ICC SPRING INTERCHANGE

2021 IRC® Performing Residential Plan Reviews Non-Structural Provisions

Based on the 2021 International Residential Code.

May 3, 2023

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ICC SPRING INTERCHANGE

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Introduction

- Housekeeping
  - Plans examiners
  - Inspectors
  - Building official
  - Builders
  - Designers
  - Engineers or Architects

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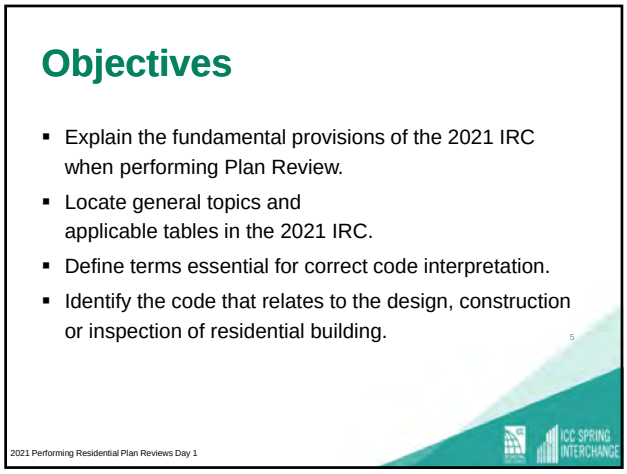

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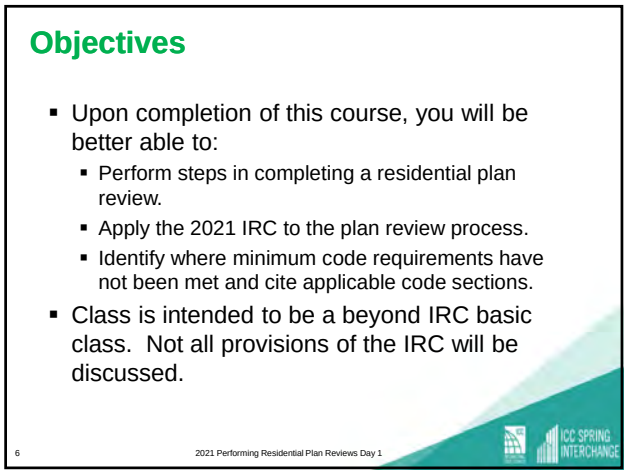

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Todays Class

Guide to a successful class:

- Ask Questions, ask questions, ASK QUESTIONS!!!!
- Intended to go beyond basics of IRC.
- Work with plans to support learning concepts.
- Last but not least!!!

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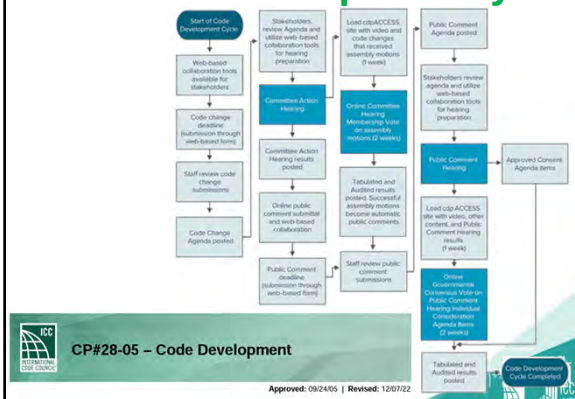
ICC Code Development Cycle



CP#28-05 – Code Development

Approved: 09/24/05 | **Revised:** 12/07/22

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Class Materials

1. Residential Plan Set
2. 2021 IRC
3. IRC Plan Review Record

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International Residential Code

- Purpose and Scope
- Why was it developed?
- What is the IRC code an example of?
  - A minimum prescriptive based design that when complied with provides a minimum level of safety for one and two family dwellings without the need for a design professional.

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Plan Review

- Why are plan reviews performed?
- Jurisdictions vary in process and what is reviewed
- What makes a successful plan review?
- How should comments be formatted?

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IRC Scope – R101.2

- R101.2 Scope. The provisions of this code shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress and their accessory structures not more than three stories above grade plane in height.

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R101.2 Scope

Exceptions 1 through 5

Bed and breakfast

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IRC Scope - R101.2

- Exception: The following shall be permitted to be constructed in accordance with this code where provided with a residential fire sprinkler system complying with Section P2904:

1. Live/work units located in townhouses and complying with the requirements of Section 419 of the International Building Code.
2. Owner-occupied lodging houses with five or fewer guestrooms.
3. A care facility with five or fewer persons receiving custodial care within a dwelling unit.
4. A care facility with five or fewer persons receiving medical care within a dwelling unit.
5. A care facility for five or fewer persons receiving care that are within a single-family dwelling.

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IRC Purpose –R101.3

The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment, and to provide safety to fire fighters and emergency responders during emergency operations.

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Plan Review

- What type of projects would be covered by the scoping of the IRC?
  - New dwelling units. Single Family, Duplex Townhomes.
  - Additions.
  - Interior alterations.
  - Accessory structures.
    - Sheds
    - Pools
    - Detached Garage

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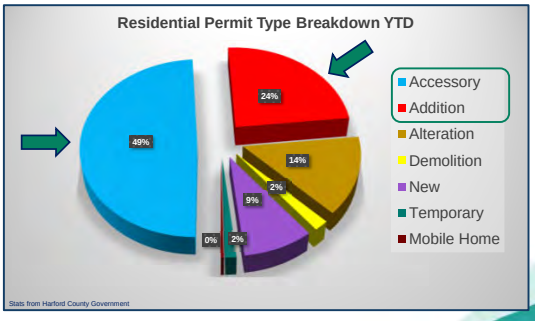
FY 23 Residential Building Permit Types



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Plan Review

- The document submittal should include what type of plans?
  - Floor Plans of each floor including basements
  - Foundation Plan
  - Elevations of all cardinal directions
  - Cross sections
  - Enlarged details
  - Energy Code Analysis (compliance Path)
  - Framing Plans to include wall bracing details
  - Specifications
  - Site Plan
  - Trade schematics

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Plan Review - Plans

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Construction Documents R106

- Submittal documents shall be submitted in two or more sets with each permit application.
- 2021 IRC allows for submittal digital format were allowed by the building official
- Be prepared by registered design profession where required by the statues of the jurisdiction.
- The building official my wave submission when the nature of work is such that compliance can be easily achieved with this code.

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Construction Documents R106.1.1

- Construction documents shall contain the following;
  - Be drawn upon suitable material,
  - electronic media submissions are permissible where approved by the building official, and
  - be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.

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Construction Documents

- R106.2.2 - Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.
- R106.1.3 – Buildings and structures utilizing braced wall design, and where required by the building official, braced wall lines shall be identified on the construction documents. Pertinent information including, but not limited to, bracing methods, location and length of braced wall panels and foundation requirements of braced wall panels at top and bottom shall be provided.
- R106.2 - A site plan showing the size and location of new construction and existing structures on the site and distances from lot lines. May be waived where the application for permit is for alteration or repair or otherwise warranted.

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Examination of Documents R106.3

- R106.3.1 Approved construction documents shall be approved in writing or by a stamp that states "REVIEWED FOR CODE COMPLIANCE." One set shall be retained by the building official. The other set shall be returned to the applicant, shall be kept at the site of work.
- R106.3.2 Changes in construction documents are not required where a lawful permit has been issued and the construction has been pursued in faith within 180 days of issuance and has not been abandoned.

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Examination of Documents R106.3

R106.3.3 The building official may issue a permit for the construction of foundations or any other part of a building or structure before the construction documents for the whole building or structure have been submitted. Adequate information and detailed statements ensuring compliance with this code shall be provided.

The holder of such permit for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a permit for the entire structure will be granted.

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Construction Documents R106

- R106.4 Amended construction documents. Any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.
- R106.5 One set of approved construction documents shall be retained by the building official for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

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Plan View

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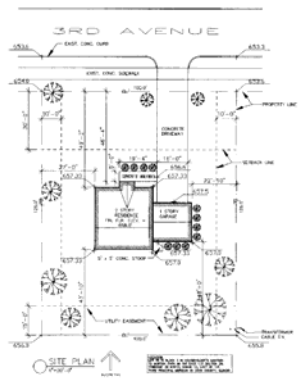

Site Plan View

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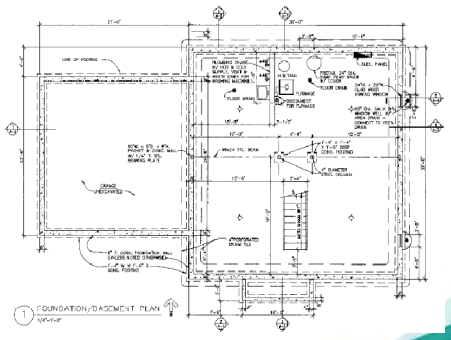
Foundation Plan



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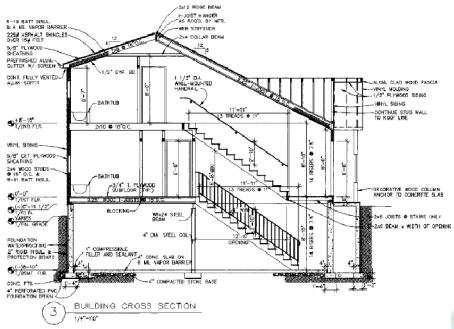
Sections View



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Elevations View

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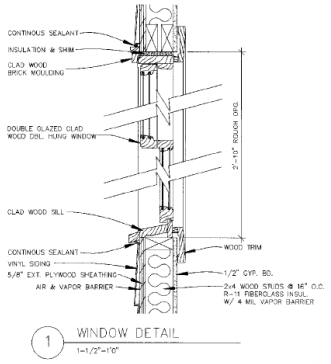
Details



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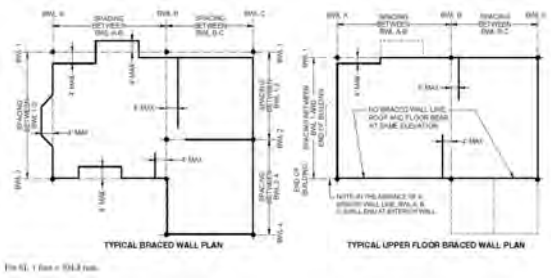
Braced Wall Lines



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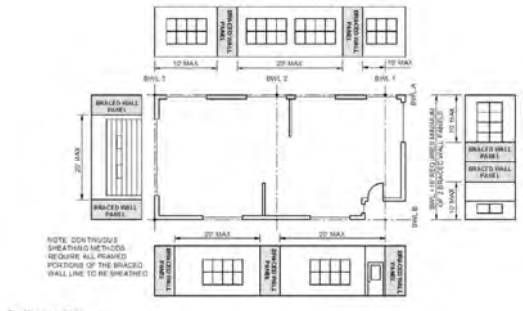
Braced Wall Panels



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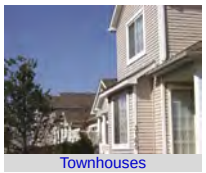
IRC – International Residential Code

- Regulates of 1- and 2-family dwellings and townhouse structures
- Combines all regulations for building, energy, mechanical, fuel gas, plumbing and electrical into one document

Single-family dwelling



Townhouses

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Dwellings and Townhouses

Habitable attic is not considered a story

Allows a full basement in addition to 3 stories

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Habitable attic R325.6

- Shall not be considered a story where complying with all of the following requirements:
  - The occupiable floor area is not less than 70 square feet per R304.
  - The occupiable floor area has a ceiling height per R305.
  - The occupiable space is enclosed by the roof assembly above, knee walls on the sides and the floor-ceiling assembly below.
  - The floor of the occupiable space shall not extend beyond the exterior walls of the floor below.

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Dwellings

- Separate means of egress to the outdoors for each dwelling unit
  - 1 exterior exit door
  - Egress travel distance is not regulated
- No limit on size of dwellings
- 2-family dwellings require fire-resistant separations

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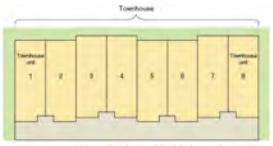
Townhouse and Townhouse Unit R202

- **TOWNHOUSE.** 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.



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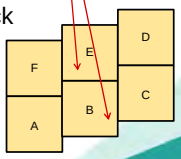
Townhouses

Units are not open on 2 full sides; cannot be constructed under the IRC

- Minimum of 3 townhouses
- No maximum on the number of townhouses
- Fire-resistant separations between townhouses
- Townhouses open on front and back



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Accessory Buildings

- The IRC regulates accessory buildings
  - Use incidental and accessory to dwelling
  - On same lot as dwelling
  - Unlimited area
  - ≤ 3 stories AGP

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Existing Structures

- Existing buildings permitted to continue without change
  - Maintained per code under which they were constructed
- The IRC regulates additions, alterations and repairs to an existing building
- Appendix J offers compliance alternatives for construction on existing buildings
  - Work categorized as repair, renovation, alteration or reconstruction

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Jurisdictional Adoption of the IRC

- Adopting by local ordinance includes:
  - Edition and title of the IRC
  - Purpose and scope
  - Effective date for ordinance
  - Insertion of local information and criteria into code text:
    - Name of the jurisdiction
    - Design criteria
    - Building sewer depths

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Appendices

- Developed in the same manner as the main body of code
- May provide some guidelines or examples of recommended practices
- May assist in the determination of alternative materials or methods
- Have no legal status until specifically recognized in the adopted ordinance or legislation

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Provides the code section reference?

What section of the IRC addresses use of the steel column?

How would we approve the use?

Third Party Evaluation Reports such As ICC-ES. ESR-1766

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Alternative Designs - R104.11

- Use Manufactures Documentation
- Designed by a registered design professional
- Independent Assessment Reports
  - Evaluation Services

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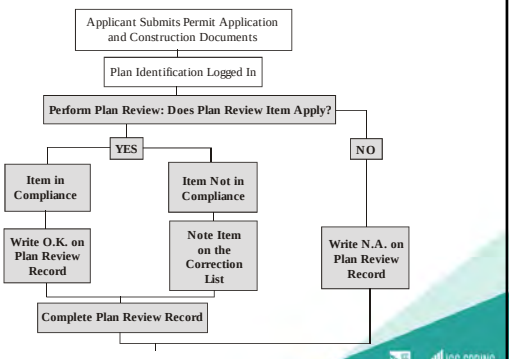
The Plan Review Process



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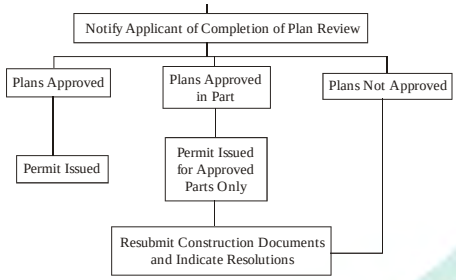
The Plan Review Process (continued)



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IRC Plan Review Record

- Throughout this course, the IRC Plan Review Record will be used to acquaint you with the process of reviewing submissions.
- Local jurisdictions use this form or may use their own form.

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Plan Review Steps

- Building Planning Review
- Foundation Review
- Floor System Review
- Wall Construction Review
- Wall Covering Review
- Roof/Ceiling Construction Review
- Roof Covering Review
- Chimney and Fireplace Review
- Mechanical Review
- Plumbing Review
- Electrical Review
- Energy Review
- Existing Buildings
- Trade Reviews
- Accessory Structures

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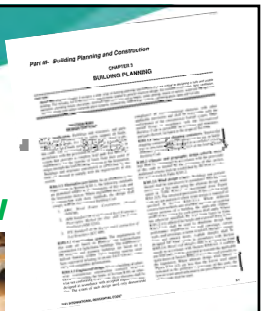
Building Planning Review



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Building Planning Review

Subtasks

1. Design Criteria
2. Fire-resistant Construction, Site Plan Review
3. Accessibility
4. Light, Ventilation, Ceiling Heights, Habitable Room Sizes, Heating.
5. Sanitation Review
6. Glazing Review
7. Garage Review
8. Egress Review
9. Automatic Fire Sprinkler System Review
10. Smoke Alarm and Carbon Monoxide Alarm Review
11. Dwelling Unit Separation Review
12. Fire Protection of Floors Review and Draftstopping
13. Moisture, Decay and Termite Protection Review
14. Exterior Decks
15. Solar Roof Access

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Building Planning Review

- The purpose of a building planning review is to determine that one- and two-family dwellings, as shown on building plans and in specifications:
  - Comply with applicable standards of construction.
  - Use appropriate materials and methods.
  - Are safe for people and property.
  - Comply with code requirements.

52 2021 Performing Residential Plan Reviews Day 1 Chapter 1

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ICC SPRING INTERCHANGE

- Sub Task 1: Design Criteria

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Subtask 1: Design Criteria, Fire-resistant Construction, Light, Ventilation and Room Size Review

1. Check for proper edition of code and applicable codes.
2. Check for design loads on plans.
3. Compare design loads to criteria in Table R301.2(1-3).
4. Check for exterior wall rating and opening requirements and site plan review.
5. Check for natural or artificial light.
6. Check for required ventilation.
7. Check for required heating.
8. Check for minimum room size.
9. Check for minimum ceiling height.

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Prescriptive and Performance

- Conventional construction
  - Engineered design can be used for structural elements that:
    - Exceed the limits in the code; or
    - Are not included in the code
- Alternative to wood framing provisions
  - Wood Frame Construction Manual published by the American Wood Council
    - WFCM addresses wind speeds up to 150 mph
    - IRC wind speeds are less than 110 mph

For example, the sizing of wide flange steel beams

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Live Loads R301.5

IRC Table R301.5

Minimum Uniformly Distributed Live Loads

USE	LIVE LOAD (psf)
Uninhabitable attics without storage	10
Uninhabitable attics with limited storage	20
Habitable attics and attics served with fixed stairs	30
Balconies (exterior) and decks	40
Fire escapes	40
Rooms other than sleeping rooms	40
Sleeping rooms	30

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Live Loads R301.5 (Continued)

IRC Table R301.5

Minimum Uniformly Distributed Live Loads

USE	LIVE LOAD (psf)	
Guardrails and handrails	200	Single concentrated load applied in any direction along the top.
Guardrail in-fill components	50	Horizontally applied normal load of 50 lb. on area of 1 sq. ft.
Passenger vehicle garages	50	2,000-lb concentrated load / 20-sq. in. area.
Stairs	40	300-lb concentrated load / 4 sq. in. of tread

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Dead Loads R301.4

- Average dead loads are included in the prescriptive tables for:
  - Footings
  - Floors
  - Walls
  - Roofs

For example, spread footing sizes for conventional frame construction assume average weights for the construction materials being supported

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Dead Loads R301.4

- Average dead loads included in prescriptive tables
  - Footings
  - Floors
  - Walls
  - Roofs

DESCRIPTION	WEIGHT (PSF)
Roof dead load (framing, sheathing, asphalt shingles, insulation, drywall)	10
Exterior wall (2 × 4 framing, sheathing, siding, insulation, drywall)	11
Floor (joist, sheathing, carpeting, drywall)	10
Concrete wall, 8 in. thick	100
10 in. thick	125
12 in. thick	150
Solid CMU (density 125 pcf) wall, 8 in. thick	81
Hollow CMU (density 125 pcf) wall, 8 in. thick, grout at 48" o.c.	44

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Deflection R301.7

- Allowable deflection in structural framing members:
  - Studs
  - Joists
  - Beams
  - Rafters
- Table R301.7
  - L = span length
  - H = span height

Structural Member	Allowable Deflection
Rafters having slopes greater than 3:12 with no finished ceiling attached to rafters	*L*/180
Interior walls and partitions	*H*/180
Floors/ceilings with plaster or stucco finish	*L*/360
All other structural members	*L*/240
Exterior walls—wind loads with plaster or stucco finish	*H*/360
Exterior walls with other brittle finishes	*H*/240
Exterior walls with flexible finishes	*H*/120
Lintels supporting masonry veneer walls	*L*/600

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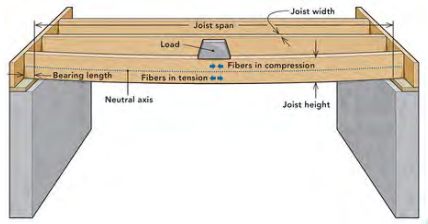
Deflection R301.7



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Example Floor Joist Deflection

- Floor joist span is 14’
- Allowable deflection from Table R301.7 is L/360

  L = 14’ x 12” = 168”

  168” ÷ 360 = 0.47”

  Allowable deflection is 0.47”

Note: a 14’ span rafter with 4:12 slope and no ceiling attached has an allowable deflection of L/180, which is twice the deflection allowed for floor joists

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Climate and Geographic Design Loads - Table R301.2(1)

TABLE R301.2(1)
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD[a]	WIND DESIGN				SEISMIC DESIGN CATEGORY[f]	SUBJECT TO DAMAGE FROM			WINTER DESIGN TEMP[e]	ICE BARRIER UNDERLAYMENT REQUIRED[h]	FLOOD HAZARDS[g]	AIR FREEZING INDEX[i]	MEAN ANNUAL TEMP[j]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Windborne debris zone[m]		Weathering[a]	Frost line depth[b]	Termite[c]					
—	—	—	—	—	—	—	—	—	—	—	—	—	—

MANUAL J DESIGN CRITERIA[o]

Elevation	Latitude	Winter heating	Summer cooling	Altitude correction factor	Indoor design temperature	Design temperature cooling	Heating temperature difference
—	—	—	—	—	—	—	—
Cooling temperature difference	Wind velocity heating	Wind velocity cooling	Coincident wet bulb	Daily range	Winter humidity	Summer humidity	—
—	—	—	—	—	—	—	—

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

a. Where weathering requires a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code, the frost line depth strength required for weathering shall govern. The weathering column shall be filled in with the weathering index, “negligible,” “moderate” or “severe” for concrete as determined from Figure R301.2(4). The grade of masonry units shall be determined from ASTM C34, C55, C62, C73, C90, C129, C145, C216 or C652.

b. Where the frost line depth requires deeper footings than indicated in Figure R403.1(1), the frost line depth strength required for weathering shall govern. The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.

c. The jurisdiction shall fill in this part of the table to indicate the need for protection depending on whether there has been a history of local subterranean termite damage.

d. The jurisdiction shall fill in this part of the table with the wind speed from the basic wind speed map [Figure R301.2(5)A]. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.

e. The outdoor design dry-bulb temperature shall be selected from the columns of 97½ percent values for winter from Appendix D of the *International Plumbing Code*. Deviations from the Appendix D temperatures shall be permitted to reflect local climates or local weather experience as determined by the building official. [Also see Figure R301.2(1).]

f. The jurisdiction shall fill in this part of the table with the seismic design category determined from Section R301.2.2.1.

g. The jurisdiction shall fill in this part of the table with (a) the date of the jurisdiction’s entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the Flood Insurance Study and (c) the panel numbers and dates of the currently effective FIRMs and FBFMs or other flood hazard map adopted by the authority having jurisdiction, as amended.

h. In accordance with Sections R905.1.2, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall fill in this part of the table with “NO.”

i. The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99 percent) value on the National Climatic Data Center data table “Air Freezing Index-USA Method (Base 32°F).”

j. The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table “Air Freezing Index-USA Method (Base 32°F).”

k. In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

l. In accordance with Figure R301.2(5)A, where there is local historical data documenting unusual wind conditions, the jurisdiction shall fill in this part of the table with “YES” and identify any specific requirements. Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

m. In accordance with Section R301.2.1.2 the jurisdiction shall indicate the wind-borne debris wind zone(s). Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

n. The jurisdiction shall fill in these sections of the table to establish the design criteria using Table 1a or 1b from ACCA Manual J or established criteria determined by the jurisdiction.

o. The jurisdiction shall fill in this section of the table using the Ground Snow Loads in Figure R301.2(6).

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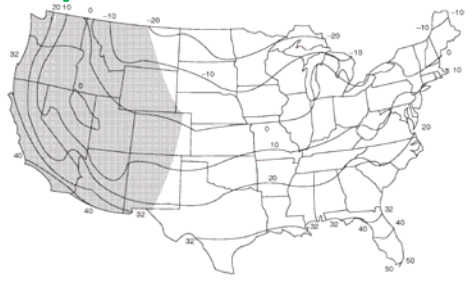
Example Floor Joist Deflection



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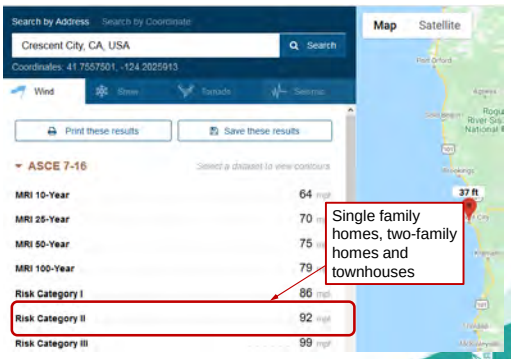
Hazards.atcouncil.org



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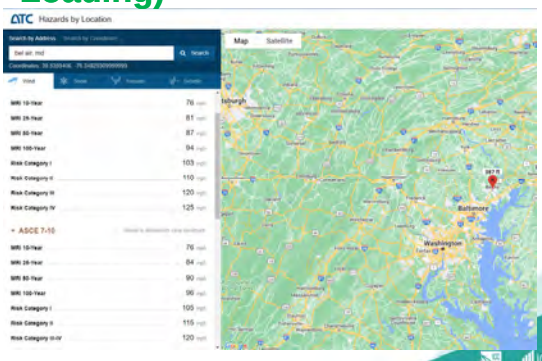

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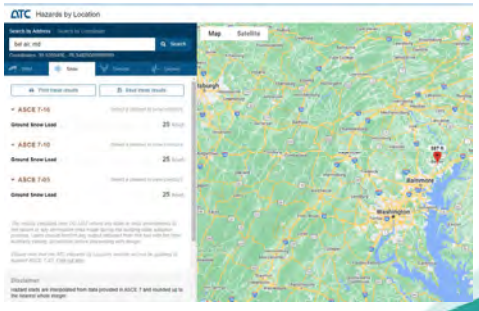

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Hazards.atcouncil.org (Tornado)

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Hazards.atcouncil.org (Tornado)

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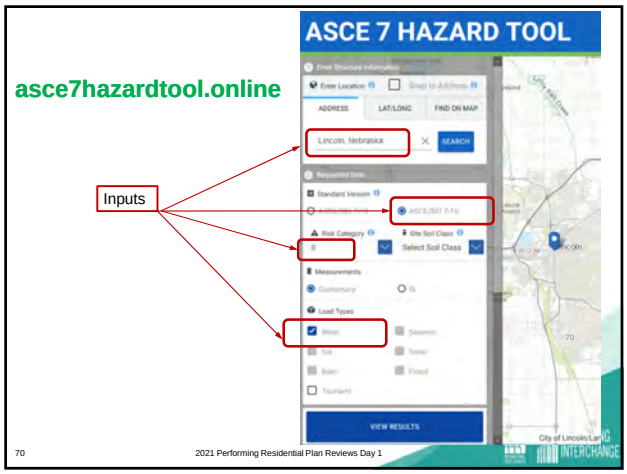
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ASCE 7 HAZARD TOOL
Inputs
VIEW RESULTS
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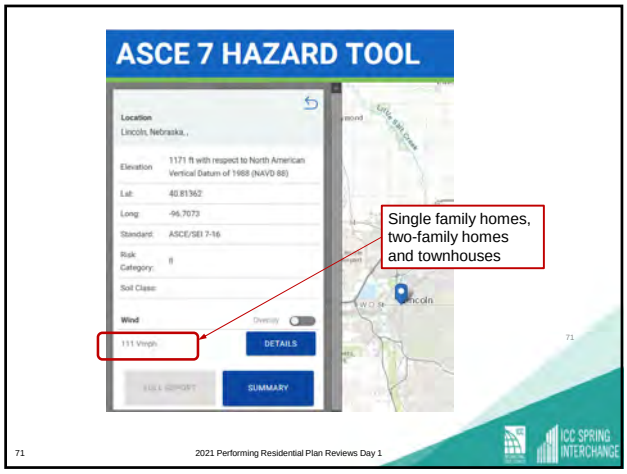
ASCE 7 HAZARD TOOL
Single family homes, two-family homes and townhouses
DETAILS
SUMMARY
71
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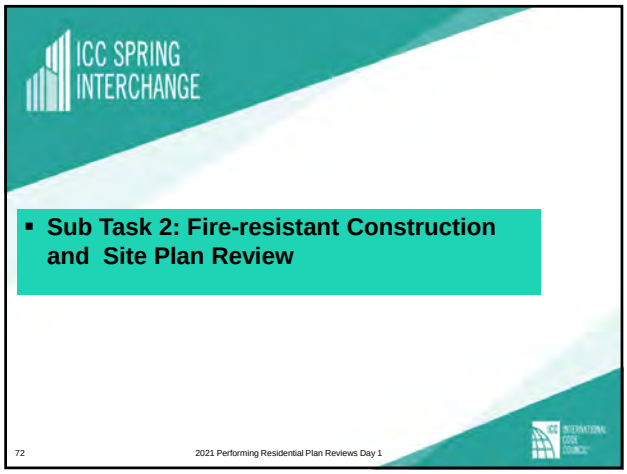
ICC SPRING INTERCHANGE
Sub Task 2: Fire-resistant Construction and Site Plan Review
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Sub Task 2: Fire-resistant Construction and Site Plan Review

1. Fire Separation Distance
2. Location on Property
3. Rated Wall Assemblies and Exterior Walls
4. Storm Drainage
5. Sire Preparation

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Chapter 2 Fire Separation Distance

[RB] FIRE SEPARATION DISTANCE. The distance measured from the building face to one of the following:

1. To the closest interior lot line.
2. To the centerline of a street, an alley or public way.
3. To an imaginary line between two buildings on the lot.

The distance shall be measured at a right angle from the face of the wall.

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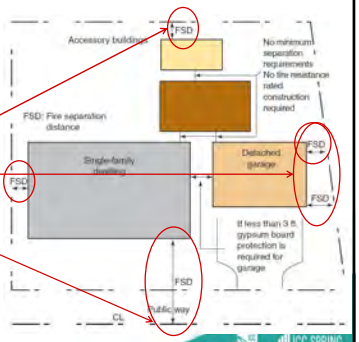
Location on Property

- Measured perpendicular to the exterior wall
- Measured between the building and:
  - Lot lines
  - Centerline of a street or alley



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Tables R302.1(1) and R302.1(2)

Exterior Wal Element	Fire Rating	Fire Separation Distance W/O Sprinklers	Fire Separation Distance With Sprinklers
Walls	1 hour—tested in accordance with ASTM E119, UL 263 or Section 703.3 of the International Building Code with exposure from both sides.	0' : <5'	0 : < 3' [a]
Projections	Not Allowed	< 2'	< 2' [a]
Projections	1 hour on the underside, or heavy timber, or fire-retardant-treated wood. [a b]	2' : < 5'	2' : < 3'
Openings in Walls	Not Allowed	< 3'	< 3' [a]
Openings in Walls	Max 25% - 0 rating	< 3' : < 5'	N/A
Openings in Walls	Unlimited	5' min	3' min
Penetrations	Comply with R302.4	< 3'	< 3'

Footnote from Table R302.1(2)
a. For residential subdivisions where all dwellings are equipped throughout with an automatic sprinkler system installed in accordance with Section P2904, the fire separation distance for exterior walls not fire-resistance rated and for fire-resistance-rated projections shall be permitted to be reduced to 0 feet, and unlimited unprotected openings and penetrations shall be permitted, where the adjoining lot provides an open setback yard that is 6 feet or more in width on the opposite side of the property line.

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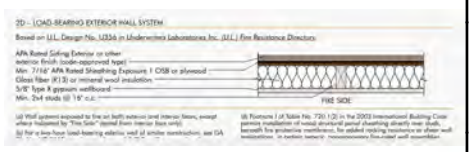
Rated Wall Assemblies - Tables R302.1(1) and R302.1(2)

USG SA100 - UL Des U305 U314
Exposure Rated Both Sides



APA Fire-Rated Systems UL U356
Exposure Rated Inside

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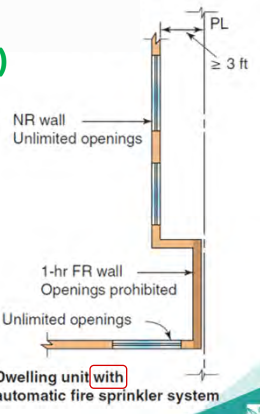
Exterior Walls Table R302.1(2)



§R302.1

Dwelling unit with automatic fire sprinkler system

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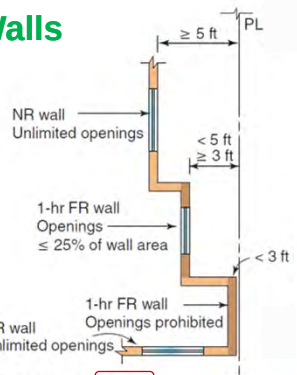
Exterior Walls Table R301.1(1)



§R302.1

Dwelling unit without automatic fire sprinkler system

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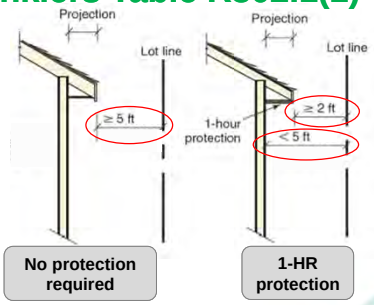
Eave Projections – w/o Sprinklers Table R302.1(1)



§R302.1

No protection required

1-HR protection

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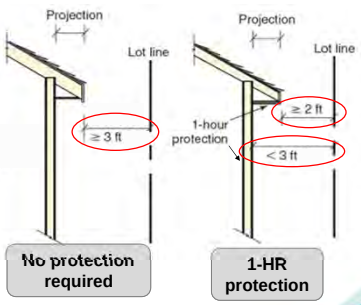
Eave Projections – w/ Sprinklers Table R302.1(2)



§R302.1

No protection required

1-HR protection

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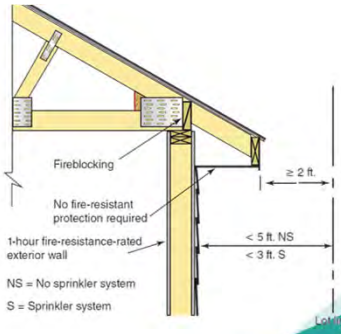
Eave Projections Tables R302.1(1) and R302.1(2)



§R302.1

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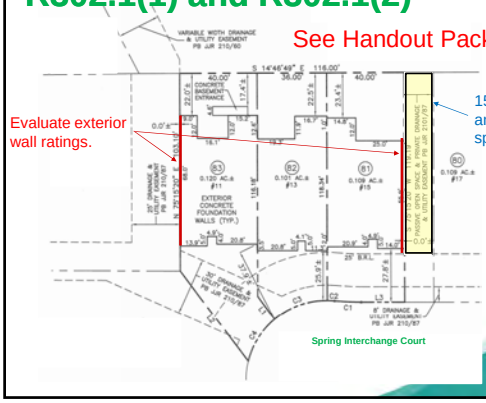
Exterior Wall Review Tables R302.1(1) and R302.1(2)

See Handout Packet Page 2



83

Storm Drainage Section R401.3

- Final grade
  - Minimum fall 6" within 10' of foundation
  - Exception for local site conditions
    - Water can be directed to swales or drains
  - Concrete surfaces within 10' of foundation need 2% slope

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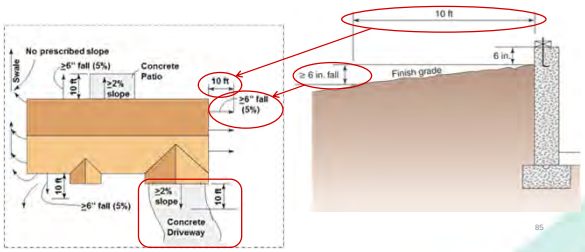
Storm Drainage R401.3



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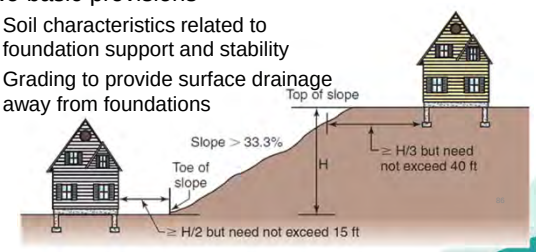
Site Preparation R403.1.7 Footings on or adjacent to slopes.

- Two basic provisions
  - Soil characteristics related to foundation support and stability
  - Grading to provide surface drainage away from foundations



Alternative setbacks are allowed subject to approval of the building official.

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Site Address R319

- Buildings shall be provided with approved address identification.
- The address shall be legible and placed in a position that is visible from the street or road fronting the property.
- Identification characters shall contrast with their background.
- Address numbers shall be Arabic numbers or alphabetical letters and the numbers shall not be spelled out.
- Min 4: High and 1/20" stroke width.
- Fire Code Official may require additional signs to aid in emergency response.
- Access by private road and cannot be viewed from public way allowed to have a monument pole or other sign.

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Practice Exercise 1

- Based on the plans, determine which Jurisdiction the home is being constructed in?

89

Practice Exercise 1

1. Identify the ground snow load indicated on the plans and the required ground snow load from Table R301.2 (1).
   Plans _____ Figure R301.2(4) _____
2. Identify the wind speed indicated on the plans and the min design wind speed From Table R301.2 (1).
   Plans _____Figure R301.2 (2)_____
3. Identify the minimum fire separation distance for each of the four cardinal directions.
   North ____ East ____ South ____ West _____

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Practice Exercise 1

4. Do the plans have a critical error that would prevent you from continuing with plan review?

5. Do the plans provide for the proper slope form the foundation?

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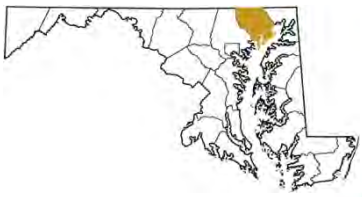
Practice Exercise 1

- Based on the plans, determine which Jurisdiction the home is being constructed in?
- Harford County, MD



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Practice Exercise 1

1. Identify the ground snow load indicated on the plans and the required ground snow load from Table R301.2 (1).
   Plans 30 PSF Page A-1 Figure R301.2(4) 25/CF Site Specific

2. Identify the wind speed indicated on the plans and the min design wind speed From Table R301.2 (1).
   Plans Not Indicated Figure R301.2 (2) 115 Ultimate Design Wind Speed

3. Identify the minimum fire separation distance for each of the four cardinal directions.
   North 189' East 208' South 50' West 145'

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Practice Exercise 1

4. Do the plans have a critical error that would prevent you from continuing with plan review?

Yes, plans are based on the 2018 edition of the IRC. Building shall resubmit documents demonstrating compliance with the 2021 edition of the IRC.

5. Do the plans provide for the proper slope form the foundation?

The site plan nor elevations specifically address positive slope away from foundation. Builder must provide positive slope away from foundation in accordance with R401.3

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ICC SPRING INTERCHANGE

- **Sub Task 3: Accessibility**

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Sub Task 3: Fire-resistant Construction and Site Plan Review

1. Background
2. Accessibility Codes

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Accessibility and the IRC

Does the IRC address accessibility?

How?

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Accessibility R320

- Background
  - Derived from the Federal Fair Housing Act
  - Administered by HUD
  - Applicable to Buildings built for first occupancy after March 13, 1991
  - Safe Harbor Designs
    - Fair Housing Act Design Manual
    - 2000 International Building Code (IBC)
    - 2003 International Building Code (IBC)
    - 2006 International Building Code (IBC)
    - 2009 ICC A117.1 Accessible and Usable Buildings and Facilities Standard
    - 2009 International Building Code (IBC)
    - 2012 International Building Code (IBC)
    - 2015 International Building Code (IBC)
    - 2018 International Building Code (IBC)

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Accessibility R320

- R320.1 Where there are four or more dwelling units or sleeping units in a single structure, the provisions of Chapter 11 of the International Building Code for Group R-3 shall apply.
  - Except in owner-occupied lodging houses with five or fewer guestrooms constructed in accordance with the International Residential Code.

- R320.2 Live/work units.
  - The nonresidential portion shall be accessible in accordance with Sections 508.5.9 and 508.5.11 of the International Building Code.
  - In a structure where there are four or more live/work units, the dwelling portion of the live/work unit shall comply with Section 1108.6.2.1 of the International Building Code.

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Group R-3 Accessibility IBC 1108.6.3

- In Group R-3 occupancies where there are four or more dwelling units or sleeping units intended to be occupied as a residence in a single structure, every dwelling unit and sleeping unit intended to be occupied as a residence shall be a Type B unit. Bedrooms within congregate living facilities, dormitories, sororities, fraternities, and boarding houses shall be counted as sleeping units for the purpose of determining the number of units.
- Exception: The number of Type B units is permitted to be reduced in accordance with Section 1108.7.

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Group R-3 Multistory Exception IBC 1108.7.2

- 1108.7.2 A multistory dwelling unit or sleeping unit that is not provided with elevator service is not required to be a Type B unit.
- Where a multistory unit is provided with external elevator service to only one floor, the floor provided with elevator service shall be the primary entry to the unit, shall comply with the requirements for a Type B unit and, where provided within the unit, a living area, a kitchen and a toilet facility shall be provided on that floor.

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Group R-3 Accessibility IBC 1107.6.3

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ICC SPRING INTERCHANGE

- **Sub Task 4: Light, Ventilation, Ceiling Heights, Habitable Room Sizes, Heating.**

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Sub Task 4: Light, Ventilation, Ceiling Heights, Habitable Room Sizes, Heating.

1. Light and Ventilation Requirements.
2. Stairway Illumination.
3. Mechanical Ventilation Requirements.
4. Heating Requirements.
5. Minimum Room Sizes.
6. Ceiling Heights.

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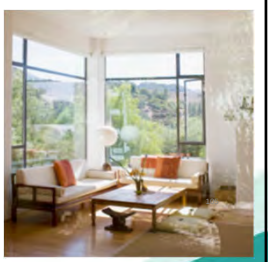
Light and Ventilation R303.1

- Habitable rooms
  - Glazing ≥ 8% or lighting ≥ 6 footcandles
  - Openings ≥ 4% or mechanical ventilation
- Bathrooms
  - Glazing ≥ 3 ft^2 or electric lighting
  - Openings ≥ 1.5 ft^2 or mechanical exhaust

§R303.1



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Habitable Rooms R303.1

Exceptions:

1. For habitable rooms other than kitchens, the glazed areas need not be openable where the opening is not required by Section R310 and a whole-house mechanical ventilation system or a mechanical ventilation system capable of producing 0.35 air changes per hour in the habitable rooms is installed in accordance with Section M1505.
2. For kitchens, the glazed areas need not be openable where the opening is not required by Section R310 and a local exhaust system is installed in accordance with Section M1505.
3. The glazed areas need not be installed in rooms where Exception 1 is satisfied and artificial light is provided that is capable of producing an average illumination of 6 footcandles (65 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.
4. Use of sunroom and patio covers, as defined in Section R202, shall be permitted for natural ventilation if in excess of 40 percent of the exterior sunroom walls are open, or are enclosed only by insect screening.

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Adjoining Rooms R303.2

Not less than one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room and not less than 25 square feet (2.3 m^2)

Openings required for light or ventilation shall be permitted to open into a sunroom with thermal isolation or a patio cover, provided that there is an open-able area between the adjoining room and the sunroom or patio cover of not less than one-tenth of the floor area of the interior room and not less than 20 square feet (2 m^2). The minimum openable area to the outdoors shall be based on the total floor area being ventilated.

Emergency escape and rescue openings of Section R310 must also be satisfied

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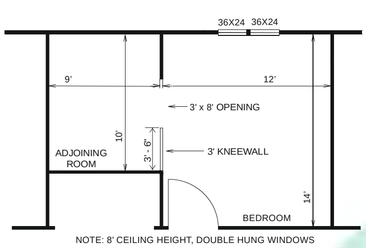
Natural Light for adjoining rooms R303.2

- Adjoining Room Calculation:
- Adjoining room area = 9 x 10 = 90sf ft^2
- Total common wall area = 8 x 10 = 80 ft.
- Open common wall area = (3 x 8) + (3.5 x 5) = 41.5 ft^2



Room With Adjoining Room

[illegible] exceeds 10% (41.5sf > 9sf).

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Bathrooms R303.3

- Bathrooms:
  - Glazing ≥ 3 ft^2 or electric lighting
  - Openings ≥ 1.5 ft^2 or mechanical exhaust

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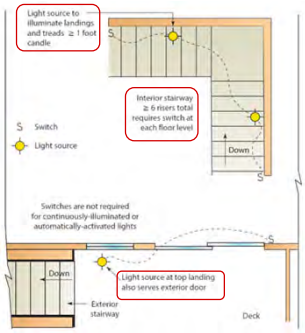
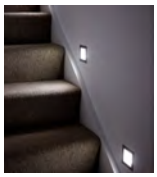
Stairway Illumination R303.7 & R303.8

§R303.7 Interior Staris



§R303.8 Exterior Stairs



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Mechanical Ventilation R303.4

- Buildings and dwelling units complying with Section N1102.4.1.2 (Testing) shall be provided with mechanical ventilation in accordance with Section M1505, or with other approved means of ventilation.

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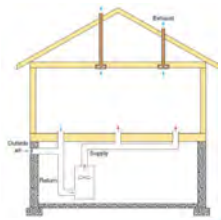
Mechanical Ventilation System M1505

- Prescriptive air flow rate based on
  - Area of dwelling
  - Number of bedrooms
  - Continuous or intermittent operation



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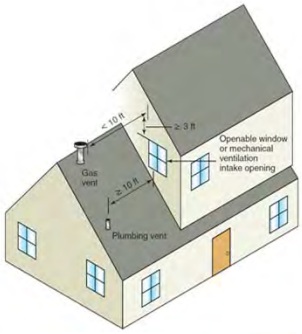
Opening and Intake Locations R303.5



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R303.1 Mechanical Ventilation Exceptions

- Whole-house mechanical ventilation system <u>or a mechanical ventilation system capable of producing 0.35 ACH in habitable rooms</u>
- A local exhaust system is an acceptable substitute for natural ventilation in kitchens installed in accordance with M1505.

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Table N1103.6.2 (R403.6.2 IECC) Wole-house Mechanical Ventilation System Fan Efficacy

TABLE N1103.6.2 (R403.6.2)
WHOLE-DWELLING MECHANICAL VENTILATION SYSTEM FAN EFFICACY[a]

FAN LOCATION	AIRFLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)
HRV, ERV	Any	1.2 cfm/watt
In-line supply or exhaust fan	Any	3.8 cfm/watt
Other exhaust fan	< 90	2.8 cfm/watt
Other exhaust fan	≥ 90	3.5 cfm/watt
Air-handler that is integrated to tested and listed HVAC equipment	Any	1.2 cfm/watt

For SI: 1 cubic foot per minute = 28.3 L/min.
a. Design outdoor airflow rate/watts of fan used.

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Table M1505.4.3.(1) and M1505.4.3(2)

TABLE M1505.4.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0–1	2–3	4–5	6–7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501–3,000	45	60	75	90	105
3,001–4,500	60	75	90	105	120
4,501–6,000	75	90	105	120	135
6,001–7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m^2, 1 cubic foot per minute = 0.0004719 m^3/s.

TABLE M1505.4.3(2)
INTERMITTENT WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS[a, b]

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor[a]	4	3	2	1.5	1.3	1.0

a. For ventilation system run-time values between those given, the factors are permitted to be determined by interpolation.
b. Extrapolation beyond the table is prohibited.

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Required Heating R303.10

TABLE R301.2
CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA

GROUND SNOW LOAD[a]	WIND DESIGN			SEISMIC DESIGN CATEGORY[a]	SUBJECT TO DAMAGE FROM			ICE BARRIER UNDERLAYMENT REQUIRED[a]	FLOOD HAZARDS[a]	AIR FREEZING INDEX[a]	MEANANNUAL TEMP[a]
	Speed[d] (mph)	Topographic effects[k]	Special wind region[l]	Windborne debris zone[m]		Weathering[a]	Frost line depth[b]	Termite[c]				
—	—	—	—	—	—	—	—	—	—	—	—	—

MANUAL J DESIGN CRITERIA[a]

Elevation	Altitude correction factor[a]	Coincident wet bulb	Indoor winter design dry-bulb temperature	Indoor winter design dry-bulb temperature	Outdoor winter design dry-bulb temperature	Heating temperature difference
—	—	—	—	—	—	—
Latitude	Daily range	Indoor summer design relative humidity	Indoor summer design relative humidity	Indoor summer design dry-bulb temperature	Outdoor summer design dry-bulb temperature	Cooling temperature difference
—	—	—	—	—	—	—

- Winter design temperature blow 60º F.
- Must be provided with heating facilities capable of marinating room temperature of not less than 68ºF at a point 3' above the floor and 2' from exterior wall in habitable rooms.
- One or more portable space heaters are prohibited.

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Minimum Room Areas R304

Space	Minimum Area	Minimum Horizontal Dimension
Habitable rooms	70 square feet	7 feet
Kitchen	N.A.	N.A.
Bedrooms	70 square feet	7 feet
Bathroom	N.A.	N.A.

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

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Habitable Rooms Minimum Ceiling Height R304.5 & R304.3

Space	Minimum Ceiling Height
Habitable rooms (e.g., living room, dining room, bedroom) habitable basements and hallways	Minimum 7 feet: For sloped ceilings: • Not more than 50 percent of required floor area may have a sloped ceiling less than 7 feet in height. • No portion of ceiling in required floor area can be less than 5 feet in height.
Bathrooms, toilet rooms, and laundry rooms	Minimum 6 feet 8 inches
Nonhabitable basement	• 6 feet 8 inches clear for ceilings. • 6 feet 4 inches clear for beam, girders, ducts or other obstructions.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

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Ceiling Height R305

- Generally 7 ft. 0 in.
- 6 ft. 8 in.:
  - Bathrooms
  - Toilet rooms
  - Laundry rooms
  - Basements w/o habitable space or hallways
- 6 ft. 4 in. basements:
  - Beams
  - Girders
  - Ducts
  - Other obstructions

Ceiling height

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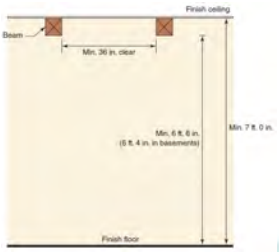
Ceiling Height R305.1 Exception 4

- Minimum ceiling height reduced to 6 ft. 6 in. under beams spaced at least 36 in. apart in habitable space.



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ICC SPRING INTERCHANGE

Practice Exercise 2
10 Minutes

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Practice Exercise 2

1. What is the ceiling height identified on the plans and where on the plans is that notation made?
2. Do the bathrooms have the proper ventilation?
3. For Bedroom-4 how what is the minimum required net free ventilation opening?

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Practice Exercise 2

1. What is the ceiling height identified on the plans and where on the plans is that notation made?
   The ceiling height in the basement is 8'-8 ½" and the remained of the home is at 9'-1". Information is listed on Page A-5.
2. Do the bathrooms have the proper ventilation?
   Bathrooms show exhaust fans. No indication of CFM size. Page A-1 addresses whole house mechanical ventilation and fan efficiencies without specifics.
3. For Bedroom-4 how what is the minimum required net free ventilation opening?
   Bedroom-4 is 11'-10" wide and 12'-0 ½" long for a total of 142.49 sf. 8% is 11.39 sf. Plans show (2) 3'x5' windows. Without knowing exact net fee opening each window would need to provide a minimum of 5.85 sf of open area. Most likely these windows will supply enough net free opening.

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- **Sub Task 5: Sanitation Review**

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Sub Task 5: Sanitation Review

1. Check dwelling unit for toilet facilities.
2. Check bathroom for adequate clearances.
3. Check kitchen area for sink.
4. Check fixtures for connection to sewage disposal system.
5. Check fixtures are connected to water supply system.
6. Check for non-absorbent wall surfaces.

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Clearance Inspection R307

Proper clearances

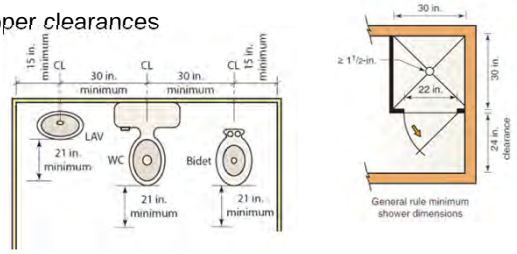

Figure R307.1 &P2705.1 Installation
Specific installation requirements for each fixture type listed in section.

R307.2 requires bathtubs and shower spaces with shower heads shall have nonabsorbent wall surfaces to not less than 6' AFF

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- **Sub Task 6: Glazing**

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Sub Task 6: Glazing

1. Safety Glazing Identification.
2. Louvered Windows and Jalousies.
3. Impact Tests.
4. Hazardous Locations.

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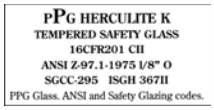
Safety Glazing Identification R308.1

Manufacturer's designation for each pane of glazing in hazardous location:

- Who applied the designation
- Type of glass
- Safety glazing standard
- 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.
- Labels are permitted



Exceptions:

- Certificate, affidavit or other evidence (not tempered)
- Tempered spandrel glass – Can be identified with removable paper

130

Safety Glazing Identification Multiple Panes R308.1.1

Multiple pane assemblies:

- Multi-pane assemblies having individual panes not exceeding 1 sf in exposed area shall have not less than one pane in the assembly identified.
- Other panes in the assembly shall be labeled "CPSC 16 CFR 1201" or "ANSI Z97.1" as appropriate.

131

Louvered Windows or Jalousies R308.2

- Regular, float, wired or patterned glass in jalousies and louvered windows:
  - Must be ≥ 3/16" thick nominal and
  - Not more than 48" in length
  - Exposed glass edges shall be smooth.
- Wired glass with wire exposed on longitudinal edges prohibited in jalousies or louvered windows.

132

Impact Test R308.3.1

- Glazing in hazardous locations as defined in R308.4.
- CPSC 16 CFR 1201
  - Glazing shall comply with the test criteria Category II unless otherwise indicated in R308.3.1 (1)
- Exception:
  - ANSI Z97.1
  - Unless the glazing is in doors or enclosu hot tubs, whirlpools, saunas, steam room bathtubs and showers
  - Glazing shall comply with the test criteria Class A unless indicated in Table R308.3

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Hazardous Locations R308.4

- The code identifies 7 locations as hazardous for purposes of glazing.
  - R308.4.1 Glazing in doors.
  - R308.4.2 Glazing adjacent to doors.
  - R308.4.3 Glazing in windows.
  - R308.4.4 Glazing in guards and railings.
  - R308.4.5 Glazing and wet surfaces.
  - R308.4.6 Glazing adjacent to stairs and ramps.
  - R308.4.7 Glazing adjacent to the bottom stair landing.

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Glazing in Doors R308.4.1

- Glazing in fixed or operable panels of swinging, sliding and bifold doors shall be considered to be a hazardous location.
- Exceptions:
  - Glazed openings where a 3-in.-diameter sphere cannot pass through
  - Decorative glazing

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Glazing Adjacent to Doors R308.4.2

- Glazing in an individual fixed or operable panel adjacent to a door where the bottom exposed edge of the glazing is less than 60" above the floor or walking surface and
  - Where the glazing is within 24" of either side of the door in the plane of the door in a closed position.
  - OR
  - Where the glazing is on a wall less than 180 degrees from the plane of the door in a closed position and within 24" of the hinge side of an in-swinging door.

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Glazing adjacent to doors R308.4.2 Exceptions

- Exceptions;
  - Decorative glazing.
  - Where there is an intervening wall or other permanent barrier between the door and the glazing.
  - Where access through the door is to a closet or storage area 3 feet or less in depth. Glazing in this application shall comply with Section R308.4.3.
  - Glazing that is adjacent to the fixed panel of patio doors.

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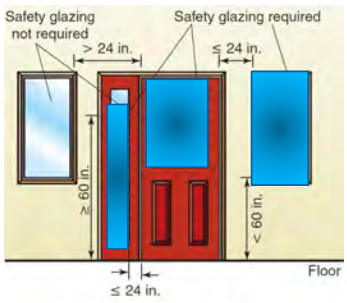
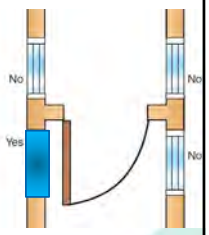
Safety Glazing – Adjacent Doors R308.4.2





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Glazing adjacent to doors R308.4.2

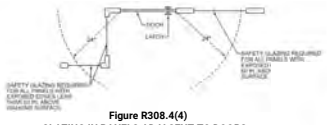


Figure R308.4(4)
GLAZING IN PANELS ADJACENT TO DOORS—PLAN (Section R308.4.2)

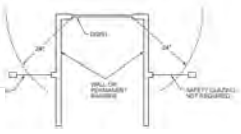


Figure R308.4(5)
BARRIER BETWEEN GLAZING AND DOOR
(Section R308.4.2, Exception 2)

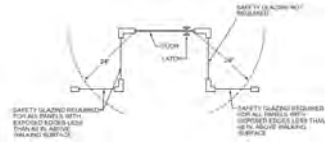


Figure R308.4(6)
GLAZING IN PANELS ADJACENT TO DOORS—PLAN (Section R308.4.2, Item 2)

139

Glazing in windows R308.4.3

- Glazing in an individual fixed or operable panel that meets all of the following conditions;
  - Exposed area of an individual pane > 9 sq. ft.
  - Bottom edge of glazing < 18 in. above floor
  - Top edge of glazing > 36 in. above floor
  - Walking surface within 36 in.

140

R308.4.3 Glazing in windows

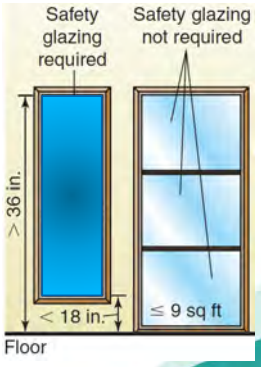
Exceptions:

- Decorative glazing
- Horizontal rail on accessible side 34” to 38” above walking surface.
  - Withstand horizontal load of 50 lb. per lin. ft. without contacting glass
  - Cross-sectional height not less than ≥ 1 ½ in. in height.
- Outboard panes ≥ 25 feet above any grade, roof, walking surface or other surface adjacent to the glass exterior

141

Safety Glazing – Windows R308.4.3

- Exposed area of an individual pane > 9 sq. ft.
- Bottom edge of glazing < 18 in. above floor
- Top edge of glazing > 36 in. above floor
  - Exception:
    - Horizontal rail installed 34 to 38 in. above walking surface



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Glazing in Guards R308.4.4

- Glazing in guards and railings, including structural baluster panels and nonstructural in-fill panels.
- Regardless of area or height above a walking surface.

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Glazing in guards and railings R308.4.4

- Always require safety glazing
- Footnote H of Table R301.5 requires a safety factor of 4
  - The safety factor is applied to concentrated loads at top of rail and to load on in-fill components.

USE	LIVE LOAD (psf)	
Guardrails and handrails	200	Single concentrated load applied in any direction along the top.
Guardrail in-fill components	50	Horizontally applied normal load of 50 lb. on area of 1 sq. ft.

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Glazing and Wet Surfaces R308.4.5

- Regulates glazing in walls adjacent to or enclosing:
  - Hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and swimming pools
- Safety glazing if both apply:
  - Glazing is less than 60 inches above any standing or walking surface
  - Glazing ≤ 60 inches horizontally from tub, shower, etc.

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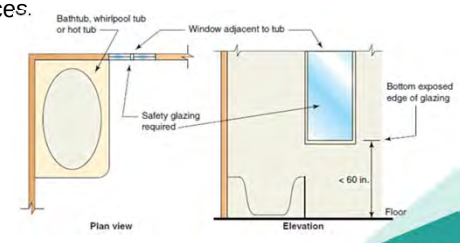
Glazing and Wet Surfaces R308.4.5

- Replaced the word "facing" with the words "adjacent to" for those elements related to wet surfaces.



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Adjacent to Stairs and Ramps R308.4.6

- Where the bottom exposed edge of the glazing is less than 36" above the plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps.

Exceptions:
- A rail installed across glazing
  - 34" to 38" above walking surface.
  - Capable of withstanding a horizontal load of 50 pounds per linear foot without contacting the glass and
  - Cross-sectional height ≥ 1 ½ inches
- Glazing ≥ 36 inches horizontally from the walking surface.

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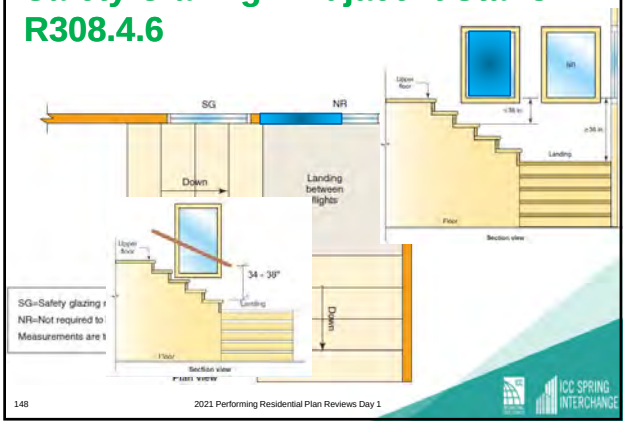
Safety Glazing – Adjacent Stairs R308.4.6



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Glazing adjacent to the bottom stair landing R308.4.7

- Hazardous location if:
  - Bottom edge of glazing < 36” inches above landing and within a 60” horizontal arc less than 180 degrees from bottom tread nosing
  - Exception for guard complying with Section R312 when glass is set back a min of 18” from guard.

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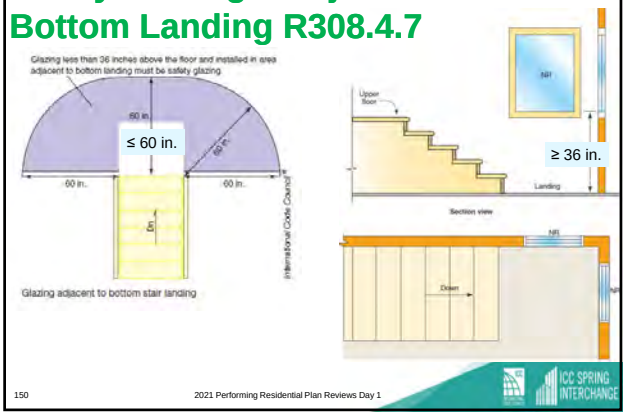
Safety Glazing – Adjacent Bottom Landing R308.4.7



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Under Stair Protection R302.7

- Protect underside of stairs and wall with ½ gypsum.
- Such spaces are accessed by a door or access panel.

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Ramps R311.8

- 2021 IRC provides new scoping.
- Ramps must comply where required by this code or are provided.
- Exception: Ramps not within or serving a building, porch or deck.
- Max 1:12 when serving required egress door unless technical infeasible 1:8.
- Max 1:8 all other ramps.

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- **Sub Task 7: Garage Review**

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Sub Task 7: Garage Review

1. Openings Into Dwelling Units
2. Garage Separation.

154

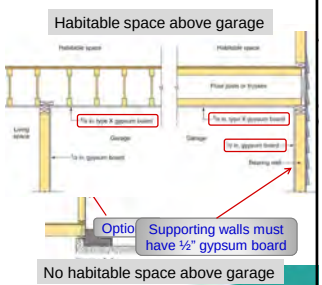
Garage Review R302.5, R302.6

1. Check for openings between garage and sleeping rooms.
2. Check for proper door opening protection, duct and other penetrations.
3. Check for separation between garage and living spaces.
4. Check floor material.
5. Check for floor slope and drains.
6. Check for carport requirements.
7. Check automatic garage door openers are in accordance with UL 325.

155

Dwelling Separation from Garage Table R302.6

- Not a fire-resistance-rated assembly
- ½" gypsum board on the garage side provides limited resistance to the spread of fire
- ⅝" Type X gypsum board on ceiling when habitable space above

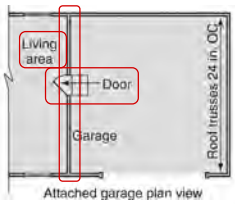


156

Dwelling Separation from Garage R302.5.1

- Penetrations not rated
- No openings from garage into a sleeping room
- Self-closing door
  - 1⅜"-thick solid-core wood
  - 1 ⅜"-thick solid-core steel
  - 1 ⅜"-thick honeycomb-core steel
  - 20-minute fire-resistance-rated

"Automatic closing", permitted in lieu of self- closing



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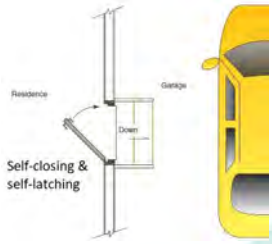
Dwelling-Garage Opening Protection R302.5

- Door between the garage and residence must be self-latching.



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Practice Exercise 3
10 Minutes

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Practice Exercise 3

1. Locate three hazardous glazing locations and identify if the glazing is complaint.

2. What type of garage protection has been provided.

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Practice Exercise 3

1. Locate three hazardous glazing locations and identify if the glazing is complaint.
   Location 1 – Each window next to the front door.
   Location 2 – Windows adjacent to the tub in the second-floor master bathroom.
   Location 3 – Shower door in the Second-floor master bathroom.

2. What type of garage protection has been provided.
   The garage ceiling is identified as 5/8" type x gypsum board.
   The interior door between the garage and the dwelling unit is not specifically identified. Need to also verify self closing requirement is met.

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ICC SPRING INTERCHANGE

- **Sub Task 8: Egress Review**

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Sub Task 8: Egress Review

1. Check sleeping rooms for means of emergency escape and rescue.
2. Check landings at egress doors.
3. Check for under stair protection.
4. Check hallway width.
5. Locate the required exit door.
6. Check the size and type of exit door.
7. Check straight stairways.
8. Check handrails.
9. Check stairway illumination.
10. Check any winder and circular stairways.
11. Check any spiral stairways.
12. Check ramps.
13. Check guards

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Egress Review Steps R311

1. Check sleeping rooms for means of emergency escape and rescue.
2. Check landings at egress doors.
3. Check for under stair protection.
4. Check hallway width.
5. Locate the required exit door.
6. Check the size and type of exit door.
7. Check straight stairways.
8. Check handrails.
9. Check stairway illumination.
10. Check any winder and circular stairways.
11. Check any spiral stairways.
12. Check ramps.
13. Check guards.

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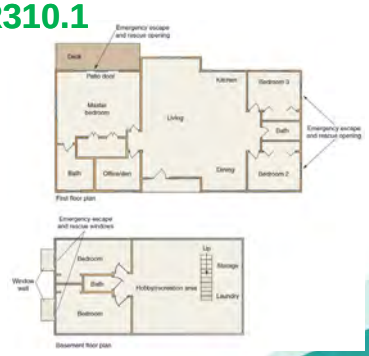
Emergency Escape and Rescue Openings R310.1

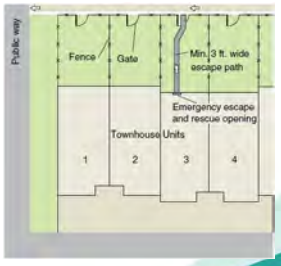
- Basements
- Habitable attics
- Sleeping rooms
  - Exceptions:
    - Storm shelters
    - Basements ≤ 200 sq. ft. used only to house mechanical equipment and if two ways out (dwelling w/ fire sprinklers).



165

Emergency Escape and Rescue Opening Required R310.1

- Emergency escape and rescue openings require a clear 36-inch-wide path to a public way.



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Emergency Escape and Rescue Openings R310.2.2

Minimum width = 20”
Minimum height = 24”
Minimum area = 5.7 ft²

Minimum area 5.0 ft² for grade floor or below grade openings

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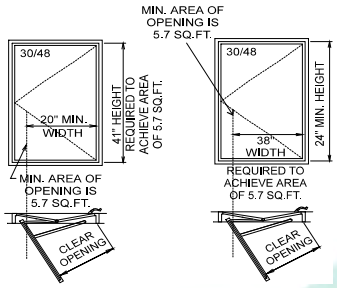
Emergency Escape and Rescue Openings R310.2.2

Casement Window



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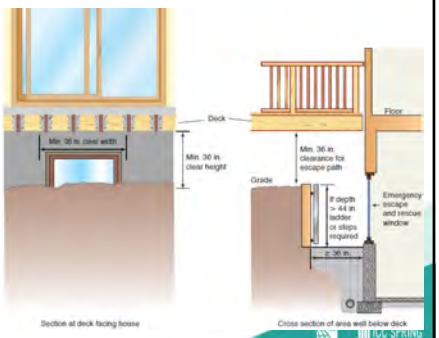
Emergency Escape and Rescue Openings (Continued) R310.2.4

- 36 in. height
- 36 in. width



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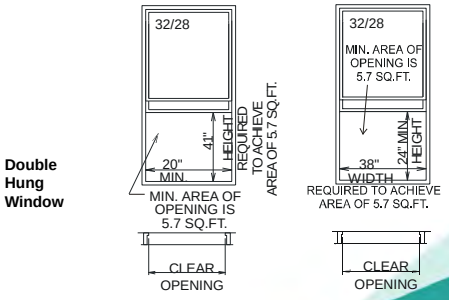
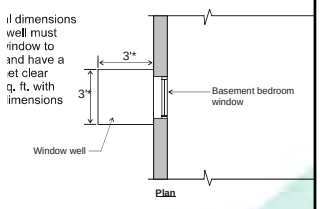
R310 Emergency Escape and Rescue Openings



170

Window Wells R310.4

Horizontal dimensions of window well must allow the window o open fully and have a minimum net clear area of 9 sf. with minimum dimensions of 3'-0".



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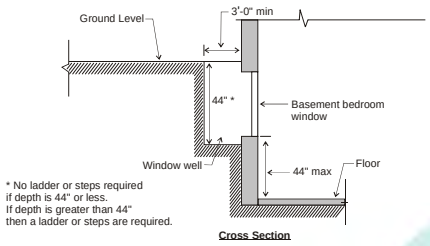
Window Wells R310.4



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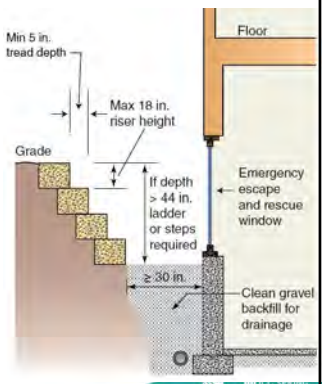
EERO Area Wells R310.3, R310.4

- Window wells and area wells merged into area wells.
- Dimensions are given for steps:
  - 5 in. tread
  - 18 in. rise
  - 12 in. width



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Window-Sill Height Window Fall Protection R312.2

- Window openings >72" above grade must have a sill height of >24"
- Alternatives to 24" sill height
  - Window opening control device
  - Window fall prevention device
  - Fixed glazing

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Means of Egress R311

- "Means of egress" describes the path of travel from any location in the dwelling to the exterior
  - Stairways
  - Ramps
  - Hallways
  - Doors
    - One nominal 3 - 0 × 6 - 8 side-swinging egress door to exterior, providing a minimum 32" x 78" clear opening
    - No size or type requirements for other doors
    - No limits on travel distance

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Means of Egress R311

- Designed to provide a safe path to exterior
  - Does not pass through a garage
  - ½" gypsum board on enclosures under stairs
  - Egress components securely anchored to the structure
  - Required egress door can be opened without a key or special knowledge
  - Access to grade at required egress door

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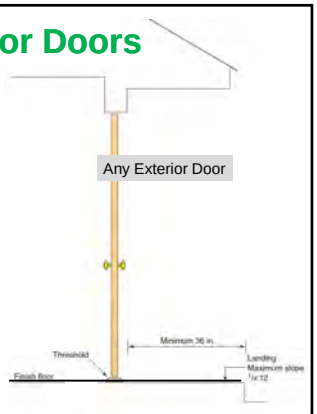
Landings at Exterior Doors R311.3

- Landing or floor on each side of exterior door
  - At least as wide as the door
  - ≥ 36 in. in the direction of travel
- Max. landing slope = ¼ /12
- No elevation requirements in Section R311.3
- Exception for balconies



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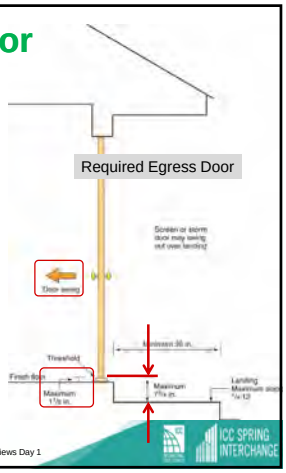
Landings at Exterior Doors R311.3.1

- Required egress door
- Landings or finished floors ≤ 1½ in. below top of threshold
- Exception
  - Door swings in
  - Exterior landing can be a maximum of 7¾ inches below top of the threshold
- Access to grade



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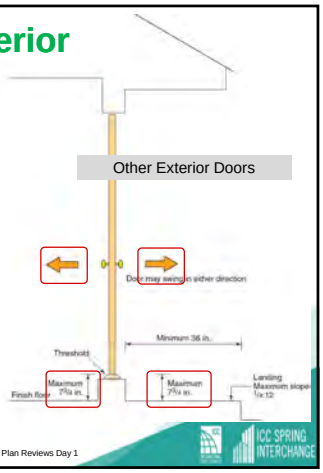
Landings at Exterior Doors R311.3.2

- Other than required egress door
- Landing on either side:
  - ≤ 7¾ in. below top of the threshold
- Door swings either direction.



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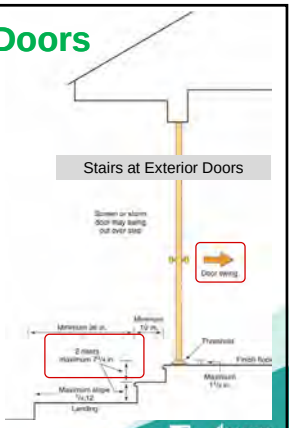
Stairs at Exterior Doors R31.3.2 Exception

- Door other than required egress door
- Exception
  - Stairs allowed on exterior side
    - Door cannot swing out over stairs
    - Stairs can have a maximum of 2 risers



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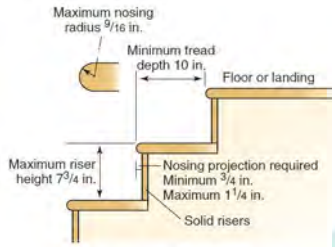
Stair treads and risers R311.7.5

- Riser ≤ 7¾ in.
- Tread ≥ 10 in.
- Variance ≤ ⅜ in.
- Nosing projection ¾ - 1¼ in.



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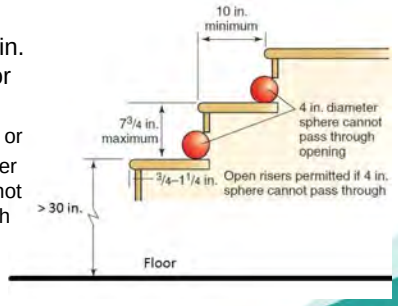
Stair Treads and Risers R311.7.5.1

- Treads > 30 in. above floor or grade
  - Solid risers, or
  - 4-in. diameter sphere cannot pass through



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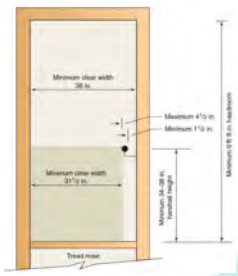
Stairway Width R311.7.1

- Minimum clear width of 36”
  - Required above the handrail; and
  - Below the required headroom height
  - ≤ 4½” handrail projection either side



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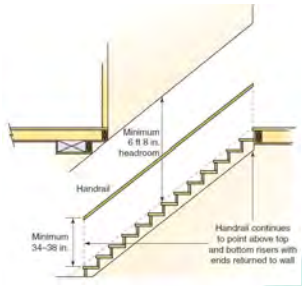
Stairway Headroom R311.7.2

- Minimum headroom
  - 6 ft. 8 in.
  - Above plane of tread nosings



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Winder Stairs R311.7.5.2.1

- Nonparallel edges
- Tread depth of 6” at the narrow end
- Tread depth of 10” measured at walk line

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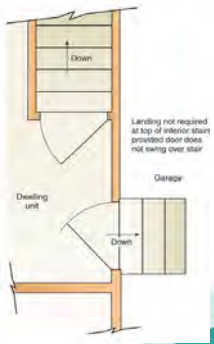
Stair Landings R311.7.6

- Required at top and bottom of stairs
- Width of stairway
- Minimum 36” in direction of travel
- Maximum 12’-7”” vertically between landings. R311.7.3
- Exception allows a door at the top of an interior flight of stairs, provided the door does not swing over the step



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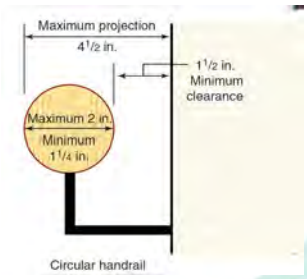
Handrails R311.7.8, R311.7.8.1 & R311.7.8.2

- Provided on one side on stairs with 4 or more raisers.
- Max. 4½-inch projection from wall
- Min. 1 ½-inch clearance to wall
- Graspable shape



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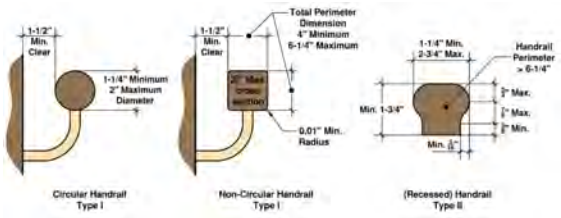
Handrails – Type I & Type II Section R311.7.8.5



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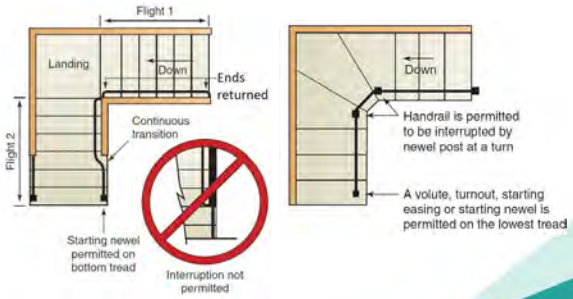
Handrail Continuity R311.7.8.1 $ R311.7.8.4



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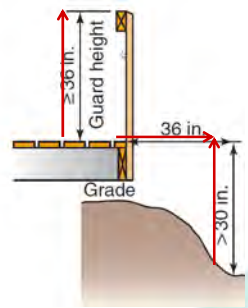
Guards R312.1

- A walking surface >30" above any point within 36" horizontally
- Min. guard height 36".
  - 34" at stairs



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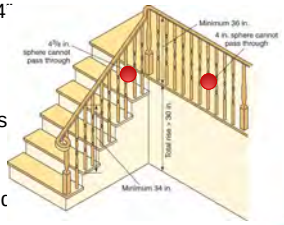
Guards R312.1.3

- Openings shall not allow a 4" sphere to pass through
  - 4 ⅜" along stairs
- Top rail to resist a single concentrated load of 200 lbs applied in any direction
- Infill components to resist 50-lb. horizontal load applied to an area of 1 ft²



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Practice Exercise 4
10 Minutes

192

Practice Exercise 4

1. Can compliance with EERO requirements be ascertained from the plans?

2. Is window fall protection required? If so, do the plans have sufficient information to demonstrate compliance?

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Practice Exercise 4

3. Are the stirs in compliance with egress provisions?

4. Are the handrails and guards in compliance with applicable provisions of Chapter 3?

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Practice Exercise 4

1. Can compliance with EERO requirements be ascertained from the plans?

   Cover sheet indicates windows are Andersen 400 series with note builder to verify egress requirements.
   Need to provide specific locations of all EERO's along with manufacturers specifications to verify EERO requirements are met.
   Basement has door and stairs that lead to outside. Windows are shown but not on elevations. Window wells are also not provided.

2. Is window fall protection required? If so, do the plans have sufficient information to demonstrate compliance?

   Cover sheet has note regarding window fall protection requirements. Plans do not indicate locates where compliance must be met. Side and rear elevation windows most likely will have to comply.

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Practice Exercise 4

3. Are the stirs in compliance with egress provisions?

   No specific stair requirements have been identified. Plans must indicate all riser, tread, handrail, headroom and guard requirements. Plans also need to provide how elevation change from front porch to grade is achieved.

4. Are the handrails and guards in compliance with applicable provisions of Chapter 3?

   No specific details have been provided. Plans need to provide detail.

196

ICC SPRING INTERCHANGE

- **Sub Task 9: Automatic Sprinkler Review**

197

Sub Task 9: Automatic Sprinkler Review

1. Verify System Design
2. Identify System Layout

198

Automatic Sprinkler Systems R313

Section R313.1
Required in all new townhouses per P2904 or NFPA 13D.

Section R313.2
Required in all new one and two family dwelling units per P2904 or NFPA 13D.

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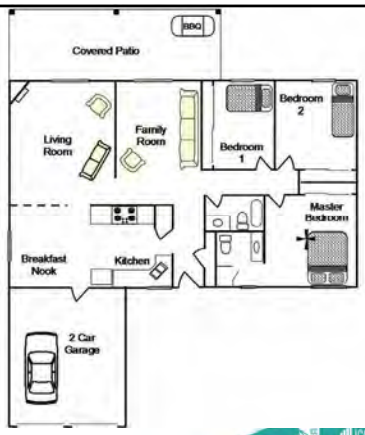
Sample Floor Plan Layout



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Room Information

Room Dimensions of Floor Plan

Room or Area	Dimensions (feet)	Area (square feet)
Living Room	15 × 21	315
Family Room	15 × 21	315
Master Bedroom	15 × 17	255
Master Bath	7 × 10	70
Master Closet	2 × 9	18
Bedroom 1	10 × 14	140
Bedroom 1 Closet	2 × 11	22
Bedroom 2	13 × 14	182
Bedroom 2 Closet	2 × 9	18
Bath	9 × 6	54
Kitchen	13 × 14	182
Kitchen Pantry	3 × 4	12
Entry	5 × 14	70
Entry Closet	2 × 10	20
Hall	3 × 14	42
Breakfast Nook	13 × 14	182
Covered Patio	34 × 10	340
Garage	20 × 21	420

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Where is Protraction Required P2904.1.1

1. Which rooms need fire sprinkler protection?

	Yes	No		Yes	No
Family Room	X		Kitchen	X	
Breakfast Nook	X		Bedroom 1	X	
Master Bedroom	X		Bedroom 2	X	
Entry	X		Bath 1		X
Kitchen Pantry		X	Master Bath	X	
Living Room	X		Entry Closet		X
Bedroom Closets		X	Garage		X
Covered Patio		X			

202

Manufacturer Data Sheet

August 13, 2009 Sprinkler 147e

VIKING TECHNICAL DATA — FREEDOM® RESIDENTIAL CONCEALED PENDENT SPRINKLER VK456 (K4.9)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com

1. **DESCRIPTION**
Viking Freedom® Residential Concealed Pendent Sprinkler VK456 is a small high-sensitivity solder link and lever residential sprinkler designed for installation on concealed pipe systems where the appearance of a smooth ceiling is desired. The orifice design, with a K-Factor of 4.9 (70.6 metric*), allows the sprinkler's efficient use of available water supplies for the hydraulically designed fire-protection system. The fast response operating element and special deflector combine speed of operation and areas of coverage to meet residential sprinkler standards.
The sprinkler is pre-assembled with a threaded adapter for installation with a low-profile small-diameter cover assembly installed flush to the ceiling. The two-piece design allows installation and testing of the sprinkler prior to installation of the cover plate. The "push-on", "thread-off" design of the concealed cover plate assembly allows easy installation of the cover plate after the system has been tested and the ceiling finish has been applied, while also providing up to ½" (12.7 mm) of vertical adjustment. The cover assembly can be removed and reinstalled, allowing temporary removal of ceiling panels without taking the sprinkler system out of service or removing the sprinkler.

2. **LISTINGS AND APPROVALS**
cULus Listed: Category VKKW
NYC Approved: MEA 89-92-E, Volume 36
NSF Certified: NSF/ANSI Standard 61, Drinking Water System Components
Refer to the Approval Chart on page 147g and Design Criteria on page 147h for cULus Listing requirements that must be followed.

203

Manufacturer Data Sheet

Approval Chart
Residential Concealed Pendent Sprinkler VK456
For systems designed to NFPA 13D or NFPA 13R.
For systems designed to NFPA 13, refer to the design criteria on page 147h.

Sprinkler Base Part Number[1]	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure
		Inches	mm	U.S.	metric[2]	
13620A	VK456	1/2	15	4.9	70.6	175 psi (12 bar)

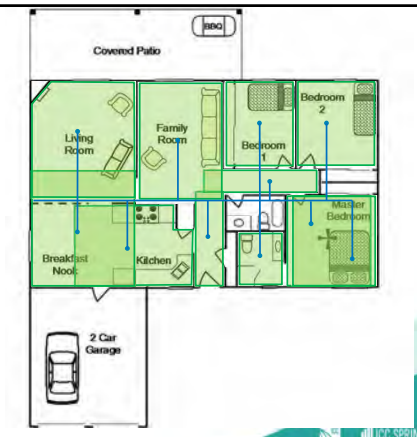
Maximum Areas of Coverage[3]	Minimum Water Supply Requirements[3]	Listings and Approvals[4] (Refer also to Design Criteria on page 147h.)		
		cULus[5]	NYC[6]	NSF[7]
Installed below smooth, flat, horizontal ceilings, including ceilings with slopes up to and including 2/12 (9.5°).				
13 ft. x 13 ft. (3.7 m x 3.7 m)	13 gpm @ 7.0 psi (49.1 L/min. @ 0.48 bar)	AX1	AX1	AX1
14 ft. x 14 ft. (4.3 m x 4.3 m)	13 gpm @ 7.0 psi (49.2 L/min @ 0.48 bar)	AX1	AX1	AX1
16 ft. x 16 ft. (4.9 m x 4.9 m)	17 gpm @ 12.0 psi (64.4 L/min @ 0.83 bar)	AX1	AX1	AX1
18 ft. x 18 ft. (5.5 m x 5.5 m)	17 gpm @ 12.0 psi (64.4 L/min @ 0.83 bar)	AX1	AX1	AX1
20 ft. x 20 ft. (6.1 m x 6.1 m)	23 gpm @ 22.0 psi (87.1 L/min @ 1.52 bar)	AX1	AX1	AX1
Installed below ceilings with sloped up to and including a 8/12 (33.7°) pitch. Refer to Figure 5 on page 147j.				
		UL	NYC	NSF[7]
16 ft. x 16 ft. (4.9 m x 4.9 m)	17 gpm @ 12.0 psi (64.4 L/min @ 0.83 bar)	AX1	–	AX1
20 ft. x 20 ft. (6.1 m x 6.1 m)	36 gpm @ 28.2 psi (98.4 L/min @ 1.94 bar)	AX1	–	AX1

Sprinkler Temperature Ratings: A - 140 °F (60 °C)
Cover Temperature Rating: X - 135 °F (57 °C) 13750°, 14934° (large diameter), or 15394° (square cover plate)
Cover Plate Finishes: 1 - Polished Chrome, Painted White, Painted Ivory, and Painted Black[8]

Footnotes
[1] Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
[2] Metric K-factor measurement shown is when pressure is measured in kPa; divide the metric K-factor shown by 10.0.
[3] This chart shows the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals.
[4] Listed by Underwriter's Laboratories for use in the U.S. and Canada.
[5] Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 36.
[6] Tested and Certified by NSF (National Sanitation Foundation) to NSF/ANSI Standard 61, Drinking Water System Components.
[7] For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the "Minimum Water Supply Requirement" used.
[8] Areas under sloped ceilings must be measured along the ceiling slope. Actual floor coverage in the horizontal plane under sloped ceilings will be less than the listed area of coverage.
[9] Other paint colors are available on request with the same listings as the standard finish colors. Listings and approvals apply for any paint manufacturer. Contact Viking for additional information. Custom colors are indicated on a label inside the cover assembly. Refer to Figure 3.

204

System Layout



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ICC SPRING INTERCHANGE

- **Sub Task 10: Smoke Alarm and Carbon Monoxide Alarm Review**

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Sub Task 10: Smoke Alarm and Carbon Monoxide Alarm Review

1. Check for smoke alarm in each sleeping room.
2. Check for smoke and carbon monoxide alarms outside of and in vicinity of sleeping rooms.
3. Check for smoke alarms on each floor.
4. Check for smoke alarm near bathroom doors.
5. Check for smoke alarms in split level drawings.
6. Check for smoke alarms near cooking appliances
7. Check for interconnection and installation.
8. Check power source.
9. Check for smoke alarms throughout dwelling, if addition or alteration.

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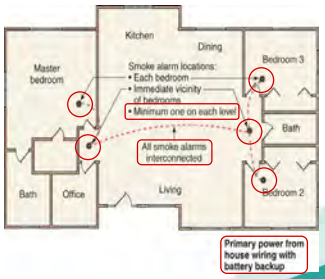
Smoke Alarms R314

- In each sleeping room
- Outside each sleeping area
- On each story
- Building wiring system to provide primary power
- Battery backup
- Interconnection



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Carbon Monoxide (CO) Alarms R315

- Required if
  - Fuel-fired appliance or
  - Attached garage communicating with dwelling unit
- Locations
  - Outside of each separate sleeping area adjacent bedrooms
  - Within bedroom with fuel-burning appliance located within bedroom or attached bathroom
- Power
  - House wiring with battery backup

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Smoke Alarms in Existing Dwellings R314.2.2

- Retrofit smoke alarms when a permit is required:
  - Interior alterations or repairs
  - Additions
- Battery-operated smoke alarms
- Exception – provisions do not apply for:
  - Minor work that does not require a permit
  - Exterior work such as roofing or siding
  - Replacing doors or windows
  - Addition of a deck or porch
  - Installation , alteration or repairs of plumbing.

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Carbon Monoxide Alarms Existing Dwellings R315.2.2

- Retrofit Carbon Monoxide alarms when a permit is required:
  - Interior alterations or repairs
  - Additions
- Battery-operated smoke alarms
- Exception – provisions do not apply for:
  - Minor work that does not require a permit
  - Exterior work such as roofing or siding
  - Replacing doors or windows
  - Addition of a deck or porch
  - Installation , alteration or repairs of plumbing.
  - Installation, alteration or repairs of ,mechanical systems that are not fuel fired.,

211

Practice Exercise 5
10 Minutes

212

Practice Exercise 5

1. Are smoke alarms required for this dwelling?
2. Are carbon monoxide alarms required? If so why?
3. Identify the locations of smoke and CO alarms and assess if these are located per the 2021 IRC.

213

Practice Exercise 5

4. Review smoke alarm and carbon monoxide alarm details from plans and identify and deficiencies.

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Practice Exercise 5

1. Are smoke alarms required for this dwelling?
   Yes
2. Are carbon monoxide alarms required? If so why?
   Yes CO alarms are required. The project has an attached garage.
3. Identify the locations of smoke and CO alarms and assess if these are located per the 2021 IRC.
   Smoke and CO alarms are identified on the second floor only.
   The second floor has smoke and CO alarm locations per code.

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Practice Exercise 5

4. Review smoke alarm and carbon monoxide alarm details from plans and identify and deficiencies.
   Smoke and Carbon monoxide alarms do not indicate where they receive primary power
   Smoke alarms do not indicate interconnection.
   Smoke alarms and not indicated in the basement.

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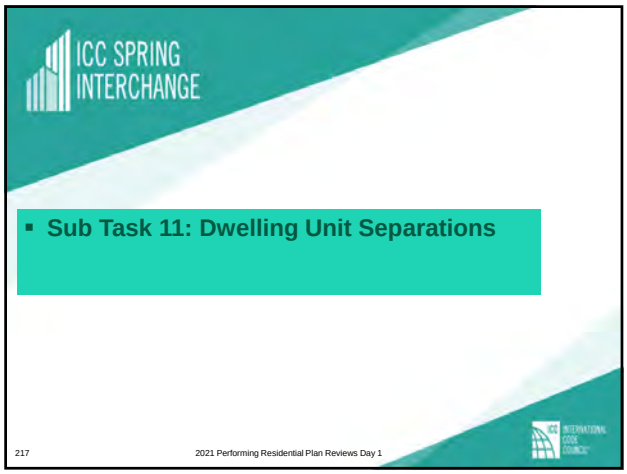
ICC SPRING INTERCHANGE
Sub Task 11: Dwelling Unit Separations
217
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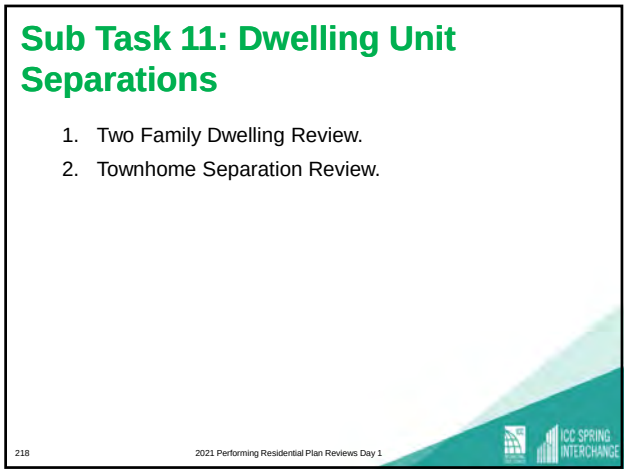
217


Sub Task 11: Dwelling Unit Separations
1. Two Family Dwelling Review.
2. Townhome Separation Review.
218
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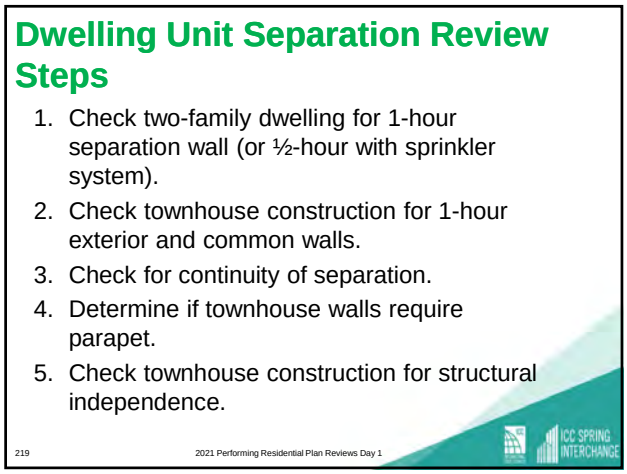
Dwelling Unit Separation Review Steps
1. Check two-family dwelling for 1-hour separation wall (or ½-hour with sprinkler system).
2. Check townhouse construction for 1-hour exterior and common walls.
3. Check for continuity of separation.
4. Determine if townhouse walls require parapet.
5. Check townhouse construction for structural independence.
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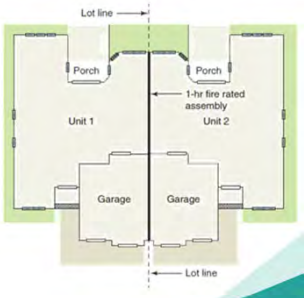
219

R302.3 Two-Family Dwelling Separation

- 1-hour separation whether or not a lot line exists between units



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R302.3 Two-family Dwellings

- Exceptions for wall separation:
  1. A 1/2 hour fire-resistance rating is permitted with P2904 sprinkler system
  2. Wall assemblies need not extend through attic spaces where:
     - Ceiling is protected by not less than 5/8-inch Type X gypsum board
     - Attic draft stop is provided above and along the wall assembly separating the dwellings
     - Structural framing supporting the ceiling is protected by not less than 1/2-inch gypsum board or equivalent.

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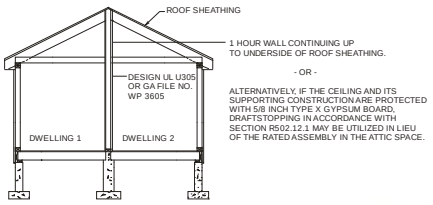
R302.3 Two-family Dwelling Separation



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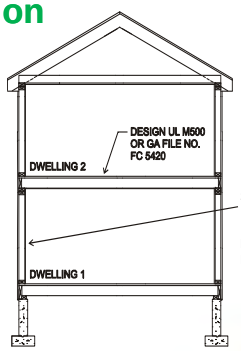
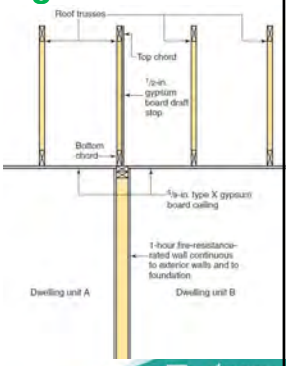
R302.3 Two-family Dwelling Separation



223

Two-Family Dwelling Separation

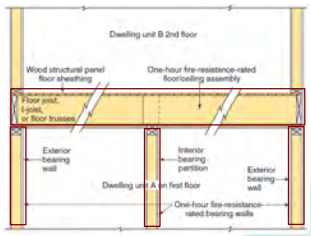
- 1-hour separation
  - Continuous foundation to roof
- Exception
  - ⅝-inch gypsum board ceiling
  - ½-inch gypsum board on bearing walls
  - Draft stop in attic



224

Two-family Dwellings R302.3

- Floor/ceiling separation:
  - One-hour fire-resistance rating
  - Extend to and be tight against the exterior wall
  - Supporting construction of equal or greater fire-resistance rating



225

Two Family Dwelling

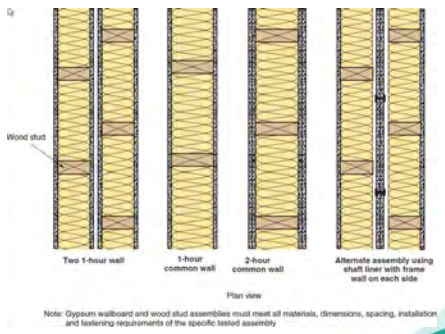
226

Townhouse Separation Methods

- Section R302 provides two methods for providing dwelling unit protection in townhouses.
  - Double Wall Method.
    - Dwelling units must be separated by two 1 hour rated walls.
    - Each wall must be tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the 2021 IBC
  - Common Wall Method.
    - With sprinkler 1 hour tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the 2021 IBC.
    - Without sprinkler 2 hours tested in accordance with ASTM E119, UL 263 or Section 703.2.2 of the 2021 IBC

227

Townhouse Separation



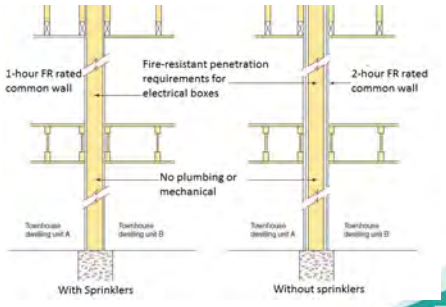
228

Common Wall Townhouse Separation R302.2.2

- The common wall separating townhouses;
  - Must be rated for fire exposed on both sides.
  - Shall extend to and be tight against exterior sheathing, or the inside face of exterior walls without stud cavities.
  - From the foundation to the underside of the roof sheathing.
  - May not contain plumbing or mechanical equipment ducts or vents other than water filled sprinkler piping.
  - Limited electoral installations allowed based upon the penetration provisions of Section R302.4

229

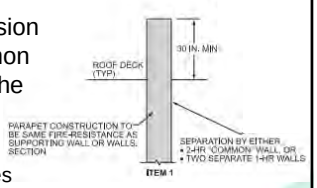
Townhouse Separation Common Wall Method R302.2.2



230

Parapets for Townhouses R302.2.4

- Shall be constructed for townhouses as an extension of exterior walls or common wall in accordance with the following;
  1. Extend a min of 30 inches above the roof surfaces where the roof surfaces adjacent to the wall or walls are at the same elevation.

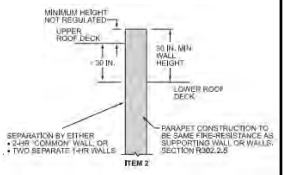


231

Parapets for Townhouses R302.2.4

2. Where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is not more than 30 inches (762 mm) above the lower roof, the parapet shall extend not less than 30 inches (762 mm) above the lower roof surface.

   - Exception: A parapet is not required in the preceding two cases where the roof covering complies with a minimum Class C rating and the roof decking or sheathing is of noncombustible materials or fire-retardant-treated wood for a distance of 4 feet of the wall or walls.



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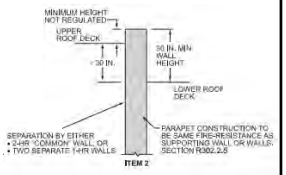
Parapets for Townhouses R302.2.4

- A layer of 5/8-inch Type X gypsum board may also be installed directly beneath the roof decking or sheathing, supported by not less than nominal 2-inch ledgers attached to the sides of the roof framing members, for a distance of not less than 4 feet on each side of the wall or walls and any openings or penetrations in the roof are not within 4 feet of the common walls. Fire-retardant-treated wood shall meet the requirements of Sections R802.1.5 and R803.2.1.2.



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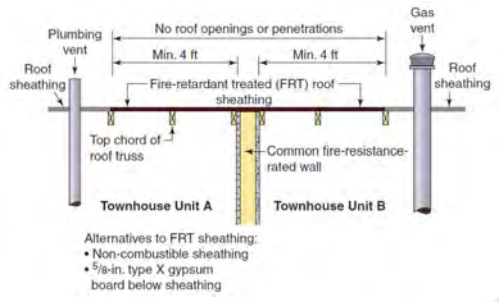
Parapet Exception



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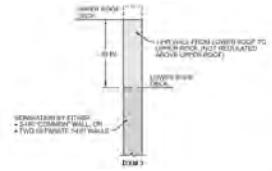
Parapets for Townhouses R302.2.4

3. A parapet is not required where roof surfaces adjacent to the wall or walls are at different elevations and the higher roof is more than 30 inches above the lower roof.

   The common wall construction from the lower roof to the underside of the higher roof deck shall have not less than a 1-hour fire-resistance rating. The wall shall be rated for exposure from both sides.



235

235

Parapets Construction R302.2.5

Parapets shall have the same fire-resistance rating as that required for the supporting wall or walls.

On any side adjacent to a roof surface, the parapet shall have noncombustible faces for the uppermost 18 inches, to include counterflashing and coping materials.

Where the roof slopes toward a parapet at slopes greater than 2 units vertical in 12 units horizontal, the parapet shall extend to the same height as any portion of the roof within a distance of 3 feet, and the height shall be not less than 30 inches.

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Structural Independence R302.2.6

Each townhouse shall be structurally independent except for the following;

1. Foundations supporting exterior walls or common walls.
2. Structural roof and wall sheathing from each unit fastened to the common wall framing.
3. Nonstructural wall and roof coverings.
4. Flashing at termination of roof covering over common wall.
5. Townhouses separated by a common wall as provided in Section R302.2.2, Item 1 or 2.

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ICC SPRING INTERCHANGE

- **Sub Task 12: Fire Protection of Floors and Draftstopping**

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Sub Task 12: Fire Protection of Floors and Draft stopping

1. Review Fire Protection for Floor
2. Review Draft stopping

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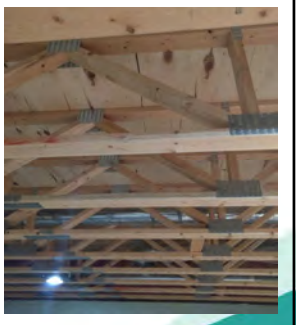
Fire Protection of Floors Review R302.13

1. Check that all non-rated floor/ceiling assemblies are provided with a ½" thick gypsum board ceiling or equal.
2. Check that all penetrations or openings for air or exhaust ducts, mechanical and plumbing vents, electrical outlets, lighting, wiring, etc. are properly sealed and protected to maintain the ceiling integrity.
3. Check whether the Exceptions of Section R302.13 apply.



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Draftstopping R302.12

Item	Requirement
Materials	▪Minimum 1/2-inch gypsum board. ▪Minimum 3/8-inch wood structural panel. ▪Minimum 3/8-inch Type 2-M-W particleboard.
Located in floor/ceiling assemblies when:	▪Ceiling is suspended under floor framing. ▪Floor framing is constructed of truss-type open-web or perforated members.
Installation	▪Divides concealed floor/ceiling space into approximately equal areas. ▪No area is greater than 1,000 square feet. ▪Parallel to floor framing members.

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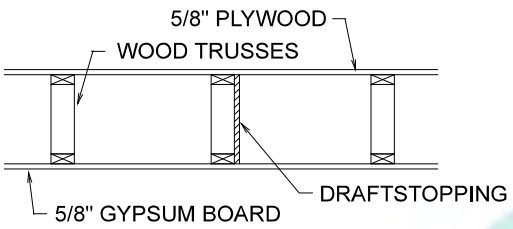
Draftstopping in Floor Trusses R302.12



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ICC SPRING INTERCHANGE

- **Sub Task 13: Moisture, Decay and Termite Protection Review**

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Sub Task 13: Moisture, Decay and Termite Protection Review

1. Review Termite Protection
2. Wood Treatment Naturally Durable Wood
3. Protection against Decay

244

Subterranean termite control methods R318.1

In areas subject to damage from termites as indicated by Table R301.2, protection shall be by one, or a combination, of the following methods:

1. Chemical termiticide treatment in accordance with Section R318.2.
2. Termite-baiting system installed and maintained in accordance with the label.
3. Pressure-preservative-treated wood in accordance with the provisions of Section R317.1.
4. Naturally durable termite-resistant wood.
5. Physical barriers in accordance with Section R318.3 and used in locations as specified in Section R317.1.
6. Cold-formed steel framing in accordance with Sections R505.2.1 and R603.2.1.

245

Moisture, Decay and Termite Protection Review Steps

1. Determine if minimum clearances are provided or if naturally durable or treated wood is used.
2. Check submerged or embedded posts, poles or columns for ground contact use and protected by impervious moisture barrier.
3. Determine if termite protection is required.
4. Check for naturally durable or treated wood where the local jurisdiction has indicated so in Table R302.2(1).

246

Wood Treatment R317.1

- Wood in locations subject to decay requires
  - Treatment with preservatives or
  - Naturally durable wood
    - Redwood
    - Cedar
    - Black locust
    - Black walnut
- R317.1.1 Requires treatment of all field cuts in accordance with AWPA M4

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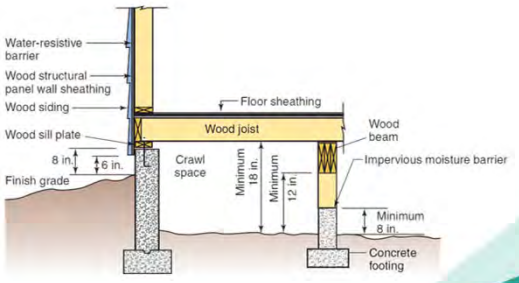
Protection Against Decay R317.1



§R317

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Practice Exercise 6
10 Minutes

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Practice Exercise 6

1. Identify a minimum of two locations where wood may be subject to decay?

2. What type of method was used to protect wood from decay.

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Practice Exercise 6

3. Is draftstopping required ion the floor systems? Is it required?.

4. Are the floors required to be fire protected? Why?

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Practice Exercise 6

1. Identify a minimum of two locations where wood may be subject to decay?

Page A-5, Cross Section.
Wood sill plates
Wood sheathing

2. What type of method was used to protect wood from decay.

Page A-5, Section A shows wood sill to be ACQ treated.
No indication of sheathing separation from grade. Sheathing is indicated as ½" CDX.

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Practice Exercise 6

3. Is draftstopping required ion the floor systems? Is it required?.

Draftstopping is not shown in the plans. Draftstopping is not required since the floor system is 2x10 dimensional lumber and no drop ceiling are provided

4. Are the floors required to be fire protected? Why?

The floors are not required to be fire protected since the dwelling is equipped with an automatic sprinkler system.

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ICC SPRING INTERCHANGE

- **Sub Task 14: Exterior Deck Review**

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Sub Task 14: Exterior Deck Review

1. General Provision Review
2. Deck Footing Review
3. Deck Post Review
4. Deck Post Beam and Joist Review
5. Deck Attachment Review

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Deck Loads R507.1

- Deck designs now based on live or ground snow loads.
  - 40 psf live or snow
  - 50, 60, or 70 psf snow
  - Tables for beams, joists, and ledger connections all modified to accommodate snow loading

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Landings, Deck, Balcony and Stria Construction R311.5

- Where applicable, decks shall be positively anchored to the primary structure to resist both vertical and lateral loads.
- Such attachment shall not be accomplished by the use of toenails or nails subject to withdrawal.

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Deck Footings R507.3

- Decks must be supported on concrete footing or other approved systems and designed to accommodate all loads

Exceptions

- Freestanding decks consisting of joist directly supported on grade over the entire length
- For freestanding decks where the joists bear directly on precast concrete pier blocks at grade without support by beams or posts, the deck does not exceed 200 sf and the walking surface is not more than 20" above grade at any point within 36" measured horizontally from the edge

- R507.3.3 - When attached to frost protected structure footings shall be protected from frost by extending below the local frost line, erecting on solid rock, or other approved method

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Minimum Deck Footing Sizes Table R507.3.1

Deck footing size shall be based upon Table R507.3.1
Excerpt of table provided. Expanded to proved for higher live loading.

LIVE OR GROUND SNOW LOAD (psf)	TRIBUTARY AREA (ft^2)	SOIL BEARING CAPACITY 1500 psf		
		Side of a square footing (inches)	Diameter of a round footing (inches)	Thickness (inches)
40	5	7	8	6
	20	10	12	6
	40	14	16	6
50	5	7	8	6
	20	11	13	6
	40	15	17	6
60	5	7	8	6
	20	12	14	6
70	5	7	8	6
	20	12	14	6

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Deck Post Height Table Excerpt Table R507.4

Loads (psf)	Post Species	Post Size	Tributary Area (ft^2) 40	80	120	160
			Maximum Deck Post Height (feet-inches)			
50 Ground Snow Load	Southern Pine	4 x 4	12-2	8-5	6-7	5-4
		4 x 6	14-0	10-9	8-7	7-3
		6 x 6	14-0	14-0	14-0	13-4
		8 x 8	14-0	14-0	14-0	14-0
	Douglas Fir, Hem-fir, SPF	4 x 4	12-1	8-2	6-2	4-2
		4 x 6	14-0	10-7	8-4	6-11
		6 x 6	14-0	14-0	14-0	12-10
		8 x 8	14-0	14-0	14-0	14-0
	Redwood, W. Cedars, Pond. Pine, Red Pine	4 x 4	11-8	6-10	NP	NP
		4 x 6	14-0	10-0	7-0	NP
		6 x 6	14-0	14-0	14-0	2-4
		8 x 8	14-0	14-0	14-0	14-0

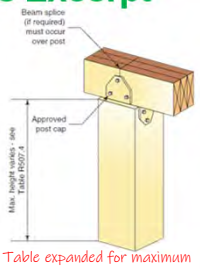

Table expanded for maximum post height
Tributary area supported
Wood species
Ground snow loads

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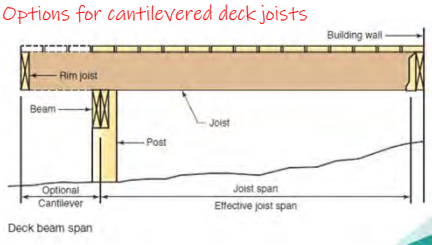
Deck Beams R507.5

- Multiple tables providing spans for
  - Given deck live or snow loads
  - Single and multi-ply spans
  - Options for cantilevered deck joists



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Maximum Deck Beam Spans R507.4

50 psf Ground Snow Load

Beam Species	Beam Size	Effective Deck Joist Span Length (ft)			
		6	10	14	18
		Maximum Beam Span (feet-inches)			
Southern Pine	1-2x6	4-6	3-6	2-11	2-7
	1-2x8	5-9	4-5	3-9	3-3
	1-2x10	6-9	5-3	4-5	3-11
	1-2x12	8-0	6-2	5-3	4-7
	2-2x6	6-8	5-2	4-4	3-10
	2-2x8	8-6	6-7	5-7	4-11
	2-2x10	10-1	7-10	6-7	5-10
	2-2x12	11-11	9-2	7-9	6-10
	3-2x6	7-11	6-6	5-6	4-10
	3-2x8	10-5	8-3	6-11	6-2
	3-2x10	12-8	9-9	8-3	7-3
	3-2x12	14-11	11-6	9-9	8-7

262

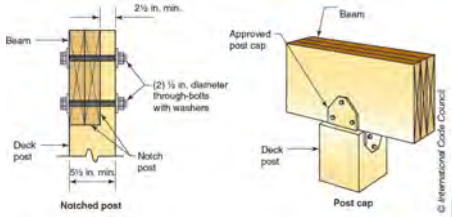
Deck Beam Fastening R507.5

- Deck beam plies shall be fastened together with two rows of 10 D nails at 16 inches on center along each edge beam.
- Shall be permitted to cantilever at each end up to ¼ of the actual beam span.
- Deck beams of other materials shall be permitted were designed in accordance with accepted engineering practices.
- The ends of beams shall not have less than one in 1 ½" of bearing on wood or metal and not less than 3" of bearing on concrete or masonry for the entire width of the beam.
- Where multiple a beam spans on intermittent posts each ply of the beam must have full bearing on post.

263

Deck Joists and Beams R507.5.2

- Prescriptive methods for joists and beams in deck construction.
  - Spans & bearing requirements



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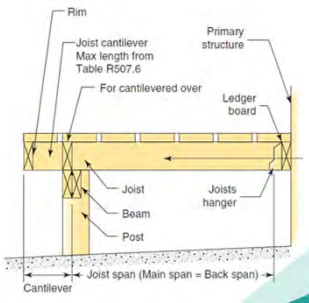
Deck Joists Section R507.6

- Deck joist options are added for decks with large ground snow loads
- Cantilever spans are now specifically based on maximum joist spans



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Maximum Deck Joist Spans R507.6

Load[a] (psf)	Joist Species[b]	Joist Size	Allowable Joist Span (feet-inches) Joist Spacing (inches) 12	16	24	Maximum Cantilever (feet-inches) Joist Back Span (feet) 4	8	12	16
40 Live Load	Southern Pine	2x6	9-11	9-0	7-7	1-0	1-5	NP	NP
		2x8	13-1	11-10	9-8	1-0	2-0	2-3	NP
		2x10	16-2	14-0	11-5	1-0	2-0	3-0	3-4
		2x12	18-0	16-6	13-6	1-0	2-0	3-0	4-0
	Douglas Fir, Hem-fir, Spruce-Pine-Fir	2x6	9-6	8-4	6-10	1-0	1-4	NP	NP
		2x8	12-6	11-1	9-1	1-0	2-0	2-0	NP
		2x10	15-8	13-7	11-1	1-0	2-0	3-0	NP
		2x12	18-0	15-9	12-10	1-0	2-0	3-0	3-11
	Redwood, W. Cedars, Pond. Pine, Red Pine	2x6	8-10	8-0	6-10	1-0	1-1	NP	NP
		2x8	11-8	10-7	8-8	1-0	2-0	NP	NP
		2x10	14-11	13-0	10-7	1-0	2-0	3-0	NP
		2x12	17-5	15-1	12-4	1-0	2-0	3-0	3-8

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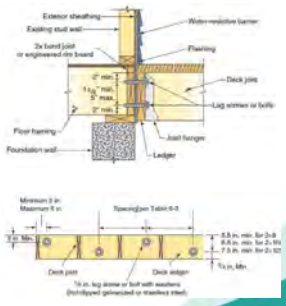
Deck Attachment R507.9

- Deck ledger connection to:
  - 2" band joist; or
  - 1 x 9½ Douglas Fir LVL rim board
- Fasteners
  - ≥½" diameter lag screws or bolts with washers
  - Hot-dipped galvanized or stainless steel
  - Lag screws full-depth through rim joist
  - Fasteners staggered along length of ledger



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Deck Attachment R507.9

- Table R507.9.1.3(1) Revised to include additional snow loads

TABLE R507.9.1.3(1)
DECK LEDGER CONNECTION TO BAND JOIST

LOAD[a] (psf)	JOIST SPAN[a] (feet)	ON-CENTER SPACING OF FASTENERS[b] (inches)		
		½-inch diameter lag screw with ½-inch maximum sheathing[c,e]	½-inch diameter bolt with ½-inch maximum sheathing[c]	½-inch diameter bolt with ¾-inch maximum sheathing[c]
40 live load	6	30	36	36
	8	23	36	36
	10	18	34	29
	12	15	29	24
	14	13	24	21
	16	11	21	18
	18	10	19	16
50 ground snow load	6	29	36	36
	8	22	36	35
	10	17	33	28
	12	14	27	23
	14	12	23	20
	16	11	20	17
	18	9	18	15

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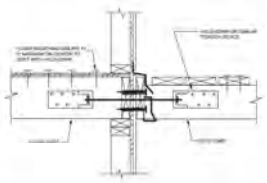
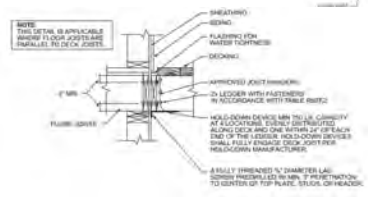
Lateral Connections R507.9.2

- Prescriptive Methods provide in code.
- Alternatively can be designed by structural engineer.





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ICC SPRING INTERCHANGE

- **Sub Task 15: Solar Roof System Review**

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Sub Task 15: Solar Roof System Review

1. General Provision Review
2. Deck Footing Review
3. Deck Post Review
4. Deck Post Beam and Joist Review
5. Deck Attachment Review

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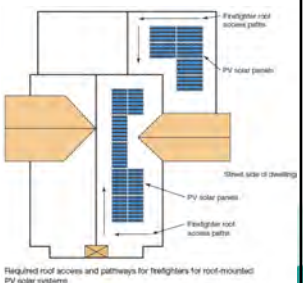
Design R324.3.1 & R324.4.1

- Equipment listed and labeled - UL1703 or UL1703 and UL161730-2.
- Inverters listed and labeled – UL1741.
- Roof Designed to handled all dead and live loads including panels.
  - In retrofit satiations roof will need to be structurally evaluated.

272

Roof Access for Photovoltaic Solar Energy Systems R324.6

- Min 2-36” wide pathways on separate roof plans.
- Min one pathway on street or driveway side.
- Each roof plane min 1 36” wide from lowest roof edge to ridge, on an adjacent roof plane, or straddling the same and adjacent roof plane.
- Roof must be capable of supporting fire fighting operations.
- Located with minimal obstructions such as vents conduit or mechanical equipment.



Required roof access and pathways for firefighters for roof-mounted PV solar systems

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Roof Access and Pathways R324.6

- Exceptions:
- 1. Detached, nonhabitable structures, including but not limited to detached garages, parking shade structures, carports, solar trellises and similar structures, shall not be required to provide roof access.
- 2. Roof access, pathways and setbacks need not be provided where the code official has determined that rooftop operations will not be employed.
- 3. These requirements shall not apply to roofs with slopes of 2 units vertical in 12 units horizontal (17-percent slope) or less.
- 4. BIPV systems listed in accordance with Section 690.12(B)(2) of NFPA 70, where the removal or cutting away of portions of the BIPV system during fire-fighting operations has been determined to not expose a fire fighter to electrical shock hazards.

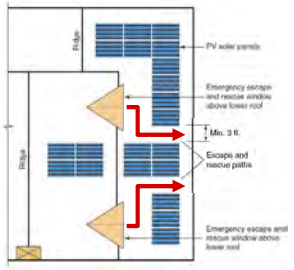
274

Ridge Setbacks R324.6.2

Array Percent of Roof Area	Fire Sprinkler System	Min Setback on Both Sides of Ridge (inches)
≤ 33%	No	18
> 33%	No	36
≤ 66%	Yes	18
> 66%	Yes	36

275

Solar Panels Near Emergency Escape and Rescue Openings R324.6.3



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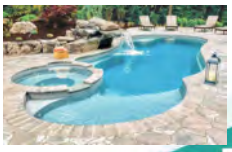
Existing Structure Accessory Structure Review

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Existing Structure and Accessory Structure Review

Subtasks

1. Administrative Review Chapter 1
2. Building Planning Review Chapter 3
3. Existing Structure Energy Efficiency Review Chapter 11
4. Appendix AJ Review
5. Accessory Structures Review

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Where are provisions related to existing structures located?

Existing Structure Provisions

- Administrative Chapter 1
  - R102.7,Existing Structures
  - R105.1, Permits
  - R105.2.1 and R105.2.2, Emergency Repairs and Repairs
  - R110 Certificate of Occupancy
- Chapter 2 Definitions
  - *Change of Occupancy*

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Where are provisions related to existing structures located?

- Building Planning Chapter 3
  - R308 Glazing
  - R310.5 Replacement Windows for EERO
  - R310.6 Dwelling Additions (EERO)
  - R310.7 Alterations or Repairs of Existing Basements (EERO)
  - R313 Automatic Sprinkler Systems
  - R314.2.2 Smoke Alarms
  - R315.2.2 Carbon Monoxide Alarms
  - R322.1 Flood-resistant Construction

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Where are provisions related to existing structures located?

- Energy
  - N1109 (R501) Energy Related Provisions for Existing Building undergoing an alteration, addition, repair and change of occupancy.
- Appendix AJ – Existing Buildings and Structures
  - Developed in format consistent with the IEBC work area compliance method.
  - Provides provisions for Building, Electrical, Plumbing , HVAC and Energy.

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- Sub Task 1: Administrative Review Chapter 1

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Section R102.7 provides the basis for our discussion

"R102.7 Existing structures. The **legal occupancy** of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the *International Property Maintenance Code* or the *International Fire Code*, or as is deemed necessary by the *building official* for the general safety and welfare of the occupants and the public."

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Legal Occupancy

Although not specially defined in IRC we can generally consider Legal Occupancy as;

1. The structure was issued a Certificate of Occupancy by the Authority Having Jurisdiction and no additional work has been performed that would be regulated by the IRC.
2. The structure was built prior to the adoption of a code within the Jurisdiction and no additional work has been performed that would be regulated by the IRC.

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Section R102.7.1 Additions, Alterations, or Repairs

- Shall conform to the requirements for a new structure without the existing structure having to comply.
- Shall not cause an existing structure to become less compliant with the provisions of this code than the existing building or structure was prior to the addition, alteration or repair.
  - An existing building together with its additions shall comply with the height limits of this code.
  - Where the alteration causes the use or occupancy to be changed to one not within the scope of this code, the provisions of the IEBC shall apply.

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Chapter 1 Administrative

Section R105.1 Permits, provides scoping language that requires a permit

"Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be performed, shall first make application to the building official and obtain the required permit."

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Chapter 1 Administrative

Section R105.2.1 Emergency repairs

- Allows repairs to be made without a permits on an emergency basis as long as the application for permit is made within, the next business day

R105.2.2 Repairs

- Provides scoping for when ordinary repairs do not require a permit
- Ordinary repairs do not include;
  - Removing walls
  - Structural modifications
  - Removal, change, rearrangement to the required means of egress
  - Changes to water supply, sewer, drain etc.
  - Electrical wiring
  - Mechanical
  - Or other work affecting public health and safety

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Chapter 1 Administrative
Chapter 2 Definitions

Section R110 Certificate of Occupancy

Prohibits a change of Occupancy of a building or structure or portion until the Building Official has issued a Certificate of Occupancy.

Chapter 2

CHANGE OF OCCUPANCY. *A change in the use of a building or portion of a building that involves a change in the application of the requirements of this code.*

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- Sub Task 2: Building Planning Review Chapter 3

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Glazing

Section R308 Glazing

- Additions and alterations to dwelling units may cause existing glazing installations to be now considered a hazardous location subject to human impact loads.
  - For example, the installation of a new exterior deck with stairs adjacent to an existing window where the bottom exposed edge of glazing is less than 36” above the adjacent walking surface of stairways, landings between flights or stairs and ramps.
  - Glazing now within 60” from the bottom of a stairway where the exposed edge is less than 36” above the landing.

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Replacement widows for EERO

Section R310.5

Exempts compliance with Sections R310.2 (EERO minimum openings) and Section R310.4.4 (EERO Bars, grills, covers and screens) as long as the replacement window;

- Is the largest std size window from the mfgr that will fit in the existing rough opening
- The same operating style that provides for an equal or greater window opening
- The replacement window is not part of a change of occupancy.

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Dwelling Additions and EERO

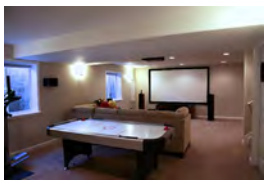
Section R310.6 Dwelling Additions

- Required in new sleeping rooms of additions.
- Required in basement additions unless;
  - New sleeping room is within a basement with an EERO
  - Not required in new basement where an existing basement has an EERO and there is access to the new basement.
  - An operable window in complacence with R310.7.1 is acceptable as an EERO

292

Alterations or Repairs to Existing Basements EERO

Section R310.7 Alterations or repairs to existing Basements



- Required when creating new sleeping rooms of basement renovations.
- Are not required for basement renovations where new sleeping rooms are not created.
- Operable windows complying with Section R310.7.1 are acceptable as an EERO.

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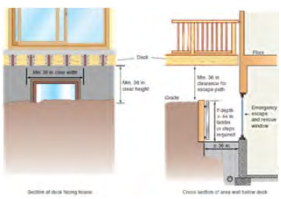
Alterations or Repairs to Existing Basements EERO

Section R310.2.4 Emergency escape and rescue openings under decks, porches and cantilevers.



Verify that the installation of a new exterior deck or other addition to the dwelling does not adversely affect an existing EERO. Compliance may be achieved if R310.2.4 is complied with

294

Alterations or Repairs to Existing Basements

Section R310.7.1 Existing Emergency Escape and Rescue Opening's

- Where a Change of Occupancy would require an EERO, operable windows serving as the EERO shall comply with the following;
- Existing Window Size
  - 4 ft2 clear opening for
  - Min height 22"
  - Min width 20"
  - Sill Max 44" AFF
- Replacement Window
  - Replacement window meets the size for exiting windows and
  - The replacement window is the MFGR's largest standard size that will fit in the rough opening
  - May be of same operating style as existing window or style that provides for an area equal or greater than the existing window.

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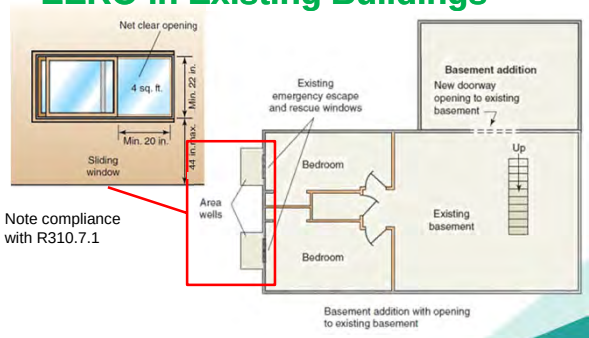
EERO in Existing Buildings



Note compliance with R310.7.1

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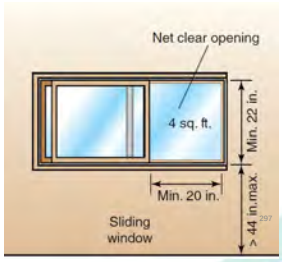
EERO in Existing Buildings R310.7

- 4 sq. ft. clear opening for EERO for:
  - Basement remodel
  - Basement addition
  - Change of occupancy



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Automatic Sprinkler Systems

Section R313.1

Not required where additions or alterations are made to existing townhomes that does not have an automatic sprinkler system.

Section R313.2

Not required where additions or alterations are made to existing buildings that do not have an automatic sprinkler system.

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Smoke Alarms

R314.2.2 Alterations, repairs and additions.

Where alterations, repairs or additions requiring a permit occur, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.

Exceptions:
1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck.
2. Installation, alteration or repairs of plumbing or mechanical systems.

R314.6 Power Source Exception

Smoke alarms installed in accordance with Section R314.2.2 shall be permitted to be battery powered.

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Carbon Monoxide Alarms

R315.2.2 Alterations, repairs and additions.

Where alterations, repairs or additions requiring a permit occur, the individual dwelling unit shall be equipped with smoke alarms located as required for new dwellings.

Exceptions:
1. Work involving the exterior surfaces of dwellings, such as the replacement of roofing or siding, the addition or replacement of windows or doors, or the addition of a porch or deck.
2. Installation, alteration or repairs of plumbing systems.
3. *Installation, alteration or repairs of mechanical systems that are not fuel fired.*

R315.6 Power Source Exception

Smoke alarms installed in accordance with Section R315.2.2 shall be permitted to be battery powered.

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Flood-Resistant Construction

R322.1 General.

Buildings and structures constructed in whole or in part in flood hazard areas, including A or V Zones and Coastal A Zones, as established in Table R301.2, and substantial improvement and repair of substantial damage of buildings and structures in flood hazard areas, shall be designed and constructed in accordance with the provisions contained in this section.

* IBC can be used to define terms

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- Sub Task 3: Existing Structure Energy Efficiency Review Chapter 11

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Energy Efficiency General

N1109.1 (R501.1) Scoping

- N1109 through N1113 address the alterations, repair, addition and change of occupancy of existing buildings or structures.
- Allows continued use of existing building s and systems lawfully in existence at the time of adoption of this code.
- Compliance must be achieved with the applicable section based on classification of work;
  - N1110 Additions
  - N1111 Alterations
  - N1112 Repairs
  - N1113 Change of Occupancy
- Changes in space conditioning shall comply with N1110 Additions.

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Energy Efficiency Additions N1110 (R502)

- **N1110.1 General**
  - Additions shall comply without requiring unaltered portions to comply.
  - Additions are deemed comply when;
    - The addition alone complies
    - The existing building and the addition comply as a single building
    - The building and addition does not use more energy than the existing building
- **N1110.2 Change in Space Conditioning**
  - Any unconditioned space or low energy space altered to become conditioned space shall comply
    - *The proposed design based upon simulated performance may be 110% of the annual energy cost of the base model.*
    - *Where Total UA is used, the building and the addition shall be less than or equal to the Total UA generated for the existing building.*
    - *For simulated performance where the annual energy cost or use of the addition and the existing building is less than or equal to the annual energy cost of the existing building. The addition and alteration shall comply with simulated performance.*

304

Energy Efficiency Additions N1110.3 (R502.3) Prescriptive Compliance

- **N1110.3 Prescriptive Complacence**
  - The additions shall comply with one of three prescriptive compliance paths
  - The addition may take advantage of specific insulation requirements contained within Section N1102.2 (R402.2)Additions shall comply without requiring unaltered portions to comply.
  - Comply with Fenestration provisions outlined in N1102.3.1 through N1102.3.5
  - Comply with air leakage requirements of N1102.4 except are *exempt from the testing requirement in N1102.4.1.2*
- **N1110.3.2 Heating and Cooling Systems –** *Unless ducts are extended into the addition newly installed ducts shall.*
- **N1110.3.3 Service Hot Water Heating –** New service hot water systems part of the addition shall comply
- **N1110.3.4 Lighting –** New slighting systems that are part of the addition shall comply and be high-efficacy lighting per N1104.1.

305

Energy Efficiency Alterations N1111 (R503)

- **N1111.1 General**
  - Alterations shall comply without requiring unaltered portions to comply.
- **N1111.1 Building Envelope**
  - Shall comply with the following sections;

- N1102.1.2 *U*-Factor Table N1102.1.2 or *R*-Value computation Table N1102.1.3
- N1102.2.1 through N1102.2.12 Prescriptive provisions
- N1102.3.1 area weighted *U*-factor for fenestration
- N1102.3.2 Glazed Fenestration SHGC
- N1102.4.3 Through N1102.4.5 Fenestration air leakage, rooms with fuel burning appliances and recessed lighting.

306

Energy Efficiency Alterations N1111 (R503)

- The following alteration shall be exempt from complying provided that the energy use of the building is not increased.
  - Storm windows installed over existing fenestration.
  - Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
  - Construction where the existing roof, wall or floor cavity is not exposed.
  - Roof recover.
  - Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
  - Surface-applied window film installed on existing single-pane fenestration assemblies to reduce solar heat gain provided that the code does not require the glazing or fenestration assembly to be replaced.
- The same addition provisions for HVAC, water service heating and lighting also apply.

307

Energy Efficiency Repairs N1112 (R504)

- **N1112.1 General**
  - Repairs shall be made in accordance with Section N1109.3 and repaired in compliance with the code edition that it was installed under.
  - Work on nondamaged components shall be considered as part of the repair and not subject to the provisions for alterations.
- **N1112.2 Application**
  - The following shall be considered repairs;
    - Glass-only replacement in existing sash and frame
    - Roof repairs
    - Repairs where only the bulb, ballast or both within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

308

Energy Efficiency Change of Occupancy N1113 (R505)

- **N1113.1 General**
  - Any space that is converted to a dwelling unit or portion thereof from another use or occupancy shall comply with this chapter unless when simulated performance option in Section N1105 is used to comply with this section, the annual energy cost of the proposed design is permitted to be 110 percent of the annual energy cost allowed by Section N1105.2.
  - Any unconditioned or low-energy space that is altered to become a conditioned space shall comply with the additional energy package options of Section N1108.

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- Sub Task 4: Existing Structure Appendix Review Appendix AJ

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Appendix AJ101.2 & AJ101.3

- **AJ101.2 Classification of Work.** (Each term is defined within Section AJ106.)
  Work shall be classified into 4 categories
  1. Repair
  2. Renovation
  3. Alteration
  4. Reconstruction

- **AJ101.3 Multiple Categories of Work**
- Each project must be classified in a work category.
- A project may contain more than one category.
- Related work within a 12-month period shall be considered a single project.
- Projects containing multiple classifications and the work being performed is within separate and unrelated areas. Each area may be classified separately.
- Projects containing multiple classifications and the work is performed in the same area or related areas. The project shall comply with the more stringent category.

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Appendix AJ106 Definitions

REPAIR. The patching, restoration or minor replacement of materials, elements, components, *equipment* or fixtures for the purposes of maintaining those materials, elements, components, *equipment* or fixtures in good or sound condition.

Note: Section R105.2.2 defines when application to the Building Official is not required for ordinary repairs

RENOVATION. The change, strengthening or *addition* of load-bearing elements; or the refinishing, replacement, bracing, strengthening, upgrading or extensive repair of existing materials, elements, components, *equipment* or fixtures. Renovation does not involve reconfiguration of spaces. Interior and exterior painting are not considered refinishing for purposes of this definition, and are not renovation.

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Appendix AJ106 Definitions

ALTERATION. The reconfiguration of any space; the *addition* or elimination of any door or window; the reconfiguration or extension of any system; or the installation of any additional *equipment*."

RECONSTRUCTION. The reconfiguration of a space that affects an exit, a renovation or *alteration* where the work area is not permitted to be occupied because existing means-of-egress and fire protection systems, or their equivalent, are not in place or continuously maintained; or there are extensive *alterations* as defined in Section AJ109.3.

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Appendix AJ Compliance

- Regardless of the category of work being performed, the work shall not cause the structure to become unsafe or adversely affect the performance of the building;
- Shall not cause an existing mechanical or plumbing system to become unsafe, hazardous, insanitary or overloaded; and unless expressly permitted by these provisions,
- Shall not make the building any less compliant with this code or to any previously *approved* alternative arrangements than it was before the work was undertaken.

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Appendix J Replacement Windows AJ102.4.4 Window control devices (Fall Protection)

Window control devices.

- Where window fall prevention devices complying with ASTM F 2090 are not provided, window opening control devices complying with ASTM F 2090 shall be installed where an existing window is replaced and where all of the following apply to the replacement window:

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Appendix J Replacement Windows AJ102.4.4 Window control devices (Fall Protection)

1. The window is operable.
2. The window replacement includes replacement of the sash and the frame.
3. The top of the sill of the window opening is at a height less than 24" above the finished floor.
4. The window will permit openings that will allow passage of a 4" diameter sphere where the window is in its largest opened position.
5. The vertical distance from the top of the sill of the window opening to the finished grade or other surface below, on the exterior of the building, is greater than 72".

The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit.

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Equivalent Alternatives AJ102.6

Equivalent alternatives.

- Work performed in accordance with the *International Existing Building Code* shall be deemed to comply with the provisions of this appendix. These provisions are not intended to prevent the use of any alternative material, alternative design or alternative method of construction not specifically prescribed herein, provided that any alternative has been deemed to be equivalent and its use authorized by the *building official*.

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Other Alternatives AJ 102.7

Other alternatives.

- Where compliance with these provisions or with this code as required by these provisions is technically infeasible or would impose disproportionate costs because of construction or dimensional difficulties, the building official shall have the authority to accept alternatives. These alternatives include materials, design features and operational features.

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More Restrictive Requirements AJ102.8

More restrictive requirements.

- Buildings or systems in compliance with the requirements of this code for new construction shall not be required to comply with any more restrictive requirement of these provisions.

319

Features Exceeding Code Requirements AJ102.9

- Elements, components and systems of existing buildings with features that exceed the requirements of this code for new construction, and are not otherwise required as part of *approved* alternative arrangements or deemed by the *building official* to be required to balance other building elements not complying with this code for new construction, shall not be prevented by these provisions from being modified as long as they remain in compliance with the applicable requirements for new construction.

320

EVALUATION OF AN EXISTING BUILDING AJ104.1

- In cases of reconstruction, the *building official* has the authority to require an existing building to be investigated and evaluated by a registered *design professional.*
- The evaluation shall determine the existence of any potential non-conformities to the Code
- Becomes the basis for determining the impact of the proposed changes on the performance of the building.

321

EVALUATION OF AN EXISTING BUILDING AJ104.1

- The evaluation shall use the following sources of information:
  - Available documentation of the existing building.
    - Field surveys.
    - Tests (nondestructive and destructive).
    - Laboratory analysis.

- Detached one- or two-family dwellings that are not irregular buildings under Section R301.2.2.2.5 *(R301.2.2.6)* and are not undergoing an extensive reconstruction shall not be required to be evaluated.

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Repairs Section AJ107.1.1

AJ301.1 Materials.
Unless specified, work shall be done using like materials or materials permitted by this code for new construction.

AJ301.1.1 Hazardous materials.
Hazardous materials no longer permitted, such as asbestos and lead-based paint, shall not be used.

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Repairs Section AJ107.1.2

Prohibited plumbing materials;

- All-purpose solvent cement, unless *listed* for the specific application.
- Flexible traps and tailpieces, unless *listed* for the specific application.
- Solder having more than 0.2 percent lead in the repair of potable water systems.

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Repairs Section AJ107.2

Water closets.
Must be replaced with a newly manufactured unit and comply with Section P2903.2.

1.6 gal per flushing cycle

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Repairs Section AJ107.3 Electrical

- Like materials are allowed to be used for repair or replacement of existing electrical wiring and *equipment.*
- Replacement of electrical receptacles shall comply with the requirements of Chapters 34 through 43.
- Plug fuses of the Edison-base type shall be used for replacements only when there is not evidence of overfusing or tampering. Must also be in accordance with the applicable requirements of Chapters 34 through 43.

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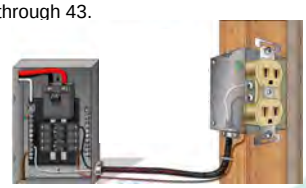
Repairs Section AJ107.3

- When replacement nongrounding-type receptacles with grounding-type receptacles and for branch circuits that do not have an equipment grounding conductor in the branch circuitry, the grounding conductor of a grounding-type receptacle outlet shall be permitted to be grounded to any accessible point on the grounding electrode system, or to any accessible point on the grounding electrode conductor, as allowed and described in Chapters 34 through 43.



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Repairs Section AJ107

AJ107.3 Electrical.

Repair or replacement of existing electrical wiring and equipment undergoing repair with like material shall be permitted except;

- Replacement of electrical receptacles shall comply with the requirements of Chapters 34 through 43.
- Plug fuses of the Edison-base type shall be used for replacements only where there is not evidence of overfusing or tampering in accordance with the applicable requirements of Chapters 34 through 43.
- For replacement of nongrounding-type receptacles with grounding-type receptacles and for branch circuits that do not have an equipment grounding conductor in the branch circuitry, the grounding conductor of a grounding-type receptacle outlet shall be permitted to be grounded to any accessible point on the grounding electrode system, or to any accessible point on the grounding electrode conductor, as allowed and described in Chapters 34 through 43.

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Renovations Section AJ108

AJ108.1 Materials and methods.

The work shall comply with the materials and methods requirements of this code.

AJ108.2 Door and window dimensions.

Minor reductions in the clear opening dimensions of replacement doors and windows that result from the use of different materials shall be allowed, whether or not they are permitted by this code.

AJ108.3 Interior finish.

Wood paneling and textile wall coverings used as an interior finish shall comply with the flame spread requirements of Section R302.9.

AJ401.4 Structural.

Unreinforced masonry buildings located in Seismic Design Category D2 or E shall have parapet bracing and wall anchors installed at the roofline whenever a reroofing permit is issued. Such parapet bracing and wall anchors shall be of an approved design.

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Alterations Section AJ109

AJ109.1 Newly constructed elements.

Newly constructed elements, components and systems shall comply with the requirements of this code.

Exceptions:

1. Openable windows may be added without requiring compliance with the light and *ventilation* requirements of Section R303.
2. Newly installed electrical *equipment* shall comply with the requirements of Section AJ109.5.

AJ501.2 Nonconformities.

The work shall not increase the extent of noncompliance with the requirements of Section AJ110, or create nonconformity to those requirements that did not previously exist.

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Alterations Section AJ109

AJ109.3 Extensive alterations.
Where the total area of all of the work areas included in an *alteration* exceeds 50 percent of the area of the *dwelling unit*, the work shall be considered to be a reconstruction and shall comply with the requirements of these provisions for reconstruction work.
Exception: Work areas in which the *alteration* work is exclusively plumbing, mechanical or electrical shall not be included in the computation of the total area of all work areas.

AJ109.4 Structural.
The minimum design loads for the structure shall be the loads applicable at the time the building was constructed, provided that a dangerous condition is not created. Structural elements that are uncovered during the course of the *alteration* and that are found to be unsound or dangerous shall be made to comply with the applicable requirements of this code.

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Alterations Section AJ109

Electrical equipment and wiring.
AJ109.5.1 Materials and methods.
Newly installed electrical *equipment* and wiring relating to work done in any work area shall comply with the materials and methods requirements of Chapters 34 through 43.
Exception: Electrical *equipment* and wiring in newly installed partitions and ceilings shall comply with the applicable requirements of Chapters 34 through 43.

AJ109.5.2 Electrical service.
Service to the *dwelling unit* shall be not less than 100 ampere, three-wire capacity and service *equipment* shall be dead front having no live parts exposed that could allow accidental contact. Type "S" fuses shall be installed where fused *equipment* is used.
Exception: Existing service of 60 ampere, three-wire capacity, and feeders of 30 ampere or larger two- or three-wire capacity shall be accepted if adequate for the electrical load being served

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Alterations Section AJ109

AJ109.5.3 Additional electrical requirements.
Where the work area includes any of the following areas within a *dwelling unit*, the following requirements shall apply.

AJ109.5.3.1 Enclosed areas.
Enclosed areas other than closets, kitchens, *basements*, garages, hallways, laundry areas and bathrooms shall have not less than two duplex receptacle outlets, or one duplex receptacle outlet and one ceiling- or wall-type lighting outlet.

AJ501.5.3.2 Kitchen and laundry areas.
Kitchen areas shall have not less than two duplex receptacle outlets. Laundry areas shall have not less than one duplex receptacle outlet located near the laundry *equipment* and installed on an independent circuit.

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Alterations Section AJ501

AJ501.5.3.3 Ground-fault circuit-interruption.
Ground-fault circuit-interruption shall be provided on newly installed receptacle outlets if required by Chapters 34 through 43.

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Alterations Section AJ109

AJ109.5.3.3 Ground-fault circuit-interruption.
Ground-fault circuit-interruption shall be provided on newly installed receptacle outlets if required by this Code

AJ109.5.3.4 Lighting outlets.
Not less than one lighting outlet shall be provided in every bathroom, hallway, stairway, attached garage and detached garage with electric power to illuminate outdoor entrances and exits, and in utility rooms and *basements* where these spaces are used for storage or contain *equipment* requiring service.

AJ501.5.3.5 Clearance.
Clearance for electrical service *equipment* shall be provided in accordance with this Code

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Alterations Section AJ109

AJ109.6 Ventilation.
Reconfigured spaces intended for occupancy and spaces converted to habitable or occupiable space in any work area shall be provided with *ventilation* in accordance with Section R303.

AJ109.7 Ceiling height.
- *Habitable spaces* created in existing *basements* shall have ceiling heights of not less than 6 feet, 8 inches
- The ceiling height at obstructions shall be not less than 6 feet 4 inches (1930 mm) from the *basement* floor.
- Existing finished ceiling heights in non-habitable spaces in *basements* shall not be reduced.

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Alterations Section AJ109

AJ109.8.1 Stair width.
Existing *basement* stairs and handrails not otherwise being altered or modified shall be permitted to maintain their current clear width at, above and below existing handrails.

AJ109.8.2 Stair headroom.
Headroom height on existing *basement* stairs being altered or modified shall not be reduced below the existing stairway finished headroom. Existing *basement* stairs not otherwise being altered shall be permitted to maintain the current finished headroom.

AJ501.8.3 Stair landing.
Landings serving existing *basement* stairs being altered or modified shall not be reduced below the existing stairway landing depth and width. Existing *basement* stairs not otherwise being altered shall be permitted to maintain the current landing depth and width.

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Reconstruction Section AJ110

AJ102.2 Requirements by Category Stairways
- Projects classified as a reconstruction shall comply with Section AJ110, Sections AJ108 for Renovations, and Section AJ109 for Alterations.

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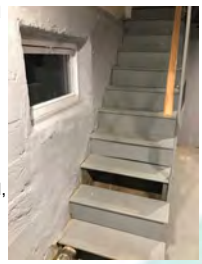
Reconstruction Section AJ110

AJ110.1 Stairways
- Stairways within the work area shall be provided with illumination in accordance with Section R303.6.
- Handrails are required for;
  - every exit stairway that has four or more risers,
  - is part of the means of egress for any work area,
  - and is not provided with at least one handrail,
  - or in which the existing handrails are judged to be in danger of collapsing
- Handrails shall designed and installed in accordance with Section R311 for the full length of the run of steps on not less than one side.



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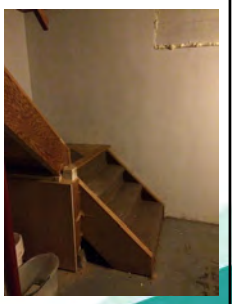
Reconstruction Section AJ110

AJ110.1.3 Guards

- Guards are required on every open portion of a stair, landing or balcony;
  - that is more than 30 inches (762 mm) above the floor or *grade* below,
  - is part of the egress path for any work area,
  - and does not have *guards*,
  - or in which the existing *guards* are judged to be in danger of collapsing
  - *Guards* shall designed and installed in accordance with Section R312.



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Reconstruction Section AJ110

AJ110.2 Wall and Ceiling Finishes

- The interior finish of walls and ceilings in any work area shall comply with the requirements of Section R302.9 for flame spread and smoke development

- Existing interior finish materials that do not comply with those requirements shall be removed or shall be treated with an *approved* fire-retardant coating in accordance with the manufacturer's instructions.

AJ110.3 Separation Walls

- Where the work area is in an attached *dwelling unit*, walls separating *dwelling units* that are not continuous from the foundation to the underside of the roof sheathing shall be constructed to provide a continuous fire separation using construction materials consistent with the existing wall or complying with the requirements for new structures. Performance of work shall be required only on the side of the wall of the *dwelling unit* that is part of the work area.

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Reconstruction Section AJ110

AJ110.4 Ceiling Heights

- Habitable spaces created in existing basements shall have ceiling heights of not less than 6 feet, 8 inches, except that the ceiling height at obstructions shall be not less than 6 feet 4 inches from the basement floor. Existing finished ceiling heights in nonhabitable spaces in basements shall not be reduced.

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ICC SPRING INTERCHANGE

- Sub Task 5: Accessory Structure Review

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Types of Accessory Structures

Examples of different type of accessory structures.

- Swimming Pools and Hot Tubs
- Utility Buildings/Sheds.
- Fences over 7’ in height.
- Ground Mounted Solar Systems.
- Pools Houses

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R327 Swimming Pools, Spas and Hot Tubs

Section requires compliance with the International Swimming Pool and Spa Code.

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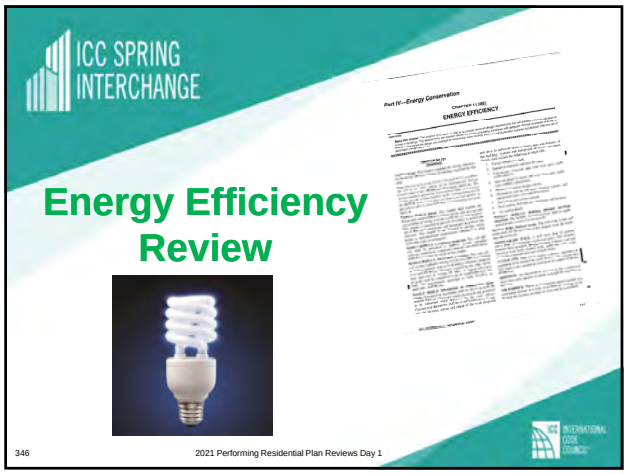

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Energy Efficiency Review

Subtasks

1. General Review
2. Compliance Path and Additional Energy Feature Review
3. Systems Review
4. Total Building Performance and Energy Rating Index Reviews

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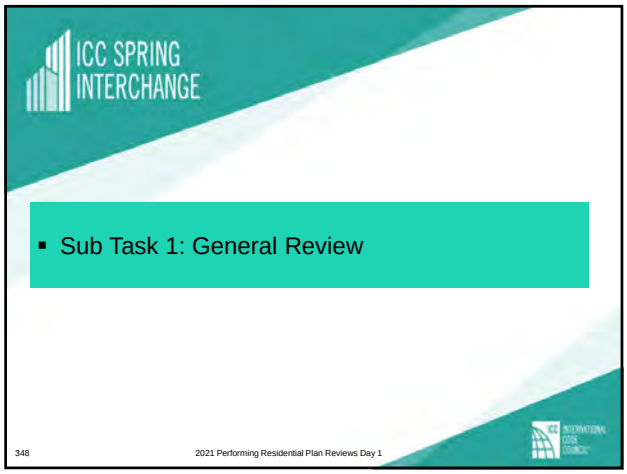

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Residential Energy Efficiency, Chapter 4 (IECC) and Chapter 11 (IRC) Overview

- N1101 General
- N1102 Building Thermal Envelope
- N1103 Systems
- N1104 Electrical Power and Lighting Systems
- N1105 Total Building Performance
- N1106 Energy Rating Index Compliance Alternative
- N1107 Tropical Climate Region Compliance Path
- N1108 Additional Efficiency Package Options
- N1109 Existing Buildings
- N1110 Additions
- N1112 Repairs
- N1113 Change of Use

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Scope N1101.1

- Pertains to detached one- and two-family dwellings and townhouses as well as Group R-2, R-3 and R-4 buildings three stories or less in height above grade plane
- New and existing buildings
- Apply to residential buildings, building sites and associated systems and equipment.

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Intent N1101.2

- This chapter shall regulate the design and construction of buildings for the effective use and conservation of energy over the useful life of each building.
- This chapter is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective.
- This chapter is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

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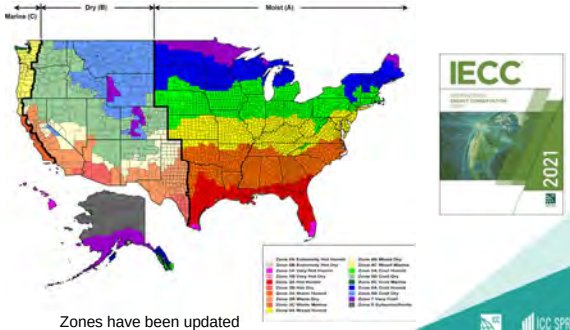
Energy Efficiency

- IRC Chapter 11 is extracted from the applicable provisions of the 2021 IECC



Zones have been updated

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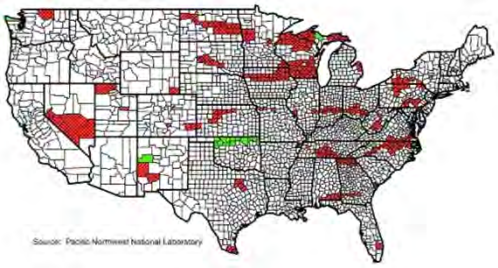
County-Level Climate Zone Changes



Pacific Northwest National Lab (PNNL) map shows specific counties shifted to warmer (lower) CZs (red) and which shifted to cooler(higher) CZs (green).

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Major Components of the Energy Code

- There are 3 major components of a residential structural that will be addressed by the Energy Code.

1. Building Thermal Envelope
2. Systems
   1. HVAC
   2. Plumbing
3. Electrical Power and Lighting

Compliance is exempted if low energy building. Defined as a peak energy design rate of energy usage less than 3.4 BTU/h per SF or 1.0watt/sf of floor are for the space conditioning purpose.

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- Sub Task 2: Compliance Path and Additional Energy Feature Review

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Construction Documents N1101.5

N1101.5 (R103.2) Information on construction documents. Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted when approved by the code official. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed.
Details shall include the following as applicable:
1. Energy compliance path.
2. Insulation materials and their R-values.
3. Fenestration U-factors and solar heat gain coefficients (SHGC).
4. Area-weighted U-factor and solar heat gain coefficient (SHGC) calculations.
5. Mechanical system design criteria.
6. Mechanical and service water heating systems and equipment types, sizes and efficiencies.
7. Equipment and system controls.
8. Duct sealing, duct and pipe insulation and location.
9. Air sealing details.

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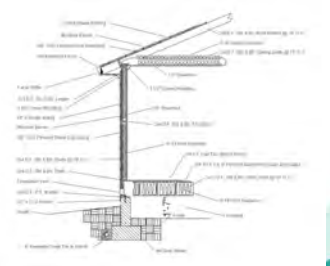
Construction Documents N1101.5.1

- The building thermal envelope shall be represente on the construction documents.



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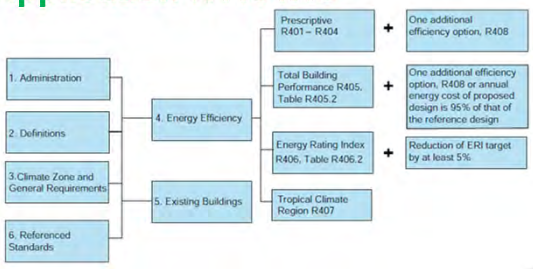
Application N1101.13



New section. Establishes that residential buildings must comply with one of the compliance paths and an additional energy feature of new section N1108.

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Compliance Paths

- Projects shall comply with one of the following:

1. Sections N1101.14 through N1104.
   1. R-Value
   2. U-Factor
   3. Total U
2. Section N1105 and the provisions of Sections N1101.14 through N1104 labeled “Mandatory.”
3. An energy rating index (ERI) approach in Section N1106.

Prescriptive and mandatory provisions

Performance and mandatory provisions

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Prescriptive R-value Table N1102.1.3

TABLE N1102.1.3 (R402.1.3)
INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b,c]	SKYLIGHT[c] *U*-FACTOR	GLAZED FENESTRATION SHGC[c,d]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE[e]	MASS WALL *R*-VALUE[f]	FLOOR *R*-VALUE	BASEMENT[g,h] WALL *R*-VALUE	SLAB[i] *R*-VALUE & DEPTH	CRAWL SPACE[g,h] WALL *R*-VALUE
0	NR	0.75	0.25	30	13 or 0 + 10	3/4	13	0	0	0
1	NR	0.75	0.25	30	13 or 0 + 10	3/4	13	0	0	0
2	0.40	0.65	0.25	49	13 or 0 + 10	4/6	13	0	0	0
3	0.30	0.55	0.25	49	20 or 13 + 5ci or 0 + 15	8/13	19	5ci or 13[j]	10ci, 2 ft	5ci or 13[j]
4 except Marine	0.30	0.55	0.40	60	20 + 5 or 13 + 10ci or 0 + 15	8/13	19	10ci or 13	10ci, 4 ft	10ci or 13
5 and Marine 4	0.30	0.55	0.40	60	20 + 5 or 13 + 10ci or 0 + 15	13/17	30	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci
6	0.30	0.55	NR	60	20 + 5ci or 13 + 10ci or 0 + 20	15/20	30	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci
7 and 8	0.30	0.55	NR	60	20 + 5ci or 13 + 10ci or 0 + 20	19/21	38	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci

For SI: 1 foot = 304.8 mm.
NR = Not Required.
ci = continuous insulation.
a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13 + 5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall, or R-19 cavity insulation on the interior side of the wall, or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation *R*-value for slabs, as indicated in the table. The slab-edge insulation for heated slabs shall not be required to extend below the slab.
e. There are no SHGC requirements in the Marine Zone.
f. Basement wall insulation shall not be required in Warm Humid locations as defined by Figure N1101.7 and Table N1101.7.
g. The first value is cavity insulation, the second value is continuous insulation. Therefore, as an example, "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation.
h. Mass walls shall be in accordance with Section N1102.2.5. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
i. A maximum *U*-factor of 0.32 shall apply in Climate Zones 3 through 8 to vertical fenestration products installed in buildings located either:
   1. Above 4,000 feet in elevation, or
   2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.

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Prescriptive U-Factor Table N1102.1.2

TABLE R1102.1.2 (R402.1.2)
MAXIMUM ASSEMBLY *U*-FACTORS[a] AND FENESTRATION REQUIREMENTS

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT *U*-FACTOR	GLAZED FENESTRATION SHGC[c,d]	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
0	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
1	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.25	0.026	0.084	0.165	0.064	0.360	0.477
3	0.30	0.55	0.25	0.026	0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.30	0.55	0.40	0.024	0.045	0.098	0.047	0.059	0.065
5 and Marine 4	0.30	0.55	NR	0.024	0.045	0.082	0.033	0.050	0.055
6	0.30	0.55	NR	0.024	0.045	0.060	0.033	0.050	0.055
7 and 8	0.30	0.55	NR	0.024	0.045	0.057	0.028	0.050	0.055

For SI: 1 foot = 304.8 mm.

a. Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.

b. Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.

c. In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall *U*-factor shall not exceed 0.360.

d. The SHGC column applies to all glazed fenestration.
Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.

e. There are no SHGC requirements in the Marine Zone.

f. A maximum *U*-factor of 0.32 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
1. Above 4,000 feet in elevation above sea level, or
2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.

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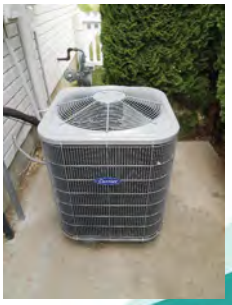
N1108 – Additional Energy Efficiency

- Prescriptive Compliance Option
  - Select one additional efficiency package option in Section R408.2
- Total Building Performance option
  - Select one additional efficiency package option in Section R408.2
    OR
  - Proposed design must have annual energy cost less than or equal to 95% of the referenced design
- Energy Rating Index
  - ERI value must be at least 5% less than ERI target



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Additional Energy Efficiency Requirements

- New Section N1108 (R408) Additional measures required in addition to compliance path requirements
- 5 options provided. Options are specific to compliance path based upon Section N1101.13.5 (R401.2.5)
  - Enhanced envelope performance
  - More Efficient HVAC
  - Reduce Energy use in service water heating
  - More efficient duct thermal distribution system options
  - Improved air sealing and efficient ventilation system option.

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- Sub Task 3: Systems Review

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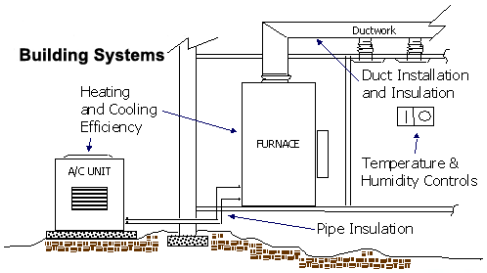
N1103 – Systems



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Key Building Systems Provisions

- Mechanical equipment efficiency
- Water heater efficiency
- Programmable thermostat
- Heat pump supplementary heat
- Ducts
- Insulation
- Ventilation - IMC

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Controls N1103.1

- At least one thermostat must be provided for each separate heating and cooling system
- Daily schedule to maintain different set points at different times of day / days of week
- Set back capabilities 55°F min - 85°F max
- Initial programming by manufacturer
  - Maximum heating setpoint of 70°F
  - Minimum cooling setpoint of 78°F
- Heat pump supplementary heat controlled to not activate unless heat compressor can not meet heating load.
- Hot water boiler automatic temperature reset by manufacturer
  - Outdoor reset, indoor reset or water temperature sensing

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Mechanical System Piping Insulation N1103.4

- Minimum R-value of HVAC piping capable of carrying fluids greater than 105°F or less than 55°F is R-3
- Applies to refrigerant piping and piping for hydronic heating systems

- Piping insulation exposed to weather must be protected

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Heated Water Circulation and Temperature Maintenance Systems N1103.5.1

- Automatic controls, temperature sensors and pumps must be in a location with access
- Manual controls must be in a location with ready access
- Circulation and heat trace systems must have controls

Gravity and thermosyphon systems are prohibited

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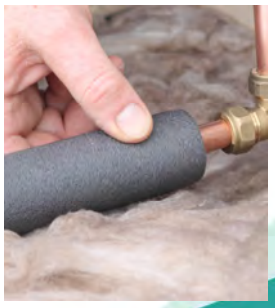
Hot Water Pipe Insulation N1105.3.2

Minimum R-3 insulation

1. Piping larger than 3/4-inch nominal diameter inside conditioned space
2. Piping serving more than one dwelling unit
3. Piping located outside the conditioned space
4. Piping from the water heater to a distribution manifold
5. Piping located under a floor slab
6. Buried piping
7. Supply and return piping in circulation and recirculation systems other than cold water pipe return demand recirculation systems.



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Equipment Sizing N1103.7

- Heating and cooling equipment sizing
  - ACCA Manual S, Residential Equipment Selection
  - ACCA Manual J, Residential Load Calculations
- New or replacement heating and cooling equipment must have efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed

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Pools and Permanent Spa Energy Consumption N1103.10

- Heater, time switch and cover requirements for pools and in ground, permanently installed spas
  - Pool heaters equipped with a readily accessible on-off switch
  - No continuously burning pilot lights
  - Time switches to automatically turn off and on heaters and pumps according to a preset schedule required
    - Exceptions address public health standards and circumstances where the pumps serve pools with solar-waste-heat recovery heating systems

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Lighting Equipment N1104.1

- High-efficacy lighting is required in all permanent lighting fixtures
- New provisions regulate lighting controls for interior and exterior lighting

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Exterior Lighting N1104.1.1

- Connected exterior lighting For Group R-2, R-3 and R-4 must comply with the commercial requirements for exterior lighting power, C405.5

Exceptions:
1. Detached one- and two-family dwellings
2. Townhouses
3. Solar-powered lamps not connected to any electrical service
4. Luminaires controlled by a motion sensor

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Interior Lighting Controls N1104.2

- Lighting controls required for all permanently installed lighting fixtures
- Exceptions
  - Bathrooms
  - Hallways
  - Exterior lighting fixtures
  - Lighting designed for safety or security

Occupant sensors, dimmers, automatic daylight sensors meet requirements

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Exterior Lighting Controls N1104.3

Total permanently installed exterior lighting power greater than 30 watts

- Manual on/off switch
  - Exception: lighting serving multiple dwelling units
- Daylight sensor
- Overrides must reset after 24 hours

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ICC SPRING INTERCHANGE

- Sub Task 4: Total Building Performance and Energy Rating Index Reviews

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Performance-Based Compliance N1105

Table N1105.2 Provides Requirements

2009 IECC backstop for envelope, SHGCs

Annual energy cost less than or equal to annual energy cost of standard reference design

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Documentation N1105.3

Compliance software tools.
Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the code official.

Compliance report.
Compliance software tools shall generate a report that documents that the proposed design complies with Section N1105.3. A compliance report on the proposed design shall be submitted with the application for the building permit. Upon completion of the building, a confirmed compliance report based on the confirmed condition of the building shall be submitted to the code official before a certificate of occupancy is issued.

Compliance reports shall include information in accordance with Sections N1105.3.1 and N1105.3.2.2.

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Documentation N1105.3.2.1

Compliance report for permit application.
A compliance report submitted with the application for building permit shall include the following:

1. Building street address, or other building site identification.

2. The name of the individual performing the analysis and generating the compliance report.

3. The name and version of the compliance software tool.

4. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.

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Documentation N1105.3.2.1

Compliance report for permit application.

5. A certificate indicating that the proposed design complies with Section N1105.3. The certificate shall document the building components' energy specifications that are included in the calculation, including component-level insulation R-values or U-factors; duct system and building envelope air leakage testing assumptions; and the type and rated efficiencies of proposed heating, cooling, mechanical ventilation and service water-heating equipment to be installed. If on-site renewable energy systems will be installed, the certificate shall report the type and production size of the proposed system.

6. When a site-specific report is not generated, the proposed design shall be based on the worst-case orientation and configuration of the rated home.

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Documentation N1105.3.2.2

Compliance report for certificate of occupancy.
A compliance report submitted for obtaining the certificate of occupancy shall include the following:

1. Building street address, or other building site identification.

2. Declaration of the total building performance path on the title page of the energy report and the title page of the building plans.

3. A statement, bearing the name of the individual performing the analysis and generating the report, indicating that the as-built building complies with Section N1105.3.

4. The name and version of the compliance software tool.

5. A site-specific energy analysis report that is in compliance with Section N1105.3.

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Documentation N1105.3.2.2

Compliance report for certificate of occupancy.

6. A final confirmed certificate indicating compliance based on inspection, and a statement indicating that the confirmed rated design of the built home complies with Section N1105.3. The certificate shall report the energy features that were confirmed to be in the home, including component-level insulation R-values or U-factors; results from any required duct system and building envelope air leakage testing; and the type and rated efficiencies of the heating, cooling, mechanical ventilation and service water heating equipment installed.

7. Where on-site renewable energy systems have been installed, the certificate shall report the type and production size of the installed system.

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Compliance Report N1105.4.2

Simplification for report at time of permit (similar for C/O)

1. Building street address, or other building site identification
2. The name of the individual performing the analysis and generating the compliance report
3. The name and version of the compliance software tool
4. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home
5. A certificate indicating that the proposed design complies with Section R405.3. The certificate shall document the building components' energy specifications that are included in the calculation including: component-level insulation R-values or U-factors; duct system and building envelope air leakage testing assumptions; and the type and rated efficiencies of proposed heating, cooling, mechanical ventilation and service water-heating equipment to be installed. If on-site renewable energy systems will be installed, the certificate shall report the type and production size of the proposed system.
6. Where a site-specific report is not generated, the proposed design shall be based on the worst-case orientation and configuration of the rated home

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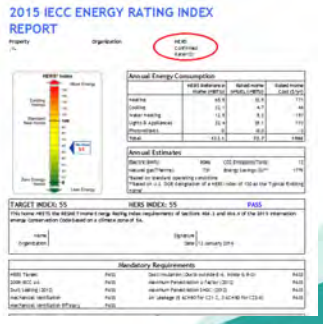
Energy Rating Index Overview N1106

- ERI compliance requires the design to be a specified percentage better than the referenced home.
- Rated Home with Index of 100 = Reference Home meeting 2006 IECC
- Each 1% reduction in energy use = 1 point deduction from index
- Zero Energy Home = ERI Index of 0
- Essentially a HERS score with modified ventilation rate



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ERI Compliance Documentation N1106.7

- Software tools used for determining ERI shall be Approved Software Rating Tools in accordance with RESNET/ICC 301.
- Compliance software tools shall generate a report that documents that the home and the ERI score of the rated design comply with Sections N1106.2, N1106.3 and N1106.4.
- Compliance documentation shall be created for the proposed design and shall be submitted with the application for the building permit.
- Confirmed compliance documents of the built dwelling unit shall be created and submitted to the code official for review before a certificate of occupancy is issued. Compliance reports shall include information in accordance with Sections N1106.7.2.1 and N1106.7.2.2.

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ERI Proposed Compliance Documentation N1106.7.2.1

Proposed compliance report for permit application shall include the following:

1. Building street address, or other building site identification.
2. Declaration of ERI on the title page and on the building plans.
3. The name of the individual performing the analysis and generating the compliance report.
4. The name and version of the compliance software tool.
5. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
6. A certificate indicating that the proposed design has an ERI less than or equal to the appropriate score indicated in Table N1106.5 when compared to the ERI reference design.

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ERI Proposed Compliance Documentation N1106.7.2.1

6. A certificate indicating that the proposed design has an ERI less than or equal to the appropriate score indicated in Table N1106.5 when compared to the ERI reference design. The certificate shall document the building component energy specifications that are included in the calculation, including: component level insulation R-values or U-factors; assumed duct system and building envelope air leakage testing results; and the type and rated efficiencies of proposed heating, cooling, mechanical ventilation and service water-heating equipment to be installed. If on-site renewable energy systems will be installed, the certificate shall report the type and production size of the proposed system.
7. When a site-specific report is not generated, the proposed design shall be based on the worst-case orientation and configuration of the rated home.

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Confirmed Compliance Report Documentation N1106.7.2.2

A confirmed compliance report submitted for obtaining the certificate of occupancy shall be made site and address specific and include the following:

1. Building street address or other building site identification.
2. Declaration of ERI on the title page and on the building plans.
3. The name of the individual performing the analysis and generating the report.
4. The name and version of the compliance software tool.
5. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home..

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Confirmed Compliance Report Documentation N1106.7.2.2

6. A final confirmed certificate indicating that the confirmed rated design of the built home complies with Sections N1106.2 and N1106.4. The certificate shall report the energy features that were confirmed to be in the home, including: component-level insulation R-values or U-factors; results from any required duct system and building envelope air leakage testing; and the type and rated efficiencies of the heating, cooling, mechanical ventilation, and service water-heating equipment installed. Where onsite renewable energy systems have been installed on or in the home, the certificate shall report the type and production size of the installed system.

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Renewable Energy Certificate (REC) documentation.N1106.7.2.2

Where on-site renewable energy is included in the calculation of an ERI, one of the following forms of documentation shall be provided to the code official:

1. Substantiation that the RECs associated with the on-site renewable energy are owned by, or retired on behalf of, the homeowner.

2. A contract that conveys to the homeowner the RECs associated with the on-site renewable energy, or conveys to the homeowner an equivalent quantity of RECs associated with other renewable energy.

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ERI Compliance Score N1106.4

TABLE N1106.5 (R406.5)
MAXIMUM ENERGY RATING INDEX

CLIMATE ZONE	ENERGY RATING INDEX
0–1	52
2	52
3	51
4	54
5	55
6	54
7	53
8	53

*Note – these values need reduced by 5% to comply because of the additional efficiency requirement.

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Practice Exercise 7
10 Minutes

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Practice Exercise 7

1. Identify the correct climate zone for this project.
2. Identify the Compliance method that was indicated on the plans?
3. Is there enough documentation provided to be able to complete an energy review based on the compliance method indicated?

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Practice Exercise 7

4. Assuming the compliance method is *R*-value alternative what would the min *R* values be and the Max *U* Factors for each building thermal envelope component.

Component	Table Value	Plan Value
Fenestration *U*		
Skylight *U*		
Glazed Fenestration SHGC *U*		
Ceiling *R*		
Wood Frame Wall *R*		
Mass Wall *R*		
Floor *R*		
Basement Wall *R*		
Slab *R*		
Crawl Space Wall *R*		

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Practice Exercise 7

5. Would this project comply with *R*-value alternative method?
6. Identify the lighting control from the plans?
7. Identify the conflict on the cover sheet for ceiling insulation value and the cross section provided on page A-5.

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Practice Exercise 7

1. Identify the correct climate zone for this project.
   Climate Zone 4 for Harford County Maryland.
2. Identify the Compliance method that was indicated on the plans?
   Cover Sheet page in left hand column identifies compliance with energy code. No specific compliance method was provided. Appears to be R-Value Alternative. Formal complicne method for 2021 shall be provided.
3. Is there enough documentation provided to be able to complete an energy review based on the compliance method indicated?
   No. The plans indicate compliance with 2018 IECC.

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Practice Exercise 7

4. Assuming the compliance method is *R*-value alternative what would the min *R* values be and the Max *U* Factors for each building thermal envelope component.

Component	Table Value	Plan Value
Fenestration *U*	0.30	0.32 ✗
Skylight *U*	0.55	N/A
Glazed Fenestration SHGC *U*	0.40	0.40 ✓
Ceiling *R*	60	49 Raised Heal 38 ✗
Wood Frame Wall *R*	20+5 or 13+10 or 0+15	R20 or R13+5 ✓
Mass Wall *R*	8/13	N/A
Floor *R*	19	19 ✓
Basement Wall *R*	10 ci or 13	13 or 10 ci ✓
Slab *R*	10 ci, 4ft	10ci 2ft ✗
Crawl Space Wall *R*	10 ci or 13	13 or 10ci ✓

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Practice Exercise 7

5. Would this project comply with *R*-value alternative method?
   No
6. Identify the lighting control from the plans?
   Lighting controls must be provided for interior and exterior lighting.
7. Identify the conflict on the cover sheet for ceiling insulation value and the cross section provided on page A-5.
   The cover sheet indicates that a raised heal truss is being used and the reduction allowed in N1102.2.1 is being used. The cross section does not show a raised heal truss.

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Discussion Activity

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Final Reflection

- **What?** What happened and what was observed in the training?
- **So what?** What did you learn? What difference did this training make?
- **Now what?** How will you do things differently back on the job as a result of this training?

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