Residential

mass save

2025 Massachusetts Existing Buildings Additions

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Together, we make good happen for Massachusetts.

Your local electric and natural gas utilities and energy efficiency service provider are taking strides in energy efficiency: Berkshire Gas, Cape Light Compact, Eversource, Liberty, National Grid and Unitil.

As one, we form Mass Save®, with the common goal of helping residents and businesses across Massachusetts save money and energy, leading our state to a clean and energy efficient future.

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Presented by:

PSD

Moving Energy Efficiency Forward

We combine building science with technology to help utility companies, program implementers, and building performance professionals achieve energy savings.

Agenda

- Introduction
- Massachusetts Energy Code
- Chapter 5 [RE] Overview
- Residential Additions
- Compliance Paths
- Solar Ready and Additions
- Case Studies
- Summary/Closing

Learning Outcomes

Gain knowledge about the application of the Energy and Stretch Code for Large Additions

Apply the appropriate compliance paths based on project type

Identify the requirements for Solar Ready provisions of the Stretch code as it applies to additions

Poll Question #1

Which of the following best describes your field of work?

A. Builder

B. Architect

C. Code Official

D. HERS Rater

E. Passive House Consultant

2025 Massachusetts Residential Energy Code

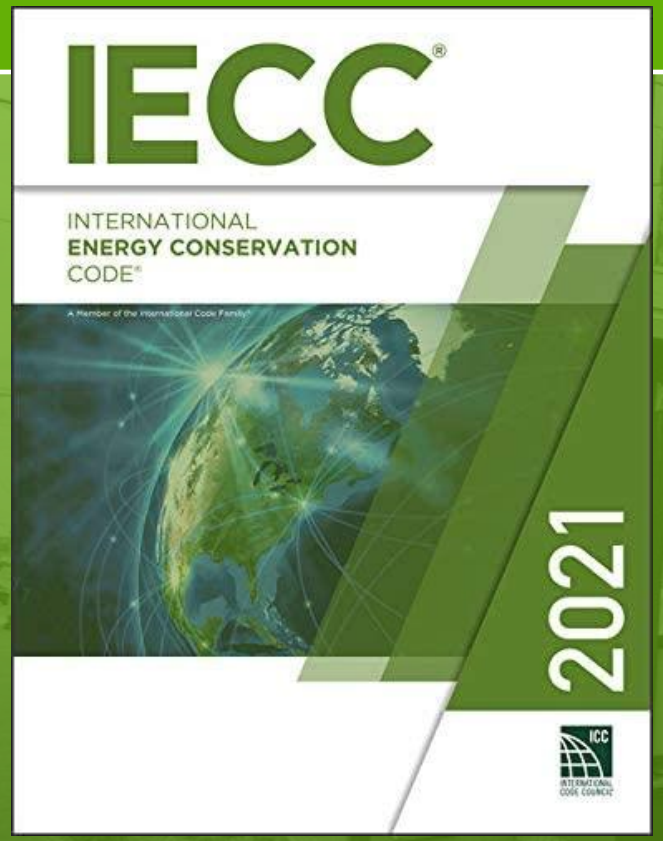
Base Code	Stretch Code	Specialized Code
2021 IECC w/MA Amendments; 780 CMR Chapter 11R (residential) & 780 CMR Chapter 13 (commercial) 780 CMR 10th Edition is the current MA Building Code	2021 IECC w/MA Amendments; 225 CMR Chapter 22 (residential) & 225 CMR Chapter 23 (commercial)	2021 IECC w/MA Amendments; 225 CMR Chapter 22 + Appendix RC (residential) & 225 CMR Chapter 23 + Appendix CC (commercial)

Source: MA DOER

Current Energy Code Options

The 2025 Massachusetts Energy Code

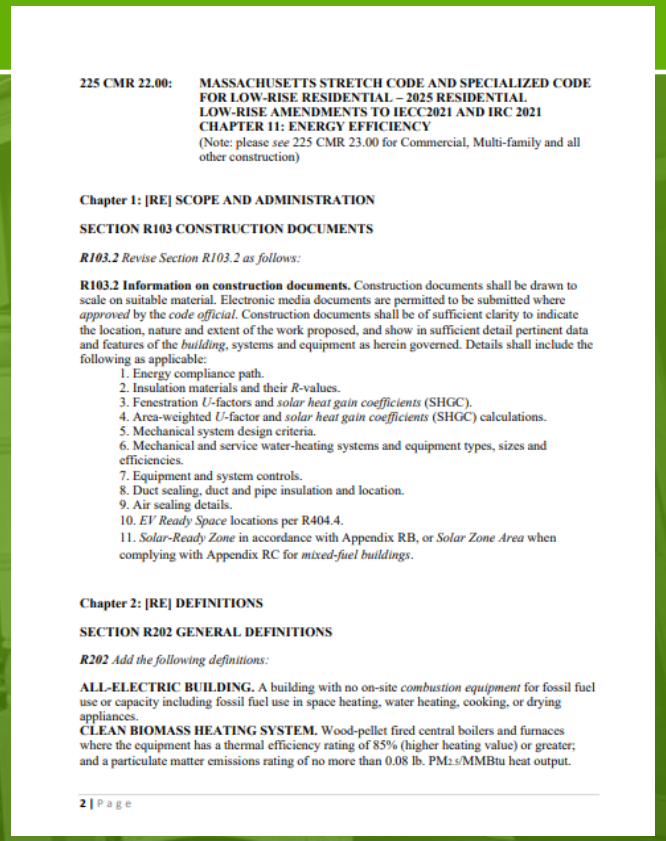
The 2021 IECC



Source: ICC

+

Massachusetts Amendments



225 CMR 22.00: MASSACHUSETTS STRETCH CODE AND SPECIALIZED CODE FOR LOW-RISE RESIDENTIAL – 2025 RESIDENTIAL LOW-RISE AMENDMENTS TO IECC2021 AND IRC 2021 CHAPTER 11: ENERGY EFFICIENCY
(Note: please *see* 225 CMR 23.00 for Commercial, Multi-family and all other construction)

Chapter 1: [RE] SCOPE AND ADMINISTRATION

SECTION R103 CONSTRUCTION DOCUMENTS

R103.2 *Revise Section R103.2 as follows:*

R103.2 Information on construction documents. Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the *building*, systems and equipment as herein governed. Details shall include the following as applicable:

1. Energy compliance path.
2. Insulation materials and their *R*-values.
3. Fenestration *U*-factors and *solar heat gain coefficients* (SHGC).
4. Area-weighted *U*-factor and *solar heat gain coefficients* (SHGC) calculations.
5. Mechanical system design criteria.
6. Mechanical and service water-heating systems and equipment types, sizes and efficiencies.
7. Equipment and system controls.
8. Duct sealing, duct and pipe insulation and location.
9. Air sealing details.
10. *EV Ready Space* locations per R404.4.
11. *Solar-Ready Zone* in accordance with Appendix RB, or *Solar Zone Area* when complying with Appendix RC for *mixed-fuel buildings*.

Chapter 2: [RE] DEFINITIONS

SECTION R202 GENERAL DEFINITIONS

R202 *Add the following definitions:*

ALL-ELECTRIC BUILDING. A building with no on-site *combustion equipment* for fossil fuel use or capacity including fossil fuel use in space heating, water heating, cooking, or drying appliances.
CLEAN BIOMASS HEATING SYSTEM. Wood-pellet fired central boilers and furnaces where the equipment has a thermal efficiency rating of 85% (higher heating value) or greater; and a particulate matter emissions rating of no more than 0.08 lb. $PM_{2.5}$/MMBtu heat output.

Source: ICC

The 2025 Massachusetts Energy Code

Base Code

Stretch Code

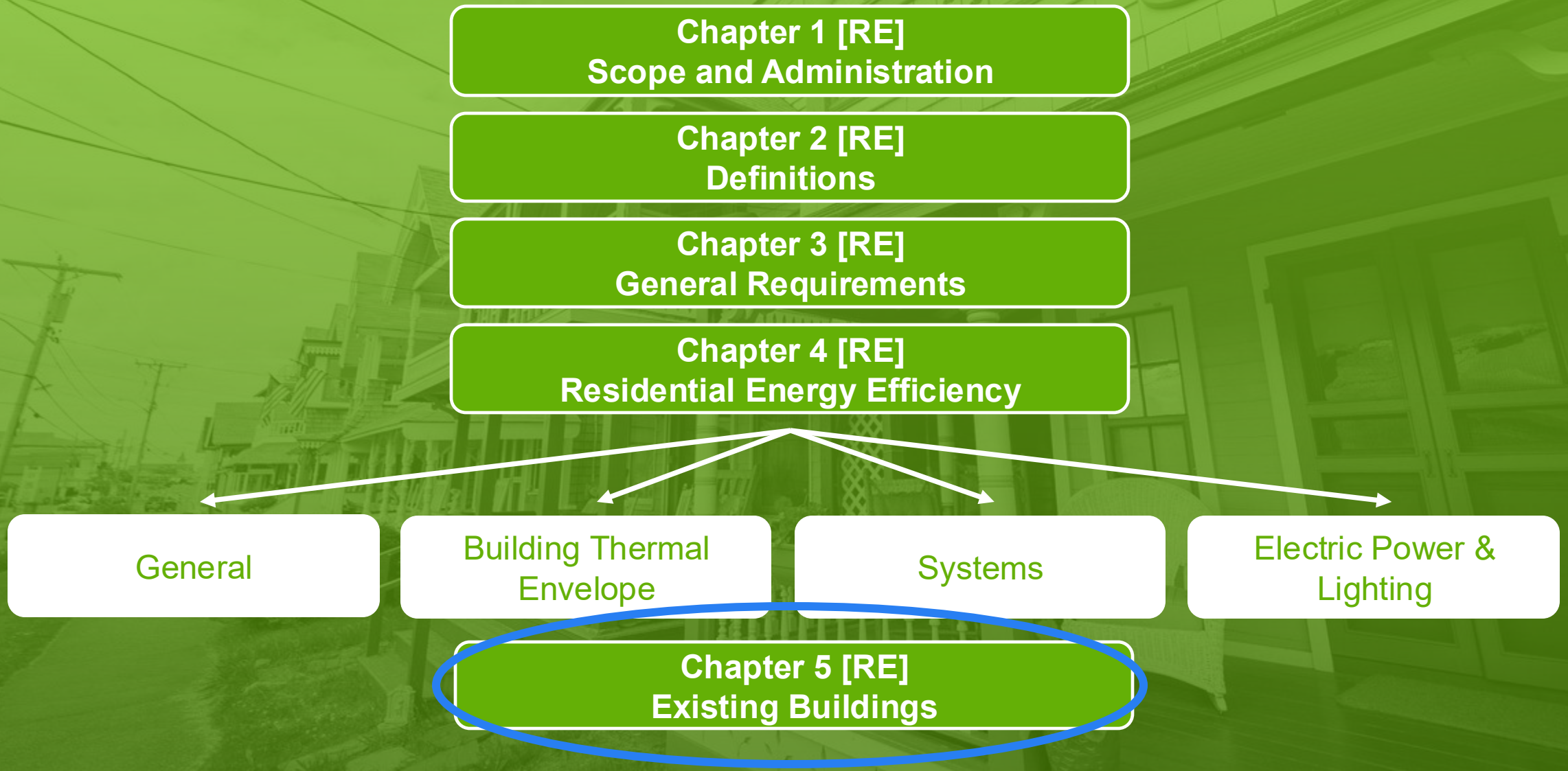
Municipal Opt-In Specialized Stretch Code

MA Stretch Energy Code

The residential Stretch Energy Code…

- Is developed by the MA Department of Energy Resources (DOER)
- Results in greater energy savings than the Base Energy Code
- Requires new homes and large additions and alterations to receive a HERS Rating or Passive House certification
- Requires compliance with 2021 IECC “mandatory” provisions (Passive House excluded)
- Is adopted at the level of the local jurisdiction

The Base Code and (Most) Stretch Code Alterations



Poll Question #2

Residential Additions are covered under Chapter 5 of the Massachusetts Energy Code.

A. True

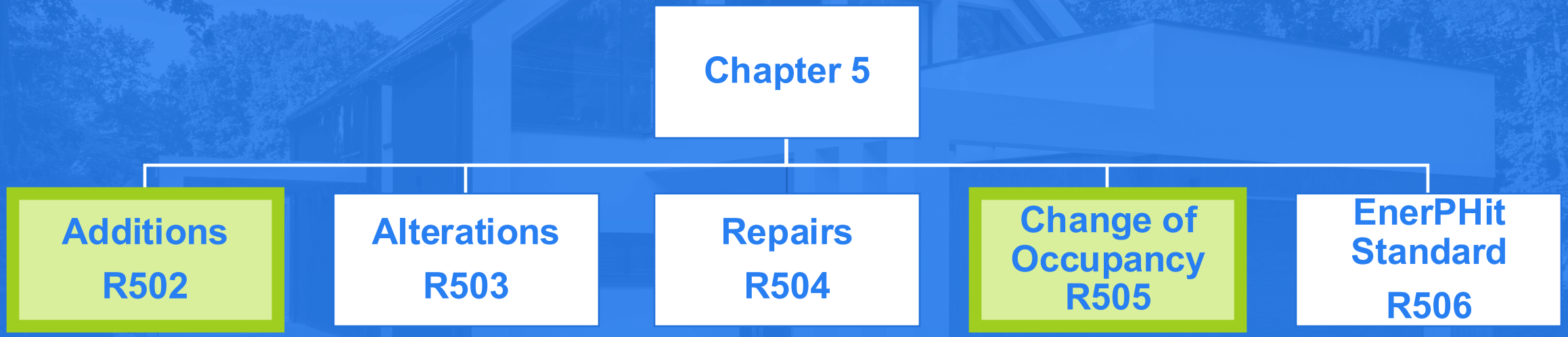
B. False

Chapter 5 Overview

Residential Provisions

Chapter 5 of the MA Amended 2021 IECC

The provisions for existing buildings are found in MA Amended 2021 IECC Chapter 5



Existing Buildings

R501.1.1 General

- Unaltered portions of the existing building or system shall not be required to comply
- This code shall not be used to require the removal, alteration or abandonment of, nor prevent the continued use of an existing building, provided it was legal when it was built

Change of Occupancy or Use

Section R505

Any space that is converted to a dwelling unit or portion thereof from another use or occupancy shall comply with this code

To be treated similar to additions (R502)

“Any unconditioned or low-energy space that is altered to become a conditioned space shall comply with Section R502”

Historic Buildings

R501.6 Energy code does not apply ***provided***:

- A report is submitted to the code official demonstrating that compliance with a provision would threaten, degrade or destroy the historic form, fabric or function of the building
- The report must be signed by one of the following:
  - Owner
  - Registered design professional
  - Rep of the State Historic Preservation Office or historic preservation AHJ

Source: PSD

Residential Additions

Section R502

Definitions

Chapter 2 Definition:

ADDITION – An extension or increase in the conditioned floor area or height of a building or structure

Conditioning of previously unconditioned space

Adding of new conditioned floor area

Source: PSD

Types of Additions

From Section R502.1.1 Large Additions:

Additions to a dwelling unit

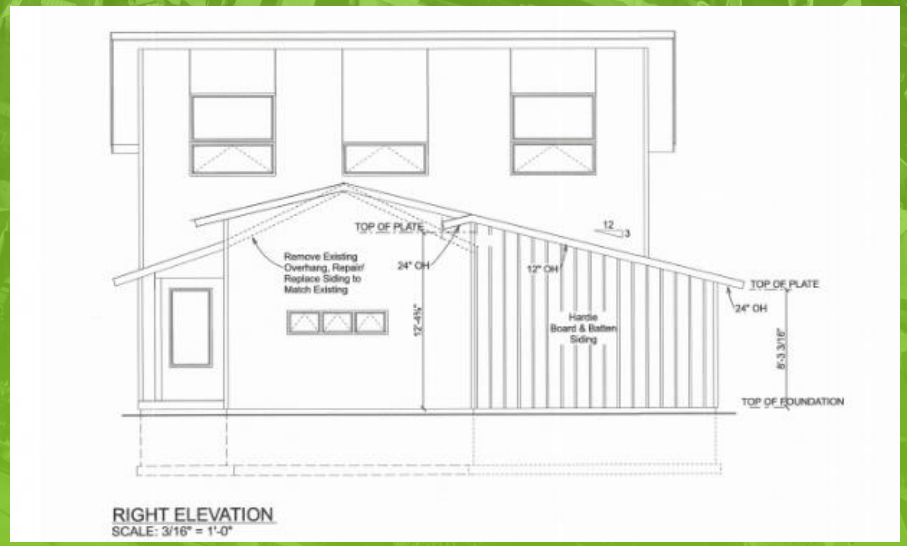
> 1000 ft^2 or

> 100% of the existing conditioned floor area

All others are “Small Additions”

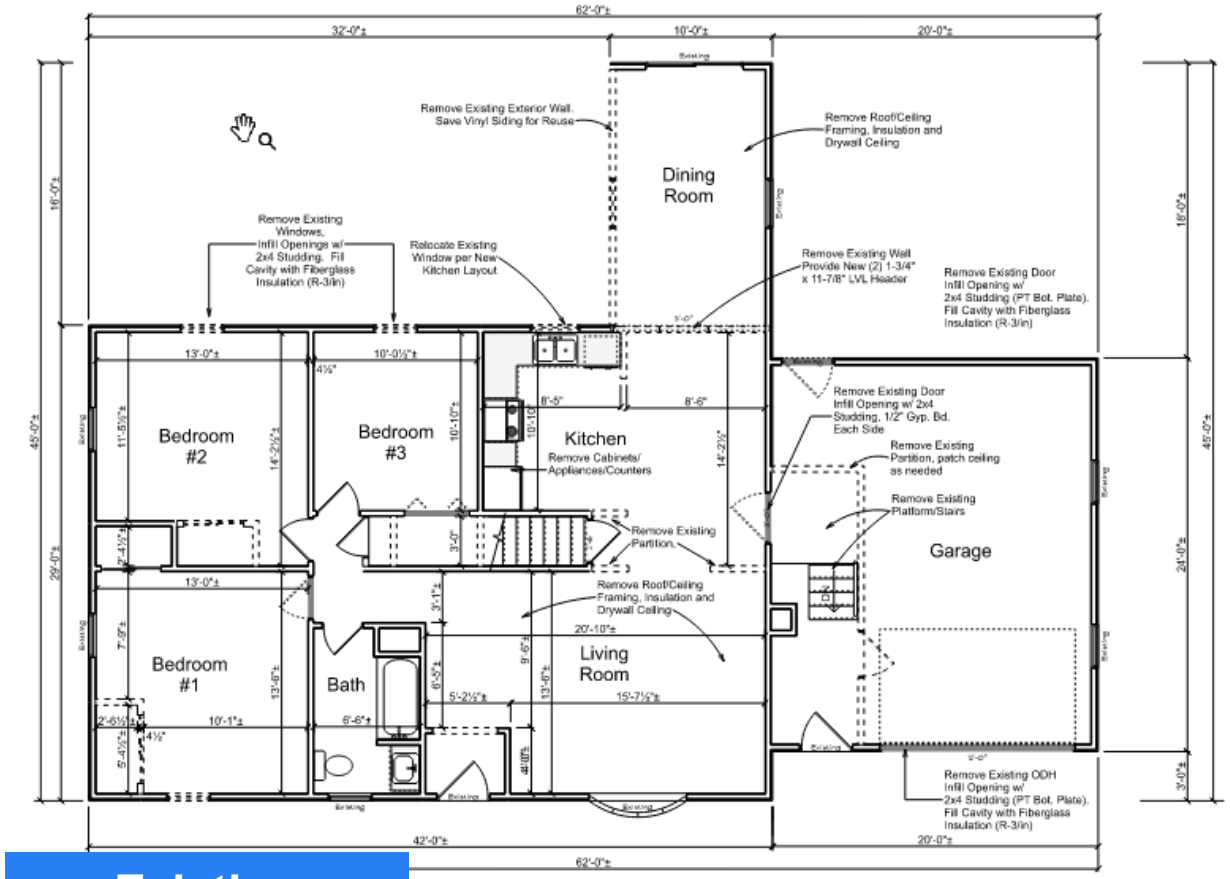
Exception: Additions that add existing basement or attic spaces to the conditioned floor area of an existing dwelling unit due to changing the thermal boundary but not changing the building footprint or roofline do not require a HERS rating.

Source: PSD

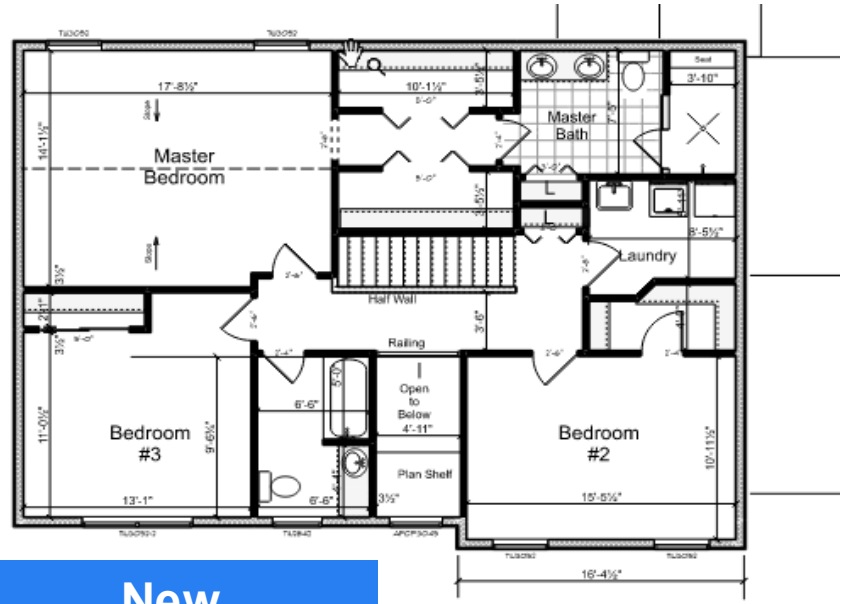


Source: PSD

Small or Large?



Existing
1st Floor Layout



New
2nd Floor Layout

Source: PSD

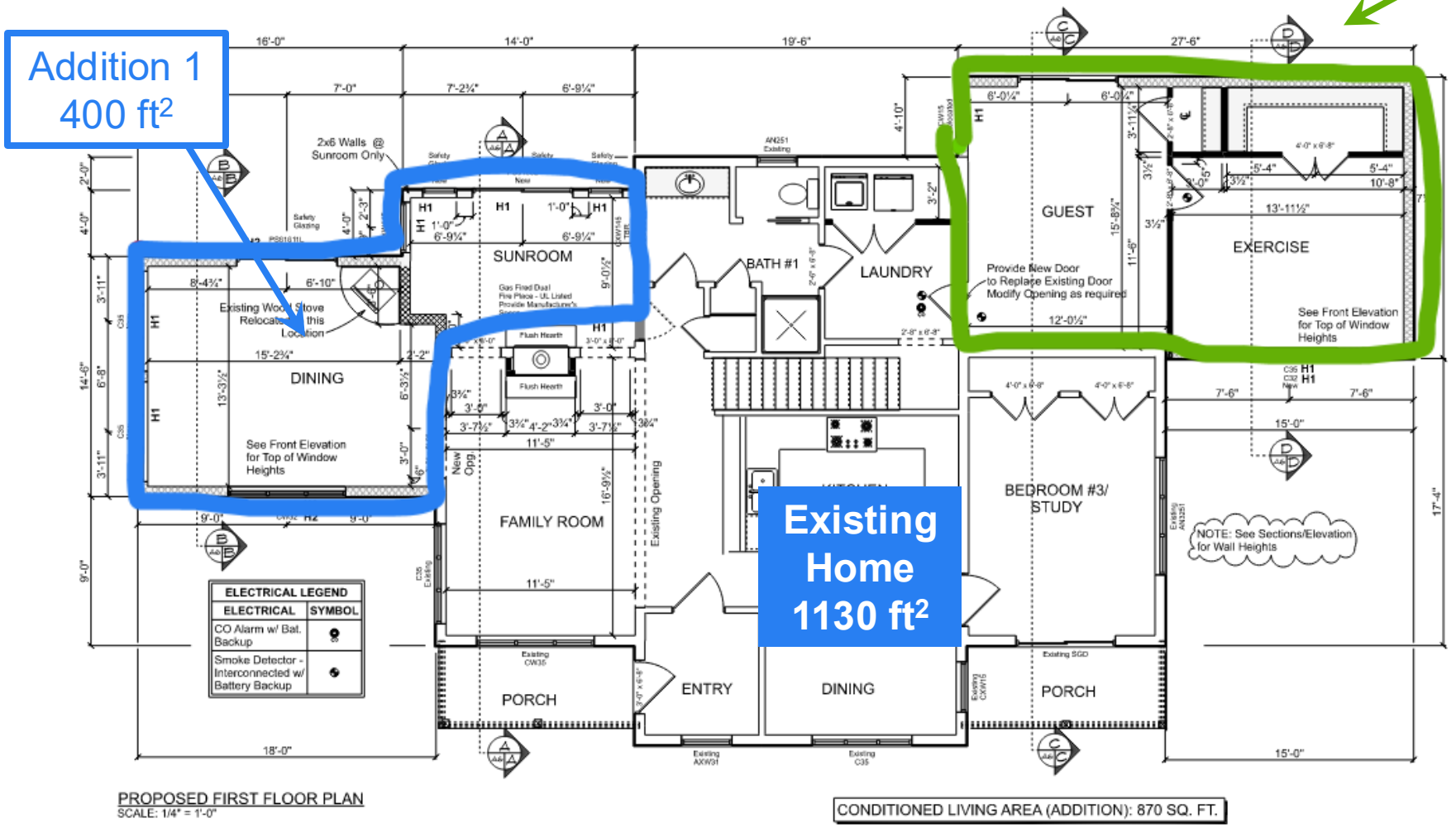
Existing Floor 1362 ft²
Proposed 2nd Fl 1230 ft²
Total Addition = 1230 ft²

1230 > 1000
∴ "Large Addition"

Small or Large?

Addition 1
400 ft²

Addition 2
470 ft²



PROPOSED FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"

CONDITIONED LIVING AREA (ADDITION): 870 SQ. FT.

Total of Additions: 853 ft²
400 + 470 = 870 ft²
870 ft² < 1000 ft²

∴ **"Small" Addition**

Existing Home 1130 ft²
Total Additions 870 ft²
~75% of Existing

∴ **"Small" Addition**

Section R502.1

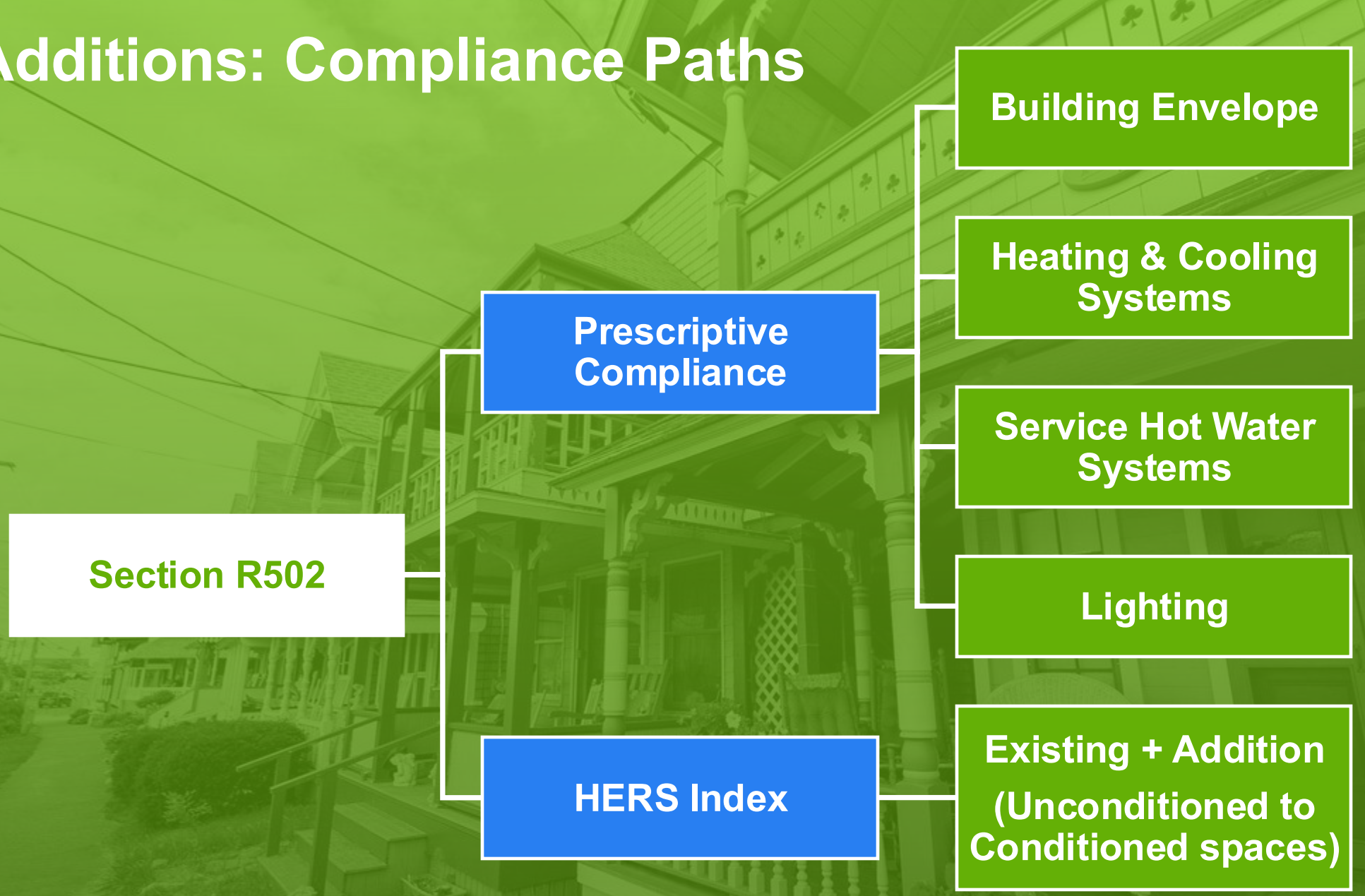
An addition shall comply where:

- The Addition alone complies
- When the existing building & addition comply as a single building
- Where the dwelling unit with the addition achieves a certified HERS rating per Table R406.5
- The requirements for large additions are determined by the conditioned floor area of the project

Source: PSD

Compliance Paths

Additions: Compliance Paths



Small Additions – Compliance

Two options for compliance:

- Prescriptive
  The addition taken as a **separate unit** complies with the code
- Energy Rating Index (optional for Small Additions)
  The **addition + existing building** complies with the code and Table R406.5 as a single building **(R406 ERI)**

Large Additions – Compliance

One compliance path:

Energy Rating Index
The **addition + existing building** complies with the code and Table R406.5 as a single building **(R406 ERI)**

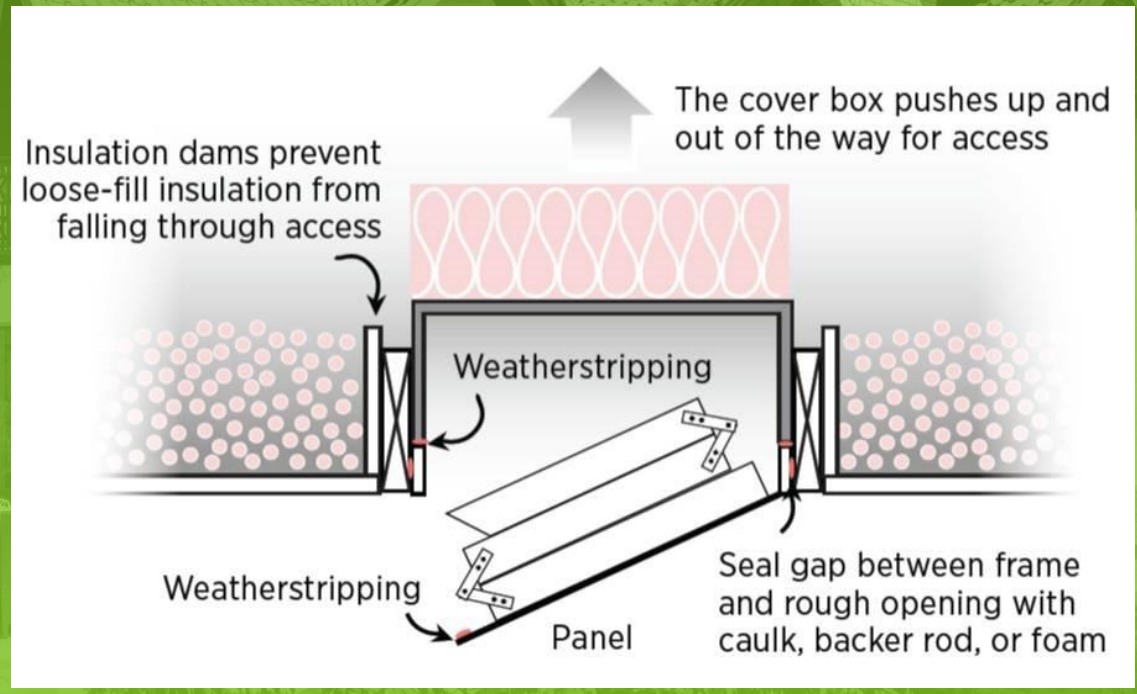
Changes to Prescriptive Values for Climate Zone 5

	2018 IECC	MA Amended 2021 IECC
FENESTRATION U-FACTOR	0.30	0.30
SKYLIGHT U-FACTOR	0.55	0.55
GLAZED FENESTRATION SHGC	NR	NR
CEILING R-VALUE	49	49
WOOD FRAME WALL R-VALUE	20 or 13+5	**30 or 20+5ci or 13+10ci or 0+20ci**
MASS WALL R-VALUE	13/17	13/17
FLOOR R-VALUE	30	30
BASEMENT WALL R-VALUE	15/19	**15ci or 19 or 13+5ci**
SLAB R-VALUE & DEPTH	10, 2ft.	**10ci and 4'**
CRAWL SPACE WALL R-VALUE	15/19	**15ci or 19 or13+5ci**

Prescriptive Compliance – R502.3.1 Envelope

The addition must meet:

- R402.1 General requirements (prescriptive R-values)
- R402.2 Specific insulation requirements (e.g. attic hatches and doors)
- R402.3.1 – R402.3.5 Maximum area-weighted fenestration U-factor and SHGC
- R402.4 Air leakage requirements



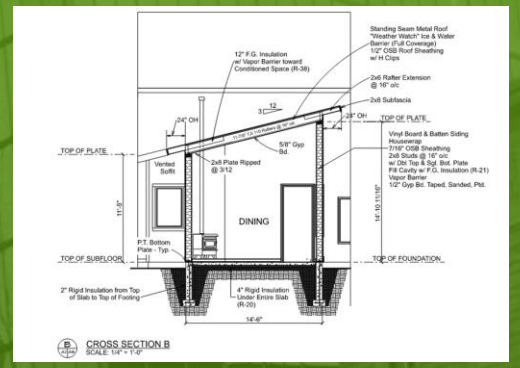
Source: PNNL Building America Solutions Center

Prescriptive Compliance

New Building Thermal Envelope assemblies that are part of the addition shall comply as if new construction

Except – new envelope assemblies in additions for < 1000 ft^2 are <u>not</u> required to have a blower door test performed

Source: PSD

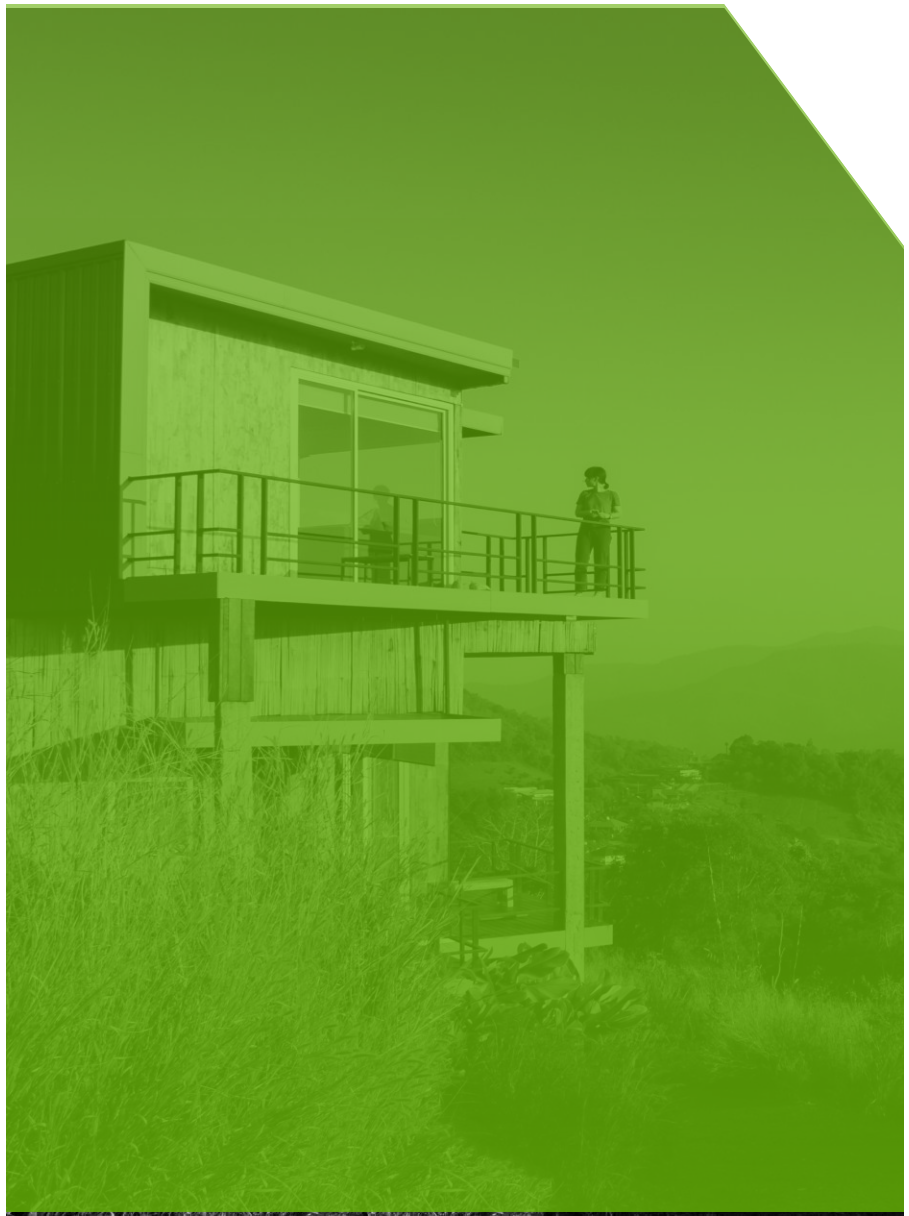


Source: PSD

Prescriptive Compliance- Heating & Cooling Systems

New heating and cooling systems that are part of the additions need to comply with:

- Controls
- Duct insulation
- Duct sealing
- Duct testing
- Duct leakage



Duct Leakage Testing

Duct leakage testing is required ***regardless*** of duct and air handler location

- No exceptions for systems entirely within the thermal envelope

Testing standards added

- ANSI/RESNET/ICC 380 or
- ASTM E1554

Prescriptive leakage limits

- 4 cfm/100 sf with air handler installed
- 3 cfm/100 sf without air handler installed
- 8 cfm/100 sf when entire system is inside

Limits do not apply to ERI path

Testing is exempt when existing ducts are extended into an addition

Duct Insulation

Ducts Outside Conditioned Space:

- Ducts 3” and greater = R-8
- Ducts less than 3” = R-6

Ducts in Floors and Exterior Walls

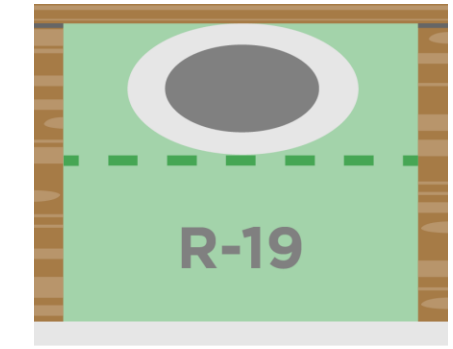
Ducts, floors, and exterior walls that are a part of the thermal envelope **can be considered in conditioned space** when certain criteria are met. *This section does NOT apply to the ERI path.*

Ducts in floors over unconditioned space

1. A continuous air barrier is installed between the unconditioned space and the duct
2. Floor insulation is installed per R402.2.7 found under Specific Insulation Requirements
3. At least R-19 insulation installed separating the duct from the unconditioned space for the full cavity width

Ducts in exterior walls

1. A continuous air barrier is installed between the unconditioned space and the duct
2. Minimum R-10 insulation separating the duct from the outside for the full cavity width
3. The remainder of the cavity is filled with insulation



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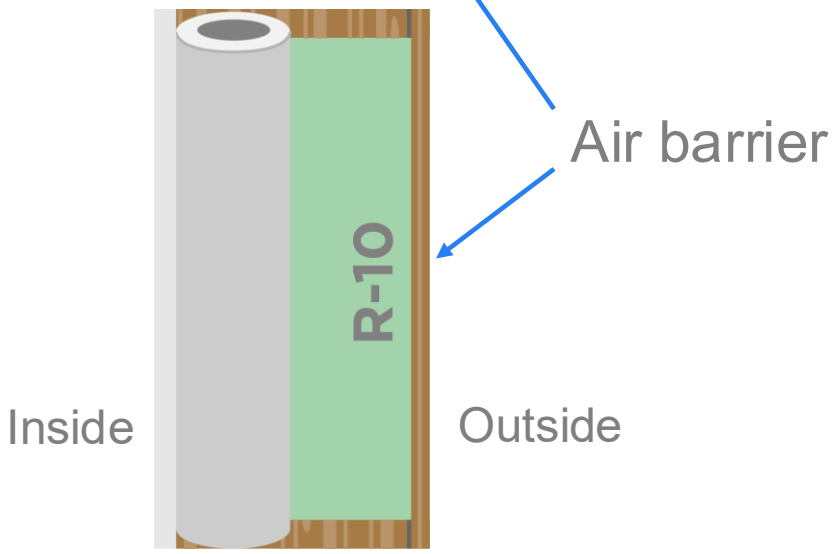


Source: PSD

Prescriptive Compliance

Service Hot Water Systems

New service hot water systems that are part of additions need to meet requirements of Section R403.5.

Source: PSD

Prescriptive Compliance

Mechanical System Pipe Insulation

Mechanical system piping capable of carrying fluids greater than 105° or less than 55° shall be insulated to an R-value of not less than R-3.

Source: PSD

Prescriptive Compliance
Water Pipe Insulation

IECC 2021 Hot Water Pipe Insulation of R-3 Required for
1. Hot water piping ¾ inch nominal diameter and larger
2. Piping serving more than one dwelling unit
3. Piping located outside conditioned space
4. Piping from water heater to distribution manifold
5. Piping located under a floor slab
6. Buried piping
7. Supply and Return piping in recirculation systems other than demand recirculation systems

Piping located outside conditioned space should be insulated even if the nominal diameter is less than ¾ in.

Prescriptive Compliance

Heated Water Circulation

Hot water boiler temperature reset are required, and the controls must now be manufacturer installed.

Source : Supply house

Prescriptive Compliance

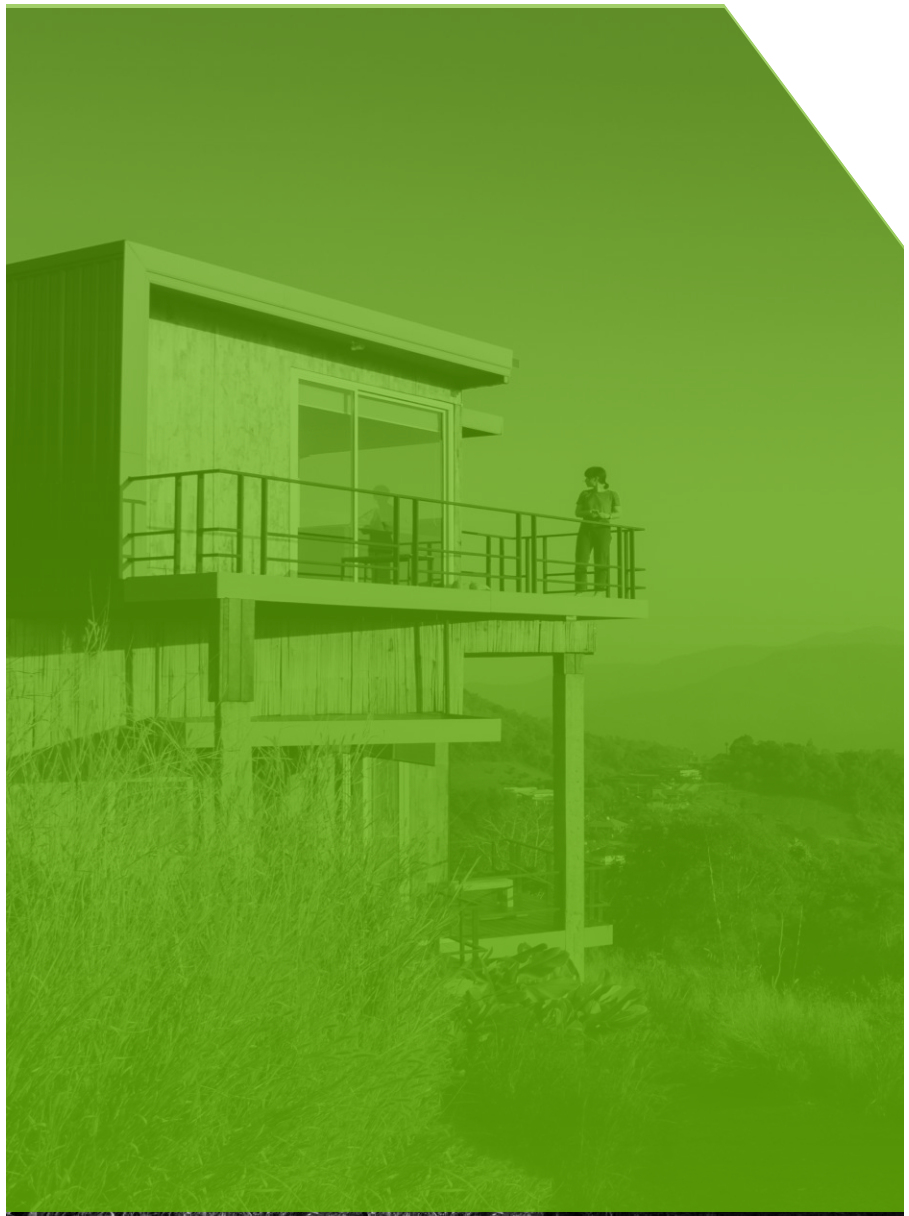
Lighting

100% of new lighting systems installed in additions need to be high-efficacy, without exceptions;

High-efficacy lamps:

- Compact fluorescent lamps
- Linear fluorescent lamps T-8 or smaller (<1 inch diameter)
- LED lamps

Same as New Construction



Exterior Lighting Power

Exterior lighting for multifamily buildings must comply with the commercial provisions of the IECC (Lighting Power Allowance).

Exceptions

- Detached two-family dwellings
- Townhouses
- Solar-powered lamps not connected to any electrical service
- Luminaires controlled by a motion sensor
- Lamps and luminaires that comply with Section R404.1 (high-efficacy light sources)

Same as New Construction

High-efficacy light sources:

- Lamps with at least 65 lumens per watt
- Luminaires with at least 45 lumens per watt

Exterior Lighting Controls

Where total exterior lighting is > 30 W

- **Manual on/off switch that is auto-off capable**
  - **Exception for lighting serving multiple dwelling units**
- **Lighting automatically shuts off when daylight is present and satisfies the lighting needs**
- **Override allowed, but must return to automatic within 24 hours**

Same as New Construction

Source: Building America Solutions Center

Interior Lighting Controls

Dimmers, occupant sensors, or controls built into the fixture

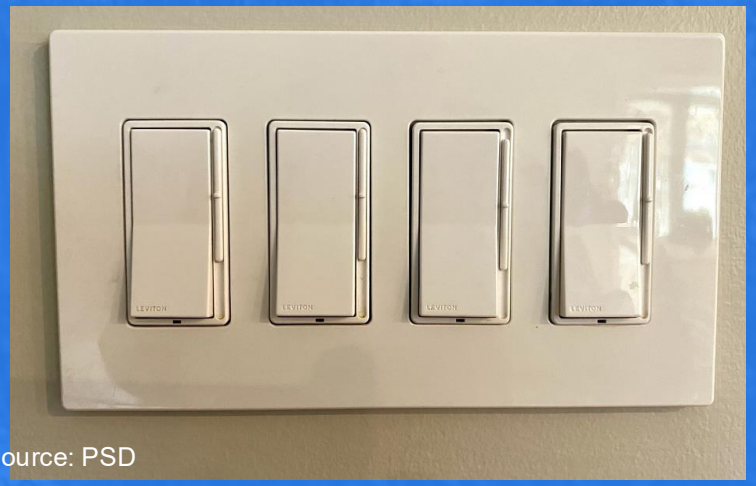
Exceptions:

- Bathrooms
- Hallways
- Exterior lighting fixtures
- Lighting designed for safety or security

Same as New Construction

Source: Z22

Source: PSD



Source: PSD

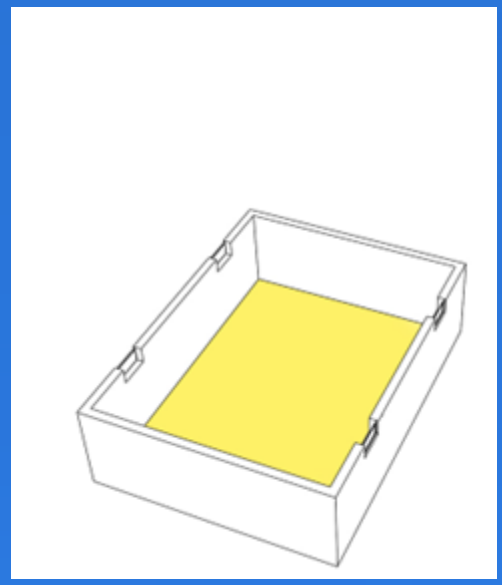
R406 ERI Compliance Path

- ERI = HERS (In MA)
- Required for “Large Additions” per Section R502.1.1
- Includes the Addition and Existing Building as one unit

Projects That DO NOT Trigger a HERS Rating

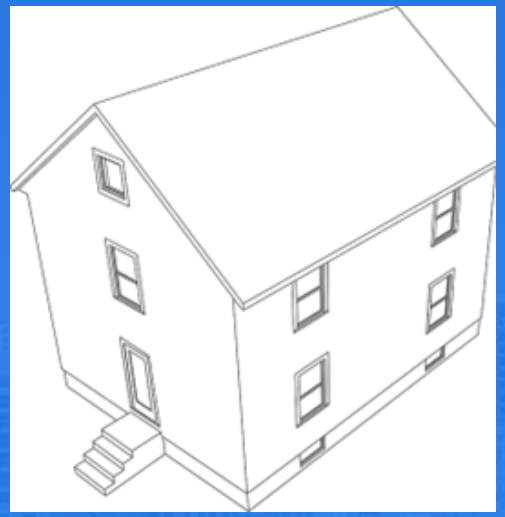
An existing house with an unconditioned basement will be remodeled. The basement is 1,200 ft^2 and will be insulated and fully conditioned.

Source: Mass DOER

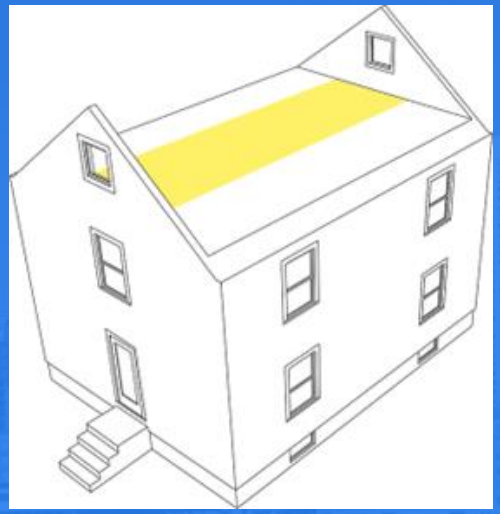


Source: Mass DOER

An existing attic space, 1200 ft^2, will be finished and insulated so that it is part of the conditioned building envelope. No changes to the roof will be made to "grow" the space.



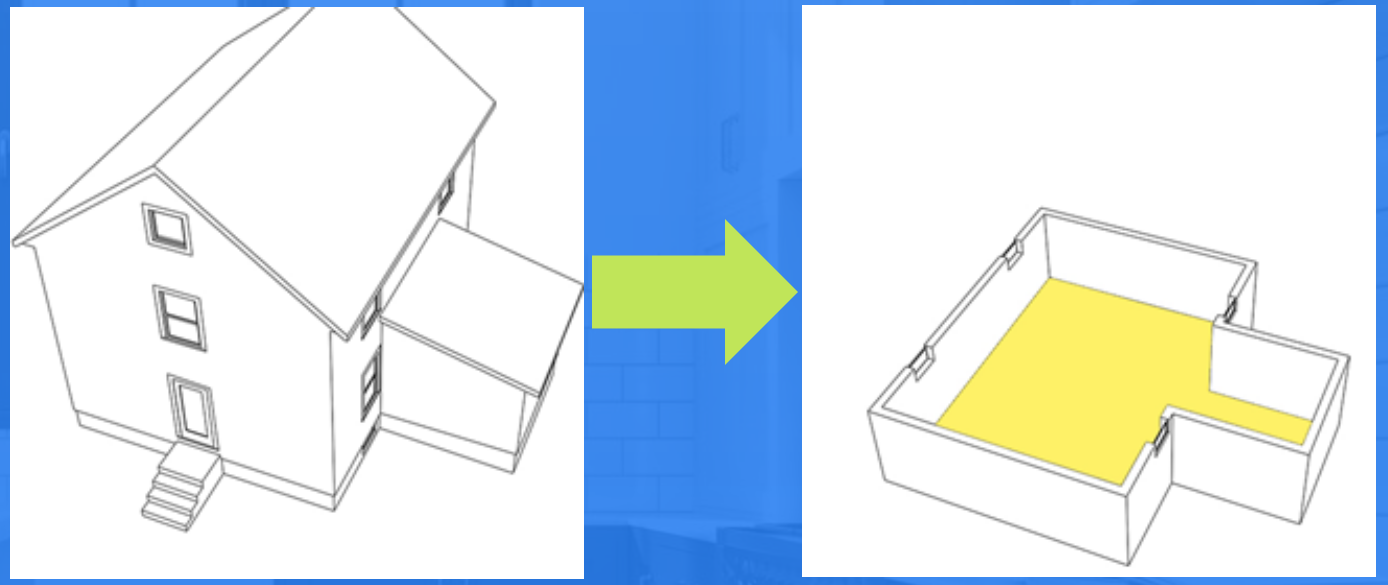
Source: Mass DOER



Source: Mass DOER

Projects That DO Trigger a HERS Rating

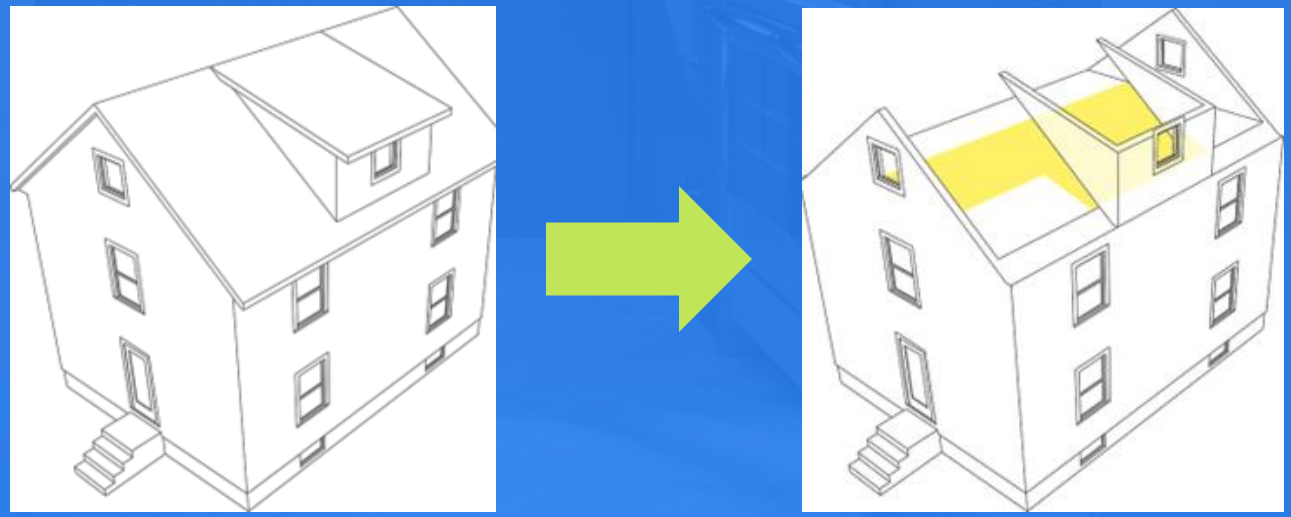
If an addition is added to the house with a full basement connecting to the existing basement, and the new larger basement is conditioned, the project will require a HERS rating.



Source: Mass DOER

Source: Mass DOER

If a dormer is added to the existing roof, thereby increasing the occupiable SF of the existing attic, and the attic is insulated and finished to become part of the conditioned building envelope, this WILL trigger a HERS rating.



Source: Mass DOER

Source: Mass DOER

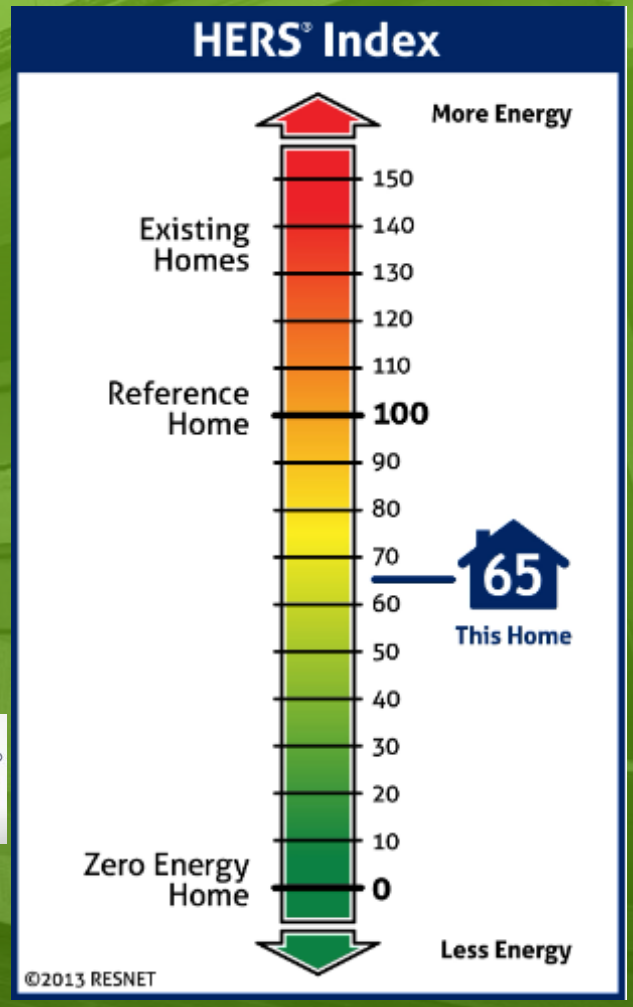
HERS Index

A certified Home Energy Rater assesses the energy efficiency of a home, assigning it a relative performance score. The lower the number, the more energy efficient the home. A typical home built to 2006 energy efficiency standards scores 100 on the HERS® Index.

- A home with a HERS® Index Score of 70 is 30% more energy efficient than a standard new home
- A home with a HERS® Index Score of 130 is 30% less energy efficient than a standard home

Some variables included in a HERS Rating:

- All exterior walls (both above and below grade)
- Floors over unconditioned spaces (like garages or cellars)
- Ceilings and roofs
- Attics, foundations and crawlspaces
- Windows and doors, vents and ductwork
- HVAC systems, water heating system, and your thermostat



Large Additions

Table R406.5 Maximum Energy Rating Index

Clean Energy Application	New Construction – Permits after July 1, 2024	New Construction – With R406.5.2 embodied carbon credit	Accessory Dwelling Units	Major Alterations, Additions, and Changes of Use
Mixed-Fuel Building	42	45	52	65
Solar Electric Generation*	42	45	55	70
All-Electric Building	45	48	55	70
Solar Electric* and All-Electric Building	45	48	58	75

**Solar Electric Generation = Solar photovoltaic array rated at 4kW*

a. Maximum HERS rating prior to onsite renewable electric generation in accordance with Section R406.5

b. The building shall meet the mandatory requirements of Section R406.2.

c. Alterations, Additions or Change of use covered by Section R502.1.1 or R503.1.5 are subject to this maximum HERS rating, except for Historic Buildings which may opt to follow R503.1.1 for alterations.

Clean Energy Options

Accessory dwelling units (ADUs) following Section R406 or existing buildings and additions following IECC chapter 5[RE] may use clean energy trade-offs to increase the maximum allowable HERS rating for each unit separately served by any combination of the following:

1. Solar Electric Generation: Solar photovoltaic array rated at 4 kW or higher shall offset 3 HERS points for new ADUs, and **5 HERS points** for alterations, change of use to Residential R-use occupancies or for **fully attached additions**.
2. All-Electric Buildings shall offset 3 HERS points for each dwelling unit in new construction, including new ADUs, and **5 HERS points** for alterations, change of use to Residential R-use occupancies and **fully attached additions.**

If both are included the project can offset an additional 5 points

Clean Energy Application	Major Alterations, Additions, and Changes
Mixed-Fuel Building	65
Solar Electric Generation*	70
All-Electric Building	70
Solar Electric* and All-Electric Building	75

Energy Rating Index – Mandatory Requirements

Formerly Listed as Mandatory Requirements

Now in One Table

Section	Title
General	
R401.3	Certificate
Building Thermal Envelope	
R402.1.1	Vapor retarder
R402.2.3	Eave Baffle
R402.2.4.1	Access hatches and doors
R402.2.10.1	Crawl space wall insulation installation
R402.4.1.1	Installation
R402.4.1.2	Testing
Mechanical	
R403.1	Controls
R403.3	Ducts (except R403.3.2, R403.3.3, and R403.3.6)
R403.4	Mechanical system piping insulation
R403.5.1	Heated water circulation and temperature maintenance systems
R403.5.3	Drain water heat recovery units
R403.6.1	**Heat or energy recovery ventilation (HRV/ERV)**
R403.7	Equipment sizing and efficiency rating
R403.8	System serving multiple dwelling units
R403.9	Snow and ice melt systems
R403.10	Energy consumption of pools and spas
R403.11	Portable spas
R403.12	Residential pools and permanent residential spas
Electrical Power and Lighting Systems	
R404.1	Lighting equipment

Image Source: Upcodes.com

Energy Rating Index: Documentation Permit Application

Prior to the issuance of a **building permit**:

- A **HERS compliance report** which includes a HERS index score of 65 or lower, or otherwise complies via renewable trade-offs
- **A description of energy features**
- A statement that the rating index score is “**based on plans**”

R406.6.2 Documentation for Permit Application
Energy Rating Index

Home Energy Rating Certificate

Projected Report
Based on Plans

Rating Date:
Registry ID:
Ekotrope ID: yL0b3n8v

HERS® Index Score:
49 Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit www.hersindex.com

Annual Savings
$651
*Relative to an average U.S. home

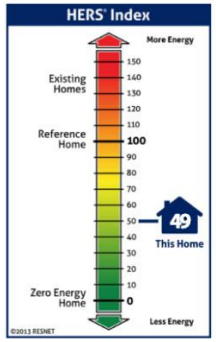
Home:
Newbury, MA 01951
Builder:

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	25.4	$145
Cooling	1.3	$30
Hot Water	10.0	$50
Lights/Appliances	15.7	$367
Service Charges		$120
Generation (e.g. Solar)	0.0	$0
Total:	**52.4**	**$712**

This home meets or exceeds the criteria of the following:

ENERGY STAR v3.1
ENERGY STAR v3
2021 International Energy Conservation Code
2018 International Energy Conservation Code



Home Feature Summary:

Home Type:	Single family detached
Model:	N/A
Community:	N/A
Conditioned Floor Area:	1,311 ft²
Number of Bedrooms:	3
Primary Heating System:	Furnace • Natural Gas • 96.1 AFUE
Primary Cooling System:	Air Conditioner • Electric • 14 SEER
Primary Water Heating:	Residential Water Heater • Natural Gas • 0.93 UEF
House Tightness:	2.25 ACH50
Ventilation:	75 CFM • 24 Watts • HRV
Duct Leakage to Outside:	5 CFM @ 25Pa (0.38 / 100 ft²)
Above Grade Walls:	R-27
Ceiling:	Vaulted Roof, R-62
Window Type:	U-Value: 0.28, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-48

Rating Completed by:

Energy Rater: Alex Pakatar
Rating Company:
Rating Provider: Performance Systems Development
950 Danby Rd, Ste 201P, Ithaca NY 14850
607-277-6240

ekotrope
Energy savings calculated without modifications to the energy model. (As Modeled)

Ekotrope RATER - Version:4.0.0.3123
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.

IECC 2021 Proposed Home Summary

Property

Organization

Inspection Status
Results are projected

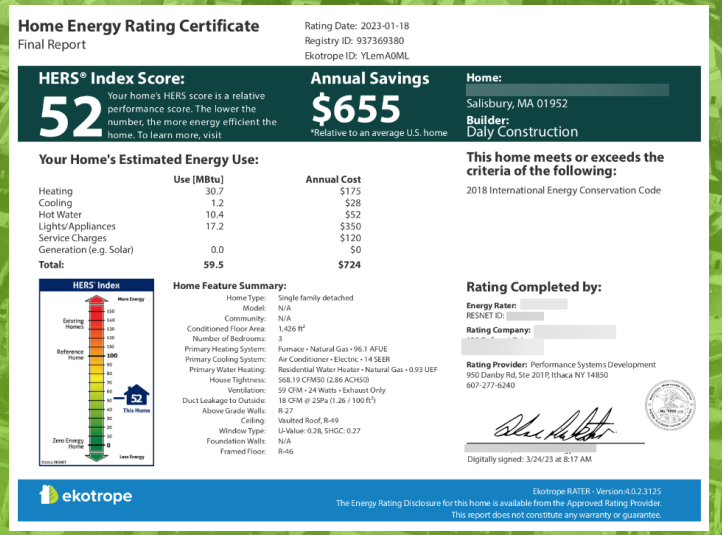
Builder

MA Residential Amendments

ERI Documentation – Final

Prior to the issuance of a ***certificate of occupancy***:

1. A *copy of the final certificate* indicating that the HERS rating index score for each unit is verified to be 52 or less or otherwise complies via renewable trade-offs,
2. Completed *IECC 2021 Reference Home Summary (Verified).*
3. A *copy of the certificate*, as required by Section R401.3 for each unit listing the final HERS index score of the dwelling unit



Home Energy Rating Certificate
Final Report

Rating Date: 2023-01-18
Registry ID: 937369380
Ekotrope ID: YLemA0ML

HERS® Index Score: 52
Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit

Annual Savings $655
*Relative to an average U.S. home

Home:
Salisbury, MA 01952
Builder:
Daly Construction

Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	30.7	$175
Cooling	1.2	$28
Hot Water	10.4	$52
Lights/Appliances	17.2	$350
Service Charges		$120
Generation (e.g. Solar)	0.0	$0
Total:	**59.5**	**$724**

This home meets or exceeds the criteria of the following:
2018 International Energy Conservation Code

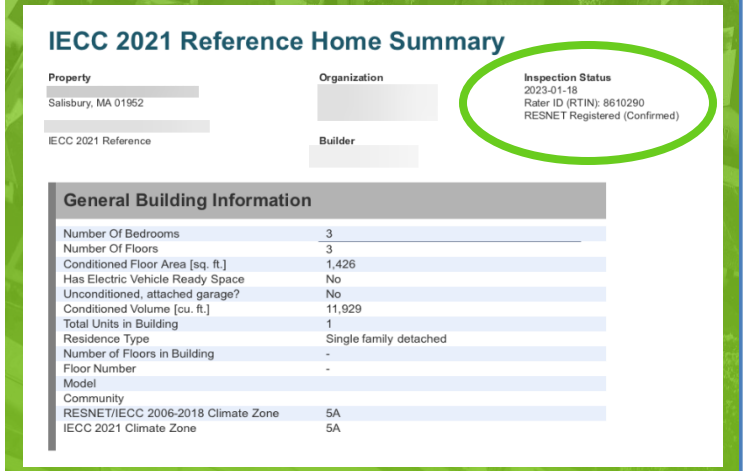
HERS Index
More Energy
Existing Homes
Reference Home 100
52 This Home
Zero Energy Home
Less Energy

Home Feature Summary:

Home Type:	Single family detached
Model:	N/A
Community:	N/A
Conditioned Floor Area:	1,426 ft²
Number of Bedrooms:	3
Primary Heating System:	Furnace • Natural Gas • 96.1 AFUE
Primary Cooling System:	Air Conditioner • Electric • 14 SEER
Primary Water Heating:	Residential Water Heater • Natural Gas • 0.93 UEF
House Tightness:	568.19 CFM50 (2.86 ACH50)
Ventilation:	59 CFM • 24 Watts • Exhaust Only
Duct Leakage to Outside:	18 CFM @ 25Pa (1.26 / 100 ft²)
Above Grade Walls:	R-27
Ceiling:	Vaulted Roof, R-49
Window Type:	U-Value: 0.28, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-46

Rating Completed by:
Energy Rater:
RESNET ID:
Rating Company:
Rating Provider: Performance Systems Development
950 Danby Rd, Ste 201F, Ithaca NY 14850
607-277-6240
Digitally signed: 3/24/23 at 8:17 AM

ekotrope
Ekotrope RATER - Version:4.0.2.3125
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.
This report does not constitute any warranty or guarantee.



IECC 2021 Reference Home Summary

Property
Salisbury, MA 01952
IECC 2021 Reference

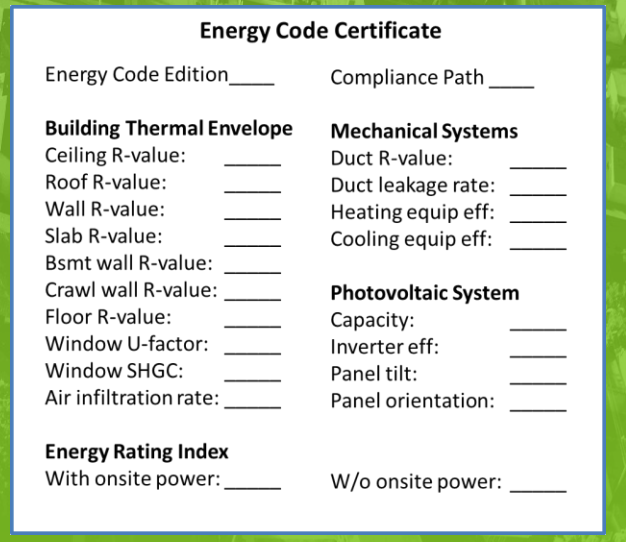
Organization

Builder

Inspection Status
2023-01-18
Rater ID (RTIN): 8610290
RESNET Registered (Confirmed)

General Building Information

Number Of Bedrooms	3
Number Of Floors	3
Conditioned Floor Area [sq. ft.]	1,426
Has Electric Vehicle Ready Space	No
Unconditioned, attached garage?	No
Conditioned Volume [cu. ft.]	11,929
Total Units in Building	1
Residence Type	Single family detached
Number of Floors in Building	-
Floor Number	-
Model	
Community	
RESNET/IECC 2006-2018 Climate Zone	5A
IECC 2021 Climate Zone	5A



Energy Code Certificate

Energy Code Edition____ Compliance Path ____

Building Thermal Envelope
Ceiling R-value: _____
Roof R-value: _____
Wall R-value: _____
Slab R-value: _____
Bsmt wall R-value: _____
Crawl wall R-value: _____
Floor R-value: _____
Window U-factor: _____
Window SHGC: _____
Air infiltration rate: _____

Mechanical Systems
Duct R-value: _____
Duct leakage rate: _____
Heating equip eff: _____
Cooling equip eff: _____

Photovoltaic System
Capacity: _____
Inverter eff: _____
Panel tilt: _____
Panel orientation: _____

Energy Rating Index
With onsite power: _____ W/o onsite power: _____

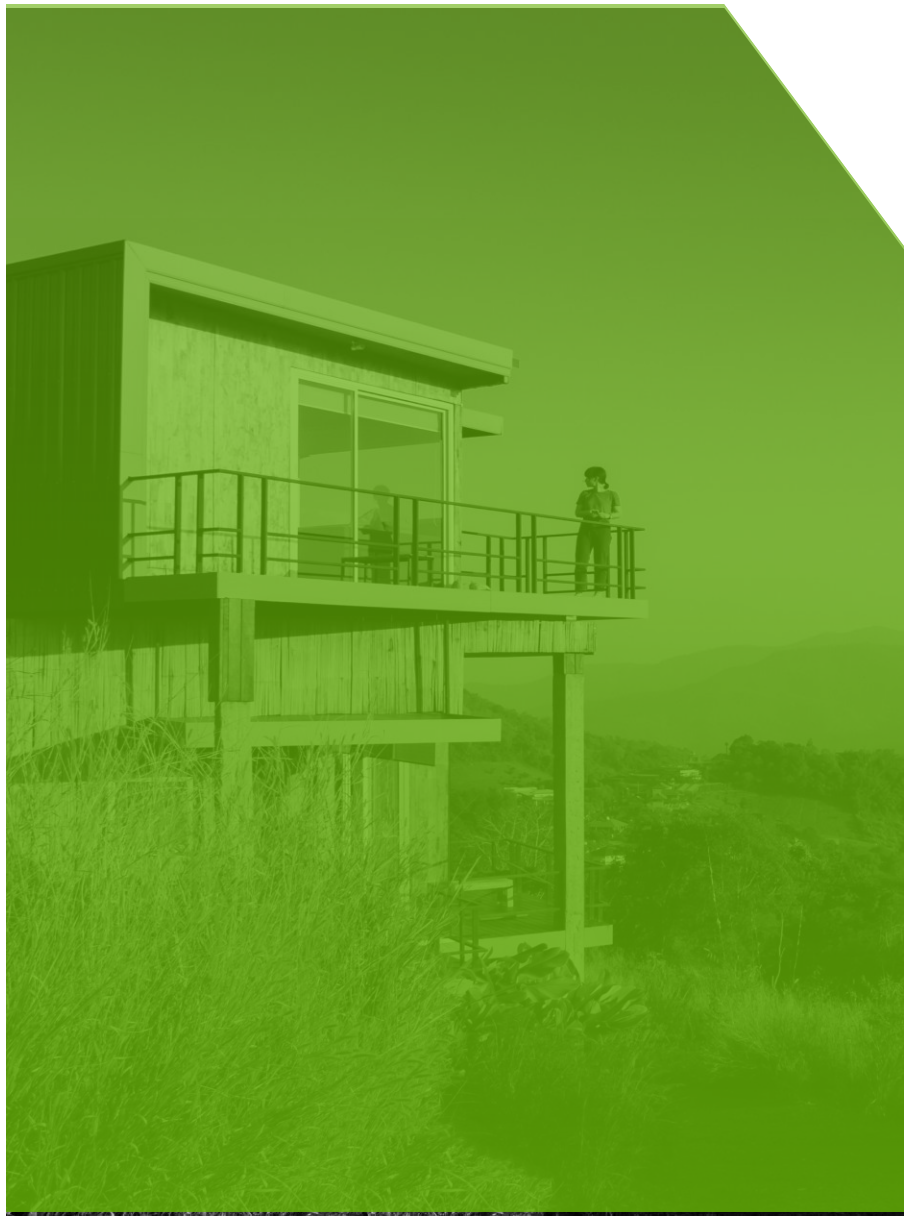
Solar Ready Requirements

RB 101 Scope

RB101.1 General. These provisions shall be applicable for new construction, **except additions 1,000 ft^2 and under.**

Exceptions

- Buildings and dwelling units complying with Appendix RC
  - Section RC102 (Zero energy pathway)
  - Section RC105 (Solar-roof zone)



Appendix RB: Solar-Ready Provisions

New in MA Amended 2021 IECC:

- Applies to Group R (in addition to one- and two-family dwellings and townhouses)
- Zone setbacks from obstructions
- Capped roof penetration sleeve for flat roofs

Solar-Ready Zone – Solar-Ready Zone Area - Townhouses

RB103.3 Solar-ready zone area

Townhouses with a total floor area less than or equal to 2,000 ft^2

Minimum solar-ready zone area = 150 ft^2

This is exclusive of mandatory access or set back areas as required by the MA Fire Code

Source: PSD

Poll Question #3

Roofs of single-family homes must contain Solar-Ready Zones meeting which of the following criteria? Choose all that apply.

A. A total area of not less than 300 ft^2
B. Individual zones not less than 40 ft^2
C. Individual zones not less than 80 ft^2
D. Widths of not less than 4 feet
E. Widths of not less than 5 feet

Poll Question #4

Which of the following are true of Solar-Ready zones? Multiple answers may apply.

A. They shall not be less than 300 ft^2 (townhouses excluded)

B. They shall not be composed of areas less than 80 ft^2

C. They shall not be less than 10 feet in width

D. They shall not be less than 5 feet in width

E. They shall not be composed of areas less than 40 ft^2

Case Studies

Case Study #1

Small Addition

Project Background

- Single Family Home
- Part one story; part two stories
- 25-30 years old

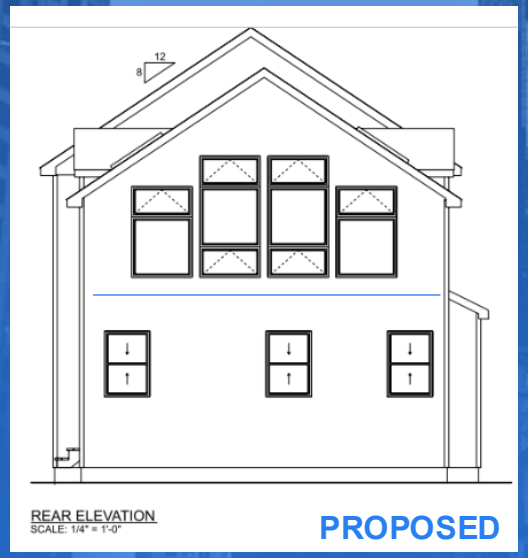
Proposed Project

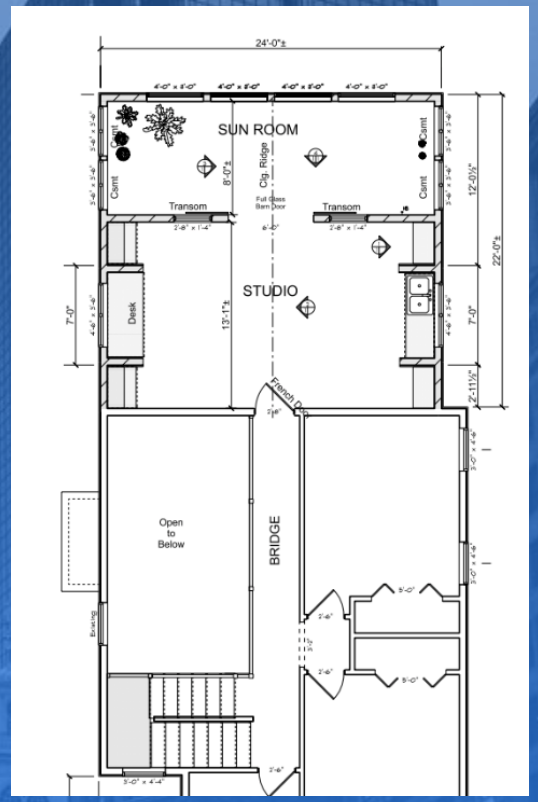
- Add 528 sqft Addition over single story (24’ x 22’)

Code Assessment

- Small Addition
- Prescriptive Compliance
- Must follow U-factor Table R402.1.2 or R-value Table R402.1.3
- Must meet all prescriptive requirements from Chapter 4 as referenced in Chapter 5

Source: PSD





Case Study #2

Large Addition

Project Background

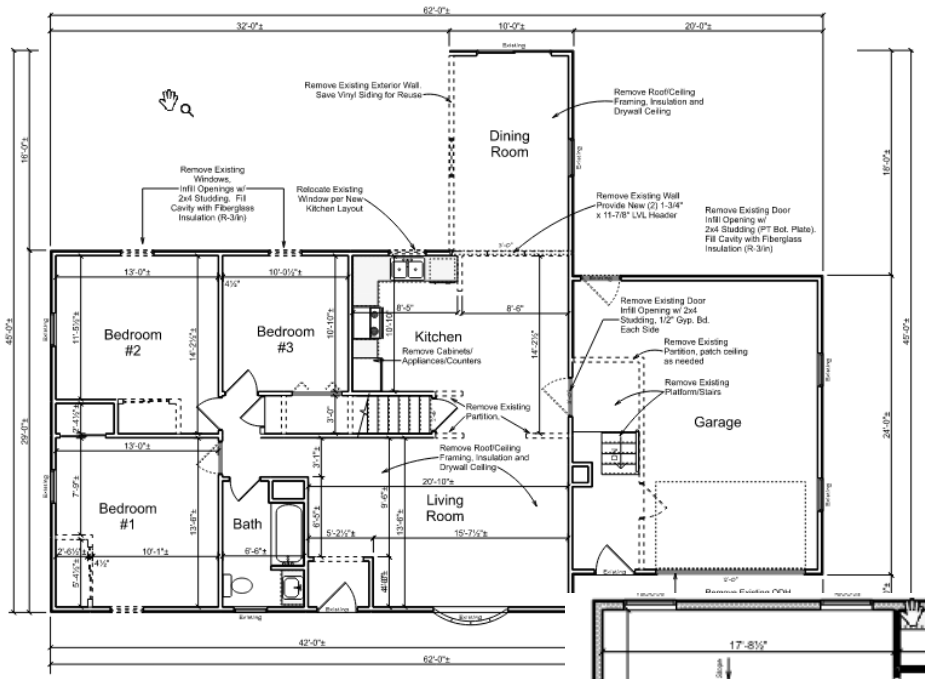
- Single Family Home
- One Story, Attached Garage
- 30-35 years old
- Existing 1st Floor = 1,362 ft^2
- Total Addition 3,175 ft^2

Proposed Project

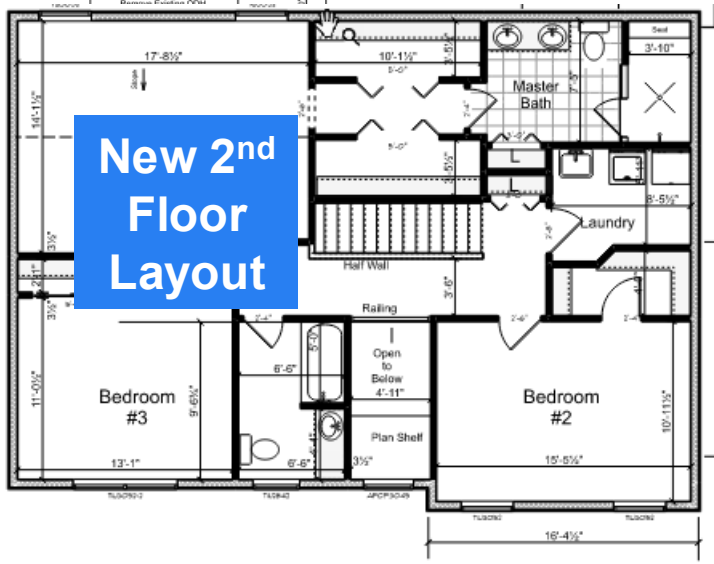
- Add 1st Floor to include in-law suite
- Finish Garage
- Enlarge Dining Room
- Add 2nd Floor

Case Study #2
Large Addition

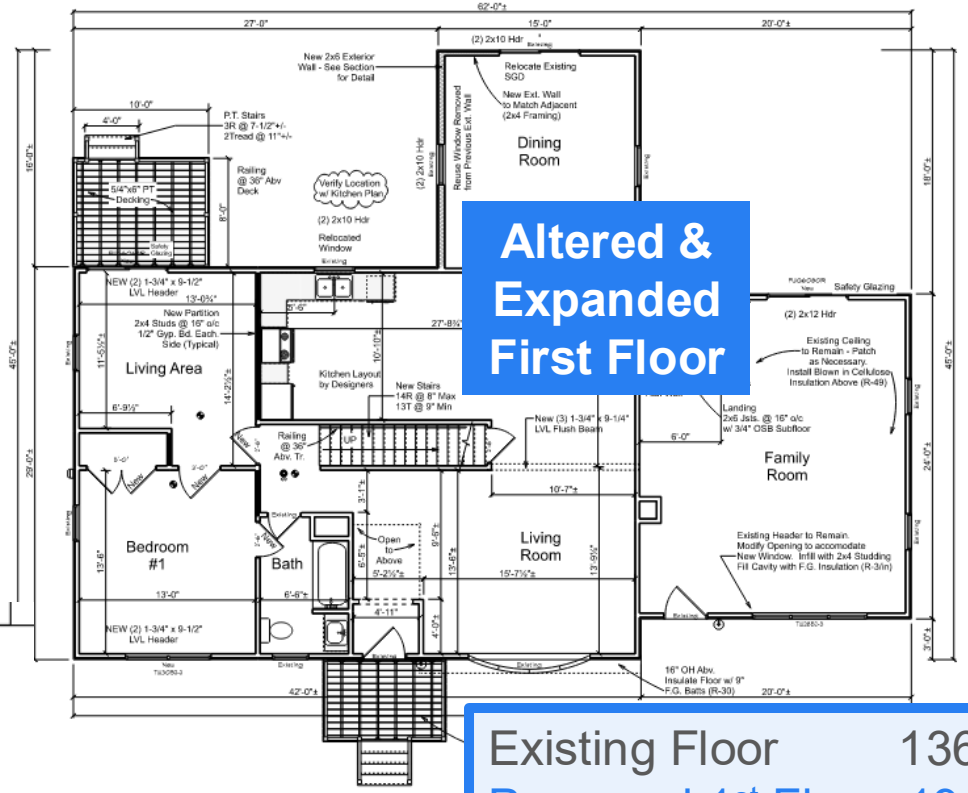
Source: PSD



Existing 1st Floor Layout



New 2nd Floor Layout



Altered & Expanded First Floor

Existing Floor	1362 ft²
Proposed 1st Fl	1945 ft²
Proposed 2nd Fl	1230 ft²
Total Addition = 3175 ft²	

3175 > 1000

∴ "Large Addition"

Case Study #2

Large Addition

Code Assessment

- Classified as “Large Addition”
- HERS Index Compliance per Section R502.1
- HERS 65 max. per Table R406.5*
- Both existing house and addition to be included in HERS

*Can increase the HERS allowed by incorporating Energy Efficiency Packages

Major Alterations, Additions, and Changes
65
70
70
75

Case Study #3

Conversion of Unconditioned Space to Conditioned Space

Project Background

- Single Family Home
- Walkout Basement
- Newer Construction
- Existing Unfinished Basement 1,296 ft^2
- Partially Concrete Walls (Uninsulated)
- Partially Wood Framed Abv. Grade Walls (R-21 cavity)

Source: PSD

Source: PSD

Source: PSD

Case Study #3

Conversion of Unconditioned Space to Conditioned Space

Proposed Project

- Finish Existing Basement
- Proposed Finished Area = 1,248 ft^2

Code Assessment

- Exempt from HERS Rating Requirements as per exemption in R502.1.1:
- Additions that add existing basement or attic spaces to the conditioned floor area of an existing dwelling unit due to changing the thermal boundary but not changing the building footprint or roofline do not require a HERS rating

Source: Famartin

Case Study #4

Conversion of Unconditioned Garage to Conditioned Space

Project Background

- Existing Garage – unfinished
- Single Story, 26’ x 30’; 780 ft^2
- Slab on Grade, 2 x 4 above grade walls

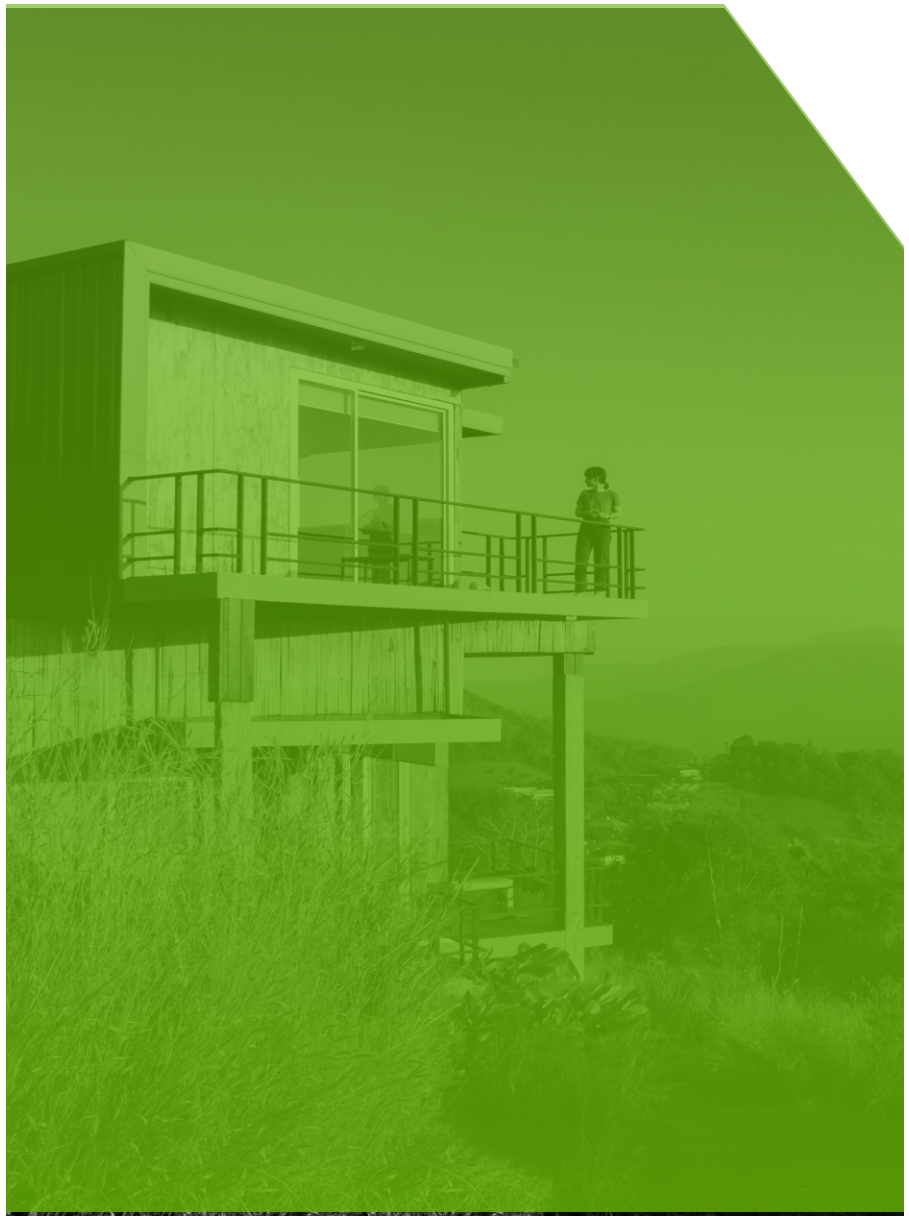
Proposed Project

- Convert to Living Space

Code Assessment

- Small Addition
- Prescriptive Compliance
- Must follow U-factor Table R402.1.2 or R-value Table R402.1.3
- Must meet all prescriptive requirements from Chapter 4 as referenced in Chapter 5

Summary/Closing



Existing Buildings Summary

- For additions over 1000 square feet or 100% of the existing square footage require a HERS Rating per Table R406.5.
- Additions 1000 square feet and under, follow chapter 5 for existing buildings
- Additions that add existing basement or attic space to the conditioned floor area do not require a HERS Rating if they don't alter the building footprint or roofline
- Solar Ready applies only to additions over 1000 square feet.
- Additions 1000 square feet and under do not require a blower door test
- Historical buildings can still apply for exemptions if the work would affect the historical nature of the building.
- EV Ready does not apply to existing buildings

Mass Save Incentive Programs

Residential Rebates and Incentives

Rebates for appliances, heating systems and more.

www.masssave.com/en/residential/rebates-and-incentives

Low Rise/Repair & Additions

Incentives for energy efficient building and renovating:

- Single Family Homes
- Multi-Family 3 stories and residential-metered heat
- New Construction
- Major Renovations and Large Additions
- Residential Energy Code
- Residential HVAC and DHW Systems only
- On-site testing and verification completed by program-approved HERS Raters
- Incentives for commercially metered buildings/units are not available

Details at: www.masssave.com/en/saving/residential-rebates/new-construction

Low-Rise/Repairs & Additions

Incentives for energy efficient building and renovating

Benefits of Working with a HERS Rater

Diagnostic testing

- Blower door and duct leakage tests (pre- and post-tests, ideally)
  - Help with Code compliance documents
- Infrared testing
- Ventilation commissioning
- Quantify savings

Plan analysis

- Drives deeper energy savings
- Improves occupant comfort

Technical guidance and expertise

- Create a comprehensive plan for energy efficiency
- Can act as a liaison between homeowner, builder, architect, and trades

Access to Mass Save incentives

- Can be paid to builder or homeowner

Low-Rise/Repairs & Additions

Incentives for energy efficient building and renovating

Renovations and Additions

Gut Renovations and Additions

- Renovations are ideally at least 50% gut projects
- Substantial HVAC changes
- Clear project scope
- Small jobs like kitchen/bath remodels are not a good fit
- Additions should be at least 500 SF

Participants include Builders, Developers & Homeowners

Program-approved HERS Rating companies

Access to Mass Save 0% interest HEAT Loan

- Up to 7 years and $25,000

Process Similar to LR with addition of Preliminary Inspection

Energy Code Support

Questions about the energy code?

Energy Code Support Hotline:

855-757-9717

Energy Code Support Email:

energycodesma@psdconsulting.com

Thanks!

Massachusetts Energy Code Technical Support Program

WE ARE MASS SAVE®:

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