1

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

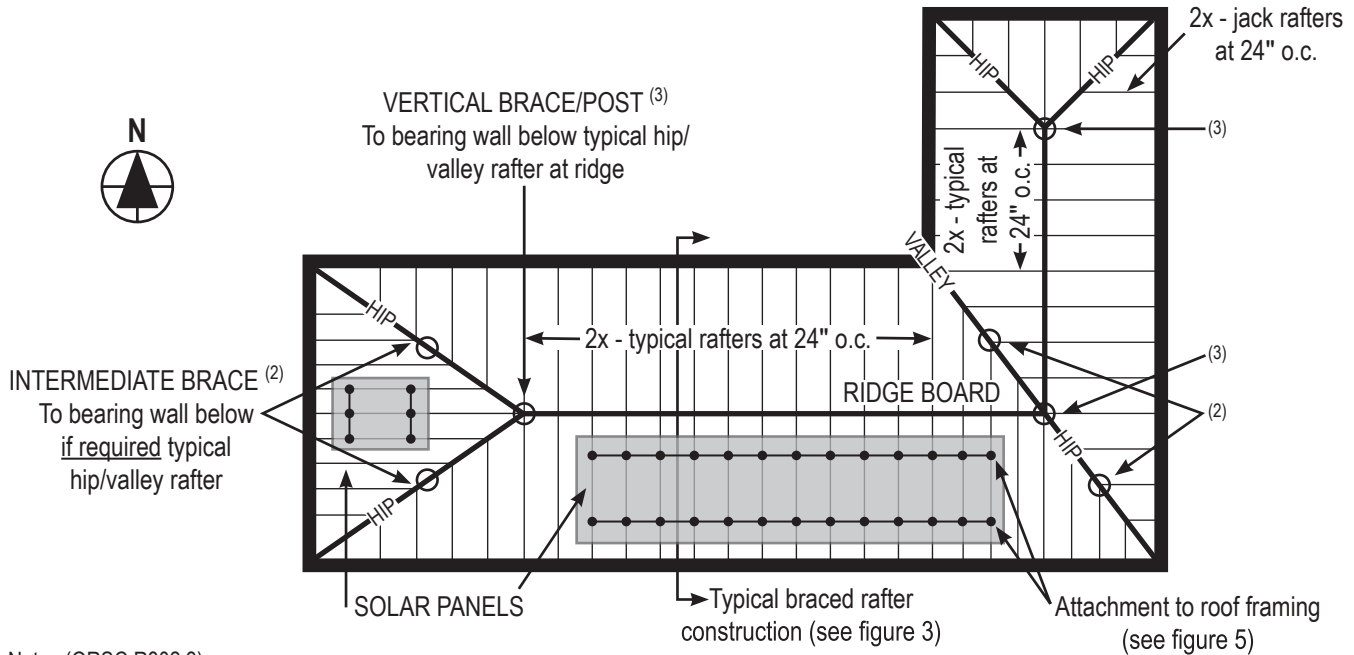
H_r = Height of roof ridge measured vertically above the top of rafter support walls.

Note: To qualify as an intermediate support or brace for rafters, the intermediate brace must bear on a bearing wall. Where the intermediate brace/support, bears on the ceiling joist, the intermediate brace shall not be considered as a support for rafters and rafter span shall be from exterior bearing wall to ridge.

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Figures and Tables

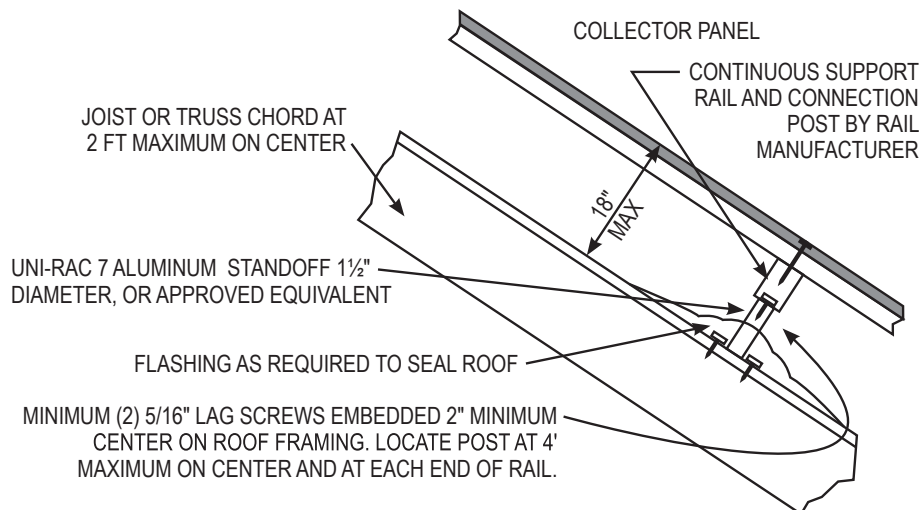
FIGURE 4
SAMPLE ROOF FRAMING PLAN



Notes (ORSC R802.3):

- (1) Hip and rafter framing shall not be less than 2-inch nominal thickness and not less in depth than the cut end of the typical roof rafter.
- (2) If typical roof rafter requires intermediate support to comply with the rafter span tables. Intermediate support to bearing wall would also be required at hip and valley rafters.
- (3) Hip and Valley rafters shall be supported at the ridge by a brace/post to a bearing wall below.

FIGURE 5
SAMPLE SYSTEM RACKING ATTACHMENT DETAIL



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Figures and Tables

OSSC TABLE 2308.7.2(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
 (Roof live load= 20 psf, ceiling not attached to rafters, L/1' = 180)

If the species and grade is not known use Douglas Fir-Larch #2

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				
			(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)
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	10-6	15-8	19-10	23-2	Note b
	Southern Pine	#2	9-0	13-6	17-1	20-3	23-10
	Southern Pine	#3	6-11	10-2	12-10	15-7	18-6
	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	25-7	Note b
	Southern Pine	#1	9-1	13-7	17-2	20-1	23-10
	Southern Pine	#2	7-9	11-8	14-9	17-6	20-8
	Southern Pine	#3	6-0	8-10	11-2	13-6	16-0
	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	21-9
	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	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	19-7	23-4	Note b
	Southern Pine	#1	8-4	12-4	15-8	18-4	21-9
	Southern Pine	#2	7-1	10-8	13-6	16-0	18-10
	Southern Pine	#3	5-6	8-1	10-2	12-4	14-7
	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	

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Figures and Tables

OSSC TABLE 2308.7.2(1)
RAFTER SPANS FOR COMMON LUMBER SPECIES
 (Roof live load= 20 psf, ceiling not attached to rafters, L/1' = 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				
			(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)	(ft. - in.)
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	13-10	17-6	20-10	24-8
	Southern Pine	#1	7-5	11-1	14-0	16-5	19-6
	Southern Pine	#2	6-4	9-6	12-1	14-4	16-10
	Southern Pine	#3	4-11	7-3	9-1	11-0	13-1
	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

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. Where ceiling joists or rafter ties are located higher in the attic space, the rafter spans shall be multiplied by the following factors:

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.