

# Knox County Code Administration & Inspection

## Residential Deck Code Handout

REV. 060821



This handout is a guide and is not all-inclusive and all materials must be installed per the manufacturers' instructions and the 2018 International Residential Code IRC.

- Z-Flashing shall be installed at top of the ledger board and regular flat flashing between the ledger board and the house wall. Flashing shall be continuous corrosion resistance type and installed per manufacturers instructions. This is usually stainless, double hot dipped galvanized, vinyl or copper. Aluminum flashing is not allowed due to the corrosive nature of the treated lumber.
- The house wall ledger board shall be bolted to the house and be the same size as the floor joists or larger.
- The house ledger board shall be bolted (staggered top to bottom) to the house with ½" dia. lag bolts \* or through-bolted with washers that are long enough to fully penetrate the structural member of the house. Bolt spacing shall be as follows:
 

Joist Span	6' and less	Bolt Spacing	30" oc
Joist Span	6'1" to 8'	Bolt Spacing	23" oc
Joist Span	8'1" to 10'	Bolt Spacing	18" oc
Joist Span	10'1" to 12'	Bolt Spacing	15" oc
Joist Span	12'1" to 14'	Bolt Spacing	13" oc
Joist Span	14'1" to 16'	Bolt Spacing	11" oc
Joist Span	16'1" to 18'	Bolt Spacing	10" oc

**Do not bolt to brick.** Center of bolts must be at least 2" from the edge.

- Joist hangers shall be sized and anchored \* in accordance to the joist size and manufacturer's instructions.
- Joists shall be sized per **table 1**.
- Joists are permitted to cantilever ¼ of the joist span or the maximum cantilever length specified in **table 1**, whichever is less.
- Deck beams shall be sized and supported in accordance with **table 4**. Beams must be fully supported by and structurally anchored to posts. Beam plies shall be fastened with two rows of 3" 10d nails minimum 16" on center along each edge.
- Deck beams are permitted to cantilever at each end up to ¼ of the allowable beam span.
- Posts shall be sized in accordance with **table 2**. All posts must be structurally anchored to the footing.
- Footings shall be sized in accordance with **table 3**.

**\* ALL FASTENERS, HANGERS, AND NAILS ARE TO BE DOUBLE HOT DIPPED GALVANIZED OR STAINLESS STEEL.**

### Guardrails:

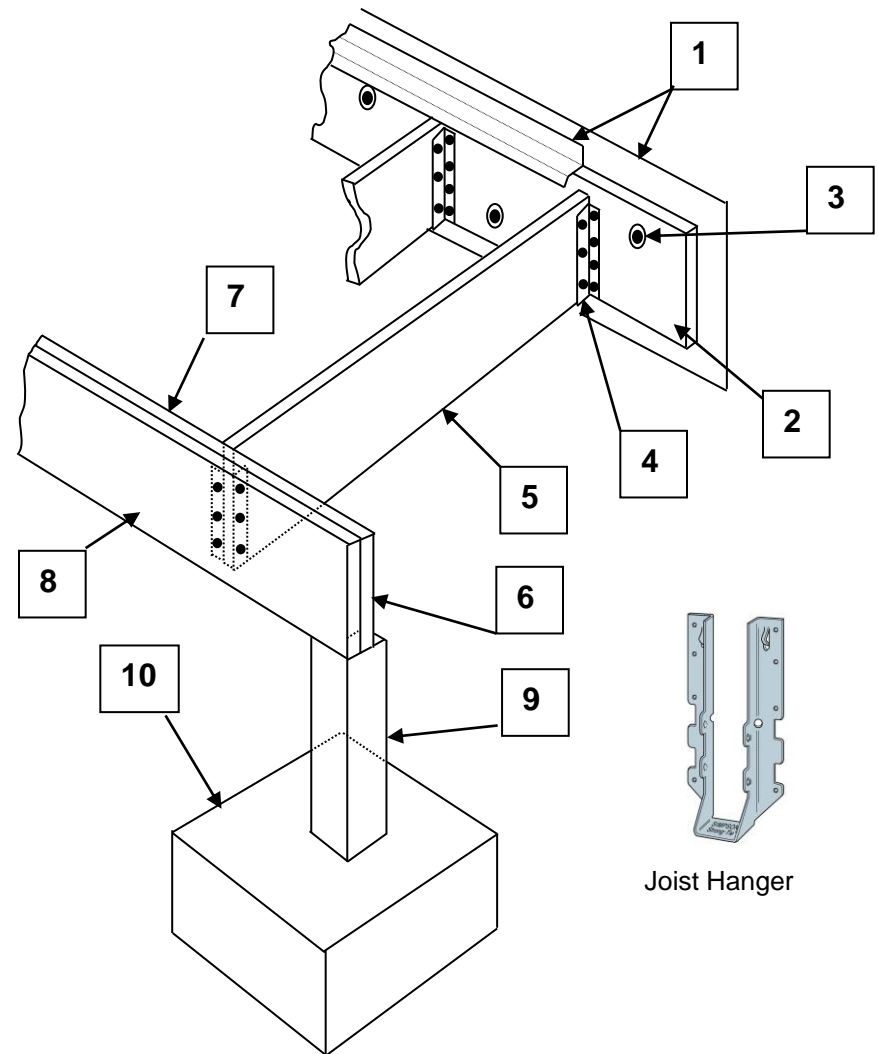
Porches and decks with a raised floor surface located more than 30" above the grade or floor below shall have guardrails not less than 36" in height. Intermediate rails shall be placed which do not allow passage of a 4" sphere.

### Stairs and Handrails:

Open sides of stairs with a total rise of more than 30" above the grade or floor below shall have guardrails not less than 34" in height measured vertically from the nosing of the treads. Intermediate rails shall be placed which do not allow passage of a 4" sphere. Handrails shall be provided on at least one side for stairs with 4 or more risers. Handrails shall be continuous, graspable, and terminate into posts or returns in accordance with R311.7.8. Landings shall be provided at the top and bottom of stairs with a minimum size of the width of the stairs x 36" in the direction of travel. R311.7.6

### Treads and Risers:

The maximum riser height shall be 7-3/4" (measured vertically between leading edges of adjacent treads). The minimum tread depth shall be 10". A nosing not less than ¾" but not more than 1-¼" shall be provided on stairs with treads less than 11". Risers for stairs greater than 30" above grade shall not have openings of more than 4".



Based on the 2018 International Residential Code. Other materials, configurations, or engineered designs may be utilized that fall within the guidelines of this code.

**TABLE 1**

Joist Size	DECK JOIST SPANS			MAXIMUM CANTILEVER		
	12" oc	16" oc	24" oc	12" oc	16" oc	24" oc
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"

**TABLE 2**

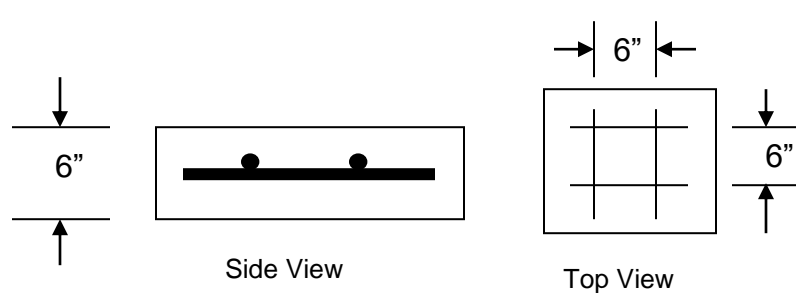
Post Height	Wood Post Size
0' to 6'-9"	4" x 4"
8'	4" x 6"
14'-0"	6" x 6"
14'-0"	8" x 8"

*Note: Height measured to the underside of the beam*

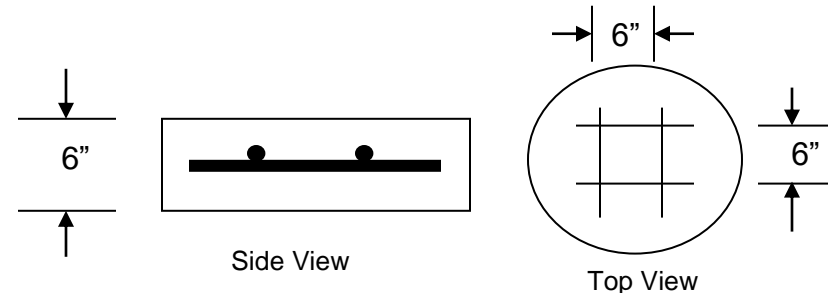
**TABLE 3: Deck Pier Footing Chart**

Beam Size	2 @ 2"x6" or a single member	2 @ 2"x8"	2 @ 2"x10"	2 @ 2"x12"
Square Footing Size	12" x 12"	17" x 17"	20" x 20"	24" x 24"
Round Footing Size	14"	19"	23"	27"

*Note: Minimum thickness of concrete = 6", minimum footing depth = 12". Install two (2) #4 rebar in each direction spaced 6" on center. Based on highest load case. See Table R507.3.1 for minimum allowable sizes.*



**Typical Square Footing  
Rebar Placement**



**Typical Round Footing  
Rebar Placement**

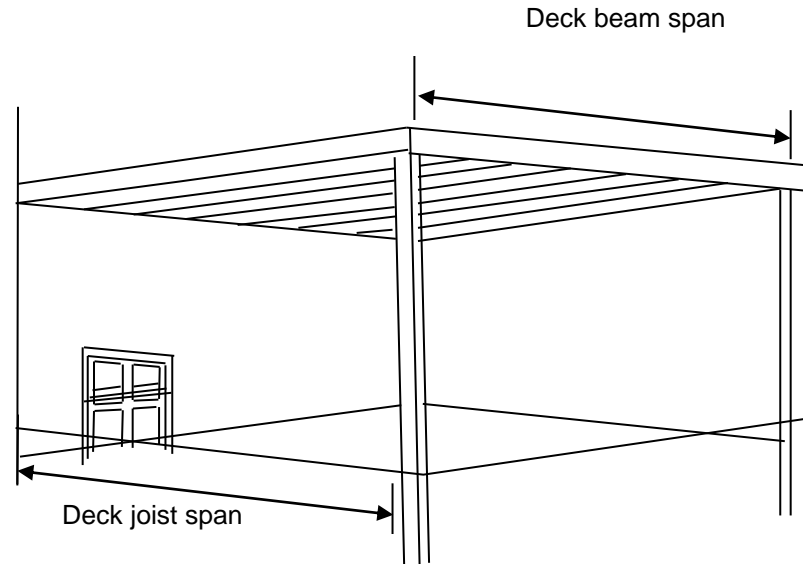
**TABLE 4: DECK BEAM SPAN LENGTHS**

WOOD SPECIES	SIZE	DECK JOIST SPAN LESS THAN OR EQUAL TO:						
		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"

Southern Pine lumber sizes for No. 2 grade are shown in regular type, with number of plies given in parentheses. Southern Pine glued laminated timber beams should be used when (3) 2x12's no longer meet design conditions. The ends of beams are required to have not less than 1.5" of bearing on wood or metal and not less than 3" of bearing on concrete or masonry for the entire width of the beam. Where multiple-span beams bear on intermediate posts, each ply must have full bearing on the post.

**Steps in Using this Table:**

1. Find the span of the deck joists.
2. Find the span of the deck beam required.
3. Select the number of plies and size of the Southern Pine timber.
4. Beams supporting face mounted joists cannot be smaller than joist. Joist hangers are required.
5. Beams shall be supported to foundations



## LATERAL BRACING

Member sizes were designed assuming beams were braced continuously to prevent lateral compression buckling. Where the lateral load connection is provided as shown in Figure 1 below, hold-down tension devices shall be installed in not less than two locations per deck, within 24" of each end of the deck. Where the lateral load connection is provided as shown in Figure 2, the hold-down tension devices shall be installed in not less than four locations per deck.

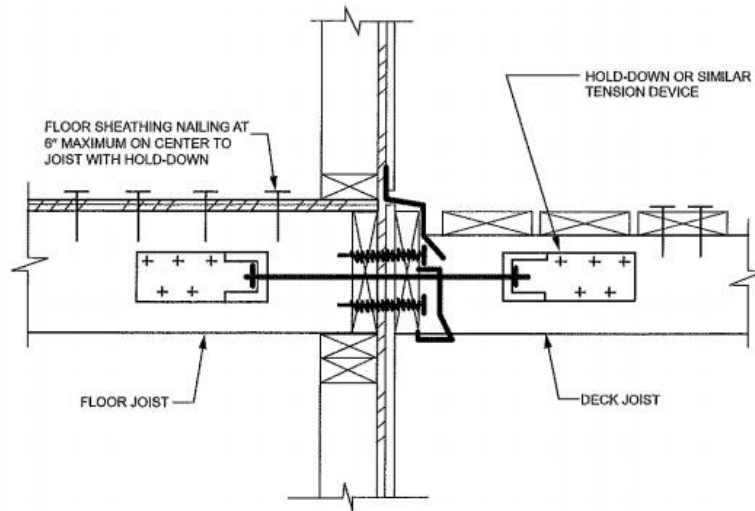


FIGURE 1

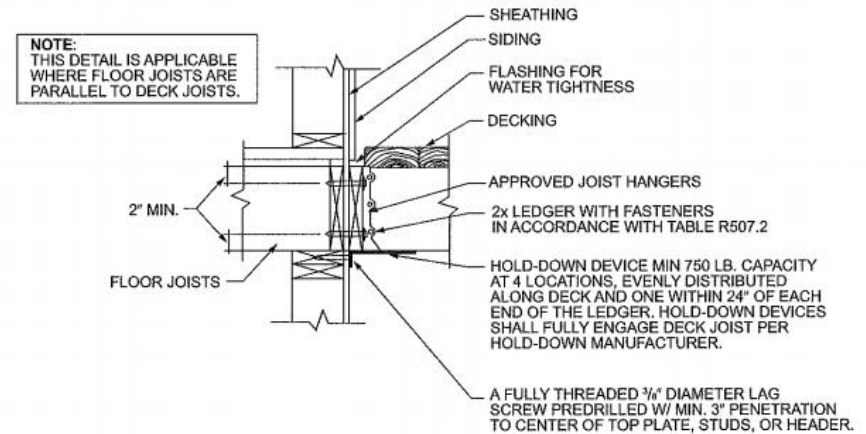


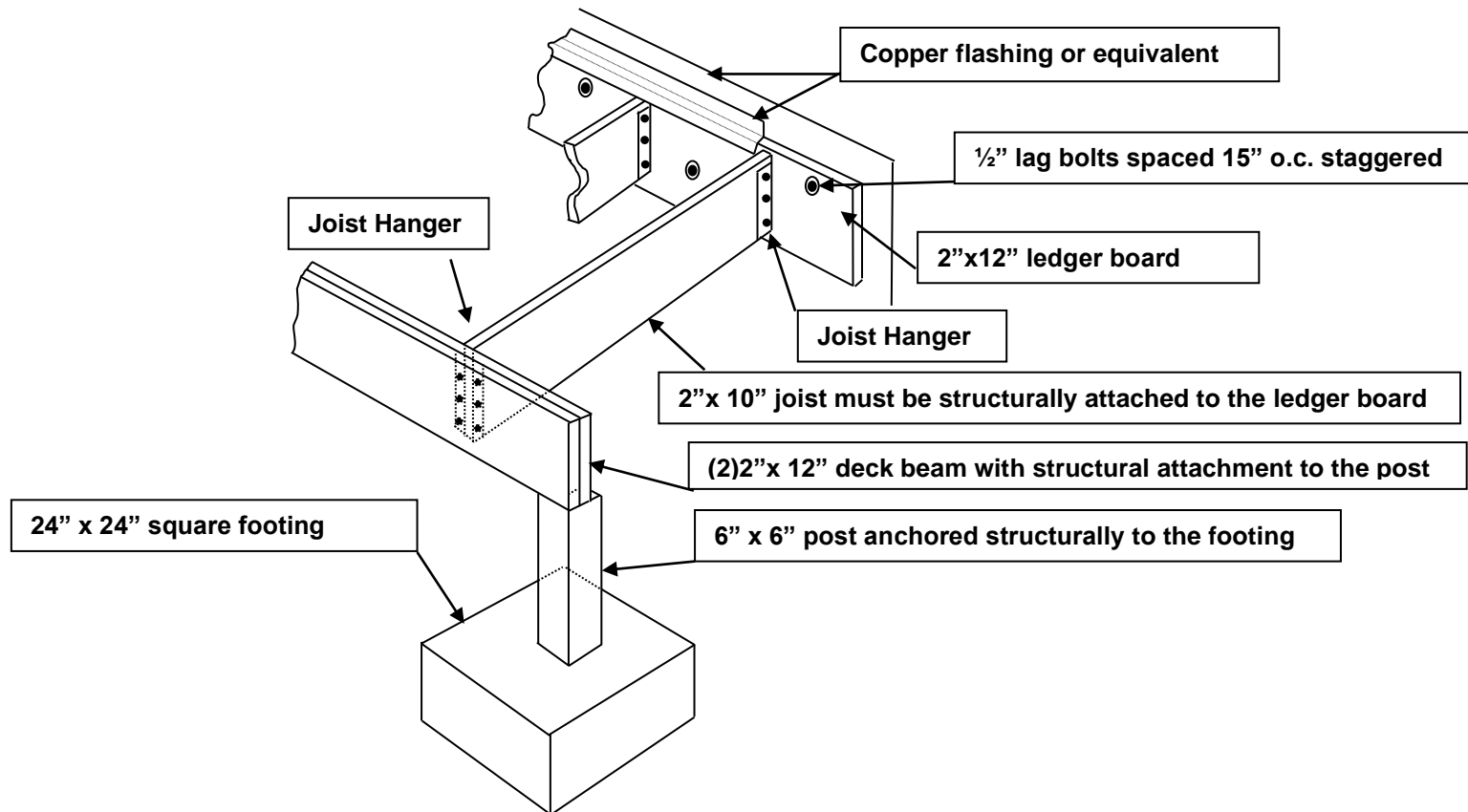
FIGURE 2

## DECK ATTACHMENT FOR LATERAL LOADS

### EXAMPLE 1A:

An owner wishes to attach a deck 15' long to the back of his house. The deck will extend 12' from the back of the house and will be 10' above finished grade when complete. Two methods of construction will be considered to demonstrate the use of the above tables. It should be noted that the methods described here are not the only methods which could be used to construct this particular deck.

The first method of construction to be considered is to have the deck boards running parallel to the house with the floor joists running perpendicular. This allows a girder loaded on one side with joists spanning 12'. Using **Table 1** above and a joist spacing of 16" on center, 2x10 joists will be required. The house wall ledger board shall be 2x10 minimum. The house wall ledger board is anchored to the house using 1/2" diameter lag bolts with washers spaced 15" o.c, staggered spaced. Copper flashing is used between the house and the ledger board and Z-flashing above the ledger board. **Table 4** requires the deck beam to be 2-2x12 minimum having a maximum span of 8'-7". When 2-member deck beams are used, both members must be supported by the posts at each end and at splice points. From **Table 2**, a deck height of 10' requires the use of 6" x 6" wood. Finally, using **Table 3**, a 2-2x12 deck beam requires a footing size of 24" x 24" square or 27" diameter round dug a minimum of 12" deep and poured a minimum of 6" thick concrete. Install 2 #4 rebar in the footing each direction for reinforcement. Lateral load tension devices will be installed per Figure 1 or Figure 2 above. **Note: The house rim / band board must be structurally attached to the house frame.**



**EXAMPLE 1B:** A second method of construction is to have the deck boards running perpendicular to the house with floor joists running parallel. This method uses a deck beam loaded on both sides to allow joist spans of 7'-6". Using **Table 1** and a joist spacing of 24" on center, 2x6 joists can be used. The house wall ledger board in this case is not required since ledger boards are not allowed to support concentrated loads from beams or girders. Additional posts will be required at the house to support the deck beams. The deck beams will now run perpendicular to the house and the deck is free-standing. **Table 4** shows us that 2-2x8 deck beams will span 7'-7" between posts. This means that for a 12' deck beam a post will be required mid-span of the beam and another at each end of the beam. Again, **Table 2** requires 6" x 6" posts for a deck height of 10' and **Table 3** shows footings of 17" x 17" square or 19" diameter round when using 2-2x8 beams or girders. Lateral load tension devices will be installed per Figure 1 or Figure 2 above.

**Note: The house rim / band board must be structurally attached to the house frame.**

