Visual Interpretation of the

STAIR BUILDING CODE

2021 International Residential Code

STAIRBUILDERS AND MANUFACTURERS ASSOCIATION™ SMA



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About this Publication

SMA Visual Interpretation of the 2021 IRC Stairbuilding Codes.

This visual guide simplifies complex technical stair code language using drawings and renderings that exceed the limitations of often misunderstood terminology. Homeowners, Industry Professionals, and Regulators alike have praised the SMA Visual Interpretations of the Stair Building Code. Void of editorial comment they are an essential tool to accurate understanding and visualization of the stairway as it is regulated. The SMA provides these publications to aid in consistent code interpretation by all involved in the safe design, construction and functional use of beautiful stairways, with both regulatory and aesthetic requirements.

SMA and Code Development.

Since 1988, the SMA has continued as a proud participant in the model code development process. We are a member of the International Code Council (ICC) and participate on several committees including the ICC A117.1 Standard for Accessible and Usable Buildings and Facilities and the Deck Code Coalition. The SMA is recognized and respected for our responsible efforts at code reform and interpretation in addition to our trade and industry experience. Our reputation and expertise are assets as we strive to provide safe stairways while allowing freedom of design and aesthetic preference. Thank you to the ICC for providing the SMA permission to print portions of the International Residential Code (IRC) as we work to responsibly inform.

To the User.

Printed copies are available for purchase on the SMA website at stairways.org. This document is just one of the many examples of the value of the SMA to Designers, Builders, Regulators, Stair Industry Professionals and Homeowners. SMA members know their craft and they know the building codes. Their knowledge will be an advantage in your stairway project. You can find SMA Members in your area on our website at stairways.org.

To learn more about the SMA and our code of ethics visit stairways.org, or contact us toll free at 877-500-5759 or sma@stairways.org.

Consider Membership.

If your work is related to stairs and you can prescribe to the ethics and quality standards of the SMA you may qualify for membership. Learn more about the SMA and benefits available as a member by visiting our website stairways.org. You may apply online at sma@stairways.org or contact us toll free 877-500-5759.

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INTERNATIONAL CODE COUNCIL, (ICC) DEFINITIONS

INTERNATIONAL RESIDENTIAL CODE, (IRC) - Section R202 Definitions

R201.3 Terms Defined in other codes. When terms are not defined in this code such terms shall have the meanings ascribed in other code publications of the International Code Council

ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 and 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

BUILDING. Any one-or two-family dwelling or townhouse, or portion thereof, used or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, or any accessory structure.

FLIGHT. A continuous run of rectangular treads or winders or combination thereof from one landing to another.

GUARD. A building component or a system of building components located near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to a lower level

HANDRAIL. A horizontal or sloping rail intended for grasping by the hand for guidance or support.

NOSING. The leading edge of treads of stairs and of landings at the top of stairway flights.

RAMP. A walking surface that has a running slope steeper than 1 unit vertical in 20 units horizontal (5 percent slope).

RISER. The vertical component of a step or stair.

SLEEPING UNIT. A single unit that provides rooms or spaces for one or more persons, includes permanent provisions for sleeping and can include provisions for living, eating and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

STAIR. A change in elevation, consisting of one or more risers.

STAIRWAY. One or more flights of stairs, either interior or exterior, with the necessary landings and connecting platforms to form a continuous and uninterrupted passage from one level to another.

STAIRWAY, SPIRAL. A stairway with a plan view of closed circular form and uniform section-shaped treads radiating from a minimum-diameter circle.

TOWNHOUSE. A building that contains three or more attached townhouse units.

TOWNHOUSE UNIT. A single-family dwelling unit in a townhouse that extends from foundation to roof and that has a yard or public way on not less than two sides.

WINDER. A tread with nonparallel edges.

INTERNATIONAL BUILDING CODE, (IBC) - Chapter 2 Definitions

201.1 Scope. Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings shown herein.

ALTERNATING TREAD DEVICE. (Same as IRC Definition above)

BUILDING. Any structure utilized or intended for supporting or sheltering any occupancy.

DWELLING. A building that contains one or two dwelling units used, intended or designed to be used, rented, leased, let or hired out to be occupied for living purposes.

DWELLING UNIT. A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

FLIGHT. A continuous run of rectangular treads, winders or combination thereof from one landing to another.

GUARD. A building component or a system of building components located at or near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to a lower level.

HANDRAIL. (Same as IRC definition above)

NOSING. (Same as IRC definition above)

RAMP. (Same as IRC definition above)

SLEEPING UNIT. (Same as IRC definition above)

STAIR. (Same as IRC definition above)

STAIRWAY. One or more flights of stairs, either exterior or interior, with the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one level to another.

STAIRWAY, SPIRAL. A stairway having a closed circular form in its plan view with uniform section-shaped treads attached to and radiating from a minimum-diameter supporting column.

TOWNHOUSE. A single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides.

WINDER. (Same as IRC definition above)

Note: The terms defined above appear in italics within the document. We have listed all the stair related definitions from both the IRC and the IBC to aid understanding.

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SECTION R311 MEANS OF EGRESS

R311.7 Stairways. Where required by this code or provided, *stairways* shall comply with this section.

Exceptions: 1. *Stairways* not within or serving a building, porch or deck.
2. *Stairways* leading to nonhabitable attics.
3. *Stairways* leading to crawl spaces.

IRC DEFINITION:

STAIRWAY. One or more flights of stairs, either interior or exterior, with the necessary landings and connecting platforms to form a continuous and uninterrupted passage from one level to another.

R311.7.1 Width. *Stairways* shall be not less than 36 inches (914 mm) in clear width at all points above the permitted *handrail* height **PHOTO 1 & 2** and below the required headroom height **PHOTO 2**. The clear width of *stairways* at and below the *handrail* height, including treads and landings, shall be not less than 31½ inches (787 mm) where a *handrail* is installed on one side **PHOTO 3** and 27 inches (698 mm) where *handrails* are installed on both sides **PHOTO 4**.

Exception: The width of *spiral stairways* shall be in accordance with Section R311.7.10.1 See **PHOTO 52 (p. 19).**

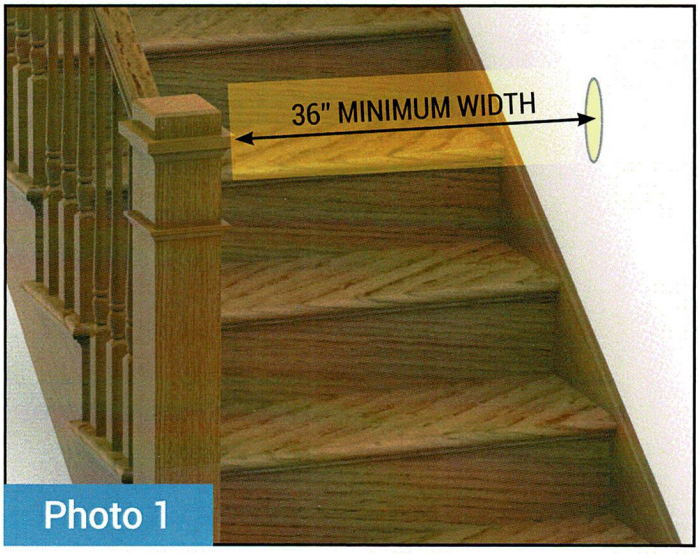


Photo 1



Photo 3

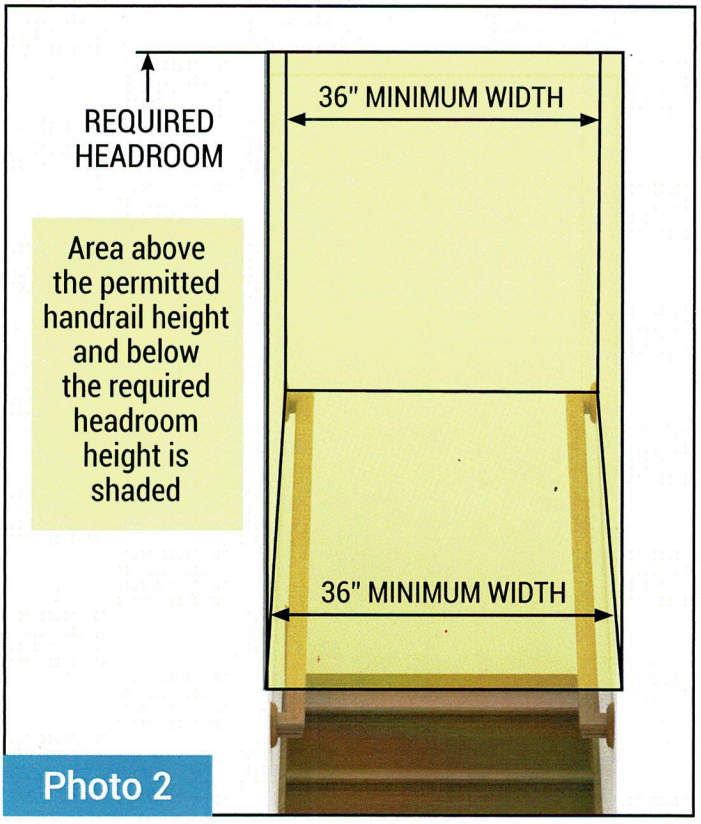


Photo 2

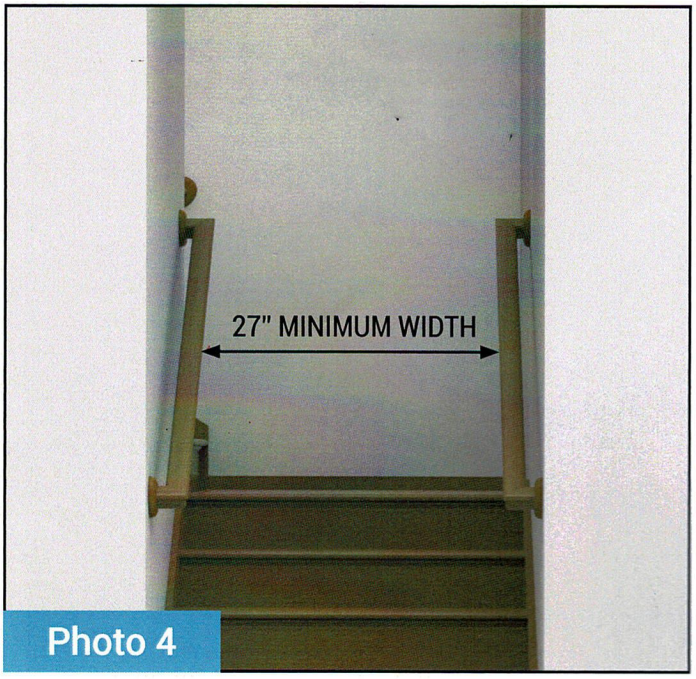


Photo 4

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R311.7.2. Headroom. The headroom in *stairways* shall be not less than 6 feet 8 inches (2032 mm) measured vertically from the sloped line adjoining the tread *nosing* **PHOTO 5** or from the floor surface of the landing or platform on that portion of the *stairway* **PHOTO 6**.

Exceptions:

1. 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 not project horizontally into the required headroom more than 4¾ inches (121 mm) **PHOTOS 7 & 8.**

2. The headroom for *spiral stairways* shall be in accordance with Section R311.7.10.1 **PHOTO 55 (p. 19).**

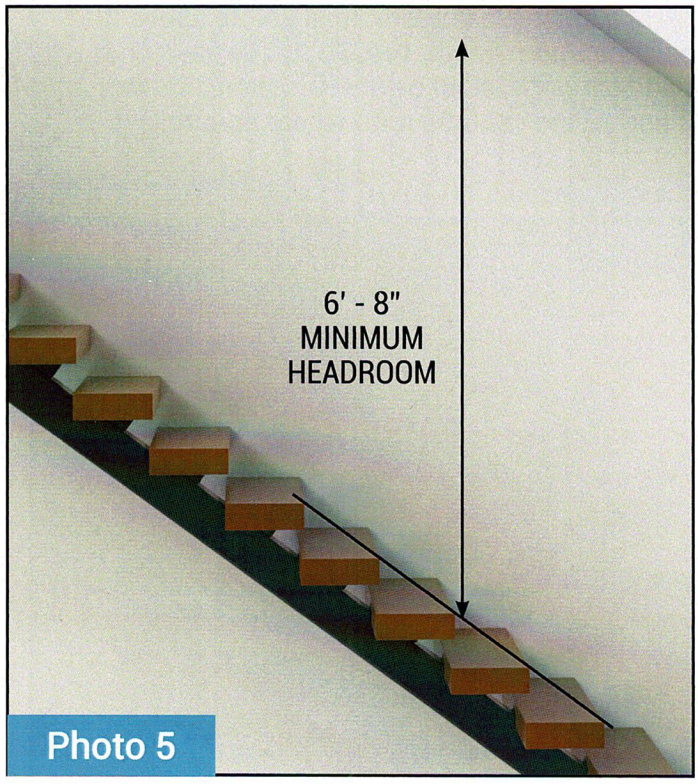


Photo 5



Photo 7

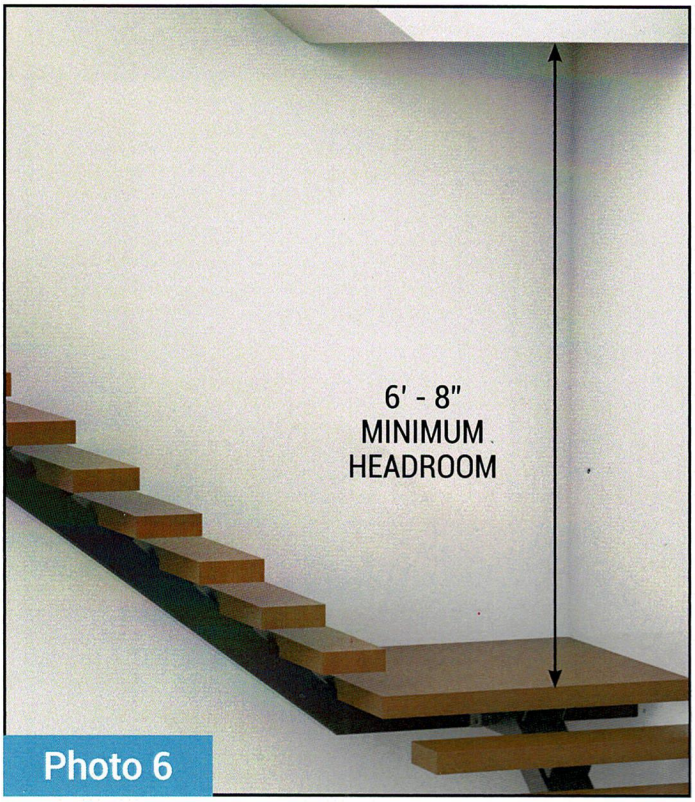


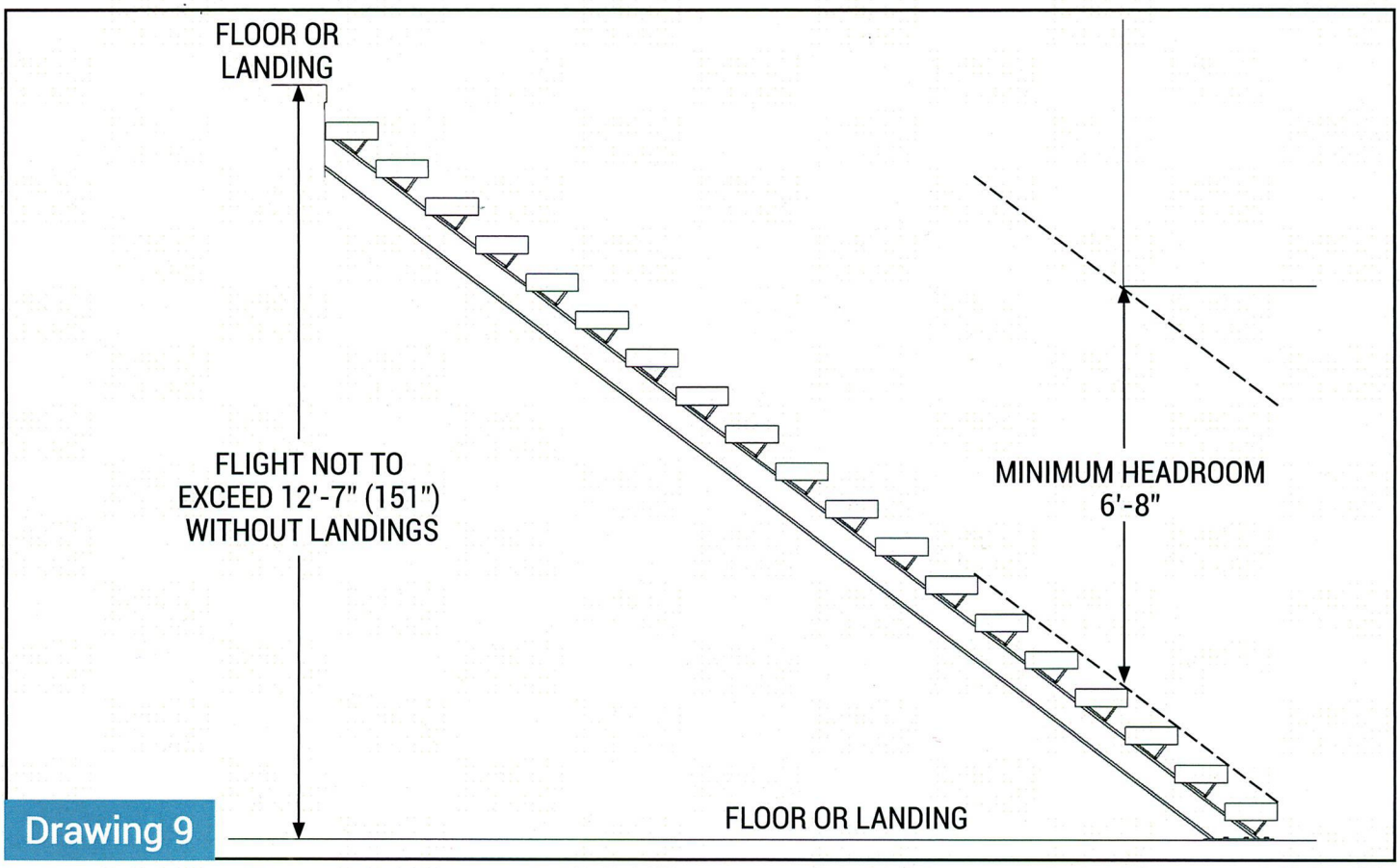
Photo 6



Photo 8

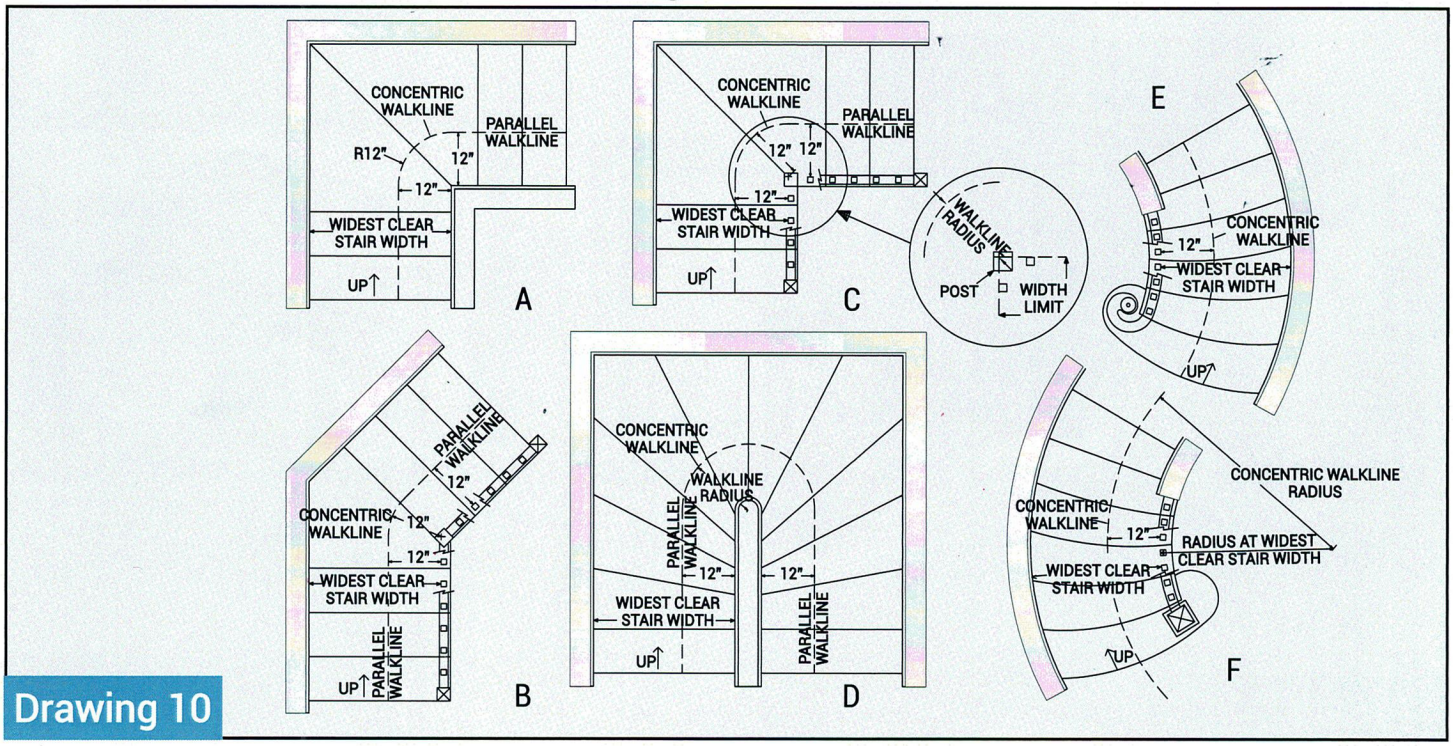
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R311.7.3 Vertical rise. A *flight* of stairs shall not have a vertical rise greater than 12 feet 7 inches (3835 mm) between floor levels or landings **DRAWING 9.**



Drawing 9

R311.7.4 Walkline. The walkline across *winder* treads and landings shall be concentric to the turn **DRAWING 10 Figures A-F** and parallel to the direction of travel entering and exiting the turn **DRAWING 10 Figures A-D.** The walkline shall be located 12 inches (305 mm) from the inside of the turn. The 12-inch (305 mm) dimension shall be measured from the widest point of the clear *stair* width at the walking surface **DRAWING 10 Figures A-F.** Where *winders* are adjacent within the *flight,* **DRAWING 12 (p. 8)** the point of the widest clear stair width of the adjacent *winders* shall be used **DRAWING 10 Figures E-F.**



Drawing 10

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R311.7.5 Stair treads and risers. Stair treads and *risers* shall meet the requirements of this section. For the purposes of this section, dimensions and dimensioned surfaces shall be exclusive of carpets, rugs or runners **PHOTO 11.**

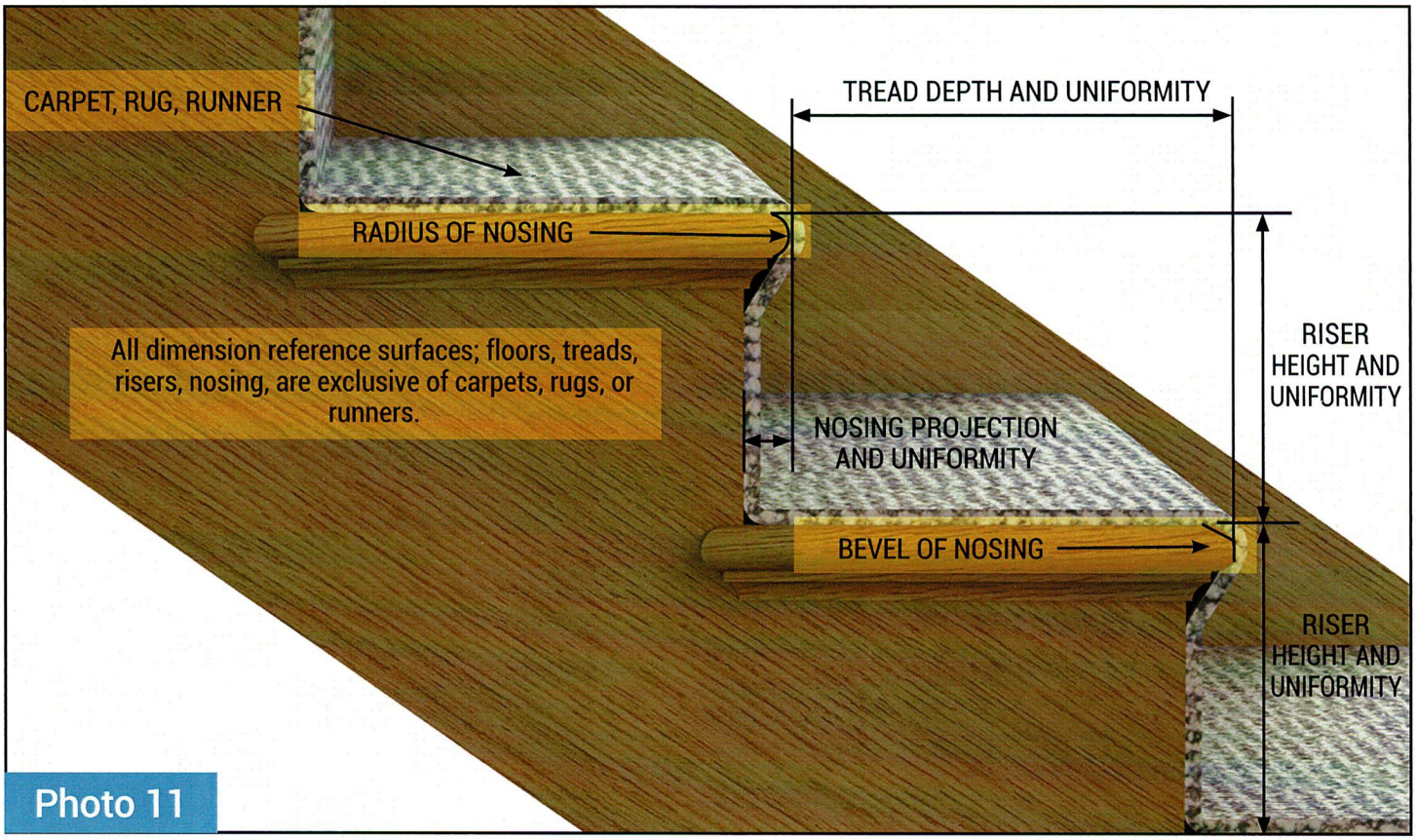
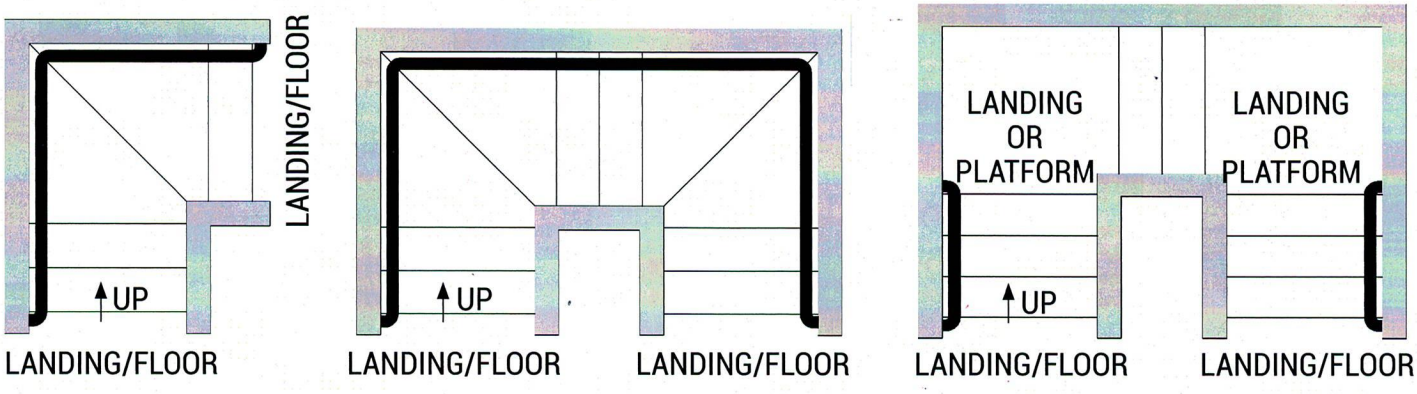


Photo 11

ICC DEFINITION:

FLIGHT. A continuous run of rectangular treads or winders or combination thereof from one landing to another.



Drawing 12

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R311.7.5.1 Risers. The *riser* height shall be not more than 7¾ inches (196 mm). The *riser* height shall be measured vertically between leading edges of the adjacent treads **PHOTO 13.** The greatest *riser* height within any *flight* **DRAWING 12 (p. 8)** of *stairs* shall not exceed the smallest by more than ⅜ inch (9.5 mm) **PHOTO 14.** Risers shall be vertical or sloped from the underside of the nosing of the tread above at an angle not more than 30 degrees (0.51 rad) from the vertical **PHOTO 15**. At open *risers*, openings located more than 30 inches (762 mm), as measured vertically, to the floor or grade below shall not permit the passage of a 4-inch-diameter (102 mm) sphere **PHOTO 16**.

Exceptions:

1. The opening between adjacent treads is not limited on spiral stairways **PHOTO 55 (p. 19).**
2. The *riser* height of spiral stairways shall be in accordance with Section R311.7.10.1 **PHOTO 52 (p. 19).**

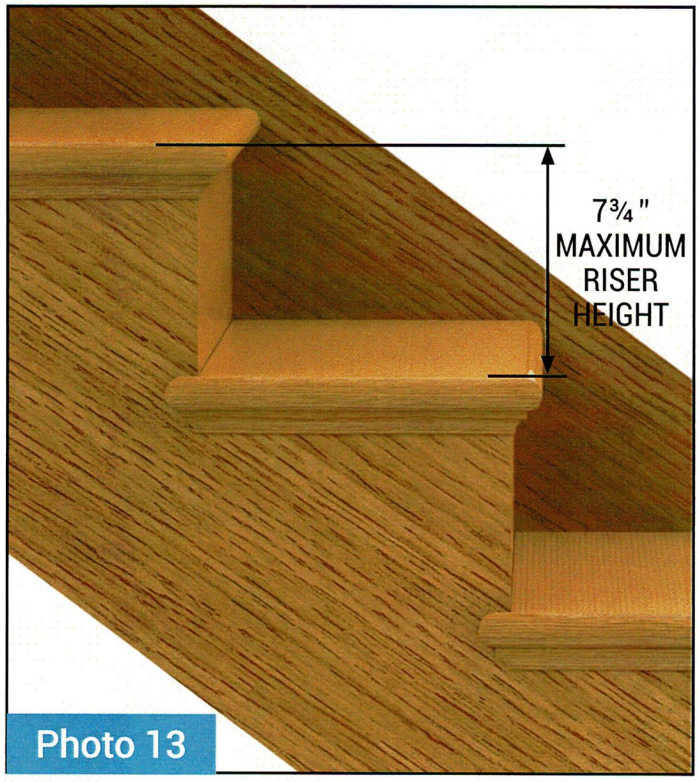


Photo 13

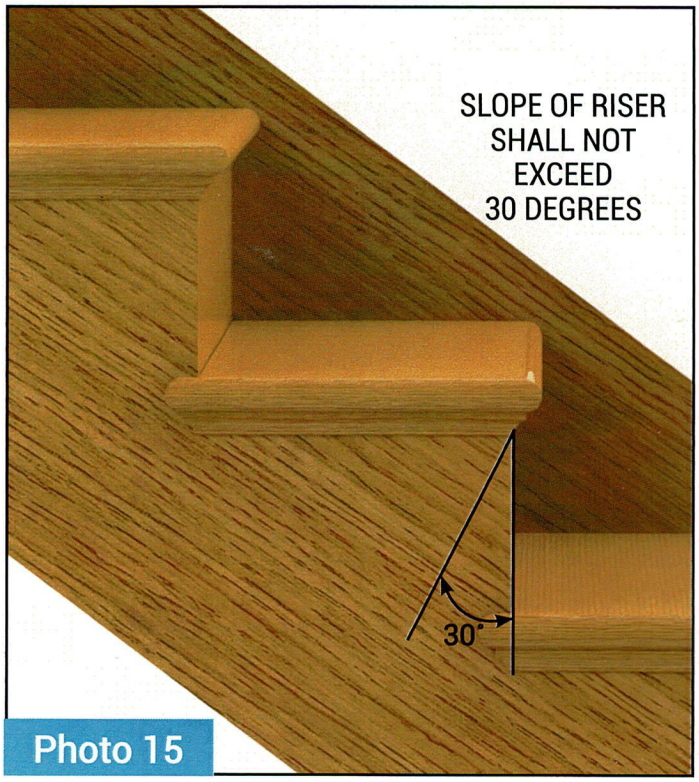


Photo 15

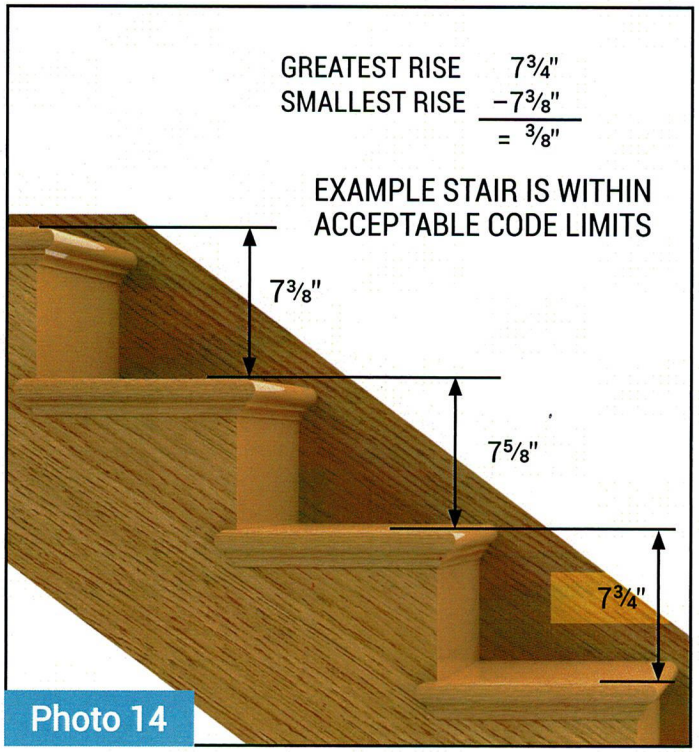


Photo 14

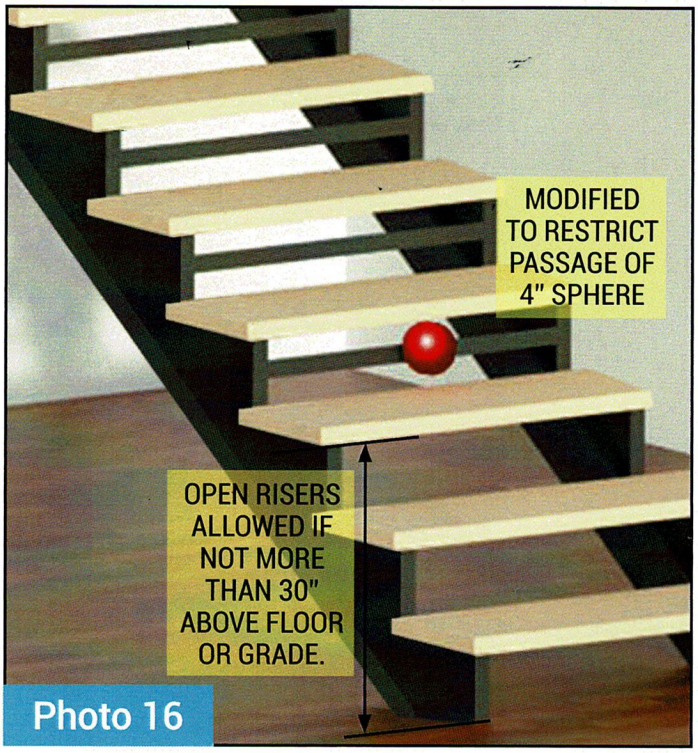


Photo 16

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R311.7.5.2 Treads. The tread depth shall be not less than 10 inches (254 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads **PHOTO 17** and at a right angle to the tread's leading edge. The greatest tread depth within any *flight* **DRAWING 12 (p. 8)** of *stairs* shall not exceed the smallest by more than ⅜ inch (9.5 mm) **PHOTO 18.**

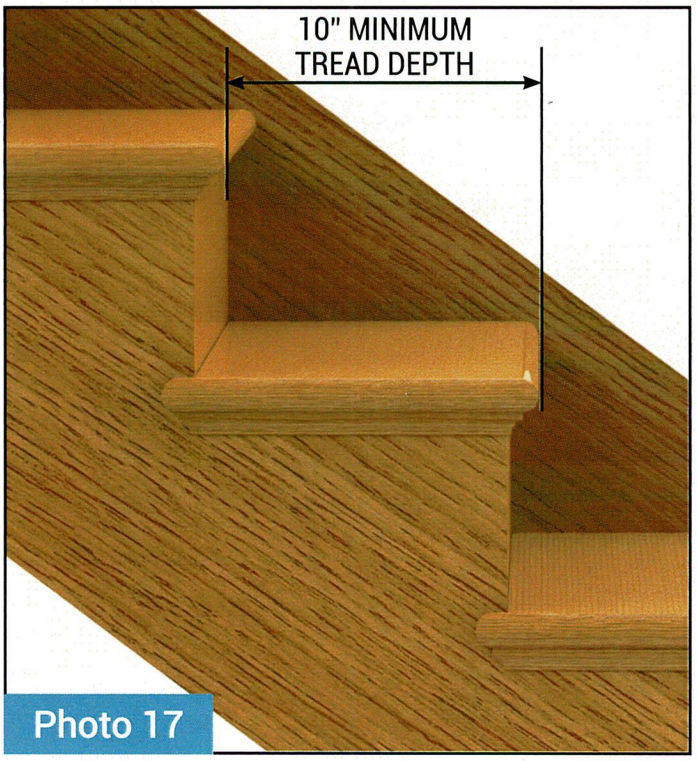


Photo 17

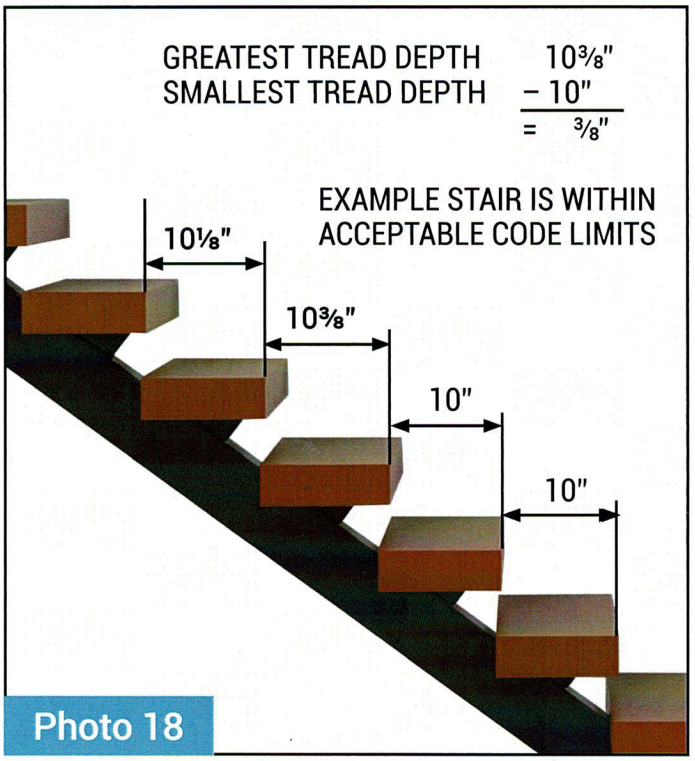
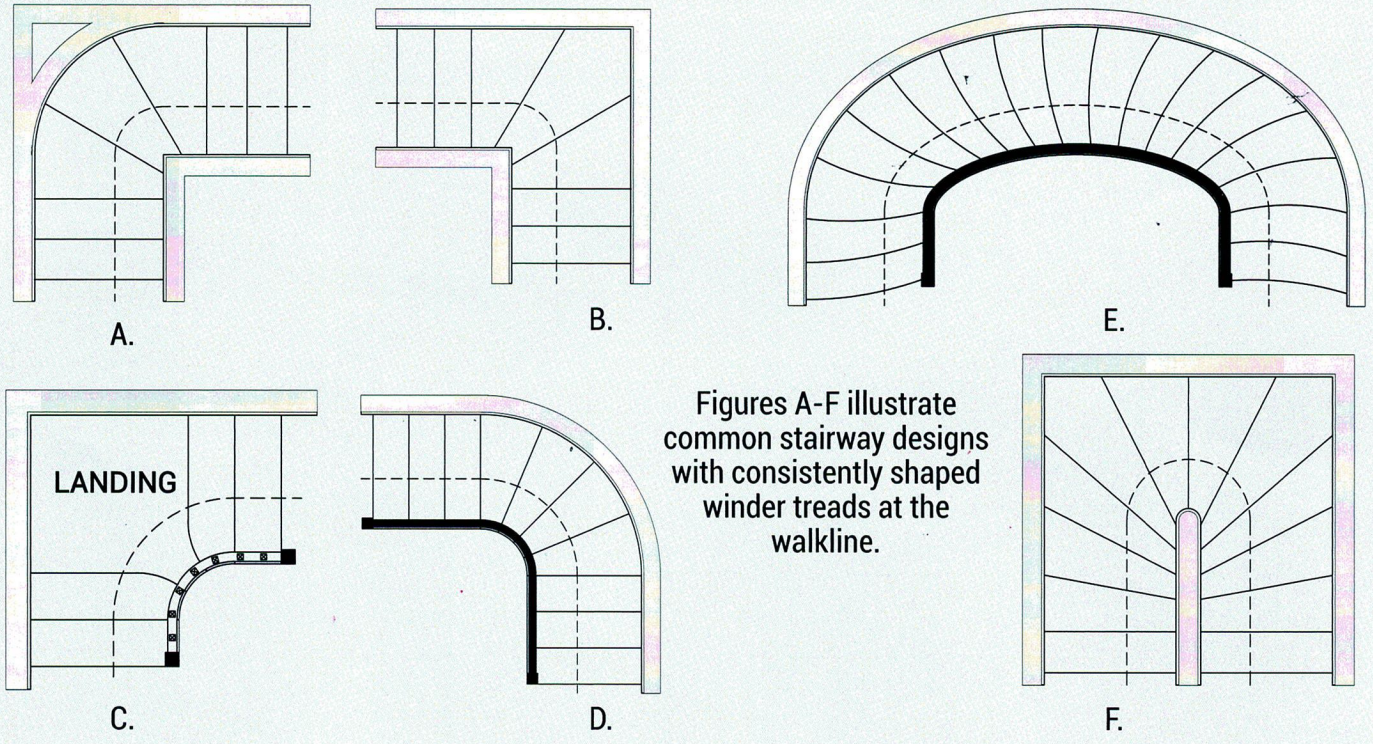


Photo 18

ICC DEFINITION:

WINDER. A tread with nonparallel edges.

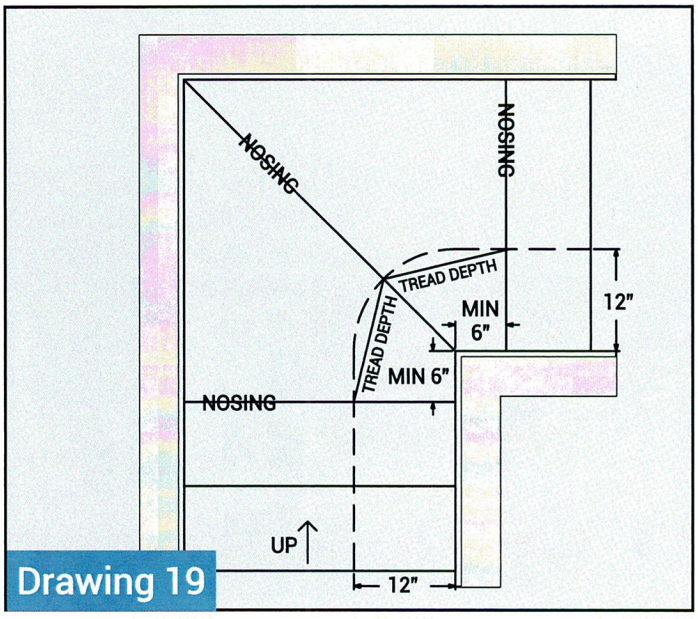


Figures A-F illustrate common stairway designs with consistently shaped winder treads at the walkline.

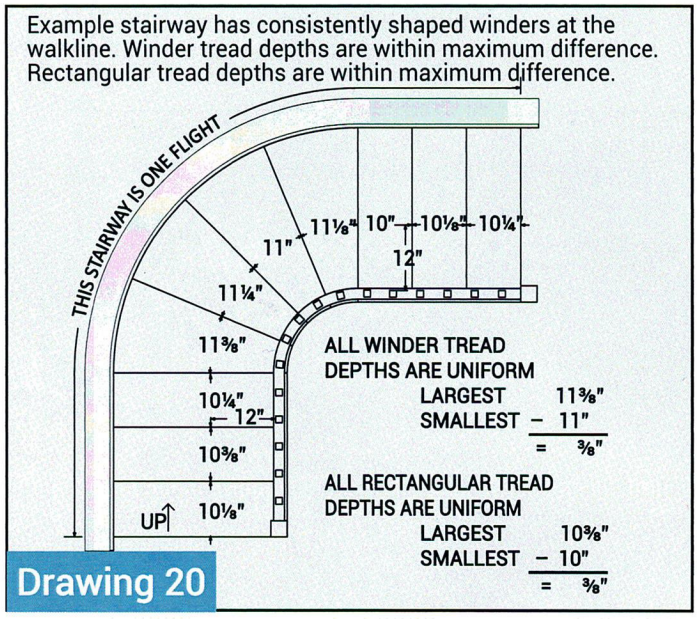
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R311.7.5.2.1 Winder treads. *Winder* treads shall have a tread depth of not less than 10 inches (254 mm) measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline. *Winder* treads shall have a tread depth of not less than 6 inches (152 mm) at any point within the clear width of the *stair* **DRAWING 19.** Within any *flight* of *stairs,* **DRAWING 12 (p. 8)** the largest *winder* tread depth at the walkline shall not exceed the smallest *winder* tread by more than ⅜ inch (9.5 mm) **DRAWING 20**. Consistently shaped *winders* at the walkline shall be allowed within the same *flight* of *stairs* as rectangular treads and shall not be required to be within ⅜ inch (9.5 mm) of the rectangular tread depth **DRAWING 20.**

Exception: The tread depth at *spiral* stairways shall be in accordance with Section R311.7.10.1 **DRAWING 54 (p. 19).**



Drawing 19



Drawing 20

R311.7.5.3 Nosings. *Nosings* at treads, landings and floors of *stairways* shall have a radius of curvature at the *nosing* not greater than 9/16 inch (14 mm) **PHOTO 21** or a bevel not greater than ½ inch (12.7 mm) **PHOTO 22**. A *nosing* projection not less than ¾ inch (19 mm) and not more than 1¼ inches (32 mm) shall be provided on *stairways* **PHOTO 23**. The greatest *nosing* projection shall not exceed the smallest *nosing* projection by more than ⅜ inch (9.5 mm) within a *stairway* **PHOTO 24**.

Exception: A *nosing* projection is not required where the tread depth is not less than 11 inches (279 mm).

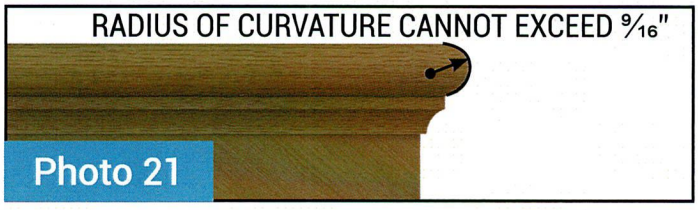


Photo 21



Photo 22

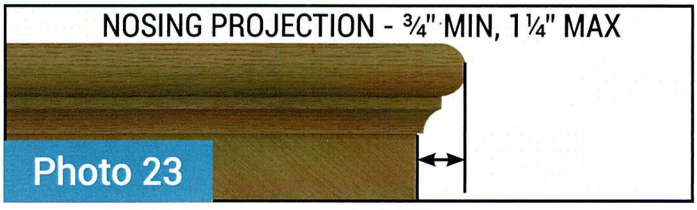


Photo 23

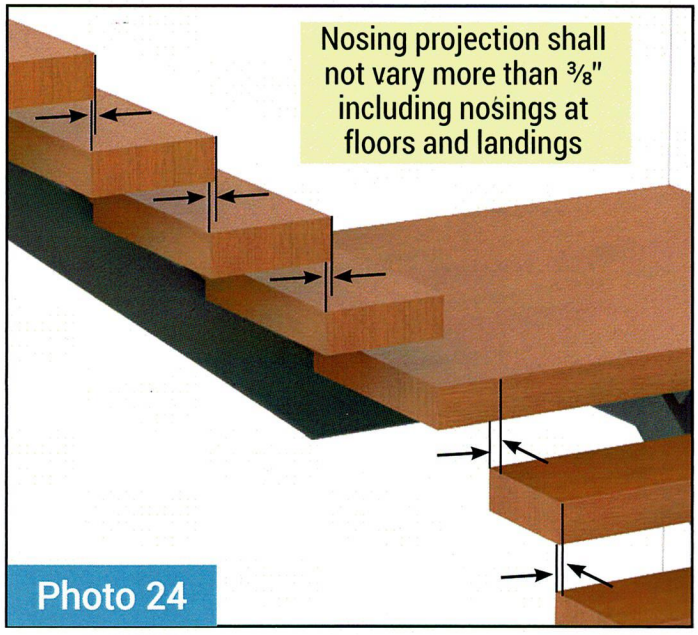


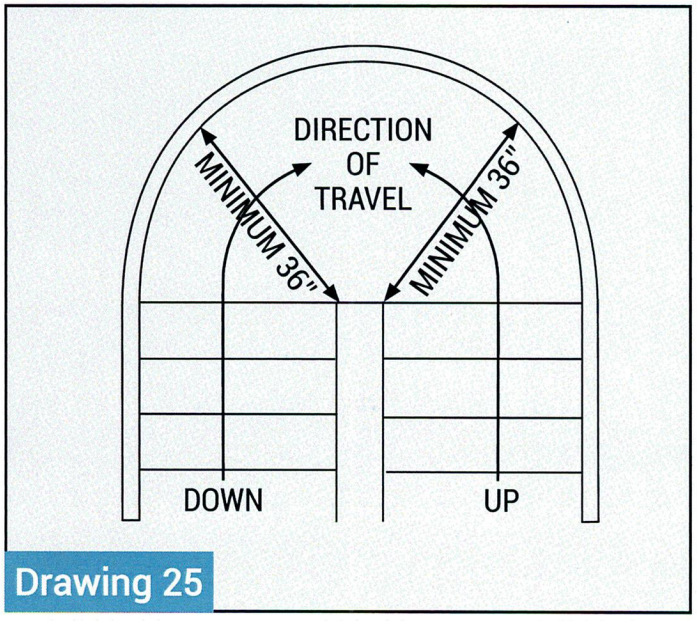
Photo 24

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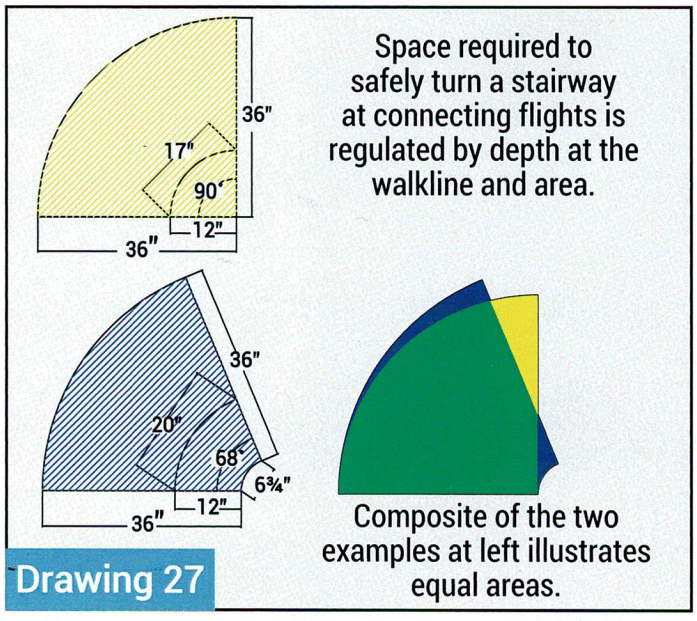
R311.7.5.4 Exterior plastic composite stair treads. Plastic composite exterior stair treads shall comply with the provisions of this section and Section R507.2.2.

R311.7.6. Landings for stairways. There shall be a floor or landing at the top and bottom of each *stairway.* The width perpendicular to the direction of travel **DRAWING 25** shall be not less than the width of the *flight* served **DRAWING 26.** For landings of shapes other than square or rectangular the depth at the walk line and the total area shall be not less than that of a quarter circle with a radius equal to the required landing width **DRAWING 27**. Where the *stairway* has a straight run, the depth in the direction of travel shall be not less than 36 inches (914 mm).

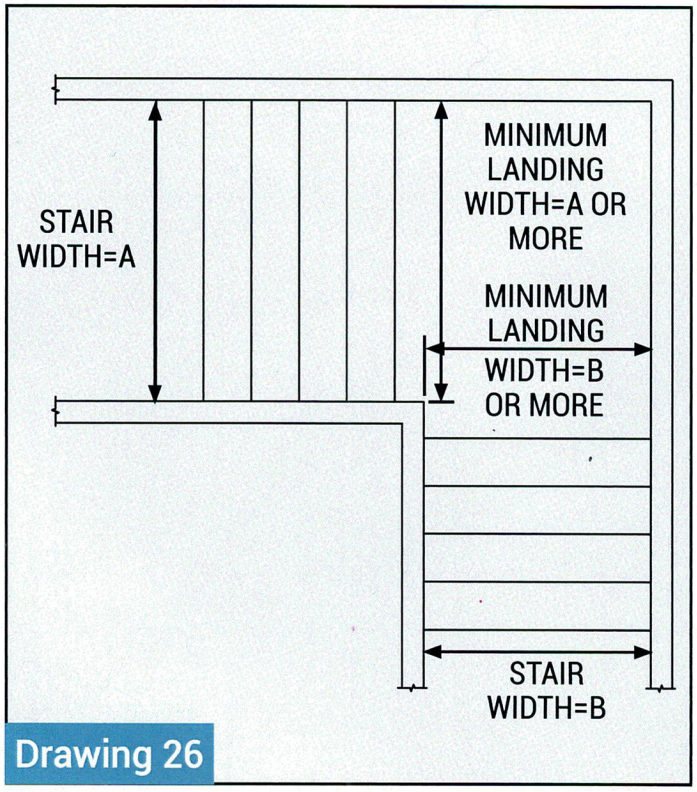
Exception: A floor or landing is not required at the top of an interior *flight* of *stairs,* including *stairs* in an enclosed garage, provided a door does not swing over the *stairs*.



Drawing 25



Drawing 27



Drawing 26

R311.7.7 Stairway walking surface. The walking surface of treads and landings of *stairways* shall be sloped not steeper than one unit vertical in 48 units horizontal (2-percent slope) **PHOTO 28.**

Exception: Where the surface of a landing is required elsewhere in the code to drain surface water, the walking surface of the landing shall be sloped not steeper than 1 unit vertical in 20 units horizontal (5-percent slope) in the direction of travel.

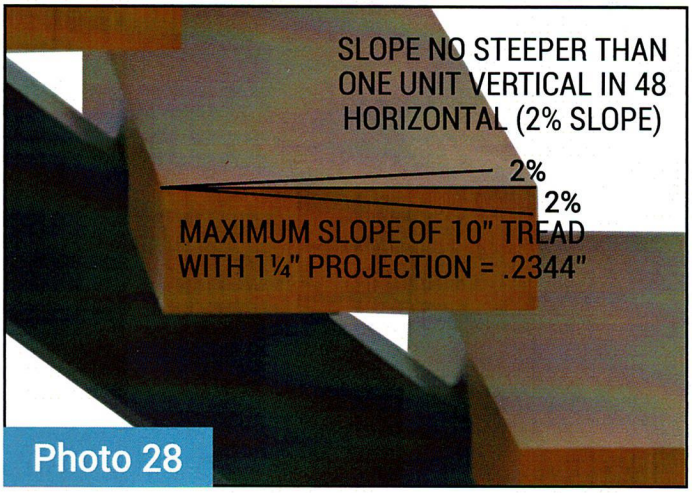


Photo 28

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ICC DEFINITION:

HANDRAIL. A horizontal or sloping rail intended for grasping by the hand for guidance or support

R311.7.8 Handrails. *Handrails* shall be provided on not less than one side of each *flight* of *stairs* **DRAWING 12 (p. 8)** with four or more *risers* **PHOTO 29.**

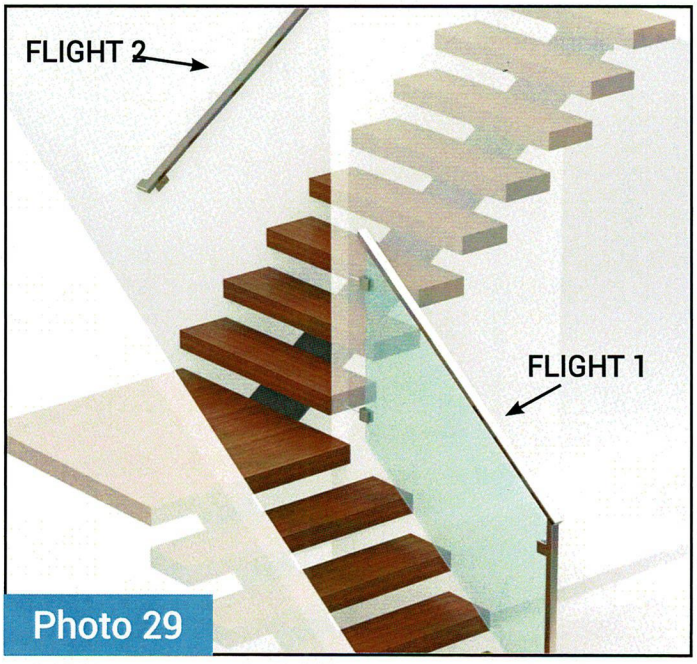


Photo 29

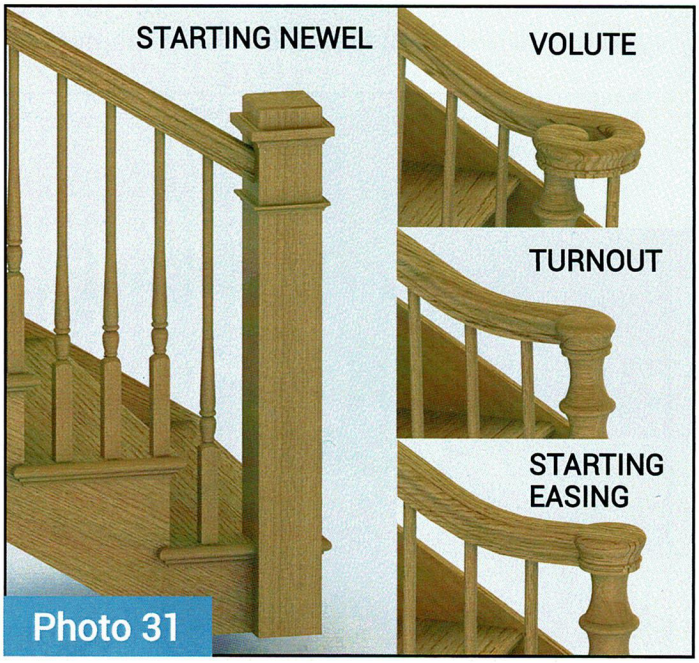


Photo 31

R311.7.8.1 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) **PHOTO 30.**

Exception:

1. The use of a volute, turnout or starting easing shall be allowed over the lowest tread **PHOTO 31**.
2. Where *handrail* fittings or bendings are used to provide continuous transition between *flights*, transitions at *winder* treads, the transition from *handrail* to *guard*, or used at the start of a *flight*, the *handrail* height at the fittings or bendings shall be permitted to exceed 38 inches (956 mm) **PHOTO 32.**



Photo 30

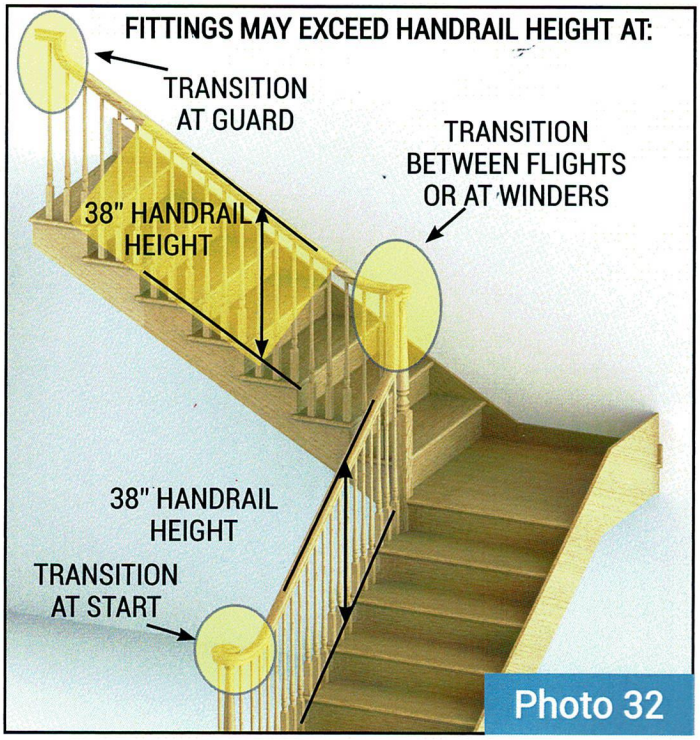


Photo 32

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R311.7.8.2 Handrail projection. *Handrails* shall not project more than 4½ inches (114 mm) on either side of the *stairway* **PHOTO 33.**

Exception: Where nosings of landings, floors **PHOTO 34** or passing *flights* **PHOTO 35** project into the *stairway* reducing the clearance at passing handrails, handrails shall project not more than 6½ inches (165 mm) into the *stairway,* provided that the stair width and handrail clearance are not reduced to less than that required.

R311.7.8.3. Handrail clearance. Handrails adjacent to a wall shall have a space of not less than 1½ inches (38 mm) between the wall and the handrails **PHOTO 36.**



Photo 33

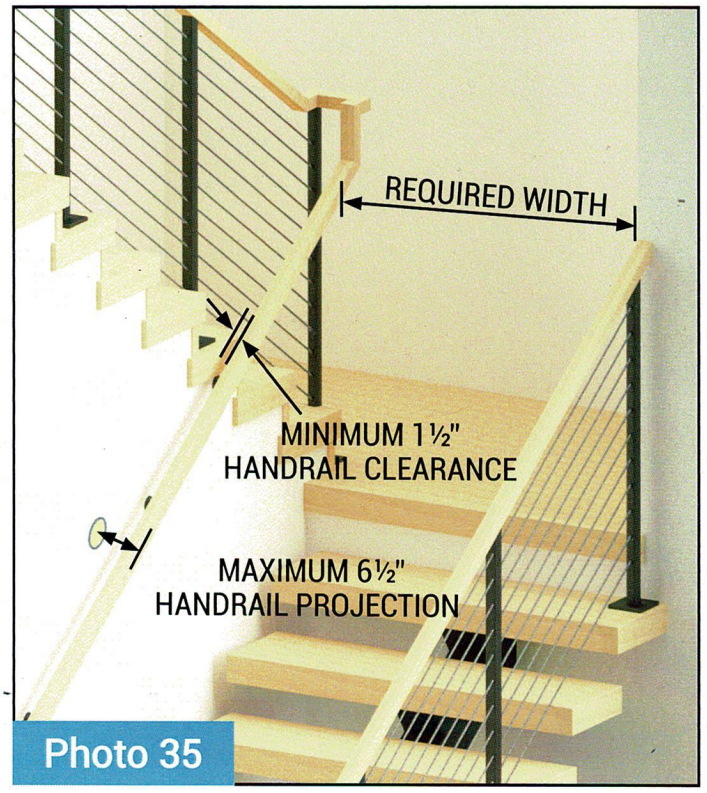


Photo 35

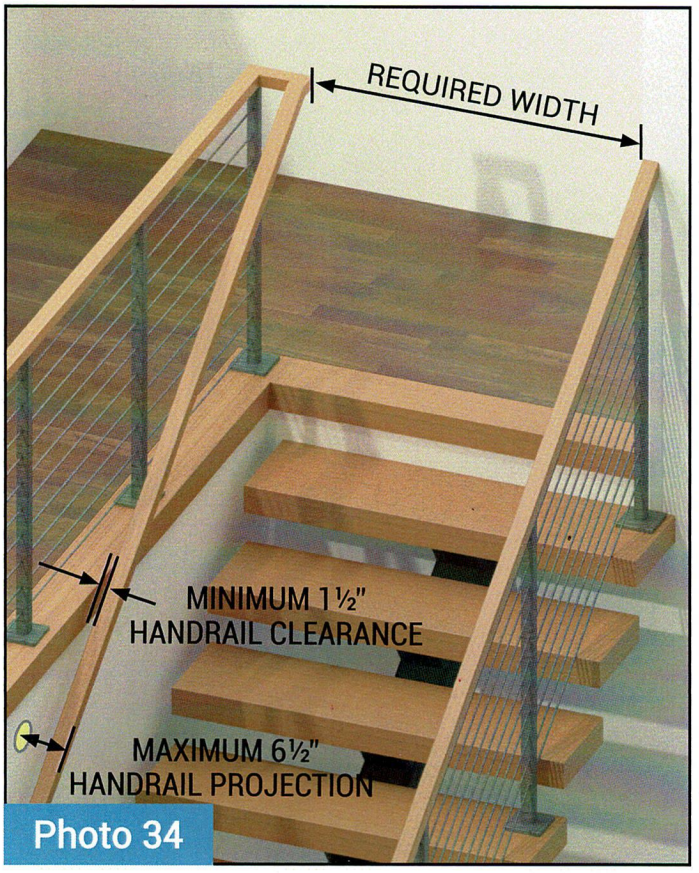


Photo 34

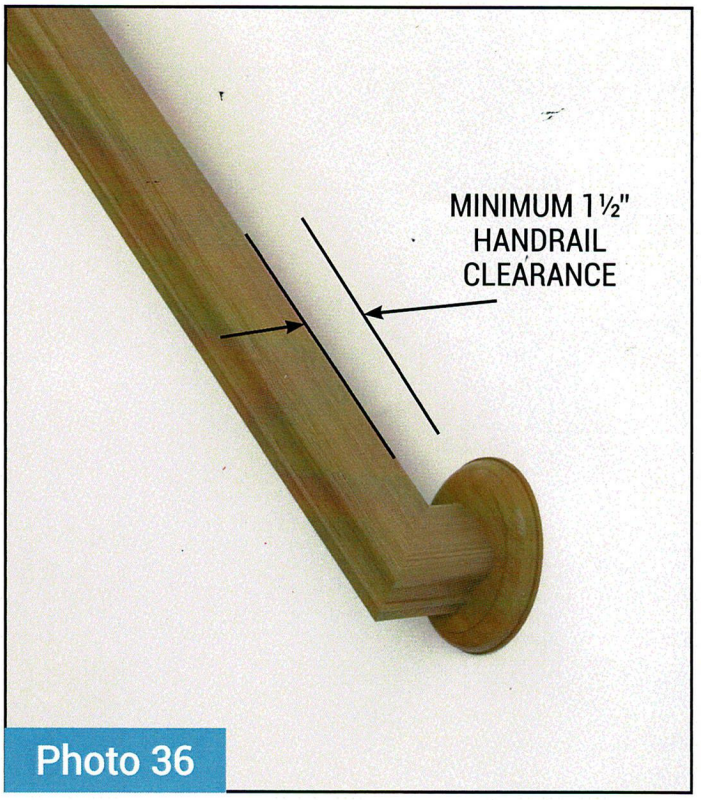


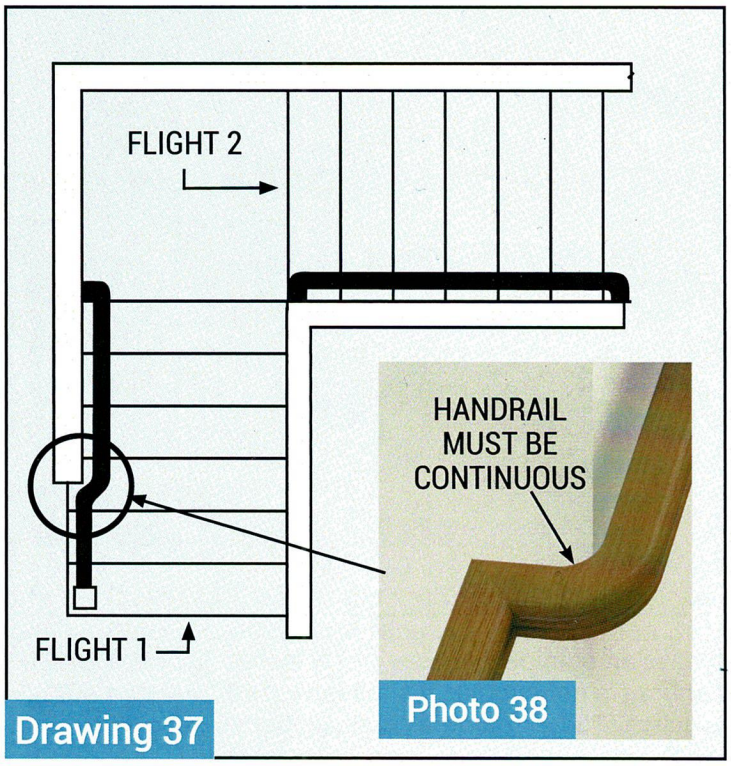
Photo 36

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R311.7.8.4 Continuity. *Handrails* shall be continuous for the full length of the *flight,* **DRAWING 12 (p. 8)** from a point directly above the top *riser* of the *flight* to a point directly above the lowest *riser* of the *flight* **DRAWING 37 and PHOTO 38.** *Handrail* ends shall be returned toward a wall **PHOTO 39** gaurd, walking surface, continuous to itself, or terminate to a post **PHOTOS 40 and 41** or safety terminals.

Exception:

1. *Handrail* continuity shall be permitted to be interrupted by a newel post at a turn in a flight with winders, at a landing **PHOTO 40**, or over the lowest tread **PHOTO 31 (p. 13).**
2. A volute, turnout or starting easing shall be allowed to terminate over the lowest tread and over the top landing **PHOTO 31 (p. 13).**



Drawing 37

Photo 38



Photo 40

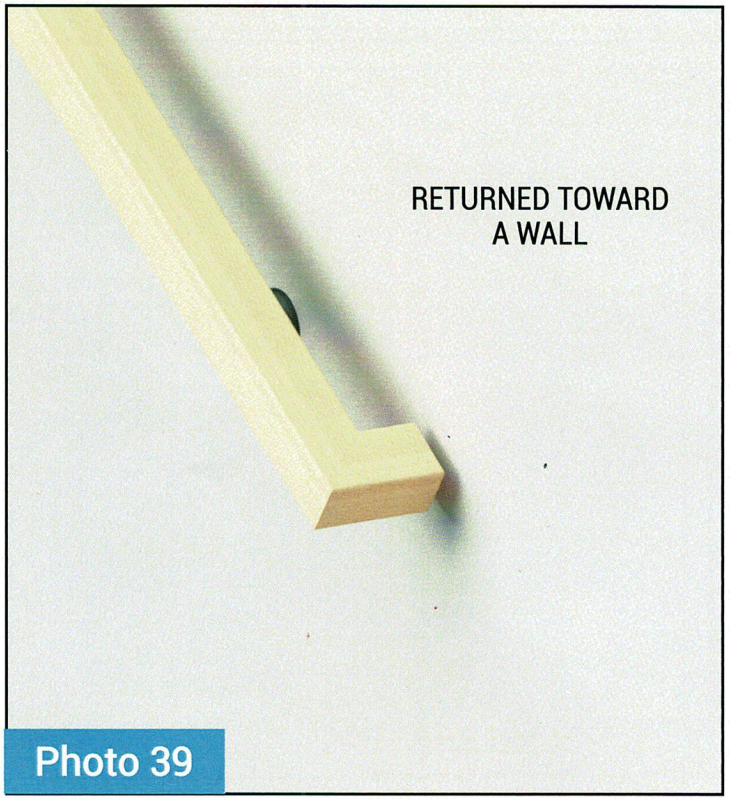


Photo 39

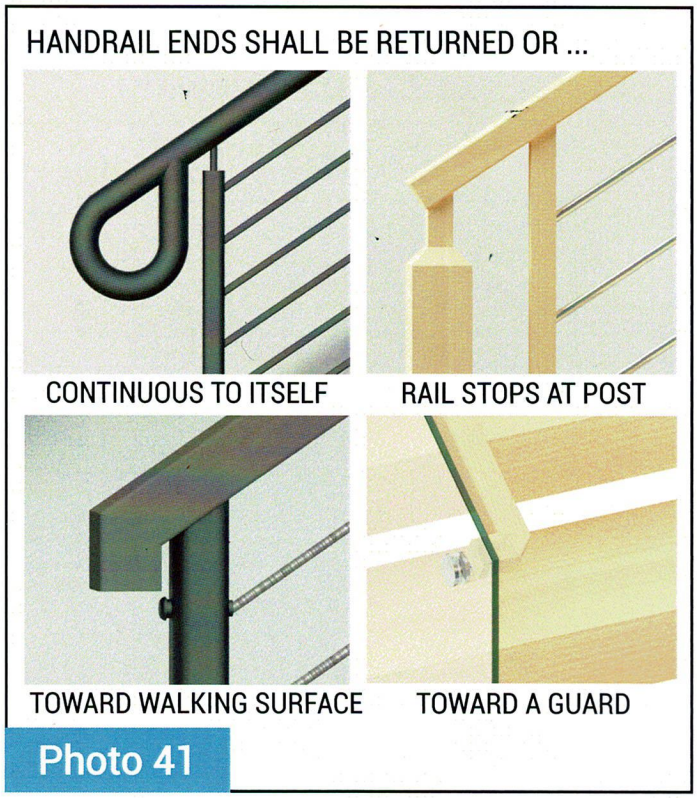
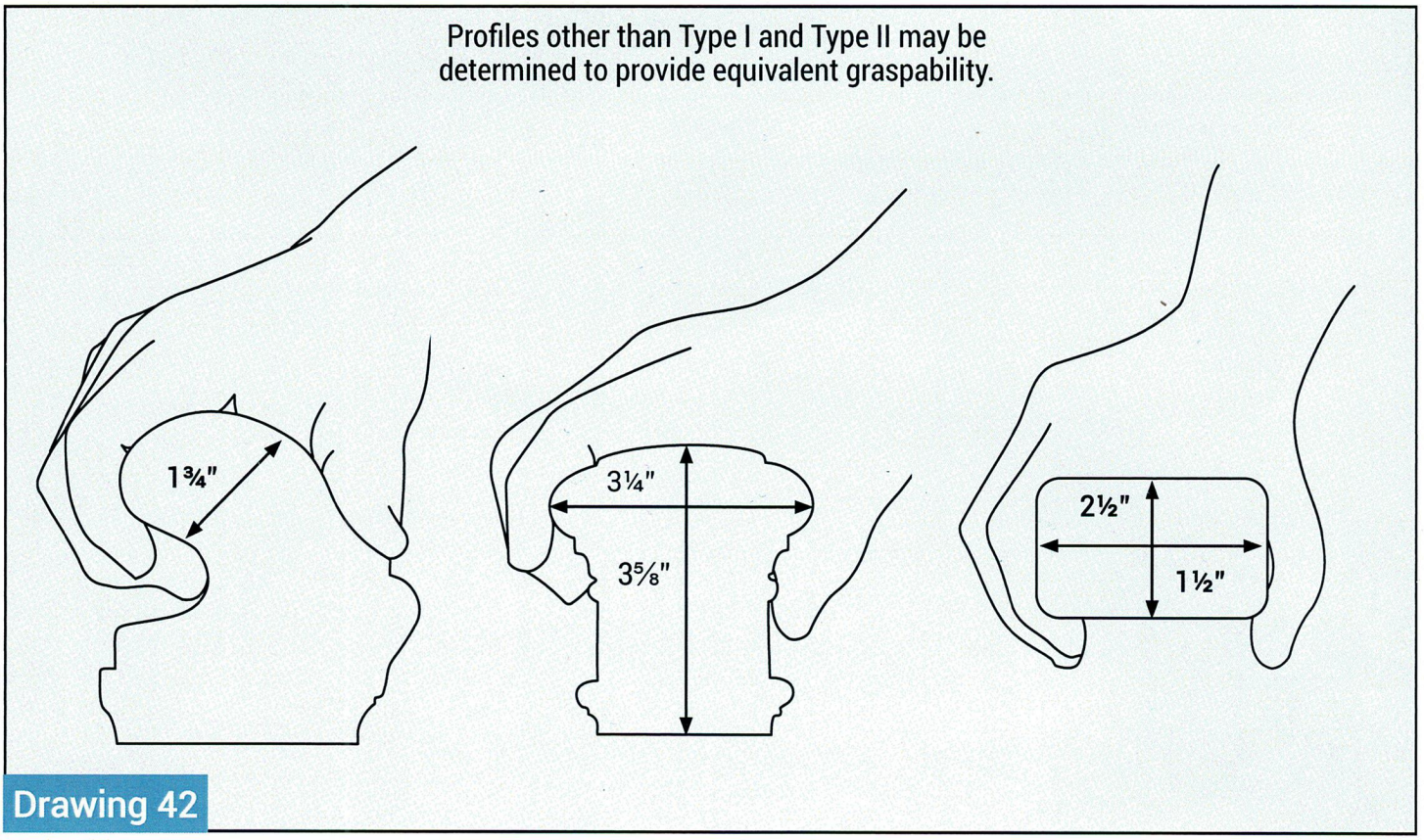


Photo 41

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R311.7.8.5 Grip-size. Required *handrails* shall be of one of the following types or provide equivalent graspability **DRAWING 42.**



Drawing 42

1. Type I. *Handrails* with a circular cross section shall have an outside diameter of 1¼ inches (32 mm) and not greater than 2 inches (51 mm) **PHOTO 43.** If the *handrail* is not circular, it shall have a perimeter of not less than 4 inches (102 mm) and not greater than 6¼ inches (160 mm) and a cross section of not more than 2¼ inches (57 mm). Edges shall have a radius of not less than 0.01 inches (0.25 mm) **PHOTO 44.**

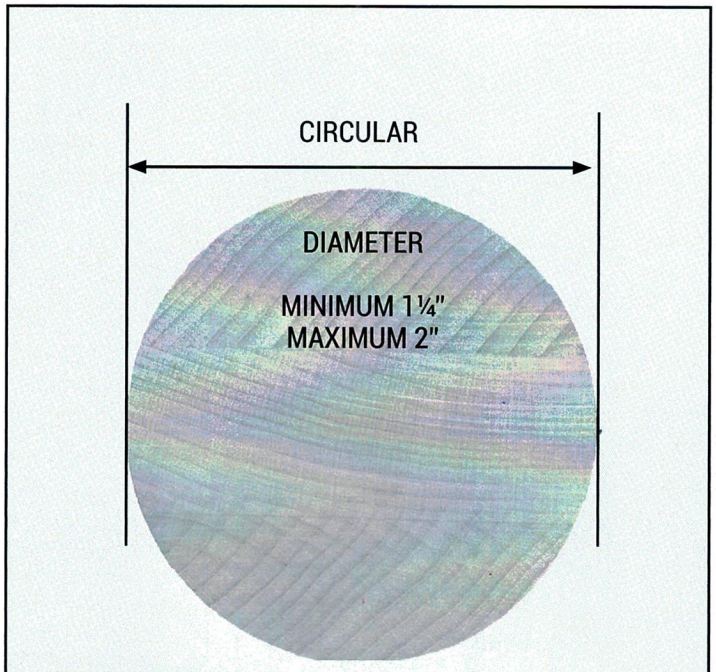


Photo 43

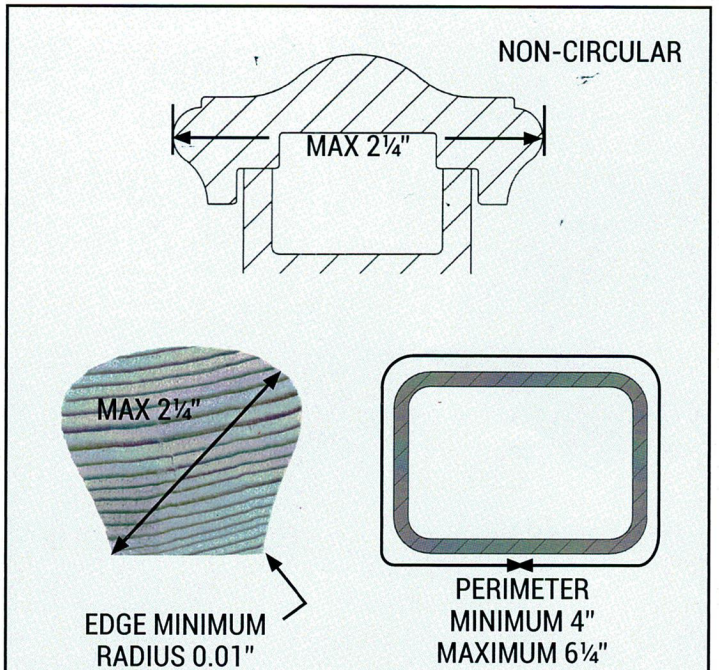


Photo 44

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R311.7.8.5 Grip-size. (continued)

2. Type II. *Handrails* with a perimeter greater than 6¼ inches (160 mm) shall have a graspable finger recess area on both sides of the profile **PHOTO 45**. The finger recess shall begin within ¾ inch (19 mm) measured vertically from the tallest portion of the profile and have a depth of not less than 5⁄16 inch (8 mm) within ⅞ inch (22 mm) below the widest portion of the profile **PHOTO 46**. This required depth shall continue for not less than ⅜ inch (10 mm) to a level that is not less than 1¾ inches (45 mm) below the tallest portion of the profile **PHOTO 47**. The width of the handrail above the recess shall be not less than 1¼ inches (32 mm) and not more than 2¾ inches (70 mm). Edges shall have a radius of not less than 0.01 inch (0.25 mm) **PHOTO 48**.

Handrails with a perimeter greater than 6¼ inches (160 mm) shall have a graspable finger recess area on both sides of the profile.

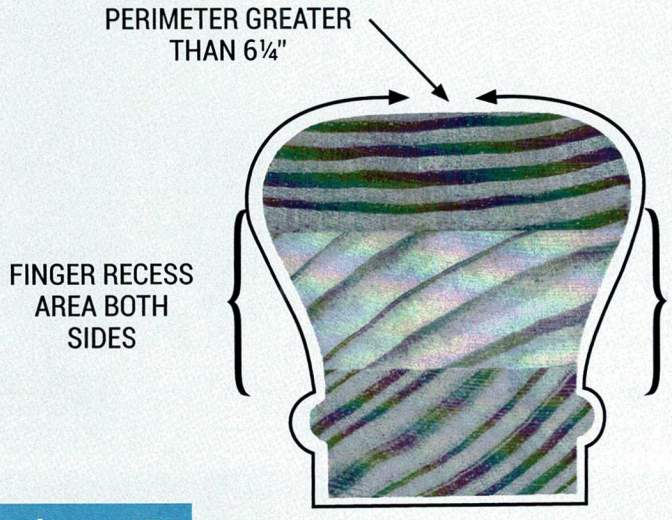


Photo 45

This required depth shall continue for not less than ⅜ inch (10 mm) to a level that is not less than 1¾ inches (45 mm) below the tallest portion of the profile.

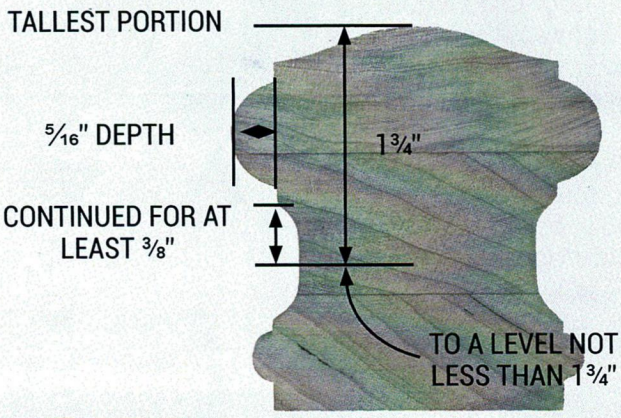


Photo 47

The finger recess shall begin within ¾ inch (19 mm) measured vertically from the tallest portion of the profile and a depth of not less than 5⁄16 inch (8 mm) within ⅞ inch (22 mm) below the widest portion of the profile.

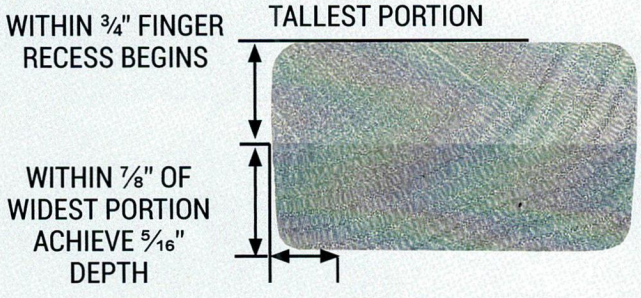


Photo 46

The width of the handrail above the recess shall be not less than 1¼ inches (32 mm) and not more than 2¾ inches (70 mm). PHOTO 45. Edges shall have a radius of not less than 0.01 inch (0.25 mm).

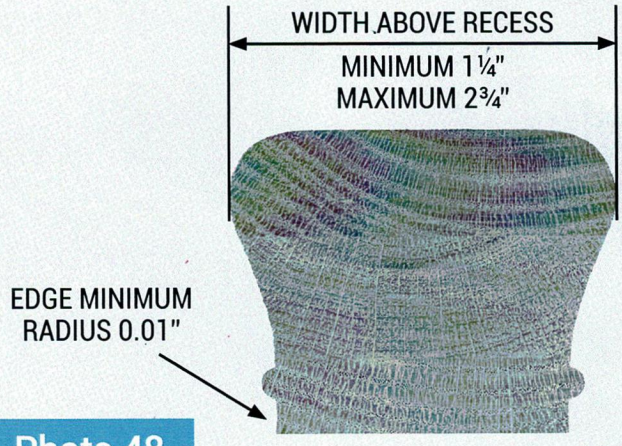


Photo 48

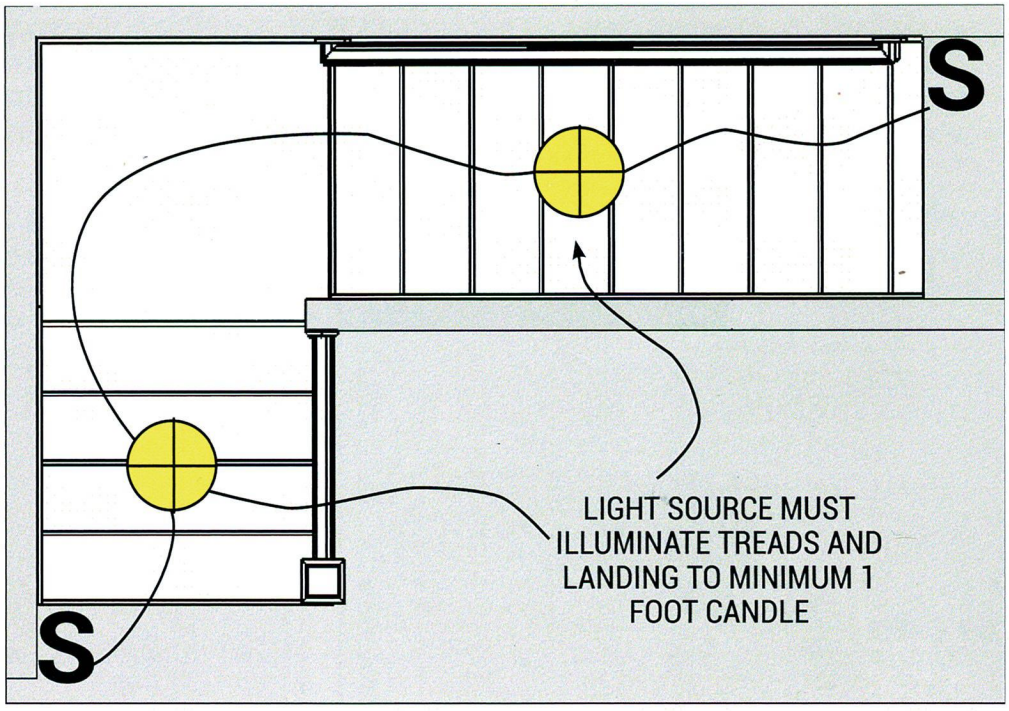
R311.7.8.6 Exterior plastic composite handrails. Plastic composite exterior handrails shall comply with the requirements of Section R507.2.2

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R311.7.9 Illumination. *Stairs* shall be provided with illumination in accordance with Section R303.7 **DRAWING 49** and R308.8

R303.7 Interior stairway illumination. Interior stairways shall be provided with an artificial light source to illuminate the landings and treads. The light source shall be capable of illuminating treads and landings to levels of not less than 1 foot-candle (11 lux) as measured at the center of treads and landings. There shall be a wall switch at each floor level to control the light source where the stairway has six or more risers.

Exception: A switch is not required where remote, central or automatic control of lighting is provided.



Drawing 42

IRC DEFINITION:

SPIRAL STAIRWAY. A stairway with a plan view of closed circular form and uniform section-shaped treads radiating from a minimum diameter circle **PHOTO 50 & 51.**

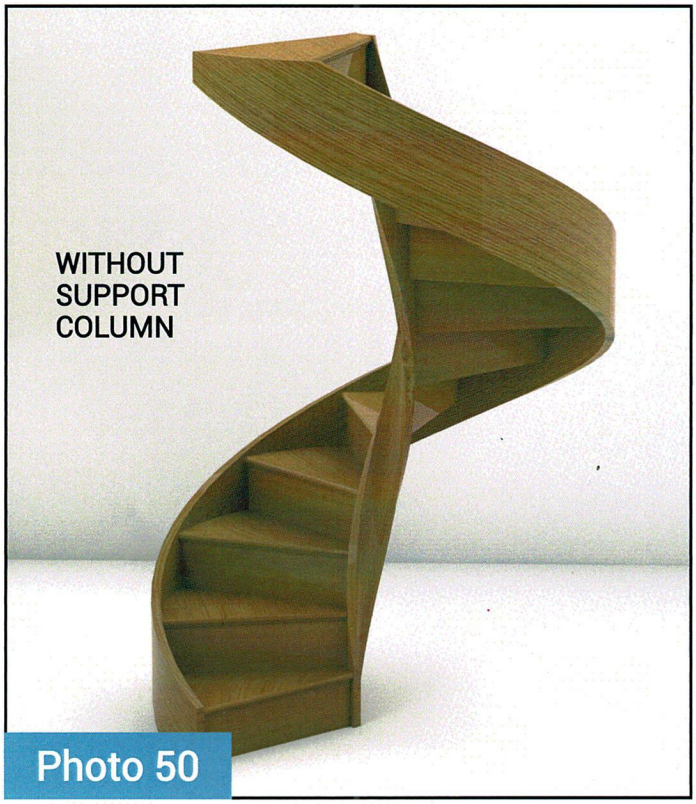


Photo 50

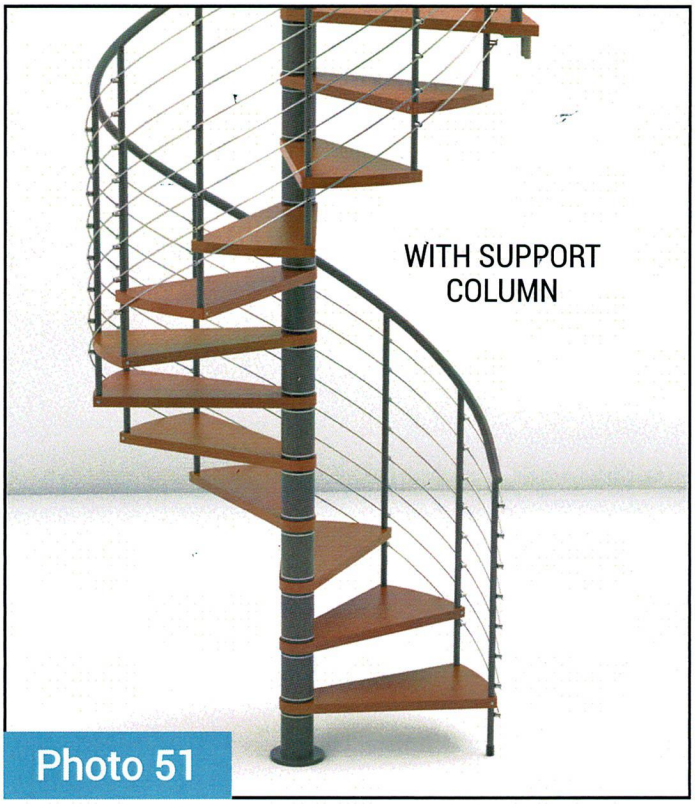


Photo 51

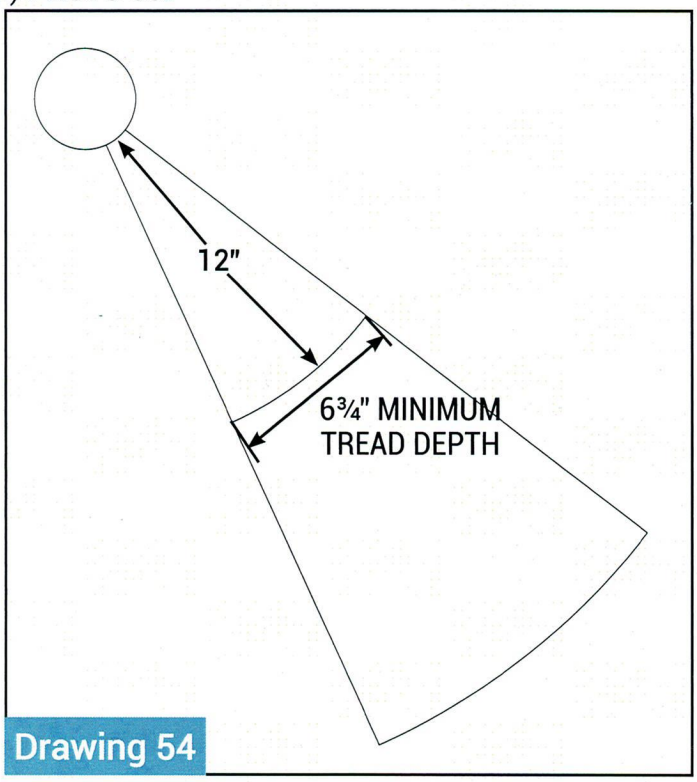
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R311.7.10 Special stairways. Spiral *stairways* and bulkhead enclosure *stairways* shall comply with requirements of Section R311.7 except as specified in Sections R311.7.10.1 and R311.7.10.2.

R311.7.10.1 Spiral stairways. The clear width at and below the *handrails* at spiral stairways shall be not less than 26 inches (660 mm) **PHOTO 52** and the walkline radius shall be not greater than 24½ inches (622 mm) **PHOTO 53.** Each tread shall have a depth of not less than 6¾ inches (171 mm) at the walkline **DRAWING 54.** Treads shall be identical, **PHOTO 53** and the rise shall be not more than 9½ inches (241 mm) **PHOTO 52.** Headroom shall be not less than 6 feet 6 inches (1982 mm) **PHOTO 55.**



Photo 52



Drawing 54

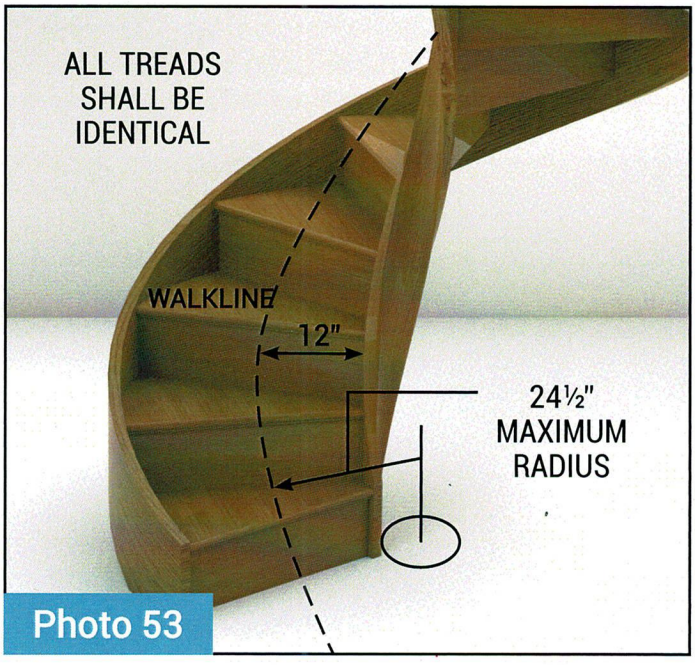


Photo 53

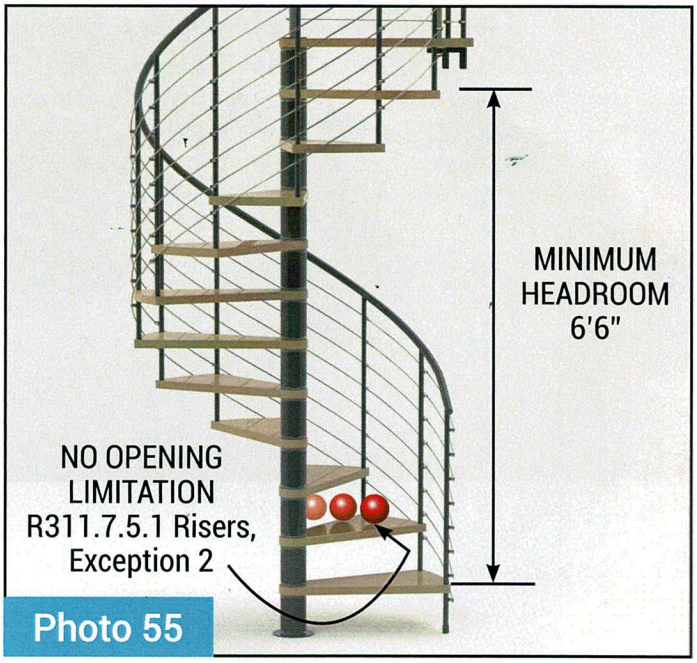


Photo 55

R311.7.10.2 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 height from the *basement* finished floor level to grade adjacent to the stairway is not more than 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.

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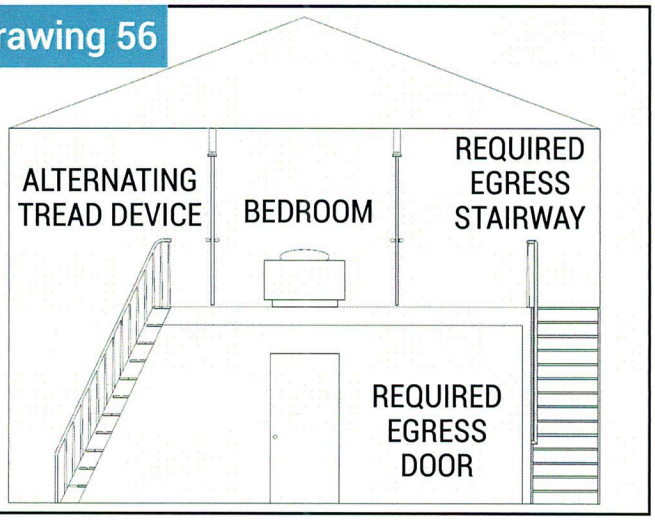
ICC DEFINITION:

ALTERNATING TREAD DEVICE. A device that has a series of steps between 50 to 70 degrees (0.87 and 1.22 rad) from horizontal, usually attached to a center support rail in an alternating manner so that the user does not have both feet on the same level at the same time.

R311.7.11 Alternating tread devices. *Alternating tread devices* shall not be used as an element of a means of egress. Alternating tread devices shall be permitted provided that a required means of egress *stairway* or ramp serves the same space at each adjoining level **DRAWING 56** or where a means of egress is not required. The clear width at and below the *handrails* shall be not less than 20 inches (508 mm) **PHOTO 57.**

Exception: Alternating tread devices are allowed to be used as an element of a means of egress for lofts, mezzanines and similar areas of 200 gross square feet (18.6 m²) or less where such devices do not provide exclusive access to a kitchen or bathroom.

Drawing 56



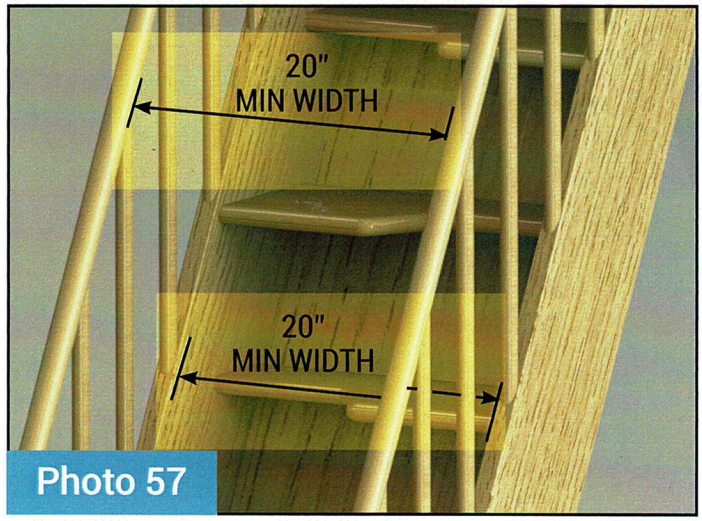


Photo 57

R311.7.11.1 Treads of alternating tread devices. *Alternating tread devices* shall have a tread depth of not less than 5 inches (127 mm), a projected tread depth of not less than 8½ inches (216 mm), a tread width of not less than 7 inches (178 mm) and a *riser* height of not more than 9½ inches (241 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projections of adjacent treads. The *riser* height shall be measured vertically between the leading edges of adjacent treads **PHOTO 58.** The *riser* height and tread depth provided shall result in an angle of ascent from the horizontal of between 50 and 70 degrees (0.87 and 1.22 rad). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface **PHOTO 59.**

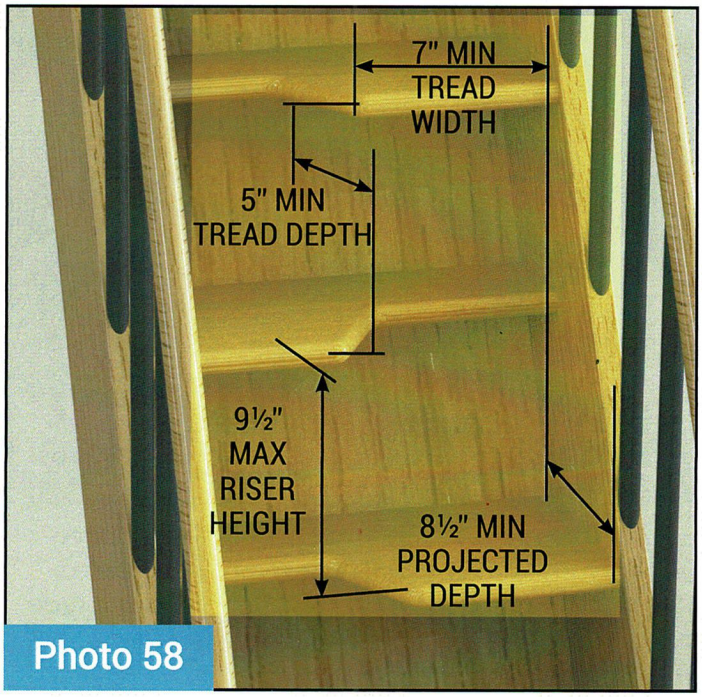


Photo 58

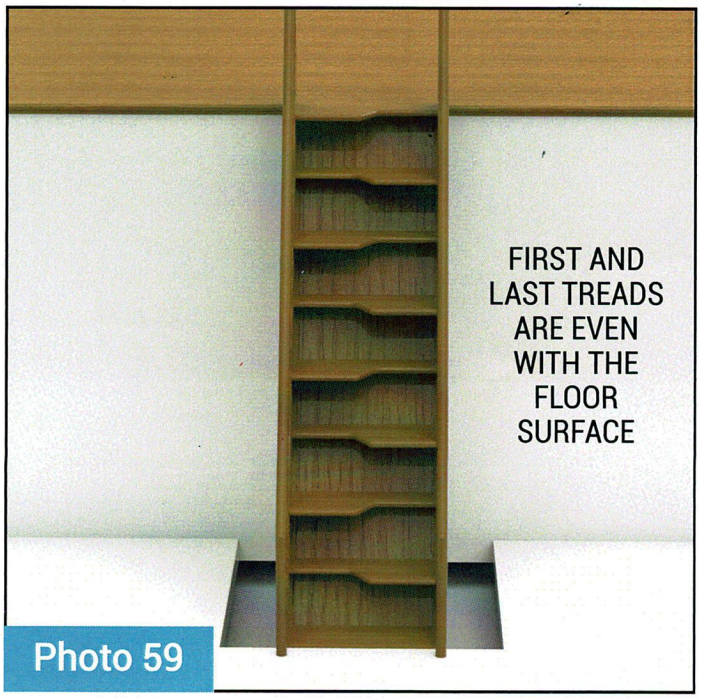


Photo 59

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R311.7.11.2 Handrails of alternating tread devices. *Handrails* shall be provided on both sides of *alternating tread devices* and shall comply with Sections R311.7.8.2 to R311.7.8.6 **PHOTO 60.** *Handrail* height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm) **PHOTO 61.**

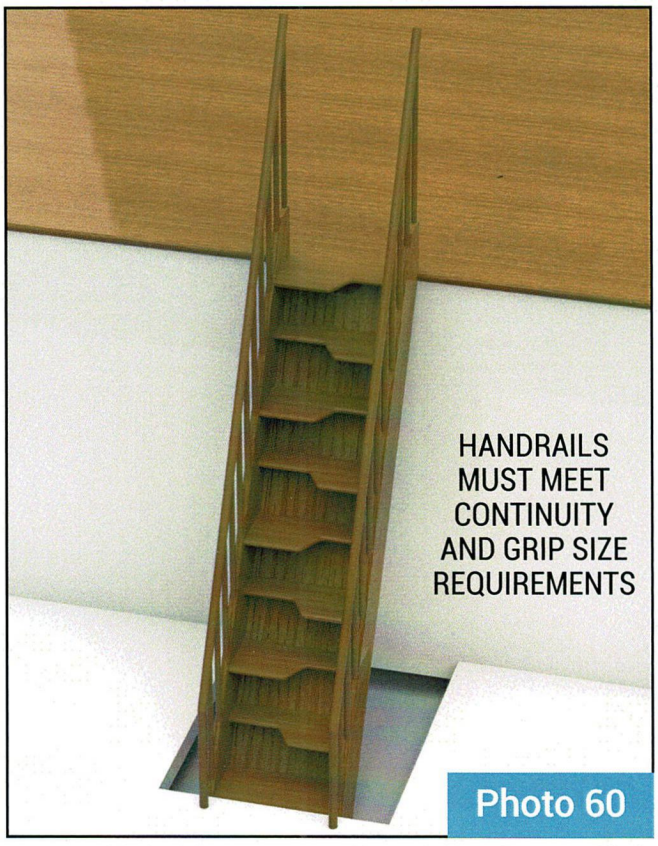


Photo 60

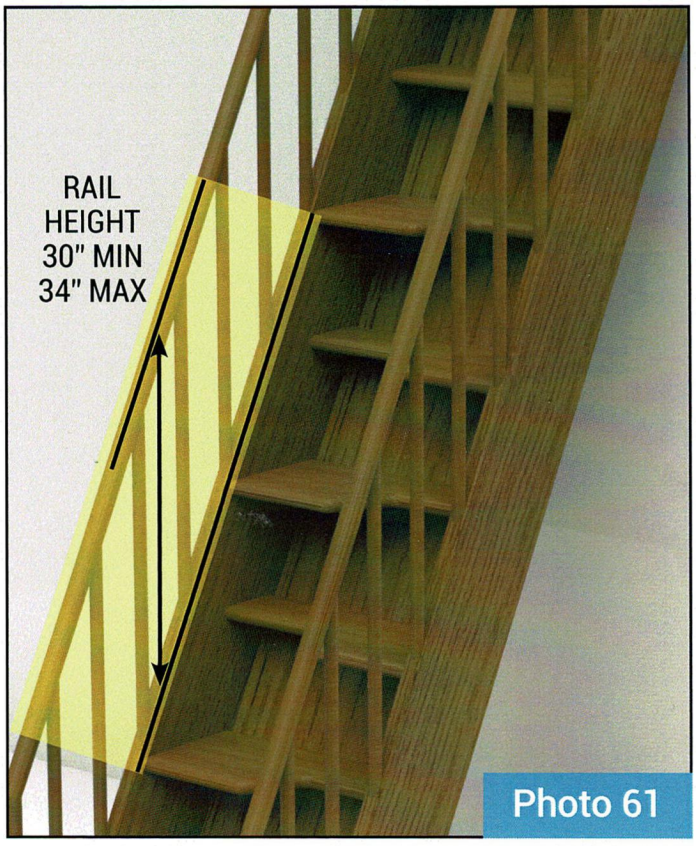
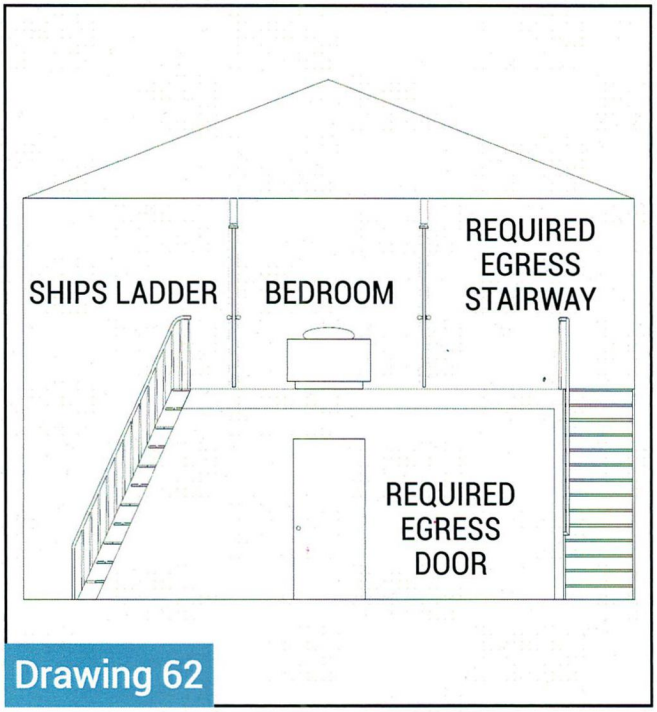


Photo 61

R311.7.12 Ships ladders. Ships ladders shall not be used as an element of a means of egress. Ships ladders shall be permitted provided that a required means of egress *stairway* or ramp serves the same space at each adjoining level or where a means of egress is not required **DRAWING 62.** The clear width at and below the *handrails* shall be not less than 20 inches (508 mm) **PHOTO 63.**

Exception: Ships ladders are allowed to be used as an element of a means of egress for lofts, mezzanines and similar areas of 200 gross square feet (18.6 m²) or less that do not provide exclusive access to a kitchen or bathroom.



Drawing 62

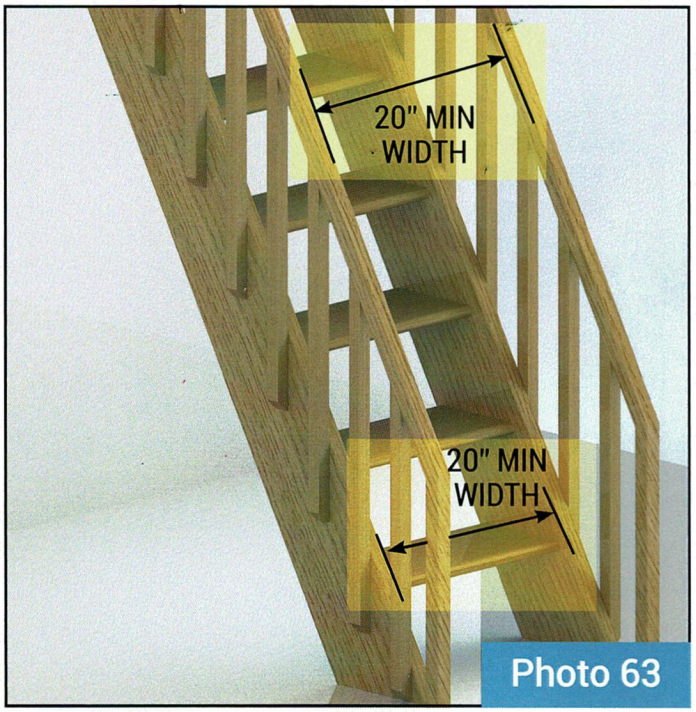


Photo 63

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R311.7.12.1 Treads of ships ladders. Treads shall have a depth of not less than 5 inches (127 mm). The tread shall be projected such that the total of the tread depth plus the nosing projection is not less than 8½ inches (216 mm) **PHOTO 64.** The *riser* height shall be not more than 9½ inches (241 mm) **PHOTO 65.**



Photo 64

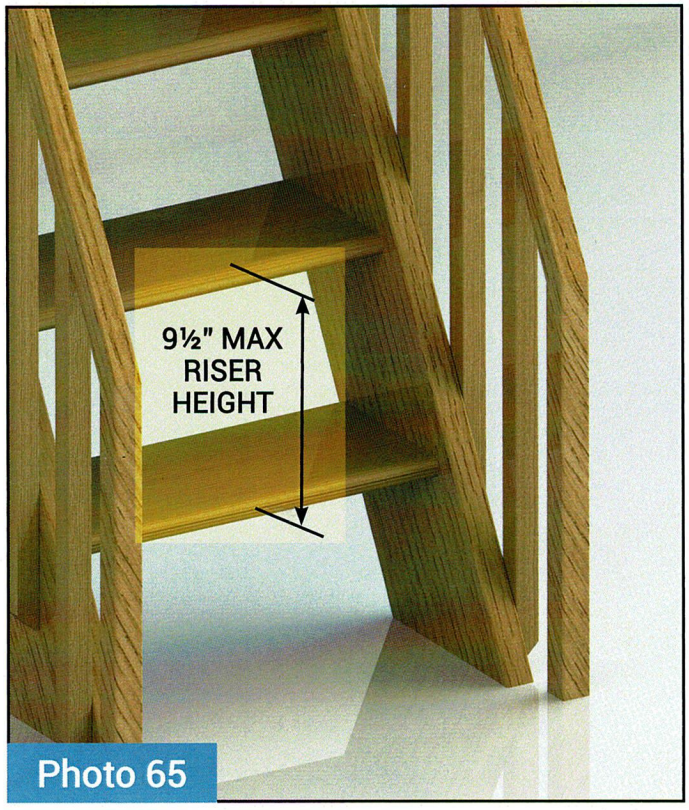


Photo 65

R311.7.12.2 Handrails of ships ladders. *Handrails* shall be provided on both sides of ships ladders and shall comply with Sections R311.7.8.2 to R311.7.8.6 **PHOTO 66** *Handrail* height shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm) **PHOTO 67.**

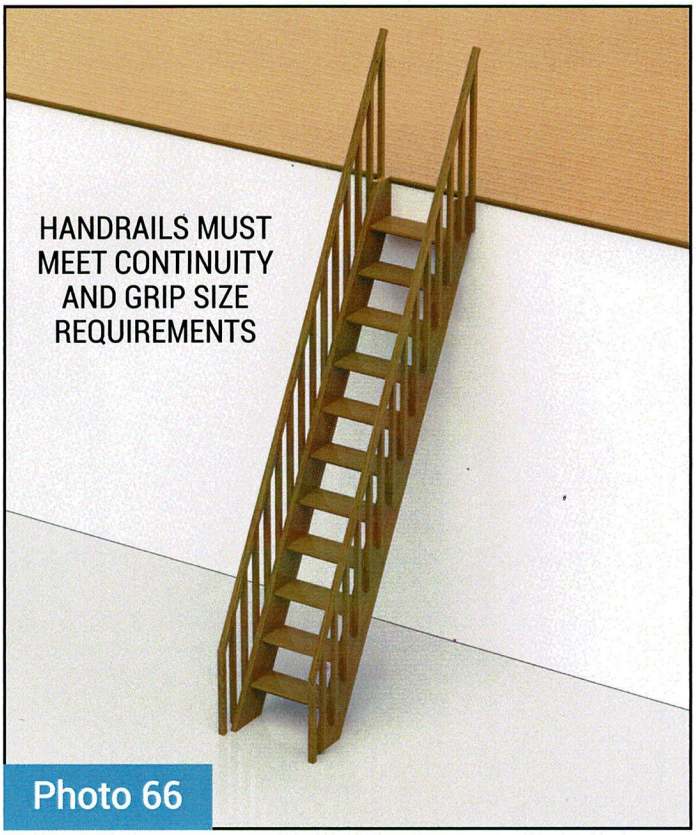


Photo 66



Photo 67

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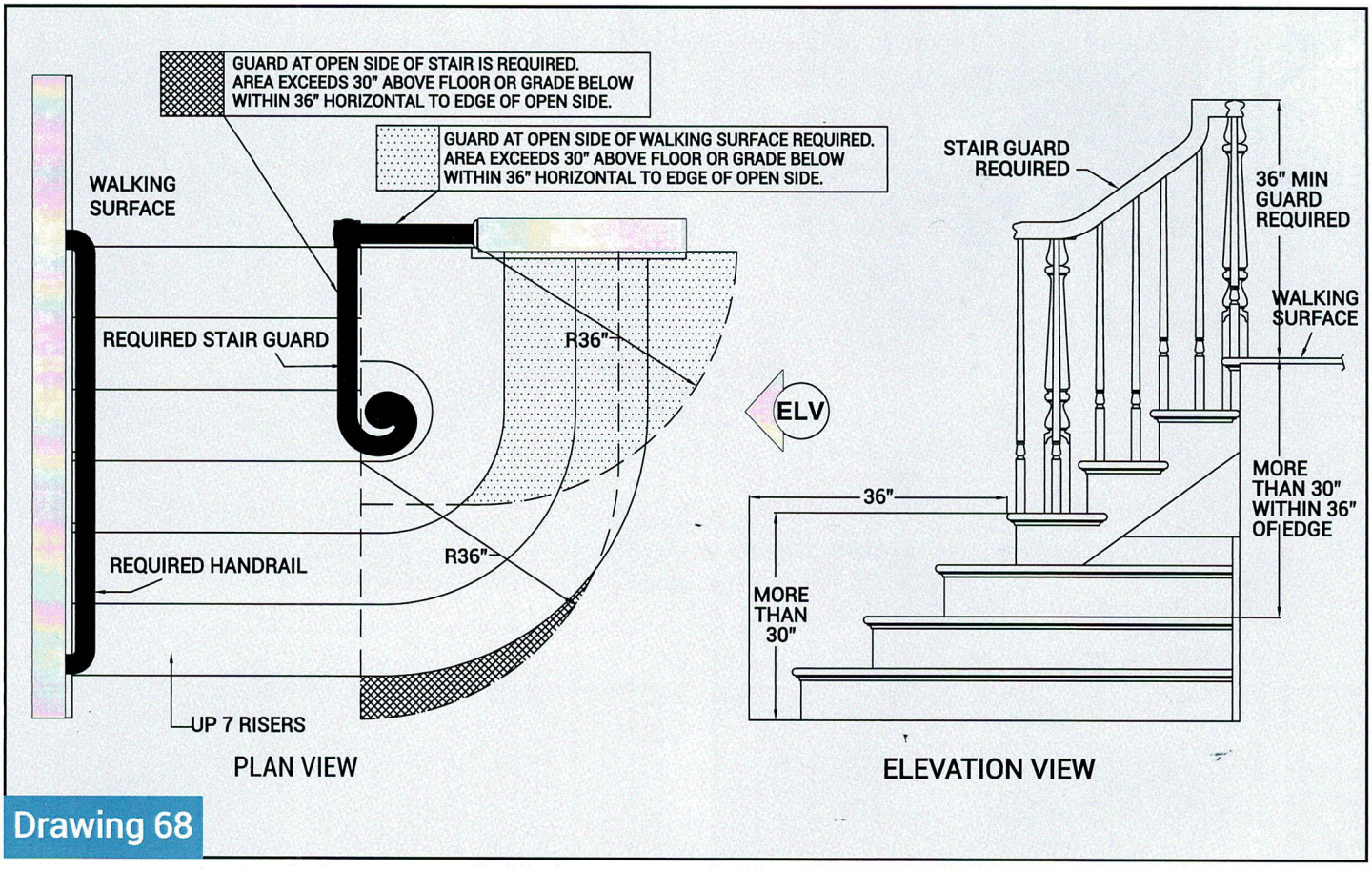
SECTION 312 GUARDS AND WINDOW FALL PROTECTION

IRC DEFINITION:

GUARD. A building component or a system of building components located near the open sides of elevated walking surfaces that minimize the possibility of a fall from the walking surface to a lower level.

R312.1 Guards. *Guards* shall be provided in accordance with Sections R312.1.1 through R312.1.4.

R312.1.1 Where required. *Guards* shall be provided for those portions of open-sided walking surfaces, including floors, *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 **DRAWING 68.** Insect screening shall not be considered as a *guard.*



Drawing 68

R312.1.2. Height. Required *guards* at open-sided walking surfaces, including *stairs,* porches, balconies or landings, shall be not less than 36 inches (914 mm) in height as measured vertically above the adjacent walking surface or the line connecting the *nosings* **PHOTOS 69 & 70.**

Exceptions:

1. *Guards* on the open sides of *stairs* shall have a height of not less than 34 inches (864 mm) measured vertically from a line connecting the *nosings* **PHOTO 69.**

2. Where the top of the *guard* 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) as measured vertically from a line connecting the *nosings* **PHOTO 69.**

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R312.1.2 Height.

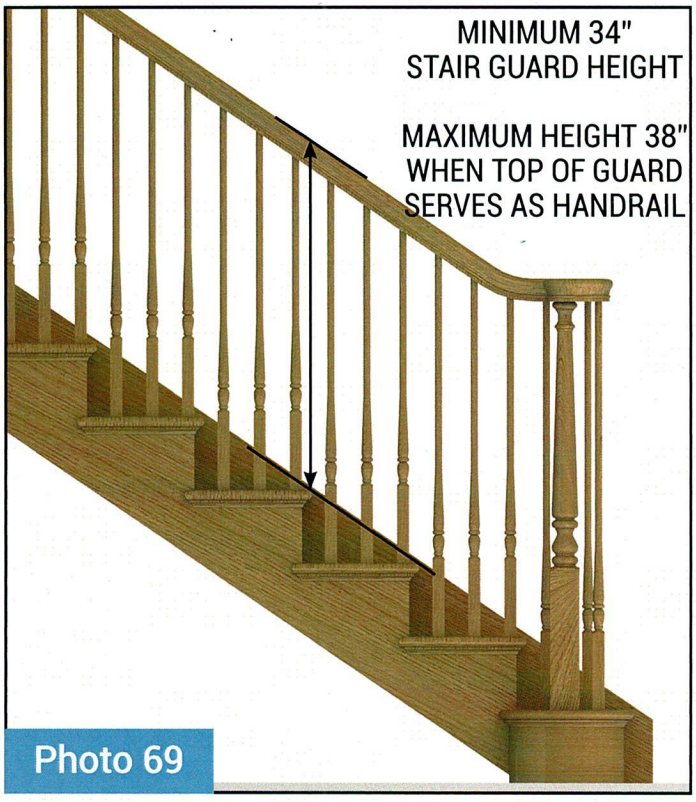


Photo 69

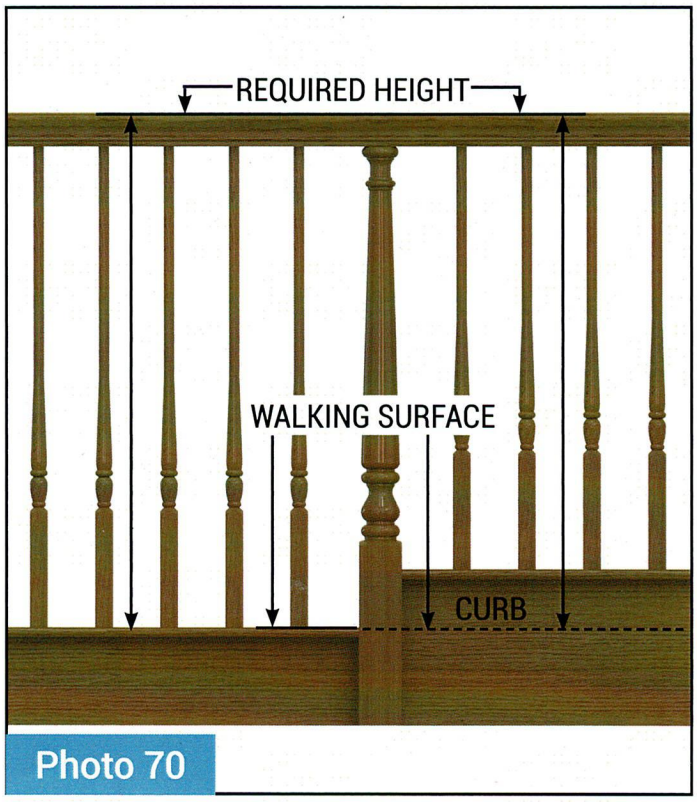


Photo 70

R312.1.3 Opening limitations. Required *guards* shall not have openings from the walking surface to the required *guard* height that allow passage of a sphere 4 inches (102 mm) in diameter **PHOTO 71.**

Exceptions:

1. The triangular openings at the open side of *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 **PHOTO 72.**
2. *Guards* on the open side of *stairs* shall not have openings that allow passage of a sphere 4⅜ inches (111 mm) in diameter **PHOTO 72.**

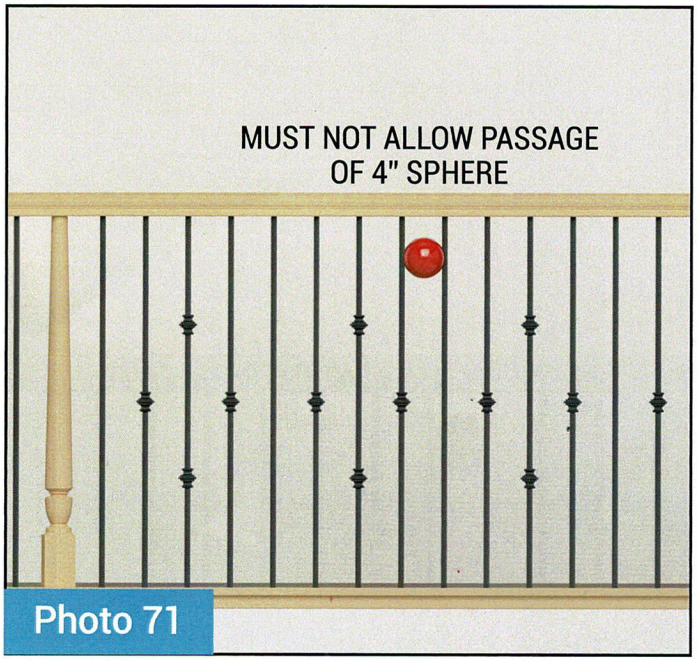


Photo 71

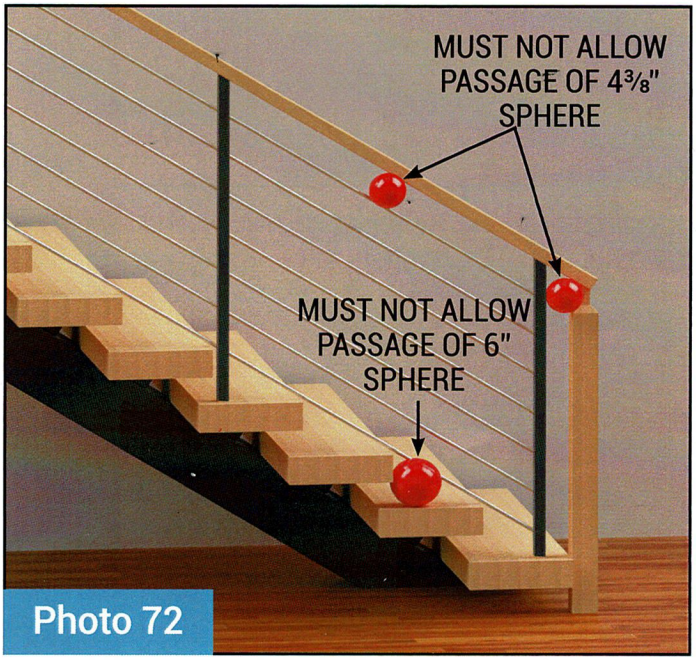


Photo 72

R312.1.4 Exterior plastic composite guards. Plastic composite exterior *guards* shall comply with the requirements of Section R317.4

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APPENDIX - Glazing in Guards and Railings

SECTION R308 - GLAZING**

R308.1 Identification. Except as indicated in Section R308.1.1 each pane of glazing installed in hazardous locations as defined in Section R308.4 shall be provided with a manufacturer's designation specifying who applied the designation, the type of glass and the safety glazing standard with which it complies, and that is visible in the final installation. The designation shall be acid etched, sandblasted, ceramic-fired, laser etched, embossed, or be of a type that once applied cannot be removed without being destroyed. A label shall be permitted in lieu of the manufacturer's designation.

Exceptions:

1. For other than tempered glass, manufacturer's designations are not required provided that the building official approves the use of a certificate, affidavit or other evidence confirming compliance with this code.
2. Tempered spandrel glass is permitted to be identified by the manufacturer with a removable paper designation.

R308.4.4 Glazing in guards and railings. Glazing in guards and railings, including structural baluster panels and nonstructural in-fill panels, regardless of area or height above a walking surface shall be considered to be a hazardous location.

R308.4.4.1 Structural glass baluster panels. Guards with structural glass baluster panels shall be installed with an attached top rail or handrail. The top rail or handrail shall be supported by not less than three glass baluster panels, or shall be otherwise supported to remain in place should one glass baluster panel fail.

Exception: An attached top rail or handrail is not required where the glass baluster panels are laminated glass with two or more glass plies of equal thickness and of the same glass type.

R308.4.6 Glazing adjacent to stairs and ramps. Glazing where the bottom exposed edge of the glazing is less than 36 inches (914 mm) above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps shall be considered to be a hazardous location.

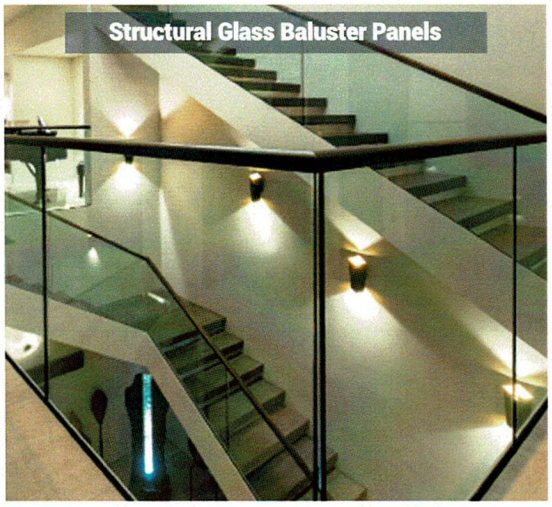
Exceptions:

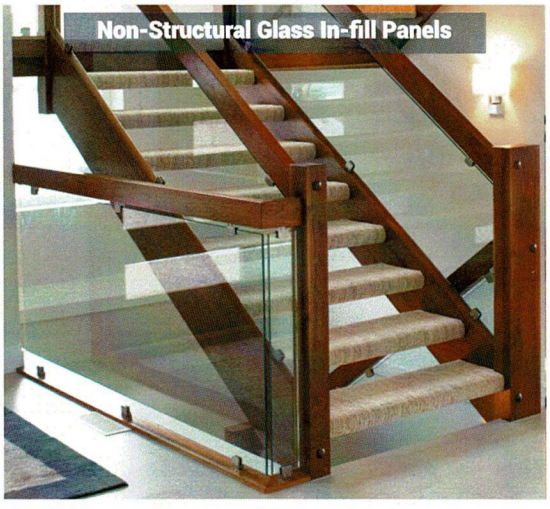
1. Where glazing is adjacent to a walking surface and a horizontal rail is installed at 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and have a cross-sectional height of not less than 1½ inches (38 mm).
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.

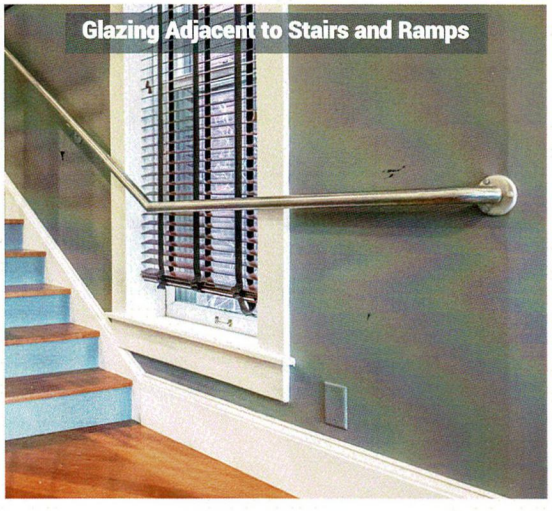
R308.4.7 Glazing adjacent to the bottom stair landing. Glazing adjacent to the landing at the bottom of a stairway where the glazing is less than 36 inches (914 mm) above the landing and within a 60-inch (1524 mm) horizontal arc less than 180 degrees from the bottom tread nosing shall be considered to be a hazardous location.

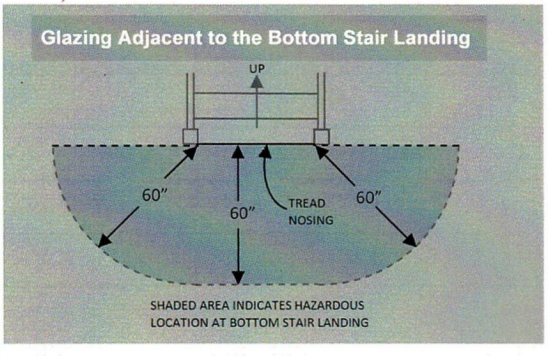
Exception: Where the glazing is protected by a guard complying with Section R312 and the plane of the glass is more than 18 inches (457 mm) from the guard.

****Portions of Section 308 not specific to Guards and Rails are not shown.**









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NOTES:

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Cut on line and laminate for handy field/desk reference tool.

Full Scale Type II Rail Test

INSTRUCTIONS:

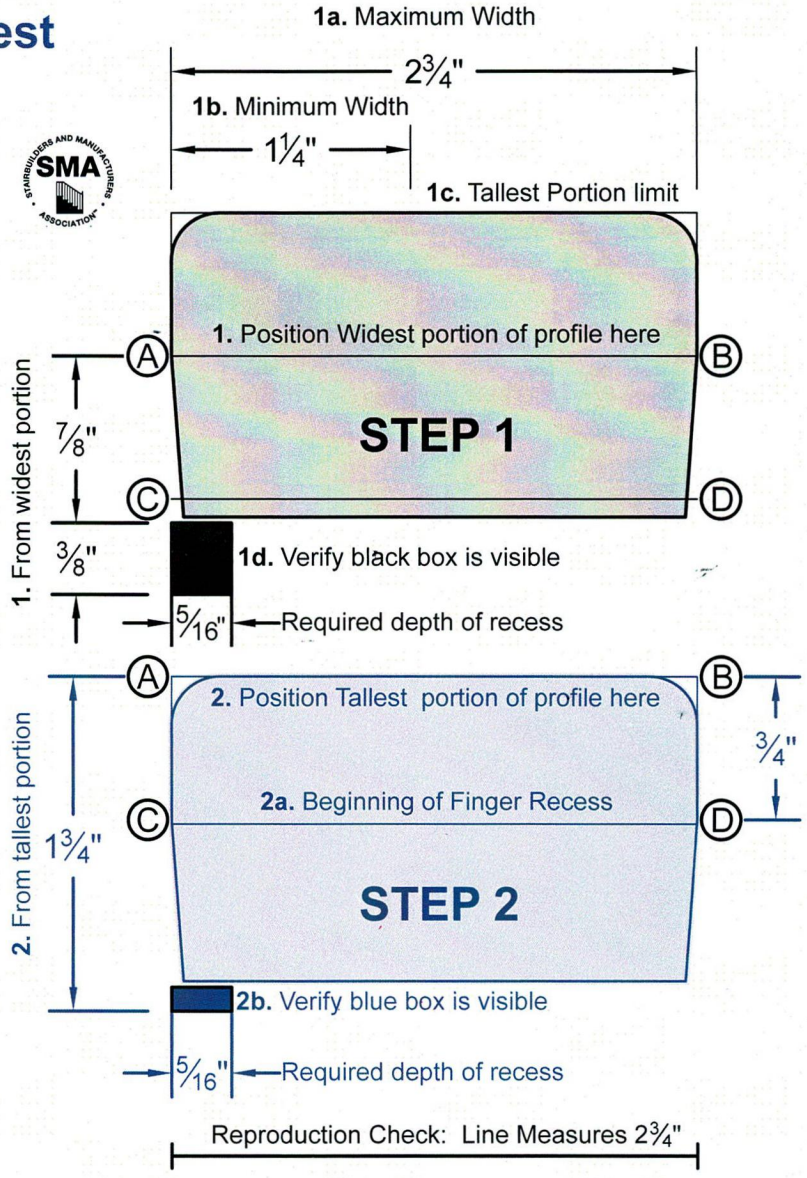
Step 1. Position the widest portion on A-B line and left edge touching line A-C. Keep horizontal axis of rail parallel to line A-B. With the rail in this position.

- **1a.** verify < maximum width
- **1b.** verify > minimum width
- **1c.** verify tallest portion is at or below the limit line
- **1d.** verify black box is visible

Step 2. Position tallest portion of rail section touching line A-B and left edge touching line A-C. Keep horizontal axis of rail parallel to line A-B.

- **2a.** verify beginning of recess is at or above line C-D
- **2b.** verify blue box is visible

Note: Type II rails have a perimeter greater than 6¼ inches and a finger recess on each side. If profile is asymmetrical both sides must pass.



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