

Residential Deck Handout International Residential Code (IRC)

HOW TO USE THIS GUIDE

This guide was designed to assist in creating a construction plan to build a simple deck using conventional construction methods. Non-conventionally constructed decks may require a design professional.

- 1. Complete this Building Guide** by indicating which construction details will be used.
- 2. Provide a Site Plan** showing the dimensions of your project and its relationships to existing buildings or structures, utilities, property lines and easements. In addition to project dimensions, your plot plan must also show other details such as post locations and spacing, joist and beam spans, and any other pertinent information not shown on the section drawing.
- 3. Now you are ready to apply for your building permit.** The majority of permit applications can be processed with little delay. The submitted documents will help determine if the project is in compliance with building codes, zoning ordinances and other applicable laws.
- 4. Inspections.** A footing inspection is required before they can be poured. A framing inspection may be required before you lay decking or attach handrails to verify plans are being followed and that proper connections are used. All projects must receive a final inspection in order to verify that your project meets code, is safe to use and to close out the permit. Remember YOU are responsible to get the inspections! If you are unsure during the construction process contact Building Services 319-286-5831.



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HOW TO CALCULATE FOOTINGS FOR A DECK OR PORCH

Step 1: Find the Area Supported by each Footing in Square Feet = (A x B).

Step 2: Determine the type of Load supported by each post.

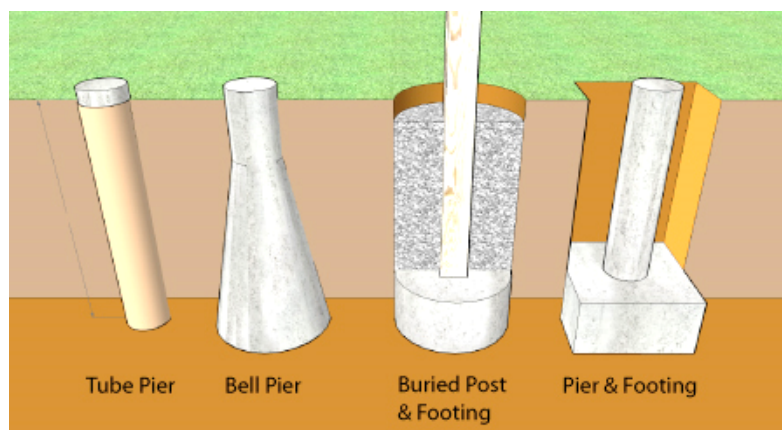
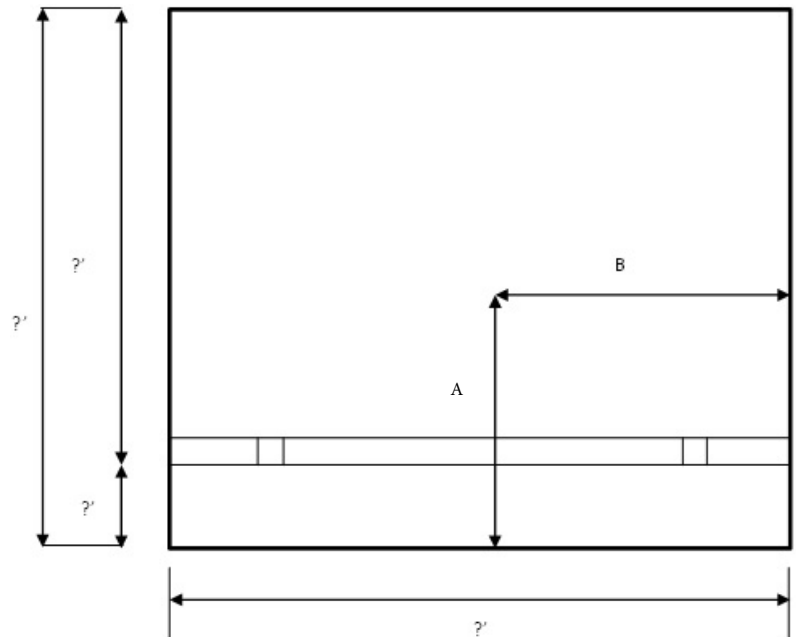
* Load for open decks shall be 50# PSF based on a floor load only.

* Load for covered decks, porches and 3 season rooms shall be 90# PSF based on a floor load of 50# PSF plus a roof load of 40# PSF.

Step 3: Find the Total Load (TL) supported by each footing by multiplying the Area by the Load.

Step 4: Divide the Total Load by 2000, which is the presumed soil bearing capacity of local soil.

Step 5: Use the resulting value (Footing PSF) to find the proper footing size on the table below. Each Footing PSF will require a Footing Diameter with the minimum size listed below it on the table. Any fraction of a number larger than the Footing PSF listed shall be supported by a footing of the next larger diameter.



$$\text{FORMULA: } [(A \times B) \times \text{TL}] / 2000 = \text{Footing PSF}$$

MINIMUM AREA REQUIRED FOR A ROUND PIER FOOTING									
Footing PSF (from calculation)	0.35	0.55	0.79	1.07	1.39	1.77	2.18	2.63	3.12
Minimum Footing Diameter	8"	10"	12"	14"	16"	18"	20"	22"	24"

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TABLE R507.5(1)
MAXIMUM DECK BEAM SPAN—40 PSF LIVE LOAD^c

BEAM SPECIES ^d	BEAM SIZE ^e	EFFECTIVE DECK JOIST SPAN LENGTH ^{a, i, j} (feet)						
		6	8	10	12	14	16	18
		MAXIMUM DECK BEAM SPAN LENGTH (feet-inches) ^{a, b, f}						
Southern pine	1 – 2 × 6	4-7	4-0	3-7	3-3	3-0	2-10	2-8
	1 – 2 × 8	5-11	5-1	4-7	4-2	3-10	3-7	3-5
	1 – 2 × 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1 – 2 × 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2 – 2 × 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2 – 2 × 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2 – 2 × 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2 – 2 × 12	12-2	10-7	9-5	8-7	8-0	7-5	7-0
	3 – 2 × 6	8-6	7-5	6-8	6-1	5-8	5-3	4-11
	3 – 2 × 8	10-11	9-6	8-6	7-9	7-2	6-8	6-4
	3 – 2 × 10	13-0	11-2	10-0	9-2	8-6	7-11	7-6
	3 – 2 × 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10
Douglas fir-larch ^g Hem-fir ^g Spruce-pine-fir	1 – 2 × 6	4-1	3-6	3-0	2-8	2-5	2-3	2-1
	1 – 2 × 8	5-6	4-8	4-0	3-6	3-2	2-11	2-9
	1 – 2 × 10	6-8	5-10	5-1	4-6	4-1	3-9	3-6
	1 – 2 × 12	7-9	6-9	6-0	5-6	5-0	3-9	3-6
	2 – 2 × 6	6-1	5-3	4-9	4-4	3-11	3-7	3-3
	2 – 2 × 8	8-2	7-1	6-4	5-9	5-2	4-8	4-4
	2 – 2 × 10	10-0	8-7	7-9	7-0	6-6	6-0	5-6
	2 – 2 × 12	11-7	10-0	8-11	8-2	7-7	7-1	6-8
	3 – 2 × 6	7-8	6-8	6-0	5-6	5-1	4-9	4-6
	3 – 2 × 8	10-3	8-10	7-11	7-3	6-8	6-3	5-11
	3 – 2 × 10	12-6	10-10	9-8	8-10	8-2	7-8	7-2
	3 – 2 × 12	14-6	12-7	11-3	10-3	9-6	8-11	8-5

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. Interpolation permitted. Extrapolation not permitted.

b. Beams supporting a single span of joists with or without cantilever.

c. Dead load = 10 psf, $L/\Delta = 360$ at main span, $L/\Delta = 180$ at cantilever. Snow load is 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.

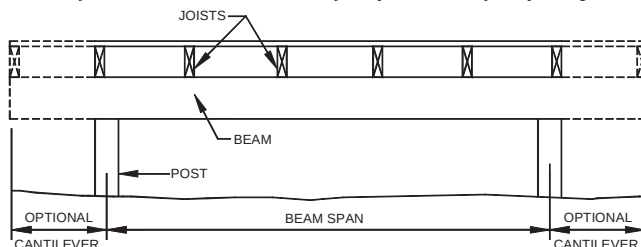
f. Beam cantilevers are limited to the adjacent beam's span divided by 4.

g. Includes incising factor.

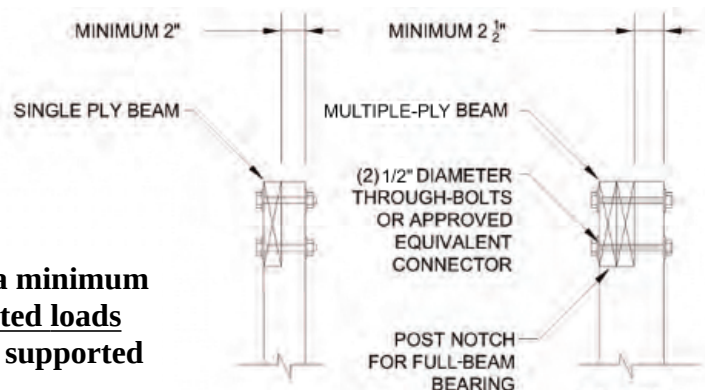
h. Incising factor not included.

i. Deck joist span as shown in Figure R507.5.

j. For calculation of effective deck joist span, the actual joist span length shall be multiplied by the joist span factor in accordance with Table R507.5(5).



R507.9.1.1 Ledger details. Deck ledgers shall be a minimum 2" x 8". Deck ledgers shall not support concentrated loads from beams or girders. Deck ledgers shall not be supported on stone or masonry veneer.



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TABLE R507.4
MAXIMUM JOIST SPACING

MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Perpendicular to joist	Diagonal to joist ^a
1 ¹ / ₄ -inch-thick wood	16 inches	12 inches
2-inch-thick wood	24 inches	16 inches
Plastic composite	In accordance with Section R507.3	In accordance with Section R507.3

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 degree = 0.01745 rad.

a. Maximum angle of 45 degrees from perpendicular for wood deck boards

TABLE R507.6
MAXIMUM DECK JOIST SPANS

LOAD ^a (psf)	JOIST SPECIES ^b	JOIST SIZE	ALLOWABLE JOIST SPAN ^{b, c} (feet-inches)		MAXIMUM CANTILEVER ^{d, f} (feet-inches)								
			Joist spacing (inches)			Joist back span ^g (feet)							
			12	16	24	4	6	8	10	12	14	16	18
40 live load	Southern pine	2 × 6	9-11	9-0	7-7	1-0	1-6	1-5	NP	NP	NP	NP	NP
		2 × 8	13-1	11-10	9-8	1-0	1-6	2-0	2-6	2-3	NP	NP	NP
		2 × 10	16-2	14-0	11-5	1-0	1-6	2-0	2-6	3-0	3-4	3-4	NP
		2 × 12	18-0	16-6	13-6	1-0	1-6	2-0	2-6	3-0	3-6	4-0	4-1
	Douglas fir-larch ^e Hem-fir ^e Spruce-pine-fir ^e	2 × 6	9-6	8-4	6-10	1-0	1-6	1-4	NP	NP	NP	NP	NP
		2 × 8	12-6	11-1	9-1	1-0	1-6	2-0	2-3	2-0	NP	NP	NP
		2 × 10	15-8	13-7	11-1	1-0	1-6	2-0	2-6	3-0	3-3	NP	NP
		2 × 12	18-0	15-9	12-10	1-0	1-6	2-0	2-6	3-0	3-6	3-11	3-11

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

NP = Not Permitted.

a. Dead load = 10 psf. Snow load not assumed to be concurrent with live load.

b. No. 2 grade, wet service factor included.

c. $L/\Delta = 360$ at main span.

d. $L/\Delta = 180$ at cantilever with a 220-pound point load applied to end.

e. Includes incising factor.

f. Incising factor not included.

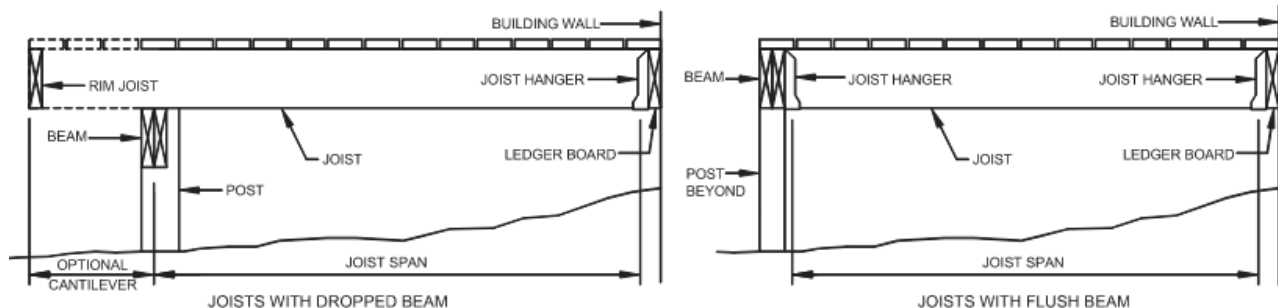
g. Interpolation allowed. Extrapolation is not allowed.

TABLE R507.5(5)
JOIST SPAN FACTORS FOR CALCULATING EFFECTIVE DECK JOIST SPAN
[for use with Note j in Tables R507.5(1), R507.5(2), R507.5(3) and R507.5(4)]

C/J ^a	JOIST SPAN FACTOR
0 (no cantilever)	0.66
1/12 (0.87)	0.72
1/10 (0.10)	0.80
1/8 (0.125)	0.84
1/6 (0.167)	0.90
1/4 (0.250)	1.00

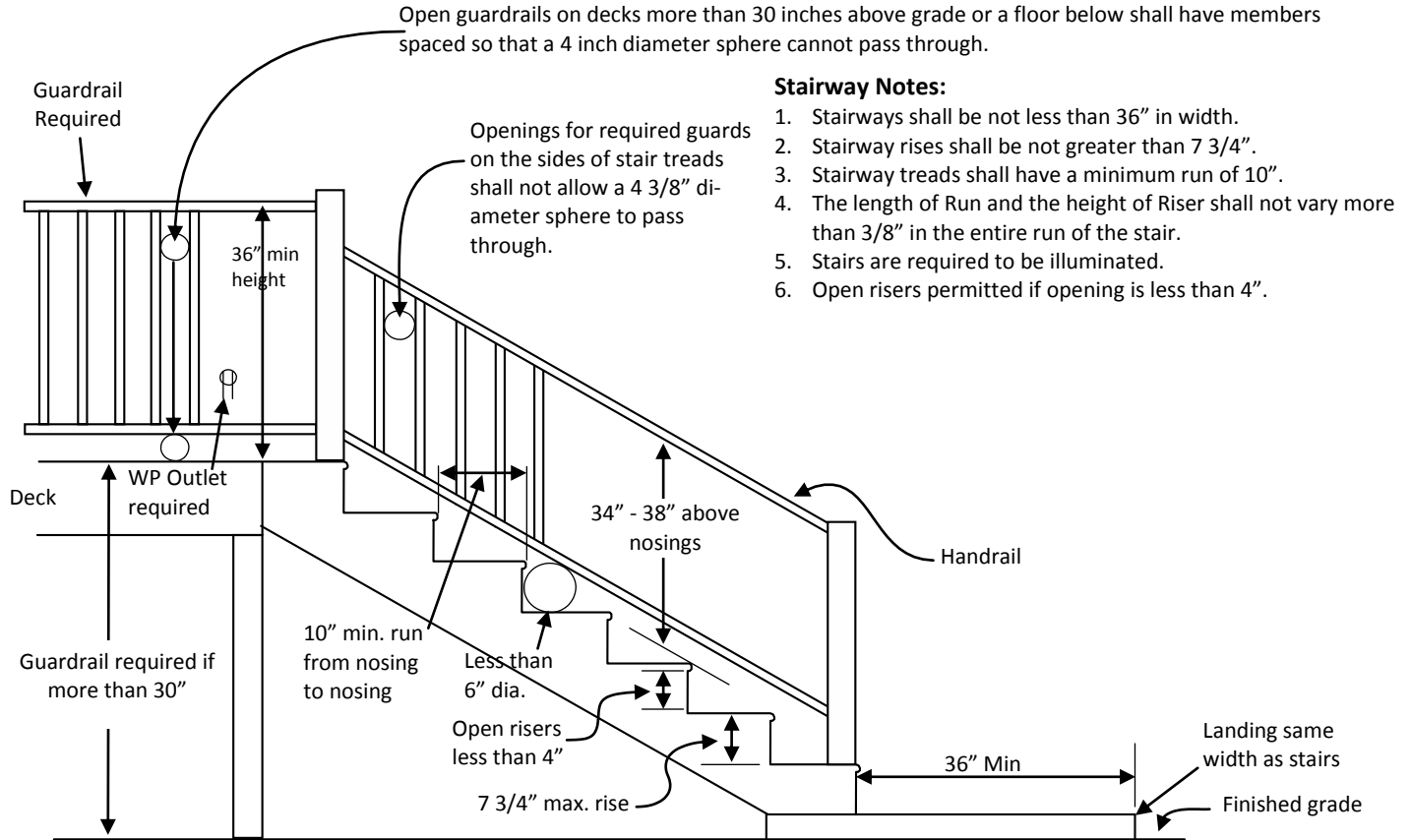
For SI: 1 foot = 304.8 mm.

a. C = actual joist cantilever length (feet); J = actual joist span length (feet).

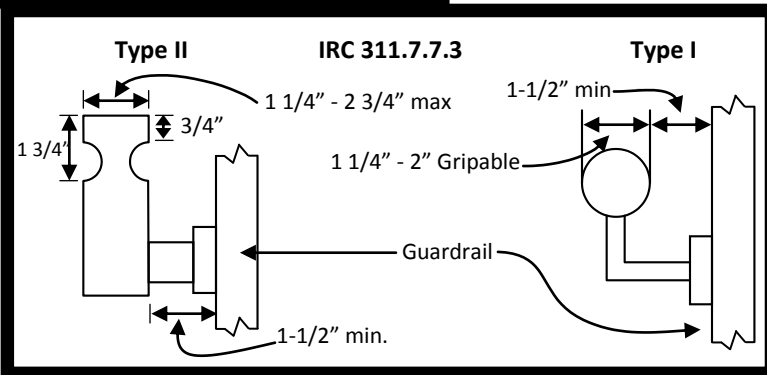


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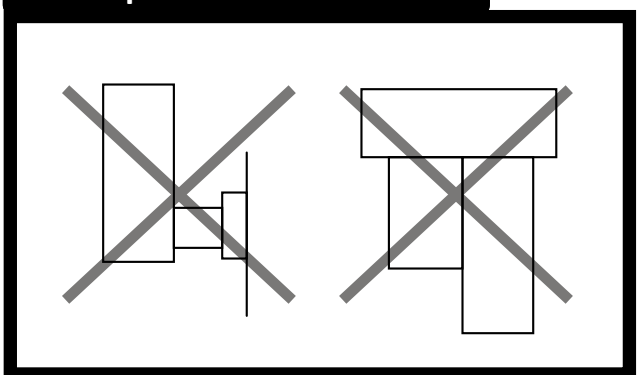
Stair & Handrail Specifications



Preferred Handrail Details



Unacceptable Handrails



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Open Deck Beam & Footing Sizes

		POST SPACING										
		4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'
JOIST LENGTH	6'	Corner Footing	5	6	6	7	7	7	8	8	9	9
		Intermediate Footing	8	8	9	9	10	10	11	12	13	13
7'	Corner Footing	5	6	7	7	8	8	8	9	9	10	10
	Intermediate Footing	8	8	9	10	11	11	12	13	13	14	14
8'	Corner Footing	6	6	7	8	8	8	9	9	10	10	11
	Intermediate Footing	8	9	10	11	11	12	13	13	14	15	15
9'	Corner Footing	6	7	7	8	9	9	10	10	10	11	11
	Intermediate Footing	9	10	10	11	12	13	14	14	15	15	16
10'	Corner Footing	6	7	8	8	9	10	10	11	11	12	12
	Intermediate Footing	9	10	11	12	13	14	14	15	16	16	17
11'	Corner Footing	7	7	8	9	9	10	11	11	12	12	13
	Intermediate Footing	9	11	12	12	13	14	14	15	16	16	17
12'	Corner Footing	7	8	9	9	10	10	11	12	12	13	13
	Intermediate Footing	10	11	12	13	14	15	16	16	17	18	18
13'	Corner Footing	7	8	9	10	10	11	12	12	13	13	14
	Intermediate Footing	10	12	13	14	15	15	16	17	18	19	19
14'	Corner Footing	8	8	9	10	11	11	12	13	13	14	14
	Intermediate Footing	11	12	13	14	15	16	17	18	18	19	20
15'	Corner Footing	8	9	10	10	11	12	12	13	14	14	15
	Intermediate Footing	11	12	14	15	16	17	17	18	19	20	21
16'	Corner Footing	8	9	10	11	11	12	13	13	14	15	15
	Intermediate Footing	11	13	14	15	16	17	18	19	20	21	21

TABLE R507.8
DECK POST HEIGHT^a

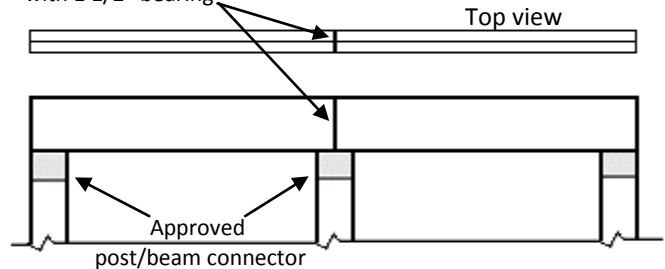
DECK POST SIZE	MAXIMUM HEIGHT ^a
4 × 4	8'
4 × 6	8'
6 × 6	14'

For SI: 1 foot = 304.8 mm.

a. Measured to the underside of the beam.

Beam Splices

Splice must occur over posts with 1 1/2" bearing



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LEDGER BOARD DETAILS

- Minimum of ½" lag screws or bolts are required and are to be staggered with spacing as shown in the table below.
- All screws or bolts are to be placed 2 inches in from the bottom and top edge of the ledger and between 2 and 5 inches in from the ends.
- Tips of the lag screws are to extend past the inside face of the bandjoist.
- Lag screws, bolts, and washers are to be hot-dipped galvanized or stainless steel when using.
- Ledger boards shall not be attached to open web trusses, brick veneers, hollow concrete block, or cantilever without prior approval.

JOIST SPAN	6' OR LESS	6'1" to 8'	8'1" to 10'	10'1" to 12'	12'1" to 14'	14'1" to 16'	16'1" to 18'
Connection details	Inches on center spacing of fasteners						
½" diameter lag screw	30	23	18	15	13	11	10
½" diameter bolt	36	36	34	29	24	21	19

When using engineered fastener screws (Ledgerlock®), follow manufacturer's instructions for spacing and location.

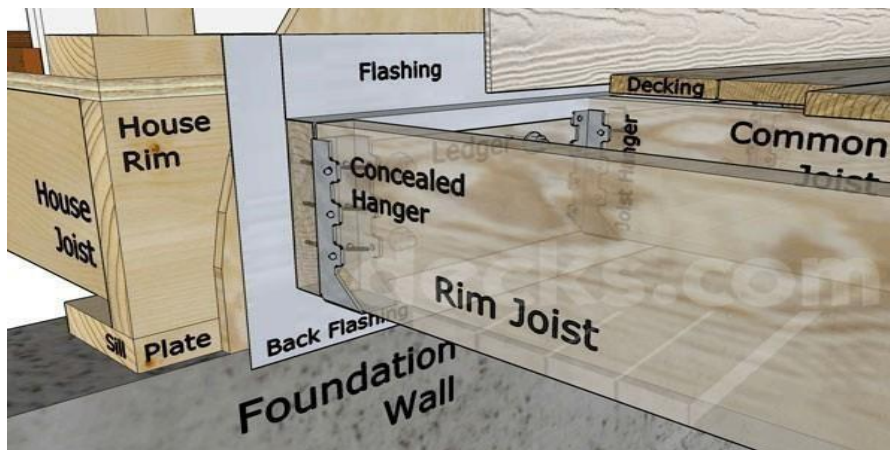
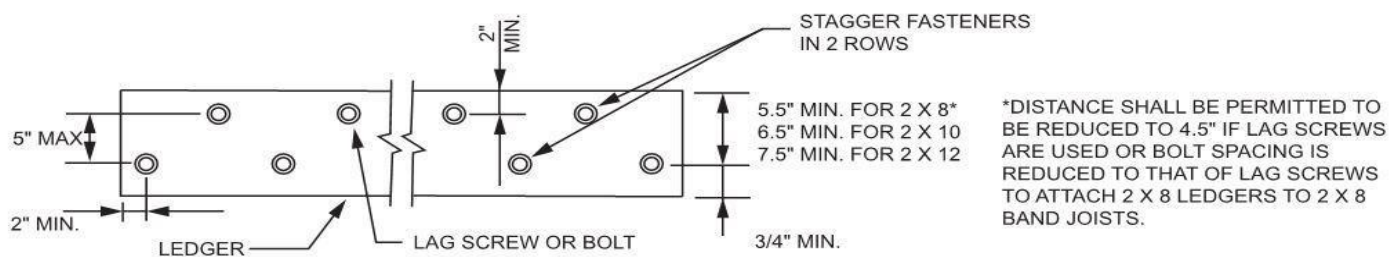


Photo courtesy of Decks.com

- Flashing**
- House siding must be removed prior to the installation of the ledger board.
 - Flashing is required where a ledger is fastened to wood construction.



For SI: 1 inch = 25.4 mm.

FIGURE R507.9.1.3(1)
PLACEMENT OF LAG SCREWS AND BOLTS IN LEDGERS

Simple Deck Plan View

Please include the actual deck shape, dimensions, footing locations, and beam locations with your building permit application. All lumber shall be approved pressure treated to .40 retention or naturally resistant to decay (cedar/redwood) Fill in boxes with dimensions and sizes

Size of desired deck:

- A. Deck width ____ ft. ____ in.
B. Deck length ____ ft. ____ in.

Ledger board: (Flashing required)

Size: ____ x ____ (2x8 Minimum)
Lag or bolt size: ____

Flashing material: _____

Joists:

Size: ____ x ____
Spacing: ____ on center
Length of cantilever:

Beams: (Any splices to be over a post.)

Beam size: Double ____ x ____
Length of beam: ____
Number of beams needed: ____

Post

Height of deck off ground: ____
Posts spacing: ____
Number of posts needed: ____

Decking:

Material: ____
Size desired: ____ x ____

Footings: (42" min. depth)

Diameter of footing: ____

OPEN DECK CONSTRUCTION (Not to scale)

