

Means of Egress

“How do I get out of here”

Thursday 3/14/2024

2021 IRC Means of Egress - R311

INSTRUCTOR:



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Background:
Building Contractor - 1984 to present
Building Inspector Technician - 1987 - 2 years
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Code Consultant - 2005 to present
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In Reference to all: Materials / Products / Illustrations / Pictures of this presentation

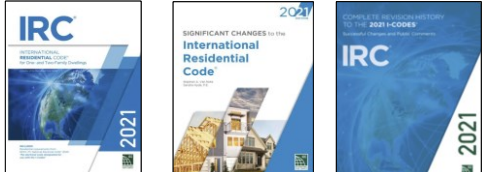
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- ...that any product has been properly installed unless you have done a complete research of that product through the manufacturer’s installation instruction, approved acceptable tested listing, and have reviewed its current evaluation report requirements.

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Reference and Resources Material

- 2021 *International Residential Code*® (IRC®)
- Significant Changes to the IRC 2021 Edition



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IRC - Preface



Introduction

- This comprehensive, **stand-alone** residential code establishes minimum regulations for one - and two -family dwellings and townhouses using prescriptive provisions.

Development

- This code is founded on principles **intended to establish** provisions consistent with the scope of a residential code **that adequately protects public health, safety and welfare**; ...

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Means of Egress

- What are the general thoughts - the Intent:
 - Fundamental: Safe and Efficient exiting from structure
 - Webster defines egress: "A place or means of going out."
 - Components of means of egress and exits, the emphasis will appear to be on escaping
 - Characteristics of the building is to eliminate panic and confusion

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Means of Egress - IRC

SECTION R311 MEANS OF EGRESS


- R311.1 Means of egress. Dwellings shall be provided with a means of egress in accordance with this section.
- R311.2 Egress door. Not less than one egress door shall be provided for each dwelling unit. The egress door shall be in accordance with Section R310.2.
- R311.3 Floors and landings at exterior doors. There shall be a landing or floor on each side of each exterior door.
- R311.3.1 Floor elevations at the required egress doors. Landings or finished floors at the required egress doors shall be in accordance with Section R310.2.
- R311.3.2 Floor elevations at other exterior doors. Doors other than the required egress door shall be in accordance with Section R310.2.
- R311.3.3 Storm and screen doors. Storm and screen doors shall be permitted to swing over exterior stairs.
- R311.4 Vertical egress. Egress from habitable levels including habitable attics and basements that are not in accordance with Section R310.2 shall be in accordance with Section R311.4.
- R311.5 Landing, deck, balcony and stair construction and attachment.
- R311.6 Hallways. The width of a hallway shall be not less than 3 feet (914 mm).
- R311.7 Stairways
 - R311.7.1 Width. Stairways shall be not less than 36 inches (914 mm) in clear width at all points above the stairs.
 - R311.7.2 Headroom. The headroom in stairways shall be not less than 6 feet 8 inches (2032 mm) measured vertically from the finished floor to the lowest overhead obstruction.
 - R311.7.3 Vertical rise. A flight of stairs shall not have a vertical rise larger than 151 inches (3835 mm).
 - R311.7.4 Walkline. The walkline across winder treads and landings shall be concentric to the turn and shall be in accordance with Section R311.7.1.
 - R311.7.5 Stair treads and risers. Stair treads and risers shall meet the requirements of this section.
 - R311.7.6 Landings for stairways. There shall be a floor or landing at the top and bottom of each stair flight.
 - R311.7.7 Stairway walking surface. The walking surface of treads and landings of stairways shall be in accordance with Section R311.7.1.
 - R311.7.8 Handrails. Handrails shall be provided on not less than one side of each flight of stairs with a maximum height of 38 inches (965 mm) above the finished floor.
 - R311.7.9 Illumination. Stairways shall be provided with illumination in accordance with Sections R303.1 through R303.4.
 - R311.7.10 Special stairways. Spiral stairways and bulkhead enclosure stairways shall comply with the requirements of Section R311.7.1.
 - R311.7.11 Alternating tread devices. Alternating tread devices shall not be used as an element of a means of egress.
 - R311.7.12 Ships ladders. Ships ladders shall not be used as an element of a means of egress.
- R311.8 Ramps
 - R311.8.1 Maximum slope. Ramps serving the egress door required by Section R311.2 shall have a maximum slope of 1:12.
 - R311.8.2 Landings required. There shall be a floor or landing at the top and bottom of each ramp, which shall be in accordance with Section R311.7.6.
 - R311.8.3 Handrails required. Handrails shall be provided on not less than one side of ramps exceeding 6 inches (152 mm) in height.
- SECTION R312 GUARDS AND WINDOW FALL PROTECTION
 - R312.1 Guards. Guards shall be provided in accordance with Sections R312.1.1 through R312.1.4.
 - R312.2 Window fall protection. Window fall protection shall be provided in accordance with Sections R312.2.1 through R312.2.4.

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Means of Egress

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

Stairway
One or more flights of stairs, either interior or exterior, with necessary landings and platforms connecting them to form a **continuous and uninterrupted** passage from one level to another within or attached to a building, deck or porch.


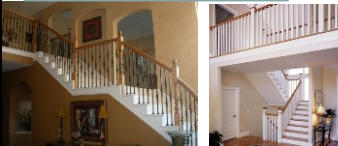


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Means of Egress

Chapter 2 Definitions (IRC)

Flight
A continuous run of rectangular treads or winders from one landing to another.


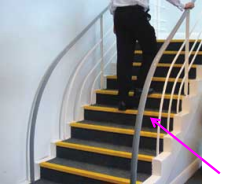

1 stairway - 2 flights 1 stairway - 2 flights 1 stairway - 6 flights

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Means of Egress

Chapter 2 Definitions (IRC)

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

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Means of Egress

Path + Egress Door + Public Way = Means of Egress

Interior / Exterior

Sleeping Areas

Basements

Habitable Attics

Door

Hallways

Stairways

Landings

Balconies

Sizes (width/height)

Placement

Locking

Location

Support

Illumination

Activation

Handrail

Guardrail

Attachment


Operational

Not to be confused with EERO!
Emergency Escape & Rescue Openings

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All Dwellings

One- and Two-Family Dwellings and Townhouses



- Continuous and unobstructed
- Path of vertical and horizontal egress
- Travel from all portions... exterior of the residence

Egress door shall open directly into a public way or to a yard or court that opens to a public way.

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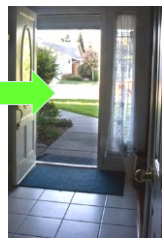
Means of Egress

1. Egress path


Hallways

Stairways

Ramps



2. Egress door

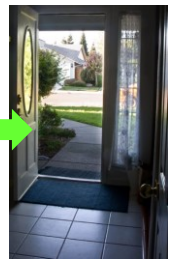


3. Egress to public way

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Means of Egress - PATH

- Continuous vertical and horizontal path from all parts of the house
- Hallways
- Stairways
- Ramps



Egress door

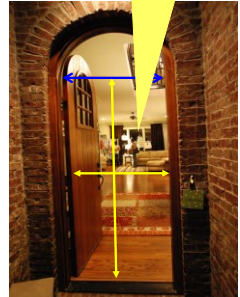
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Means of Egress Door

Egress door requirements:

- Every residence must have at least one "egress" door,
- Door must be side-hinged,
- **NET clear door opening** to be 32" from the stop to the face of the door when opened at a 90 degree angle, **AND**
- The height is 78" from the threshold to the stop.

Do not confuse: "Egress door" with "Exterior door"

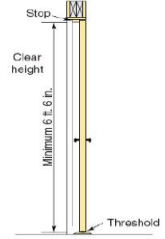


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Means of Egress - Door

Door Size


- **Net clear opening** requirements for the required egress door to the exterior: 32" wide at 90° from the door stop and 78" in height



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Means of Egress - Door

- **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 19

Means of Egress - DOOR


EGRESS DOOR	EGRESS DOOR	EXTERIOR DOOR
Side hinged	Side hinged	Any kind
Slider		Any width
Min 20" x 24"	Min 32" x 78"	



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Means of Egress - DOOR


- Landings - both sides of exterior door(s)



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Means of Egress - DOOR

- Landing exception
 - ≤ 2 risers - no exterior top landing required
 - Provided door does not swing over stair
 - Storm doors and screen doors allowed



R311.3.3 23

Means of Egress - Door




222
Inspection
...without use of key,
special effort or
special knowledge

R311.2 23

Woman dies feet from locked door



Exit door had double-cylinder dead bolt lock

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Means of Egress - DOOR

- Openable from inside without key or special knowledge or effort

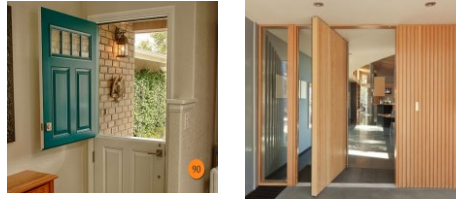


R311.2

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Other Exterior - DOOR

- Other exterior doors
 - Not required to comply with dimensions
 - Not required to comply key or special knowledge



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Means of Egress - PATH

- Path from basements or habitable attic
 - Vertically - interior stairs or ramp
 - Horizontally - thru egress door

Not to be confused with EERO!



Basement



Habitable space

R311.1 Means of Egress

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Floors and Landings at Exterior Doors



Landings at exterior doors and adjacent to stairs:

- Landings are required of each side of exterior door
- Width of landing not to be less than the door it serves
- Length 36" measured in the direction of travel



R311.3

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Floors and Landings at Exterior Doors



The slope at exterior landings shall not exceed 1/4 unit vertical in 12 units horizontal (2 percent).

R311.3

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Floors and Landings at Exterior Doors



Door between garage and house:

- Is an exterior door
- It cannot be the "egress" door.

Stairs between garage and house

- Is an interior stair:
 - Does not need a landing at the top, unless door swings over the stair.
 - Except screen doors

Garages

R311.1 & R311.3

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Floors and Landings at Exterior Doors

36" landings are required on both sides of all exterior doors.



Exception: Exterior balconies less than 60 square feet and only accessible from a door are permitted to have a landing less than 36" measured in the direction of travel.

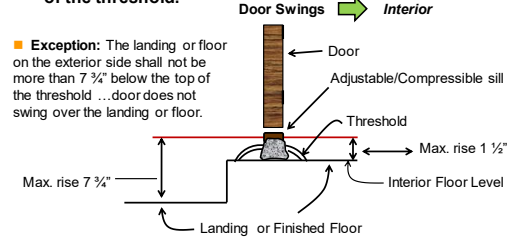


R311.3

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Landings at the required egress exterior

- Landings or finished floors at the required egress door shall not be more than 1 1/2" lower than the top of the threshold.



R 311.3.1

33

You Tell Me



33

Floors and Landings at Exterior Doors

Landings at the exterior door required.

Exception:

The exterior landing or floor shall not be more than 7 3/4" below the top of the threshold **provided the door does not swing over the landing or floor.**



R311.3.1 exception

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Floors and Landings at Exterior Doors



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.

R311.3.1 exception

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Other Doors

Landings or floors at exterior doors **other than the required.**

Doors other than the required egress door shall be provided with landings or floors **not more than 7 3/4" below the top of the threshold.**



R311.3.2

36

Means of Egress

Landings or floors at exterior doors other than the required.

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.

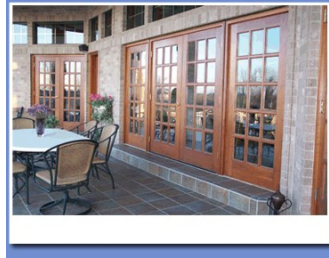


R311.3.2

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Floor elevations at other exterior doors

Landings or floors at exterior doors other than the required by R311.3.2.



Landing is **NOT** required on the exterior side of doors

- Where there are only 1-2 risers
- Door is **not** the "exit" door

R311.3.2 exception

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Means of Egress - Path

Landings or floors at exterior doors other than the required by R311.3.2.



Landing is **NOT** required on the exterior side of doors

- Where there are only 1-2 risers
- Door is **not** the "exit" door

R311.3.2

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Means of Egress - Path

Landings or floors at exterior doors other than the required by R311.3.2.



Landing is **NOT** required on the exterior side of doors

- Where there are only 1-2 risers
- Door is **not** the "exit" door

R311.3.2

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Means of Egress - Path

Landings or floors at exterior doors other than the required by R311.3.2.



Landing is required on the exterior side of doors

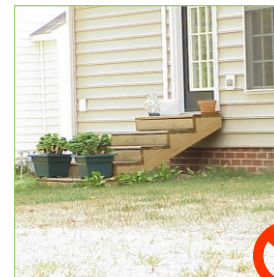
- Where there are 3 or more risers

R311.3.2

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Means of Egress - Path

Landings or floors at exterior doors other than the required by R311.3.2.



Landing is required on the exterior side of the door

- Where there are 3 or more risers
- Don't forget handrails when there are 4 or more risers

R311.3.2

42

Means of Egress - Path

Landings or floors at exterior doors other than the required by R311.3.2.




Don't get your risers and treads mixed up!!!

R311.3.2 43

Means of Egress - Path

Landings or floors at exterior doors other than the required by R311.3.2.




Landing is required on the exterior side of the door

- Where there are 3 or more risers
- Don't forget handrails when there are 4 or more risers

R311.3.2 44

Means of Egress - Path


- Interior stairs
 - Landing at bottom of stairs only (includes garages)
- Exterior stairs
 - Landing at bottom and top of stairs



R311.3.2 46

Means of Egress - PATH

- Stairs landing
 - ≥ 36" long
 - As wide as the flight of stairs



U shaped landing L shaped landing

R311.3.2 47

Means of Egress - PATH

- Stairway landings- adjacent doors
 - Door at top of interior stairs cannot swing over stairs
 - Door at bottom of stairs
 - Landing before the door 36" long




R311.3.2 48

Means of Egress - Path

Landings or floors at exterior doors other than the required by R311.3.2.

Storm and screen doors.

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



R311.3.3 48

Means of Egress - PATH


???

Vertical Egress

Every *habitable level* that is not provided with egress door shall be accessed by a code compliant stairway or ramp:

Stairway

- Minimum 36" wide stairway
- 7 ¾" max. riser and 10" min. tread
- Min. 6'-8" headroom
- Handrail on at least one side
- Landing top & bottom stairs
- Light & activation




R311. Vertical Egress & R311.7.6 Stairs Landing & Exception 49

Means of Egress - PATH

Vertical Egress

Every habitable level (i.e. habitable attics or basements) requires a code compliant stairway.




R311.4 50

Landing, Deck, Balcony & Stair Construction & Attachment.


Exterior

- Shall be positively anchored to the primary structure to resist both vertical and lateral forces *or* shall be designed to be self-supporting.



R311.5 51

Means of Egress - PATH



The minimum width of a hallway shall be *not less than 3 feet*

R311.6 Hallways. 52

Means of Egress - PATH

- Hallways
 - ≥ 3' clear width
 - ≥ 7' clear height



R311.6 & R305.1. 54

R311.7, R311.8 Stairways and Ramps

- The provisions of Sections R311.7 and R311.8 apply only to stairways and ramps within or serving:
 - Building
 - Porch or
 - Deck
- Stair exceptions:
 - nonhabitable attics
 - crawl spaces



Code Change No: RB107-19

Means of Egress - PATH

Stairways shall not be less than 36 inches in clear width at all points above the permitted handrail height. Stairway landings not less than 36" x 36".

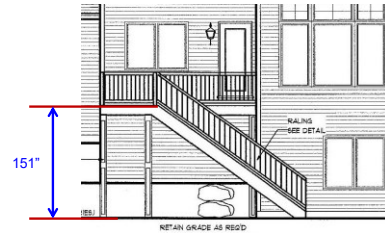


The minimum headroom shall not be less than 6 feet 8 inches measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform.

R311.7

55

Vertical rise - Stairway



A flight of stairs shall not have a vertical rise greater than 151" (12' 7") between floor levels or landings.

R311.7.3 review R301.3 (11'7" or 13'7")

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Landings for stairways



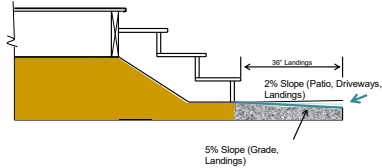
- There shall be a floor or landing at the top and bottom of each stairway.
- The min. width perpendicular to the direction of travel shall be no less than the width of the flight served.
- Landings of shapes other than square or rectangular shall be permitted provided the depth at the walk line and the total area is not less than that of a quarter circle with a radius equal to the required landing width.
- Where the stairway has a straight run, the minimum depth in the direction of travel shall be < 36".

R311.7.6

57

R311.7.7 Stairway and Landing Walking Surface

- New exception allows steeper slopes for exterior landings that also serve to drain surface water away from the building.



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Discussion

Is this a code violation?
The inspector is 5'-11".

6' 8" headroom from leading edges, interior and exterior



Glazing?

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Framing Inspection

Wood floor framing.

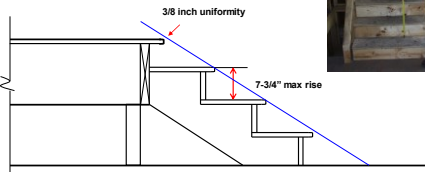
Although not finished, the stair rise and tread depth shall be measured/inspected exclusive of carpet, rugs, or runners (at the framing inspection).



R311.7.5


60

Means of Egress - PATH



3/8 inch uniformity

7-3/4" max rise



Stairways: Rise and Run

R 311.7.5.1

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Stairs: Rise & Run

What's wrong with these pictures?



7 3/4" max. riser

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Stairs: Rise & Run



6 1/2"

7 1/2"

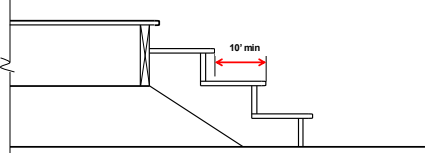
3/8" max. difference

7 3/4" max. rise allowed

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Means of Egress - PATH

Stairways: Rise and Run



10' min

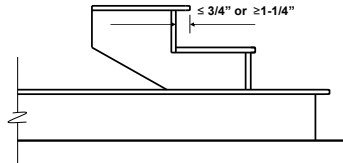
R 311.7.5.2

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Means of Egress - PATH

Stairways: Nosing

Nosings. The radius of curvature at the leading edge of the tread shall be no greater than 9/16". A nosing not less than 3/4 inch but not more than 1 1/4" shall be provided on stairways.



≤ 3/4" or ≥ 1-1/4"

R 311.7.5.3

67



Means of Egress - PATH

- Stairways
 - $\leq 7.75''$ riser
 - $\leq 3/8''$ deviation in flight
 - $\leq 4''$ sphere
 - $\geq 10''$ tread
 - $\leq 3/8''$ deviation in flight
 - $\geq 36''$ width
 - $\geq 6'-8''$ headroom

R311.7.2 68

Means of Egress - PATH

Profile

Open risers are permitted, provided that the opening between treads does not permit the passage of a 4" diameter sphere.

R311.7.5.1 70

Means of Egress - PATH

Stairways: Open 100% When Not Required

The opening between adjacent treads is not limited on stairs with a total rise of 30" or less.

R311.7.5.1 Risers 71

Means of Egress - PATH

Stairways: Nosing When Not Required

Open risers are permitted, provided that the opening between treads does not permit the passage of a 4-inch diameter sphere.

Exceptions: A nosing is not required where the tread depth is a minimum of 11 inches

R311.7.5.3, Exception 72

Means of Egress - PATH

R311.7.5 Stair treads and risers

- Tread depth
- Nosing radius
- Riser height
- Open riser
 - $< 4''$ riser spacing
 - $> 30''$ finished floor finish grade

Min. 10" tread depth
 36" Landing
 Risers > 30" stair
 Max riser Height 7 3/4"
 Max. nosing radius 9/16"
 Nosing projection required:
 Minimum 3/4"
 Maximum 1 1/4"

R311.7.5 Stair treads and risers 73

Means of Egress - PATH

- ≥ 4 stairway risers requires handrail

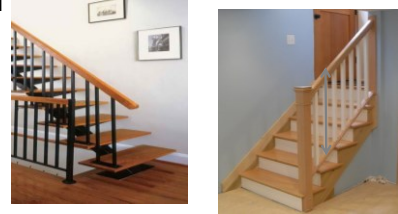


R311.7.8

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Means of Egress - PATH

- 34-38" handrail height
- Continuous over all stairs
 - Handrail may terminate by volute over bottom tread



R311.7.8.1

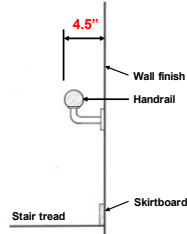
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Means of Egress - PATH

Stairways

Handrails shall not project more than 4.5 inches on either side of the stairway.

Spacing 1.5"
Type II 2.75"
Total 4.25"



R311.7.8.2

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Means of Egress - PATH

Handrails adjacent to a wall shall have a space of not less than 1 1/2" between the wall and the handrail.

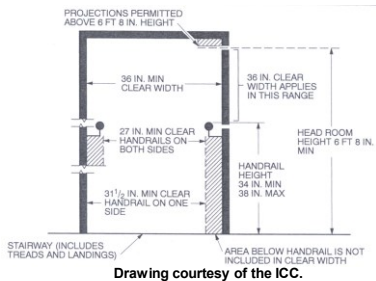


R311.7.8.3

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Means of Egress - PATH

Handrail on Plans



Drawing courtesy of the ICC.

R311.7.1

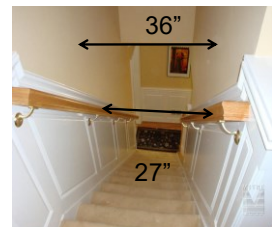
78

Means of Egress - PATH

- ≤ 4.5 " projection of handrail(s) into stairway



1 handrail



2 handrails

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Means of Egress - PATH

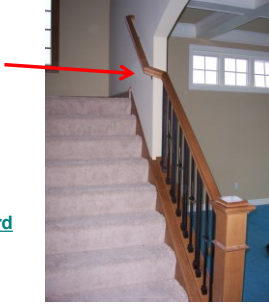
Final Inspection

Stairway.

Handrail (grip, continuous, space between handrail and the wall)...

Headroom (6 foot 8 inches).

“Handrail ends shall be returned toward a wall, guard walking surface continuous to itself, or terminate to a post.”



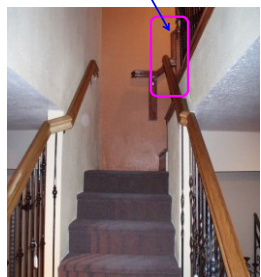
R311.7.8.4 exception & R311.7.8.1 80

Means of Egress - PATH

Height - Final Inspection

2. When handrail transitions 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 transition fittings or bendings shall be permitted to exceed the maximum height.

Goose Neck

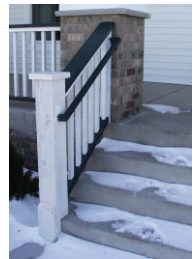


R311.7.8.1 81

Means of Egress - PATH

Continuity:

All required handrails shall be continuous the full length of the stairs with four or more risers from a point directly above the top riser of a flight to a point directly above the lowest riser of a flight.



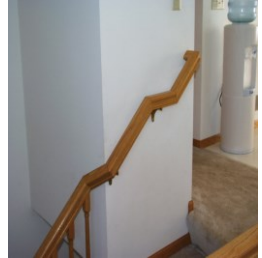
R311.7.8.4 83

Means of Egress - PATH

Continuity:

All required handrails shall be continuous the full length of the stairs...

Ends shall be returned toward a wall, guard walking surface continuous to itself, or terminate to a post.




R311.7.8.4 84

Means of Egress - PATH

Stair handrail continuity.

Handrail continuity shall be permitted to be interrupted by a newel post at a turn in a flight with winders, at a landing, or over the lowest tread.



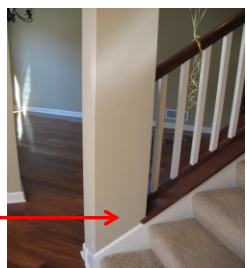
R311.7.8.4 exception 1 85

Means of Egress - PATH

Stair handrail continuity.

“A volute, turnout or starting easing shall be allowed to terminate over the lowest tread and over the top landing.”

Although, this situation may not have been what they were thinking about when this provision was written in the code.



R311.7.8.4 exception 2 86

Means of Egress - PATH

Stair handrail grip size.

Question:

We have a 2 x 6 laid flat as a handrail. Would it comply with the code provisions for grip size?

Answer:

No. The maximum cross section cannot exceed 2 1/4 inches. You would need to install a complying handrail.



R311.7.8.5 Type 1

87

Means of Egress - PATH

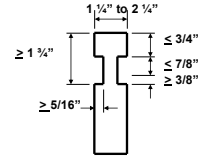
Stair handrail grip size.

Question:

Can a 2 x 6 on edge with a finger groove comply with the handrail requirements in the code?

Answer:

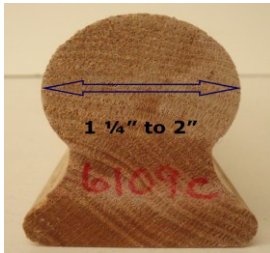
Yes. IRC Section R311.7.8.5, contains criteria for handrails with a graspable finger recess area for handrails.



R311.7.8.5 Type 2 (both sides)

Example see code text for complete description 88

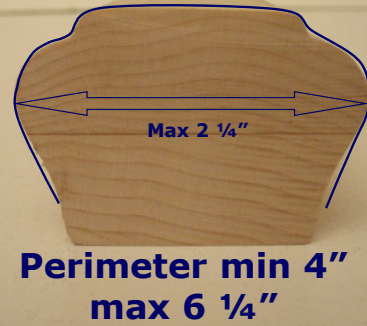
Type I Handrail



...circular cross section shall have an outside diameter of not less than 1 1/4\" and not greater than 2\"

R311.7.8.5 # 1 - Grip size

89



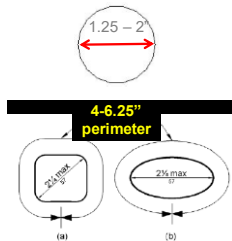
Perimeter min 4\" max 6 1/4\"

90

Means of Egress - PATH

■ Type 1 handrails

■ Type 2 handrails



90

Type II Handrail



The width of the handrail above the recess shall be not less than 1 1/4\" and not more than 2 3/4\".

R311.7.8.5 # 2 - Grip size

92

Means of Egress - PATH



Guards and Handrails^d - Live Load 200lb^h

Table R301.5

93

Means of Egress - PATH



Handrail ends shall be returned toward a wall, guard walking surface continuous to itself, or terminate to a post.

R311.7.8.4 Continuity

94

Means of Egress - PATH



Continuous handrail



Termination at newel

95

Means of Egress - PATH



1 1/2" Minimum clearance

Workmanship is NOT in the Code

R311.7.8.3

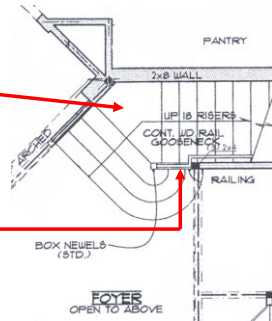
96

Means of Egress - PATH

Means of Egress.

Is this intermediate landing/tread compliant?

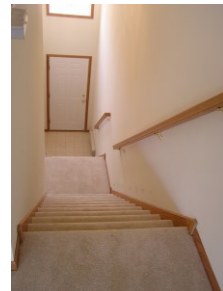
The proponent would like to wrap the handrail 180 degrees at the bottom toward the round treads. Is this compliant?



R311.7.8.4 exception (2)

97

Discussion Item #3 Is this situation code compliant?



98

Means of Egress - PATH

Final Inspection

Stair landings.

Enclosed accessible space under stairs shall have walls, under stair surface and any soffits protected on the enclosed side with 1/2 inch gypsum board.

Handrail required on at least one side.



R302.7

99

Means of Egress - PATH

Landings for stairways

A landing is not required at the top of an interior flight of stairs, provided a door does not swing over the stairs.



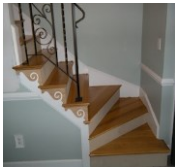
R311.7.6 exception

100

Means of Egress - PATH

Special stairs

- Winders
- Spiral stairs
- Alternating stairs

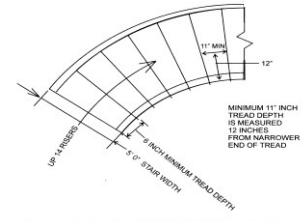


100

Circular Stairways

Means of Egress.

2000 IRC Section R314.6 Circular stairways has been deleted entirely in the 2006 IRC.



Section R314.6
Circular Stairs

102



103



104

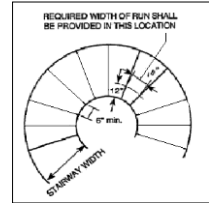


105

Means of Egress - PATH

- Winder treads shall have a minimum tread depth of 10" measured between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline.
- Winder treads shall have a minimum tread depth of 6" 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 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.

Winder Treads



R311.7.5.2.1 Winder treads

106

Means of Egress - PATH

Framing Inspection

Does this meet code?

A winder has a "tread with non-parallel edges..." and "within any flight of stairs, the largest winder tread depth at the 12" walk line. (Does this 3/8" apply here?)



It Depends

R311.7.5.2.1 Winder treads

107

Means of Egress - PATH

Tread Depth Clarification

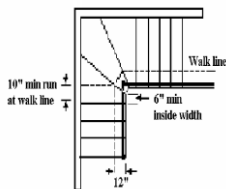
- ... Consistently shaped **winders** at the walkline shall be allowed within the same flight of stairs as rectangular treads and do not have to be within 3/8 inch of the rectangular tread depth. True measurement without the carpet
- Explanation:** Winders treads that are code compliant may be located in the same flight as regular treads that are code compliant.

R311.7.5.2.1 Winder treads

108

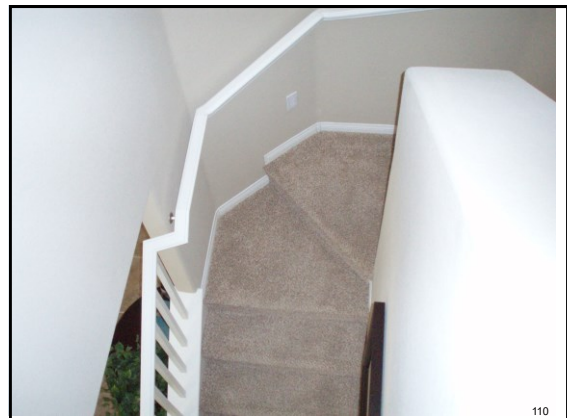
Means of Egress - PATH

Walkline

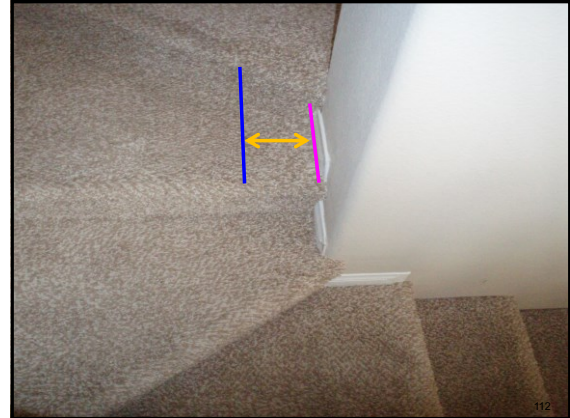


R311.7.4

109



110



Means of Egress - PATH

Stairway illumination and activation

- All interior stairways shall be provided with a means to illuminate the stairs, including the landings and treads. Interior stairways shall be provided with an artificial light 1-foot candle.
- 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.

311.7.9 according to R303.7 & R303.8

Stairway Illumination and Activation

- Exterior stairways - an artificial light source located at **top** landing of stairway.
- Exterior stairways - access to a basement from the outdoor grade level artificial light - located at the bottom landing of the stairway.

R303.8

Spiral Stairways

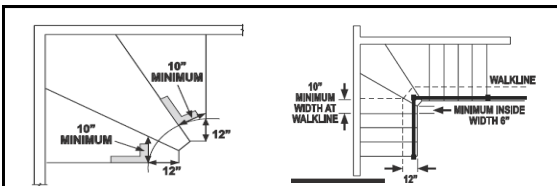
Spiral stairways.

“...Minimum width shall be 26 inches with each tread having a 6 3/4” minimum tread depth at 12” from the narrower edge.

All treads shall be identical, and the rise shall be no more than 9 1/2”.

A min. headroom of 6’ 6” shall be provided.”

R311.7.10.1
Drawing courtesy of the ICC 2009 Commentary



R311.7.10.1 Spiral stairways.

Spiral stairways are permitted, provided the minimum width shall be 26 inches with each tread having a 6½-inches at the walkline. All treads shall be identical, and the rise shall be no more than 9½ inches. A minimum headroom of 6 feet 6 inches shall be provided.

IRC 202 Def: SPIRAL. A stairway with a plan view of closed circular form and uniform section-shaped treads radiating from a minimum-diameter circle.

IBC 1002 Def: 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



Means of Egress - Path

Spiral stairways
R311.7.10.1.

“All treads shall be identical, and the rise shall be no more than 9 1/2 inches.

A minimum headroom of 6 feet 6 inches shall be provided.”



123

Means of Egress - Path

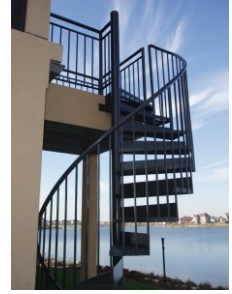
Spiral stairways R311.

Question:

Does the code require the handrail to be on any particular side of the stair (such as narrow vs. outer side)?

Answer:

No. The handrail can be on either side.



124

Means of Egress - Path

Alternating Tread Devices

- Exception: Alternating tread or Ships ladders 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 or less where such devices do not provide exclusive access to a kitchen or bathroom.



R311.7.11 & R311.7.12

125

Means of Egress - Path

Guards where required.

Guards shall be located ... open-sided walking surfaces, including stairs, ramps and landings, ...located more than 30" measured vertically to the floor or grade below at any point within 36" horizontally to the edge of the open side.

Porches and decks which are enclosed with insect screening shall be equipped with guards ...”



R312.1.1

126

Means of Egress - Path

Live loads for guards

Guardrails and handrails...shall be designed to withstand a single concentrated load... of 200 pounds... applied in any direction at any point along the top.



Table R301.5

127

Means of Egress - Path

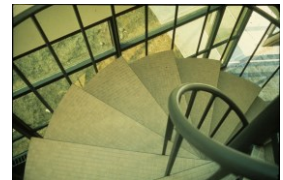
Guard.

Question:

Is the guard (guardrail) requirement for spiral stairs different (less or more restrictive) than the code for other stairs?

Answer:

Same requirement.



R312.1

128

Means of Egress - Path

Guards on open-sided stairs

Where there is an open-sided stairs:

- Min. 34" guardrail is required
- Pickets must pass 4" sphere test.



Min 34"

R312.1.2 Height

129

Means of Egress - Path

Guards on open-sided stairs

Where there is an open-sided stair:

- Min. 34" guardrail is required w/ max. 38".
- Pickets must pass 4 3/8" sphere test.



Min 34"

R312.1.2, Exception 2

130

Means of Egress - Path

Guards

Required guards **shall not** have **openings** from the walking surface to the required guard height which allow passage of a sphere **4" in diameter**.



R312.3

131

Means of Egress - Path

Guard opening limitations.

"Openings for required guards on the sides of stair treads shall not allow a sphere 4 3/8 inch to pass through."



Question:
Does the code address slip-resistance for interior or exterior stairs?

Answer: No.

R312.1.3, Exception 2

132

Means of Egress - Path

Guards



Guards measured at widest opening



R312

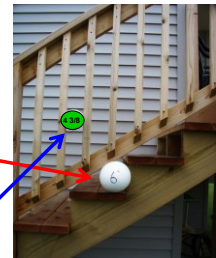
133

Means of Egress - Path

Guards

The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere 6 inches in diameter cannot pass through.

Guards ...open sides of stairs shall not have openings ... sphere 4 3/8" in diameter.



R312.1.3

134

Means of Egress - Path

Guard



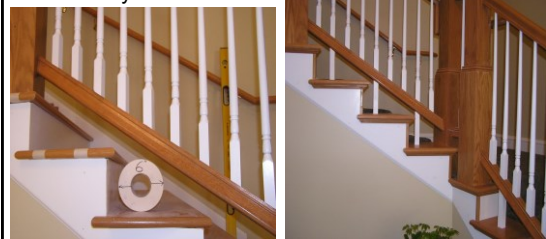
Missing guards

R312

135

Means of Egress - Path

Stairway - Guards



The problem

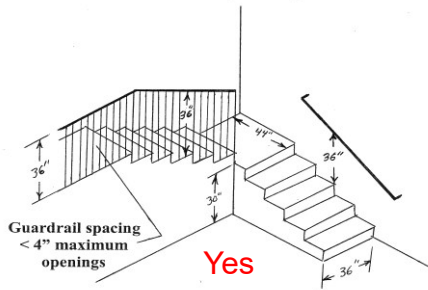
The fix

R312

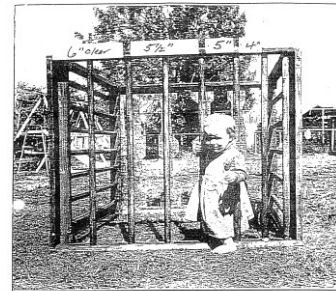
136

Discussion Item

Is this handrail/guardrail situation compliant?



137



Eighteen-month-old Janelle Zeigler easily passes completely through the 5-inch-wide opening. Approximately one-half of all children 13 to 18 months old can pass completely through a 5-inch-wide opening as shown above. The four sides of the guardrail assembly used in the demonstration are visible in this photo. The horizontal bars at left are spaced 4 inches apart and those at right are 6 inches apart.

138

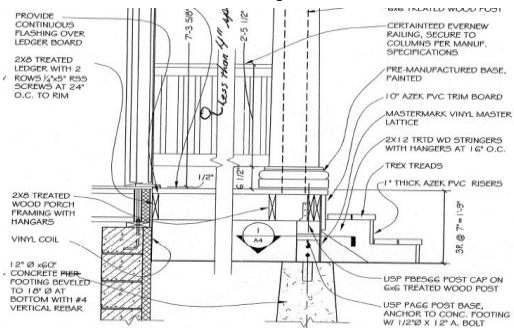
Work exempt from permit

- Exemption from permit requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this jurisdiction.

R105.2

139

Example



R311.5 - Attachment - Positively anchored

140

Guard Openings



- Guards spacing's shall not have an openings from the walking surface that allow passage of a sphere 4" in diameter.
- Guards on the open side of stairs shall not have openings that allow passage of a sphere 4 3/8" in diameter.

R312.1.3

141



142

Means of Egress- PATH

Answer

No...

In this example, a guardrail would only be required along the sidewalk that meets the front door.

Required here.

Not required here.



143

Means of Egress- PATH

- Ramps
 - ≤ 1:12 slope
 - Handrail on at least 1 side
 - 34" - 38" high handrail
 - Handrail continuous for the full length, 1 1/2" gap, return
 - ≥ 36" long landings top and bottom



R311.8

143

Means of Egress- PATH

Ramp / Landing ???

Exterior items.

"Ramps shall have a maximum slope of one unit vertical in twelve units horizontal 1:12 or 8.3 percent slope).

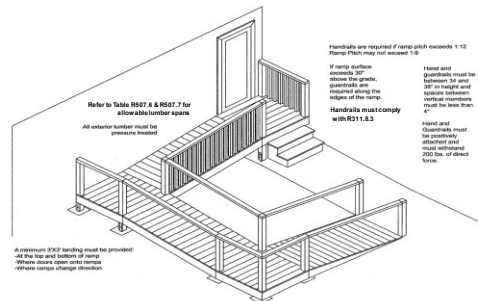
Exception: Where it is technically infeasible to comply because of site constraints, ramps may have a maximum slope of one unit vertical in eight units horizontal (1:8 or 12.5 percent slope)."



R311.8.1

145

Means of Egress- PATH



R311.8

146

Means of Egress- PATH



Handrail are required if ramp pitch exceeds 1:12
Handrails on ramps shall comply with R311.7.8.5.

R311.8.3 Handrails required

147

Wood Plastic Composites

311.7.5.4 Exterior Plastic Composite Stair Treads.
Plastic composite exterior stair treads shall comply with the provisions of this section and Section R507.2.2.

R507.2.2 Plastic composite deck boards, stair treads, guards, or handrails. Plastic composite exterior deck boards, stair treads, guards and handrails shall comply with the requirements of ASTM D7032 and this section.

R507.2.2.5 Installation of plastic composites.
Plastic composite deck boards, stair treads, guards and handrails shall be installed in accordance with this code and the manufacturer's instructions.

148

ASTM D7032

R317.4 Wood/plastic composites



□ This specification presents the standard procedures for establishing the performance rating of wood-plastic composite (WPC) deck boards and guardrail systems (guards or handrails). The purpose of this specification is to establish the basis for code recognition of these products or systems in exterior applications where combustible construction is allowed. The general requirements for these products shall be dictated by their performance in the following test methods:

- ⊙ flexural tests;
 - ⊙ ultraviolet resistance test;
 - ⊙ biodeterioration tests; and
 - ⊙ temperature and moisture effects;
 - ⊙ freeze-thaw resistance test;
 - ⊙ fire performance tests.
- ⊙ Deck boards are additionally examined by:
- ⊙ creep-recovery test;
 - ⊙ mechanical fastener holding tests;
 - ⊙ determination of unadjusted allowable load;
 - ⊙ and slip resistance test.
- ⊙ In the same manner, guards and handrails are additionally analyzed through concentrated load tests, and one- and two-family dwelling requirements.

<http://www.10klikes.org/Uniformity/2010/PLASTICD.pdf>



149



150



151



152



153

Means of Egress - PUBLIC WAY

- Stairs - same



- Ramps - same



1544

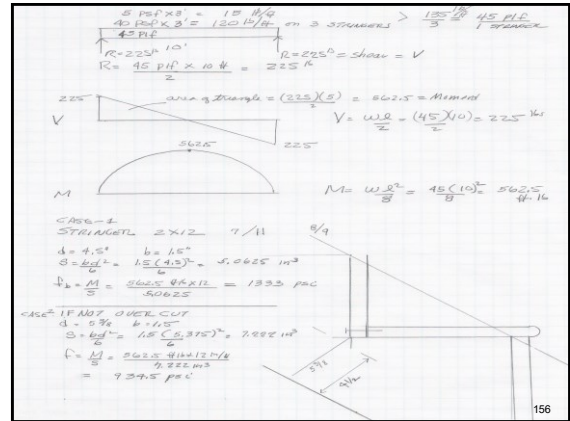
Means of Egress - PUBLIC WAY

- Ramps - Exception
 - ≤ 1: 8 for utility ramps (other ramps)
 - ≤ 1: 8 “where technically infeasible”



R311.8.1

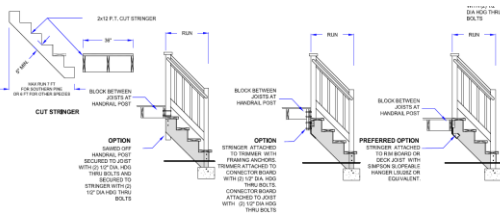
1555



156

Where is the Code Language?

- Wood Species, grade, size and minimum cut, stringer
- Connecting / Fastening deck stringers



Is this drawing Code compliant?

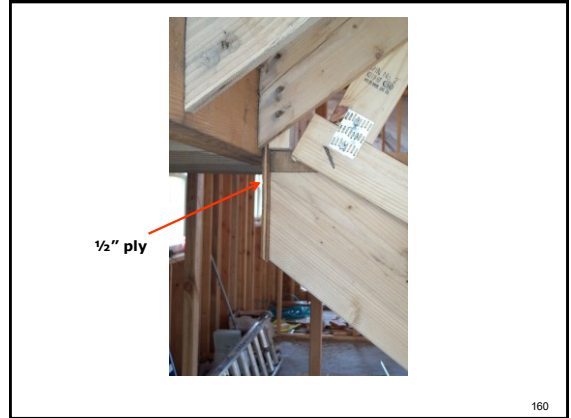
157



158



159



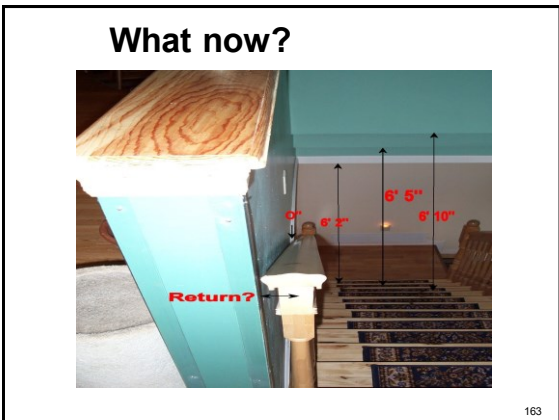
160



161



162



163



164



165

Equivalent grasping surface?



166

SKILL CHECK

Name the three parts of a
means of egress

1. _____
2. _____
3. _____



167

SKILL CHECK - ANSWER

Name the three parts of a
means of egress

1. PATH
2. EGRESS DOOR
3. PUBLIC WAY



168

Short Cuts

*Learn from the mistakes of others.
You can never live long enough
To make them all yourself.*

170

Summary

- Verify all code requirements.
- Call one another with your questions.
- ...And remember: "Life is good."
(Brent Snyder 2006)



171