



**MINOR  
AMENDMENTS  
TO THE  
2015 CODES**

**Boulder County**

**Boulder County Building Code Amendments**

Resolution 2012-50: Amendments to Boulder County Building Code • Effective January 1, 2013



Land Use Department  
Countywide Service Building • 2001 12th Street, 4th Floor • Boulder, CO 80502  
Building Safety & Inspection Services

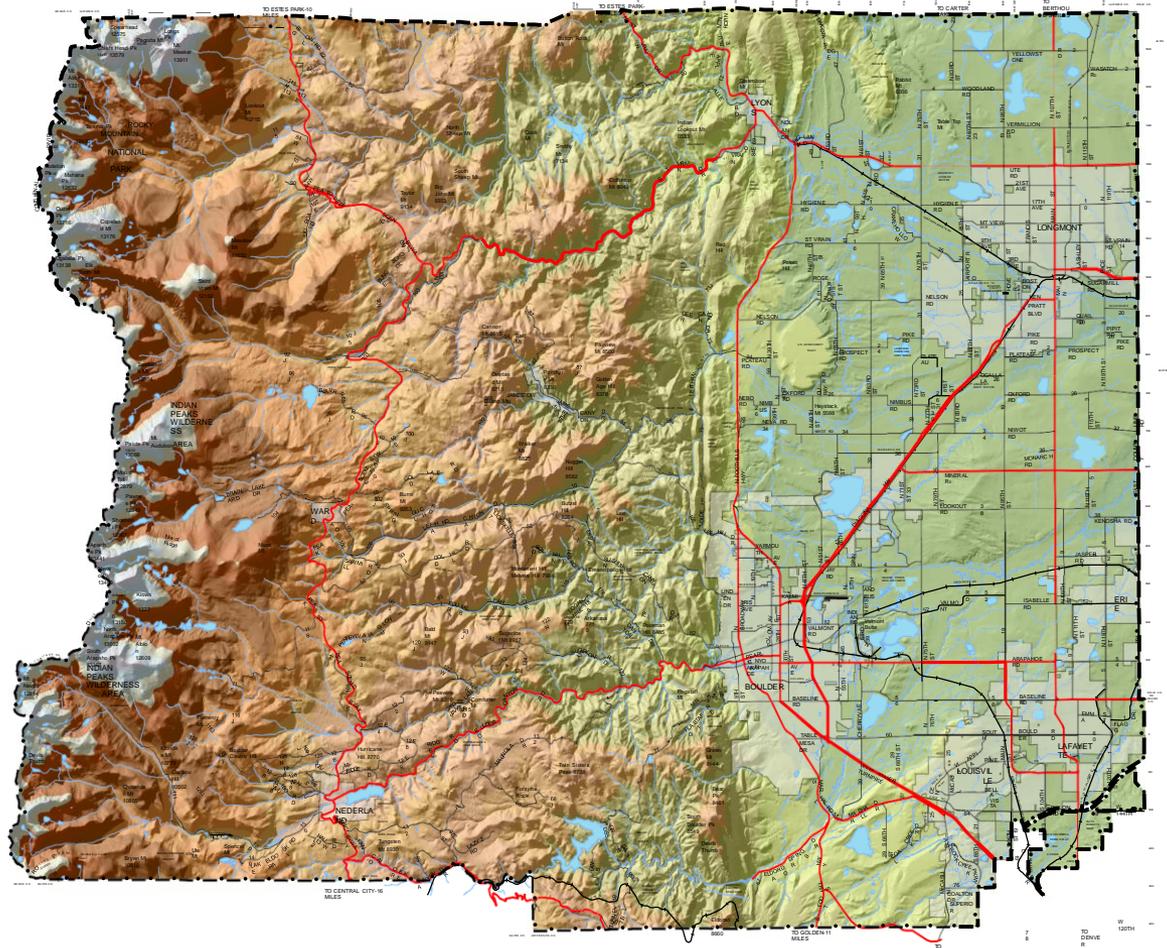
**DOCKET #BORC-16-001**

**Proposed BOCC Resolution #2016-96**

**MINOR AMENDMENTS TO  
THE BOULDER COUNTY  
BUILDING CODE**



# BOULDER COUNTY



Coordinate System: Colorado State  
Plane North NAD83 / HARN  
Projection: Lambert Conformal Conic  
Central Meridian: -  
105.500 Latitude of  
Origin: 40.333

Source:  
USGS 7.5 Min. DEM  
Boulder County Transm.  
Data  
Date: June 2003

# UNINCORPORATED BOULDER COUNTY

- DOES INCLUDE:

- Boulder County areas outside of cities and towns
- Unincorporated areas like Allenspark, Eldora, Eldorado Springs, portions of Gunbarrel and all of Niwot

- DOES NOT INCLUDE:

- Cities of Boulder, Lafayette, Longmont and Louisville
- Towns of Erie, Jamestown\*, Lyons, Nederland, Superior and Ward

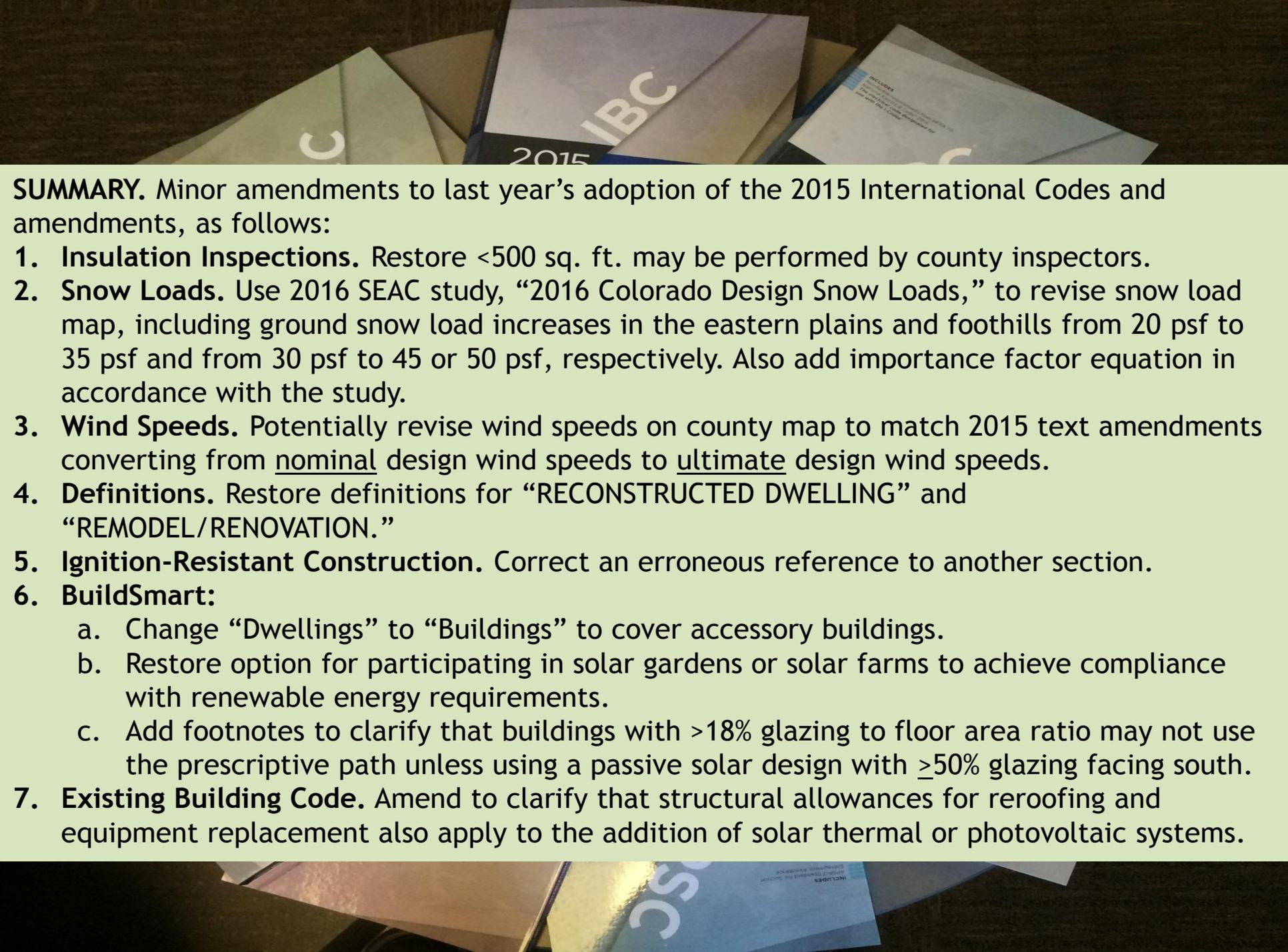


\* Boulder County does perform building plan reviews and inspections for the Town of Jamestown through an intergovernmental agreement.

# 2016 BUILDING CODES AMENDMENTS PROCESS

- Land Use Department Web Site Postings, Updates and E-Mail Notifications to E-Mail List Servers, Licensed Contractors and other interested parties.
- Thursday, August 25, 2016: Public Notice of Board of Review hearing published in the Longmont Times-Call. Information packets sent to the Board of Review and available for public review.
- **Thursday, September 1, 2016 - 3:00 P.M.: Boulder County Board of Review Public Hearing** for input and feedback from the public and to make a recommendation to the Board of County Commissioners.
- Tuesday, September 6: Public Notice of Board of County Commissioners hearing published in the Longmont Times-Call
- Tuesday, September 13: Information packets sent to Board of County Commissioners and available for public review.
- **Tuesday, September 20, 2016 - 9:30 A.M.: Board of County Commissioners Public Hearing.**
- **Friday, January 1, 2017:** Amendments Effective for all Building Permit Applications received after this date.



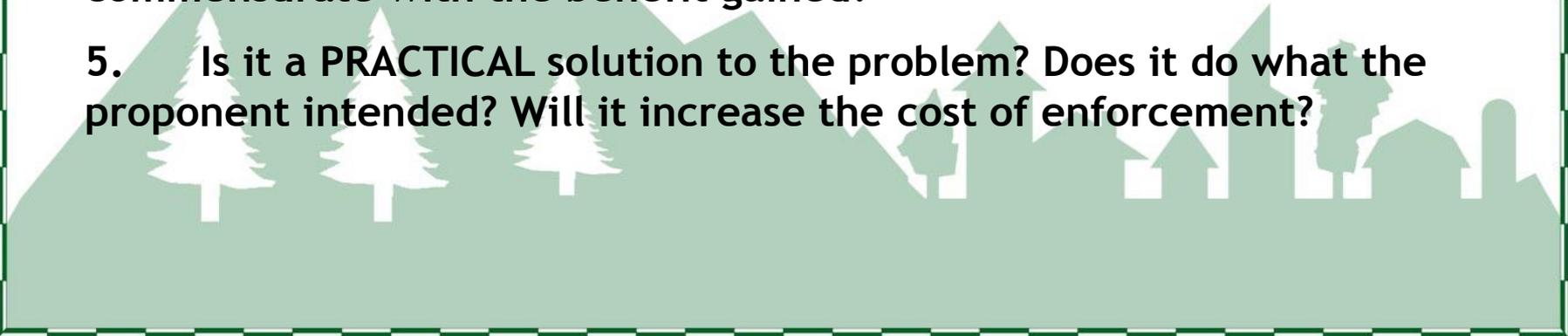


**SUMMARY.** Minor amendments to last year's adoption of the 2015 International Codes and amendments, as follows:

1. **Insulation Inspections.** Restore <500 sq. ft. may be performed by county inspectors.
2. **Snow Loads.** Use 2016 SEAC study, "2016 Colorado Design Snow Loads," to revise snow load map, including ground snow load increases in the eastern plains and foothills from 20 psf to 35 psf and from 30 psf to 45 or 50 psf, respectively. Also add importance factor equation in accordance with the study.
3. **Wind Speeds.** Potentially revise wind speeds on county map to match 2015 text amendments converting from nominal design wind speeds to ultimate design wind speeds.
4. **Definitions.** Restore definitions for "RECONSTRUCTED DWELLING" and "REMODEL/RENOVATION."
5. **Ignition-Resistant Construction.** Correct an erroneous reference to another section.
6. **BuildSmart:**
  - a. Change "Dwellings" to "Buildings" to cover accessory buildings.
  - b. Restore option for participating in solar gardens or solar farms to achieve compliance with renewable energy requirements.
  - c. Add footnotes to clarify that buildings with >18% glazing to floor area ratio may not use the prescriptive path unless using a passive solar design with  $\geq 50\%$  glazing facing south.
7. **Existing Building Code.** Amend to clarify that structural allowances for reroofing and equipment replacement also apply to the addition of solar thermal or photovoltaic systems.

# CODE CHANGE DEVELOPMENT AND REVIEW CRITERIA

1. Is the code change **NECESSARY**? Is there really a problem with the existing code? Does the proposed change already exist in another section of the code or as part of a recently approved code change?
2. Is there **SUPPORTING DATA** or convincing evidence to illustrate or support the specific code change?
3. Is it **UNIFORM**? Can it be applied to any geographic area or is it needed only in a limited region? Is it generic in terms of any products to be used and thus not a proprietary code change?
4. Is it **FEASIBLE**? Can the requirement be constructed with existing or readily available methods and technology? If a product is involved, is that product readily available? Is any additional cost to the consumer commensurate with the benefit gained?
5. Is it a **PRACTICAL** solution to the problem? Does it do what the proponent intended? Will it increase the cost of enforcement?

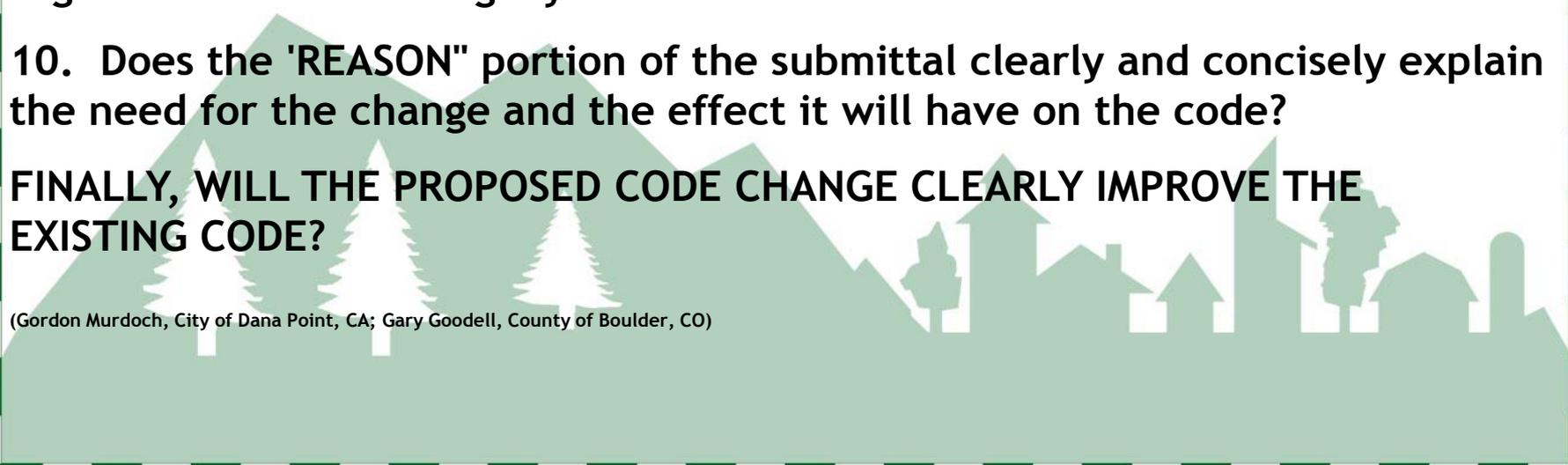


## **CODE CHANGE DEVELOPMENT AND REVIEW CRITERIA, cont'd**

- 6. Is it located in the right code chapter or section? Could it be more effective in a different LOCATION?**
- 7. Is the proposed change CONSISTENT with other code provisions and other model codes? Does it require corresponding changes in other code sections or other codes?**
- 8. Is the wording as CLEAR as it can be? Is it concise while still saying everything it needs to say? Does it avoid confusion and the potential for varying interpretations?**
- 9. Is the FORMAT of the code change consistent with proper code organization and writing style?**
- 10. Does the 'REASON' portion of the submittal clearly and concisely explain the need for the change and the effect it will have on the code?**

**FINALLY, WILL THE PROPOSED CODE CHANGE CLEARLY IMPROVE THE EXISTING CODE?**

(Gordon Murdoch, City of Dana Point, CA; Gary Goodell, County of Boulder, CO)



# PROPOSED CHANGE, ADMINISTRATIVE PROVISIONS, CHAPTER 1:

## BOULDER COUNTY BUILDING CODE CHAPTER 1

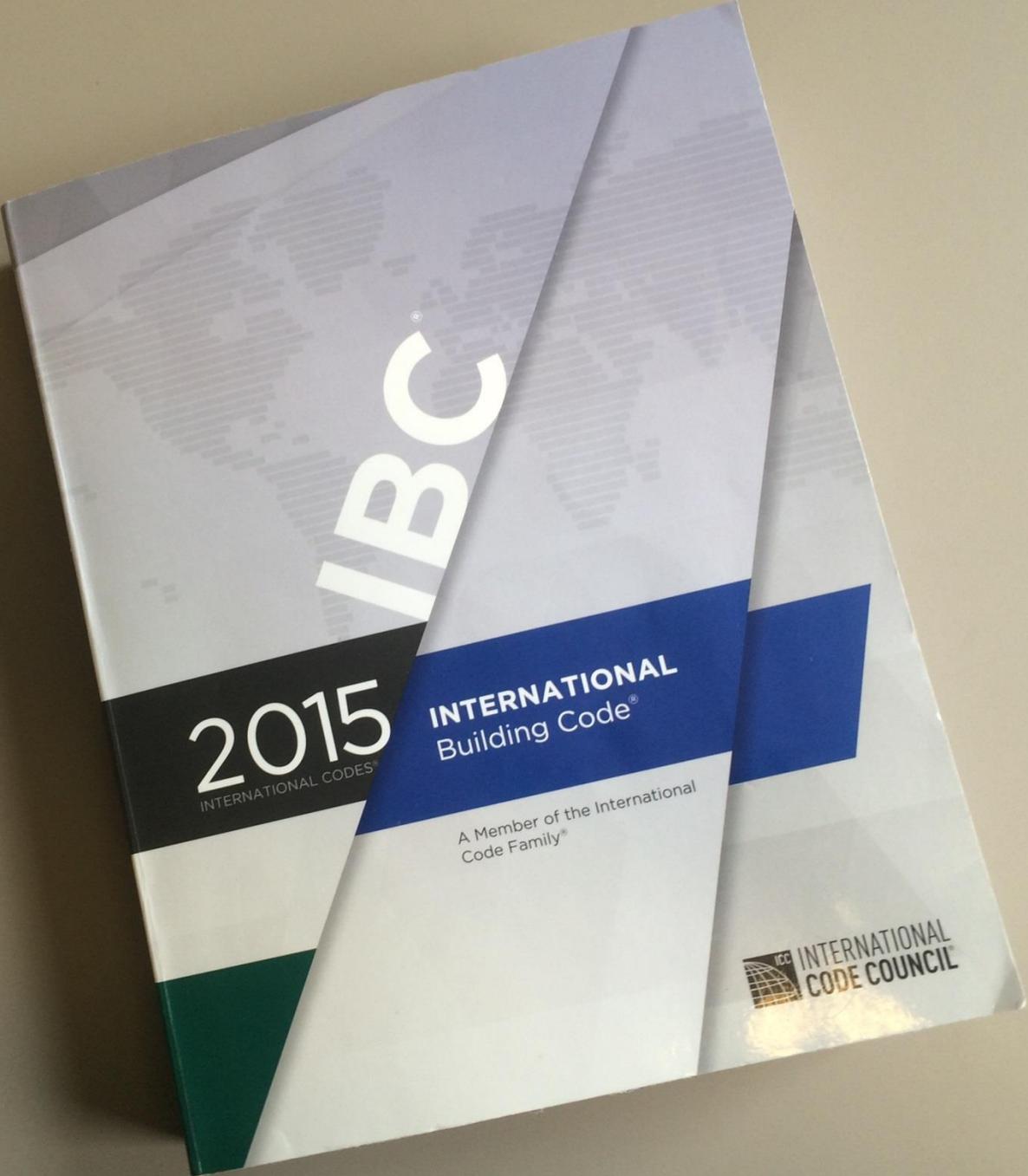
### PART 2—ADMINISTRATION AND ENFORCEMENT

#### SECTION 110 INSPECTIONS

Note: Reinsert a provision from the 2012 International Codes adoption that permits insulation inspections for smaller projects to be inspected by county building inspectors.

**110.3.7 Energy efficiency inspections.** Inspections shall be made to determine compliance with IBC Chapter 13 or IRC Chapter 11 and shall include, but not be limited to, inspections for: envelope insulation *R*- and *U*-values, fenestration *U*-value, duct system *R*-value, and HVAC and water-heating equipment efficiency.

**Exception:** Insulation inspections for projects exceeding 500 sq. ft. of conditioned floor area (CFA) must be performed by an approved third party energy rater. For projects of 500 sq. ft. of conditioned floor area (CFA) or less, an insulation inspection will be performed by the county upon request and the insulation installer shall post an insulation certificate in accordance with IRC Section N1101.14.



IBC<sup>®</sup>

2015  
INTERNATIONAL CODES<sup>®</sup>

INTERNATIONAL  
Building Code<sup>®</sup>

A Member of the International  
Code Family<sup>®</sup>

 INTERNATIONAL  
CODE COUNCIL

**PROPOSED CHANGE, STRUCTURAL PROVISIONS, IBC CHAPTER 16:**

**IBC CHAPTER 16  
STRUCTURAL DESIGN**

**IBC SECTION 1608  
SNOW LOADS**

**1608.2 Ground snow loads.**

*Note: Add an additional sentence to the end of the paragraph, as follows:*

Snow loads shall be determined by the *building official* utilizing the Boulder County map, “Colorado Front Range Gust Map and Snow Load Design Data for Colorado,” as amended. Snow loads are based upon the report, “2016 Colorado Design Snow Loads,” prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016.



# Design of Roofs to Support Colorado Snow Loads

February 12, 2016

Jeannette Torrents, P.E., SE., JVA Inc.

Abbie Liel, P.E., Ph.D., University of Colorado Boulder

Representing the SEAC Snow Load Committee:

Jim Harris, P.E., Ph.D | D. Jared DeBock, Ph.D. | Bob Pattillo, P.E.



# Acknowledgments



## **Structural Engineers Association of Colorado Snow Load Committee**

Jeannette Torrents, Jim Harris, Jared DeBock, Abbie Liel, Bob Pattillo, Michael DePaolo, Dick Cunningham

## **Technical Contributors**

Bruce Ellingwood, Michael O'Rourke, Jamie Geis, Kristen Strobel, Derek Kozak, Dania Hussain

- Reviewed by Dr. Bruce Ellingwood, Former Vice-Chair of the SEI-ASCE Technical Council on Life-Cycle Performance, Safety, Reliability and Risk of Structural Systems
- Accepted by the ASCE 7 Snow and Rain Loads Committee for inclusion in ASCE 7-16
- Endorsed by the Structural Engineers Association of Colorado
- Loads included in 2016 Denver Building Code Amendments
- Presented at the 12<sup>th</sup> International Conference on Applications of Statistics and Probability in Civil Engineering

# Motivation for Change

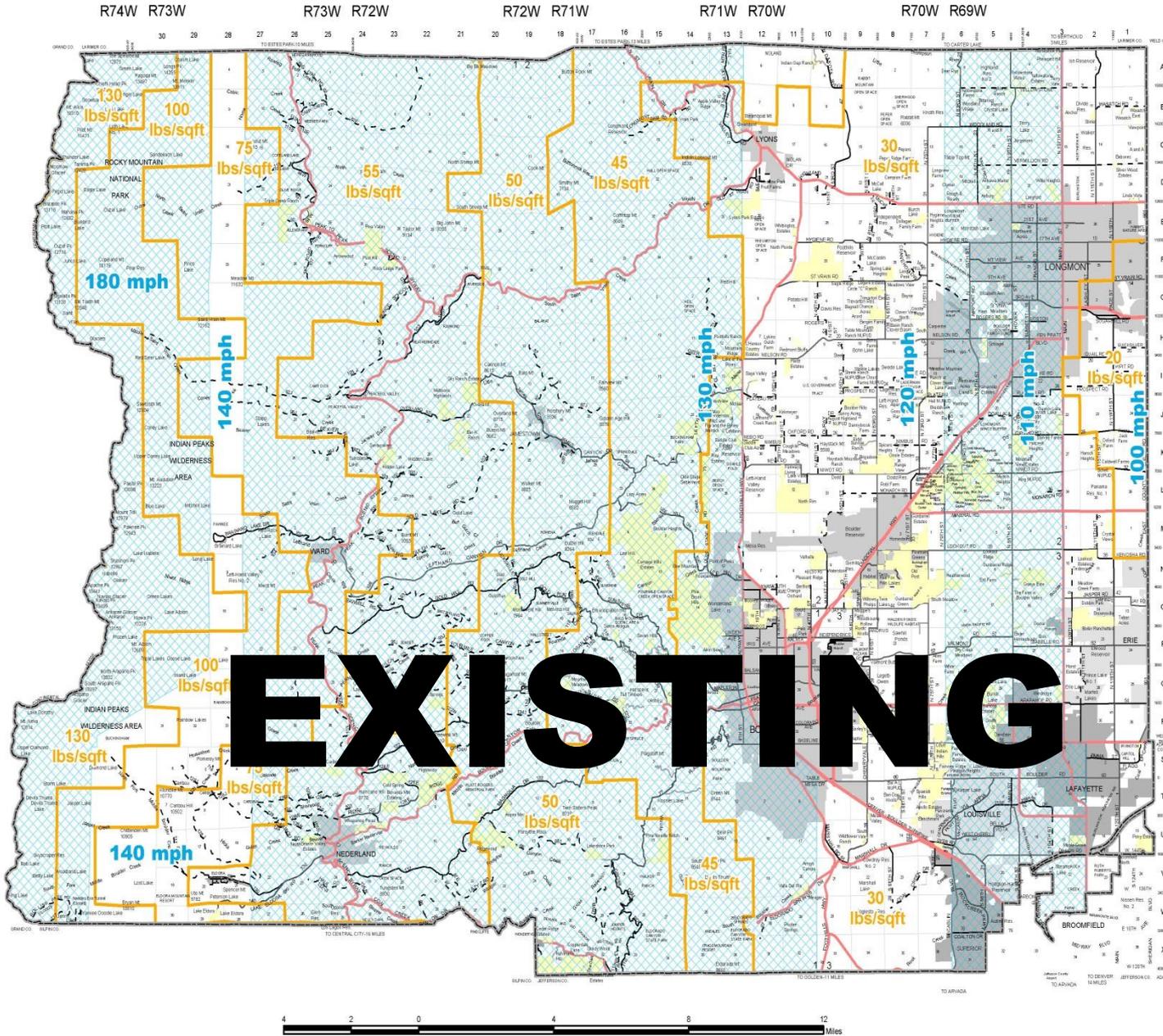
## Then: Uniform Hazard

- 50-year snow load for design, corresponds to 2% annual probability of load occurring
- Produces varying probabilities of failure, from  $\beta = 2$  (2.3% in 50 years) to  $\beta = 3.25$  (0.16% in 50 years)

## Now: Uniform Risk

- Probability of design load occurring varies
- Satisfies industry standard for all load and structure types to balance economy and safety corresponding to probability of failure for  $\beta = 3$  (0.13% in 50 years)

Colorado Front Range Gust Map  
and  
Snow Load Design Data for Colorado



LEGEND



140 mph

Design 3 Second Gust

Wind Load  
Interpolate between vertically labelled lines.  
Constant with horizontally labelled areas.



50 lbs/sqft

Design Ground Snow Load

Incorporated Areas

Subdivision or Platted Area

Note:  
Snow load design data based on report on "Snow load design data for Colorado," prepared by the Structural Engineers Assoc. of Colorado, Oct. 1971. Modified by the Boulder County building official as permitted in the International Building Code 2003 and International Residential Code 2006. This design data map provides the basic design ground snow loads for anywhere within Boulder County.

Wind Load design data based on a report titled "Colorado Front Range Gust Map" presented to the Structural Engineers Association of Colorado (SEAC) at its March 16, 2006 General Meeting, authored by Jon A. Penka with the technical assistance of SEAC's Wind Load Committee.



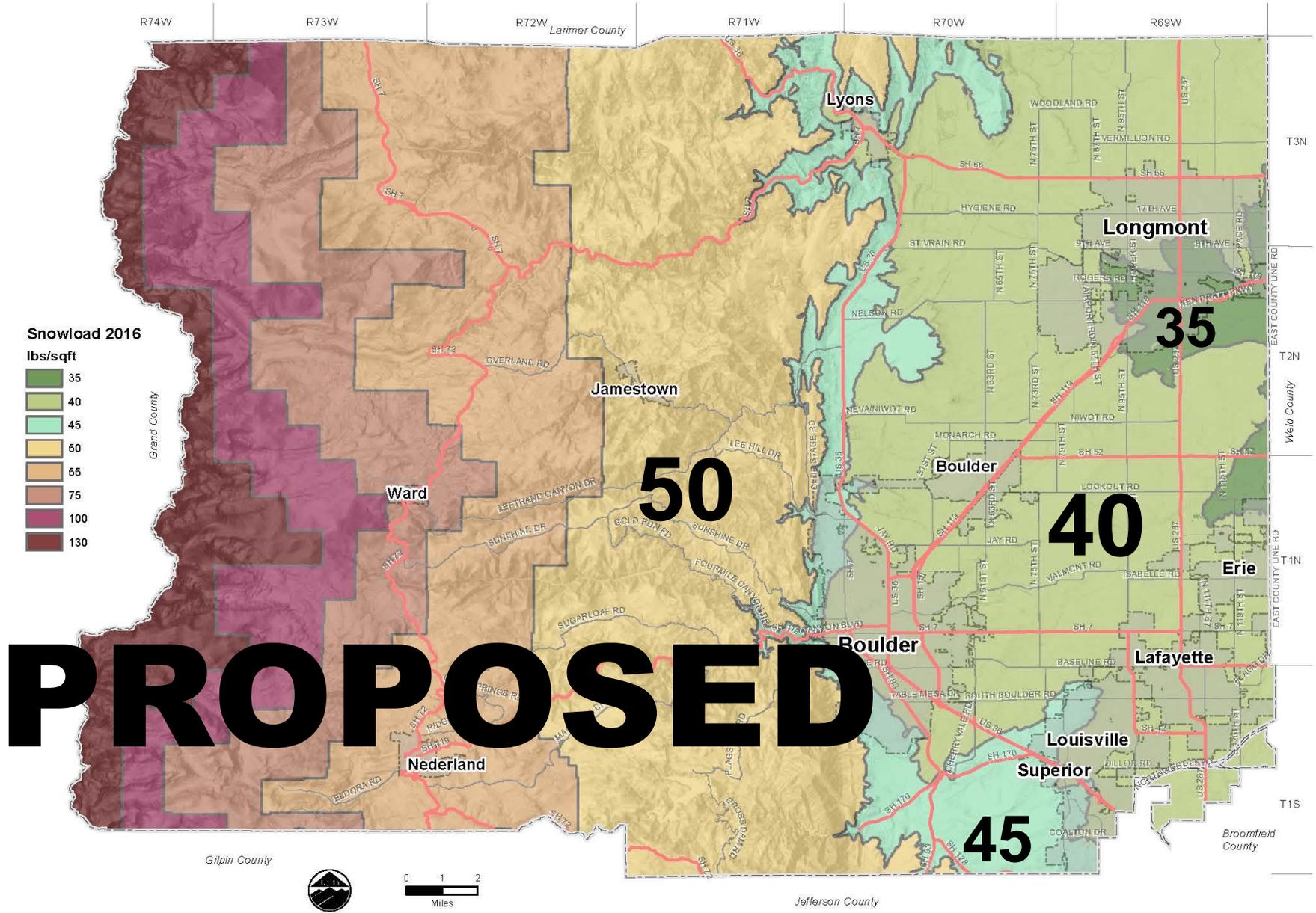
This map is for illustrative purposes only, and is not suitable for parcel-specific decision making. The areas depicted here are approximate. More site-specific studies may be required to draw accurate conclusions.

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# Proposed - 2016 Snow Load



**Snowload 2016**  
lbs/sqft

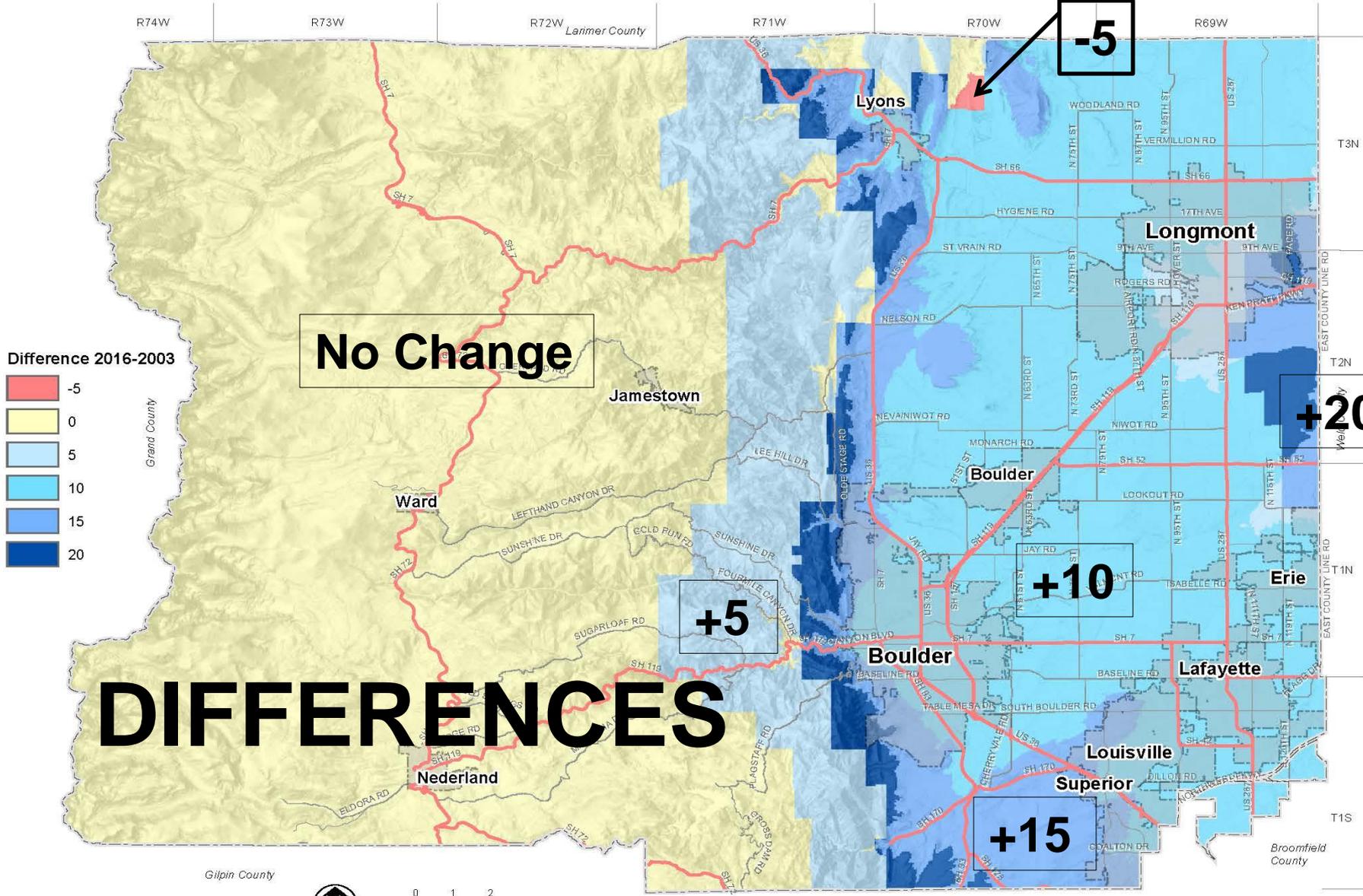
35
40
45
50
55
75
100
130

# PROPOSED





# Snow Load difference 2016-2003



No Change

-5

+20

+5

+10

+15

# DIFFERENCES

Gilpin County



Jefferson County

ASCE STANDARD

ASCE/SEI  
7-10

# Minimum Design Loads for Buildings and Other Structures

This document uses both the  
International System of Units (SI)  
and customary units

**ASCE**



RENCEED STANDARDS

**APA—continued**

Design and Fabrication of Plywood Sandwich Panels (revised 2013)	2306.1
Design and Fabrication of All-plywood Beams (revised 2013)	2306.1
Standard for Performance-Rated Cross-Laminated Timber	2303.1.4
Builders Tips: Proper Storage and Handling of Glulam Beams	2306.1
Glued Laminated Beam Design Tables	2306.1
Field Notching and Drilling of Glued Laminated Timber Beams	2306.1
Glulam Connection Details	2306.1
Product Guide-Glulam	2306.1
Glulam in Residential Construction-Western Edition	2306.1

The Association of Pool & Spa Professionals  
2111 Eisenhower Avenue  
Alexandria, VA 22314

**APSP**

Title	Referenced in code section number
Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs and Catch Basins	3109.5

American Society of Agricultural and Biological Engineers  
2950 Niles Road  
St. Joseph, MI 49085

**ASABE**

Title	Referenced in code section number
Diaphragm Design of Metal-clad, Wood-frame Rectangular Buildings	2306.1
Shallow-post and Pier Foundation Design	2306.1
Design Requirements and Bending Properties for Mechanically Laminated Wood Assemblies	2306.1

American Society of Civil Engineers  
Structural Engineering Institute  
1801 Alexander Bell Drive  
Reston, VA 20191-4400

**ASCE/SEI**

Title	Referenced in code section number
Building Code Requirements for Masonry Structures	1405.6, 1405.6.1, 1405.6.2, 1405.10, 1604.3.4, 1705.4, 1705.4.1, 1807.1.6.3, 1807.1.6.3.2, 1808.9, 2101.2, 2106.1, 2107.1, 2107.2, 2107.3, 2107.4, 2108.1, 2108.2, 2108.3, 2109.1, 2109.1.1, 2109.2, 2109.2.1, 2109.3, 2110.1
Specification for Masonry Structures	1405.6.1, 1705.4, 1807.1.6.3, 2103.1, 2103.2.1, 2103.3, 2103.4, 2104.1, 2105.1

REFERENCES

**ASCE/SEI—continued**

Minimum Design Loads for Buildings and Other Structures with Supplement No. 1

Table 1609.5, 1609.8.2, 1609.10, 1609.11, 1609.12, 1609.13, 1609.14, 1609.15, 1609.16, 1609.17, 1609.18, 1609.19, 1609.20, 1609.21, 1609.22, Table 1609.8.2, 1609.8.3, 1609.8.4, 1609.8.5, 1609.8.6, 1609.8.7, 1609.8.8, 1609.8.9, 1609.8.10, 1609.8.11, 1609.8.12, 1609.8.13, 1609.8.14, 1609.8.15, 1609.8.16, 1609.8.17, 1609.8.18, 1609.8.19, 1609.8.20, 1609.8.21, 1609.8.22, 1609.8.23, 1609.8.24, 1609.8.25, 1609.8.26, 1609.8.27, 1609.8.28, 1609.8.29, 1609.8.30, 1609.8.31, 1609.8.32, 1609.8.33, 1609.8.34, 1609.8.35, 1609.8.36, 1609.8.37, 1609.8.38, 1609.8.39, 1609.8.40, 1609.8.41, 1609.8.42, 1609.8.43, 1609.8.44, 1609.8.45, 1609.8.46, 1609.8.47, 1609.8.48, 1609.8.49, 1609.8.50, 1609.8.51, 1609.8.52, 1609.8.53, 1609.8.54, 1609.8.55, 1609.8.56, 1609.8.57, 1609.8.58, 1609.8.59, 1609.8.60, 1609.8.61, 1609.8.62, 1609.8.63, 1609.8.64, 1609.8.65, 1609.8.66, 1609.8.67, 1609.8.68, 1609.8.69, 1609.8.70, 1609.8.71, 1609.8.72, 1609.8.73, 1609.8.74, 1609.8.75, 1609.8.76, 1609.8.77, 1609.8.78, 1609.8.79, 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## **ADVANTAGES:**

- Fully vetted at state, national & academic levels
- Aligns with ASCE 7-10, referenced standard for IBC & IRC
- More **RESILIENT** structures in face of increased global warming, climate change and more severe weather events



## POTENTIAL DISADVANTAGES:

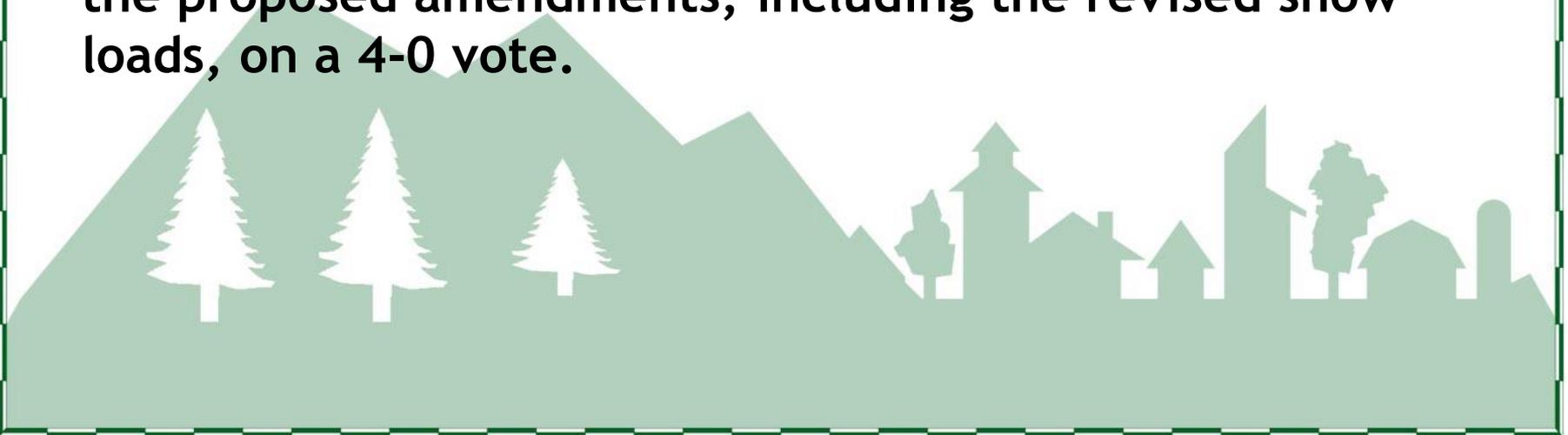
- Unintended Consequences?
- Solar PV or Solar Thermal installations on existing structures designed and built in accordance with the existing snow loads?

# OPTIONS FOR ACTION ON SNOW LOADS:

- 1. Do nothing (status quo).** Continue to use the existing, albeit outdated, snow load map.
- 2. Update.** Utilize the SEAC 2016 Colorado Design Snow Loads report to update the Boulder County Snow Load Map.
- 3. Phased/Modification approach?** Require structural engineer's calculations in accordance with the new snow loads, but allow the *building official* to approve a modification based upon an engineer's report stating that a reasonable margin of safety is provided. This may include a review date or an end date.

## **BOULDER COUNTY BOARD OF REVIEW TESTIMONY AND ACTION**

- **Four (4) structural engineers (2 on the board and 2 in the audience) and one solar installer were present at the September 1 public hearing.**
- **After quite a bit of discussion, it was determined that adopting the new snow load study and map will not substantially change engineering practice or construction in the eastern portion of the unincorporated county where the ground snow loads are proposed to be increased.**
- **The Boulder County Board of Review unanimously approved the proposed amendments, including the revised snow loads, on a 4-0 vote.**



## SUMMARY OF SNOW LOAD FINDINGS:

- Snow loads in the eastern county are currently 20 psf or 30 psf ground snow loads. With the 0.7 reduction factor permitted by ASCE 7-10, this permits roof loads to be 14 psf or 21 psf, respectively.
- It has been common practice for local engineers to design for a 30-lb roof load, which is really a 43-lb ground snow load (43-lb ground load X 0.7 reduction = 30-lb roof load)
- Boulder County allows all of the reduction factors permitted under the IBC, IRC and ASCE 7-10.
- Denver increased their ground snow load from 20 psf to 35 psf when they adopted the 2015 International Codes, but they had a previous amendment that required a minimum 25 psf roof load, which is equivalent to a 35 psf ground snow load, so neither design nor construction really changed.

## REVISED IMPORTANCE FACTOR EQUATION:

- The 2016 SEAC Snow Load Study, for similar reasons, also contains a recommendation for a revised importance factor equation for Risk Category III and Risk Category IV buildings.
- Risk categories generally are as follows:
  - Category I: Low hazard, such as agricultural or minor storage facilities.
  - Category II: Moderate hazard, including most buildings, i.e., single-family homes, small businesses, etc.
  - Category III: Substantial hazard to human life, including assembly occupancies of > 300 people, schools with > 250 students, etc.
  - Category IV: Essential facilities, such as fire and police stations, hospitals with surgery or emergency treatment, emergency shelters, etc.

# IBC CHAPTER 16 STRUCTURAL DESIGN

## IBC SECTION 1604 GENERAL DESIGN REQUIREMENTS

Note: Add an additional paragraph to IBC Section 1604.5:

**1604.5 Risk category.** Each building and structure shall be assigned a risk category in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the risk category...

For snow loads, the snow loading importance factor ( $I_s$ ) for risk category IV buildings shall be computed in accordance with Equation 1.4 below in accordance with the recommendations in the report “2016 Colorado Design Snow Loads,” prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016. For risk category III buildings,  $I_s$  shall be taken from the average of Equation 1.4 and the value 1.0.

$$I_s = 1.15 < 1.66 - 0.056 * A < 1.4$$

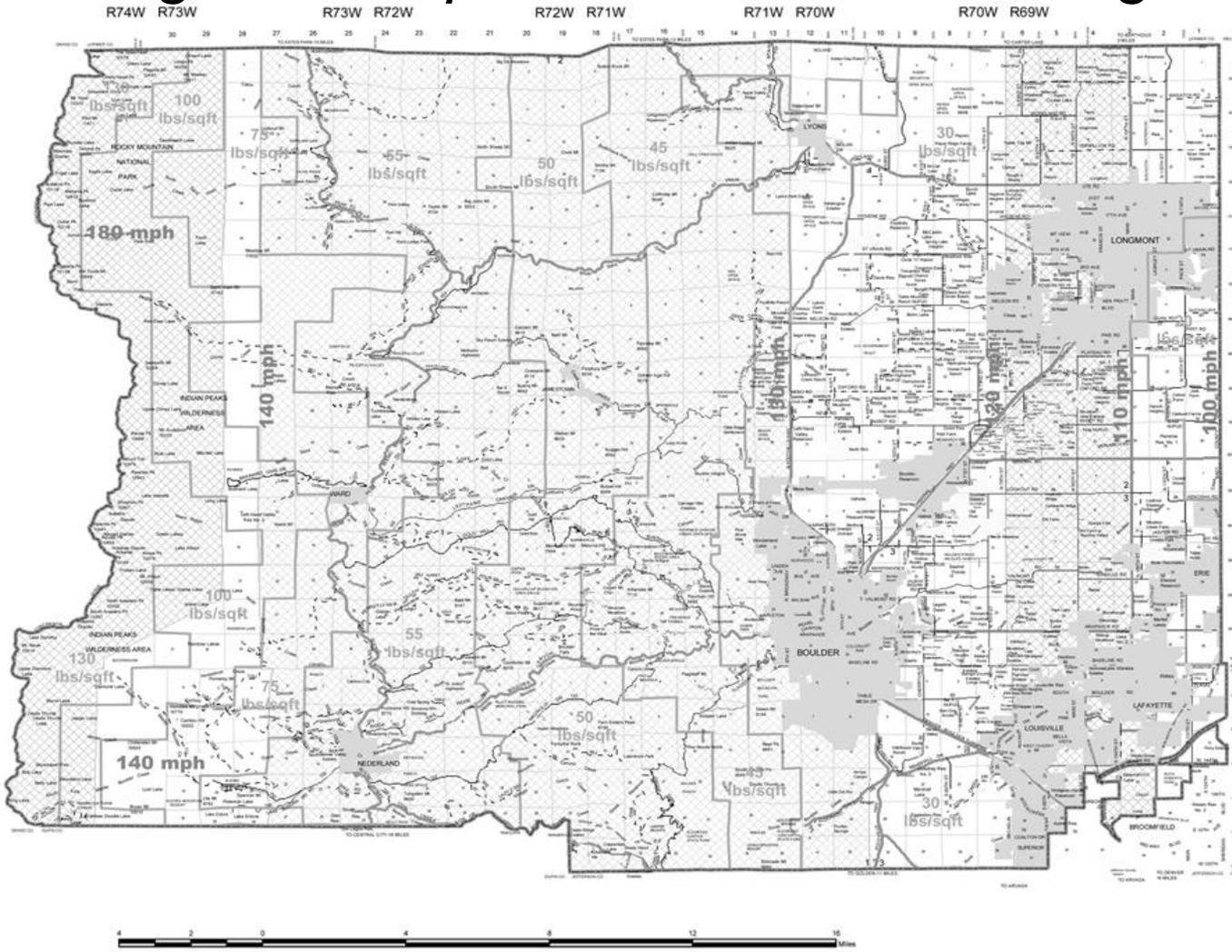
**(Equation 1.4)**

where:

A = the site altitude in thousands of feet.

The remainder of Section 1604 is to remain as published.

*If staff time permits prior to January 1, 2017, revise this existing wind map to reflect ultimate design wind speeds.*



**Colorado Front Range Gust Map and Snow Load Design Data for Colorado**

**LEGEND**

-  **140 mph**  
Design 3 Second Gust Wind Load  
Interpolate between vertically labelled lines. Constant with horizontally labelled areas.
-  **50 lbs/sqft**  
Design Ground Snow Load
-  **Incorporated Areas**
-  **Subdivision or Platted Area**

Note:  
Snow load design data based on report on "Snow load design data for Colorado" prepared by the Structural Engineers Assoc. of Colorado, Oct. 1971. Modified by the Boulder County building official as permitted in the International Building Code 2006 and International Residential Code 2006. This design data map provides the basic design ground snow loads for anywhere within Boulder County.  
Wind Load design data based on a report titled "Colorado Front Range Gust Map" presented to the Structural Engineers Association of Colorado (SEAC) at its March 18, 2006 General Meeting, authored by Jon A. Petrus with the technical assistance of SEAC's Wind Load Committee.



This map is for illustrative purposes only, and is not suitable for parcel-specific decision-making. The areas depicted here are approximate. More site-specific studies may be required to draw accurate conclusions.

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**INCLUDES**  
Residential requirements from NFPA 70,  
National Electrical Code® 2014  
The electrical code designated for  
use with the I-Codes®

**IRC**

**2015**  
INTERNATIONAL CODES®

**INTERNATIONAL**  
Residential Code®  
FOR ONE- AND TWO-FAMILY  
DWELLINGS

A Member of the International  
Code Family®

 **INTERNATIONAL  
CODE COUNCIL®**

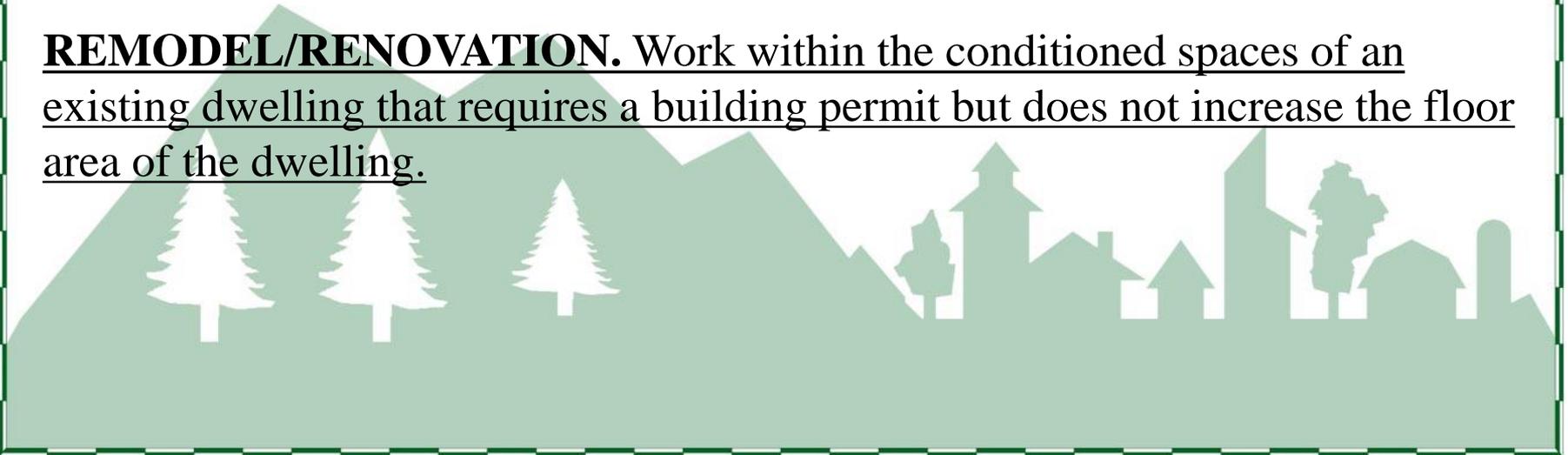
## ***Part II—Definitions***

# **IRC CHAPTER 2 DEFINITIONS**

*Note: Restore two definitions from the 2012 International Codes adoption:*

**RECONSTRUCTED DWELLING.** A dwelling which has been completely deconstructed, deconstructed to the foundation level, or deconstructed to the first floor level. For the purposes of this code, a reconstructed dwelling shall be considered a new dwelling.

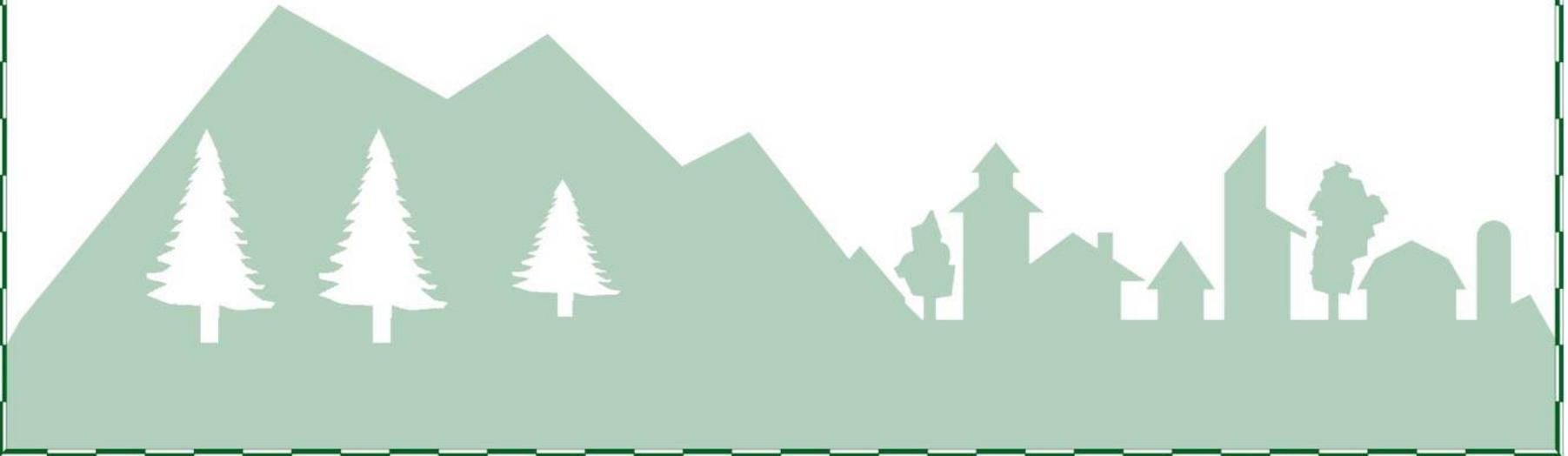
**REMODEL/RENOVATION.** Work within the conditioned spaces of an existing dwelling that requires a building permit but does not increase the floor area of the dwelling.



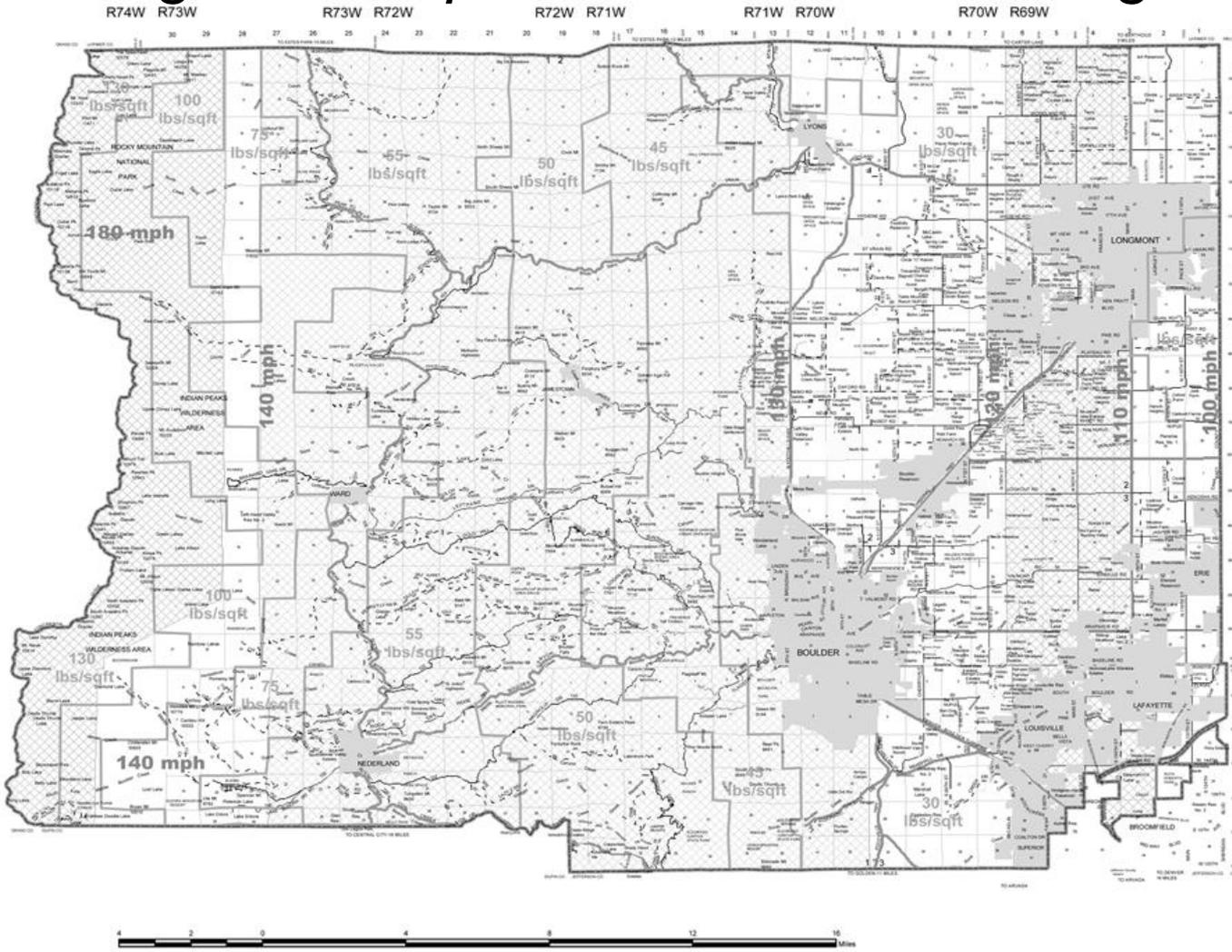
***Part III—Building Planning and Construction***

**IRC CHAPTER 3  
BUILDING PLANNING**

**SECTION R301  
DESIGN CRITERIA**



*If staff time permits prior to January 1, 2017, revise this existing wind map to reflect ultimate design wind speeds.*



**Colorado Front Range Gust Map  
and  
Snow Load Design Data for Colorado**

**LEGEND**

-  **140 mph**  
Design 3 Second Gust  
Wind Load  
Interpolate between vertically labelled lines.  
Constant with horizontally labelled areas.
-  **50 lbs/sqft**  
Design Ground Snow Load
-  **Incorporated Areas**
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Note:

Snow load design data based on report on "Snow load design data for Colorado" prepared by the Structural Engineers Assoc. of Colorado, Oct. 1971. Modified by the Boulder County building official as permitted in the International Building Code 2006 and International Residential Code 2006. This design data map provides the basic design ground snow loads for anywhere within Boulder County.

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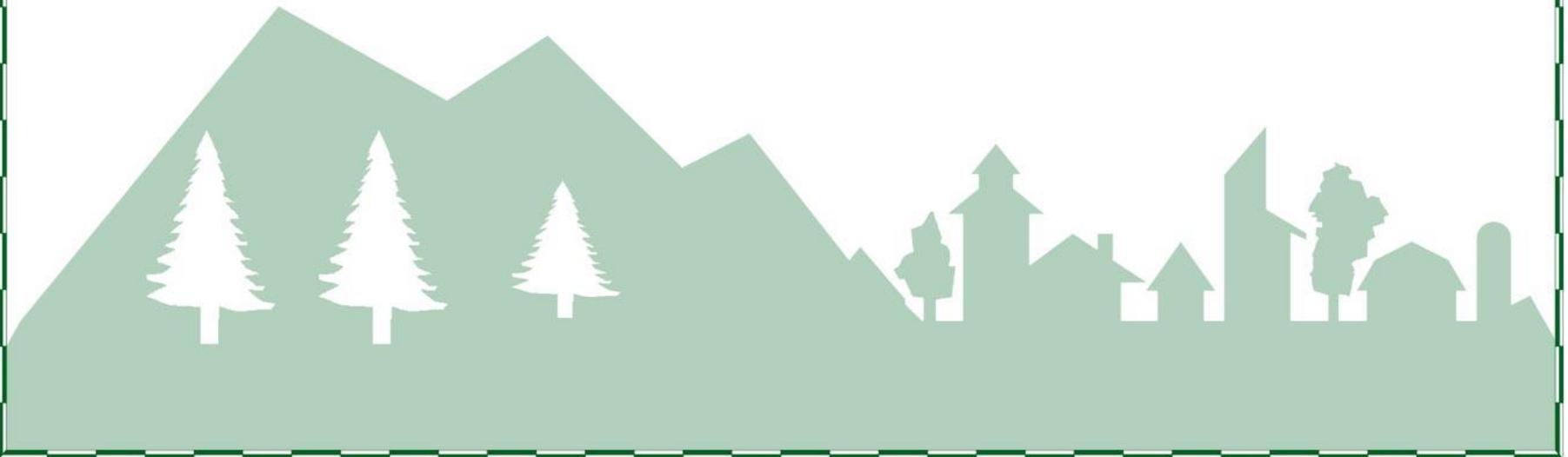
Copyright 2007 by the County of Boulder, Colorado. All rights reserved. No part of this map may be copied, reproduced, or transmitted in any form or by any means whether graphic, electronic, or mechanical, including photocopying, recording, or by an information storage and retrieval system, without written permission from the County of Boulder, Colorado.

*Note: Delete the first sentence in the currently amended section and add ~~æ~~ two sentences at the beginning of Section R301.2.3 to cite the Boulder County Snow Load Map and the 2016 SEAC Colorado Design Snow Loads study, with the remainder of the section to remain as published.*

**R301.2.3 Snow Loads.** ~~Ground snow loads shall be determined based on the Boulder County Snow Load Map prepared by the Structural Engineers Association of Colorado and dated October 1971, titled “Colorado Front Range Gust Map and Snow Load Design Data for Colorado, as amended.”~~ Snow loads shall be determined by the *building official* utilizing the Boulder County map, “Colorado Front Range Gust Map and Snow Load Design Data for Colorado,” as amended. Snow loads are based upon the report, “2016 Colorado Design Snow Loads,” prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016. Wood-framed construction, coldformed steel-framed construction and masonry and concrete construction, and structural insulated panel construction in regions with ground snow loads 70 pounds per square foot (3.35 kPa) or less, shall be in accordance with Chapters 5, 6 and 8. Buildings in regions with ground snow loads greater than 70 pounds per square foot (3.35 kPa) shall be designed in accordance with accepted engineering practice.

*Add an additional sentence to the note stating that IRC Sections R325 and R326 remain as published, as otherwise the existing Boulder County amendments appear to skip from Section R324 to Section R327.*

*Note: Sections R325 and R326 remain as published. Add a Section R327 to require ignition-resistant construction and defensible space in wildfire hazard areas.*





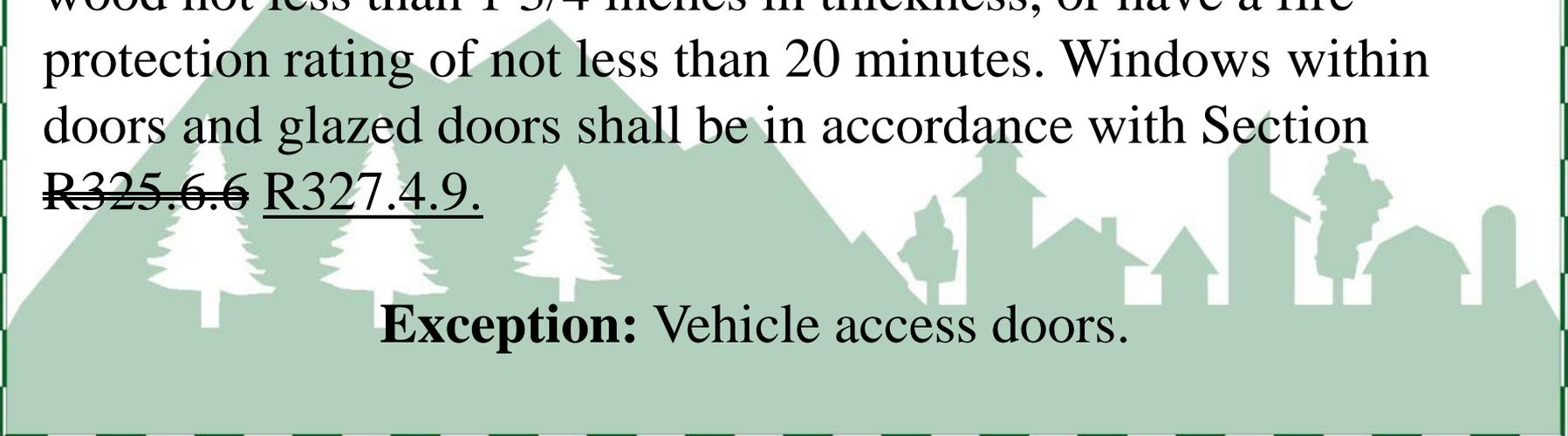
**IRC R327 IGNITION-RESISTANT CONSTRUCTION**

## SECTION R327 IGNITION-RESISTANT MATERIALS AND CONSTRUCTION

*Note: Correct an incorrect reference to another section in the ignition-resistant construction provisions.*

**R327.4.10 Exterior doors.** Exterior doors and garage doors shall be approved noncombustible construction, metal clad, solid core wood not less than 1 3/4 inches in thickness, or have a fire protection rating of not less than 20 minutes. Windows within doors and glazed doors shall be in accordance with Section ~~R325.6.6~~ R327.4.9.

**Exception:** Vehicle access doors.



## ***Part IV—Energy Conservation***

### **IRC CHAPTER 11 ENERGY EFFICIENCY**

#### **SECTION N1101 GENERAL**

*Note: Change “Dwellings” to “Buildings,” as new detached accessory structures that are heated and/or cooled also need to meet BuildSmart requirements. The title of Table N1101.13.1 is also changed accordingly.*

**N1101.13 Compliance.** Projects shall comply with one of the following:

**N1101.13.1 New ~~Dwellings~~ Buildings.** New ~~dwellings~~ buildings shall comply with the requirements of Figure N1101.13.1, “Options for New ~~Dwellings~~ Buildings.”



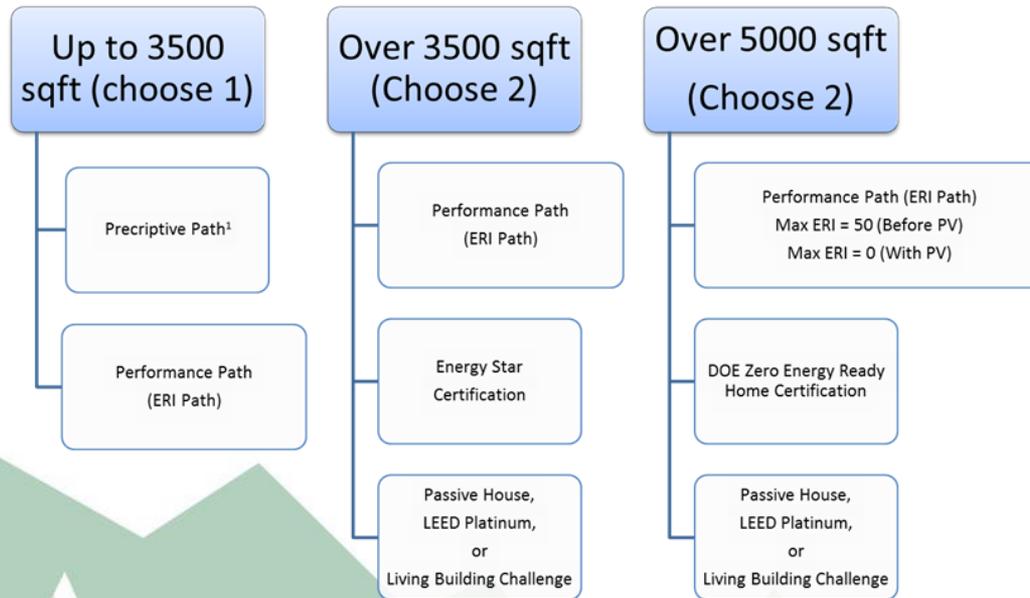
Note: Add a new sub-section that reinserts a provision from the 2012 International Codes adoption that permits participation in “solar gardens” or “solar farms” as a way to comply with the renewable energy requirements of the Buildsmart program.

**N1101.18 Renewable energy requirements.** Whenever renewable energy systems are required by this chapter, those systems must be constructed on-site.

**Exception:** If an applicant’s property is situated in a part of the county where state law permits local utility companies to operate “solar gardens,” “solar farms,” or similar community renewable energy facilities, the renewable energy requirements of this chapter may be satisfied off-site through the purchase of an adequate share in a community facility, at the discretion of the *building official*. At a minimum, an “adequate” share in a community facility must (1) enable the production of an equivalent amount of power compared to what the applicant would otherwise be required to produce on-site; (2) be purchased from a facility located within Boulder County or a county contiguous to Boulder County; and (3) given that such shares do not automatically run with the applicant’s land, include a mechanism that ensures the share cannot be sold or modified in any way without the consent of Boulder County, with the exception of legal transfer to the applicant’s successors-in-interest for use on the same property. Written proof that these requirements are met must be filed with the Building Safety and Inspection Services Division prior to the final inspection approval or the issuance of a certificate of occupancy.

*Note: Change “Dwellings” in the title of the table to “Buildings,” as new detached accessory structures that are heated and/or cooled also need to meet BuildSmart requirements.*

**FIGURE N1101.13.1**  
**OPTIONS FOR NEW BUILDINGS DWELLINGS<sup>a,b,c,d</sup>**

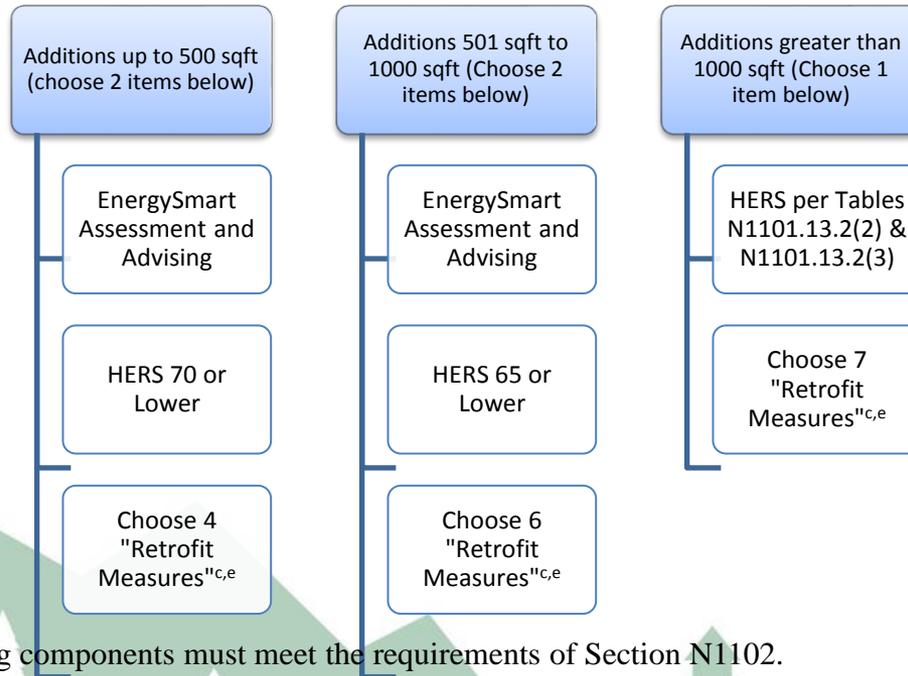


- Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.  
**Exception:** Passive solar designs in which 50% or more of the total glazing faces south.
- The energy efficiency requirements of BuildSmart are deemed to be met by buildings with an annual space conditioning requirement of less than 5kBtu/sqft/year.
- When unconditioned floor area is being converted to *conditioned floor area* (except for basement finishes), the project is to meet the requirements for an addition.
- All “sqft” numbers refer to *conditioned floor area* (“CFA”) in square feet as defined in Section N1101.6.

# FIGURE N1101.13.2(1)

## OPTIONS FOR ADDITIONS<sup>a,b,c,d,e</sup>

Note: Add a footnote “e” identical to the previous table’s footnote “a” noting that buildings with large amounts of glazing must use the performance path and obtain a HERS rating.



- a. All new building components must meet the requirements of Section N1102.  
**Exception:** Homes using the ERI (HERS) pathway.
- b. For additions with greater than 200 square feet of floor area resulting in dwellings with greater than 3,500 square feet of *conditioned floor area*, existing plus proposed, Figures N1101.13.2(2) and Table N1101.13.2(3) must be used.
- c. “Retrofit Measures” are listed in Table N1101.13.3(2).
- d. All “sqft” numbers refer to *conditioned floor area* (“CFA”) in square feet as defined in Section N1101.6.
- e. Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.  
**Exception:** Passive solar designs in which 50% or more of the total glazing faces south.

Note: Change the name to “TABLE” and renumber accordingly.

**TABLE ~~FIGURE~~ N1101.13.2(3)**  
**OPTIONS FOR ADDITIONS---continued:**  
**ERI (HERS) REQUIREMENTS FOR ADDITIONS**

CFA, SQ FT*	MAXIMU M ERI	CFA, SQ FT*	MAXIMU M ERI	CFA, SQ FT*	MAXIMU M ERI
0	76	3500	66	5600	41
1500	76	3600	66	5700	39
1600	76	3700	65	5800	37
1700	75	3800	65	5900	35
1800	75	3900	64	6000	33
1900	74	4000	63	6100	31
2000	74	4100	62	6200	29
2100	73	4200	61	6300	27
2200	73	4300	60	6400	25
2300	72	4400	59	6500	23
2400	72	4500	58	6600	21
2500	71	4600	57	6700	19
2600	71	4700	56	6800	17
2700	70	4800	55	6900	15
2800	70	4900	54	7000	13
2900	69	5000	53	7100	11
3000	69	5100	51	7200	9
3100	68	5200	49	7300	7
3200	68	5300	47	7400	5
3300	67	5400	45	7500	3
3400	67	5500	43	7600	1
				7700 or greater	0

\*Conditioned floor area (“CFA”) is to be rounded to the nearest 100 square feet.

## SECTION N1102 BUILDING THERMAL ENVELOPE

**TABLE N1102.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a,i,m</sup>**

Note: Add a footnote m stating that the prescriptive path may not be used for buildings with a glazing to floor area ratio of more than 18%.

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>a</sup>	SKYLIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b,e</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>i,j</sup>	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>c</sup> WALL R-VALUE
Boulder County (modified 5 & Marine 4)	0.30	0.43	NR	54	19 + 5 <sup>h,k</sup>	18/24	42 <sup>g</sup>	15/20	15, 3 ft	15/20

For SI: 1 foot = 304.8 mm.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall not be less than the *R*-value specified in the table.

**Exception:** An *R*-19 batt installed in a 2 X 6 stud cavity shall be deemed to meet the requirements of this code.

b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

**Exception:** Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. “15/19” means *R*-15 continuous insulation on the interior or exterior of the home or *R*-19 cavity insulation at the interior of the basement wall. “15/19” shall be permitted to be met with *R*-13 cavity insulation on the interior of the basement wall plus *R*-5 continuous insulation on the interior or exterior of the home. “10/13” means *R*-10 continuous insulation on the interior or exterior of the home or *R*-13 cavity insulation at the interior of the basement wall.

d. *R*-10 shall be added to the required slab edge *R*-values for heated slabs.

e. Not Used.

f. Not Used.

g. Floors over conditioned space are exempt from this requirement.

h. The first value is cavity insulation, the second value is continuous insulation, so “19+5” means *R*-19 cavity insulation plus *R*-5 continuous insulation.

i. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

j. For strawbale construction, see Section AS108.

k. To reduce the potential for condensation within the wall assembly, it is recommended that exterior continuous insulation be a minimum of *R*-7.5. See also Table R702.7.1.

l. Overhead doors for garages and shops that contain conditioned floor area must have fully weather stripped overhead doors with a minimum *R*-value of 13. Such doors must be weather stripped at the top, sides and bottom and between the panels.

m. Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.

**Exception:** Passive solar designs in which 50% or more of the total glazing faces south.

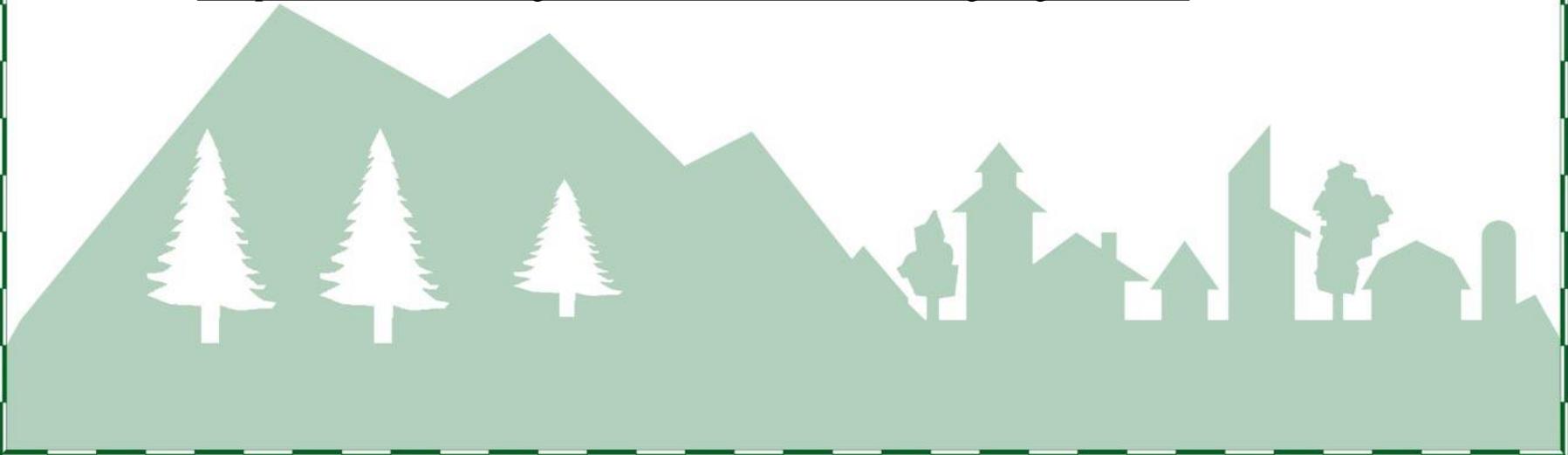
**TABLE N1102.1.4  
EQUIVALENT *U*-FACTORS<sup>a,c</sup>**

Note: Add a footnote c stating that the prescriptive path may not be used for buildings with a glazing to floor area ratio of more than 18%.

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR <sup>b</sup>	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
Boulder County (modified 5 & Marine 4)	0.30	0.43	0.020	0.045	0.056	0.026	0.067/0.05	0.05

- a. Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.
- b. When more than half the insulation is on the interior, the mass wall *U*-factors shall be a maximum of 0.065.
- c. Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.

**Exception:** Passive solar designs in which 50% or more of the total glazing faces south.



IEBC

2015

INTERNATIONAL CODES

**INTERNATIONAL**  
Existing Building  
Code®

A Member of the International  
Code Family®



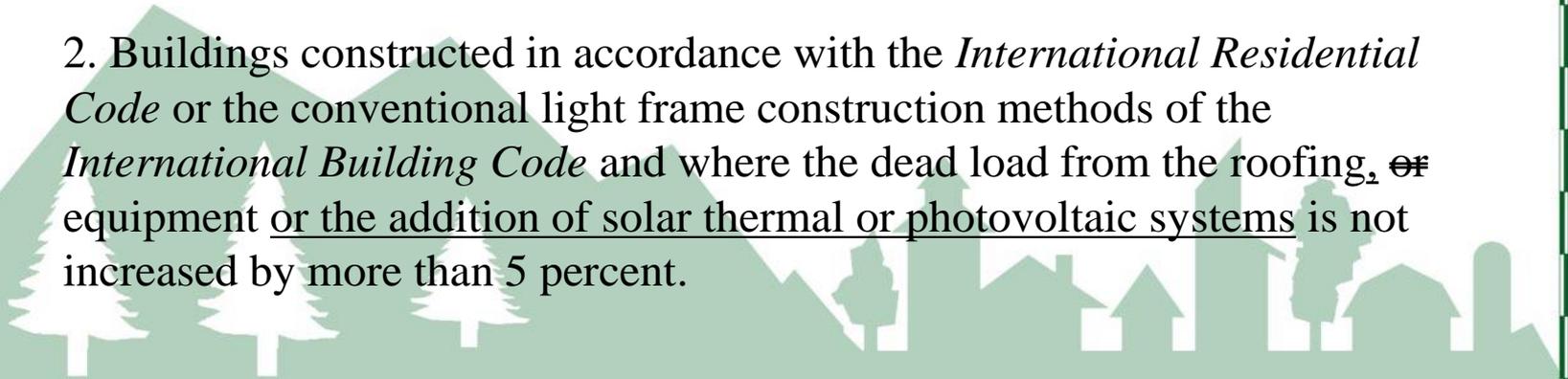
INTERNATIONAL  
CODE COUNCIL®

Note: Add an amendment to the IEBC to clearly include solar PV or solar thermal installations in these exceptions.

**707.2 Addition or replacement of roofing, ~~or~~ replacement of equipment or addition of solar thermal or photovoltaic systems.** Where addition or replacement of roofing, ~~or~~ replacement of equipment or the addition of solar thermal or photovoltaic systems results in additional dead loads, structural components supporting such reroofing or equipment shall comply with the gravity load requirements of the *International Building Code*.

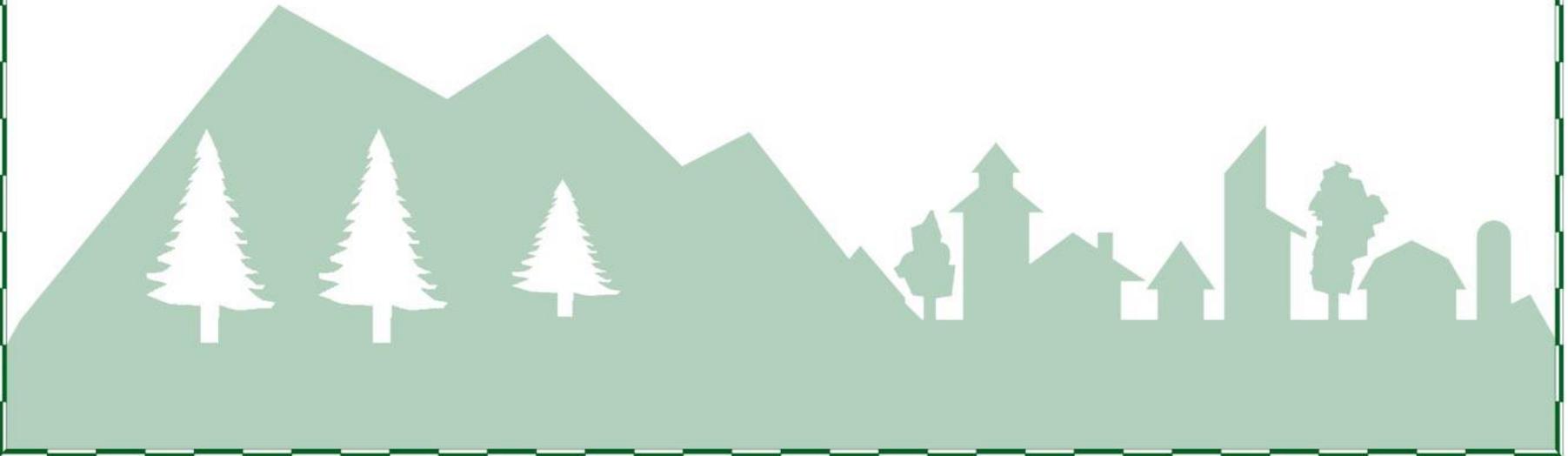
**Exceptions:**

1. Structural elements where the additional dead load from the roofing, ~~or~~ equipment or the addition of solar thermal or photovoltaic systems does not increase the force in the element by more than 5 percent.
2. Buildings constructed in accordance with the *International Residential Code* or the conventional light frame construction methods of the *International Building Code* and where the dead load from the roofing, ~~or~~ equipment or the addition of solar thermal or photovoltaic systems is not increased by more than 5 percent.



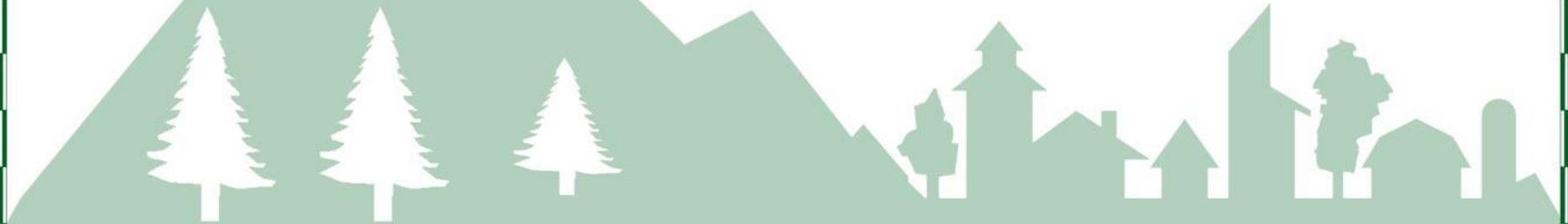
# PROPOSED CODES EFFECTIVE DATE

- **January 1, 2017:** These amendments are proposed to be effective for all building permit applications received after this date for construction in the unincorporated portions of Boulder County.



## **STAFF RECOMMENDATION:**

Staff and the Board of Review recommend that the Board of County Commissioners **APPROVE** Docket #BOR-16-0001, Minor Amendments to the Boulder County Building Code, and **ADOPT** proposed BOCC Resolution 2016-96.



## RESOLUTION 2016-96

### **A resolution amending the adoption of the 2015 editions of the International Codes, additions and amendments, as the Boulder County Building Code for application within the unincorporated area of Boulder County**

#### Recitals

- A. The Board of County Commissioners is authorized to alter and amend the Boulder County Building Code, pursuant to Title 30, Article 28, Section 204 of the Colorado Revised Statutes.
- B. The Board of County Commissioners held a duly advertised public hearing on September 20, 2016, and adopted proposed Commissioners Resolution 2016-96 approving the 2016 Amendments to the Boulder County Building Code.
- C. This Resolution shall be known as a portion of the "Boulder County Building Code," may be cited as such and will be referred to herein as "this code."
- D. This code provides minimum standards to safeguard life or limb, health, property and public welfare by regulating the design, construction, quality of materials, use, occupancy and location of all construction or alteration of dwellings, buildings and structures together with fuel gas, plumbing, mechanical and electrical installations in all parts of Boulder County not including areas embraced within the limits of any incorporated city or town.
- E. The purpose of this code is to provide for and promote the health, safety and welfare of the general public.
- F. The provisions of this code shall apply to the erection, construction, reconstruction, alteration, remodeling, renovation or the change of use of all dwellings, buildings and structures including buildings or structures used for the purpose of providing shelter for agricultural implements, farm products, livestock, or poultry within the unincorporated territory of Boulder County, and shall include the authority over existing buildings and structures provided in the adoption of the *International Building Code*, the *International Existing Building Code* and the *International Residential Code*.
- G. Pursuant to Title 30, Article 28, Section 205 of the Colorado Revised Statutes, the County Building Inspector, also referred to herein as the "building official," as authorized in Title 30, Article 28, Section 114 of the Colorado Revised Statutes, shall be authorized by the Board of County Commissioners to administer and enforce this code.
- H. The Land Use Director shall be responsible for enforcing and administering this code in the event

of the absence or disability of the building official.

- I. Upon the adoption of this code, the Board of County Commissioners shall file certified copies thereof in its office, which copies shall be accessible to the public at a cost not to exceed that of printing the same. Copies of this code printed by authority of the Board of County Commissioners shall be prima facie evidence of the original text in all courts and tribunals of this state.
- J. The Boulder County Board of Review held a duly noticed public hearing on the proposed amendments on September 1, 2016. The Board of Review unanimously recommended that the Board of County Commissioners approve the proposed amendments.
- K. On September 20, 2016, the Board of County Commissioners of Boulder County (the “Board”) held a duly noticed public hearing on the proposed amendments. Based on the public hearing, the Board decided to approve the proposed amendments.

Therefore, the Board resolves:

1. The Board hereby adopts the proposed amendments to the Boulder County Building Code, attached hereto as Exhibit A, and incorporated herein by this reference (the “Amendments”).
2. The Amendments shall be in full force an effect for all applications for building permits filed on or after January 1, 2017.
3. Except as modified by this Resolution, the provisions of Board of County Commissioners’ Resolution 2015-104 shall remain in full force and effect.
4. If any section, subsection, sentence, clause or phrase of this resolution is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this resolution. The Board of County Commissioners hereby declares that it would have passed this resolution, and each section, subsection, clause, or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases be declared unconstitutional.

[Signature Page to Follow]

A motion to approve the Proposed Amendments, was made at the Public Hearing by Commissioner \_\_\_\_\_, seconded by Commissioner \_\_\_\_\_, and passed by a \_\_\_\_\_ vote.

**ADOPTED** on this \_\_\_\_\_ day of September, 2016.

**BOARD OF COUNTY COMMISSIONERS  
OF BOULDER COUNTY:**

\_\_\_\_\_  
Elise Jones, Chair

\_\_\_\_\_  
Cindy Domenico, Vice Chair

\_\_\_\_\_  
Deb Gardner, Commissioner

ATTEST:

\_\_\_\_\_  
Clerk to the Board



EXHIBIT "A" TO COMMISSIONERS RESOLUTION 2016-96  
ADOPTION OF MODEL CODES BY REFERENCE,  
WITH DELETIONS AND AMENDMENTS

**Additional Amendments to the  
Administrative Provisions, Boulder County Building Code**



**Chapter 1, the administrative provisions of the  
Boulder County Building Code**

*Note: The administrative provisions of the first chapters of all of the adopted model codes are combined into one Chapter 1 for the Boulder County Building Code, based upon Chapter 1 of the IBC, except as may be noted under the amendments to Chapter 1 under the individual adopted model codes.*

**BOULDER COUNTY BUILDING CODE  
CHAPTER 1**

**PART 2—ADMINISTRATION AND ENFORCEMENT**

**SECTION 110  
INSPECTIONS**

**110.3.7 Energy efficiency inspections.** Inspections shall be made to determine compliance with IBC Chapter 13 or IRC Chapter 11 and shall include, but not be limited to, inspections for: envelope insulation R- and U-values, fenestration U-value, duct system R-value, and HVAC and water-heating equipment efficiency.

**Exception:** Insulation inspections for projects exceeding 500 sq. ft. of conditioned floor area (CFA) must be performed by an approved third party energy rater. For projects of 500 sq. ft. of conditioned floor area (CFA) or less, an insulation inspection will be performed by the county upon request and the insulation installer shall post an insulation certificate in accordance with IRC Section N1101.14.

# Additional Amendments to the International Building Code “IBC”



Modeled from the 2015 International Building Code

1. **2015 International Building Code**, including specifically **Appendix Chapters C, I, J and K**; published by the International Code Council, with amendments to the following:

## IBC CHAPTER 16 STRUCTURAL DESIGN

### IBC SECTION 1604 GENERAL DESIGN REQUIREMENTS

Note: Add an additional paragraph to IBC Section 1604.5:

**1604.5 Risk category.** Each building and structure shall be assigned a risk category in accordance with Table 1604.5. Where a referenced standard specifies an occupancy category, the risk category shall not be taken as lower than the occupancy category specified therein. Where a referenced standard specifies that the assignment of a risk category be in accordance with ASCE 7, Table 1.5-1, Table 1604.5 shall be used in lieu of ASCE 7, Table 1.5-1.

For snow loads, the snow loading importance factor ( $I_s$ ) for risk category IV buildings shall be computed in accordance with Equation 1.4 below in accordance with the recommendations in the report “2016 Colorado Design Snow Loads,” prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016. For risk category III buildings,  $I_s$  shall be taken from the average of Equation 1.4 and the value 1.0.

$$I_s = 1.15 \leq 1.66 - 0.056 * A \leq 1.4$$

where:

$A$  = the site altitude in thousands of feet.

**(Equation 1.4)**

The remainder of Section 1604 is to remain as published.

**IBC SECTION 1608  
SNOW LOADS**

Note: Delete IBC Section 1608.2 and replace it with the following:

**1608.2 Ground snow loads.** Snow loads shall be determined by the *building official* utilizing the Boulder County map, “Colorado Front Range Gust Map and Snow Load Design Data for Colorado,” as amended. Snow loads are based upon the report, “2016 Colorado Design Snow Loads,” prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016.

# Additional Amendments to the International Residential Code



Modeled from the 2015 International Residential Code (“IRC”)

2. *International Residential Code*, including specifically **Appendix Chapters E, F, H, R and S**, published by the International Code Council, with amendments to the following:

## ***Part II—Definitions***

### **CHAPTER 2 DEFINITIONS**

#### **SECTION R202 DEFINITIONS**

**AREA, FLOOR.** The area of the building, existing or new, under consideration including *basements* and attached garages calculated without deduction for corridors, stairways, closets, the thickness of interior walls, columns, or other features as measured from the exterior face of the exterior walls.

**BASEMENT.** That portion of a building that is partially or completely below grade (see *story above grade plane*). An under floor space below the first *story* of the building that does not meet the definition of *story above grade plane* and has a *ceiling height* measured from the *basement* floor to the bottom of the floor joists above of 6 feet 8 inches or more.

**CRAWL SPACE.** An under floor space below the first story floor of the building that does not meet the definition of *story above grade plane*, that has a *ceiling height* measured from the crawlspace grade or floor to the bottom of the floor joists above of less than six feet 8 inches, and that does not contain interior stairs, windows, wall, and ceiling finish materials, trim or finished flooring.

**RECONSTRUCTED DWELLING.** A dwelling which has been completely deconstructed, deconstructed to the foundation level, or deconstructed to the first floor level. For the purposes of this code, a reconstructed dwelling shall be considered a new dwelling.

**REMODEL/RENOVATION.** Work within the conditioned spaces of an existing dwelling that requires a building permit but does not increase the floor area of the dwelling.

## **Part III—Building Planning and Construction**

### **IRC CHAPTER 3 BUILDING PLANNING**

#### **SECTION R301 DESIGN CRITERIA**

*Note: Add a sentence at the beginning of Section R 301.2.3 to cite the Boulder County Snow Load Map, with the remainder of the section to remain as published.*

**R301.2.3 Snow Loads.** ~~Ground snow loads shall be determined based on the Boulder County Snow Load Map prepared by the Structural Engineers Association of Colorado and dated October 1971, titled “Colorado Front Range Gust Map and Snow Load Design Data for Colorado, as amended.”~~ Snow loads shall be determined by the building official utilizing the Boulder County map, “Colorado Front Range Gust Map and Snow Load Design Data for Colorado,” as amended. Snow loads are based upon the report, “2016 Colorado Design Snow Loads,” prepared by the Structural Engineers Association of Colorado (SEAC) Snow Load Committee, April 2016. Wood-framed construction, coldformed steel-framed construction and masonry and concrete construction, and structural insulated panel construction in regions with ground snow loads 70 pounds per square foot (3.35 kPa) or less, shall be in accordance with Chapters 5, 6 and 8. Buildings in regions with ground snow loads greater than 70 pounds per square foot (3.35 kPa) shall be designed in accordance with accepted engineering practice.

*Note: Sections R325 and R326 remain as published. Add a Section R327 to require ignition-resistant construction and defensible space in wildfire hazard areas.*

#### **SECTION R327 IGNITION-RESISTANT MATERIALS AND CONSTRUCTION**

**R327.4.10 Exterior doors.** Exterior doors and garage doors shall be approved noncombustible construction, metal clad, solid core wood not less than 1 3/4 inches in thickness, or have a fire protection rating of not less than 20 minutes. Windows within doors and glazed doors shall be in accordance with Section ~~R325.6.6~~ R327.4.9.

**Exception:** Vehicle access doors.

## Part IV—Energy Conservation

### IRC CHAPTER 11 ENERGY EFFICIENCY

*Note: IRC Chapter 11 is amended in its entirety to contain the requirements of the Boulder County BuildSmart program for residential energy efficiency and sustainability. Amended as such, the provisions are not interchangeable with the residential energy [RE] provisions of the International Energy Conservation Code.*

#### SECTION N1101 GENERAL

**N1101.13 Compliance.** Projects shall comply with one of the following:

**N1101.13.1 New ~~Dwellings~~ Buildings.** New ~~dwellings~~ buildings shall comply with the requirements of Figure N1101.13.1, “Options for New ~~Dwellings~~ Buildings.”

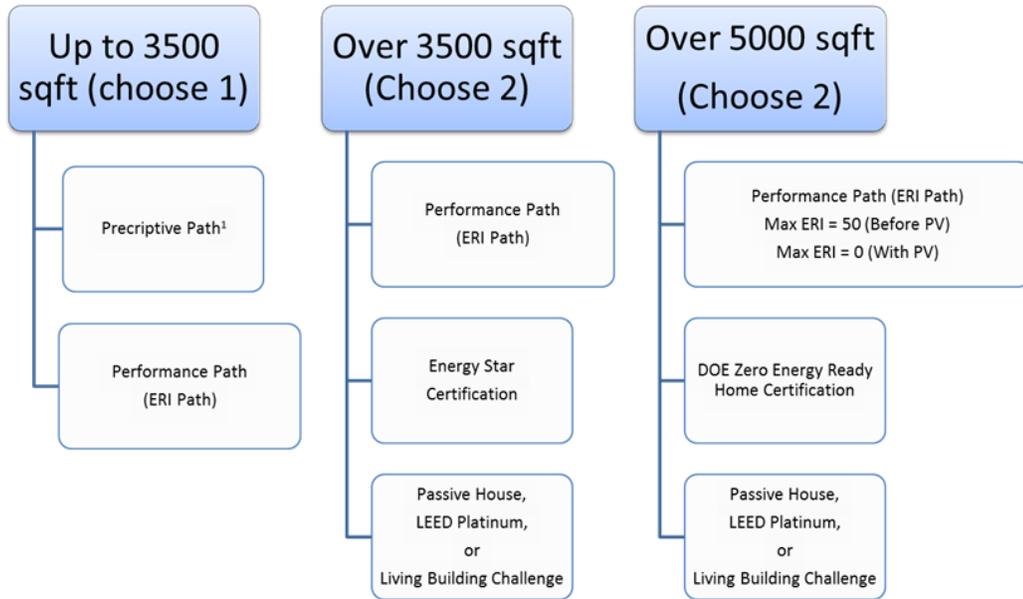
**N1101.13.2 Additions.** Additions shall comply with the requirements of Figure N1101.13.2, “Options for Additions.”

**N1101.13.3 Alterations, Remodels, and Repairs.** Alterations, Remodels, and Repairs shall comply with the requirements of Figure N1101.13.3 “Options for Alterations, Remodels, and Repairs.”

**N1101.18 Renewable energy requirements.** Whenever renewable energy systems are required by this chapter, those systems must be constructed on-site.

**Exception:** If an applicant’s property is situated in a part of the county where state law permits local utility companies to operate “solar gardens,” “solar farms,” or similar community renewable energy facilities, the renewable energy requirements of this chapter may be satisfied off-site through the purchase of an adequate share in a community facility, at the discretion of the *building official*. At a minimum, an “adequate” share in a community facility must (1) enable the production of an equivalent amount of power compared to what the applicant would otherwise be required to produce on-site; (2) be purchased from a facility located within Boulder County or a county contiguous to Boulder County; and (3) given that such shares do not automatically run with the applicant’s land, include a mechanism that ensures the share cannot be sold or modified in any way without the consent of Boulder County, with the exception of legal transfer to the applicant’s successors-in-interest for use on the same property. Written proof that these requirements are met must be filed with the Building Safety and Inspection Services Division prior to the final inspection approval or the issuance of a certificate of occupancy.

**FIGURE N1101.13.1**  
**OPTIONS FOR NEW BUILDINGS DWELLINGS**<sup>a,b,c,d</sup>

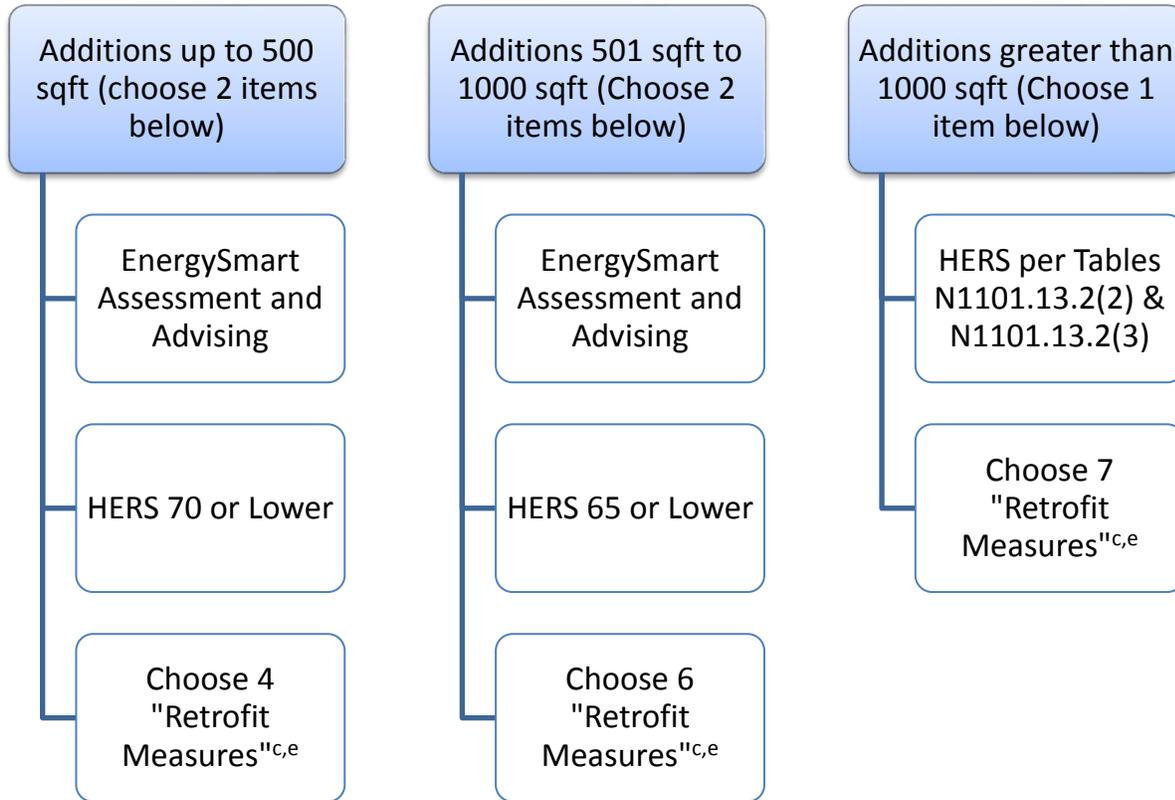


a. Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.

**Exception:** Passive solar designs in which 50% or more of the total glazing faces south.

- b. The energy efficiency requirements of BuildSmart are deemed to be met by buildings with an annual space conditioning requirement of less than 5kBtu/sqft/year.
- c. When unconditioned floor area is being converted to *conditioned floor area* (except for basement finishes), the project is to meet the requirements for an addition.
- d. All “sqft” numbers refer to *conditioned floor area* (“CFA”) in square feet as defined in Section N1101.6.

**FIGURE N1101.13.2(1)**  
**OPTIONS FOR ADDITIONS**<sup>a,b,c,d,e</sup>



- a. All new building components must meet the requirements of Section N1102.  
**Exception:** Homes using the ERI (HERS) pathway.
- b. For additions with greater than 200 square feet of floor area resulting in dwellings with greater than 3,500 square feet of *conditioned floor area*, existing plus proposed, Figures N1101.13.2(2) and ~~Table~~ Table N1101.13.2(3) must be used.
- c. “Retrofit Measures” are listed in Table N1101.13.3(2).
- d. All “sqft” numbers refer to *conditioned floor area* (“CFA”) in square feet as defined in Section N1101.6.
- e. Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.

**Exception:** Passive solar designs in which 50% or more of the total glazing faces south.

**TABLE ~~FIGURE~~ N1101.13.2(3)  
 OPTIONS FOR ADDITIONS---continued:  
 ERI (HERS) REQUIREMENTS FOR ADDITIONS**

<b>CFA, SQ FT*</b>	<b>MAXIMUM ERI</b>
0	76
1500	76
1600	76
1700	75
1800	75
1900	74
2000	74
2100	73
2200	73
2300	72
2400	72
2500	71
2600	71
2700	70
2800	70
2900	69
3000	69
3100	68
3200	68
3300	67
3400	67

<b>CFA, SQ FT*</b>	<b>MAXIMUM ERI</b>
3500	66
3600	66
3700	65
3800	65
3900	64
4000	63
4100	62
4200	61
4300	60
4400	59
4500	58
4600	57
4700	56
4800	55
4900	54
5000	53
5100	51
5200	49
5300	47
5400	45
5500	43

<b>CFA, SQ FT*</b>	<b>MAXIMUM ERI</b>
5600	41
5700	39
5800	37
5900	35
6000	33
6100	31
6200	29
6300	27
6400	25
6500	23
6600	21
6700	19
6800	17
6900	15
7000	13
7100	11
7200	9
7300	7
7400	5
7500	3
7600	1
7700 or greater	0

\*Conditioned floor area (“CFA”) is to be rounded to the nearest 100 square feet.

## SECTION N1102 BUILDING THERMAL ENVELOPE

**TABLE N1102.1.2  
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a,l,m</sup>**

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b</sup>	SKY-LIGHT <sup>b</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>b, e</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE <sup>e,j</sup>	FLOOR R-VALUE	BASEMENT <sup>c</sup> WALL R-VALUE	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>c</sup> WALL R-VALUE
Boulder County (modified 5 & Marine 4)	0.30	0.43	NR	54	19 + 5 <sup>h,k</sup>	18/24	42 <sup>g</sup>	15/20	15, 3 ft	15/20

For SI: 1 foot = 304.8 mm.

a. R-values are minimums. U-factors and SHGC are maximums. When insulation is installed in a cavity which is less than the label or design thickness of the insulation, the installed R-value of the insulation shall not be less than the R-value specified in the table.

**Exception:** An R-19 batt installed in a 2 X 6 stud cavity shall be deemed to meet the requirements of this code.

b. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

**Exception:** Skylights may be excluded from glazed fenestration SHGC requirements in Climate Zones 1 through 3 where the SHGC for such skylights does not exceed 0.30.

c. "15/19" means R-15 continuous insulation on the interior or exterior of the home or R-19 cavity insulation at the interior of the basement wall. "15/19" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the home. "10/13" means R-10 continuous insulation on the interior or exterior of the home or R-13 cavity insulation at the interior of the basement wall.

d. R-10 shall be added to the required slab edge R-values for heated slabs.

e. Not Used.

f. Not Used.

g. Floors over conditioned space are exempt from this requirement.

h. The first value is cavity insulation, the second value is continuous insulation, so "19+5" means R-19 cavity insulation plus R-5 continuous insulation.

i. The second R-value applies when more than half the insulation is on the interior of the mass wall.

j. For strawbale construction, see Section AS108.

k. To reduce the potential for condensation within the wall assembly, it is recommended that exterior continuous insulation be a minimum of R-7.5. See also Table R702.7.1.

l. Overhead doors for garages and shops that contain conditioned floor area must have fully weather stripped overhead doors with a minimum R-value of 13. Such doors must be weather stripped at the top, sides and bottom and between the panels.

m. Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.

**Exception:** Passive solar designs in which 50% or more of the total glazing faces south.

**TABLE N1102.1.4  
EQUIVALENT *U*-FACTORS<sup>a,c</sup>**

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR	SKYLIGHT <i>U</i> -FACTOR	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR <sup>b</sup>	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
Boulder County (modified 5 & Marine 4)	0.30	0.43	0.020	0.045	0.056	0.026	0.067/0.05	0.05

- a. Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.
  - b. When more than half the insulation is on the interior, the mass wall *U*-factors shall be a maximum of 0.065.
  - c. Buildings with glazing to floor area ratios that exceed 18% may not use the prescriptive path.
- Exception:** Passive solar designs in which 50% or more of the total glazing faces south.

# Additional Amendments to the International Existing Building Code (“IEBC”)



Modeled from the 2015 International Existing Building Code (“IEBC”)

## PART 2 – ADMINISTRATION AND ENFORCEMENT

### IEBC CHAPTER 7 ALTERATIONS – LEVEL 1

#### SECTION 707 STRUCTURAL

**707.2 Addition or replacement of roofing, ~~or~~ replacement of equipment or addition of solar thermal or photovoltaic systems.** Where addition or replacement of roofing, ~~or~~ replacement of equipment or the addition of solar thermal or photovoltaic systems results in additional dead loads, structural components supporting such reroofing or equipment shall comply with the gravity load requirements of the *International Building Code*.

#### Exceptions:

1. Structural elements where the additional dead load from the roofing, ~~or~~ equipment or the addition of solar thermal or photovoltaic systems does not increase the force in the element by more than 5 percent.
2. Buildings constructed in accordance with the *International Residential Code* or the conventional light-frame construction methods of the *International Building Code* and where the dead load from the roofing, ~~or~~ equipment or the addition of solar thermal or photovoltaic systems is not increased by more than 5 percent.
3. Addition of a second layer of roof covering weighing 3 pounds per square foot (0.1437 kN/m<sup>2</sup>) or less over an existing, single layer of roof covering.