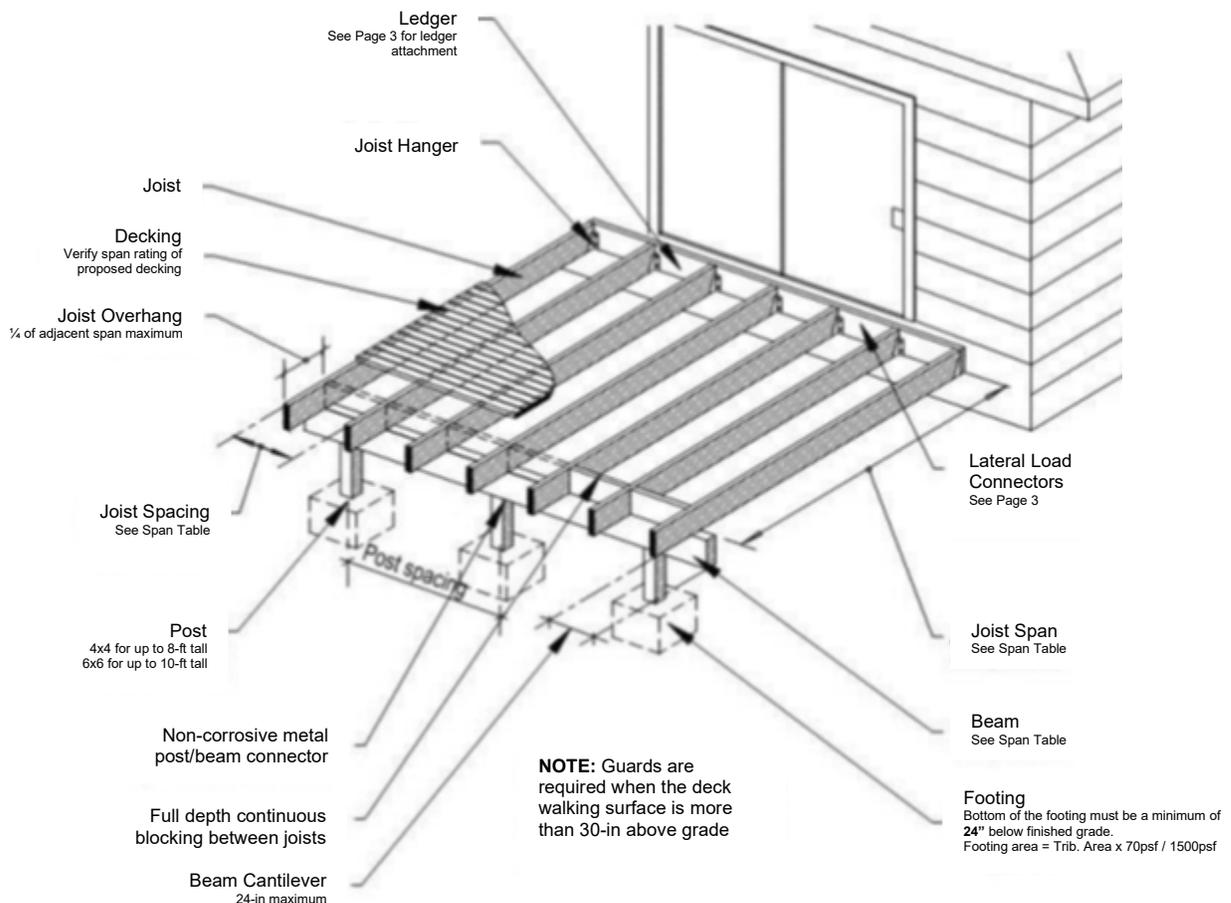


## PRESCRIPTIVE RESIDENTIAL DECK DESIGN

This document provides building code information applicable to prescriptive residential wood deck design. You may need a licensed architect or engineer to design a deck where any of the following conditions apply:

- The deck serves other than a one- or two-family dwelling building
- The deck design includes more than one level
- The deck will support a hot tub, spa or other heavy object, including heavy deck covering (such as pavers)
- The walking surface is more than 10' above grade
- The deck ledger is attached to house overhangs, bay windows, bricks, stone or concrete block
- The deck is bearing on ground with a slope greater than 1' horizontal for every 1' vertical
- The deck is self-supporting (not attached to an exterior wall)

### Typical Deck Construction



## Deck Construction Notes

- Please note that due to the WA State Amendment for 60 psf live loading, previous lumber spans and footing sizes have changed.
- Guardrails are required when the deck is more than 30-inches above grade. See related City of Richland Handout for [Residential Stairways, Handrails & Guardrails](#)
- **This handout is intended to represent good construction practices for deck construction and related IRC requirements. The following figures and tables are provided for your use in understanding the code requirements, however does not address all possible scenarios.**

### Deck Framing and Framing Connections

Many grades and sizes of materials exist; therefore, all combinations cannot be provided. *Deck framing shall be No. 2 grade or better, and must be preservative-treated or approved naturally durable wood. (R507.2.1).* Connections between deck framing members shall be made with corrosion resistant fasteners, nails, bolts, screws, and connectors.

Lateral loads shall be transferred to a structure capable of transmitting forces to the ground. Provided a minimum of 300lbs of lateral load connectors.

### Section 1 – Deck Connections

Connection:	Fastening:
Manufactured Connectors	Per manufacturer's instructions
Post to Footing	Post base required
Post to Beam	Mechanical connector required
Ledger to House Framing	See Section 3
Joist to Beam or Girder	(3) 8d toe-nails
Blocking/Bridging to Joist	(2) 10d toe-nails each end
Wood Decking	(2) 8d nails or (2) No. 8 screws at each joist
Composite Decking	Per manufacturer's instructions

### Section 2 – Footings

#### Minimum Footing Size for Decks

(Reference Reference WA Amended IRC Table IRC 507.3.1 – Deck live load = 60psf, deck dead load = 10psf)

Tributary Area <sup>e</sup> (sq. ft.)	1500psf Soil Bearing Capacity		
	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness <sup>f</sup> (inches)
<b>5</b>	7	8	6
<b>20</b>	12	14	6
<b>40</b>	18	20	6
<b>60</b>	21	24	8
<b>80</b>	25	28	9
<b>100</b>	28	31	11
<b>120</b>	30	34	12
<b>140</b>	33	37	13
<b>160</b>	35	40	15

- a. Interpolation allowed. Extrapolation is not allowed.
- b. Reserved.
- c. Footing dimensions shall allow complete bearing of the post.
- d. If the support is a brick or CMU pier, the footing shall have a minimum 2-inch projection on all sides.
- e. Area, in square feet, of deck surface supported by post and footings.
- f. Minimum thickness shall only apply to plain concrete footings.

### Section 3 – Ledger Attachment

#### Deck Ledger Connection to Band Joist

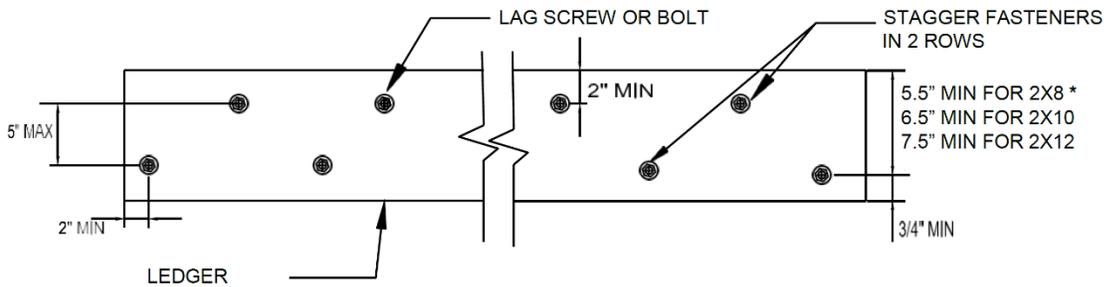
(Reference WA Amended IRC Table R507.9.1.3(1) – Deck live load = 60psf, deck dead load = 10psf)

Joist Span <sup>a</sup> (feet)	On-Center Spacing of Fasteners <sup>b</sup> (inches)		
	1/2-inch diameter lag screw w/ 1/2-inch maximum sheathing <sup>d,e</sup>	1/2-inch diameter lag bolt w/ 1/2-inch maximum sheathing <sup>e</sup>	1/2-inch diameter bolt w/ 1- inch maximum sheathing <sup>f</sup>
<b>6</b>	22	36	35
<b>8</b>	16	31	26
<b>10</b>	13	25	21
<b>12</b>	11	20	17
<b>14</b>	9	17	15
<b>16</b>	8	15	13
<b>18</b>	7	13	11

- a. Interpolation allowed. Extrapolation is not allowed.
- b. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- c. Dead Load = 10 psf. Snow load shall not be assumed to act concurrently with live load.
- d. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- e. Sheathing shall be wood structural panel or solid sawn lumber.
- f. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to 1/2-inch thickness of stacked washers shall be permitted to substitute for up to 1/2 inch of allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

#### Placement of Lag Screws and Bolts in Ledgers

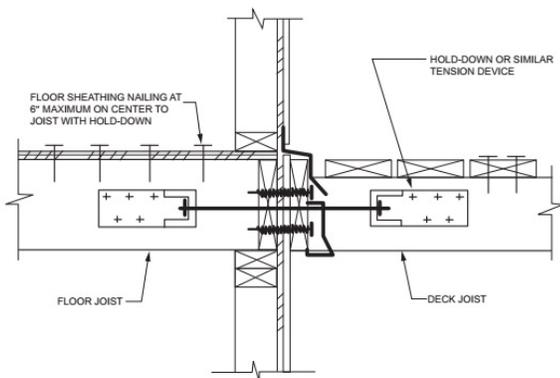
(Reference IRC Figure 507.9.1.3(1) )



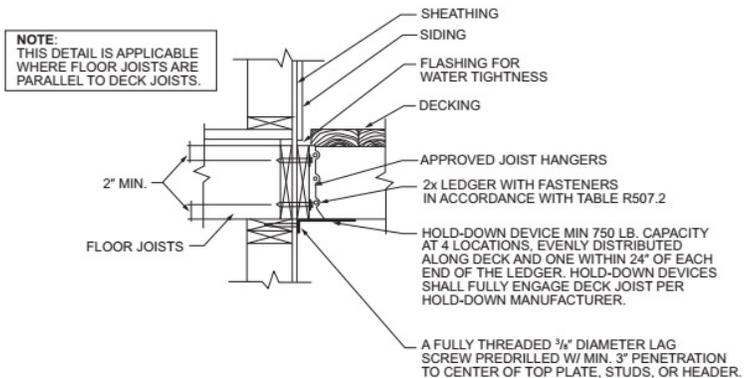
\*DISTANCE CAN BE REDUCED TO 4.5" IF LAG SCREWS ARE USED OR IF BOLT SPACING IS REDUCED TO THAT OF LAG SCREWS TO ATTACH 2X8 LEDGERS TO 2X8 BAND JOISTS.

#### Ledger Attachment for Lateral Loads

(Reference IRC 507.9.2)



**New Construction**  
(2) 1500bs connectors w/ 24-in of each end of deck



**Existing Construction**  
(4) 750lbs connectors evenly distributed

### Section 4 – Deck Framing Spans

Joist species<sup>b</sup> shall be Douglas fir-larch<sup>e</sup>, Hem-fir<sup>e</sup>, or Spruce-pine-fir<sup>e</sup>  
Table uses 70 psf. loading (10 psf. dead load + 60 psf live load)

#### Deck Joist Span Lengths

(Reference WA Amended IRC Table R507.6 – Deck live load = 60psf, deck dead load = 10psf)

JOIST SIZE	Allowable Joist Span <sup>c</sup> (feet-inches)			Maximum Cantilever <sup>d</sup> (feet-inches) Adjacent Joist Span <sup>g</sup>										
	Joist Spacing (inches)			Joist Back Span <sup>g</sup> (feet)										
	12	16	24	4	6	8	10	12	14	16	18			
<b>2x6</b>	7-11	7-1	5-9	1-0	1-6	Not permitted								
<b>2x8</b>	10-5	9-5	7-8	1-0	1-6							2-0	2-1	
<b>2x10</b>	13-3	11-6	9-5	1-0	1-6							2-0	2-6	2-8
<b>2x12</b>	15-5	13-4	10-11	1-0	1-6							2-0	2-6	3-0

- a. Dead load = 10 psf dead load. Snow load not assumed to be concurrent with live load.
- b. No. 2 grade, wet service factor included.
- c. L/Δ = 360 at main span.
- d. L/Δ = 180 at cantilever with 220-pound point load applied to end.
- e. Includes incising factor.
- f. Incising factor not included.
- g. Interpolation allowed. Extrapolation is not allowed.

#### Deck Beam Span Lengths

(Reference WA Amended IRC Table R507.5 – Deck live load = 60psf, deck dead load = 10psf)

Beam Species <sup>d</sup>	Beam Size <sup>e</sup>	Deck Joist Span <sup>a,i</sup> (feet)						
		6	8	10	12	14	16	18
		Maximum Beam Span <sup>a,b,f</sup> (feet-inches)						
<b>Douglas fir-larch <sup>g</sup>, Spruce-pine-fir <sup>g</sup></b>	<b>1-2x6</b>	3-5	2-10	2-5	2-2	2-0	1-10	1-9
	<b>1-2x8</b>	4-7	3-8	3-2	2-10	2-7	2-5	2-4
	<b>1-2x10</b>	5-8	4-9	4-1	3-8	3-4	3-1	2-11
	<b>1-2x12</b>	6-7	5-8	5-0	4-6	4-1	3-10	3-7
	<b>2-2x6</b>	5-2	4-6	4-0	3-5	3-1	2-10	2-7
	<b>2-2x8</b>	6-11	6-0	5-3	4-7	4-1	3-8	3-5
	<b>2-2x10</b>	8-5	7-4	6-6	5-10	5-2	4-9	4-5
	<b>2-2x12</b>	9-10	8-6	7-7	6-11	6-4	5-9	5-4
	<b>3-2x6</b>	6-6	5-7	5-0	4-7	4-2	3-9	3-5
	<b>3-2x8</b>	8-8	7-6	6-8	6-1	5-6	5-0	4-7
	<b>3-2x10</b>	10-7	9-2	8-2	7-6	6-11	6-4	5-10
	<b>3-2x12</b>	12-4	10-8	9-7	8-9	8-1	7-7	7-1

- a. Interpolation allowed. Extrapolation is not allowed.
- b. Beams supporting a single span of joists with or without cantilever.
- c. Dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever. Snow load not assumed to be concurrent with live load.
- d. No. 2 grade, wet service factor included.
- e. Beam depth shall be equal to or greater than the depth of intersecting joist for a flush beam connection.
- f. Beam cantilevers are limited to the adjacent beam's span divided by 4.
- g. Includes incising factor.
- h. Incising factor not included.
- i. Deck joist span as shown in Figure R507.5.