

# CHARTER TOWNSHIP OF CHESTERFIELD

## DECK CONSTRUCTION INFORMATION

**THE FEE FOR A DECK PERMIT IS \$65.00 PLUS A \$100.00 BOND**  
(5% admin fee)

**Building permits are required for all decks. When making application please provide the following:**

- A. Two (2) sets of construction drawings--see example. These should include a side view, top view, etc. of how you are building the deck.**
- B. Two plot plans/mortgage surveys indicating size, shape and distance from property lines, easements and structures-see example. If this is a condo, you will need written approval from the homeowners association.**
- C. If work is being done by a builder you will need builder's license & driver's license and insurance.**
- D. If work is being done by a homeowner you will need homeowner's affidavit and driver's license.**

**Required inspections (Some decks may require other inspections)**

- A. Post hole inspection and (ledger board inspection if deck is < 30" from grade)**
- B. Final inspection**

**Setbacks: Wood decks cannot be built in the front yard or any easement of the right-of-way nor closer than the minimum required in the ordinance.**

**Foundation: Posts to be set of (42") inches below grade.**

**Posts shall bear on undisturbed earth and backfilled with pea stone or concrete.**

**Warning: Location of posts with in three feet of basement walls may cause the posts to be supported on disturbed soil (backfill) which will cause the posts to settle.**

**FRAMING MATERIALS: All materials in contact with the ground or within (6") six inches or ground shall be .40 pressure treated and labeled "GROUND CONTACT ACCEPTABLE". All other materials to be treated .225 treated, redwood, cedar or other acceptable materials to provide protection against decay and termites.**

**FRAMING FASTENERS: All nails, bolts, brackets and fasteners shall be of zinc, zinc coated or other anti corrosive resistive materials.**

**FRAMING REQUIREMENTS:**

- A. Posts-minimum size 4"x 6".
- B. Decking-minimum size 5/4 or 2"x 6".

C. BEAMS	SIZE	POST SPACING
	(2) 2"x 6"	5'-0"
	(2) 2"x 8"	7'-0"
	(2) 2"x 10"	9'-0"
	(2) 2"x 12"	10'-6"
	(3) 2"x 6"	7'-0"
	(3) 2"x 8"	9'-0"
	(3) 2"x 10"	10'-0"

**FLOOR JOISTS:** Maximum clear span is the distance between spans.

<u>SIZE</u>	<u>12" O.C.</u>	<u>16" O.C.</u>	<u>24" O.C.</u>
2x6	9'-3"	8'-1"	6'-7"
2x8	12'-3"	10'-7"	8'-7"
2x10	15'-7"	13'-6"	11'-0"
2x12	19'-0"	16'-6"	13'-5"

**HANDRAILS:** Handrails required on one side of the stairs with 4 or more risers. Handrails are to be not less than 34" nor more than 38" measured vertical from the nosing of the treads. The width of handrails shall be a minimum of 1 ¼ " and maximum of 2". There shall be a clearance of 1 ½" between handrails & wall.

**GUARDRAILS:** Guardrails are required on decks with floors 30" or more above grade. Guardrails are to be a minimum of 36" above the finish floor with intermediate rails or ornamental closures which will not allow passage of an object 4" or more in diameter.

## CHARTER TOWNSHIP OF CHESTERFIELD BUILDING DEPARTMENT

### Residential Decks

#### GENERAL REQUIREMENTS (see the code for full text and additional requirements)

- \* Column foundations shall be a minimum of 6" thick concrete and shall be placed on soils with a minimum of 2,000 p.s.f. bearing capacity. Alternate systems may be approved upon evaluation by the Building Department.
- \* All exterior wood materials shall be pressure treated or "naturally durable" and shall be designed to safely support all dead loads and a minimum 40 p.s.f. live load. If pressure treated wood is utilized; wood above grade shall have a retention rating of .25 or more; wood below grade shall have a retention rating of .40 or better; and wood incased in concrete shall have a retention rating of .60 or better.
- \* Attachment of a deck to a dwelling shall be adequate to support all dead loads and a 40 p.s.f. live load. Bolt or lag screw connections of a ledger board shall pass through brick veneer and penetrate not less than 1-1/2" of solid wood bond, joist or stud (s). Approved joist hangers shall be used where framing abuts the ledger. All connections shall be properly positioned and shall be adequate design, size, and number to safely support all imposed dead and live loads. Lateral bracing shall be provided on attached decks where the deck is excessively high above grade or large in area.
- \* Decks which are not attached to a permanent dwelling shall be provided with lateral bracing as required for free standing structure.
- \* All open sided edges with the deck floor 30" or more above the finish grade or walking surface below shall be provided with an approved guardrail system. Such guardrail shall be not less than 36" in height with vertical guards spaced so that a object 4" in diameter cannot pass through at any point. Also, open sides of stairs with a total rise of more than 30" above the floor or grade below, or where located more than 30" above the floor or grade below, shall have guardrails which are not less than 34" in height above tread nosing.
- \* Stairs shall be not less than 3 feet in clear width with minimum headroom of 6'-8" in height measured vertically above tread nosing. The maximum riser height is 8- 1/4" and the minimum tread depth is 9" exclusive of the nosing. The difference in height between the greatest and smallest riser shall not exceed 3/8" Stairways shall safely support all dead load and a 40 p.s.f. live load.

## **Sec. 76-135. Porches/terraces, at-grade patios, step/stairs and decks.**

(a) *At-grade patios.* At-grade patios may be constructed within required side and rear yards, but not in a required yard facing upon a street.

(b) *Unenclosed, uncovered access porches.* Unenclosed and uncovered access porches (i.e., one which is not roofed over) or paved terraces may project into a required front or rear yard for a distance not exceeding eight feet. Patio and porches covered or partially covered by permanent construction (awnings excepted) shall not project into any required yard space, but this shall not be interpreted to include or permit fixed canopies or awnings.

(c) *Unenclosed porch, step, stairs.* An unenclosed porch, steps or stairs may project into a street-facing front yard for a distance not exceeding eight feet.

(d) *Decks.* Decks may be allowed to project not more than 15 feet into the required rear yard or open space, provided that the following conditions are met:

- (1) The deck does not encroach into any easement.
- (2) The deck is not located facing any street.
- (3) The deck conforms with applicable side yard setback requirements.
- (4) The deck is located not less than ten feet from any detached accessory building. This separation shall not apply to any accessory structure.
- (5) The deck elevation shall be no greater than eight inches over the first floor grade elevation of the main structure. Exception: A deck around a pool may match the height of the pool.
- (6) Any additional structures attached to the deck, such as a gazebo or pool, shall be located at least ten feet from any structure.

(Ord. No. 110-22, § 1(4.04), eff. 4-21-99)



HOUSE

Height above  
Grade: 4-3'

Handrails: 34" - 38" measured vertically from the nosing of the treads. Shall be continuous the full length of the stairs, ends shall be returned. Circular cross section 1 1/4" - 2"

Less than 4"

Less than 4"

Decking size: 5/4

Guardrail minimum 36"

Guardrail minimum 34" off nosing

A 4" sphere cannot pass through

A 6" sphere cannot pass through

1/2" LAG bolted to house Framing 16" o.c.

Beams lagged to posts 5' x 1/2' Beam size: 2x8

Joist size: 2x6 Spacing: 12" o.c.

Post size: 4x6

max Post to post span:

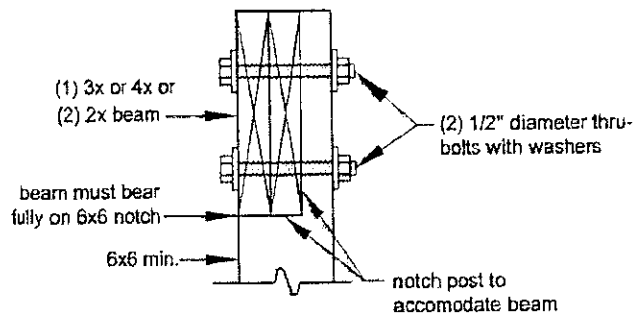
Rise: Max 7 3/4" Run: 9" Nosing: 3/4" - 1 1/4" All risers will be equal Tread 10" No nose if tread = 11"

Grade

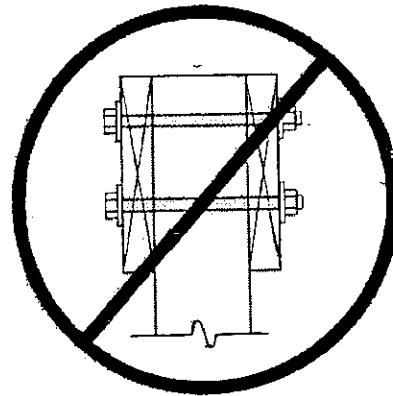
concrete Footing: 42" 8" 12"



**Figure 8: Post-to-Beam Attachment Requirements**



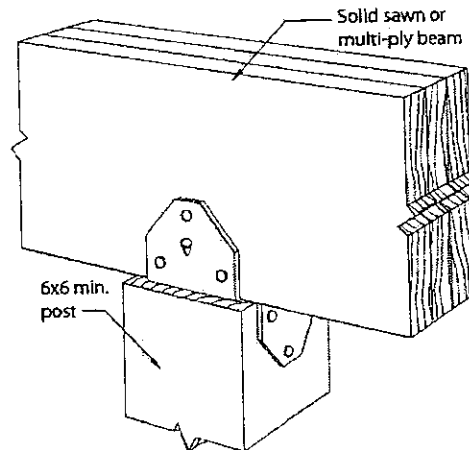
**Figure 9: Prohibited Post-to-Beam Attachment Condition**



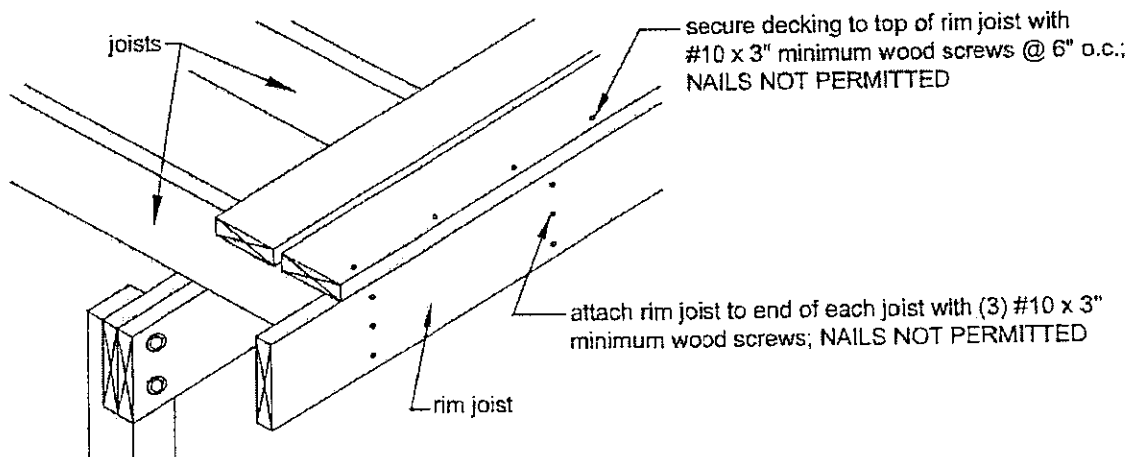
**RIM JOIST REQUIREMENTS**

Attach a continuous rim joist to the ends of joists as shown in Figure 11. Attach decking to the rim joist as shown in Figure 11. For more decking attachment requirements, see DECKING REQUIREMENTS.

**Figure 10: Alternate Approved Post-to-Beam Post Cap Attachment**



**Figure 11: Rim Joist Connection Details**

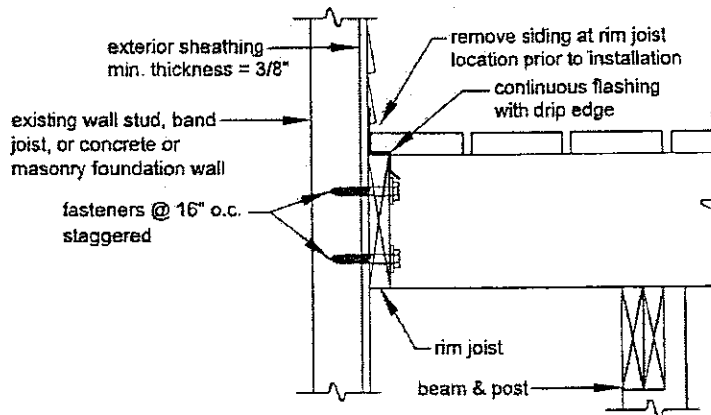


**Diagonal Bracing:** Provide diagonal bracing both parallel and perpendicular to the beam at each post as shown in Figure 22. When parallel to the beam, the bracing shall be bolted to the post at one end and beam at the other. When perpendicular to the beam, the bracing shall be bolted to the post at one end and a joist or blocking between joists at the other. When a joist does not align with the bracing location, provide blocking between the next adjacent joists. Decks attached to the house do not require diagonal bracing perpendicular to the house.

free-standing deck or attach the deck ledger to the house as shown in Figures 14, 15, or 16. The wall must be sheathed with minimum  $\frac{3}{8}$ " wood structural panel sheathing. Use lag screws or thru-bolts when fastening to an existing band joist or wall stud; use expansion anchors or epoxy anchors when fastening to concrete or masonry. **DO NOT ATTACH TO BRICK VENEERS. VERIFY THIS CONDITION IN THE FIELD PRIOR TO UTILIZING THIS METHOD.** Fasteners shall be 16" on center and staggered in 2 rows for free-standing decks. Flashing over the rim joist is required and must be installed in accordance with the flashing provisions in the LEDGER ATTACHMENT REQUIREMENTS.

**Attachment to House:** Attach the deck rim joist to the existing house exterior wall as shown in Figure 23 for a

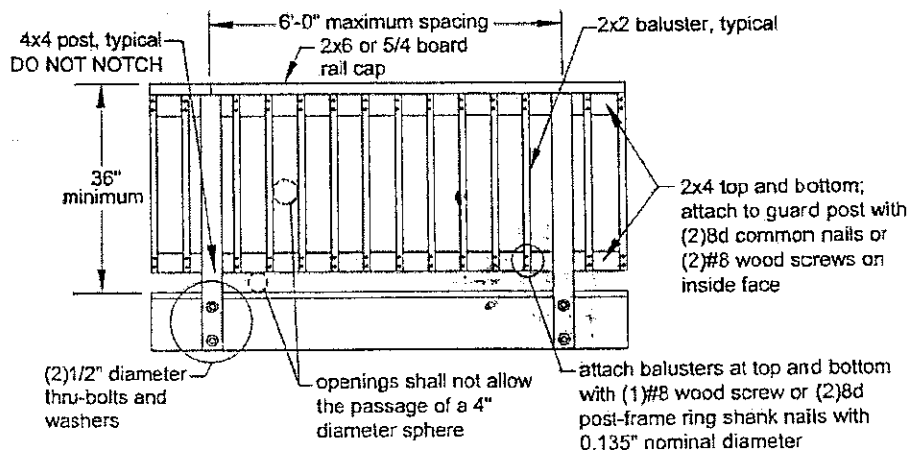
**Figure 23: Attachment of Free-Standing Deck to House for Deck Stability**



**GUARD REQUIREMENTS**

All decks greater than 30" above grade are required to have a guard [R312.1] - one example is shown in Figure 24. Other methods and materials may be used for guard construction when approved by the authority having jurisdiction.

**Figure 24: Example Guard Detail**

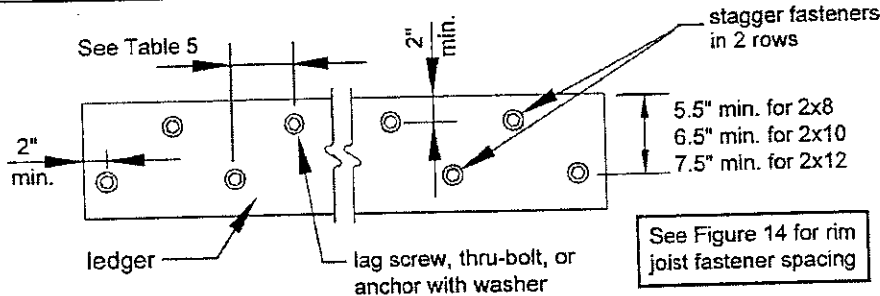


**Placement of lag screws or bolts in deck ledgers**

The lag screws or bolts shall be placed two inches from the bottom or top of the deck ledgers and between two and five inches from the ends. The lag screws or bolts

shall be staggered from the top to the bottom along the horizontal run of the deck ledger (see Figure 19). Proper installation of lag screws or bolts shall be verified by the building official.

**Figure 19: Ledger Board Fastener Spacing and Clearances**



Thru-Bolts

Thru-bolts shall have a diameter of 1/2". Pilot holes for thru-bolts shall be 17/32" to 9/16" in diameter. Thru-bolts require washers at the bolt head and nut.

Minimum embedment length shall be per the manufacturer's recommendations. All anchors must have washers.

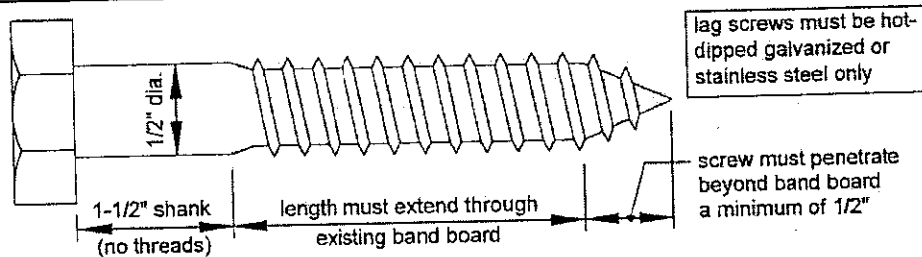
Expansion and Adhesive Anchors

Use approved expansion or adhesive anchors when attaching a ledger board to a concrete or solid masonry wall as shown in Figure 15 or a hollow masonry wall with a grouted cell as shown in Figure 16. Expansion and adhesive anchor bolts shall have a diameter of 1/2".

Lag Screws

Lag screws shall have a diameter of 1/2" (see MINIMUM REQUIREMENTS). Lag screws may be used only when the field conditions conform to those shown in Figure 14. See Figure 20 for lag screw length and shank requirements. All lag screws shall be installed with washers.

**Figure 20: Lag Screw Requirements**



**Lag screw installation requirements:** Each lag screw shall have pilot holes drilled as follows: 1) Drill a 1/2" diameter hole in the ledger board, 2) Drill a 5/16" diameter hole into the band board of the existing house. **DO NOT DRILL A 1/2" DIAMETER HOLE INTO THE BAND BOARD.**

The threaded portion of the lag screw shall be inserted into the pilot hole by turning. **DO NOT DRIVE LAG SCREWS WITH A HAMMER.** Use soap or a wood-compatible lubricant as required to facilitate tightening. Each lag screw shall be thoroughly tightened (snug but not over-tightened to avoid wood damage).

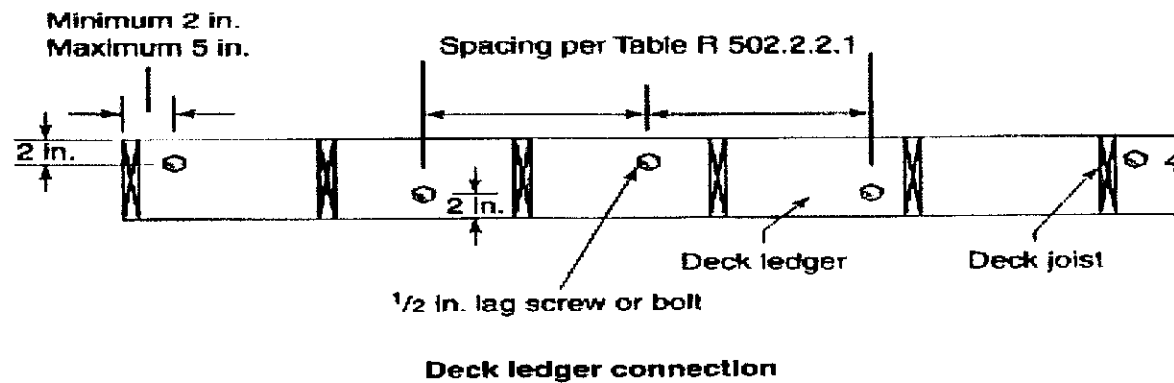
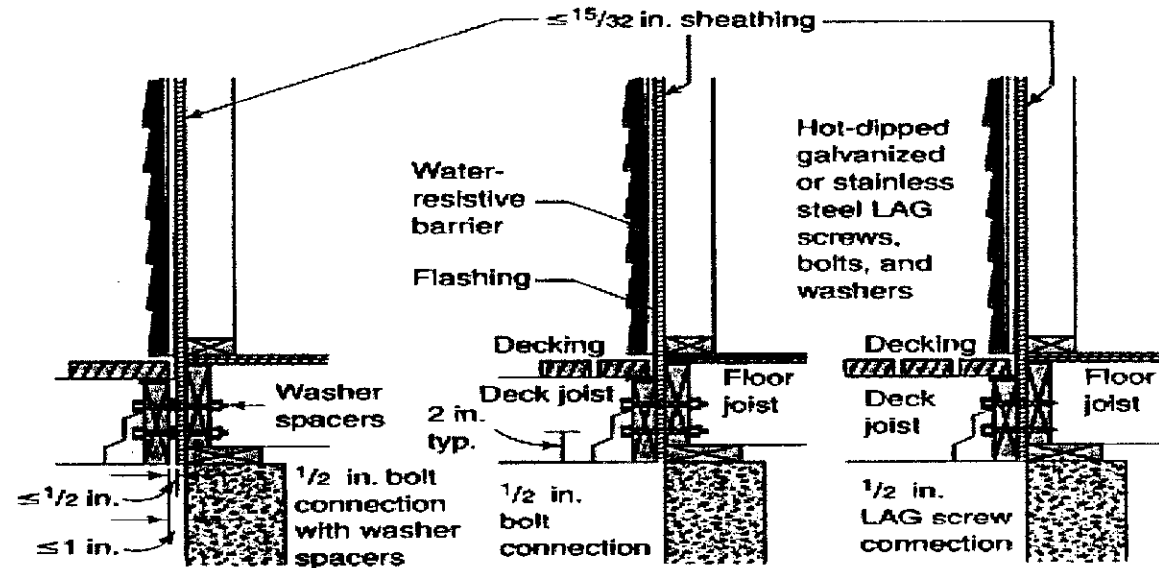
# R502.2.2.1 & Table R502.2.2.1 Deck Ledger Connection

- R502.2.2.1 Deck Ledger Connection to Band Joist.
- R502.2.2.1.1 Placement of Lag Screws or Bolts in Deck Ledgers.
- R502.2.2.2 Alternate Deck Ledger Connection.
- R502.2.2.3 Deck Lateral Load Connection.

**TABLE R502.2.2.1 Fastener Spacing for a Southern Pine or Hem-Fir Deck Ledger and a 2-Inch Nominal Solid-Sawn Spruce-Pine-Fir Band Joist<sup>c,i,g</sup>**  
**(Deck Live Load = 40 psf, Deck Dead Load = 10 psf)**

Joist Span	6'-0" and Less	6'-1" to 8'-0"	8'-1" to 10'-0"	10'-1" to 12'-0"	12'-1" to 14'-0"	14'-1" to 16'-0"	16'-1" to 18'-0"
<b>Connection Details</b>	<b>On-Center Spacing of Fasteners<sup>d,e</sup></b>						
<u>1/2"-diameter lag screw with 15/32" maximum sheathing<sup>a</sup></u>	<u>30</u>	<u>23</u>	<u>18</u>	<u>15</u>	<u>13</u>	<u>11</u>	<u>10</u>
<u>1/2"-diameter bolt with 15/32" maximum sheathing</u>	<u>36</u>	<u>36</u>	<u>34</u>	<u>29</u>	<u>24</u>	<u>21</u>	<u>19</u>
<u>1/2"-diameter bolt with 15/32" maximum sheathing and 1/2" stacked washers<sup>b,h</sup></u>	<u>36</u>	<u>36</u>	<u>29</u>	<u>24</u>	<u>21</u>	<u>18</u>	<u>16</u>

# R502.2.2.1 & Table R502.2.2.1 Deck Ledger Connection (con't)



## SECTION R311 MEANS OF EGRESS

**R311.1 Means of egress.** All *dwelling*s shall be provided with a means of egress as provided in this section. The means of egress shall provide a continuous and unobstructed path of vertical and horizontal egress travel from all portions of the *dwelling* to the exterior of the *dwelling* at the required egress door without requiring travel through a garage.

**R311.2 Egress door.** At least one egress door shall be provided for each *dwelling* unit. The egress door shall be side-hinged, and shall provide a minimum clear width of 32 inches (813 mm) when measured between the face of the door and the stop, with the door open 90 degrees (1.57 rad). The minimum clear height of the door opening shall not be less than 78 inches (1981 mm) in height measured from the top of the threshold to the bottom of the stop. Other doors shall not be required to comply with these minimum dimensions. Egress doors shall be readily openable from inside the *dwelling* without the use of a key or special knowledge or effort.

**R311.2.1 Interior doors.** Interior doors shall be not less than 24 inches (609.6 mm) in width and 6 feet, 6 inches (1981.2 mm) in height.

**Exception:** Doors to areas less than 10 square feet of floor area.

R 408.30518

**R311.3 Floors and landings at exterior doors.** There shall be a landing or floor on each side of each exterior door. The width of each landing shall not be less than the door served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel. Exterior landings shall be permitted to have a slope not to exceed  $\frac{1}{4}$  unit vertical in 12 units horizontal (2-percent).

**Exception:** Exterior balconies less than 60 square feet (5.6 m<sup>2</sup>) and only accessible from a door are permitted to have a landing less than 36 inches (914 mm) measured in the direction of travel.

**R311.3.1 Floor elevations at the required egress doors.** Landings or floors at the required egress door shall not be more than  $1\frac{1}{2}$  inches (38 mm) lower than the top of the threshold.

**Exception:** The exterior landing or floor shall not be more than  $7\frac{3}{4}$  inches (196 mm) below the top of the threshold provided the door does not swing over the landing or floor.

When exterior landings or floors serving the required egress door are not at *grade*, they shall be provided with access to *grade* by means of a ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

**R311.3.2 Floor elevations for other exterior doors.** Doors other than the required egress door shall be provided with landings or floors not more than  $7\frac{3}{4}$  inches (196 mm) below the top of the threshold.

**Exception:** A landing is not required where a stairway of two or fewer risers is located on the exterior side of the door, provided the door does not swing over the stairway.

**R311.3.3 Storm and screen doors.** Storm and screen doors shall be permitted to swing over all exterior stairs and landings.

**R311.4 Vertical egress.** Egress from habitable levels including habitable attics and *basements* not provided with an egress door in accordance with Section R311.2 shall be by a ramp in accordance with Section R311.8 or a stairway in accordance with Section R311.7.

**R311.5 Construction.**

**R311.5.1 Attachment.** Exterior landings, decks, balconies, stairs and similar facilities shall be positively anchored to the primary structure to resist both vertical and lateral forces or shall be designed to be self-supporting. Attachment shall not be accomplished by use of toenails or nails subject to withdrawal.

**R311.6 Hallways.** The minimum width of a hallway shall be not less than 3 feet (914 mm).

**R311.6.4 Modular ramps.** Modular ramp systems approved pursuant to the act are not required to comply with the requirements of section R403.1.4 of the code.

R 408.30518

**R311.7 Stairways.**

**R311.7.1 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  $31\frac{1}{2}$  inches (787 mm) where a handrail is installed on one side and 27 inches (698 mm) where handrails are provided on both sides.

**Exception:** The width of spiral stairways shall be in accordance with Section R311.7.9.1.

**R311.7.2 Headroom.** The minimum headroom in all parts of the stairway shall not be less than 6 feet 8 inches (2032 mm) measured vertically from the sloped line adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway.

**Exception:** Where the nosings of treads at the side of a flight extend under the edge of a floor opening through which the stair passes, the floor opening shall be allowed to project horizontally into the required headroom a maximum of  $4\frac{3}{4}$  inches (121 mm).

**R311.7.3 Walkline.** The walkline across winder treads shall be concentric to the curved direction of travel through the turn and located 12 inches (305 mm) from the side where the winders are narrower. The 12-inch (305 mm) dimension shall be measured from the widest point of the clear stair width at the walking surface of the winder. If winders are adjacent within the flight, the point of the widest clear stair width of the adjacent winders shall be used.

**R311.7.4 Stair treads and risers.** Stair treads and risers shall meet the requirements of this section. For the purposes of this section all dimensions and dimensioned surfaces shall be exclusive of carpets, rugs or runners.

**R311.7.4.1 Riser height.** The maximum riser height shall be  $8\frac{1}{4}$  inches (210 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  $\frac{3}{8}$  inch (9.5 mm).

R 408.30519

**R311.7.4.2 Tread depth.** The minimum tread depth shall be 9 inches (229 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  $\frac{3}{8}$  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  $\frac{3}{8}$  inch (9.5 mm).

R 408.30519

**R311.7.4.3 Profile.** The radius of curvature at the nosing shall be no greater than  $\frac{9}{16}$  inch (14 mm). A nosing not less than  $\frac{3}{4}$  inch (19 mm) but not more than  $1\frac{1}{4}$  inches (32 mm) shall be provided on stairways with solid risers. The greatest nosing projection shall not exceed the smallest nosing projection by more than  $\frac{3}{8}$  inch (9.5 mm) between two stories, including the nosing at the level of floors and landings. Beveling of nosings shall not exceed  $\frac{1}{2}$  inch (12.7 mm). Risers shall be vertical or sloped under the tread above from the underside of the nosing above at an angle not more than 30 degrees (0.51 rad) 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.

**R311.7.4.4 Exterior wood/plastic composite stair treads.** Wood/plastic composite stair treads shall comply with the provisions of Section R317.4.

**R311.7.5 Landings for stairways.** There shall be a floor or landing at the top and bottom of each stairway. A flight of stairs shall not have a vertical rise larger than 12 feet (3658 mm) between floor levels or landings. The width of each landing shall not be less than the width of the stairway served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

**Exception:** A floor or landing is not required at the top of an interior flight of stairs, including stairs in an enclosed garage, provided a door does not swing over the stairs.

**R311.7.6 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).

**R311.7.7 Handrails.** Handrails shall be provided on at least one side of each continuous run of treads or flight with four or more risers.

**R311.7.7.1 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).

**Exceptions:**

1. The use of a volute, turnout or starting easing shall be allowed over the lowest tread.
2. When handrail fittings or bendings are used to provide continuous transition between flights, the transition from handrail to guardrail, or used at the start of a flight, the handrail height at the fittings or bendings shall be permitted to exceed the maximum height.

**R311.7.7.2 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 the 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  $1\frac{1}{2}$  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.

**R311.7.7.3 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  $1\frac{1}{4}$  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  $6\frac{1}{4}$  inches (160 mm) with a maximum cross section of dimension of  $2\frac{1}{4}$  inches (57 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mm).
2. Type II. Handrails with a perimeter greater than  $6\frac{1}{4}$  inches (160 mm) shall have a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of  $\frac{3}{4}$  inch (19 mm) measured vertically from the tallest portion of the profile and achieve a depth of at least  $\frac{5}{16}$  inch (8 mm) within  $\frac{7}{8}$  inch (22 mm) below the widest portion of the profile. This required depth shall continue for at least  $\frac{3}{8}$  inch (10 mm) to a level

that is not less than  $1\frac{1}{4}$  inches (45 mm) below the tallest portion of the profile. The minimum width of the handrail above the recess shall be  $1\frac{1}{4}$  inches (32 mm) to a maximum of  $2\frac{3}{4}$  inches (70 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mm).

**R311.7.7.4 Exterior wood/plastic composite handrails.** Wood/plastic composite handrails shall comply with the provisions of Section R317.4.

**R311.7.8 Illumination.** All stairs shall be provided with illumination in accordance with Section R303.6.

**R311.7.9 Special stairways.** Spiral stairways and bulkhead enclosure stairways shall comply with all requirements of Section R311.7 except as specified below.

**R311.7.9.1 Spiral stairways.** Spiral stairways are permitted, provided the minimum clear width at and below the handrail shall be 26 inches (660 mm) with each tread having a  $7\frac{1}{2}$ -inch (190 mm) minimum tread depth at 12 inches (914 mm) from the narrower edge. All treads shall be identical, and the rise shall be no more than  $9\frac{1}{2}$  inches (241 mm). A minimum headroom of 6 feet 6 inches (1982 mm) shall be provided.

**R311.7.9.2 Bulkhead enclosure stairways.** Stairways serving bulkhead enclosures, not part of the required building egress, providing access from the outside *grade* level to the *basement* shall be exempt from the requirements of Sections R311.3 and R311.7 where the maximum height from the *basement* finished floor level to *grade* adjacent to the stairway does not exceed 8 feet (2438 mm) and the *grade* level opening to the stairway is covered by a bulkhead enclosure with hinged doors or other *approved* means.

## R311.8 Ramps.

**R311.8.1 Maximum slope.** Ramps shall have a maximum slope of 1 unit vertical in 12 units horizontal (8.3 percent slope).

**Exception:** Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical in eight horizontal (12.5 percent slope).

**R311.8.2 Landings required.** A minimum 3-foot by 3-foot (914 mm by 914 mm) landing shall be provided:

1. At the top and bottom of ramps.
2. Where doors open onto ramps.
3. Where ramps change direction.

**R311.8.3 Handrails required.** Handrails shall be provided on at least one side of all ramps exceeding a slope of one unit vertical in 12 units horizontal (8.33-percent slope).

**R311.8.3.1 Height.** Handrail height, measured above the finished surface of the ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

**R311.8.3.2 Grip size.** Handrails on ramps shall comply with Section R311.7.7.3.

**R311.8.3.3 Continuity.** Handrails where required on ramps shall be continuous for the full length of the ramp. 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  $1\frac{1}{2}$  inches (38 mm) between the wall and the handrails.

## SECTION R312 GUARDS

**R312.1 Where required.** *Guards* shall be located along open-sided walking surfaces, including stairs, ramps and landings, that are located more than 30 inches (762 mm) measured vertically to the floor or *grade* below at any point within 36 inches (914 mm) horizontally to the edge of the open side. Insect screening shall not be considered as a *guard*.

**R312.2 Height.** Required *guards* at open-sided walking surfaces, including stairs, porches, balconies or landings, shall be not less than 36 inches (914 mm) high measured vertically above the adjacent walking surface, adjacent fixed seating or the line connecting the leading edges of the treads.

### Exceptions:

1. *Guards* on the open sides of stairs shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
2. Where the top of the *guard* also serves as a handrail on the open sides of stairs, the top of the *guard* shall not be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.

**R312.3 Opening limitations.** Required *guards* shall not have openings from the walking surface to the required *guard* height which allow passage of a sphere 4 inches (102 mm) in diameter.

### Exceptions:

1. The triangular openings at the open side of a stair, formed by the riser, tread and bottom rail of a *guard*, shall not allow passage of a sphere 6 inches (153 mm) in diameter.
2. *Guards* on the open sides of stairs shall not have openings which allow passage of a sphere  $4\frac{1}{8}$  inches (111 mm) in diameter.

**R312.4 Exterior woodplastic composite guards.** Woodplastic composite *guards* shall comply with the provisions of Section R317.4.

## SECTION R313 AUTOMATIC FIRE SPRINKLER SYSTEMS

**R313.1 Design and installation.** Where installed, automatic residential fire sprinkler systems shall conform to the design and installation requirements of the national fire protection association (NFPA) standard 13D or P2904.1.

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