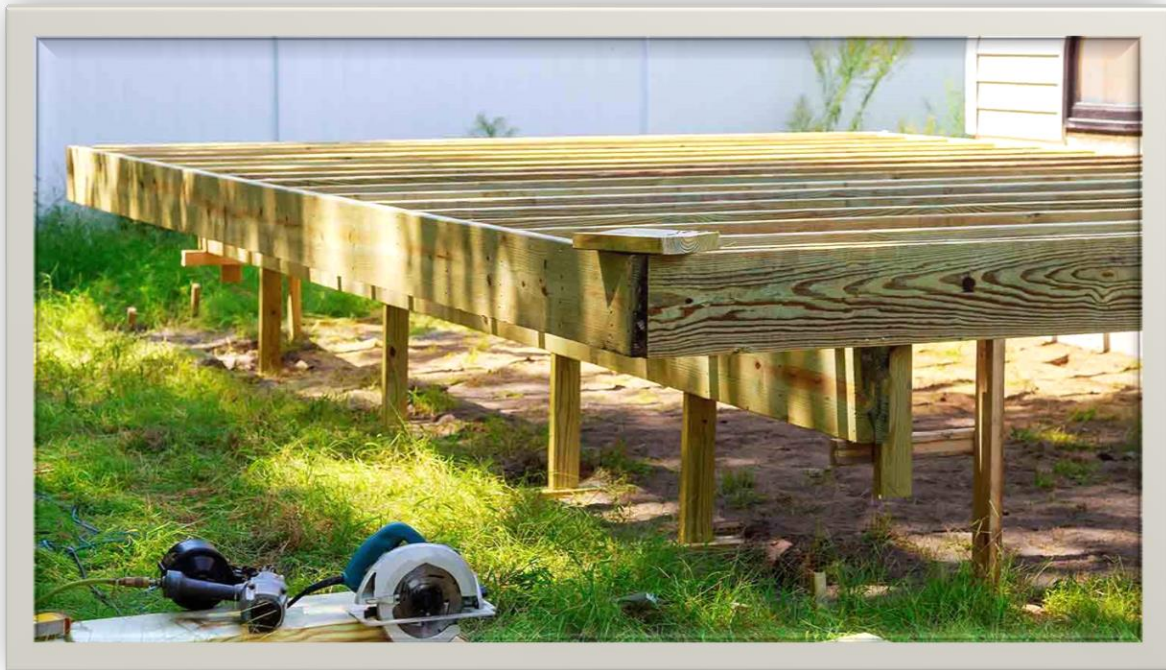


## City of Greenwood, Indiana

### 2020 Indiana Residential Code-Based Prescriptive Deck Construction Guide



A reference guide from the City of Greenwood, Indiana's  
Community Development Services Building Department

Created: August 2023



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## General Information Notes

1. This guide is using the 2020 Indiana Residential Code (2018 International Residential Code with Indiana Amendments), this is referenced in the rest of this guide as “Residential Building Code”.
2. In this guide we tried to cover all the basic construction/design code information, but this is not meant to be exhaustive list of the all the Deck code requirements.
3. All lumber shall be No. 2 grade or better, preservative-treated or approved naturally durable lumber, Preservative-treated wood products in contact with the ground shall be labeled for that use, have identifying grade marks of an approved lumber grading or inspection bureau agency.
4. If you are using Composite Decking and Railings, you need to not only to follow the Residential Building Code, but also follow the Manufacturer’s recommendations and specifications for installation of these products.
5. Nails used are to meet the requirements of *ASTM F1667*, hot-dipped galvanized per *ASTM A153*.
6. Bolts, Lags & Screws used are to meet the requirements of *ASTM A307* (Bolts), *ASTM A563* (nuts), *ASTM F844* (washers). All fasteners finish/coatings to be hot-dipped galvanized per *ASTM A153* or mechanically-galvanized per *ASTM B695*, Class 55 or 410 stainless steel.
7. Other Metal Fasteners are to meet the requirements of *ASTM A653* type G185 zinc coated galvanized steel or post hot-dipped galvanized per *ASTM A123*.
8. All Metal connectors are to meet the requirements of *ASTM A653* type G185 zinc coated galvanized steel or post hot-dipped galvanized per *ASTM A123*.
9. All Fasteners and connectors shall be of the same corrosion-resistant material.
10. All other coated or non-ferrous fasteners or hardware shall be approved by the City of Greenwood Building Department for use.
11. Wood Decks supporting large concentrated loads like Hot Tubs, Pools, Spas are beyond the scope of this guide and must be Design Professional designed and engineered.
12. All Flashing materials used must be corrosion-resistant metal of nominal thickness of 0.019-inch or approved non-metallic material, Aluminum metal is not to be used on preservative-treated wood.
13. Decks shall not be occupied until the deck Passes the Final Inspection by the City of Greenwood Building Department.



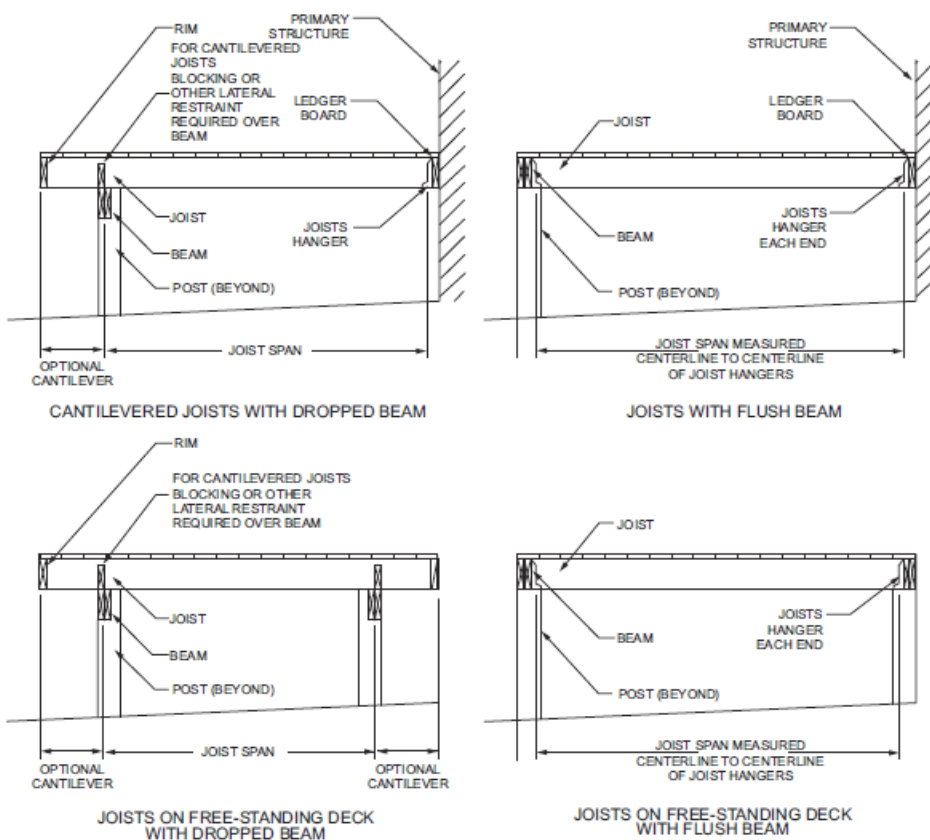
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## Deck Framing:

We suggest you start by creating a Framing Plan for your deck project which shows the deck band board frame infilled with deck joist framing. Figure R507.6 of the Residential Building Code show Section Views of the different Deck Framing Options with Joist Spans defined. Use the Table R507.6 of the Residential Building Code for the Joist Species, Size and Spacing and their associated maximum spans & cantilevers. You will need to base your deck design on what species is available and you will be using for your deck. Now in Indiana the predominant wood species readily available at local lumberyards is "Spruce-Pine Fir", usually you will have to special order "Southern Pine".

Figure R507.6 Typical Deck Joist Spans:



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**Table R507.6 Deck Joist Spans For Common Lumber Species:**

SPECIES*	SIZE	ALLOWABLE JOIST SPAN <sup>a</sup>			MAXIMUM CANTILEVER <sup>c,1</sup>		
		SPACING OF DECK JOISTS (Inches)			SPACING OF DECK JOISTS WITH CANTILEVERS <sup>c</sup> (Inches)		
		12	16	24	12	16	24
Southern pine	2 x 6	9-11	9-0	7-7	1-3	1-4	1-6
	2 x 8	13-1	11-10	9-8	2-1	2-3	2-5
	2 x 10	16-2	14-0	11-5	3-4	3-6	2-10
	2 x 12	18-0	16-6	13-6	4-6	4-2	3-4
Douglas fir-larch <sup>d</sup> , hem-fir <sup>d</sup> , spruce-pine-fir <sup>d</sup> ,	2 x 6	9-6	8-8	7-2	1-2	1-3	1-5
	2 x 8	12-6	11-1	9-1	1-11	2-1	2-3
	2 x 10	15-8	13-7	11-1	3-1	3-5	2-9
	2 x 12	18-0	15-9	12-10	4-6	3-11	3-3
Redwood, western cedars, ponderosa pine <sup>e</sup> , red pine <sup>e</sup>	2 x 6	8-10	8-0	7-0	1-0	1-1	1-2
	2 x 8	11-8	10-7	8-8	1-8	1-10	2-0
	2 x 10	14-11	13-0	10-7	2-8	2-10	2-8
	2 x 12	17-5	15-1	12-4	3-10	3-9	3-1

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. No. 2 grade with wet service factor.

b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360.

c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied to end.

d. Includes incising factor.

e. Northern species with no incising factor.

f. Cantilevered spans not exceeding the nominal depth of the joist are permitted.

### Deck Support Framing:

Next, we suggest you work on the support framing for your deck, as shown in Figure R507.6 of the Residential Building Code, there are a few different deck support options. So you will need to pick the option you will be using: Self-Supporting with a Cantilever, Self-Supporting without a Cantilever, Ledger-Attached to house with a Cantilever or Ledger-Attached to house without a Cantilever. Then you will need to define your Girder Beam(s) and Support Post layout. If this deck is a story above grade (i.e. over walkout basement, out a 2<sup>nd</sup> floor door) your minimum post size will most likely will require a 6x6 Post, see Table R507.4 of the Residential Building Code for specific code requirements. If at or near grade minimum post size is a 4x4 Post. Then you need to determine a maximum post clear span for supporting your girder beam(s), use the Table R507.5 of the Residential Building Code to reference your girder beam Species & Size for proper Post spacing.

**Table R507.4 Deck Post Height**

DECK POST SIZE	MAXIMUM HEIGHT <sup>a,b</sup> (feet-inches)
4 x 4	6-9 <sup>c</sup>
4 x 6	8
6 x 6	14
8 x 8	14



**Table R507.5 Deck Beam Span Lengths**

SPECIES <sup>e</sup>	SIZE <sup>d</sup>	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	1-2 x 6	4-11	4-0	3-7	3-3	3-0	2-10	2-8
	1-2 x 8	5-11	5-1	4-7	4-2	2-10	3-7	3-5
	1-2 x 10	7-0	6-0	5-5	4-11	4-7	4-3	4-0
	1-2 x 12	8-3	7-1	6-4	5-10	5-5	5-0	4-9
	2-2 x 6	6-11	5-11	5-4	4-10	4-6	4-3	4-0
	2-2 x 8	8-9	7-7	6-9	6-2	5-9	5-4	5-0
	2-2 x 10	10-4	9-0	8-0	7-4	6-9	6-4	6-0
	2-2 x 12	12-2	10-7	9-5	8-7	8-0	7-6	7-0
	3-2 x 6	8-2	7-5	6-8	6-1	5-8	5-3	5-0
	3-2 x 8	10-10	9-6	8-6	7-9	7-2	6-8	6-4
	3-2 x 10	13-0	11-3	10-0	9-2	8-6	7-11	7-6
3-2 x 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10	
Douglas fir-larch <sup>f</sup> , hem-fir <sup>f</sup> , spruce-pine-fir <sup>f</sup> , redwood, western cedars, ponderosa pine <sup>f</sup> , red pine <sup>f</sup>	3 x 6 or 2-2 x 6	5-5	4-8	4-2	3-10	3-6	3-1	2-9
	3 x 8 or 2-2 x 8	6-10	5-11	5-4	4-10	4-6	4-1	3-8
	3 x 10 or 2-2 x 10	8-4	7-3	6-6	5-11	5-6	5-1	4-8
	3 x 12 or 2-2 x 12	9-8	8-5	7-6	6-10	6-4	5-11	5-7
	4 x 6	6-5	5-6	4-11	4-6	4-2	3-11	3-8
	4 x 8	8-5	7-3	6-6	5-11	5-6	5-2	4-10
	4 x 10	9-11	8-7	7-8	7-0	6-6	6-1	5-8
	4 x 12	11-5	9-11	8-10	8-1	7-6	7-0	6-7
	3-2 x 6	7-4	6-8	6-0	5-6	5-1	4-9	4-6
	3-2 x 8	9-8	8-6	7-7	6-11	6-5	6-0	5-8
	3-2 x 10	12-0	10-5	9-4	8-6	7-10	7-4	6-11
	3-2 x 12	13-11	12-1	10-9	9-10	9-1	8-6	8-1

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. Ground snow load, live load = 40 psf, dead load = 10 psf, L/Δ = 360 at main span, L/Δ = 180 at cantilever with a 220-pound point load applied at the end.  
b. Beams supporting deck joists from one side only.  
c. No. 2 grade, wet service factor.  
d. Beam depth shall be greater than or equal to depth of joists with a flush beam condition.  
e. Includes incising factor.  
f. Northern species. Incising factor not included.  
g. Beam cantilevers are limited to the adjacent beam's span divided by 4.

If the girder beam is more than one member, these members are to be fastened together & Joist-to-Girder Beam connection per Table R602.3(1) of the Residential Building Code requirements. Girder to Post connection are to be either 2- 1/2" diameter Thru-Bolts(not Carriage Bolts)/Approved Equivalent Connector or approved Post-to-Beam Metal Connector, further detailed in Figure R507.5.1(1) and Figure R507.5.1(2) of the Residential Building Code.

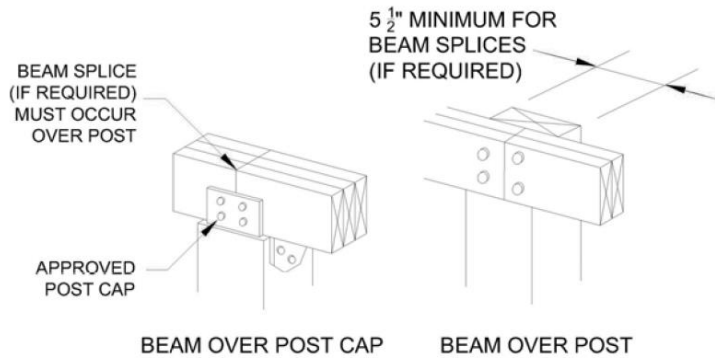
**Table R602.3(1) Fastening Schedule**

21	Joist to sill, top plate or girder	4-8d box (2 1/2" x 0.113"); or 3-8d common (2 1/2" x 0.131"); or 3-10d box (3" x 0.128"); or 3-3" x 0.131" nails	Toe nail
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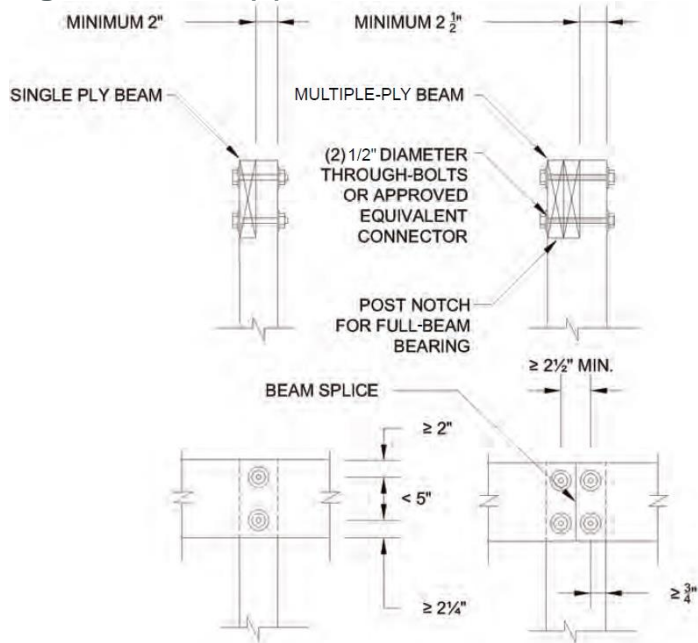


27	Built-up girders and beams, 2-inch lumber layers	20d common (4" × 0.192"); or	Nail each layer as follows: 32" o.c. at top and bottom and staggered.
		10d box (3" × 0.128"); or 3" × 0.131" nails	24" o.c. face nail at top and bottom staggered on opposite sides
		And: 2-20d common (4" × 0.192"); or 3-10d box (3" × 0.128"); or 3-3" × 0.131" nails	Face nail at ends and at each splice

**Figure R507.5.1(1) Deck Beam To Post**



**Figure R507.5.1(2) Notched Post-To-Beam Connection**



***If Using a Ledger Connection to the House:***

If you will be planning to attach to your deck to the house, this must have Post Footings to Frost, this cannot be anchored to or through masonry veneer or to a Cantilevered Floor System. If you have a masonry veneer and you would still like to attach the deck to the house you options are: Add a steel lintel to support the masonry

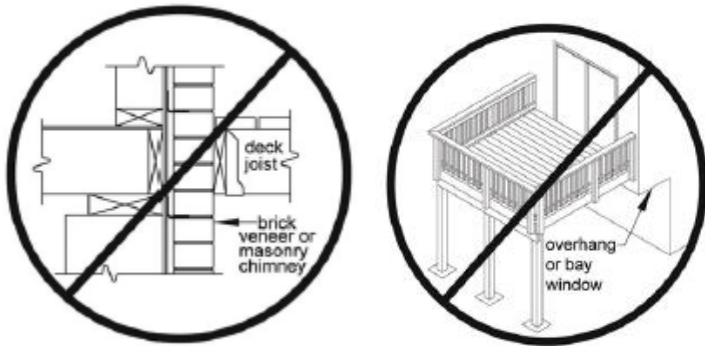


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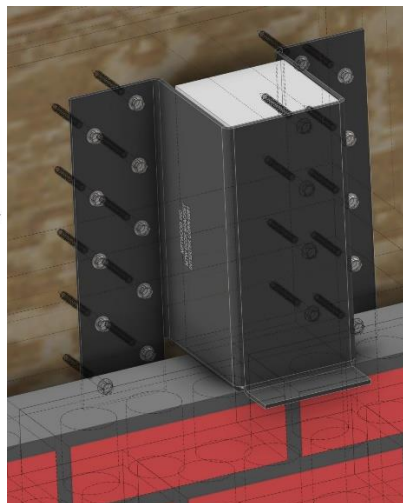
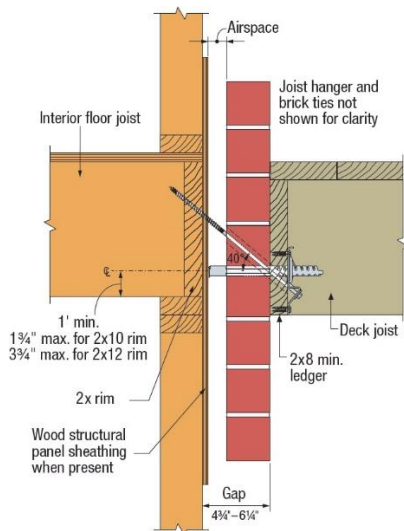
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veneer above the ledger and remove the masonry veneer at Ledger connection and connect directly to the house framing; remove masonry veneer and add solid blocking back to house framing; or another engineered product for this application-see examples below. If you still want to attach deck to a Cantilevered Floor System you will need to submit a State Registered Design Professional signed & sealed design drawing and calculations. Then you need to determine Ledger Attachment Connection Type & Spacing, you can reference the Table R507.9.1.3(1) of the Residential Building Code for fastener type & spacing based on the Joist Span being supported by this Ledger. These fasteners are to be installed per Table R507.9.1.3(2), Figure R507.9.1.3(1) & Figure R507.9.1.3(2) of the Residential Building Code. Your Ledger must be properly flashed to prevent water from getting onto or behind Ledger framing, see Flashing examples below.

**Prohibited Ledger Example Attachments:**



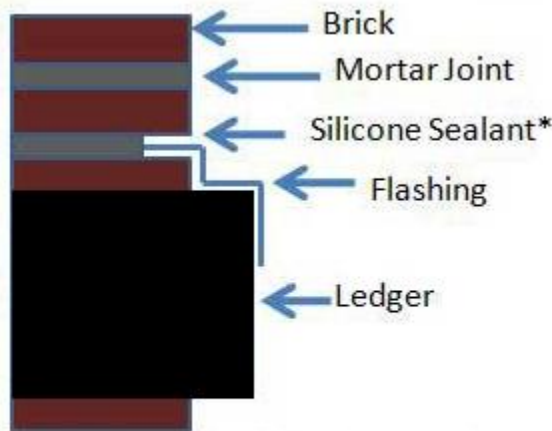
**Code-Approved Ledger Attachments To Masonry Veneer Examples:**



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### Ledger Flashing Examples:



\*Grind out 1/4" to 1/2" of mortar, insert flashing, and seal with clear silicone

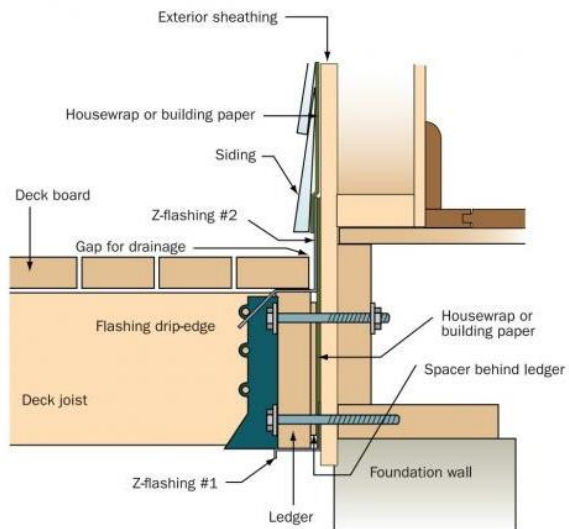


Table R507.9.1.3(1) Deck Ledger Connections To Band Joist

CONNECTION DETAILS	JOIST SPAN						
	6' and 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'
	On-center spacing of fasteners						
1/2-inch diameter lag screw with 1/2-inch maximum sheathing <sup>c, d</sup>	30	23	18	15	13	11	10
1/2-inch diameter bolt with 1/2-inch maximum sheathing <sup>d</sup>	36	36	34	29	24	21	19
1/2-inch diameter bolt with 1-inch maximum sheathing <sup>e</sup>	36	36	29	24	21	18	16

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

- a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- b. Snow load shall not be assumed to act concurrently with live load.
- c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- d. Sheathing shall be wood structural panel or solid sawn lumber.
- e. 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.

Table R507.9.1.3(2) Placement of Lag Screws and Bolts in Deck Ledgers & Band Joists

MINIMUM END AND EDGE DISTANCES AND SPACING BETWEEN ROWS				
	TOP EDGE	BOTTOM EDGE	ENDS	ROW SPACING
Ledger <sup>a</sup>	2 inches <sup>d</sup>	3/4 inch	2 inches <sup>b</sup>	1 5/8 inches <sup>b</sup>
Band Joist <sup>c</sup>	3/4 inch	2 inches	2 inches <sup>b</sup>	1 5/8 inches <sup>b</sup>

For SI: 1 inch = 25.4 mm.

- a. Lag screws or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.9.1.3(1).
- b. Maximum 5 inches.
- c. For engineered rim joists, the manufacturer's recommendations shall govern.
- d. The minimum distance from bottom row of lag screws or bolts to the top edge of the ledger shall be in accordance with Figure R507.9.1.3(1).

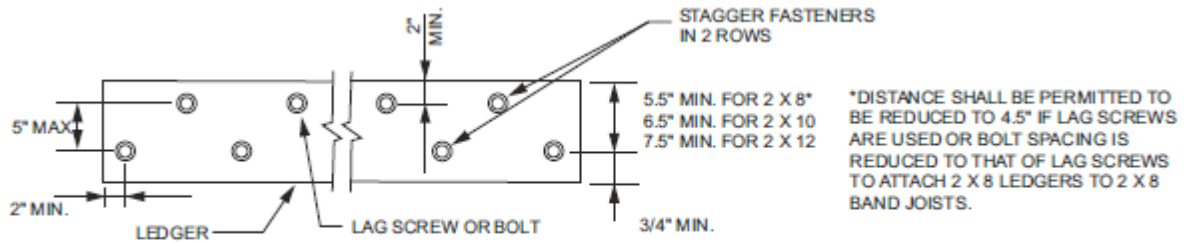


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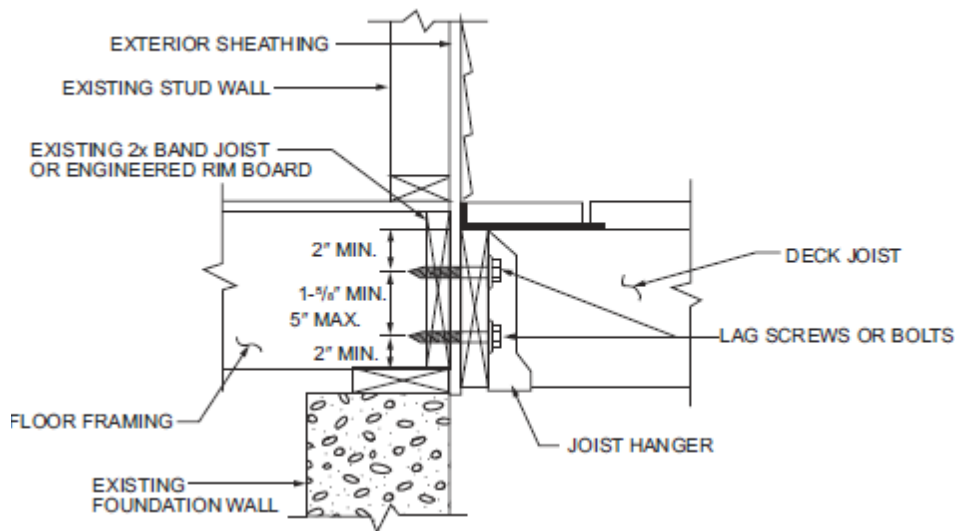


**Figure R507.9.1.3(1) Placement of Lag Screws and Bolts in Ledgers**

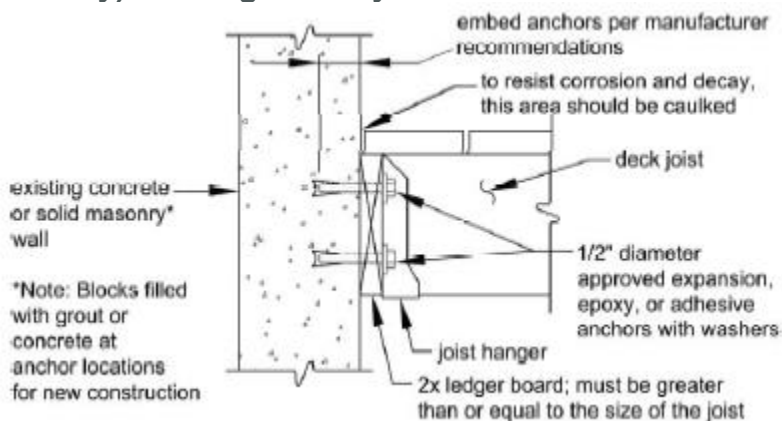


For SI: 1 inch = 25.4 mm.

**Figure R507.9.1.3(2) Placement of Lag Screws and Bolts in Band Joists**



**Figure 15 Attachment of Ledger Board to Foundation Wall (Concrete or Solid Masonry) This Figure is by American Wood Council**



Joist-to-Band board/Rim Joist connection is to be done by either Table R602.3(1) of the Residential Building Code or with metal Joist Hangers with fasteners to be used per manufacturer requirements/recommendations.



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**Table R602.3(1) Fastening Schedule**

26	Band or rim joist to joist	3-16d common (3½" × 0.162") 4-10 box (3" × 0.128"), or 4-3" × 0.131" nails; or 4-3" × 14 ga. staples, 7/16" crown	End nail
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**Deck Footings:**

Ledger-Attached Deck Footings connected to the main structure that has footings to Frost Depth must also have deck footings to Frost Depth, which for Greenwood is minimum of 30" below surrounding grade, footings to be sized per Tributary Area minimum. If this deck is Self-Supporting and not attached to the main structure are to have footings at grade. All footings shall be sized per Tributary Area Calculation and directly bear on solid soil bearing, not on soils that are compressible or shifting, loose or mucky. Posts must be securely anchored to footings to resist uplift forces.

**Calculating Footing Tributary Area:**

The code determines the size of the Deck Footings based determining the Tributary Area size you need to use the following Equation and associated Diagram:

Eq. B-1 = A (center of post) = (1/2 JL + JO)(BL)

Eq. B-2 = A (center of post) = (1/2 JL + JO)(1/2 BL + BO)

**Tributary Area Diagram:**

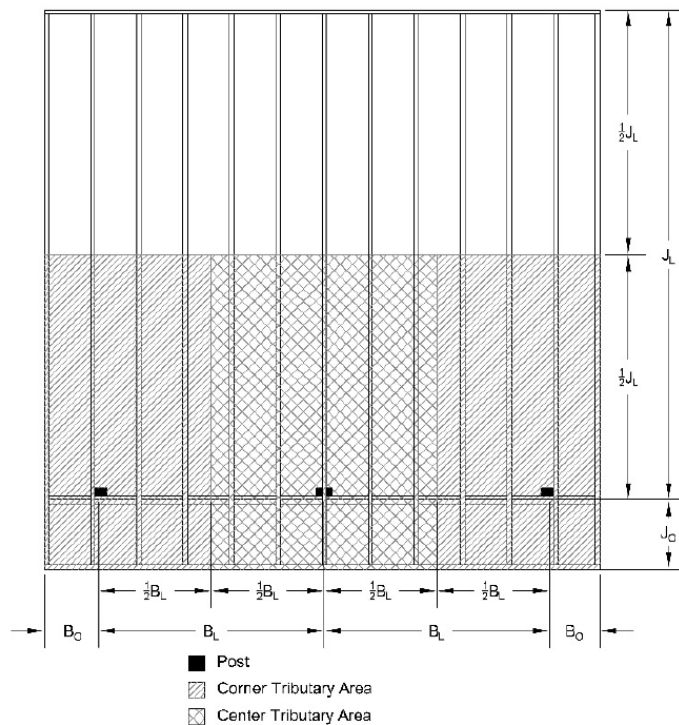


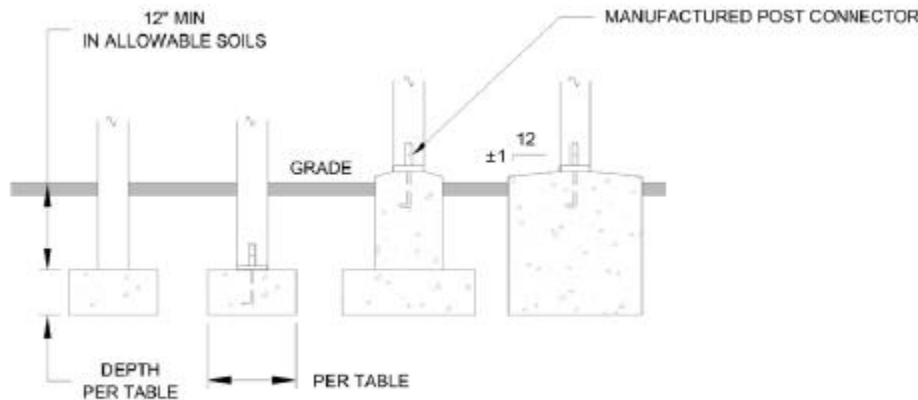
Table R507.3.1 Minimum Footing Size for Decks

LIVE OR GROUND SNOW LOAD <sup>b</sup> (psf)	TRIBUTARY AREA (sq. ft.)	1500 <sup>a</sup>		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	20	12	14	6
	40	14	16	6
	60	17	19	6
	80	20	22	7
	100	22	25	8
	120	24	27	9
	140	26	29	10
160	28	31	11	

TABLE R507.3.1  
MINIMUM FOOTING SIZE FOR DECKS

LIVE OR GROUND SNOW LOAD <sup>b</sup> (psf)	TRIBUTARY AREA (sq. ft.)	LOAD BEARING VALUE OF SOILS <sup>a,c,d</sup> (psf)											
		1500 <sup>a</sup>			2000 <sup>a</sup>			2500 <sup>a</sup>			≥ 3000 <sup>a</sup>		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)	Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	20	12	14	6	12	14	6	12	14	6	12	14	6
	40	14	16	6	12	14	6	12	14	6	12	14	6
	60	17	19	6	15	17	6	13	15	6	12	14	6
	80	20	22	7	17	19	6	15	17	6	14	16	6
	100	22	25	8	19	21	6	17	19	6	15	17	6
	120	24	27	9	21	23	7	19	21	6	17	19	6
	140	26	29	10	22	25	8	20	23	7	18	21	6
160	28	31	11	24	27	9	21	24	8	20	22	7	

Figure R507.3 Deck Posts To Footing Connection



NOTE:  
POSTS MUST BE CENTERED ON OR IN FOOTING

If this deck is a story above grade with support posts to grade these footers are to be larger per Table R403.2 of the Residential Building Code for support these increased point loads due to height: 4x4 Posts requires a min. 2'-0" x 2'-0" x 8"; 6x6 Posts requires a min. of 4'-0 x 4'-0" x 16"; 8x8 Posts requires a min. of 4'-3" x 4'-3" x 17".



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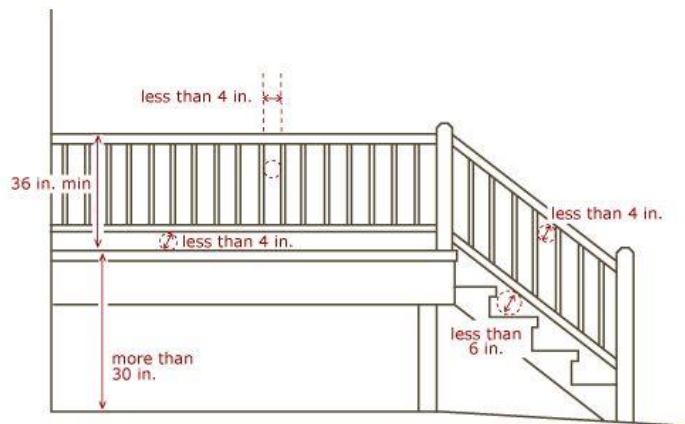
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### Deck Guardrails (if applicable):

When the Deck is greater than 30" above surrounding grades then you will be required to install a Guardrail(s). The Guardrails must be a min. of 36" high, horizontal and vertical spindles/rails spacing has to be less than 4". On Deck Stairs the triangular opening formed by the tread, riser and bottom guardrail has to be less than a 6" sphere in size, see Guardrail Example Detail. The Rail Posts must be anchored to the deck framing to resist a 200 lb. force from any direction, if posts are wood they must have a min. 2- 1/2" diameter thru-bolts with washers 2" from top and bottom of the deck frame, mounted either outside or inside the deck frame.

### **Guardrail Example Detail:**



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