

Campbell County  
Building Inspection Division  
Guideline to 2018 IRC Residential Construction for Decks

The following information is intended to assist you in complying with the code requirements adopted by Campbell County but does not encompass the entire code.

**NOTE: These guidelines do not cover hot tubs or “other” heavy objects that create additional loads on the deck.**

**Building/Zoning Permit:** A building/zoning permit shall be obtained before any work begins. The permit and the approved plans shall be available at the site for reference by the inspector when inspections are called for. Plot plan required for zoning.

Decks do not need a building permit (a zoning permit is required in most instances) if all of the following apply:

- Deck is not for the main exit door (i.e. front door)
- Deck does not exceed 200 square feet
- Deck is not more than 30” above grade at any point within 36” of deck
- Deck is not attached to the dwelling

If in doubt, please call the Building Inspection Division at (307) 682-1970.

All decks 18” or less above finished grade shall be built using pressure treated or decay resistant lumber such as redwood or cedar. The 18” dimension shall be measured from the bottom of the floor joists.

**Footers:** Minimum depth from finish grade to the bottom of the footing is 42”. Must be 8” thick and extend 2” beyond the sides of the post on all sides. (Example: 8” minimum diameter for a 4 x 4 post or 10” minimum diameter for a 5 x 6 post)  
**See Page 8.**

**Posts:** All posts or columns are to be 4 x 4 or equivalent to a height not exceeding 8’, over 8’, 5 x 6 posts are required.

- Posts shall be resting on footings and secured to concrete or concrete filled masonry with a galvanized steel post base or equivalent.
- Diagonal bracing is required when deck is not supported by the building with a ledger board or when the deck is not attached to the floor joists of the houses floor system.
- All posts shall be pressure treated or decay resistant lumber such as redwood or cedar.

#### **Beams:**

- Post and beams shall be secured to each other by a galvanized steel post cap or the beam secured to the post with two ½ inch carriage bolts. **See page 7 for examples.**
- All beam splices shall be located over top of load bearing posts. Splices between posts are prohibited.

#### **Ledger Boards:**

- Ledger boards of 2x thick and same width of joist are to be bolted to the house using lag or carriage bolts with washers.
- Bolt size shall be ½ inch diameter minimum and spaced not more than 16" on center maximum or other approved fasteners.
- Floor joists are to be attached to the band board with properly sized joist hangers. Fasteners (i.e., nails and screws) shall be installed in accordance with the manufacturer's installation guidelines.
- Siding and Flashing: House siding or exterior finish system must be removed prior to the installation of the ledger board. Flashing is required at any ledger board connection to a wall of wood framed construction and shall be stainless steel, UV resistant plastic or galvanized steel coated with 1.85oz/ft of zinc (G-185 coating).

#### **Floor Joists:**

- See the Maximum Span Table on **page 5** for treated lumber, southern yellow pine, 40 psf live load, 10 psf dead load and deflection of L/360.
- Floor joists shall be attached to ledger or band board with joist hangers.
- Deck joist shall be permitted to cantilever not greater than the actual depth of the floor joist.
- A full depth rim joist shall be provided at the cantilevered end of joists.

**Stairways: See pages 8-9 for illustration.**

- Shall have a **minimum of 3 feet in net clear width.**
- Shall not have a riser exceeding 7 ¾" or less than 4".
- Shall have a minimum tread distance of 10 inches nose to nose.
- The maximum difference between any two risers throughout the run of the stairs shall not be greater than 3/8 inch.
- Stairs shall be solidly attached to the main deck or stair landing.
- The maximum allowable spacing of the stair stringers or carriages shall be determined by the maximum allowable span of the tread material or decking used. **NOTE:** A minimum of three stringers or carriages are required for the standard 3' wide stairway.

**Handrails: See pages 8-9 for illustration.**

- Height: Handrails shall be between 34 inches and 38 inches to top of rail measured vertically above the nosing of the stair treads. Handrails shall be returned into post or wall at the top and bottom of the run.
- Continuity: Handrails shall be continuous for the full length of any flight of stairs from a point directly above the top riser of the flight to a point directly above the lowest riser.
- Grip size: All required handrails shall comply with the "grasp ability" requirements of IRC Section R311.7.8.3. **Example on page 9.**

**Guardrails: See page 9 for illustration.**

- Guardrails are required for porches, decks, balconies, or raised floor surfaces more than 30 inches above floors or finished grade within 36" of deck.
- Open sides of stairs with a total rise of more than 30 inches above the floor or grade shall have guardrails not less than 34 inches, but not more than 38 inches high, measured vertically from the nose of the tread when used as a handrail.
- Horizontal spacing between vertical members in the required guardrail shall not exceed a maximum of 4 inches.
- Triangular openings formed by riser, tread, and the bottom rail of the guardrail on the stairs shall not allow the passage of a 6 inch sphere through the opening.

**Inspections:**

Footers = before concrete is poured.

Framing = A separate framing inspection is required before the decking (finished flooring) is installed only when the deck is close to the ground making inspection of the floor joists, beams and posts not possible.

Final = All framing is installed and deck is completed.

Chemicals used in pressure treatment methods will prematurely corrode standard fasteners, hardware, and flashing when in contact with lumber. To combat corrosion, the following is required.

- All screws and nails shall be approved for application.
- All hardware (joist hangers, cast in place post anchors, etc.) shall be galvanized with 1.85 oz/sf of zinc (G-185 coating) or shall be stainless steel. Look for products such as “Zmax” from Simpson Strong Tie or “Triple Zinc” from USP.

**NOTE:** When there is any doubt about these regulations or about the proper method to perform this installation, it is always better to contact the inspector prior to the installation to assure the installation will be done to code and that work will not need to be redone at the cost of time and material. Always make sure that you understand the methods and regulations stated herein before proceeding with the installation. Please contact us at (307) 682-1970 if you have any questions.

**R507.4 Decking.**

Maximum allowable spacing for joists supporting decking shall be in accordance with Table R507.4. Wood decking shall be attached to each supporting member with not less than (2) 8d threaded nails or (2) No. 8 wood screws.

**TABLE R507.4  
MAXIMUM JOIST SPACING**

MATERIAL TYPE AND NOMINAL SIZE	MAXIMUM ON-CENTER JOIST SPACING	
	Perpendicular to joist	Diagonal to joist <sup>a</sup>
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

**R507.5 Deck joists.**

Maximum allowable spans for wood deck joists, as shown in Figure R507.5, shall be in accordance with Table R507.5. Deck joists shall be permitted to cantilever not greater than one-fourth of the actual, adjacent joist span.

**TABLE R507.5  
DECK JOIST SPANS FOR COMMON LUMBER SPECIES<sup>f</sup> (ft. - in.)**

SPECIES <sup>a</sup>	SIZE	SPACING OF DECK JOISTS WITH NO CANTILEVER <sup>b</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
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 mm, 1 pound per square foot = 0.0479 kPa, 1 pound = 0.454 kg.

a. No. 2 grade with wet service factor.

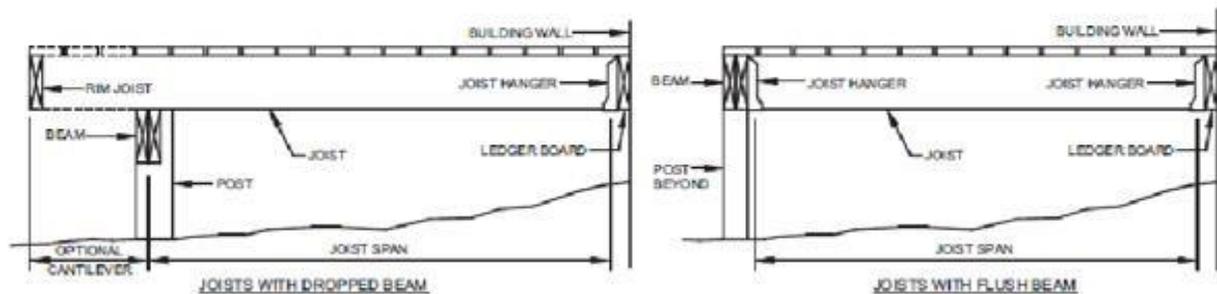
b. Ground snow load, live load = 40 psf, dead load = 10 psf, L/D = 360.

c. Ground snow load, live load = 40 psf, dead load = 10 psf, L/D = 360 at main span, L/D = 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.



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

**R507.6 Deck Beams.**

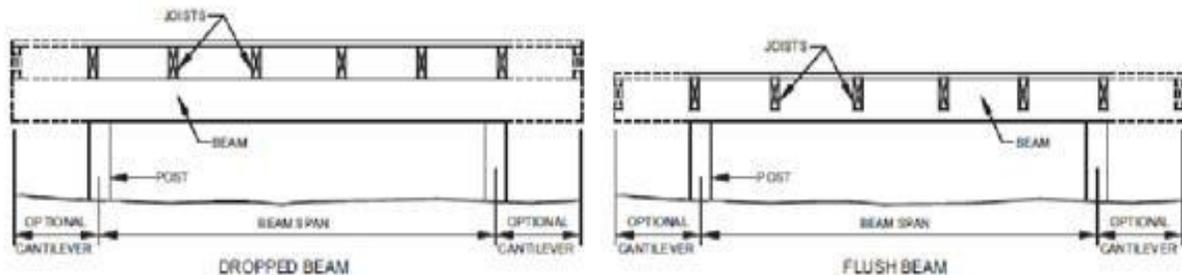
Maximum allowable spans for wood deck beams, as shown in Figure R507.6, shall be in accordance with Table R507.6. Beam plies shall be fastened with two rows of 10d (3-inch x 0.128-inch) nails minimum at 16 inches (406 mm) on center along each edge. Beams shall be permitted to cantilever at each end up to one-fourth of the actual beam span. Splices of multispan beams shall be located at interior post locations.

**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
	3 - 2 x 12	15-3	13-3	11-10	10-9	10-0	9-4	8-10
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.

- 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.

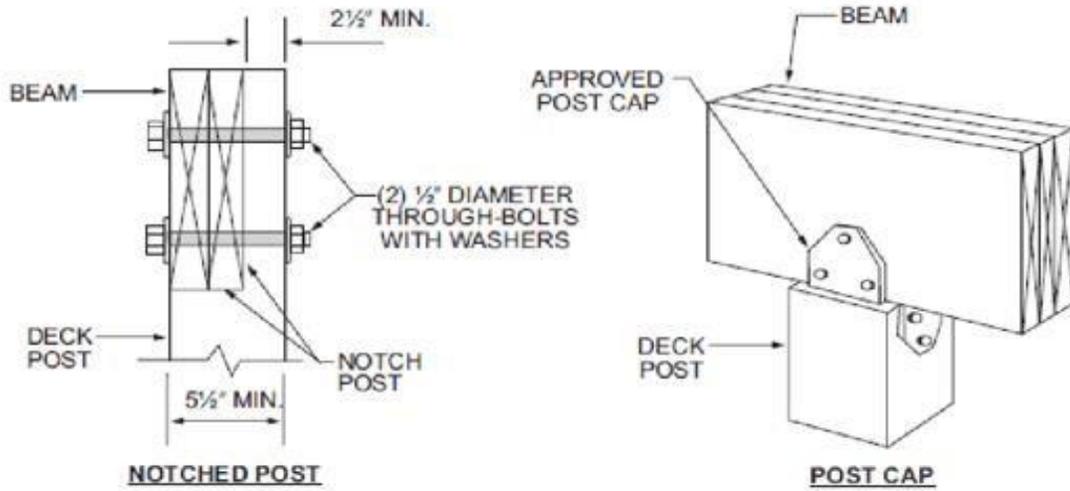


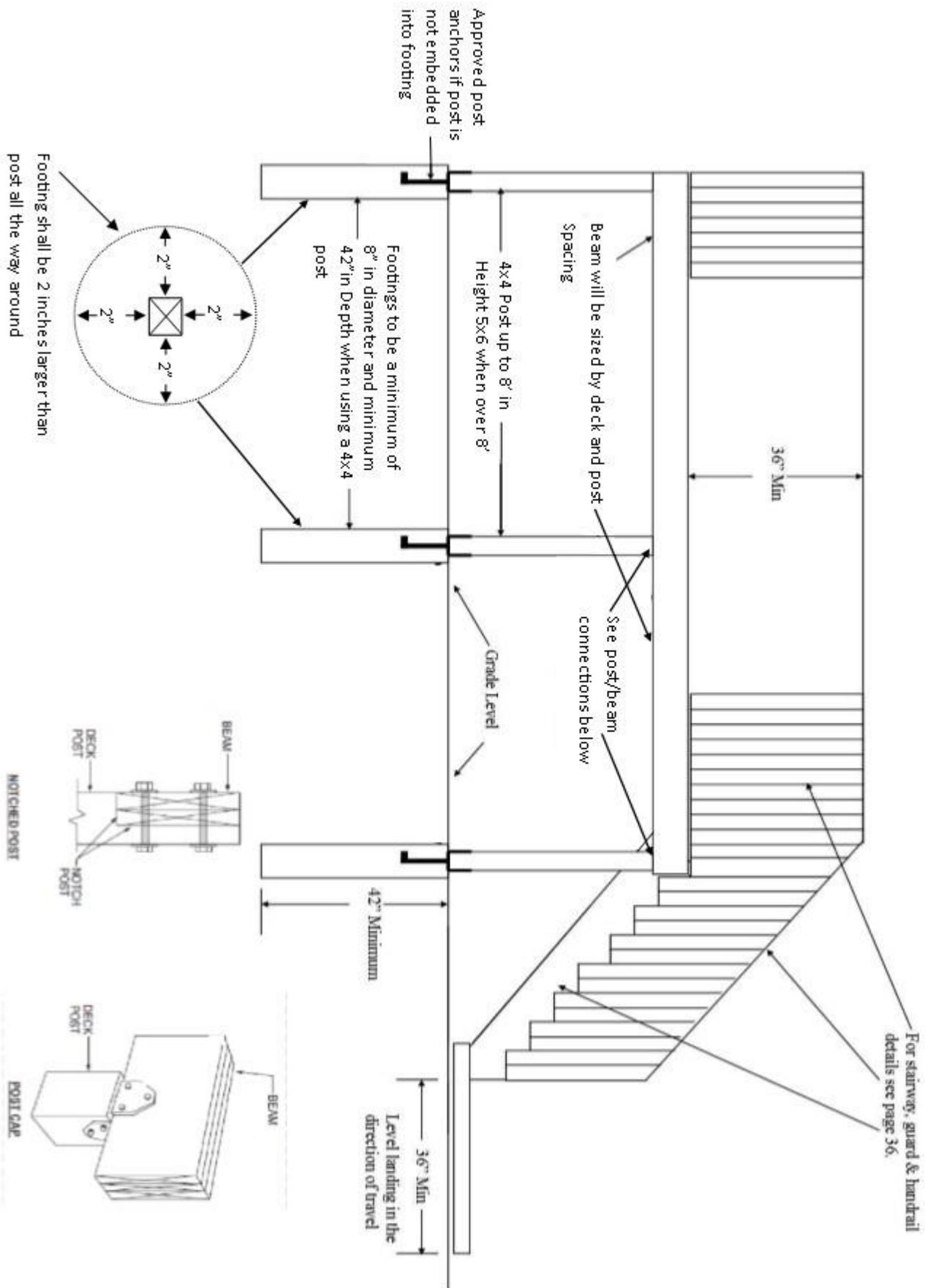
**FIGURE R507.6  
TYPICAL DECK BEAM SPANS**

**R507.7.1 Deck post to deck beam.**

Deck beams shall be attached to deck posts in accordance with Figure R507.7.1 or by other equivalent means capable to resist lateral displacement. Manufactured post-to-beam connectors shall be sized for the post and beam sizes. All bolts shall have washers under the head and nut.

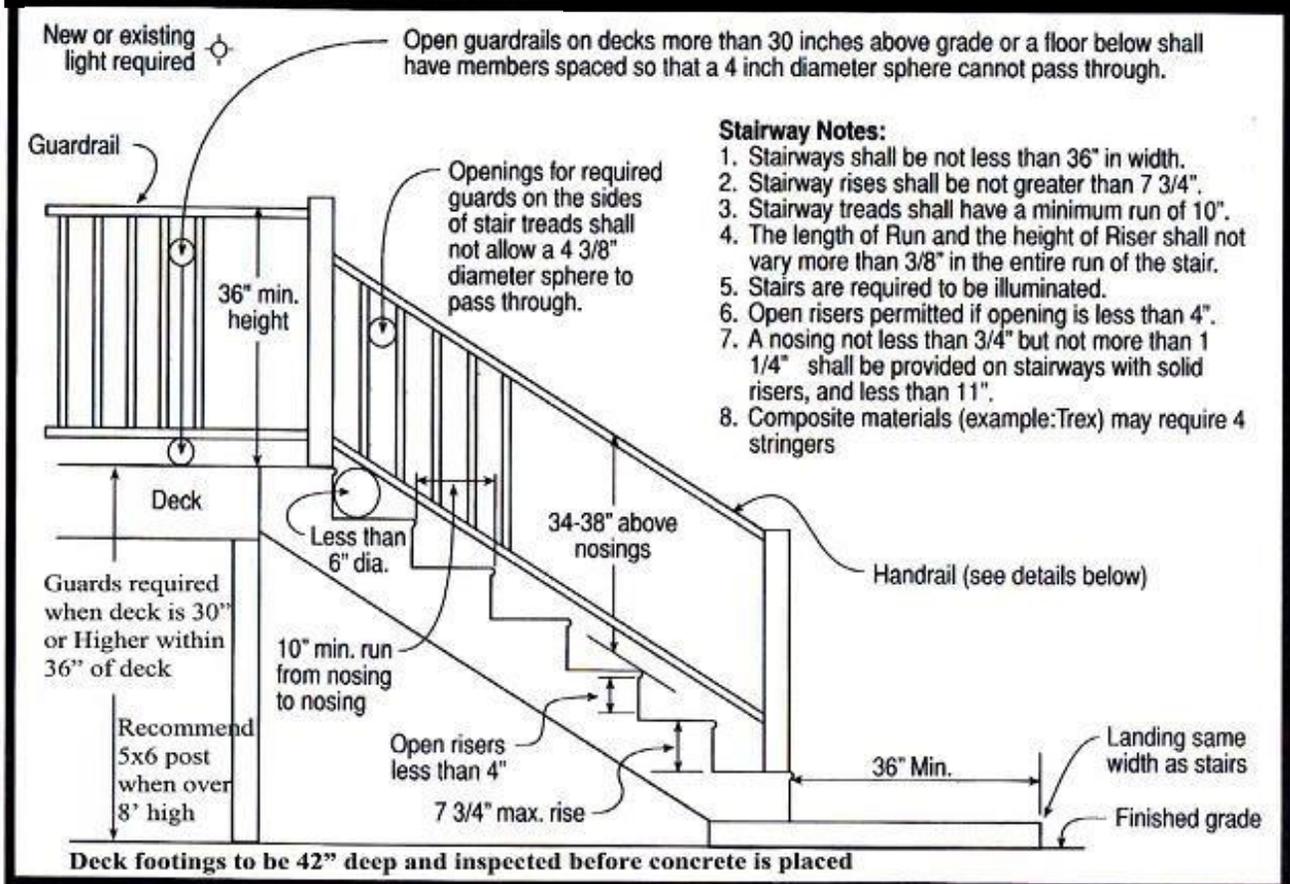
**Exception:** Where deck beams bear directly on footings in accordance with Section R507.8.1.





# Residential Handrail, Guardrail & Stairway Detail

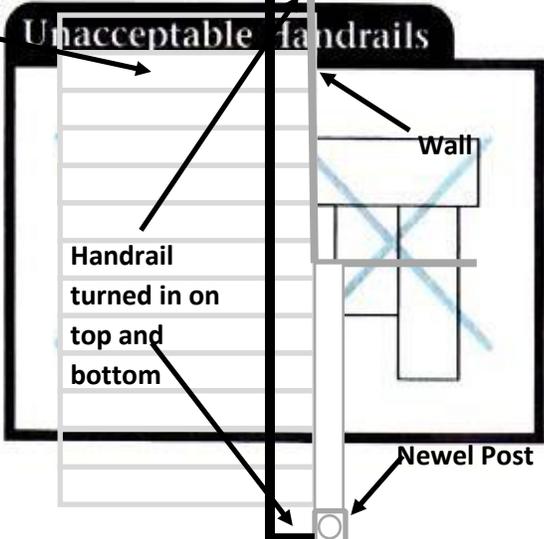
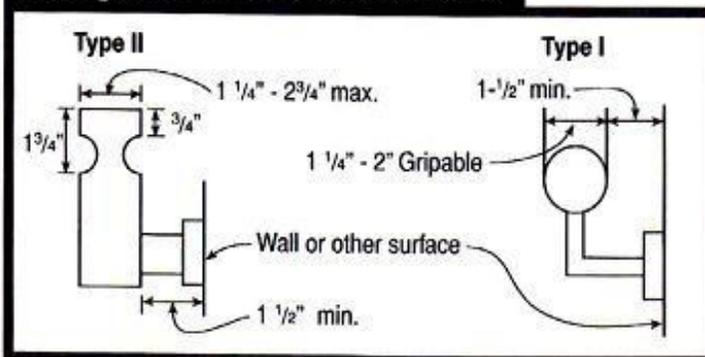
## Stair & Handrail Specifications



### Handrail Notes:

1. Handrails shall be continuous on at least one side of stairs with 4 or more risers.
2. Top of the handrails shall be placed not less than 34 inches nor more than 38 inches above stair nosings.
3. The handgrip portion of handrails shall be not less than 1-1/4 inches nor more than 2 1/4 inches in cross section for non circular handrails
4. Handrails shall be placed not less than 1-1/2 inches from any wall or other surface.
5. Handrails to be returned to wall, post or safety terminal (per 311.7.7.2 IRC)

### Acceptable Handrail Details



These Deck guidelines **DO NOT COVER** Hot Tubs or other heavy objects that create additional loads on the deck or cover all codes pertaining to deck construction, they are a general guideline:

