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# Typical Deck Details

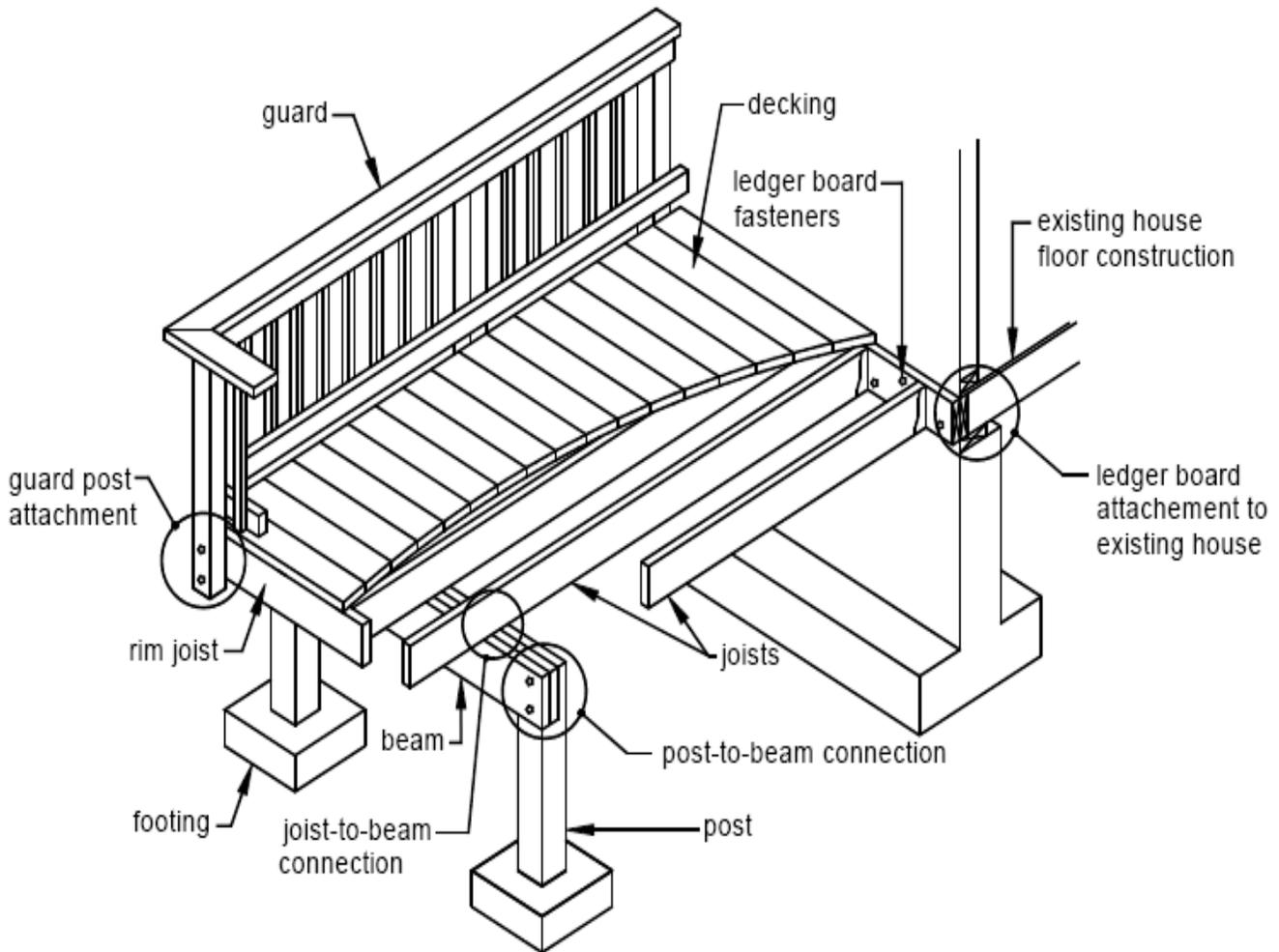
Based on the 2015 Virginia Residential Code



The design details in this document apply to residential decks only. Framing requirements are limited to single span, single level decks. Construction must not deviate from the details herein unless prior approval is obtained by the county.

***THIS GUIDE IS PART OF THE APPROVED PLAN.  
A COPY OF THIS DOCUMENT MUST BE ON THE JOB SITE  
AND AVAILABLE DURING EACH REQUIRED INSPECTION.***

# Typical Deck Details



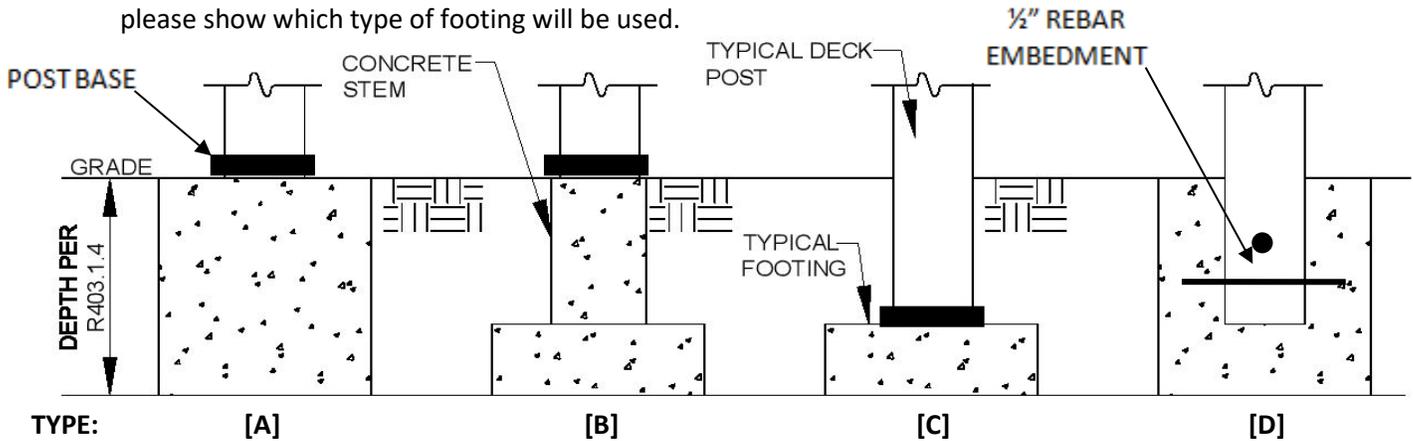
All residential decks constructed in Page County must comply with the 2015 International Residential Code (IRC) and the 2015 Virginia Uniform Statewide Building Code amendments to the 2015 IRC. This guide is for general assistance and specific questions and concerns must be addressed on **your submitted construction drawings**. To apply for a building permit you will need two sets of construction drawings. You will be asked to provide a copy of your Zoning Approval if your project is located in one of the towns located in Page County. If your project is located in the county, you will be asked to complete a **Zoning Application** when you apply for your building permit. You will also be asked to provide all contractor information if you are not building this deck yourself.

The following information is provided for your assistance in preparing your construction drawings for review and approval by this office. Any questions may be addressed by calling our office at 540-743-6674.

## FOOTINGS

Footings shall be constructed in accordance with the requirements below:

- Footings shall bear on solid ground at a minimum of 24 inches below grade for frost protection (**R403.1.4**). Footings shall be deeper if solid ground is not found. Bearing conditions must be verified by the Building Inspector prior to placement of concrete.
- (**R403.1.1**) The size of footings supporting piers and columns shall be based on the tributary load and allowable soil pressure in accordance with **Table R401.4.1**.
- Detail below is an illustration of the four types of pier footings that are acceptable. In your submittal drawings, please show which type of footing will be used.

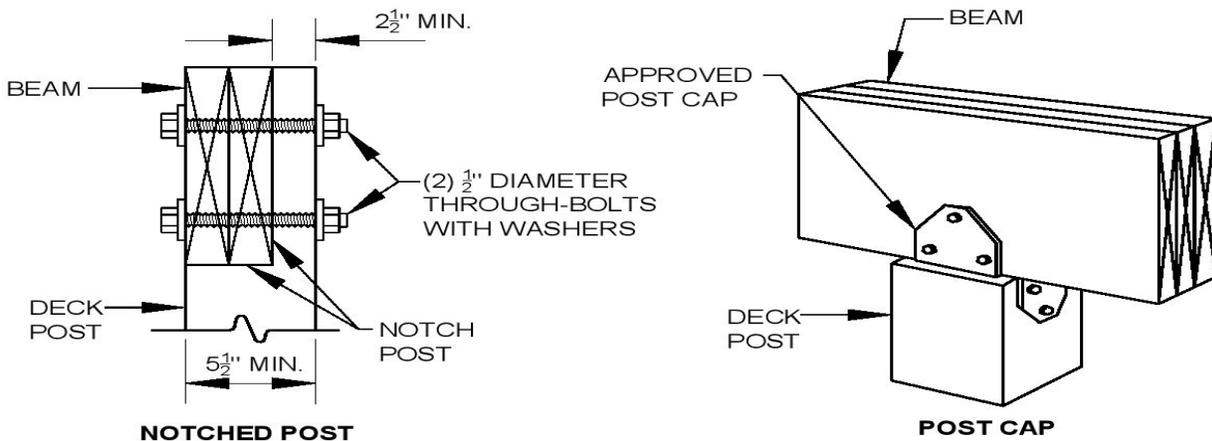


## POSTS

Posts and post connections shall meet the requirements listed below:

- Refer to Table R507.8 for post sizing based on height from grade to underside of deck beam. Posts that are over listed heights require an engineered design.
- Per **R507.8.1**, Posts shall be restrained from lateral displacement at the footing. Lateral restraint shall be provided by manufactured connectors or by minimum post embedment of 12 inches in surrounding soils or concrete piers.
- Deck beam to deck post shall be connected together by either a post cap or by a notched post to accommodate all plied of the deck beam and bolted together in accordance with **Figure R507.7.1**. Do not notch 4x4 posts.

Post Size	Maximum Height
4x4	8'-0"
4x6	8'-0"
6x6	14'-0"



## LEDGER CONNECTION TO HOUSE

Below are the general requirements for ledger boards that are positively connected to the house. Code compliance is critical to ensure the safety and structural stability of your deck. Ledger connections are the leading cause of deck failure.

- Girders supporting deck joists shall not be supported on deck ledgers or band joists. Ledger board shall not be supported on stone or masonry veneer **(R507.2.2)**.
- The ledger board shall be attached in accordance with **Table R507.2**, **Table R507.2.1**, and **Figure R507.2.1 (1)**.
- Deck ledger shall be a minimum of 2x8 pressure-preservative treated No.2 grade lumber.
- 2x2 ledger strips are not permissible. Joists shall have full bearing or in a joist hanger. **(R507.7)**
- It is apparent that we determine what the ledger will be fastened to and if that cannot be verified the deck shall be a self-supporting structure **(R507.2.1 (1))**.
- Deck lateral load devices are required for decks that cannot be positively anchored to withstand lateral movement as specified in **R507.1**. Lateral load devices shall be designed to withstand 1500 pounds and installed in two locations minimum.

**TABLE R507.2: DECK LEDGER CONNECTION TO BAND JOIST<sup>A,B</sup>**  
**(Deck live load = 40 psf, deck dead load = 10 psf, snow load ≤ 40 psf)**

CONNECTION DETAILS	JOIST SPAN						
	6' and less	6'1" - 8'	8'1" - 10'	10'1" - 12'	12'1" - 14'	14'1" - 16'	16'1" - 18'
	On-center spacing of fasteners						
½-inch diameter lag screw with ½-inch maximum sheathing <sup>c,d</sup>	30	23	18	15	13	11	10
½-inch diameter bolt with ½-inch maximum sheathing	36	36	34	29	24	21	19
½-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.

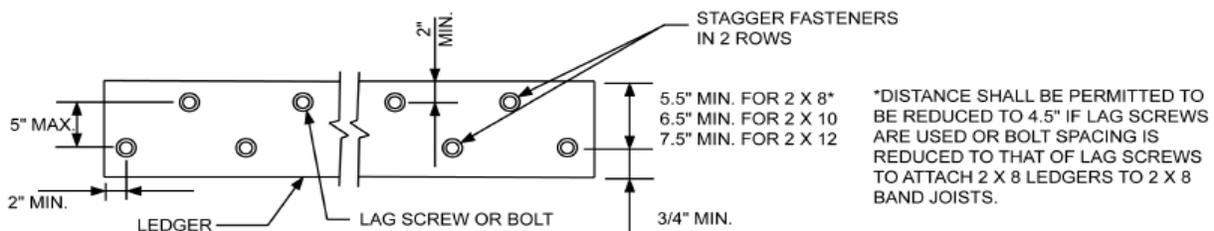
- a. Ledgers shall be flashed in accordance with Section R703.4 to prevent water from contacting the house band joist.
- b. Snow load shall not be assumed to act concurrently with live load.
- c. The tip of the lag screw shall fully extend beyond the inside face of the band joist.
- d. Sheathing shall be wood structural panel or solid saw lumber.
- e. Sheathing shall be permitted to be wood structural panel, gypsum board, fiberboard, lumber or foam sheathing. Up to ½-inch thickness of stacked washers shall be permitted to substitute for up to ½ inch allowable sheathing thickness where combined with wood structural panel or lumber sheathing.

**TABLE R507.2.1: Placement of Lag Screws and Bolts in Deck Ledgers and 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>	¾ inch	2 inches <sup>b</sup>	1 ⅝ inches <sup>b</sup>
Band Joist <sup>c</sup>	¾ inch	2 inches	2 inches <sup>b</sup>	1 ⅝ inches <sup>b</sup>

For SI: 1 inch = 25.4 mm.

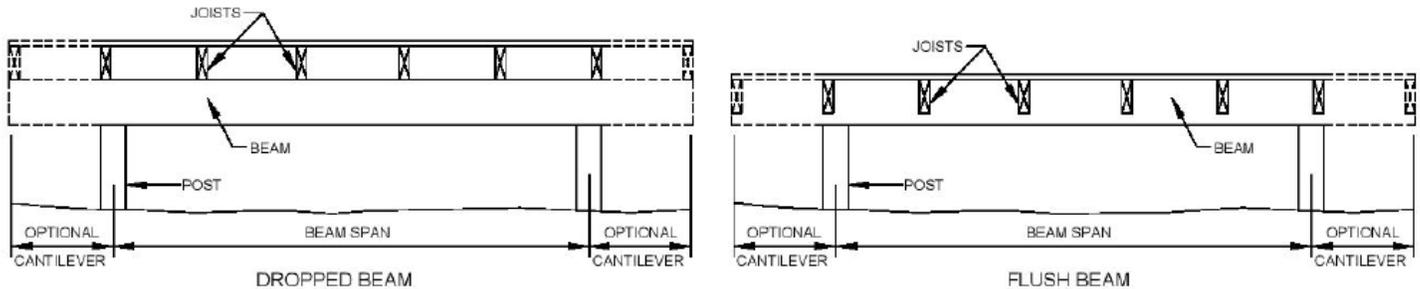
- a. Lag screw or bolts shall be staggered from the top to the bottom along the horizontal run of the deck ledger in accordance with Figure R507.2.1(1).
- b. Maximum 5 inches.
- c. For engineered rim joists, the manufacturer's recommendations shall govern.
- d. The minimum distance from bottom row of lag screws or bolts to the top ledger shall be in accordance with Figure R507.2.1(1).



## DECK BEAMS

Beams shall be designed and assembled in accordance with the requirements below:

- As shown in **Figure R507.6**, beam span is measured between the centerlines of the two adjacent posts and does not include the overhangs.
- Girders supporting deck joists shall not be supported on deck ledgers or band joists. **R507.2.2.**
- Beam size is determined using **Table R507.6**. Flush beams shall be greater or equal to the joist depth.
- As shown in **Figure R507.6**, beams may overhang past the center of the post up to one-fourth of the actual beam span.
- Beam plies shall be fastened with two rows of 10d nails minimum of 16 inches on center along each edge. This is for up to 3 plies.
- Deck beams with splices shall be located at an interior post location.



**FIGURE R507.6  
TYPICAL DECK BEAM SPANS**

**TABLE R507.6: DECK BEAM SPAN LENGTHS<sup>a,b</sup> (ft. – in.)**

SPECIES <sup>c</sup>	SIZE <sup>d</sup>	DECK JOIST SPAN LESS THAN OR EQUAL TO: (feet)						
		6	8	10	12	14	16	18
Southern pine	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
Douglas fir-larch <sup>e</sup> , hem-fir <sup>e</sup> , spruce-pine-fir <sup>e</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

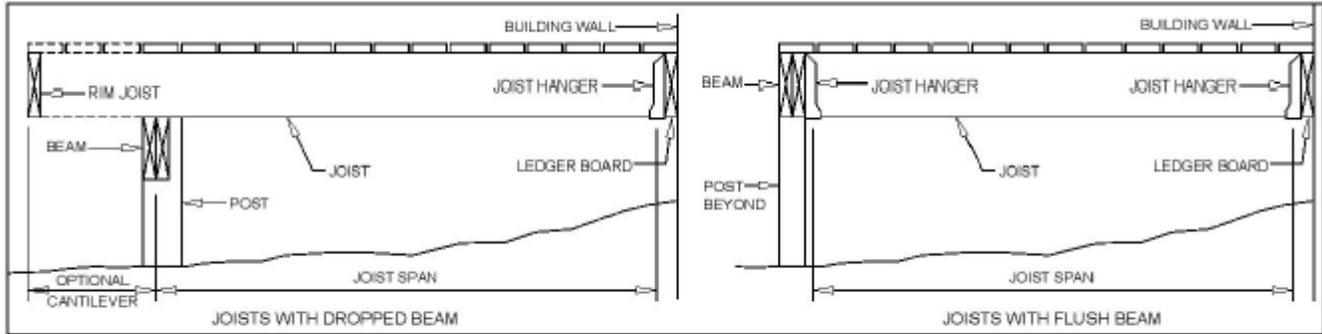
For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- Ground snow load, live load = 40 psf, dead load = 10 psf,  $L/\Delta = 360$  at main span,  $L/\Delta = 180$  at cantilever with a 220-pound point load applied at the end.
- Beams supporting deck joists from one side only.
- No. 2 grade, wet service factor.
- Beam depth shall be greater than or equal to depth of joists with a flush beam condition.
- Includes incising factor.
- Northern species. Incising factor not included.

## DECK JOISTS

Deck joist shall be designed in accordance with the requirements below:

- Joist span is measured from centerline of bearing at each joist end and does not include the overhangs. Use **Table R507.5** to determine joist size as well as allowable cantilever lengths up to one-fourth of the joist span.
- Refer to **Figure R507.5** for typical joist span details.
- Deck joist shall be supported by deck beam by using joist hangers, or have full bearing on top of the beam. If full bearing on top of the beam, blocking shall be installed between joists to prevent overturning. **R507.7**



**FIGURE R507.5  
TYPICAL DECK JOIST SPANS**

**TABLE R507.5: DECK JOIST SPANS FOR COMMON LUMBER SPECIES (ft. – in.)**

SPECIES <sup>a</sup>	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER <sup>b,f</sup> (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	6-8	6-8	6-8
	2 x 8	13-1	11-10	9-8	10-1	10-1	9-8
	2 x 10	16-2	14-0	11-5	14-6	14-0	11-5
	2 x 12	18-0	16-6	13-6	18-0	16-6	13-6
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	6-3	6-3	6-3
	2 x 8	12-6	11-1	9-1	9-5	9-5	9-1
	2 x 10	15-8	13-7	11-1	13-7	13-7	11-1
	2 x 12	18-0	15-9	12-10	18-0	15-9	12-10
Redwood, western cedars, ponderosa pine <sup>e</sup> , red pine <sup>e</sup>	2 x 6	8-10	8-0	7-0	5-7	5-7	5-7
	2 x 8	11-8	10-7	8-8	8-6	8-6	8-6
	2 x 10	14-11	13-0	10-7	12-3	12-3	10-7
	2 x 12	17-5	15-1	12-4	16-5	15-1	12-4

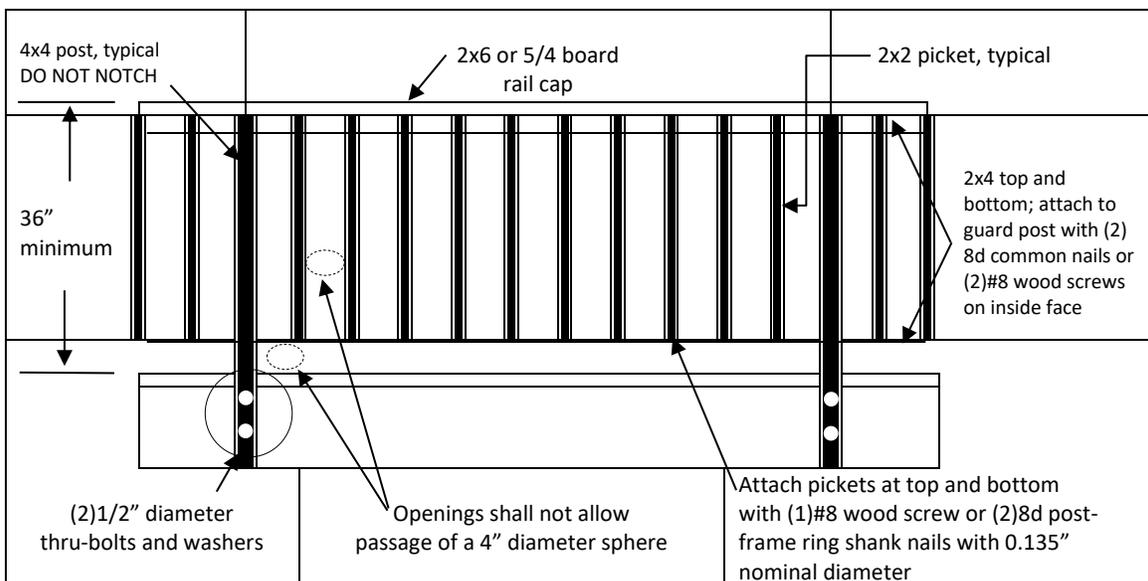
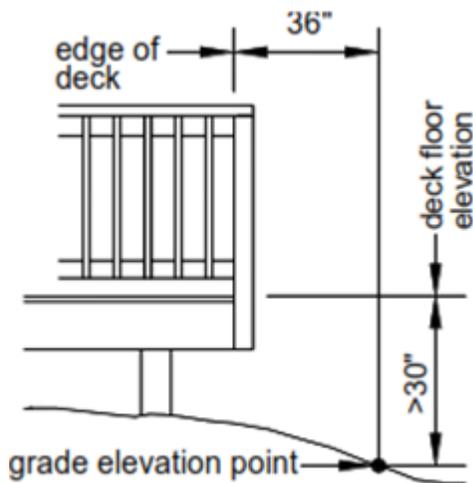
For SI: 1 inch = 25.4 mm, 1 foot = 304.8, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

- No. 2 grade with wet service factor.
- Ground snow load, live load = 40 psf, dead load = 10 psf,  $L/\Delta = 360$ .
- Ground snow load, live load = 40 psf, dead load = 10 psf,  $L/\Delta = 360$  at main span,  $L/\Delta = 180$  at cantilever with a 220-pound point load applied to end.
- Includes incising factor.
- Northern species with no incising factor.
- Cantilevered spans not exceeding the nominal depth of the joist are permitted.

## GUARDING

Guarding shall be installed in accordance with the requirements below:

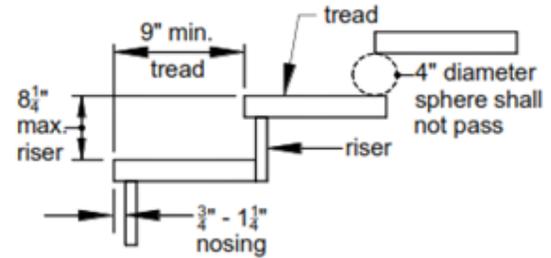
- Guarding is required at decks that are constructed at a height 30" or greater, measured from top of the walking surface to grade. See illustration below. **R3.12.1.1**
- Height of guarding shall be 36" measured vertically above the walking surface to top of the railing. **R312.1.2**
- There shall be no openings that will allow a passage of a 4" sphere between them. **R312.1.3**
- Guard systems with a valid evaluation report from an accredited listing agency are permitted.
- Guard posts shall not be notched. They shall be attached by installing (2) ½" bolts or hold down anchors per manufacturer's specifications.
- Guardrails and posts shall be installed to withstand 200# live load. **Table R301.5**



## STAIRS

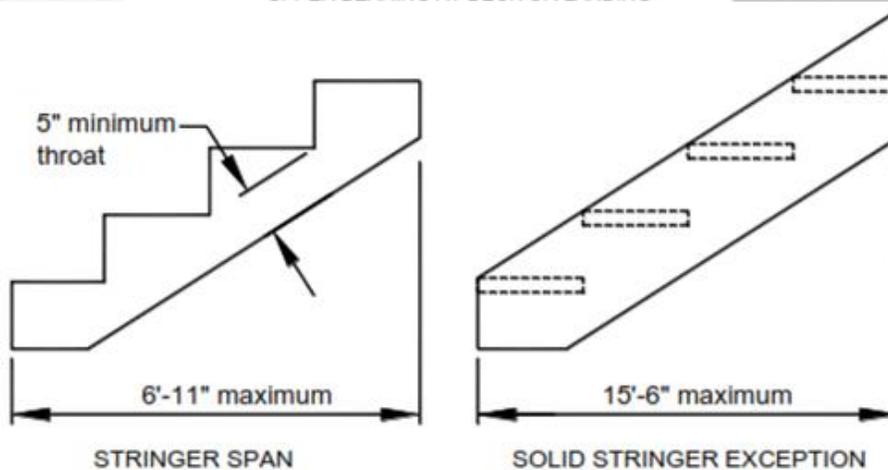
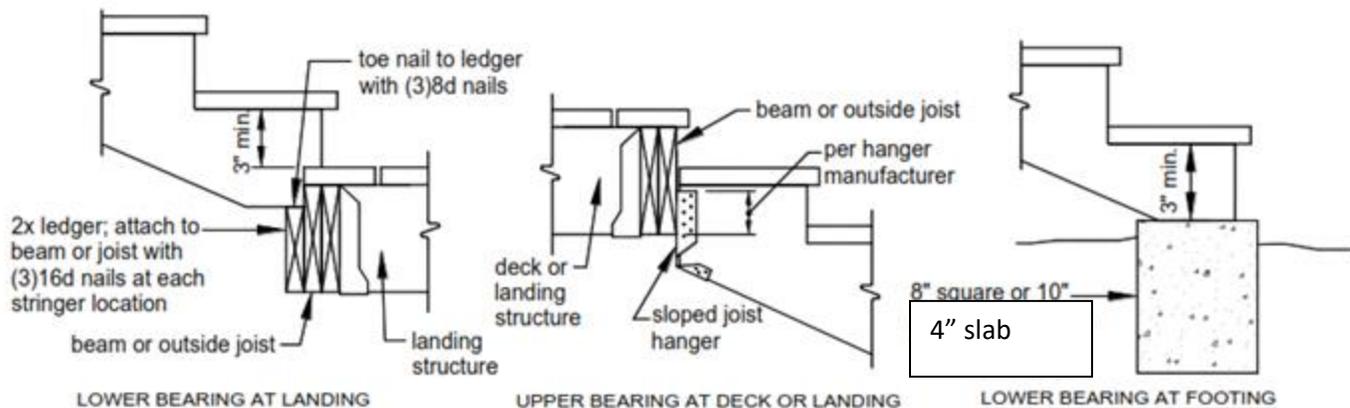
Stairs shall be constructed with the requirements below:

- The minimum stairway width shall be 36". **R311.7.1**
- Stair geometry & opening limitations shall meet the requirements as shown in the detail below. **R311.7.5.1 & R311.7.5.2**
- If the total vertical height of the stairway exceeds 12 feet, then a landing is required. **R311.7.3**
- Landing widths shall be equal to the total width(s) of the stairway(s) it serves. **R311.7.6**
- The triangular opening at the stair formed by the riser, tread and bottom rail of a guard, shall not allow the passage of a 6" diameter sphere. **R312.1.3**



Stair stringers shall be in accordance with the following requirements:

- Stringers shall be of sawn or solid 2x12's complying with the tread and riser geometry requirements.
- Stringers shall bear on footings to support a 40# live load or 300# concentrated load over 4 square inches per **R301.5**, or by the deck or landing they serve. See examples below.
- Stringer span length is measured using the horizontally projected distance between the centerlines of bearing at each end
- The span length of stringer shall not exceed 6 feet-11 inches, and the throat size of cut stringers shall not exceed 5 inches as shown below.
- The span length of a solid stringer with a width equal to 36 inches shall be permitted to have a horizontally projected span up to 15.5 feet when framed solely with two solid stringers. See example below.

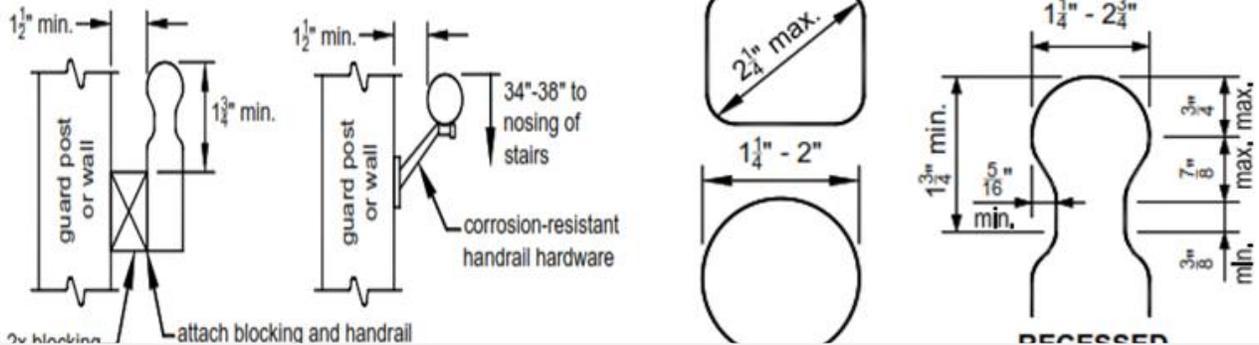
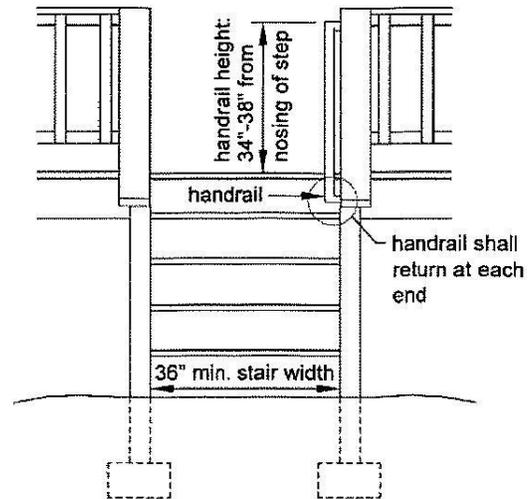


## HANDRAIL

Handrails shall meet the requirements below:

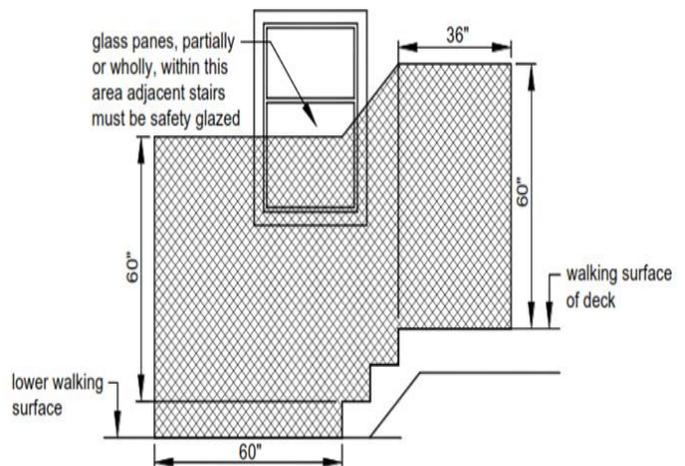
- Handrails are required when there are 4 or more risers. **R311.7.8**
- Handrail height shall be no less than 34 inches and no more than 38 inches, measured vertically from the top of the tread nosing. **R311.7.8.1**
- Handrails shall be continuous for the full length of the flight of the stairs and shall be returned or terminate into a newel post or safety terminal. **R311.7.8.2**
- Grip size of handrail shall be in accordance with examples below or for handrails with a perimeter greater than 6- 1/4" shall have a graspable finger recess area on both sides of the profile. The finger recess shall begin with a distance of 3/4" measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16" within 7/8" inch below the widest portion of the profile. **Refer to R311.7.8.3 Note #2.**

**Figure 33. Miscellaneous Stair Requirements.**



## SAFETY GLAZING

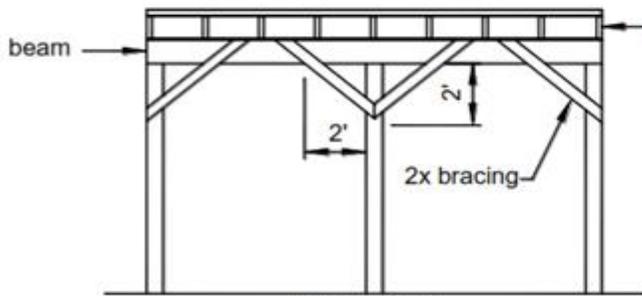
- To reduce injury due to an accidental impact, safety glazing in window and door glass is required when the existing house wall encloses any portion of the deck or acts as a barrier to stairs, landings and areas at the top and bottom of the stairs.
- **Windows adjacent stairway.** Individual panes, partially or wholly located in the hatched area shown in the example, must be safety-glazed. In the absence of safety glazing in a window adjacent a stairway, a stair guard must be constructed to separate the window from the stairway. In the absence of safety glazing in a window adjacent the 36-inch horizontal areas at the top or bottom of the stairs, a guard or horizontal rail must be installed at a height between 34 and 38 inches. The rail must meet the requirements of a stair handrail.



## FREE-STANDING DECKS

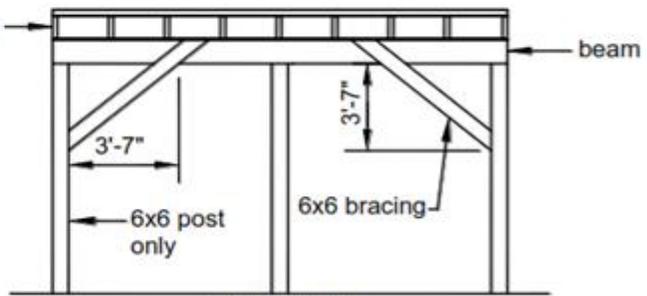
Free-standing decks shall be in accordance with the requirements below or by an engineered design.

- Diagonal bracing shall be required for decks over 8 foot tall and bracing shall be installed at post-beam locations as shown in details below.
- Diagonal bracing shall be 2x members at any post size or 6x6 members at 6x6 posts only.
- Connections of the diagonal bracing shall be in accordance with the illustrations below.
- Please note that if free-standing deck is over 14 foot tall, an engineered design shall be required.



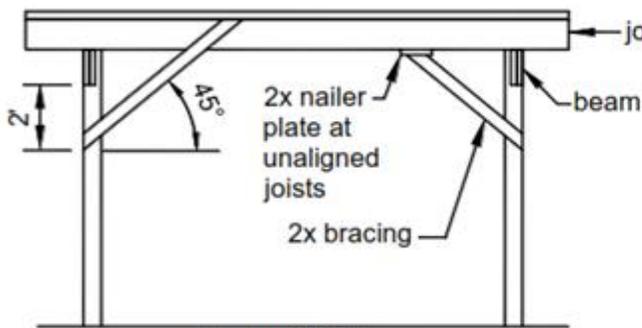
**2x BRACING**

- Place 2x bracing at all beam-post locations.
- Alternate bracing between front and back of 4x4 or 4x6 posts.



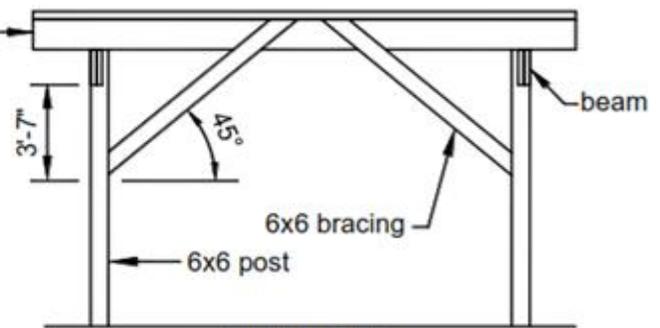
**6x6 BRACING**

- Permitted at 6x6 post locations only.
- Place 6x6 bracing at end posts and on both sides of every other interior post.



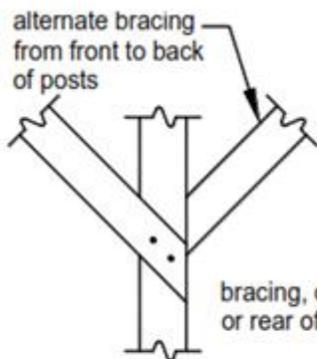
**2x BRACING**

- Place 2x bracing at all joist-post locations.
- Where bracing does not align with a joist, provide 2x nailer plate.

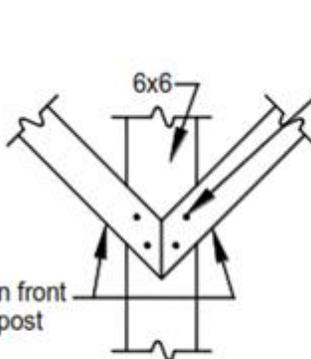


**6x6 BRACING**

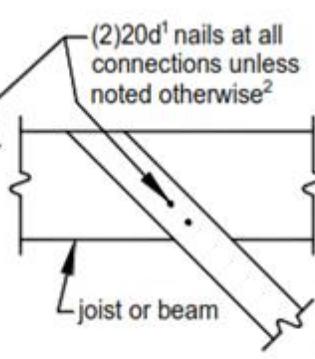
- Permitted at 6x6 post locations only.
- At unaligned joists, notch or add blocking as necessary to accommodate connection.



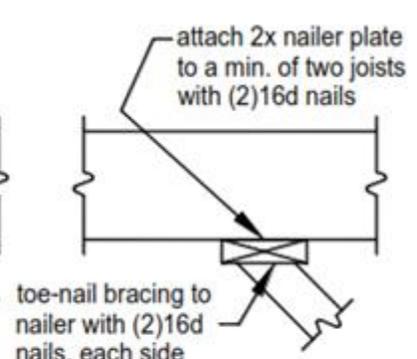
**AT 4x4 OR 4x6 POST**



**AT 6x6 POST**



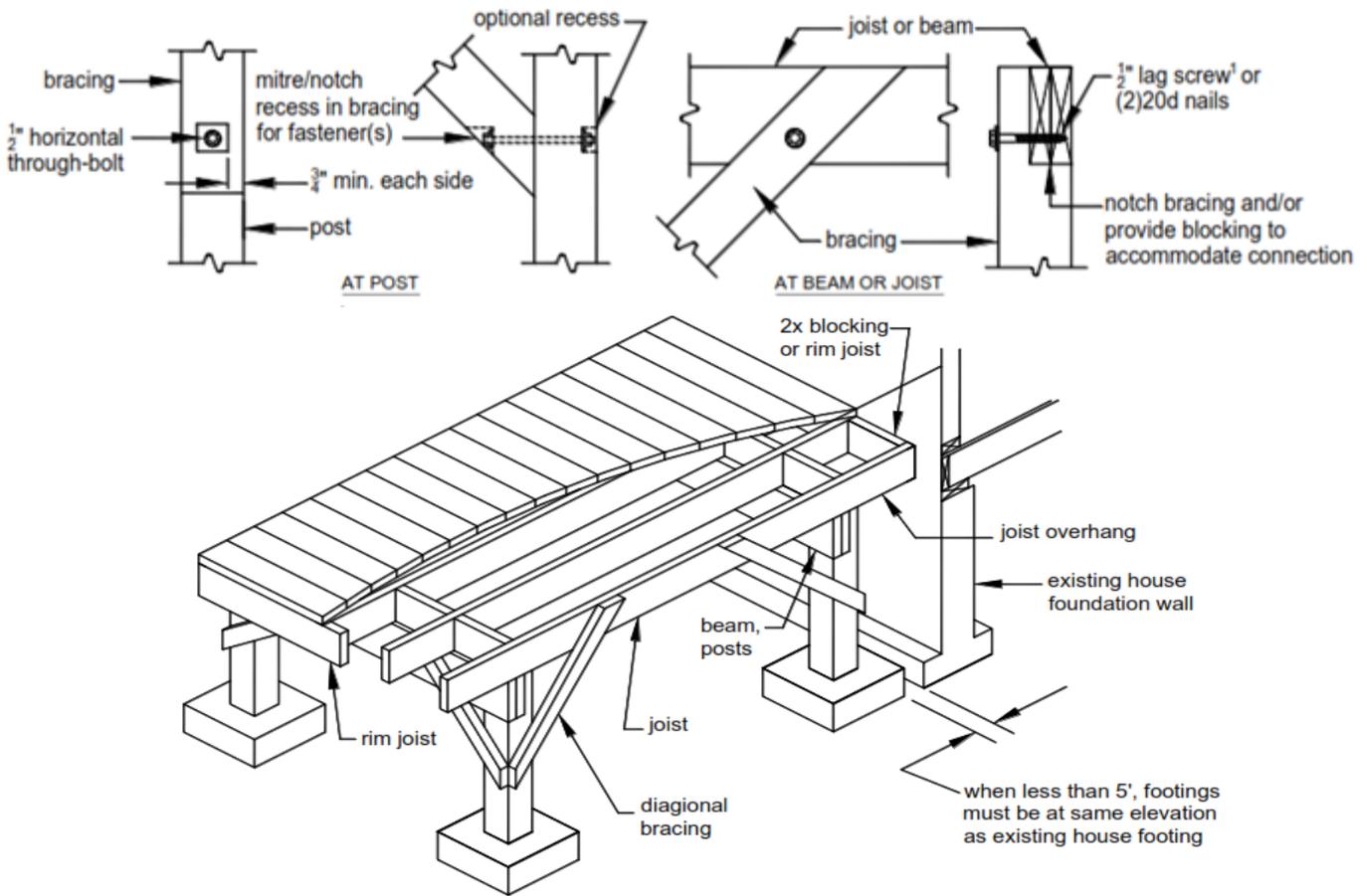
**AT JOIST OR BEAM**



**AT UNALIGNED JOIST**

<sup>1</sup> Nails maybe be substituted with an equal number of the approved wood screws listed in TABLE 7.

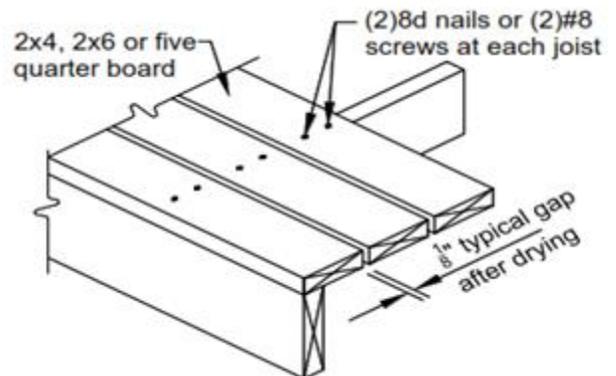
<sup>2</sup> Nails shall have a distance of 3/4 inches to all edges and 1/4 inches to the end of the bracing member.



## DECKING

Wood or wood plastic composite decking shall be installed in accordance with the requirements below:

- Decking shall be 2 inch thick wood, 5/4 inch thick wood, or wood/plastic composite material. **R507.4**
- Wood decking may be placed at a maximum angle of 45 degrees to the joists. **Table R507.4 sub note a**
- Wood/plastic composite decking may be placed at an angle but in accordance with manufacturer's installations instructions. **R507.3.1**
- Refer to **Table R507.4** for maximum joist spacing based off the decking material that will be installed.



**TABLE R507.4**  
**MAXIMUM JOIST SPACING (inches)**

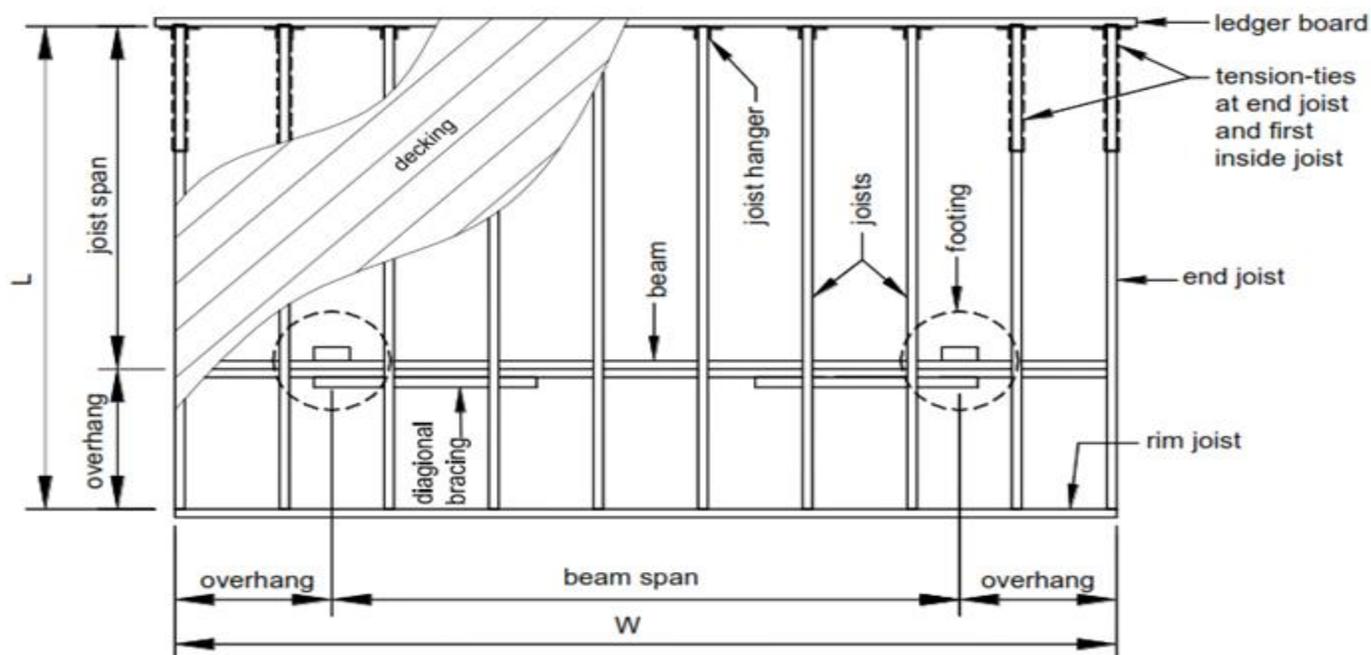
MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM JOIST SPACING	
	PERPENDICULAR TO JOIST	DIAGONAL TO JOIST <sup>a</sup>
5/4-inch thick wood	16	12
2-inch thick wood	24	16
Wood/plastic composite	Per R507.3	Per R507.3

For SI: 1 inch = 25.4 mm

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

## COMPLETE YOUR DECK

Complete your deck: A framing plan shows a bird's eye view of the joist and beam layout, the location of the deck ledger board, diagonal bracing or hold down devices, posts, footings, and the type, size and spacing of the ledger board fasteners. **Please note that a framing plan drawing shall also be provided along with this deck form.**



Size of deck: Length \_\_\_\_\_ Width \_\_\_\_\_ Height above grade \_\_\_\_\_ Guards required? (36") \_\_\_\_\_

Footings: Width \_\_\_\_\_ Thickness (8" min) \_\_\_\_\_ Type: Round  or Square

Post size: \_\_\_\_\_ Connection to footing (see pg 3)  A  B  C  D Post/Beam Connection \_\_\_\_\_

Deck post spacing \_\_\_\_\_ Diagonal Bracing for free-standing deck (yes or no) \_\_\_\_\_

Ledger size: \_\_\_\_\_ Ledger Fastener \_\_\_\_\_ Type of house floor system: Joists EWP Floor Trusses

Beams: Size \_\_\_\_\_ Plies \_\_\_\_\_ Overhang (yes or no) \_\_\_\_\_ If yes, Length (ft – in) \_\_\_\_\_

Joists: Size \_\_\_\_\_ Spacing \_\_\_\_\_ Length (ft – in) \_\_\_\_\_ Species (SYP or SPF) \_\_\_\_\_

Will the joist overhang over the deck beam? Yes or No, If yes, Overhang length (ft-in) \_\_\_\_\_

Floor decking: Type (wood or composite) \_\_\_\_\_ Size \_\_\_\_\_ Perpendicular to joist or diagonal \_\_\_\_\_

Stairs installed: yes or no Number of risers \_\_\_\_\_ Handrail height \_\_\_\_\_ (if required)

Is there any glass within 5 feet of the top or bottom of the stairs? \_\_\_\_\_

Does the house have siding, stone, or masonry veneer? \_\_\_\_\_

Please contact Don Williams at 540-743-6674 or [dwilliams@pagecounty.virginia.gov](mailto:dwilliams@pagecounty.virginia.gov) if you have any questions.