

Part 3 – Solar Ready & EV Ready Requirements



# 2023 Residential Stretch Code




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1



## What is Mass Save®?

- Mass Save® is an initiative sponsored by Massachusetts' gas and electric Program Administrators and energy efficiency service providers, including
  - The Berkshire Gas Company
  - Cape Light Compact
  - Eversource Energy
  - Liberty Utilities
  - National Grid
  - Unitil
- The Sponsors of Mass Save work closely with the Massachusetts Department of Energy Resources to provide a wide range of services, incentives, trainings, and information promoting energy efficiency that help residents and businesses manage energy use and related costs.





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2



3

## Continuing Education

**This webinar is approved for:**

- 1-hour CSL CEU
- 1 AIA LU | HSW
- 1 CO CEU
- 1 BPI CEU

*Everyone will receive a certificate of attendance via email*

4



# Agenda

**Introduction**

**Appendix RB: Solar-Ready Provisions**

**R404.4 Electric Vehicle Wirings (EV Ready)**

5

## Learning Outcomes

Know the requirements for solar ready roofs



Know the restrictions for location of solar ready zones



Be able to determine when exceptions for solar ready requirements are applicable



Be able to apply the requirements for EV Ready to a residential project.




6

**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



7




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# Appendix RB: Solar-Ready Provisions

Detached One- and Two-family Dwellings, Low-rise Residential Buildings and Townhouses

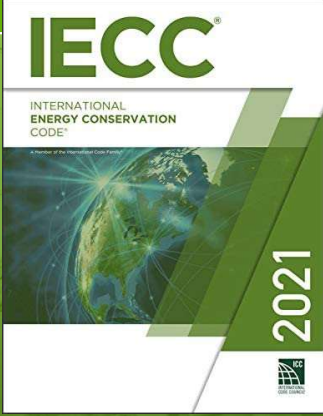
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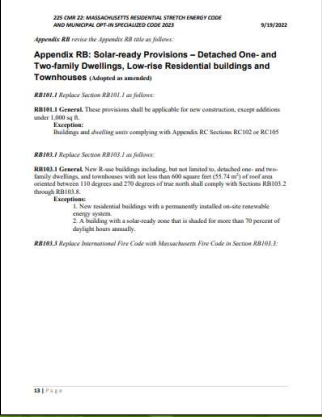


# The 2023 Massachusetts Energy Code

**2021 IECC – Appendix RB**




**Massachusetts Amendments**



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9



## RB 101 Scope

Applicability

- New construction
- Detached one- and two-family dwellings
- Townhouses
- Residential buildings ≤ 3 stories
- Additions > 1,000 sqft

Exceptions

- Buildings and dwelling units complying with the Specialized Stretch Code
  - Section RC102 (Zero energy pathway)
  - Section RC105 (Solar-roof zone)

10

## Appendix RB: Solar-Ready Provisions

### New in 2023:

- 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

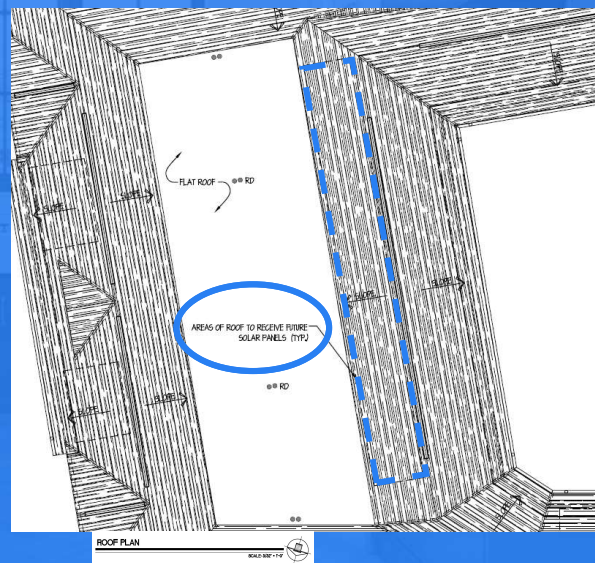


11

## Appendix RA: Solar-Ready Provisions RA103.33 Solar-Ready Zone Area




**SOLAR-READY ZONE.**  
A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.



12

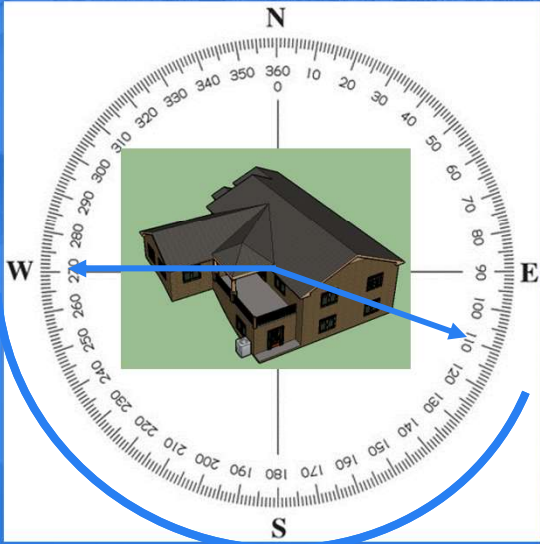
## Section RB103 Solar Ready Zone



**RB103.1 General.**


**The Solar-ready Zone Provisions apply only to:**

**Buildings with  $\geq 600$  square feet of roof area oriented between 110 degrees and 270 degrees of true north**




13

## Solar-Ready Zone - Exceptions




**Exception 1:**

**Buildings with permanently installed on-site renewable energy systems**



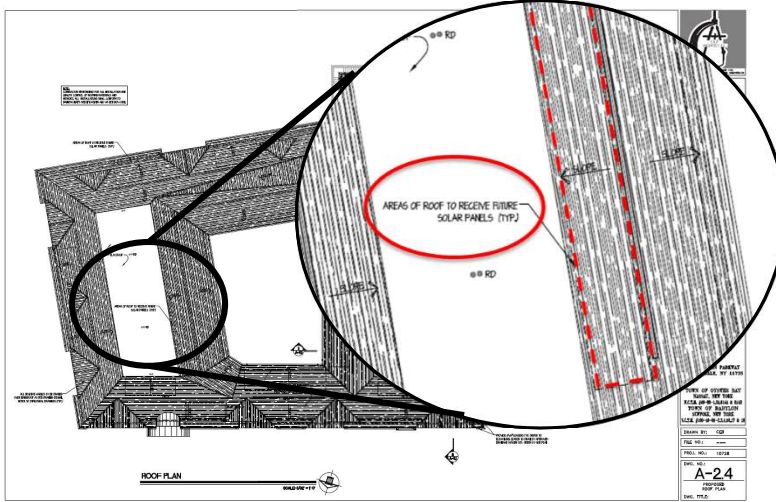
**Exception 2:**

**Solar-ready zone shaded for more than 70% of daylight hours annually**



14

## Solar-Ready Zone – Construction Documentation



**RB103.2**  
Construction  
documentation  
requirements

The Solar-ready zone shall be indicated on the construction documents

15

## Solar-Ready Zone – Solar-Ready Zone Area

**RB103.3** Solar-ready zone area

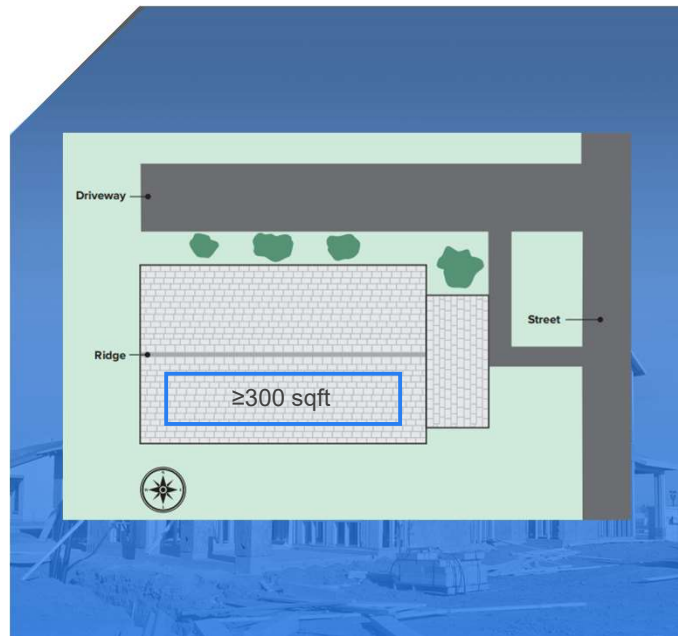
Minimum solar-ready zone area

=

300 square feet

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

Applies to all residential buildings except townhouses



16



## 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 square feet

Minimum solar-ready zone area

=

150 square feet

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



17

## RB103.3 Solar-Ready Zone Area



The solar-ready zone shall be composed of:

Areas not less than 5 feet in width

Not less than 80 square feet

Area is exclusive of access or set back areas as required by the MA Fire Code.



18



## Poll Question #2

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 square feet
- B. Individual zones not less than 40 square feet
- C. Individual zones not less than 80 square feet
- D. Widths of not less than 4 feet
- E. Widths of not less than 5 feet



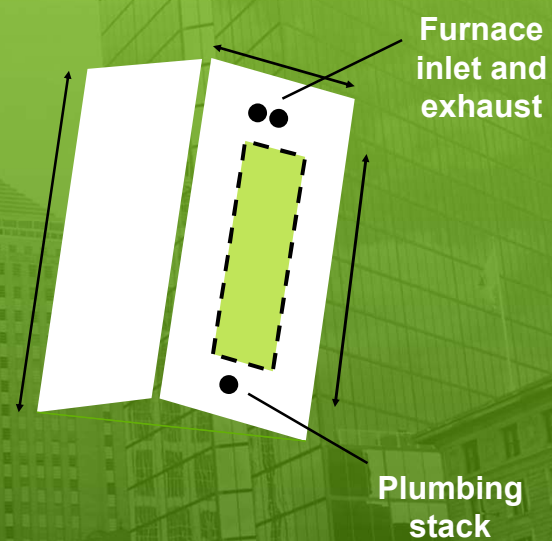
19

## Solar-Ready Zone - Obstructions



### RB103.4 Obstructions

- The solar-ready zone may not be obstructed, including but not limited to:
  - Vents
  - Chimneys
  - Roof-mounted equipment



20

### Poll Question #3

Townhomes 2000 sqft or less,  
minimum solar-ready zone equals  
\_\_\_\_\_ square feet?

- A. A total area of not less than 300 square feet
- B. A total area of not less than 150 square feet
- C. A total area of not less than 200 square feet
- D. A total area of not less than 250 square feet



21

## Solar-Ready Zone - Shading



### RB103.5 Shading


- The solar-ready zone shall be set back from any permanently affixed object, such as a chimney on the building that is located south, east, or west of the solar-ready zone
- Setback must be at least 2X the object's height
- Objects may include taller portions of the building, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings



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22

## Solar-Ready Zone – Capped Roof Penetration Sleeve



**RB103.6 Capped roof penetration sleeve**

- A capped roof penetration sleeve is required to be adjacent to solar-ready zones located roofs with a slope of  $\leq 1$  in 12.
- Sleeve shall be sized to accommodate the future photovoltaic system conduit, but not less than 1.25" in diameter



A 1 in 12 roof pitch is considered a flat roof

23

## Solar-Ready Zone – Roof Load Documentation

### RB103.7 Roof load documentation

The **structural design loads** for live and dead loads must be clearly indicated on construction documentation

<b>ROOF LOADS:</b>	
GROUND SNOW LOAD, $P_g$	= 20 PSF
TERRAIN CATEGORY	= C
SNOW EXPOSURE FACTOR, $C_e$	= 1.0
THERMAL FACTOR, $C_t$	= 1.1
SLOPE REDUCTION FACTOR, $C_s$	= 1.0
IMPORTANCE FACTOR, $I$	= 1.1
MINIMUM FLAT ROOF SNOW LOAD, $P_f$	= 22 PSF
<b>LIVE LOAD</b>	<b>= 20 PSF</b>
<b>MISCELLANEOUS MECHANICAL AND ELECTRICAL LOADS</b>	<b>= 5 PSF</b>

Image Source: <http://seblog.strongtie.com/2017/01/snow-loading-trusses-specifying-roof-snow-load-isnt-enough/>

24

## Appendix RA: Solar-Ready Provisions

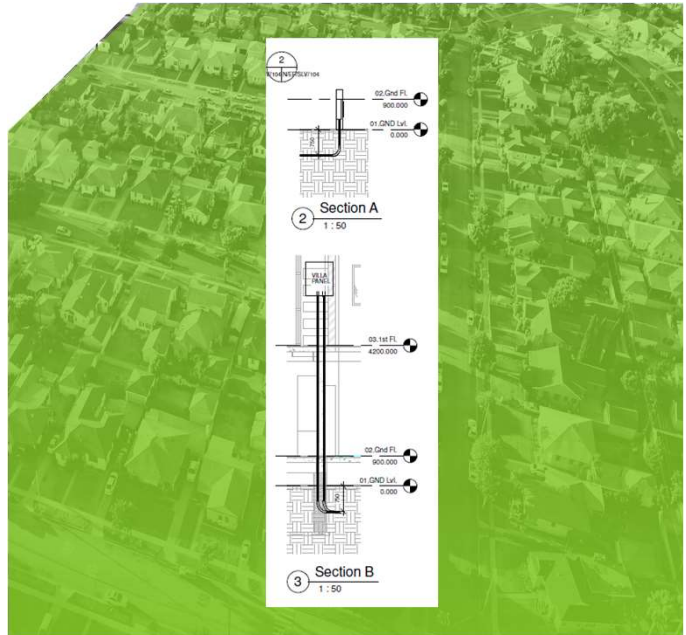
### RA103.6 Interconnection Pathway

Construction drawings must show:

Electrical conduit **pathway** from the solar-ready zone to the electrical panel (PV)

OR

Plumbing **pathway** from the solar-ready zone to the service hot water system (solar thermal)



25

## FAQ Solar-Ready

**Q**

Is there a minimum solar electric system size for a home to meet the solar-ready provisions?

**A**

**No.** *Appendix RB Solar-ready Provisions* does not contain any requirements related to solar equipment, and as such, does not specify a minimum solar system capacity in kilowatts. The only size-related requirement is the area in square feet of the designated solar-ready zone. For homes with at least 600 square feet of roof area oriented between 110 and 270 degrees of true north, the solar ready zone must be at least 300 square feet. For townhomes with a total floor area of 2,000 square feet or less, the solar ready zone must be at least 150 square feet. The solar-ready zone may be split into multiple zones, but individual zone areas must be at least 80 square feet in area and at least 5 feet wide.

**Code Reference:** Appendix RB Section RB103.3

26

## FAQ Solar-Ready

**Q**

If the building design does not allow for the required solar-ready zone area due to obstacles such as vents, chimneys, and roof-mounted equipment, does the project still need to comply with the solar-ready provisions?

**A**

**Yes.** The stretch code adopts the IECC 2021 Appendix RB without amendments, and the appendix states that solar-ready zones shall be free from obstructions. In addition, a section on shading requires that the solar-ready zone is set back by a certain distance from any object on the building or site that will shade the zone. The code does not provide exceptions for rooftops with obstructions that interfere with the free area required for a solar-ready zone, so in these cases, a redesign is required. Designers should consider this requirement early in the design process.

**Code Reference:** *2023 Massachusetts Stretch Energy Code Appendix RB103.4*

27

## FAQ Solar-Ready

**Q**

Where is the capped roof penetration sleeve required to be located?

**A**

The capped roof penetration sleeve in a solar ready design required by Appendix RB must be “adjacent to the designated solar-ready zone.” Note that a capped roof penetration sleeve is only required for roofs with slopes less than or equal to 1:12, which is essentially a flat roof.

28



## FAQ Solar-Ready

**Q**

Does the sleeve for the solar system have to be run to the panels or is a different configuration allowed?

**A**

**No.** There is no requirement to install conduit from the solar ready zone to the electric panel; the roof penetration sleeve as required per the previous Q&A makes it easier to install conduit in the future. The capped roof penetration sleeve shall be sized to accommodate photovoltaic system conduit. The code does not specify how large the diameter of the sleeve needs to be to accommodate a future photovoltaic system, but it does state that the sleeve's inside diameter may not be less than 1¼ inches.

**Code Reference:** Appendix RB Section RB103.6

29

## FAQ Solar-Ready

**Q**


Do the Solar-ready Provisions require conduit or wiring to be installed from the solar-ready zone to the electrical panel?

**A**

**No.** The Solar-ready Provisions require the construction documents to indicate pathways for routing conduit or plumbing from the solar-ready zone to the electrical panel or service hot water system, but no conduit, wiring, or plumbing are required to be installed. In addition, reserved space in the electrical panel labeled as "for future solar electric" is required, and for flat roofs, a capped roof penetration must be installed.

**Code Reference:** 2021 IECC Appendix RB RB103.1, RB103.6, RB103.8, and RB103.9

30



## Solar-Ready Summary

- Solar-ready requirements are found in 2021 IECC Appendix RB and Mass amendments
- Requirements apply to homes with 600 sqft of roof oriented 110° to 207° of true north
- The minimum solar-ready zone area is 300 sqft (150 sqft for townhouses ≤ 2K sqft)
- The minimum area for a single subzone is 80 sqft
- The minimum width of a solar-ready zone is 5 ft
- The solar-ready zone must be free from obstructions
- The solar-ready zone must be setback from objects that would otherwise shade it
- Capped roof penetration sleeves are required for flat roofs

31




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# EV Ready Spaces


## R404.4 Wiring for Electric Vehicle Charging Spaces

32


## EV Ready Spaces



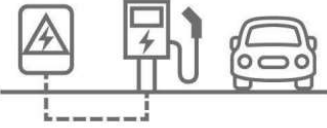
- The Stretch Code requires EV-ready spaces
- This includes electric service capacity and wiring to the space terminating in a receptacle or J plug
- Full electric vehicle service equipment is optional



**EV Capable**  
Install electrical panel capacity with a dedicated branch circuit and a continuous raceway from the panel to the future EV parking spot.



**EV Ready**  
Install electrical panel capacity and raceway with conduit to terminate in a 240-volt charging outlet (typical clothing dryer outlet).



**EV Installed**  
Install a minimum number of Level 2 EV charging stations.

Source: City of Sacramento EV Blueprint (ARV-17-042)

33

## Definitions


### ELECTRIC VEHICLE.

An automotive-type vehicle for on-road use


Includes automobiles, buses, trucks, vans, neighborhood electric vehicles, electric motorcycles

Primarily powered by an electric motor

Informational note: The EV definition comes from 527 CMR 12.00: Massachusetts Electrical Code (Amendments) section 625.2.



34



## Definitions

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) includes:**

- Conductors
- Electric Vehicle
  - Connectors
  - Attachment plugs
  - All other fittings, devices, power outlets, or apparatus

...installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle.

Note: Comprehensive ESVE is not a requirement for EV Ready Spaces

Informational note: The EV definition comes from 527 CMR 12.00: Massachusetts Electrical Code (Amendments) section 625.2.

35

## Definitions

**ELECTRIC VEHICLE READY PARKING SPACE (“EV Ready Space”)**


- A designated parking space which is provided with **wiring and electrical service** sufficient to provide:
  - 240-volt AC level II or equivalent EV charging, as defined by Standard SAE J1772 for EVSE servicing light duty Electric Vehicles.
- Standard SAE J1772 is the International and North American standard for EV plugs, known as a J plug.



This Photo by Unknown author is licensed under CC BY-NC.

36

## EV Charging Levels



**Level 1**

- Slowest charging rate
- Standard home outlets
- Charging speed: 3-5 miles per hour

**Level 2**

- Medium charging rate
- Wiring like electric stoves and clothes dryers
- Charging speed: 12-80 miles per hour

↓

MA EV Ready requirements prepare a space for Level 2 charging

**Level 3**

- Fastest charging rate
- Used at public charging stations only
- Direct current
- Charging speed: 3-20 miles per minute

37

## EV Ready Spaces – Number and Circuitry

### R404.1. Wiring for Electric Vehicle Charging Spaces (“EV Ready Spaces”)

EV Ready Spaces shall be provided in accordance with Table R404.4

TABLE R404.4 EV READY SPACE REQUIREMENTS


Type of Building	Number of parking spaces
1 & 2 Family Dwellings and Townhomes	At least 1 50-amp circuit per dwelling unit to provide for AC Level II charging
All Other R-Use Buildings	At least 20% of spaces served with a 40-amp, 208/240-volt circuit with a minimum capacity of 9.6 kVA.

38



## EV Ready Spaces – Identification in Service Panel or Subpanel

The dedicated branch circuit shall be identified as “EV READY” in the service panel or subpanel directory



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39

## EV Ready Spaces – Marking of Termination Location

The termination location shall be marked as “EV READY”.




40

## R404.4 Wiring for Electric Vehicle Charging Spaces (“EV Ready Spaces”)

The circuit shall terminate in a NEMA receptacle

OR

Society of Automotive Engineers (SAE) standard J1772 electrical connector.



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41

## EV Ready - Exceptions

**Exception 1:**

In no case shall the number of required EV Ready Spaces be greater than the number of parking spaces installed unless otherwise required by local ordinance.



42

## EV Ready - Exceptions

### Exception 2:

This requirement will be considered met if all spaces which are not EV Ready are separated from the premises by a public right-of-way.



43

## EV Ready - Exceptions



**Exception 3:**  
R-2 multi-family properties may elect to comply with Commercial EV ready requirements in C405.13 4.

**225 CMR 23: MASSACHUSETTS COMMERCIAL STRETCH ENERGY CODE AND MUNICIPAL OPT-IN SPECIALIZED CODE 2023**

**225 CMR 23: MASSACHUSETTS FRONT-END AMENDMENTS TO THE INTERNATIONAL ENERGY CONSERVATION CODE 2021**

**MASSACHUSETTS STRETCH ENERGY CODE – 2023 Commercial amendments to IECC2021**

**C405.13 Electric Vehicle Ready Parking Spaces (“EV Ready Spaces”) (Mandatory).** New parking spaces shall provide *EV Ready Spaces* in accordance with Table C405.13. Installed wiring suitable for 6.6kW or higher SAE J1772-2017 AC Level II EVSE shall be connected to the service panel and run to within 6 feet (1828mm) of any qualifying parking space. Conductors and outlets for *EVSE* shall be sized and installed in accordance with the MA electrical code.

**TABLE C405.13 EV-READY SPACE REQUIREMENTS**

Occupancy Classification	Minimum percentage of EV-Ready Spaces	EV Charging Performance Requirements
Group R and Group B	20%	40-amp dedicated branch circuit or larger branch circuit with ALMS in accordance with Table C405.13.1
All Other Occupancies	10%	40-amp dedicated branch circuit or larger branch circuit with ALMS in accordance with Table C405.13.1


**Exceptions:**

1. Parking spaces and garage spaces intended exclusively for storage of vehicles for retail sale or vehicle service are excluded from the EV-ready space percentage calculation.
2. Any parking facility with 4 or more spaces providing installed Direct Current fast charging EVSE with a minimum charging speed of 150 kW to each space.

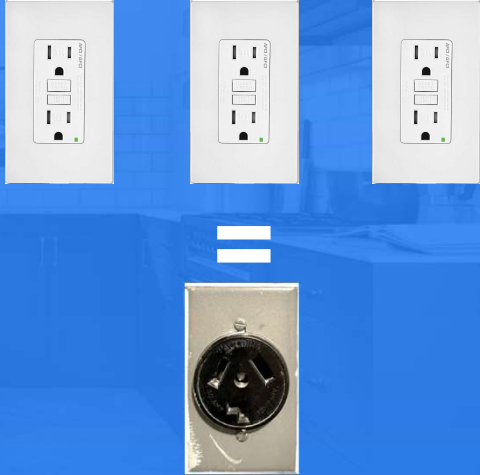
44



## EV Ready - Exceptions



**Exception 4:**  
One or more SAE Level 2 spaces may be substituted with multiple SAE Level 1 spaces provided with wiring for a minimum 20 amp, 120-volt EVSE, with a ratio of at least 3 Level 1 spaces for each Level 2 space required.




45

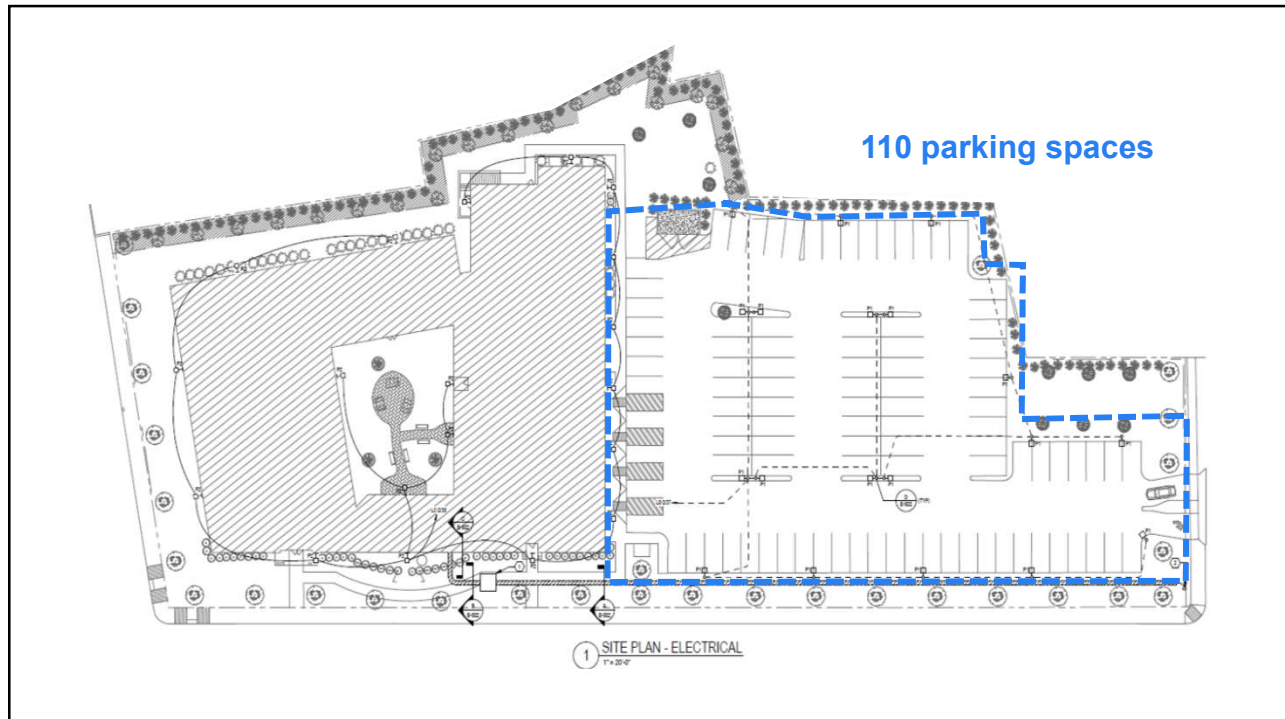
### Poll Question #4

What is the minimum number of EV Ready spaces for the building on the following site plan?

- A. 11
- B. 22
- C. 33
- D. 44



46



47

## Poll Question Answer

What is the minimum number of EV Ready spaces for the building on the following site plan?

- A. 11
- B. 22**
- C. 33
- D. 44

Group R buildings must have  $\geq 20\%$  EV Ready Spaces

$110 \times 0.20 = 22$

48



## EV Ready Summary

- One- and two-family dwellings and townhouses require at least one EV Ready Space per dwelling unit
- Group R buildings require at least 20% of spaces to be EV Ready
- EV readiness means wiring suitable for Level 2 charging (think clothes dryers)
- Electric service labeling is required
- Circuit must terminate within 6 feet of the space
- Circuit must terminate in a labeled receptacle or J plug



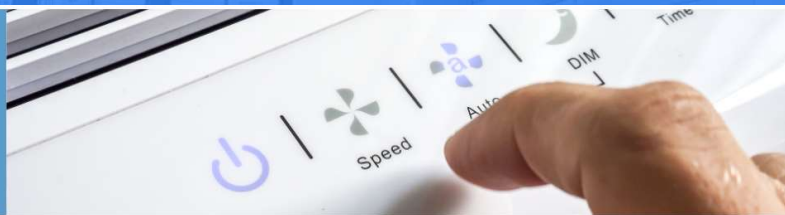
49

## Mass Save Incentive Programs



### Residential Rebates and Incentives

Rebates for appliances, heating systems and more.



[www.masssave.com/en/residential/rebates-and-incentives](http://www.masssave.com/en/residential/rebates-and-incentives)

50

## Residential New Construction

*Five incentive paths* that cover new construction and renovation projects with multiple fuel types, multiple Program Administrators and both commercial and residential meters

Incentives are *performance-based* for incorporating high-performance upgrades that go beyond minimum building code requirements

Program also features a *Passive House & All-Electric Homes workforce training initiative* to promote workforce development and market transformation in the energy efficiency and residential building construction industry.

ICF serves as single point of contact Lead Vendor for all statewide Sponsors



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51

## Residential New Construction



### Low Rise New Construction

- 1-4 unit homes and 5+ unit multi-family ≤ 3 Stories and residential-metered heat
- Enrollment via program-approved HERS rater

### All-Electric Homes

- Single Family and 2-4 unit new construction homes
- All-Electric heating, cooling, water heating and cooking
- Enrollment via program-approved HERS rater

### Renovations & Additions

- 1-4 unit homes and 5+ unit multi-family ≤ 3 Stories and residential-metered heat
- Major renovations & large additions
- Enrollment via program-approved HERS rater

52



**Residential New Construction**

High Rise New Construction

- 4+ stories and 5+ units with residential-metered heat [or] all multi-family buildings with master-metered heat
- Enrollment via program Account Manager

Passive House

- New Construction multi-family buildings of 5+ units pursuing Passive House Certification (PHI or PHIUS)
- Enrollment via program Account Manager

Passive House & All-Electric Homes Training


- Enrollment online via Energy Efficiency Learning Center
- 50% cost reimbursement upon completion of Passive House professional accreditations (PHI or PHIUS)

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53


**Energy Code Support**

**Questions about the energy code?**



**Energy Code Support Hotline:**

855-757-9717



**Energy Code Support Email:**

[energycodesma@psdconsulting.com](mailto:energycodesma@psdconsulting.com)


54



# Thanks!

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