# - RESIDENTIAL STAIRWAYS and RAMPS –

## R311.7 STAIRWAYS

**R311.7.1 Width.** Stairways shall not be less than 36 inches 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 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 where a handrail is installed on one side and 27 inches where handrails are provided on both sides.

**Exceptions:**

1. The width of spiral stairways shall be in accordance with Section R311.7.10.1
2. The width of existing or replacement stairways serving existing unfinished attics or existing unfinished basements being converted to habitable space shall not be less than 32 inches in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4 inches 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 28 inches where a handrail is installed on one side and 24 inches where handrails are provided on both sides.
3. Where an incline platform lift or stairway chairlift is installed on a stairway within a dwelling unit, a clear passage width of not less than 20 inches (508mm) shall be provided. If the seat and platform can be folded when not in use, the distance shall be measured from the folded position.

**R3117.2 Headroom.** The minimum headroom in all parts of the stairway shall not be less than 6 feet, 8 inches measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform on that portion of the stairway.

**Exception #1:** Where the nosing 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 horizontially into the required headroom a maximum of 4 ¾ inches (121mm).

**Exception #2:** The minimum headroom in all parts of existing or replacement stairways serving existing unfinished attics or existing unfinished basements being converted to habitable space shall be 6 feet, 6 inches, measured as above.

**R311.7.3 Vertical Rise.** A flight of stairs shall not have a vertical rise larger than 12 feet between floor levels or landings.

**R311.7.4 Walkline.** The walkline across winder treads shall be concentric to the curved direction of travel through the turn and located 12 inches from the side where the treads are narrower.

**R311.7.5.1 Risers.** The maximum riser height shall be 8 ¼ inches. Riser height shall be measured vertically between leading edges of adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than 3/8 inch.

**Exception:** The maximum riser height of existing or replacement stairs serving existing unfinished attics or existing unfinished basements being converted to habitable space shall be 9 inches, measured as above.

**R311.7.5.2 Treads.** The minimum tread depth shall be 9 inches. 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.

**Exception**: The minimum tread depth of existing or replacement stairs serving existing unfinished attics or existing unfinished basements being converted to habitable space shall be 8 inches, measured as above.

**R311.7.5.2.1 Winder Treads.** Winder treads shall have a minimum tread depth of 10 inches measured between the vertical planes of the foremost projection of adjacent treads at the intersection with the walkline. Winder treads shall have a minimum tread depth of 6 inches at any point within the clear width of the stair. Within any flight of stairs, the largest winder tread depth at the walkline shall not exceed the smallest winder tread depth by more than 3/8". Consistently shaped winders at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8" of the rectangular tread depth.

**R311.7.5.3 Nosings**. The radius of curvature at the nosing shall be no greater than 9/16 inch (14.3 mm). A nosing not less than ¾ inch (19 mm) but not more than 1 ¼ 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.

**Exception:** A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).

**R311.7.5 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, 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 casing 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 each 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 to a wall or shall terminate in newel posts or safety terminations. Handrails adjacent to a wall shall have a space of not less than 1 ½ inch 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 permitted 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 ¼ 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 ¼ inches (160 mm) with a maximum cross section of dimension of 2 ¼ inches (57 mm). Type I. Edges shall have a minimum radius of 0.01 inch (0.25mm)
2. Type II. Handrails with a perimeter greater than 6 ¼ 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 ¾ 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 ¾ inches (45 mm) below the tallest portion of the profile. The minimum width of the handrail above the recess shall be 1 ¼ inches (32 mm) to a maximum of 2 ¾ inches (70 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mmm).

**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 width at and below the handrail shall be 26 inches (660 mm) with each tread having a 7 ½ inches (190 mm) minimum tread depth at 12 inches from the narrower edge. All treads shall be identical, and the rise shall be no more than 9 ½ 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 one unit vertical in twelve 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 1.5 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 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.

**R312.1.3 Opening limitations.** Required guards shall not have openings from the walking surface to the required guard height which allows 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" (153 mm) in diameter.
2. Guards on open sides of stairs shall not have openings which allow passage of a sphere 4 3/8 inches (111 mm) in diameter.