



2016 Title 24, Part 6

# Recent Energy Code “Clarifications” for ADU’s

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We offer FREE



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# Recent Energy Code ADU Clarifications

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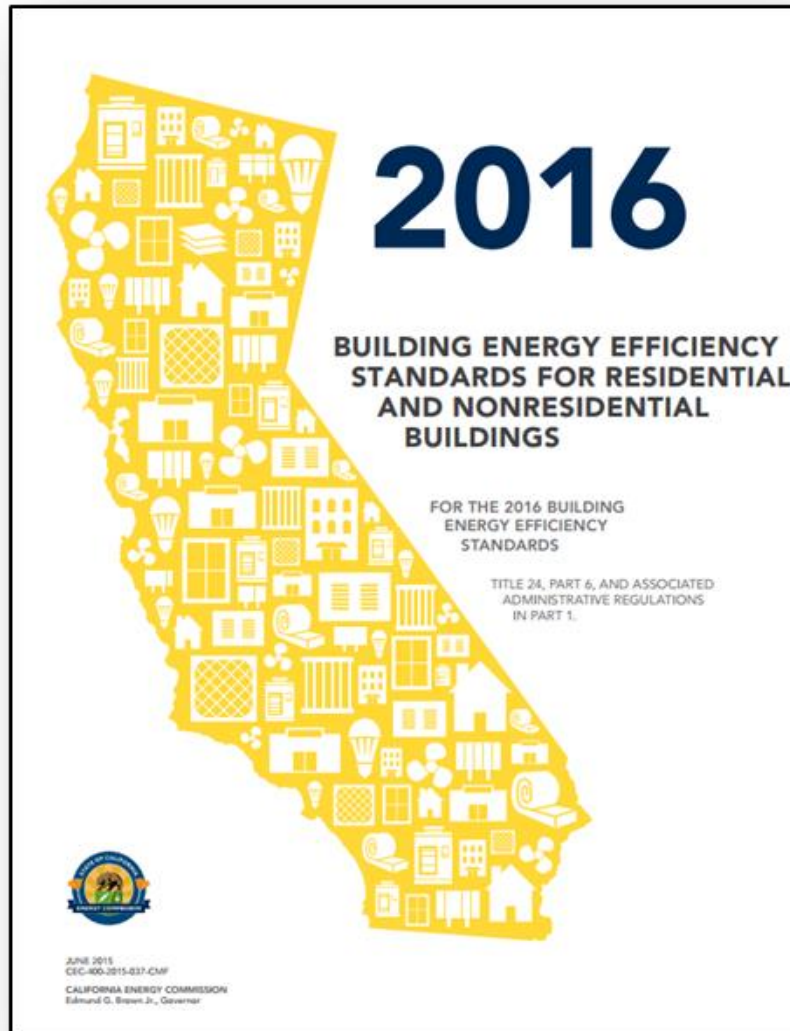
- ✦ Explore *how* the clarification provided changes code requirements for ADUs;
- ✦ Review examples of different ADU types and how they may be affected;
- ✦ Determine the modeling/documentation processes that have changed;
- ✦ Understand how the ADU compliance options may impact construction.



# Which Code Year Applies? Permit pulled....

Jan. 2017- Dec. 2019

Jan. 2020- Dec. 2023



## SUBCHAPTER 1 ALL OCCUPANCIES—GENERAL PROVISIONS

### SECTION 100.0 – SCOPE

(a) **Buildings Covered.** The provisions of Part 6 apply to all buildings:

1. That are of Occupancy Group A, B, E, F, H, L, M, R, S, or U; and
2. For which an application for a building permit or renewal of an existing permit is filed (or is required by law to be filed) on or after the effective date of the provisions, or which are constructed by a governmental agency; and
3. That are:
  - A. Unconditioned; or
  - B. Indirectly or directly conditioned by mechanical heating or mechanical cooling, or process spaces; or
  - C. ~~Low-rise residential buildings that are heated with a non-mechanical heating system.~~

**EXCEPTION 1 to Section 100.0(a):** Qualified historic buildings, as regulated by the California Historic Building Code (Title 24, Part 8). Lighting in qualified historic buildings shall comply with the applicable requirements in Section 140.6(a)3Q.

**EXCEPTION 2 to Section 100.0(a):** Building departments, at their discretion, may exempt temporary buildings, temporary outdoor lighting or temporary lighting in an unconditioned building, or structures erected in response to a natural disaster. Temporary buildings or structures shall be completely removed upon the expiration of the time limit stated in the permit.

**EXCEPTION 3 to Section 100.0(a):** Buildings in Occupancy Group I-3 and I-4.

(b) **Parts of Buildings Regulated.** The provisions of Part 6 apply to the building envelope, space-conditioning systems, water-heating systems, pool and spas, solar ready buildings, indoor lighting systems of buildings, outdoor lighting systems, electrical power distribution systems, and signs located either indoors or outdoors, in buildings that are:

1. Covered by Section 100.0(a); and
2. Set forth in TABLE 100.0-A.

(c) **Habitable Stories.**

1. All conditioned space in a story shall comply with Part 6 whether or not the story is a habitable space.
2. All unconditioned space in a story shall comply with the lighting requirements of Part 6 whether or not the story is a habitable space.

(d) **Outdoor Lighting and Indoor and Outdoor Signs.** The provisions of Part 6 apply to outdoor lighting systems and to signs located either indoors or outdoors as set forth in TABLE 100.0-A.

(e) **Sections Applicable to Particular Buildings.** TABLE 100.0-A and this subsection list the provisions of Part 6 that are applicable to different types of buildings covered by Section 100.0(a).

1. **All buildings.** Sections 100.0 through ~~110.12440-14~~ apply to all buildings.

**EXCEPTION to Section 100.0(e)1:** Spaces or requirements not listed in TABLE 100.0-A.

2. **Newly constructed buildings.**

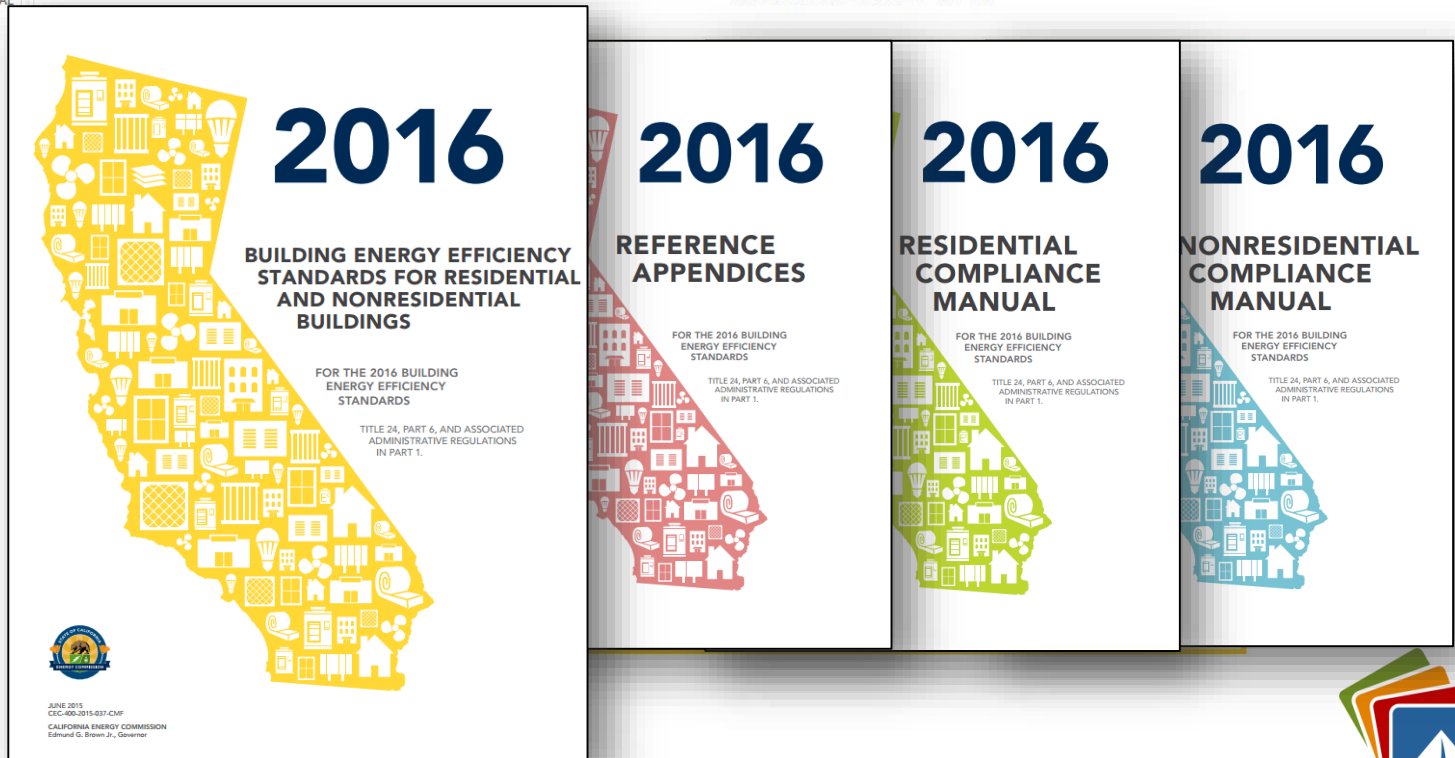
- A. **All newly constructed buildings.** Sections 110.0 through ~~110.12440-14~~ apply to all newly constructed buildings within the scope of Section 100.0(a). In addition, newly constructed buildings shall meet the requirements of Subsections B, C, D or E, as applicable.



**2016 Building and Appliance Efficiency Regulations - Reference Ace v27**

<b>Contents</b>	Index	Search
<ul style="list-style-type: none"> <li>2016 BUILDING ENERGY EFFICIENCY STANDARDS</li> <li>REFERENCE APPENDICES</li> <li>RESIDENTIAL COMPLIANCE MANUAL</li> <li>RESIDENTIAL ACM REFERENCE MANUAL</li> <li>NONRESIDENTIAL COMPLIANCE MANUAL</li> <li>NONRESIDENTIAL ACM REFERENCE MANUAL</li> <li>TITLE 20 APPLIANCE EFFICIENCY REGULATIONS</li> <li>TITLE 20 APPLIANCE EFFICIENCY REGULATIONS (Appliance-Specific Sections Only)</li> </ul>		

**2016 Building Energy Efficiency Standards and Title 20 Appliance Efficiency Regulations Reference Ace Tool**



JUNE 2015  
CEC-00-2015-037-CMF  
CALIFORNIA ENERGY COMMISSION  
Edmund G. Brown, Jr., Governor



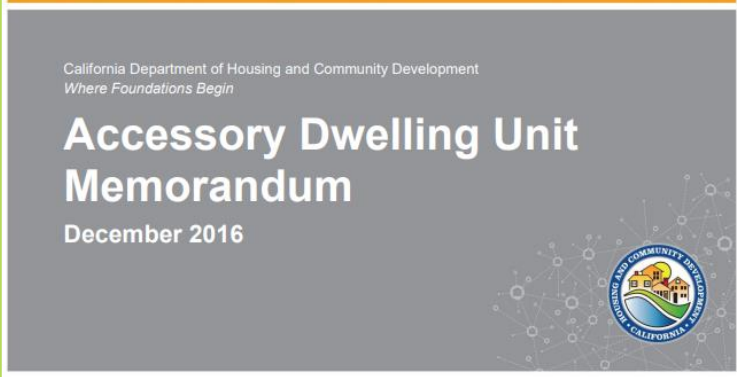


# What's an ADU?



- ✦ Often called an “in-law apartment” or “garage flat”, accessory dwelling units are a separate and complete “dwelling unit” (e.g., kitchen, sleeping area and bathrooms) that is either attached or detached from the primary residential unit on a single-family lot.
- ✦ California law has changed to help eliminate barriers to ADU construction that are adopted by EACH local government (or not):

- ✦ SB 1069
- ✦ AB 2299
- ✦ AB 2406



<http://www.hcd.ca.gov/policy-research/docs/17Jan30-ADU-TA-Memo.pdf>



# YOUR Local Building Department

## ADU Requirements

- ✦ Depend on what the local building department has adopted.
- ✦ Make sure to see if guidance has been made available.
  - ✦ City of San Francisco
  - ✦ City of LA
  - ✦ City of Berkeley

**sf-ADU**  
a guide for homeowners, designers, and contractors considering adding an Accessory Dwelling Unit to an existing residence in San Francisco

**BY-RIGHT ACCESSORY DWELLING UNITS (ADUs) Flow Chart**  
1947 CENTER STREET, BERKELEY, CA 94704  
APRIL 2017

**IN ZONE**

In Zone	No	Not allowed
R-1 R-4 R-5	Yes	Lot has 1 owner-occupied, single-family residence
R-2 R-1A R-S		
R-3 R-2A R-SMU		

**\* Development Standards**

1. See district standards for open space.
2. See district standards for lot coverage.
3. Not located in the front yard setback.
4. Maximum height <14' for peaked roof or <10' for flat roof.
5. 4' rear and side yard setbacks.
6. Separate entrance, not located on front of primary dwelling unit.
7. < 750 ft<sup>2</sup> or 75% of primary dwelling unit.

**The following applies to all ADUs**

1. If ADU creation removes main dwelling unit parking, replacement parking is required. Replacement parking can be in setbacks and no landscaping strip required.
2. No off-street parking is required for ADU.
3. If main dwelling has sprinklers, ADU must provide sprinklers.
4. If ADU is part of the main dwelling, utility hook up and fees may not be required.
5. If ADU is detached, utility hook up and fees may apply but must be proportional to burden/cost.

**AN ADU DWELLING UNITS ANGELES**

Flow Chart for Los Angeles:

- Lot has 1 owner-occupied, single-family residence:
  - Yes: Street width <20' → Not allowed; 20'-26' → AUP with approval from Fire Dept.; >26' → Created from existing legal space (building envelope does not change) or Created from new construction.
  - No: Not allowed.
- Created from existing legal space (building envelope does not change):
  - Yes: < 750 ft<sup>2</sup> or 75% of primary dwelling unit (whichever is less) → Meets Development Standards\* → Zoning Certificate.
  - No: Created from new construction → Meets Development Standards\* → Zoning Certificate.



# Why Did this Clarification Happen?

Issue 122 January - March 2018

## BLUEPRINT

California Energy Commission  
Efficiency Division

**In This Issue**

- > CBECC-Res FAQs Updated
- > Fewer and Simpler Nonresidential Forms
- > Simplified 2016 Power Distribution and Solar Ready Forms
- > Thank You, LBO and City of Chico
- > Covered Processes Quick Reference Guide Available
- > Rebuilding After Disasters
- > Presentations Posted
- > Regulatory Advisory
- > Accessory Dwelling Units
- > Q&A
  - Accessory Dwelling Units
  - Residential Performance Modeling and HERS Verification
  - LED Trim Kits
  - Insulating Refrigerant Lines
- > Energy Code Class Schedule

**CBECC-Res FAQs Updated**

Do you have questions about CBECC-Res, the free residential compliance software from the California Energy Commission (Energy Commission)? The Commission publishes **Frequently Asked Questions (FAQs)** about CBECC-Res that addresses hot topics related to the software. The FAQs were recently updated and include seven new questions and answers.

**Fewer and Simpler Nonresidential Forms**

One of the Energy Commission's goals is to reduce the number of compliance documents (forms). The 47 prescriptive nonresidential certificates of compliance (NRCC) are being cut to 10 forms. There will be one form for each building component – lighting, envelope, mechanical, etc. This lessens confusion about when to use which form.

These simplified forms incorporate dynamic features. Each form follows a similar format and offers similar features, simplifying completion and review.

Five **dynamic forms** have already been posted for:

- > Electrical Power Distribution
- > Outdoor Lighting
- > Indoor Lighting
- > Sign Lighting
- > Solar Ready

The five forms that will be posted in the future are for:

- > Commissioning
- > Envelope
- > Covered Processes
- > Mechanical
- > Water Heating

These forms are available for use now! Enforcement agencies may continue to use the static forms at their discretion. When the *2019 Building Energy Efficiency Standards* (Energy Code) is implemented, these 10 reformatted NRCC forms will be the only prescriptive nonresidential forms used.

**Simplified 2016 Power Distribution and Solar Ready Forms**

Two simplified forms are now available to document compliance with the nonresidential electrical power distribution (ELO) and solar ready (SRA) requirements. These forms simplify the compliance process for everyone involved including the contractor, plans examiner, and building department. They are project specific and expand and contract based on the project scope – reducing the total number of pages of forms for most projects.

New features include:

- > One signature block
- > Table C – Compliance Results give a quick check of the inputs on the first page and will indicate if the project “COMPLIES”
- > User selections limit drop-down menus and table options to guide users toward compliant designs
- > Hyperlinks to the Energy Code

The new **NRCC-ELC-E** and **NRCC-SRA-E** are available now.

Enforcement agencies may continue to use the static forms at their discretion.

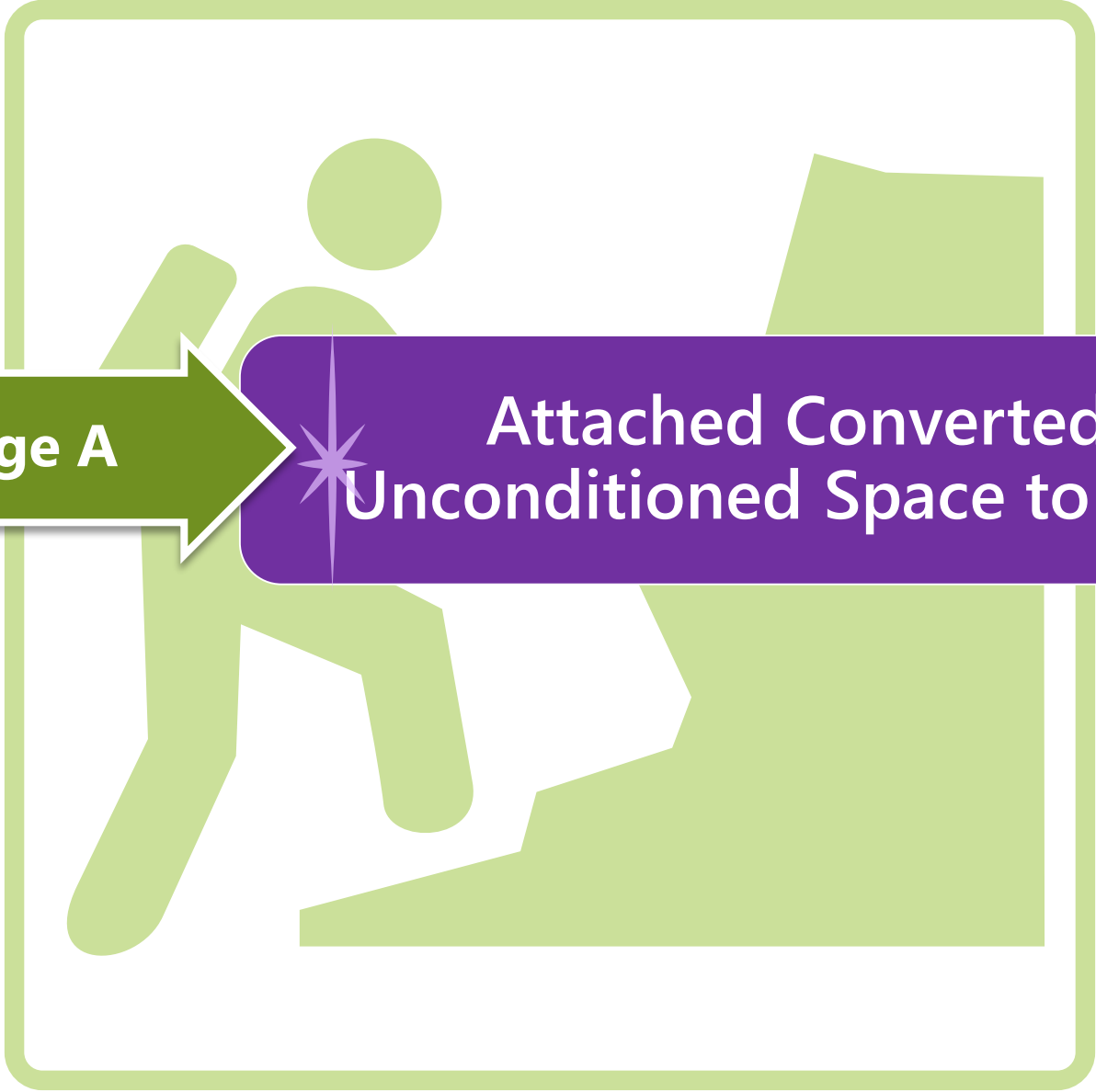
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✦ From Chris Olvera, Supervisor of Outreach and Education Unit:

- ✦ *The construction of ADUs have steadily been increasing, and as a result, so have inquiries regarding the application of the Energy Code for these building types.*
- ✦ *In response, we provided clarifications in Blueprint and the CBECC-Res FAQs on how ADUs are defined as an addition or newly constructed building per the 2016 Energy Code;*
  - *comply with the prescriptive requirements; and*
  - *are modeled under the performance approach.*



# Challenge A



**Challenge A**

**Attached Converted  
Unconditioned Space to ADU**





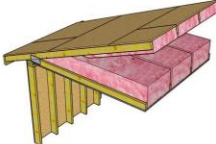

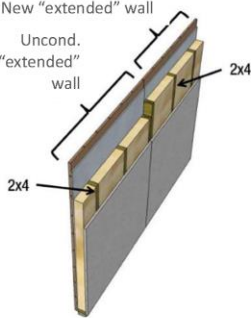


# What IS that?

**Decoding ADUs™**  
Let's Talk Recent Changes



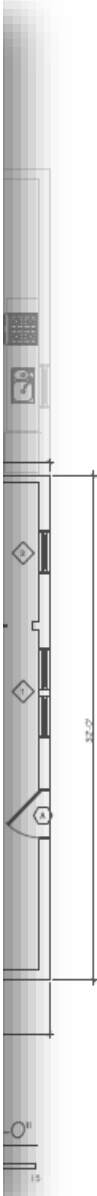
Clar

BUILDING FEATURE	PRESCRIPTIVE 2016 TITLE 24 PART 6 PACKAGE A (TABLE 150.1-A)	"AS BUILT"
<b>ATTACHED CONVERTED UNCONDITIONED SPACE TO ADU</b>		
  <b>CLARIFICATION:</b> (Per <a href="#">Blueprint 122, 3/29/18</a> ): An addition to the main house  	<b>Roof *</b>  ≤700 SF: Insulation to meet Mandatory: R-22  >700 SF: Prescriptive Package A Option A, B or C	 <i>Example of High Performance Attic (HPA) Option B</i>  <i>Example of Non HPA (or Option C)</i>
	<b>Walls</b>  <b>Extended Walls:</b> 2 x 4: R-15 2 x 6: R-19  <b>New Walls:</b> Prescriptive Package A	 New "extended" wall Uncond. "extended" wall 2x4 2x4  <b>Extended Walls</b> All walls currently existing as part of the unconditioned space are considered "extended walls" and are exempt from the Package A requirements. New walls extending from these existing unconditioned walls are also considered "extended" walls.  <b>New Walls</b> Walls added to the existing unconditioned space that are not considered "extended" from the existing walls, must meet Package A requirements.
	<b>Floor</b> Prescriptive Package A	There are no exceptions from Package A for floors of any type.
	<b>Fenestration</b>  <b>New Fenestration:</b> <a href="#">§150.2(a)1</a> (or see Page 5)  <b>Skylights:</b> ≤16 ft <sup>2</sup> U-Factor=0.55 SHGC=0.30 **	All glazing in this space are considered "new", even if it already exists as part of the unconditioned space, and must meet mandatory weighted of U-factor = 0.58, in addition to using either the Prescriptive or Performance Approach.  Area allowance exceptions are based on square footage of ADU, per the allowances of <a href="#">§150.2(a)1</a> .
	<b>HVAC ***</b> HVAC = Prescriptive Package A IAQ whole building airflow not required if ≤1,000 ft <sup>2</sup> HERS measures will apply	Per Mechanical Code, return air cannot be shared with other dwelling units. It is recommended that each dwelling unit have its own thermostat (ability to control their own heating and cooling setpoints) and separate IAQ ventilation system(s).
	<b>DHW</b> A 2 <sup>nd</sup> water heater meeting <a href="#">§150.1(c)8</a> , can be installed to serve ADU.	If no natural gas is connected to the existing home, an electric water heater that meets min. requirements can be installed for the ADU ( <a href="#">§150.2(a)1D</a> ).

\* Additions over 300 SF in Climate Zones 10-15 to meet Package A cool roof installation requirements, dependent upon roof slope.

\*\* Climate zones 1,3,5 have no SHGC requirements, nor west facing limitations on area

\*\*\* HERS testing of ducts and/ or AC equipment is required for certain mechanical systems; HERS verified IAQ required for ADU's over 1000 ft<sup>2</sup>





# Building Features: Roof

## Roof

- ✦ Can meet the prescriptive requirements of "additions" §150.2(a)1; or
- ✦ Can use the performance approach as "addition" alone or E+A or E+A+A.

### Insulation:

≤700 ft<sup>2</sup>: R-22

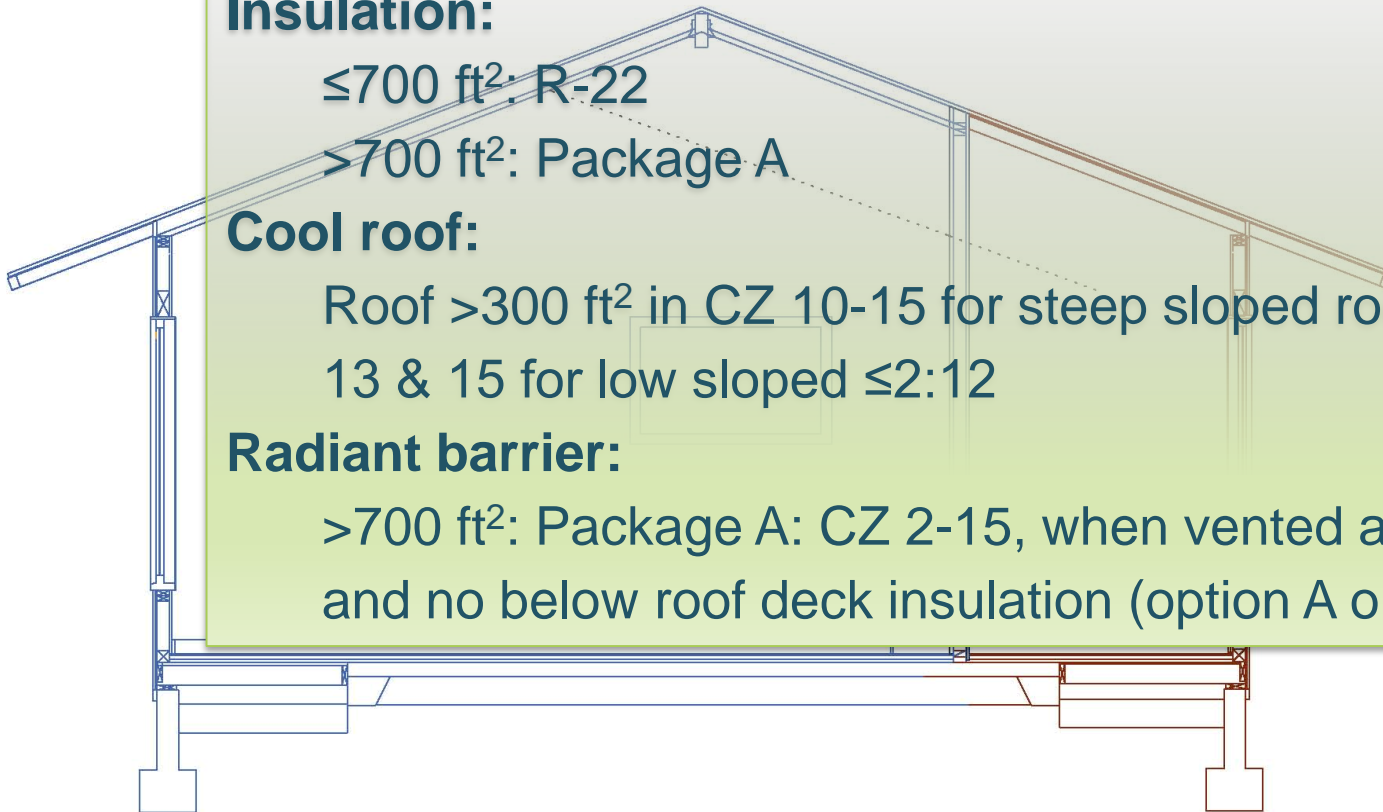
>700 ft<sup>2</sup>: Package A

### Cool roof:

Roof >300 ft<sup>2</sup> in CZ 10-15 for steep sloped roofs >2:12 / CZ 13 & 15 for low sloped ≤2:12

### Radiant barrier:

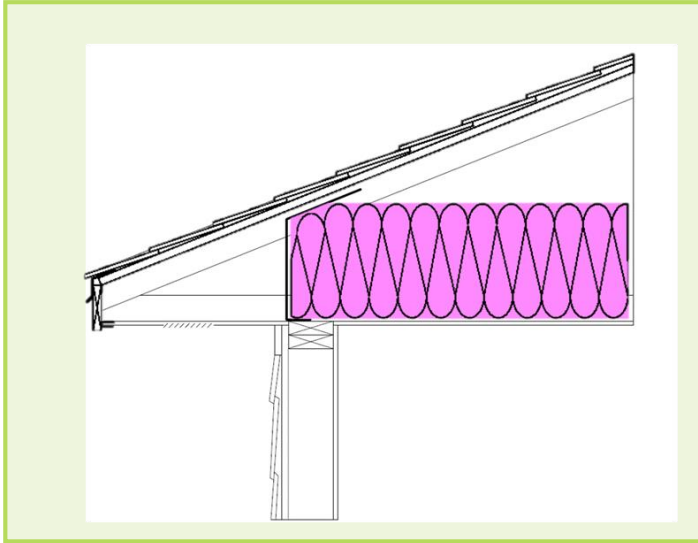
>700 ft<sup>2</sup>: Package A: CZ 2-15, when vented attic construction and no below roof deck insulation (option A or C)







# ≤700 ft<sup>2</sup>: Mandatory Minimums



★ U-factor (wood framed attic): 0.043

✧ Example: **R-22**  
(JA4.2.1-1A)

## 150.0(a) Ceiling and Rafter Roof Insulation.

The opaque portions of ceilings and roofs separating conditioned spaces from unconditioned spaces or ambient air shall meet the requirements of Items 1 through 3 below:

1. Shall be insulated to achieve a weighted average U-factor not exceeding U-0.043 or shall be insulated between wood-framing members with insulation resulting in an installed thermal resistance of R-22 or greater for the insulation alone. For vented attics, the mandatory insulation shall be installed at the ceiling level; for unvented attics, the mandatory insulation shall be placed at either ceiling or roof level; and

EXCEPTION to Section 150.0(a)1.: Ceilings and rafter roofs in an alteration shall be insulated to achieve a weighted average U-factor not exceeding 0.054 or shall be insulated between wood-framing members with insulation resulting in an installed thermal resistance of R-19 or greater

2. Attic access doors shall have permanently attached insulation using adhesive or mechanical fasteners. The attic access shall be gasketed to prevent air leakage; and
3. Insulation shall be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in Section 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling.



# Building Features

- ✦ “Extended” walls apply to walls associated with unconditioned space (§150.2(a)1); and
- ✦ Any new walls that are “extended” from those unconditioned walls.

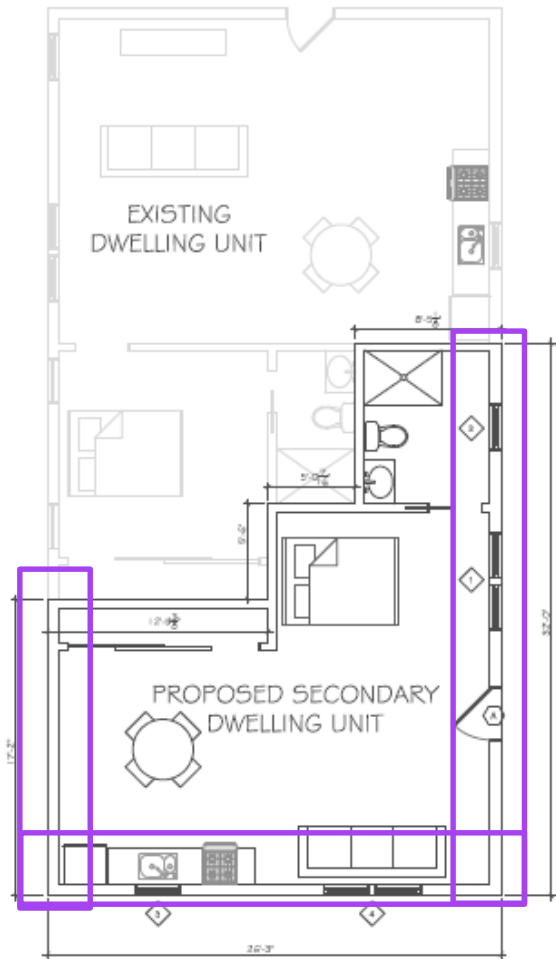
## ✦ EXTENDED walls:



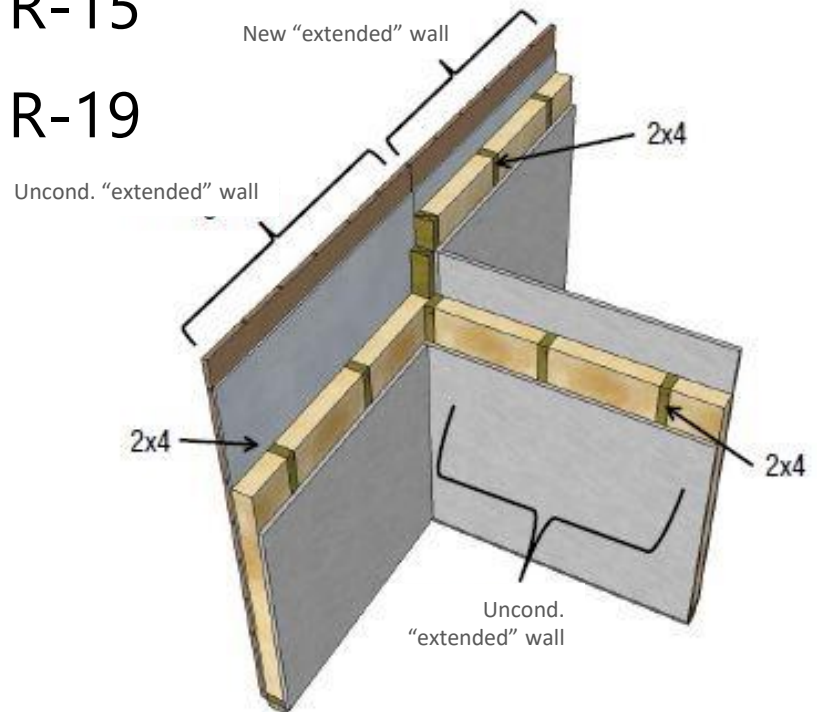
2 x 4 = R-15



2 x 6 = R-19



PROPOSED FLOOR PLAN 1/4" = 1'-0"





# Building Features: Fenestration

## Fenestration

- ★ Can meet the prescriptive requirements of "additions" §150.2(a)1; or
- ★ Can use the performance approach as "addition" alone or E+A or E+A+A.



Additions	≤ 400 ft <sup>2</sup>	> 400 ft <sup>2</sup> and ≤ 700 ft <sup>2</sup>	> 700 ft <sup>2</sup> and ≤ 1,000 ft <sup>2</sup>	> 1,000 ft <sup>2</sup>
<b>Total Glazing Area</b>	Up to 75 ft <sup>2</sup> or <b>30% of</b> Conditioned Floor Area, whichever is greater	Up to 120 ft <sup>2</sup> or <b>25% of</b> Conditioned Floor Area, whichever is greater	Up to 175 ft <sup>2</sup> or <b>20% of</b> Conditioned Floor Area, whichever is greater	Same as "new" construction
<b>West-Facing: CZ's 2, 4, 6-16</b>	Up to 60 ft <sup>2</sup> or <b>5% of</b> Conditioned Floor Area, whichever is greater		Up to 70 ft <sup>2</sup> or <b>5% of</b> Conditioned Floor Area, whichever is greater	





# Building Features

## HVAC/IAQ/DHW

- ✦ Can meet the prescriptive requirements of “additions” §150.2(a)1; or
- ✦ Can use the performance approach as “addition” alone or E+A or E+A+A.



- ✦ HVAC: Cannot share return air with other dwelling units (Mechanical Code requirement 311.4).
  - ✦ It is recommended that each dwelling unit have its own thermostat (ability to control their own heating and cooling setpoints).



CERTIFICATE OF COMPLIANCE		CF1R-ADD-02-E
Prescriptive Residential Additions That Do Not Require HERS Field Verification		Page 7 of 10
Project Name: Proposed ADU Type 1	Date Prepared: 5/29/18	

Building Envelope Measures:	
§ 110.6(a)1:	Air Leakage. Manufactured fenestration, exterior doors, and exterior pet doors must limit air leakage to 0.3 cfm/ft <sup>2</sup> or less when tested per NFRC-400 or ASTM E283 or AAMA/WDMA/CSA 101/I.S.2/A440-2011.
§ 110.6(a)5:	Labeling. Fenestration products must have a label meeting the requirements of § 10-111(a).
§ 110.6(b):	Field fabricated exterior doors and fenestration products must use U-factors and solar heat gain coefficient (SHGC) values from TABLES 110.6-A and 110.6-B for compliance and must be caulked and/or weatherstripped.
§ 110.7:	Air Leakage. All joints, penetrations, and other openings in the building envelope that are potential sources of air leakage must be caulked, gasketed, or weather stripped.
§ 110.8(a):	Insulation Certification by Manufacturers. Insulation specified or installed must meet Standards for Insulating Material.
§ 110.8(g):	Insulation Requirements for Heated Slab Floors. Heated slab floors must be insulated per the requirements of § 110.8(g).
§ 110.8(i):	Roofing Products Solar Reflectance and Thermal Emittance. The thermal emittance and aged solar reflectance values of the roofing material must meet the requirements of § 110.8(i) when the installation of a cool roof is specified on the CF1R.
§ 110.8(j):	Radiant Barrier. A radiant barrier must have an emittance of 0.05 or less and be certified to the Department of Consumer Affairs.
§ 150.0(a):	Ceiling and Rafter Roof Insulation. Minimum R-22 insulation in wood-frame ceiling; or the weighted average U-factor must not exceed 0.043. Minimum R-19 or weighted average U-factor of 0.054 or less in a rafter roof alteration. Attic access doors must have permanently attached insulation using adhesive or mechanical fasteners. The attic access must be gasketed to prevent air leakage. Insulation must be installed in direct contact with a continuous roof or ceiling which is sealed to limit infiltration and exfiltration as specified in § 110.7, including but not limited to placing insulation either above or below the roof deck or on top of a drywall ceiling.
§ 150.0(b):	Loose-fill Insulation. Loose fill insulation must meet the manufacturer's required density for the labeled R-value.
§ 150.0(c):	Wall Insulation. Minimum R-13 insulation in 2x4 inch wood framing wall or have a U-factor of 0.102 or less (R-19 in 2x6 or U-factor of 0.074 or less). Opaque non-framed assemblies must have an overall assembly U-factor not exceeding 0.102, equivalent to an installed value of R-13 in a wood framed assembly.
§ 150.0(d):	Raised-floor Insulation. Minimum R-19 insulation in raised wood framed floor or 0.037 maximum U-factor.
§ 150.0(f):	Slab Edge Insulation. Slab edge insulation must meet all of the following: have a water absorption rate, for the insulation material alone without facings, no greater than 0.3%; have a water vapor permeance no greater than 2.0 perm/inch; be protected from physical damage and UV light deterioration; and, when installed as part of a heated slab floor, meet the requirements of § 110.8(g).
§ 150.0(g)1:	Vapor Retarder. In Climate Zones 1-16, the earth floor of unvented crawl space must be covered with a Class I or Class II vapor retarder. This requirement also applies to controlled ventilation crawl space for buildings complying with the exception to § 150.0(d).
§ 150.0(g)2:	Vapor Retarder. In Climate Zones 14 and 16, a Class I or Class II vapor retarder must be installed on the conditioned space side of all insulation in all exterior walls, vented attics, and unvented attics with air-permeable insulation.
§ 150.0(q):	Fenestration Products. Fenestration, including skylights, separating conditioned space from unconditioned space or outdoors must have a maximum U-factor of 0.58; or the weighted average U-factor of all fenestration must not exceed 0.58.

Fireplaces, Decorative Gas Appliances, and Gas Log Measures:	
§ 150.0(e)1A:	Closable Doors. Masonry or factory-built fireplaces must have a closable metal or glass door covering the entire opening of the firebox.
§ 150.0(e)1B:	Combustion Intake. Masonry or factory-built fireplaces must have a combustion outside air intake, which is at least six square inches in area and is equipped with a readily accessible, operable, and tight-fitting damper or combustion-air control device.
§ 150.0(e)1C:	Flue Damper. Masonry or factory-built fireplaces must have a flue damper with a readily accessible control
§ 150.0(e)2:	Pilot Light. Continuous burning pilot lights and the use of indoor air for cooling a firebox jacket, when that indoor air is vented to the outside of the building, are prohibited.



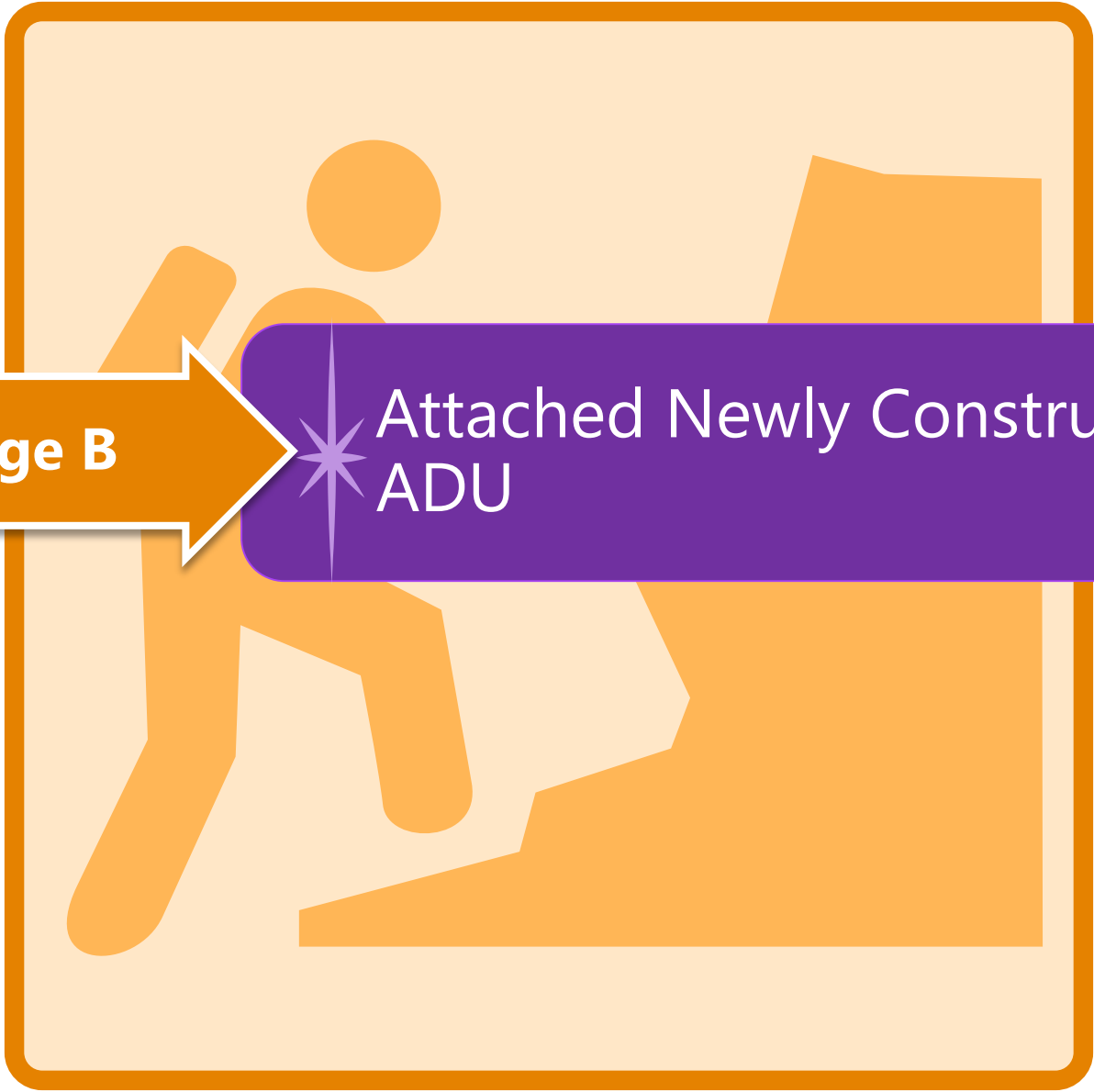
# Any Questions?





# Challenge B

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**Challenge B**



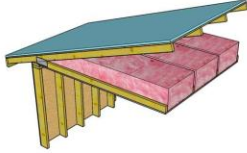
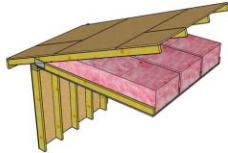
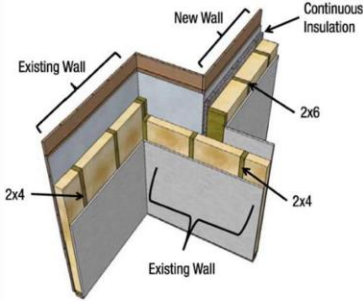
Attached Newly Constructed  
ADU





# What IS that?

**Decoding ADUs™**  
Let's Talk Recent Changes

BUILDING FEATURE	PRESCRIPTIVE 2016 TITLE 24 PART 6 PACKAGE A (TABLE 150.1-A)	"AS BUILT"	
<b>ATTACHED NEWLY CONSTRUCTED ADU</b>			
 <p><b>CLARIFICATION:</b> (Per <a href="#">Blueprint 122, 3/29/18</a>): An addition to the main house</p>  <p><b>COMPLIANCE DOCUMENTATION:</b> Prescriptive option: <a href="#">CF1R-ADD-01-E</a> (HERS required) must be registered with a HERS provider website: <a href="https://www.calcerts.com/">https://www.calcerts.com/</a> <a href="https://www.cheers.org/">https://www.cheers.org/</a> <a href="#">CF1R-ADD-02-E</a> (No HERS) or Performance option: <a href="#">CF1R-PRF-01-E</a>: Addition Alone, E+A or E+A+A</p>	<p><b>Roof *</b></p> <p>≤700 SF: Insulation to meet Mandatory: R-22</p> <p>&gt;700 SF: Prescriptive Package A Option A, B or C</p>	 <p><i>Example of High Performance Attic Option A</i></p>	 <p><i>Example of Non HPA (or Option C)</i></p>
	<p><b>Walls</b></p> <p><b>Extended Walls:</b> 2 x 4: R-15 2 x 6: R-19</p> <p><b>New Walls:</b> Prescriptive Package A</p>		<p><b>Extended Walls</b> New walls extending on the same plane from existing walls are considered "extended" walls (can be extended <i>up i.e.</i> 2<sup>nd</sup> floor, <i>down i.e.</i> basement, or <i>out</i> on the same floor).</p> <p><b>New Walls</b> New walls <i>not</i> extended are considered "new" walls and must meet Package A requirements.</p>
	<p><b>Floor</b></p> <p>Prescriptive Package A</p>	<p>There are no exceptions from Package A for floors of any type.</p>	
	<p><b>Fenestration</b></p> <p><b>New Fenestration:</b> <a href="#">§150.2(a)1</a> (or see Page 5)</p> <p><b>Skylights: ≤16 ft<sup>2</sup></b> U-Factor=0.55 SHGC=0.30 **</p>	<p>Must meet mandatory weighted of U-factor = 0.58, in addition to using either the Prescriptive or Performance Approach.</p> <p>Area allowance exceptions are based on square footage of ADU, per the allowances of <a href="#">§150.2(a)1</a>.</p>	
	<p><b>HVAC</b></p> <p>HVAC = Prescriptive Package A IAQ whole building airflow not required if ≤1,000 ft<sup>2</sup> HERS measures will apply</p>	<p>Per Mechanical Code, return air cannot be shared with other dwelling units It is recommended that each dwelling unit have its own thermostat (ability to control their own heating and cooling setpoints) and separate IAQ ventilation system(s).</p>	
	<p><b>DHW</b></p> <p>A 2<sup>nd</sup> water heater meeting <a href="#">§150.1(c)8</a>, can be installed to serve ADU.</p>	<p>If no natural gas is connected to the existing home, an electric water heater that meets min. requirements can be installed for the ADU (<a href="#">§150.2(a)1D</a>).</p>	

\* Additions over 300 SF in Climate Zones 10-15 to meet Package A cool roof installation requirements, dependent upon roof slope.

\*\* Climate zones 1,3,5 have no SHGC requirements, nor west facing limitations on area

\*\*\* HERS testing of ducts and/ or AC equipment is required for certain mechanical systems; HERS verified IAQ required for ADU's over 1000 ft<sup>2</sup>



## >700 ft<sup>2</sup>: Package A Option A

**Roof**

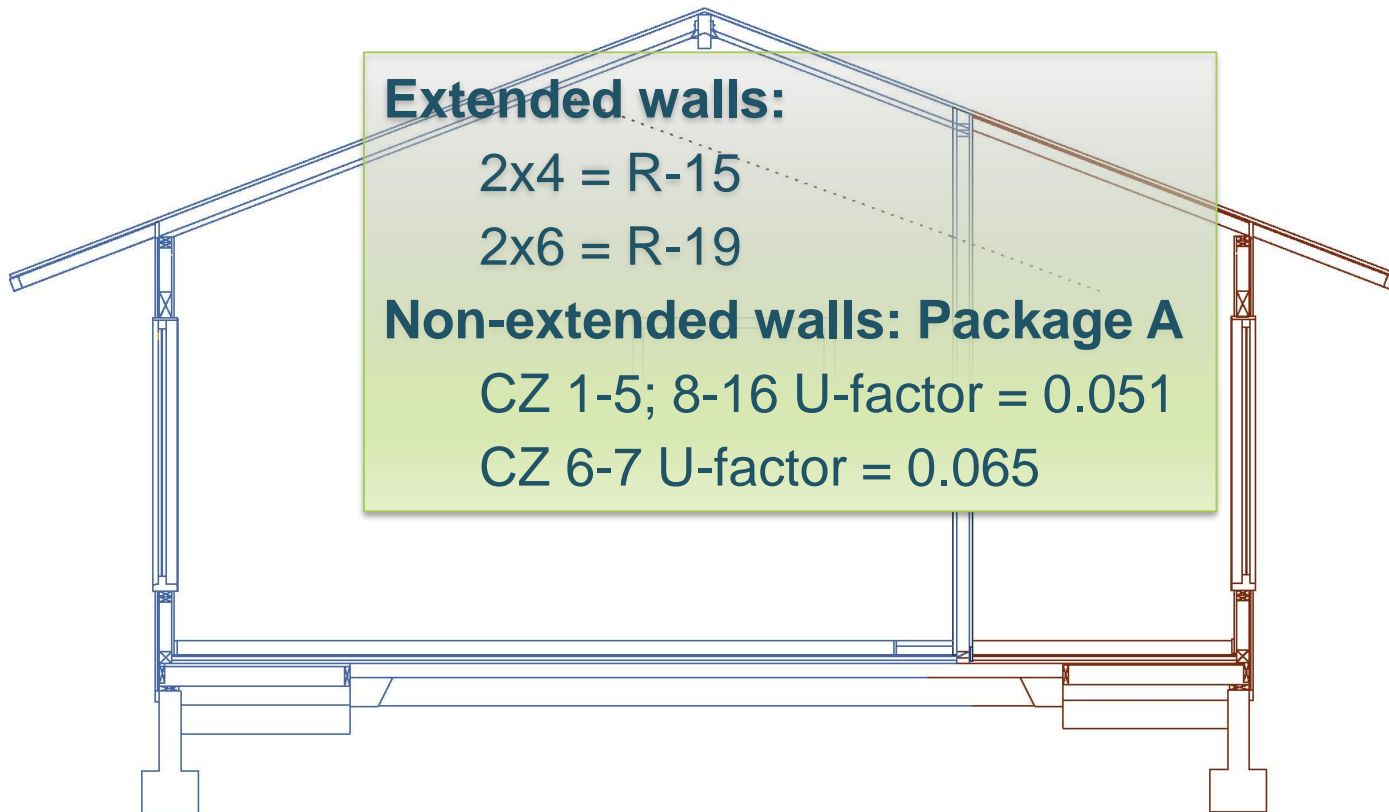
- ✦ Can meet the prescriptive requirements of "additions" §150.2(a)1; or
- ✦ Can use the performance approach as "addition" alone or E+A or E+A+A.



# Building Features

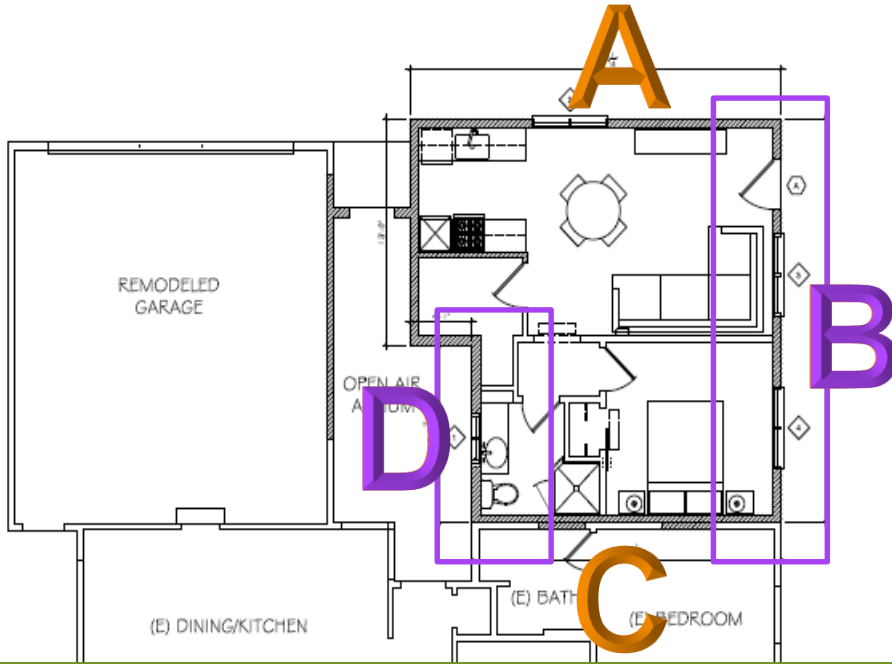
## Walls

✦ "Extended" walls applies only to new walls extended from existing walls associated with conditioned space.







# Extended Walls

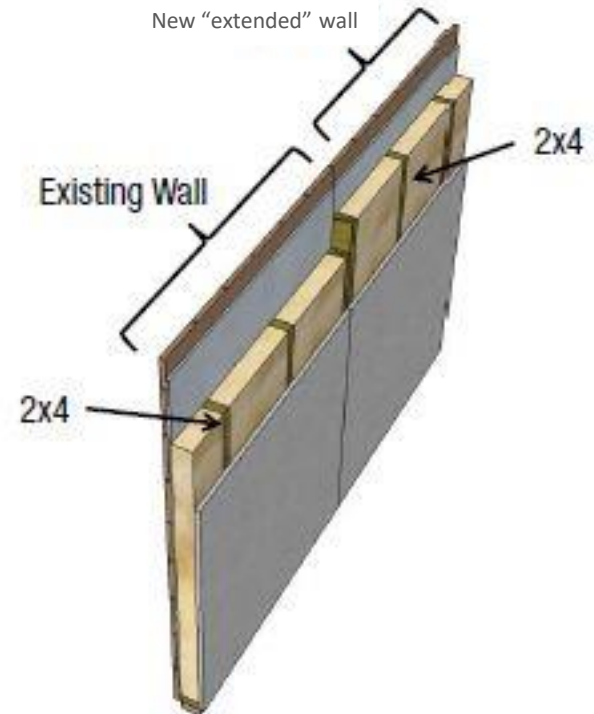


★ EXTENDED walls:

 2 x 4 = R-15

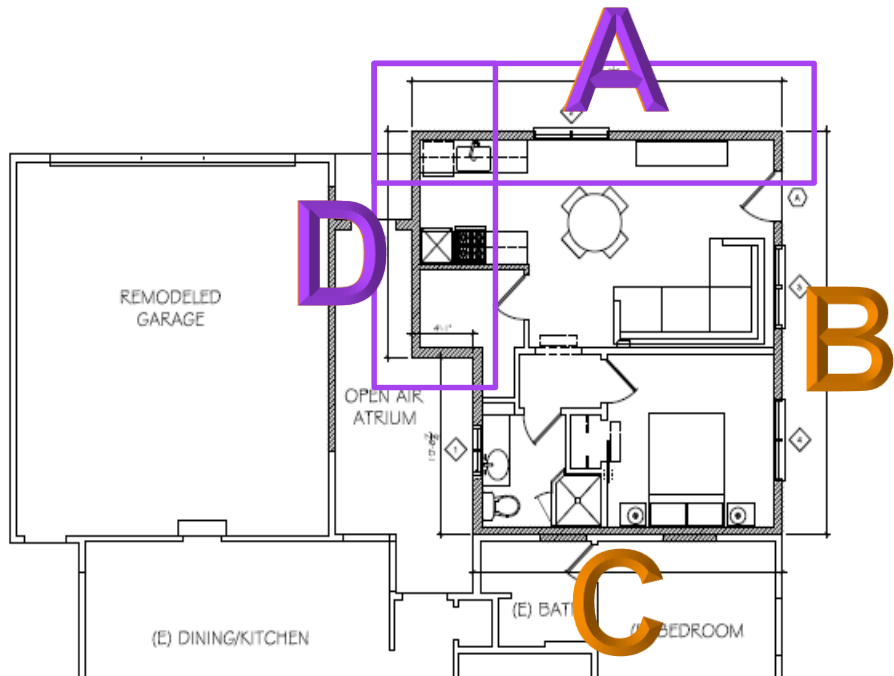
 2 x 6 = R-19

Which walls are considered extended?





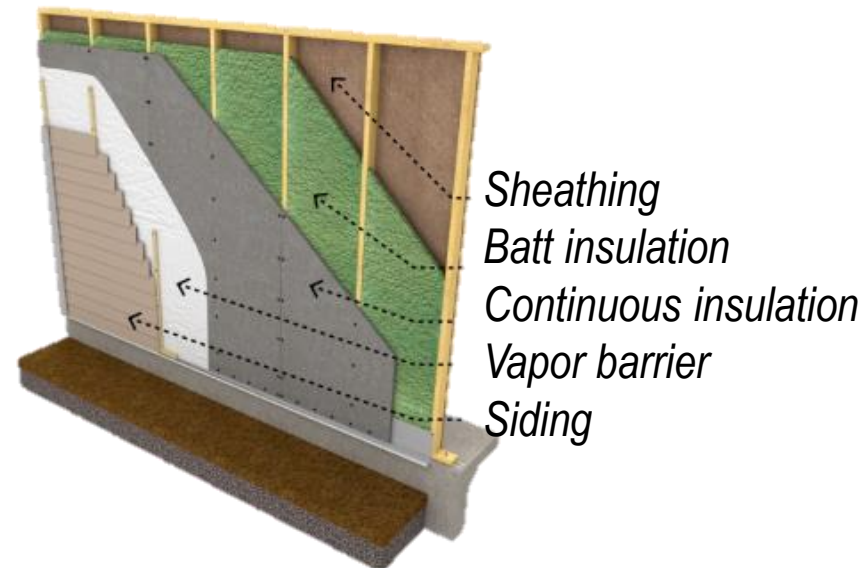
# New Walls



New walls:

- ✧ CZ 1-5, 8-16
  - U-factor = 0.051
- ✧ CZ 6-7
  - U-factor = 0.065

Which walls  
are considered  
“new”?



Source: BASF Corporation



# Building Features: Fenestration

## Fenestration

- ✦ Can meet the prescriptive requirements of "additions" §150.2(a)1; or
- ✦ Can use the performance approach as "addition" alone or E+A or E+A+A.



Existing Windows in CONVERTED space

- ✦ Converting unconditioned space **does not allow** the fenestration associated with the space to be considered "existing".
- ✦ They must be considered "new" and be shown to meet the mandatory and prescriptive requirements of the Energy Code.





# Building Features: Fenestration



Additions	Mandatory	Additions $\leq 400$ ft <sup>2</sup>	Additions $> 400$ ft <sup>2</sup> and $\leq 700$ ft <sup>2</sup>	Additions $> 700$ ft <sup>2</sup> and $\leq 1,000$ ft <sup>2</sup>	Additions $> 1,000$ ft <sup>2</sup>
U-Factor & SHGC:	<u>Weighted U-Factor</u> $\leq 0.58$	<b>Skylights:</b> $\leq 16$ ft <sup>2</sup> $> 16$ ft <sup>2</sup> <b>Vertical:</b>	$U = 0.55$ and $SHGC = 0.30$ $U = 0.32$ and $SHGC = 0.25$ $U = 0.32$ and $SHGC = 0.25$ (CZ 2, 4 & 6-16)		

**SHGC:**  
*Ability of the window to prevent solar heat gain when sun hitting window*

**U-Factor:**  
*Ability of the window to prevent heat transfer*



SHGC = 0.25\*  
NFRC Rated Low-e<sup>3</sup> product  
\*excluding CZ 1,3,5

U-factor = 0.32  
NFRC Rated dual paned nonmetal product





# Building Features

## HVAC/IAQ/DHW

- ◆ Can meet the prescriptive requirements of “additions” §150.2(a)1; or
- ◆ Can use the performance approach as “addition” alone or E+A or E+A+A.



- ◆ IAQ: Additions larger than 1,000 square feet shall meet **ALL** of ASHRAE Standard 62.2 (including whole-building ventilation airflow).
- ◆ Additions less than need to meet local exhaust requirements, and whole-building ventilation airflow is highly recommended.

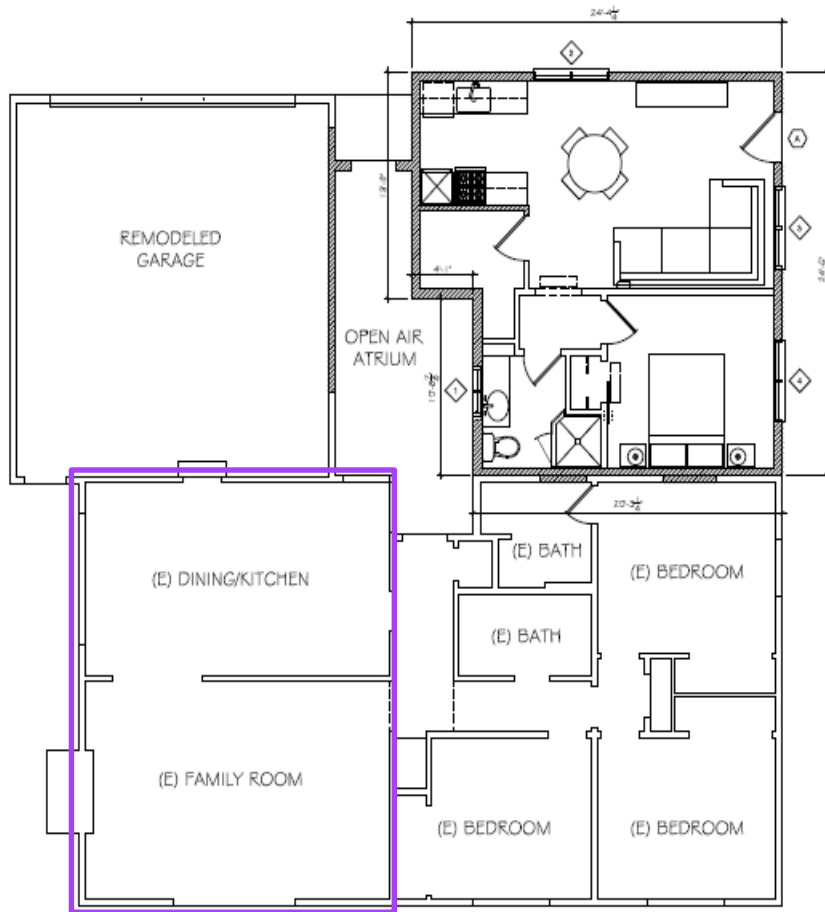
HVAC COOLING - HERS VERIFICATION					
01	02	03	04	05	06
Name	Verified Airflow	Airflow Target	Verified EER	Verified SEER	Verified Refrigerant Charge
Ex Cooling-hers-cool	Not Required	n/a	Not Required	Not Required	Not Required

HVAC - DISTRIBUTION SYSTEMS									
01	02	03	04	05	06	07	08	09	10
Name	Type	Duct Leakage	Insulation R-value	Supply Duct Location	Return Duct Location	Bypass Duct	Status	Verified Existing Condition	HERS Verification
Ducts	Ducts located in attic (Ventilated and Unventilated)	Existing (not specified)	6.0	Attic	Attic	None	Existing + New	No	n/a

IAQ (Indoor Air Quality) FANS					
01	02	03	04	05	06
Dwelling Unit	IAQ CFM	IAQ Watts/CFM	IAQ Fan Type	IAQ Recovery Effectiveness(%)	HERS Verification
SFam IAQVentRpt	0	0.25	Default	0	Not Required



# ADU from Existing Conditioned Space



PROPOSED FLOOR PLAN 1/4" = 1'-0"  
0 5 10 15

## ✦ What has to happen?

- ✦ Roof:
  - Nothing
- ✦ Walls:
  - Nothing
- ✦ Fenestration:
  - Nothing
- ✦ Floor:
  - Nothing
- ✦ HVAC
  - Cannot share return air, so will typically need an independent HVAC system
- ✦ DHW:
  - Nothing



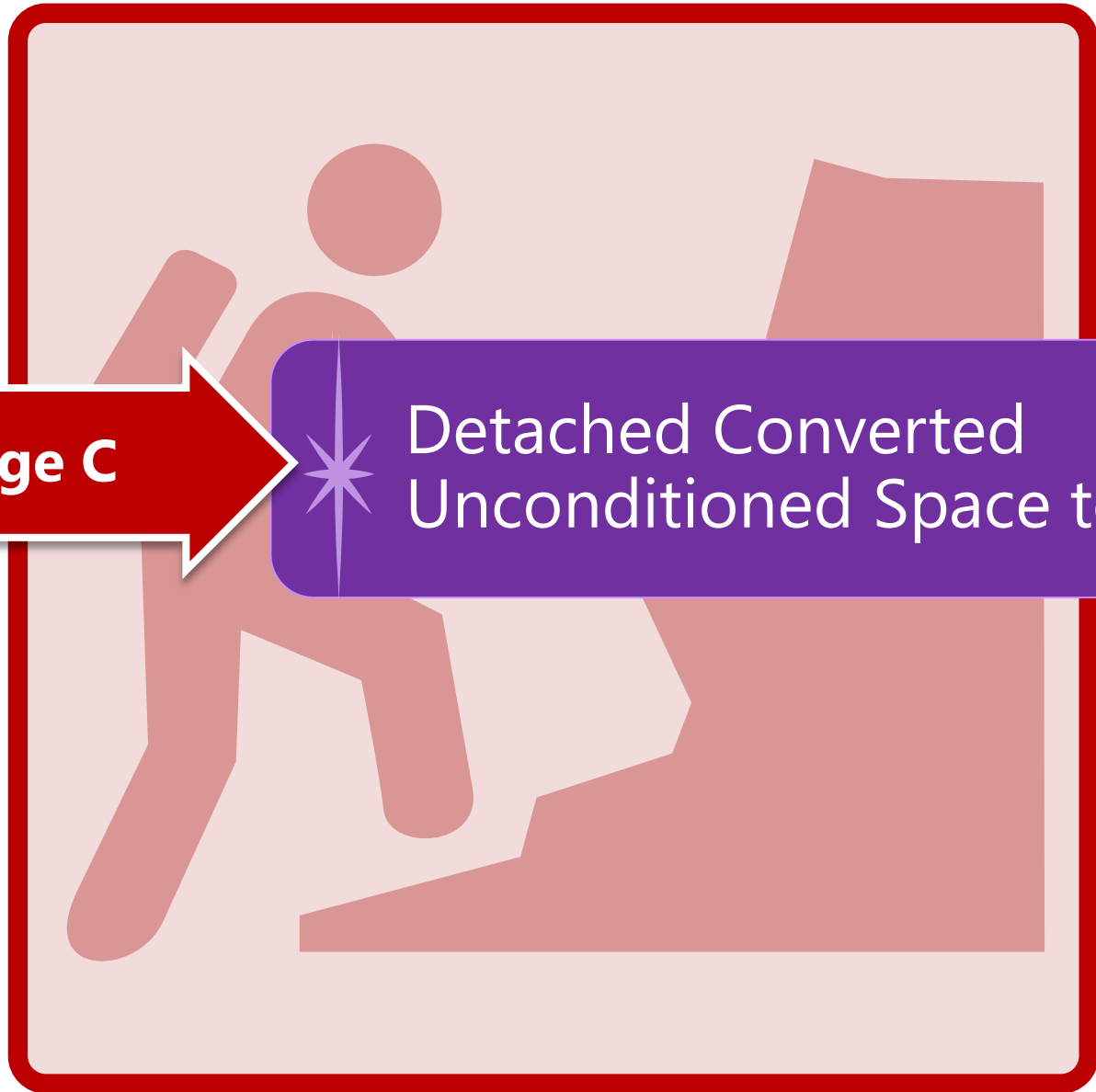
# Any Questions?





# Challenge C

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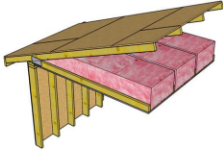
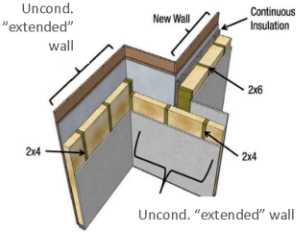
**Challenge C**

Detached Converted  
Unconditioned Space to ADU



# What IS that?

**Decoding ADUs™**  
Let's Talk Recent Changes

BUILDING FEATURE	PRESCRIPTIVE 2016 TITLE 24 PART 6 <a href="#">PACKAGE A (TABLE 150.1-A)</a>	"AS BUILT"
<b>DETACHED CONVERTED UNCONDITIONED SPACE TO ADU</b>		
  <b>CLARIFICATION:</b> (Per <a href="#">Blueprint 122, 3/29/18</a> ): An addition to the main house  	<b>Roof *</b> ≤700 SF: Insulation to meet Mandatory: R-22  >700 SF: Prescriptive Package A Option A, B or C	  <i>Example of High Performance Attic: Option C</i>
	<b>Walls</b> <b>Extended Walls:</b> 2 x 4: R-15 2 x 6: R-19  <b>New Walls:</b> Prescriptive Package A	  <b>Extended Walls</b> All walls currently existing as part of the unconditioned space are considered "extended walls" and are exempt from the Package A requirements. New walls extending on the same plane from these existing unconditioned walls are also considered "extended" walls.  <b>New Walls:</b> Walls <i>added</i> to the existing unconditioned space that are not on the same plane of "extended" walls, must meet Package A requirements (see image above).
<b>COMPLIANCE DOCUMENTATION:</b> Prescriptive option:  <a href="#">CF1R-ADD-01-E</a> (HERS required) must be registered with a HERS provider website: <a href="https://www.calcerts.com/">https://www.calcerts.com/</a> <a href="https://www.cheers.org/">https://www.cheers.org/</a>  <a href="#">CF1R-ADD-02-E</a> (No HERS) or  Performance option: <a href="#">CF1R-PRF-01-E</a> : Addition Alone, E+A or E+A+A	<b>Floor</b> Prescriptive Package A	There are no exceptions from Package A for floors of any type.
	<b>Fenestration</b> <b>New Fenestration:</b> <a href="#">§150.2(a)1</a> (or see Page 5)  <b>Skylights:</b> ≤16 ft <sup>2</sup> U-Factor=0.55 SHGC=0.30 **	All glazing in this space are considered "new", even if it already exists as part of the unconditioned space, and must meet mandatory weighted of U-factor = 0.58, in addition to using either the Prescriptive or Performance Approach.  Area allowance exceptions are based on square footage of ADU, per the allowances of <a href="#">§150.2(a)1</a> .
	<b>HVAC ***</b> HVAC = Prescriptive Package A IAQ whole building airflow not required if ≤1,000 ft <sup>2</sup> HERS measures will apply	Per Mechanical Code, return air cannot be shared with other dwelling units. It is recommended that each dwelling unit have its own thermostat (ability to control their own heating and cooling setpoints) and separate IAQ ventilation system(s).
	<b>DHW</b> A 2 <sup>nd</sup> water heater meeting <a href="#">§150.1(c)8</a> , can be installed to serve ADU.	If no natural gas is connected to the existing home, an electric water heater that meets min. requirements can be installed for the ADU ( <a href="#">§150.2(a)1D</a> ).

oned

EXI \* Additions over 300 SF in Climate Zones 10-15 to meet Package A cool roof installation requirements, dependent upon roof slope.

\*\* Climate zones 1,3,5 have no SHGC requirements, nor west facing limitations on area

\*\*\* HERS testing of ducts and/or AC equipment is required for certain mechanical systems; HERS verified IAQ required for ADU's over 1000 ft<sup>2</sup>



## >700 ft<sup>2</sup>: Package A Option B

**Roof**

- ✦ Can meet the prescriptive requirements of "additions" §150.2(a)1; or
- ✦ Can use the performance approach as "addition" alone or E+A or E+A+A.





# Extended Walls



- ✦ "Extended" walls apply to walls associated with unconditioned space (§150.2(a)1); and
- ✦ Any new walls that are "extended" from those unconditioned walls.

✦ EXTENDED walls:



2 x 4 = R-15



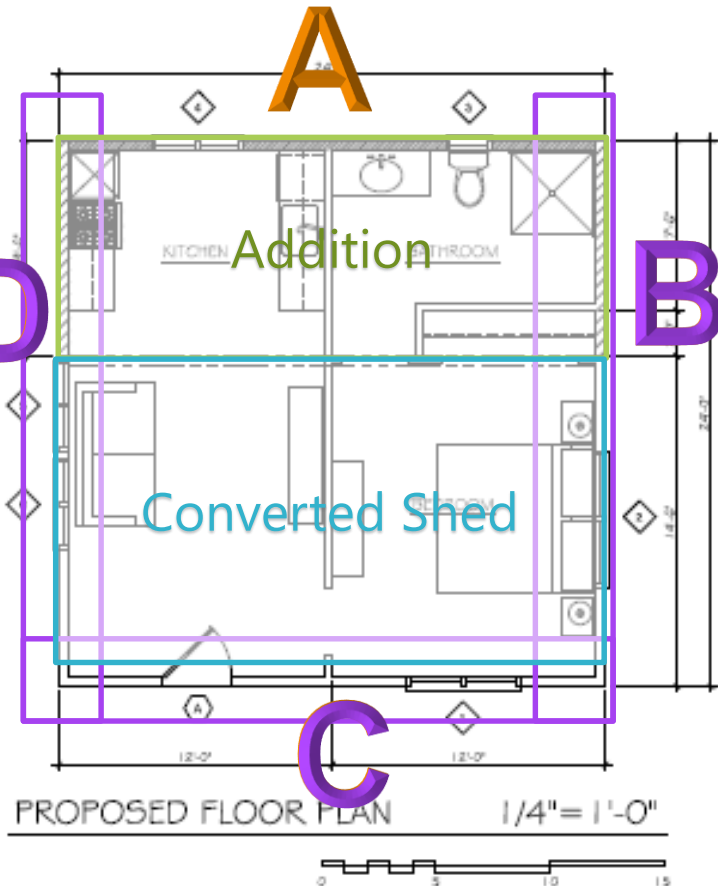
2 x 6 = R-19

New "extended" wall



Converted

Which walls are considered extended?






# Building Features: Fenestration

## Fenestration

- ✦ Can meet the prescriptive requirements of "additions" §150.2(a)1; or
- ✦ Can use the performance approach as "addition" alone or E+A or E+A+A.

 <b>World's Best Window Co.</b> Millennium 2000+ Vinyl-Clad Wood Frame Double Glazing • Argon Fill • Low E Product Type: Vertical Slider	
<b>ENERGY PERFORMANCE RATINGS</b>	
U-Factor (U.S./I-P) <b>0.32</b>	Solar Heat Gain Coefficient <b>0.25</b>
<b>ADDITIONAL PERFORMANCE RATINGS</b>	
Visible Transmittance <b>0.51</b>	Air Leakage (U.S./I-P) <b>0.2</b>
<small>Manufacturer stipulates that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. <a href="http://www.nfrc.org">www.nfrc.org</a></small>	

## Default Table 110.6-B

- ✦ Worst values available, used for non NFRC tested products
- ✦ Can only be used in performance approach.

## NA6 COG formula

- ✦ Less than 250 ft<sup>2</sup> or 5% of CFA for site built fenestration.
- ✦ Can only be used in performance approach.

## NFRC Tested and Labeled

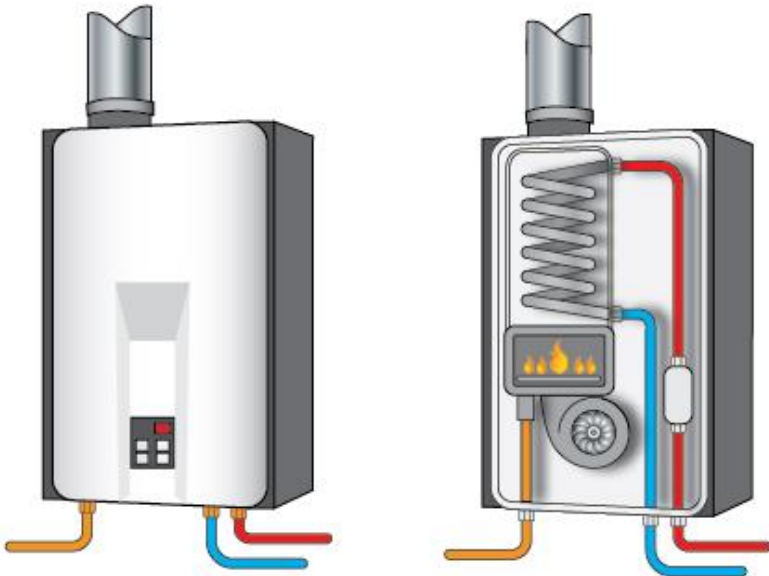
- ✦ Traditional is required for residential windows, NOT simulated



# Building Features

## HVAC/IAQ/DHW

- ◆ Can meet the prescriptive requirements of "additions" §150.2(a)1; or
- ◆ Can use the performance approach as "addition" alone or E+A or E+A+A.



- ◆ DHW: A 2nd water heater meeting §150.1(c)8 (gas tankless unit), can be installed to serve ADU,
  - ◆ IF there is only one serving the existing home.

OPAQUE SURFACES										
01	02	03	04	05	06	07	08	09	10	11
Name	Zone	Construction	Azimuth	Orientation	Gross Area (ft <sup>2</sup> )	Window & Door Area (ft <sup>2</sup> )	Tilt (deg)	Wall Exception	Status	Verified Existing Condition
Ex Wall Front	House	Wall R0	180	Front	320	76	90	n/a	Existing	No
Ex Wall Left	House	Wall R0	270	Left	288	40	90	n/a	Existing	No
Ex Wall Back	House	Wall R0	0	Back	200	59	90	n/a	Existing	No
Ex Wall Right	House	Wall R0	90	Right	288	36	90	n/a	Existing	No
Wall to Addition	House>>Addition	Interior R0			120	0		n/a	New	n/a
Ceiling (below attic)	House	Ceiling R11			1440			n/a	Existing	No
Floor Over Crawlspace	House	Raised Crawl R0			1440			n/a	Existing	No
Add Wall Left	Addition	Wall R-15	270	Left	160	25	90	Ex. w/ Siding	New	n/a
Add Back Wall	Addition	Wall R-15	0	Back	200	40.02	90	Ex. w/ Siding	New	n/a
Add Wall Right	Addition	Wall R-15	90	Right	160	25	90	Ex. w/ Siding	New	n/a
Addition Ceiling	Addition	R-38 Ceiling			500			n/a	New	n/a

ATTIC									
01	02	03	04	05	06	07	08	09	10
Name	Construction	Type	Roof Rise	Roof Reflectance	Roof Emittance	Radiant Barrier	Cool Roof	Status	Verified Existing Condition
Attic	Asphalt Shingle Roof	Ventilated	5	0.1	0.85	No	No	Existing	No
Addtn Attic	Asphalt RB	Ventilated	5	0.1	0.85	Yes	No	New	No



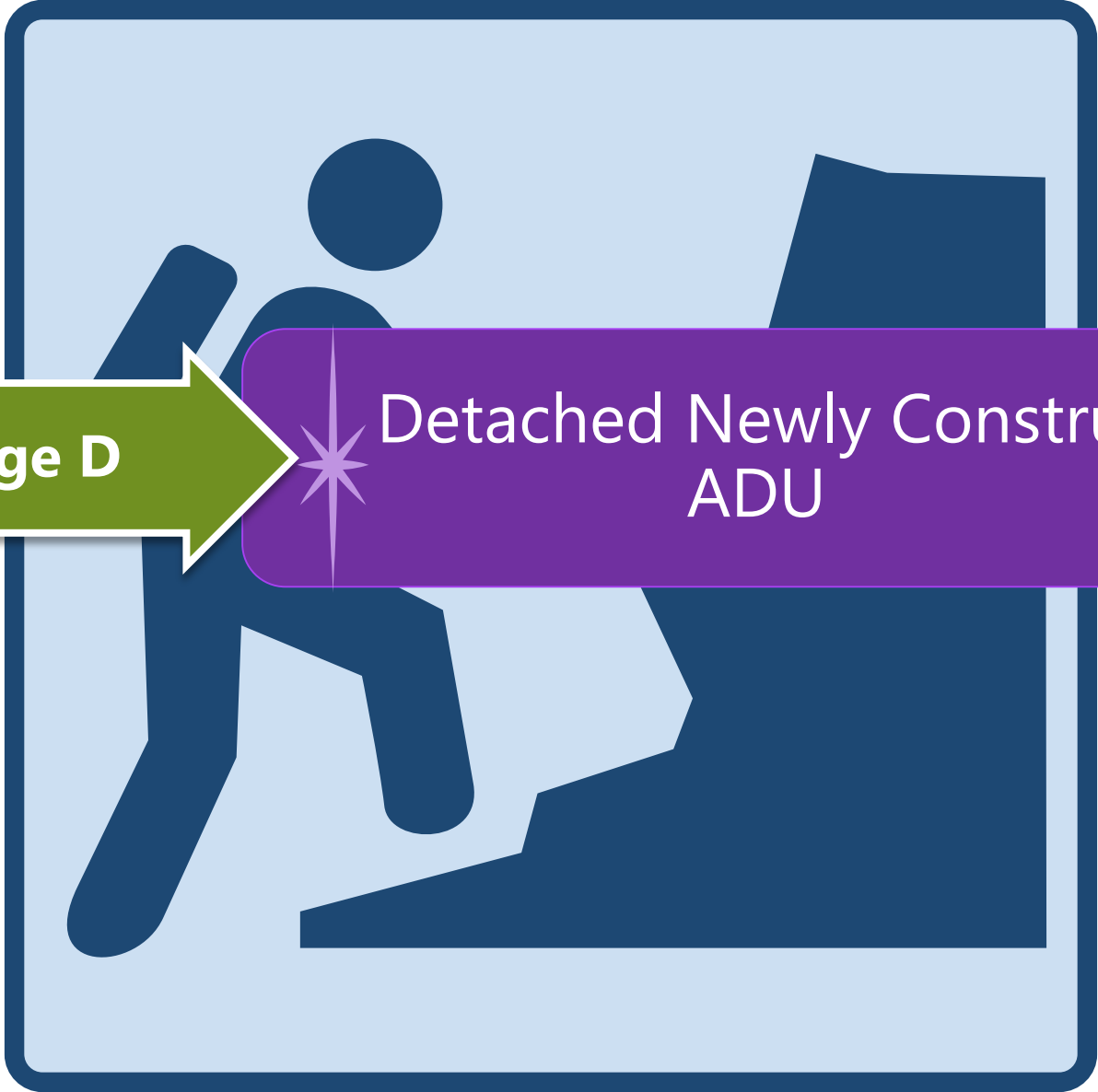
# Any Questions?





# Challenge D

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**Challenge D**

**Detached Newly Constructed  
ADU**





# What IS that?



CI





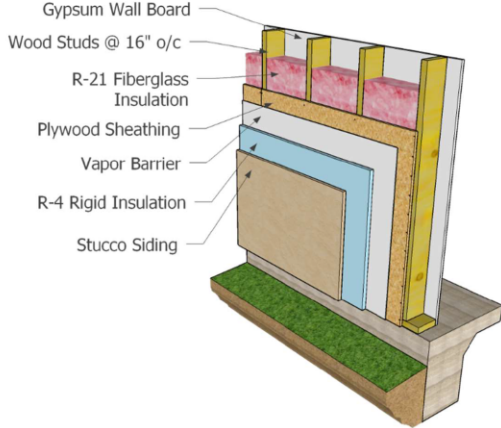
U

he

home

a



BUILDING FEATURE	PRESCRIPTIVE 2016 TITLE 24 PART 6 PACKAGE A (TABLE 150.1-A)	"AS BUILT"
<b>DETACHED NEWLY CONSTRUCTED ADU</b>		
 <p><b>CLARIFICATION:</b> (Blueprint 122, 3/29/18): No change, still considered new dwelling unit (single family home)</p> 	<p><b>Roof</b></p> <p>Any size ADU is subject to Prescriptive Package A.</p> <p><b>Walls</b></p> <p>All walls are considered "new" and are subject to Prescriptive Package A.</p> <p><b>Framed:</b> CZ1-5; 8-16 = U-factor of 0.051 CZ 6-7 = U-factor of 0.065</p>	<p>Prescriptive Option A, B or C including the provision that attics are to be ventilated, or use the Performance Approach.</p>  <p style="text-align: center;"><i>Example of High Performance Wall = U-factor of 0.051</i></p>
<p><b>DOCUMENTATION:</b> Prescriptive option: <a href="#">CF1R-NCB-01-E</a> (HERS required) must be registered with a HERS provider website: <a href="https://www.calcerts.com/">https://www.calcerts.com/</a> <a href="https://www.cheers.org/">https://www.cheers.org/</a></p> <p>or</p> <p>Performance option: <a href="#">CF1R-PRF-01-E</a> using Energy Commission approved software</p>	<p><b>Floor</b></p> <p>Prescriptive Package A</p>	<p>Raised floor = R-19; Heated Slabs = R-5 slab edge insulation</p>
	<p><b>Fenestration</b></p> <p><b>All Fenestration is "New":</b> Prescriptive Package A</p> <p><b>Skylights:</b> ≤16 ft<sup>2</sup> U-Factor=0.55 SHGC=0.30 **</p>	<p>Must meet mandatory weighted of U-factor = 0.58, in addition to using either the Prescriptive (U-factor = 0.32 and SHGC = 0.25**) or use the Performance Approach.</p> <p>Area allowance 20% of conditioned floor area, 5% west facing limitation ** per <a href="#">§150.1(c)3</a>.</p>
	<p><b>HVAC ***</b></p> <p>HVAC = Prescriptive Package A IAQ whole building airflow is required of any size ADU HERS measures will apply</p>	<p>All applicable HERS measures will apply: Duct testing; refrigerant charge; airflow and fan watt draw; IAQ.</p>
	<p><b>DHW</b></p> <p>Prescriptive Package A <a href="#">§150.1(c)8</a></p>	<p>If recirculation pumps are desired for any type of ADU, Demand Recirculation Systems with manual control pumps per RA4.4 shall be used, or use the Performance Approach for control options.</p>

\* Additions over 300 SF in Climate Zones 10-15 to meet Package A cool roof installation requirements, dependent upon roof slope.

\*\* Climate zones 1,3,5 have no SHGC requirements, nor west facing limitations on area

\*\*\* HERS testing of ducts and/ or AC equipment is required for certain mechanical systems; HERS verified IAQ required for ADU's over 1000 ft<sup>2</sup>



## >700 ft<sup>2</sup>: Package A Option C

Roof

- ✦ Package A
  - ✦ Option A, B or C
  - ✦ Cool Roof:
    - CZ 10-15 Steep Sloped
    - CZ1 3 & 15 Low Sloped
  - ✦ Radiant Barrier:
    - CZ 2-15 Vented Attic (Option B N/A)
- ✦ OR use the Performance approach



# Building Features

## Walls

### ✦ Package A

- ✦ CZ 1-5 and 8-16: U-factor = 0.051
- ✦ CZ 6-7: U-factor = 0.065





# Building Features: Fenestration

## Fenestration

### ✦ Package A

- ✦ 20% window area
- ✦ 5% west facing (N/A CZ 1,3,5)
- ✦ U-factor 0.32 / SHGC 0.25



### ✦ *We look at energy use as a "TDV" evaluation:*

- ✦ *What **T**ime is the energy being used,*
- ✦ ***D**ependent on where the building is located,*
- ✦ *And looking at the **V**alue of the energy source required.*

- ✦ **20% vertical fenestration** area to conditioned floor area
  - ✦ 2,000 sq. ft. home = 400 sq. ft. of glass window and/or glass doors
- ✦ **5% West\* facing** fenestration area to conditioned floor area
  - ✦ 2,000 sq. ft. home = 100 sq. ft. of facing west

\*excluding CZ 1,3,5

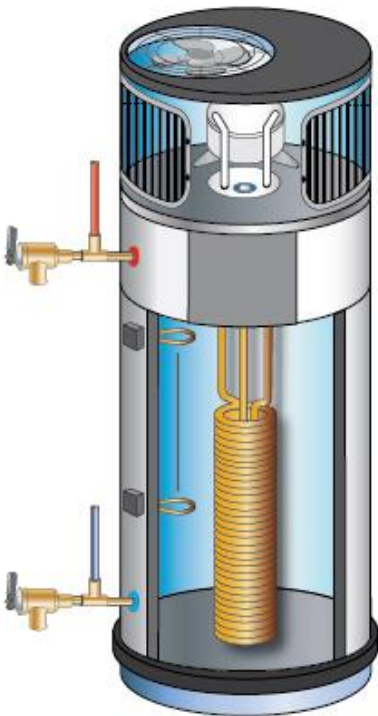


# Building Features

HVAC/IAQ/DHW

## ◆ Package A

- ✧ IAQ whole house ventilation airflow HERS verified
- ✧ All other Package A requirements



## But..I don't want gas

- ◆ High Efficiency heat pump water heater
  - ✧ Will need to make improvements to design to allow for this type of water heater such as (but not limited to) using the Performance Approach:
    - PV system or Solar hot water system or
    - Higher efficiency HVAC or ??



# Residential PV Systems



\* kilowatts direct current

A typical 1kWdc system often has approximately four PV panels

*Can be located anywhere on the property, NOT just on the roof of the ADU. Credit will not apply if PV there already feeding the same meter.*

## PV Credit

- ✦ The PV System Credit is available only if:
  - ✦ The Performance Approach is used
  - ✦ The project is in:
    - Climate Zones 1-5, 8-16
  - ✦ The system is:
    - $\geq 2$  kWdc\* for Single Family
    - $\geq 1$  kWdc\* for Multi Family
    - The amount of credit will depend upon the Climate Zone and the Conditioned Floor Area of the dwelling.



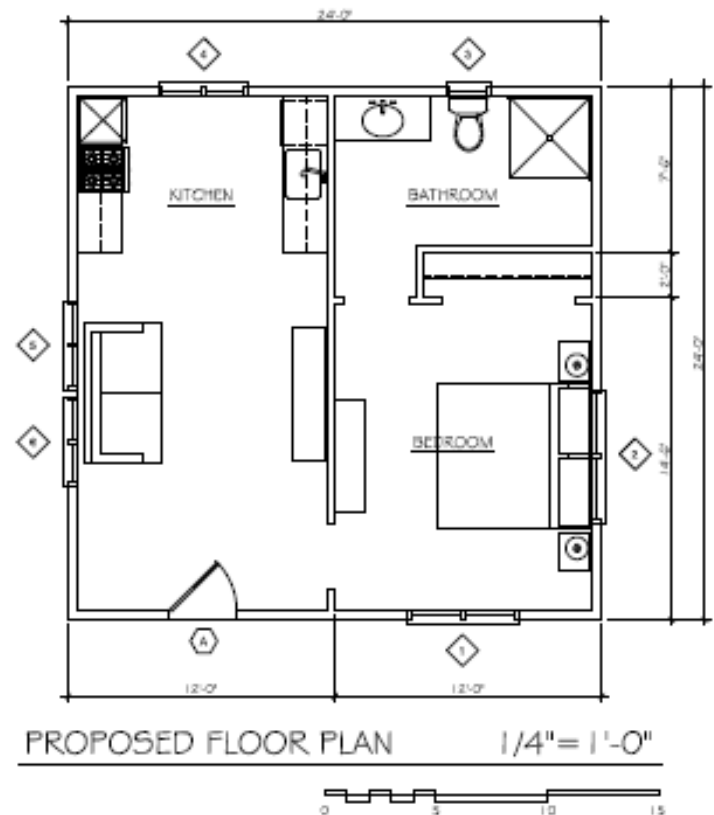


# What Does the CF1R Say?

## CF1R-PRF-01-E

### CZ 2

- ◆ Walls: 2 x 6 R-21
- ◆ Roof:
  - ◇ Vented Attic
  - ◇ R-30 at ceiling
  - ◇ Radiant Barrier
- ◆ Fenestration: Package A
- ◆ HVAC: Ducted Split DX
  - ◇ FAU: 92% AFUE
  - ◇ AC: 14.5 SEER/12 EER
- ◆ DHW: Gas Tankless
  - ◇ 0.90 Energy Factor

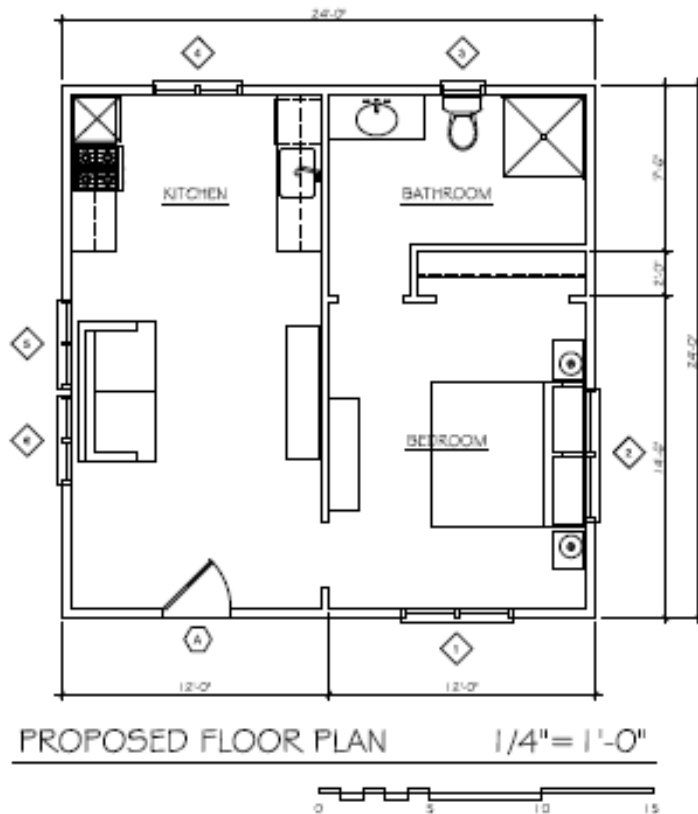




# What Does the CF1R Say?

## CF1R-PRF-01-E

CZ 12



- ◆ Walls: 2 x 6
  - ◆ Closed cell spray foam = R-27
    - R-5 per inch
- ◆ Roof:
  - ◆ Vented Attic
  - ◆ R-38 at ceiling/R-18 below roof
- ◆ Fenestration: Package A
- ◆ HVAC: Ducted Split DX
  - ◆ FAU: 92% AFUE
  - ◆ AC: 14.5 SEER/12 EER
- ◆ DHW: Gas Tankless
  - ◆ 0.90 Energy Factor



# Any Questions?





# Next Steps





*A one-hour live stream  
YouTube show  
designed to present  
"how-tos" for industry  
professionals working  
with California's  
building and appliance  
energy efficiency  
standards.*

**Coffee & Code with Brian — Residential Modeling: Accessory Dwelling Units (ADU), Part 1: Newly Conditioned Detached ADU**

Join host Brian Selby for our next Code & Coffee event — a one-hour live stream YouTube show designed to present "how-tos" for industry professionals working with California's building and appliance energy efficiency standards. The setting is informal, the platform interactive, and the java strong! In this episode of Code & Coffee, Brian will focus on residential building performance modeling for compliance with California's Title 24, Part 6 Building Energy Efficiency Standards. Brian will demonstrate how to model a newly conditioned detached ADU based on converting an existing detached garage to an ADU. This demonstration includes performing plan take-offs, modeling the project in EnergyPro, making recommendations for compliance, and reviewing the CF1R for accuracy.

*There are currently no classes scheduled for this topic. But you can click on the link below to view a recording of a previous session.*

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CABEC 2018 Brown Bag Webinar Series #6, June 20, 2018: Chris Olvera from Energy Commission on ADU's





# CBECC-Res FAQ: Link in Handout

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## Frequently Asked Questions (FAQ) about CBECC-Res

Updated April 10, 2018

1. A recent *Blueprint* (Issue 122, <http://www.energy.ca.gov/efficiency/blueprint/>) said that when an existing attached or detached space (such as an existing garage) is converted to an accessory dwelling unit (ADU), all of the existing walls can be considered “wall extensions” meaning they only require R-15 (in 2x4 framing) or R-19 (in 2x6 framing) cavity and no continuous insulation. How can I model these walls in performance to take advantage of this new allowance? Is it allowed for addition alone compliance or only “existing + addition?”

Until a new version of software is released that can identify wall extensions, we recommend first determining the prescriptive exterior wall U-factor required for the applicable climate zone (e.g., U-0.051 in climate zones 1-5 and 8-16, or U-0.065 in climate zones 6-7). Create a wall construction and name it “Prescriptive Wall” (so it is not confused for actual construction assemblies). Use this wall construction for all of the ADU’s exterior walls. The construction details to achieve exactly these U-factors are:

U-0.051 = R-19 in 5-1/2 in. cavity (2x6 @ 16 in. O.C.), R-5 sheathing, synthetic stucco

U-0.065 = R-15 (2x4 @ 16 in. O.C.), specify R-3.8 sheathing, synthetic stucco

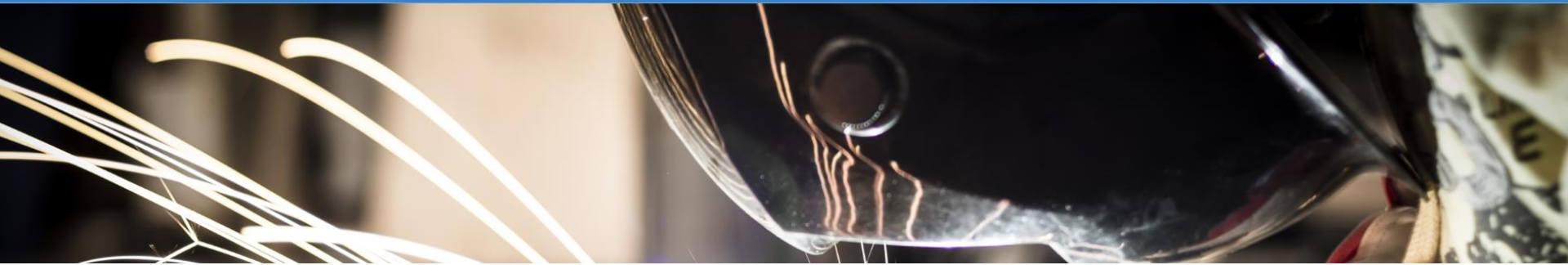
This provision is allowed for all compliance approaches (existing + addition and addition alone), as well as non-ADU projects. NOTE: if the project is not converting an existing space, there was some useful information for how to identify when a wall is an extension in Issue 118 of *Blueprint* (page 5). Typically, for such cases it is only one wall, not all of the walls.

To help avoid plan check comments, be sure to document your modeling assumption using either the language from the *Blueprint* or this FAQ. During construction, only R-15 or R-19 cavity insulation is required.



# WISE

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Workforce Instruction for Standards and Efficiency (WISE) is a training and education program designed to support the transition of California new residential building toward High Performance Attic (HPA) and High Performance Wall (HPW) construction practices.

WISE is designed to help accelerate learning and implementation of high performance building by training workers and providing a platform for the exchange of best practices and solutions from industry experts.

This web portal is designed as a central point for sharing information related to the program, including reports, technical briefings, case studies and event coordination.



# Any Questions?

