



Department of Development  
and Environmental Services

900 Oakesdale Avenue Southwest  
Renton, WA 98057-5212

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[www.kingcounty.gov](http://www.kingcounty.gov)

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## **RESIDENTIAL PRESCRIPTIVE DECK DESIGN AND DETAILS**

Deck structural failures result in the largest numbers of injuries and fatalities of all residential building failures. Railings and deck connections to the house are leading areas of failure. This handout suggests some methods to achieve safer deck construction and may assist in the design of specific deck plans. The typical plan and details may also suffice if the construction plans for a simple deck conform to these parameters and are no more than 11 feet 6 inches above grade. Decks less than 30 inches above grade may be exempt from the requirement to obtain a permit, but not from code requirements.

This design assistance sheet is intended to provide some basics of private residential deck construction. Additional information can be found at libraries, home improvement stores, and building departments.

This design may be used if all of the following are true:

This is a single family residential deck.

The deck is not higher than 11'-6" above finish grade.

No window, door, or other openings under the deck are greater than 6 feet wide.

No heavy concentrated loads will be applied on the deck (such as may be applied by hot tubs, or heavy planters).

The ground snow load does not exceed 40 pounds per square foot.

The house side of the deck is supported directly by a wall, and not an overhang or cantilever.

Notes:

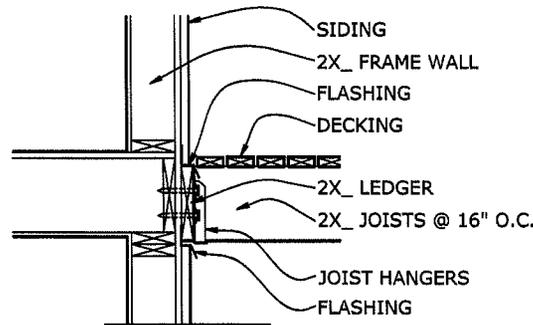
- 1) The 40 psf maximum live load used in this design covers the floor load for ordinary single family residential deck construction and is not sufficient to support significant supplemental loads as may be applied from high snow loads, hot tubs, or other concentrated loads.
- 2) Stainless steel connections are recommended for use in contact with treated wood, especially ACQ (alkaline copper quaternary). Residential treated wood for new outdoor construction is normally ACQ. Hot dipped galvanized or other corrosion resistant connectors may be acceptable; check manufacturers recommendations.
- 3) Decking shall be pressure treated, or approved plastic, or decay resistant wood. All structural wood shall be pressure treated Hem-Fir #2 minimum.
- 4) Joists must be spaced according to span limits of the decking product selected.
- 5) See Sheets 3 & 4 for stair, handrail & guard details. For additional code requirements refer to the attached *IRC Deck Conditions*.

**Standard Deck Details**

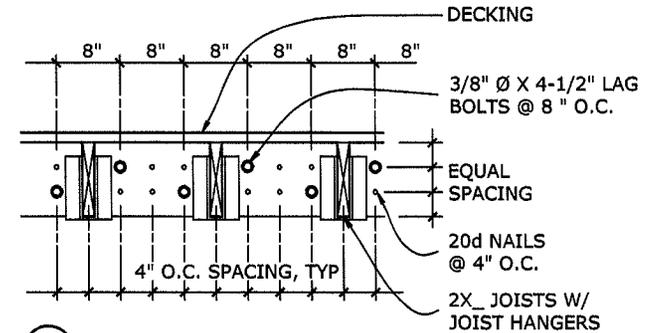
Sheet 1 of 4



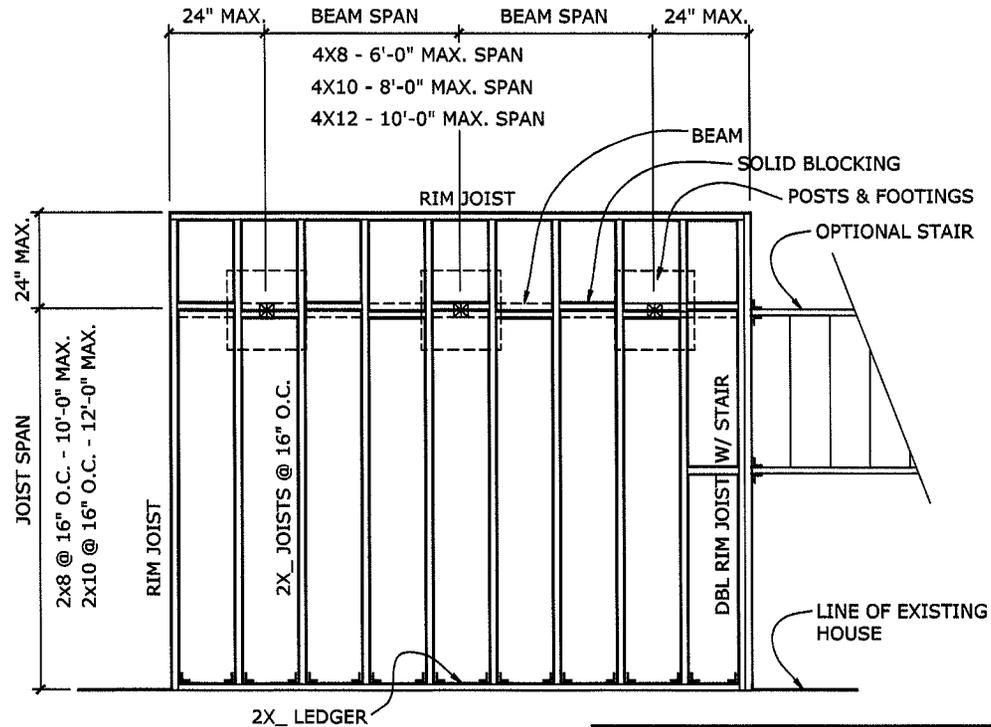
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**1 LEDGER @ RIM JOIST**



**2 FASTENERS @ LEDGER**



**3 DECK FRAMING PLAN**

**NOTES:**

DESIGN LIVE LOAD = 40 PSF

ALL FRAMING LUMBER, POSTS, & BEAMS, SHALL BE PRESSURE TREATED HEM-FIR #2 OR BETTER.

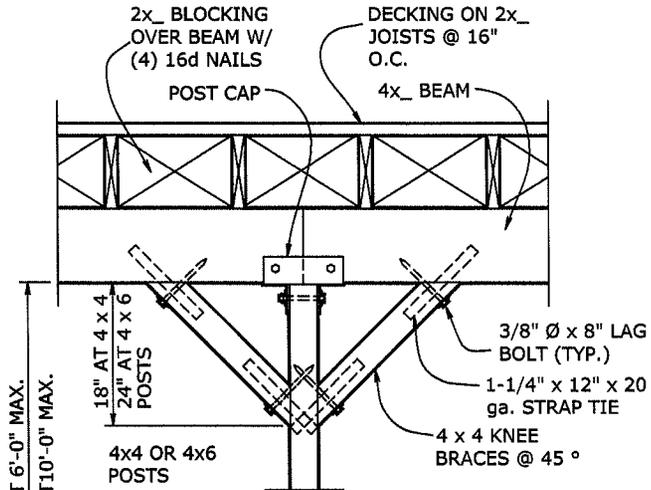
DECKING SHALL BE PRESSURE TREATED OR APPROVED DECAY RESISTANT WOOD OR PLASTIC.

FASTENERS SHALL BE STAINLESS STEEL OR HOT DIPPED GALVANIZED.

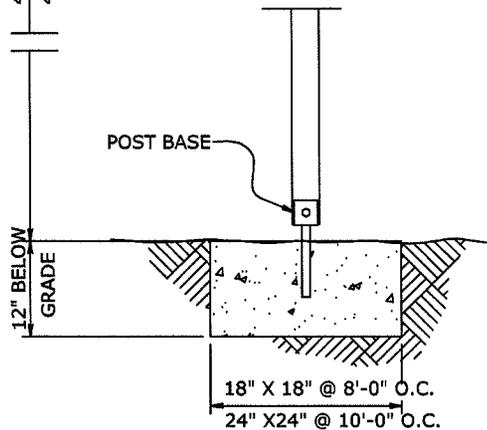


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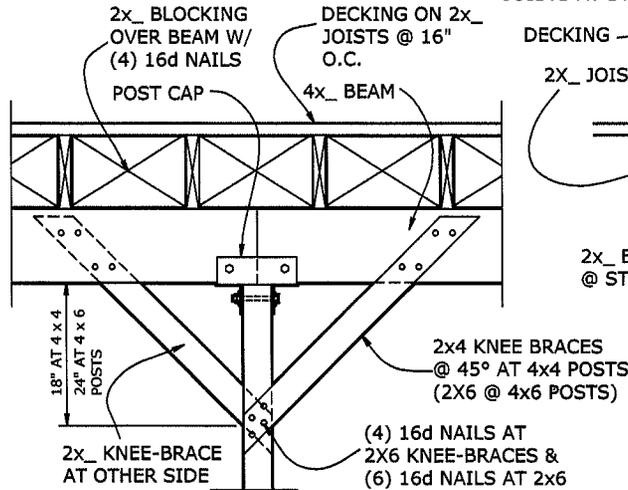
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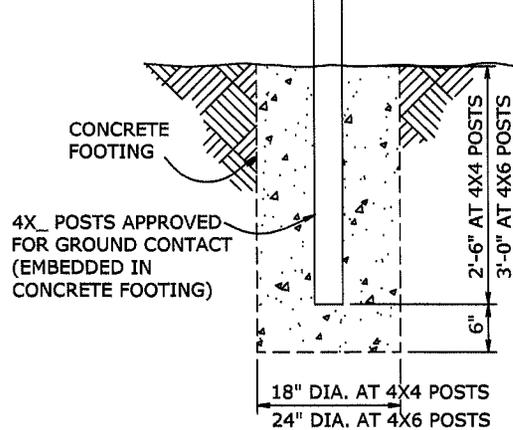
**4 TYPICAL KNEE-BRACE**  
REQ'D @ 4 FT. AND HIGHER DECKS



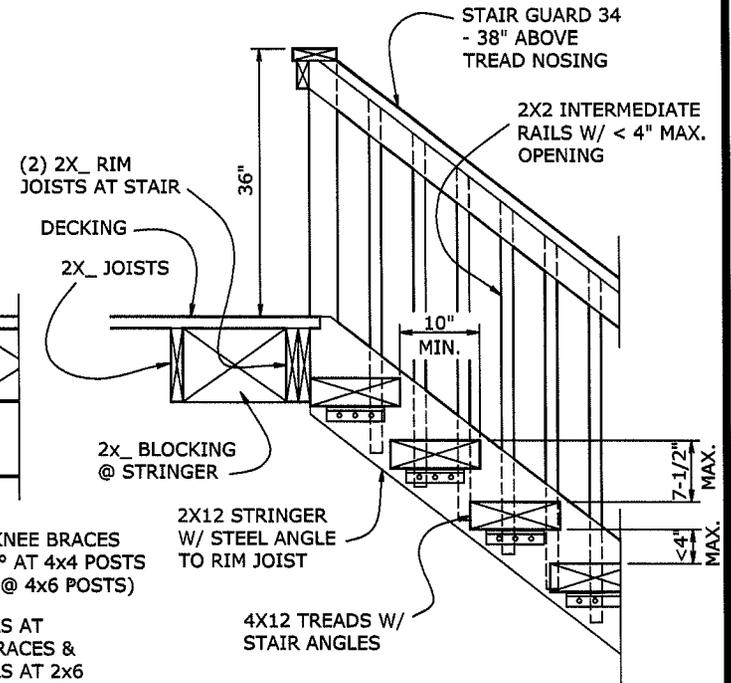
**7 TYPICAL POST FOOTING**  
ON UNDISTURBED FIRM SOIL



**5 ALTERNATE KNEE-BRACE**  
REQ'D @ 4 FT. AND HIGHER DECKS



**8 ALTERNATE POST FOOTING**  
(ELIMINATES KNEE-BRACE REQUIREMENT)



**6 DECK STAIR SECTION**

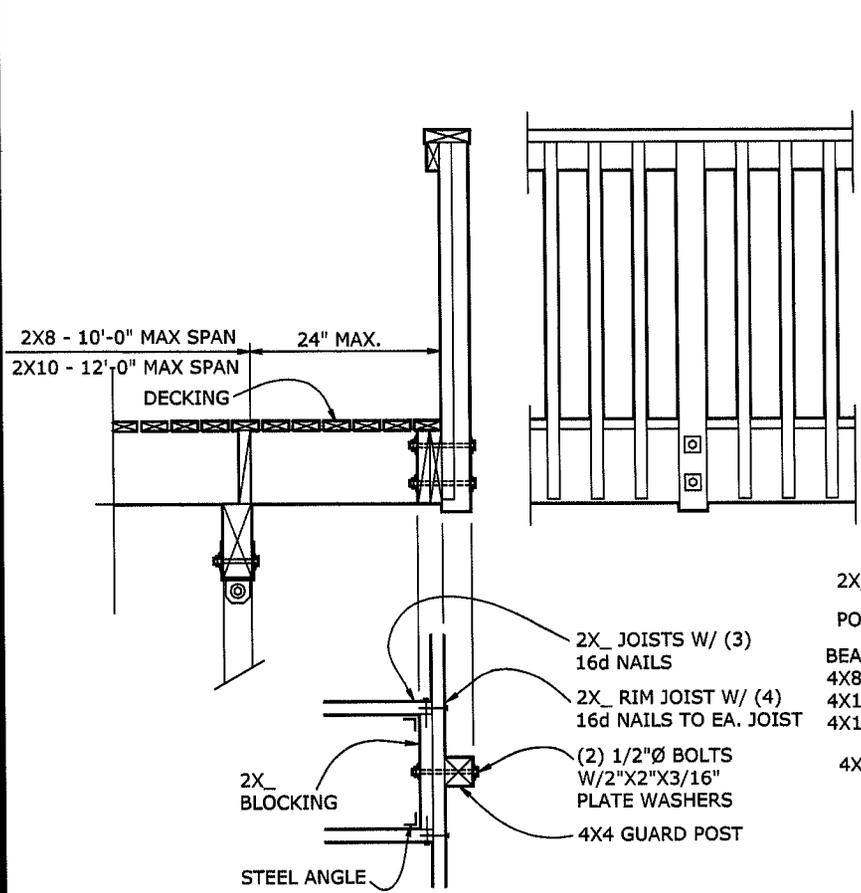
# Standard Deck Details

Sheet 3 of 4

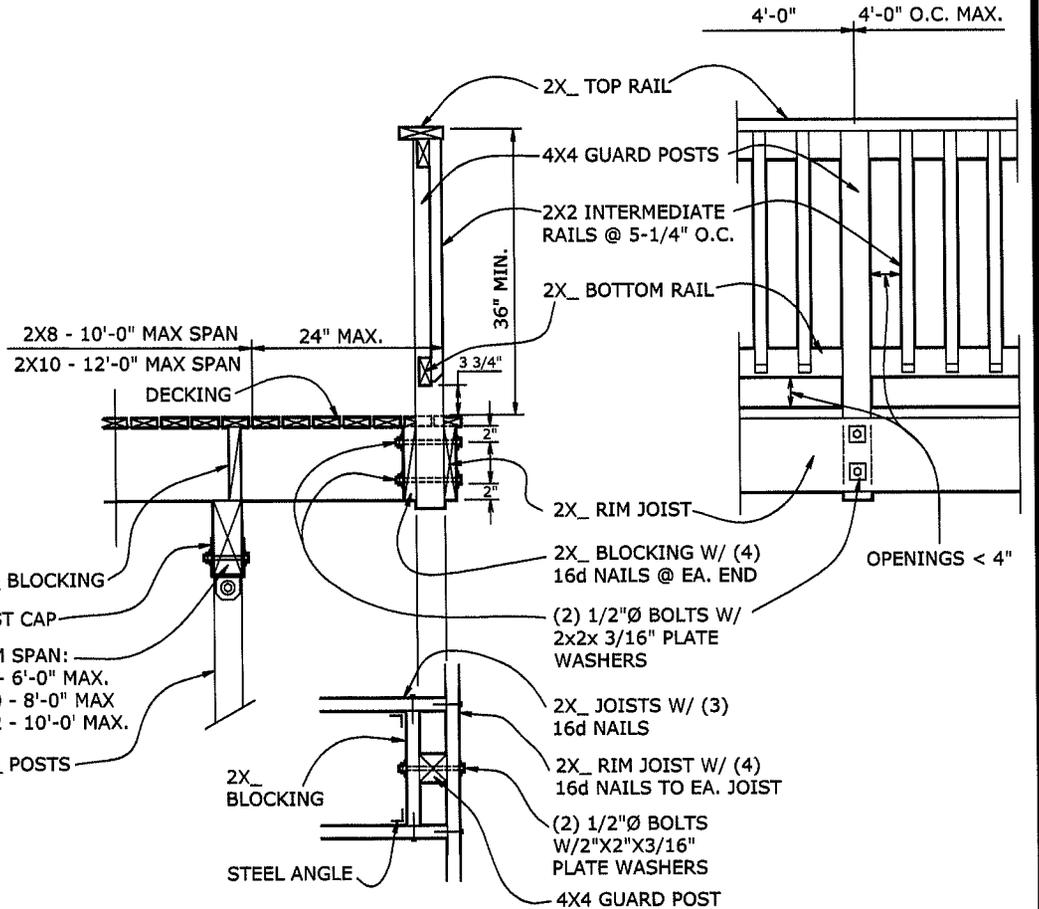


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**9 TYPICAL GUARD**



**10 ALTERNATE GUARD W/ TOP & BOTTOM RAILS**

**Standard Deck Details**  
Sheet 4 of 4

**IRC Deck Conditions**

Revised to the 2006 IRC as amended by KCC Title 16, 21a and WAC on 7-1-2004

Note: The issuance or granting of a permit shall not be construed to be a permit for, or an approval of, any violation of any of the provisions of this code or of any other ordinances of the jurisdiction. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the jurisdiction shall not be valid. The issuance of a permit based on construction documents and other data shall not prevent the building official from requiring the correction of errors in the construction documents and other data. The building official is also authorized to prevent occupancy or use of a structure where in violation of this code or other ordinances of the jurisdiction. 105.4 IRC/IBC

Note: this correction sheet is part of the approved plans and shall remain attached. Corrections indicated on the plans coincide with the numbered items below. The approval of plans and specifications does not permit the violation of any section of the International Residential Code, International Mechanical Code or other County ordinances or state law. Corrections as indicated below, along with the unchanged information shown on the drawings must be complied with.

The approved plans shall not be changed, modified or altered without authorization from the building official. The approved plans are required to be on the job site. 105.7, 106.3.1, 106.4 IRC/IBC

**Design and design criteria.** Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures shall result in a system that provides a complete load path capable of transferring all loads from their point of origin through the load-resisting elements to the foundation. R301.1

**Means of Egress.** Stairways, ramps, exterior exit balconies, hallways and doors shall comply section 311

1. **Attachment.** Decks and stairs shall be positively anchored to the primary structure to resist both vertical and lateral forces. Such attachment shall not be accomplished by use of toenails or nails subject to withdrawal. R311.2.1

2. **Stairway design parameters**

- **Width.** Stairways shall not be less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4.5 inches (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31.5 inches (787 mm) where a handrail is installed on one side and 27 (698 mm) where handrails are provided on both sides.  
Exception: The width of spiral stairways shall be in accordance with Section R311.5.8. R311.5.1
- **Headroom.** The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches (2036 mm) measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform. R311.5.2
- **Riser height.** The maximum riser height shall be 7 3/4 inches (196 mm). The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). R311.5.3.1
- **Tread depth.** The minimum tread depth shall be 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than 3/8 inch (9.5 mm). Winder treads shall have a minimum tread depth of 10 inches (254 mm) measured as above at a point 12 inches (305 mm) from the side where the treads are narrower. Winder treads shall have a minimum tread depth of 6 inches (152 mm) at any point. Within any flight of stairs, the greatest winder tread depth at the 12 inch (305 mm) walk line shall not exceed the smallest by more than 3/8 inch (9.5 mm). R311.5.3.2
- **Profile.** The radius of curvature at the leading edge of the tread shall be no greater than 9/16 inch (14.3 mm). A nosing not less than 3/4 inch (19 mm) but not more than 1 1/4 inch (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than 3/8 inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosing shall not exceed 1/2 inch (12.7 mm). Risers shall be vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30 (0.51 rad) degrees from the vertical. Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter (102 mm) sphere.

Exceptions:

1. A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).
2. The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less. R311.5.3.3

3. **Landings for stairways.** There shall be a floor or landing at the top and bottom of each stairway.  
 Exception: A floor or landing is not required at the top of an interior flight of stairs, provided a door does not swing over the stairs.  
 A flight of stairs shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings. The width of each landing shall not be less than the stairway served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel. R311.5.4
4. **Stairway walking surface.** The walking surface of treads and landings of stairways shall be sloped no steeper than one unit vertical in 48 inches horizontal (2-percent slope). R311.5.5
5. **Handrails.** Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers. R311.5.6
- **Height.** Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm). R311.5.6.1
  - **Continuity.** Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1 1/2 inch (38 mm) between the wall and the handrails.  
 Exceptions:
    1. Handrails shall be permitted to be interrupted by a newel post at the turn.
    2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread. R311.5.6.2
  - **Handrail grip size.** All required handrails shall be of one of the following types or provide equivalent graspability.
    1. Type I. Handrails with a circular cross section shall have an outside diameter of at least 1 1/4 inches (32 mm) and not greater than 2 inches (51 mm). If the handrail is not circular it shall have a perimeter dimension of at least 4 inches (102 mm) and not greater than 6 1/4 inches (160 mm) with a maximum cross section of dimension of 2 1/4 inches (57 mm).
    2. Type II. Handrails with a perimeter greater than 6 1/4 inches (160 mm) shall provide a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of 3/4 inch (19 mm) measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16 inch (8 mm) within 7/8 inch (22 mm) below the widest portion of the profile. This required depth shall continue for at least 3/8 inch (10 mm) to a level that is not less than 1 3/4 inches (45 mm) below the tallest portion of the profile. The minimum width of the handrail above the recess shall be 1 1/4 inches (32 mm) to a maximum of 2 3/4 inches (70 mm). Edges shall have a minimum radius of 0.01 inches (0.25 mm). R311.5.6.3
6. **Illumination.** All stairs shall be provided with illumination in accordance with Section R303.6. R311.5.7 See #4
- All exterior and interior stairways shall be provided with a means to illuminate (not less than 1 footcandle) the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light source located in the immediate vicinity of each landing. Exterior stairways shall be provided with an artificial light source located in the immediate vicinity of the top landing of the stairway. Exterior stairways providing access to a basement from the outside grade level shall be provided with an artificial light source located in the immediate vicinity of the bottom landing of the stairway.  
 Exception: An artificial light source is not required at the top and bottom landing, provided an artificial light source is located directly over each stairway section.
  - **Light Activation** The illumination of exterior stairs shall be controlled from inside the dwelling unit.  
 Exception: Lights that are continuously illuminated or automatically activated. R303.6, R311.5, R315
7. **Special stairways.** Circular stairways, spiral stairways, winders and bulkhead enclosure stairways shall comply with all requirements of Section R311.5 except as specified in Section. R311.5.8

### Guards

8. **Porches, balconies or raised floor surfaces** located more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 36 inches (914 mm) in height. Open sides of stairs with a total rise of more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads. R312.1
- **Porches and decks which are enclosed with insect screening** shall be provided with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.
  - **Guard opening limitations.** Required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures which do not allow passage of a sphere 4 inches (102mm) or more in diameter.  
 Exceptions:
    1. The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere 6 inches (152 mm) cannot pass through.
    2. Openings for required guards on the sides of stair treads shall not allow a sphere 4 3/8 inches (107 mm) to pass through. R312.2

### **Weathering Damage-Woods Exposed to the Weather; Treated Wood and Connectors**

9. **All wood exposed to weather, in contact with concrete or within 8 inches of exposed Ground shall be pressure treated or decay-resistant heartwood of redwood, black locust, or cedars.**
10. **Lumber and plywood required to be pressure preservatively treated** in accordance with Section R319.1 shall bear the quality mark of an approved inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been approved by an accreditation body that complies with the requirements of the American Lumber Standard Committee treated wood program. R319.2
11. **Fasteners** in preservative-treated and fire-retardant-treated wood. Fasteners for preservative-treated and fire-retardant-treated wood shall be of hot-dipped zinc-coated galvanized steel, stainless steel, silicon bronze or copper. Fastenings for wood foundations shall be as required in AF&PA Technical Report No. 7. Section 2304.9.5 IBC.

### **Footings and Supporting Structure**

12. **Strength of concrete** shall be 3000 psi for concrete exposed to weather: garage floor slabs, carport floor slabs and porches per Table R402.2
13. **Minimum size of footings.** Minimum sizes shall be as set forth in Table 403.1 and Figure 403.1(1). Spread footings shall be at least 6 inches in thickness. Footing projections shall be at least 2 inches in thickness and shall not exceed the thickness of the footing. 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. R403.1.1.
14. **Minimum depth.** All exterior footings shall be placed at least 12 inches below the undisturbed ground and shall extend below the frost line specified in Table R301.2(1). R403.1.4
15. **Posts, poles, and columns.** Posts, poles and columns supporting permanent structures that are embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather shall be approved pressure preservative treated wood suitable for ground contact use. R319.1.3
16. **Footings on or adjacent to slopes.** The placement of buildings and structures on or adjacent to slopes steeper than 1 unit vertical in 3 units horizontal (33.3-percent slope) shall conform to Sections R403.1.7.1 through R403.1.7.4. R403.1.7
  - **Building clearances from ascending slopes.** In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion and shallow failures. Except as provided in Section R403.1.7.4 and Figure R403.1.7.1, the following criteria will be assumed to provide this protection. Where the existing slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the toe of the slope shall be assumed to be at the intersection of a horizontal plane drawn tangent to the slope at an angle of 45 degrees to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope. R403.1.7.1
  - **Footing setback from descending slope surfaces.** Footings on or adjacent to slope surfaces shall be founded in material with an embedment and setback from the slope surface sufficient to provide vertical and lateral support for the footing without detrimental settlement. Except as provided for in Section R403.1.7.4 and Figure R403.1.7.1, the following setback is deemed adequate to meet the criteria. Where the slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the required setback shall be measured from an imaginary plane 45 degrees to the horizontal, projected from the toe of the slope. R403.1.7.2
17. **The columns shall be restrained** to prevent lateral displacement at the bottom end. Wood columns shall not be less in nominal size than 4 inches by 4 inches (102 mm by 102 mm) and steel columns shall not be less than 3-inch-diameter (76 mm) standard pipe or approved equivalent R319.1.4
18. **Sawn lumber.** Notches in solid lumber joists, rafters and beams shall not exceed one-sixth of the depth of the member, shall not be longer than one-third of the depth of the member and shall not be located in the middle one-third of the span. Notches at the ends of the member shall not exceed one-fourth the depth of the member. The tension side of members 4 inches (102 mm) or greater in nominal thickness shall not be notched except at the ends of the members. The diameter of holes bored or cut into members shall not exceed one-third the depth of the member. Holes shall not be closer than 2 inches (51 mm) to the top or bottom of the member, or to any other hole located in the member. Where the member is also notched, the hole shall not be closer than 2 inches (51 mm) to the notch. R502.8.1
  - **Engineered wood products.** Cuts, notches and holes bored in trusses, laminated veneer lumber, glue-laminated members or I-joists are not permitted unless the effects of such penetrations are specifically considered in the design of the member. R502.8.2
    1. Handrails shall be permitted to be interrupted by a newel post at the turn.
    2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread. R311.5.6.2