Part 3 – Solar Ready & EV Ready Requirements

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2025 Residential Stretch Code

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Presented by:

PSD

Agenda

Introduction

Appendix RB: Solar-Ready Provisions

R404.4 Electric Vehicle Wirings (EV Ready)

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.

Poll Question #1

Which of the following best describes your field of work?

A. Builder

B. Architect

C. Code Official

D. HERS Rater

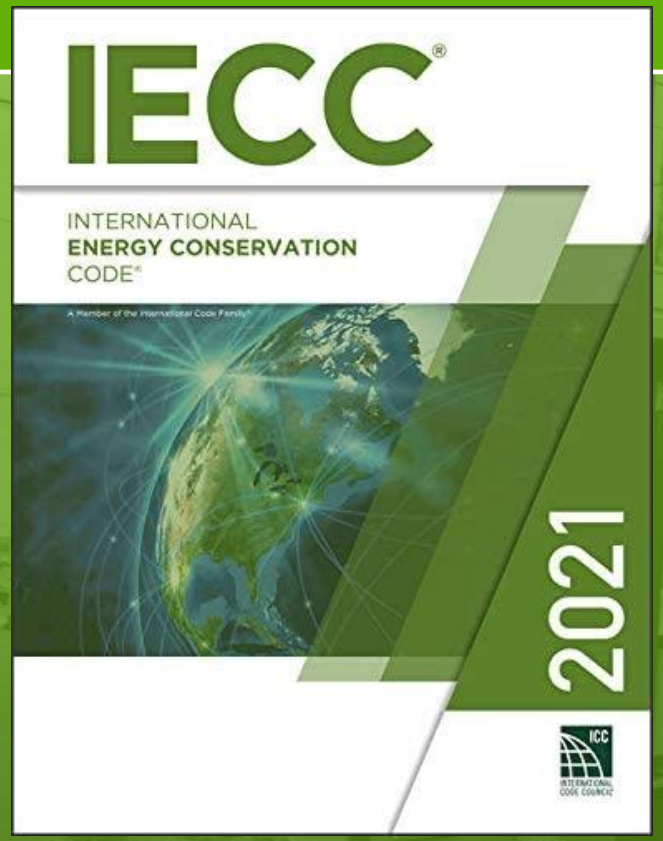
E. Passive House Consultant

Appendix RB: Solar-Ready Provisions

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

The 2025 Massachusetts Energy Code

The 2021 IECC – Appendix RB



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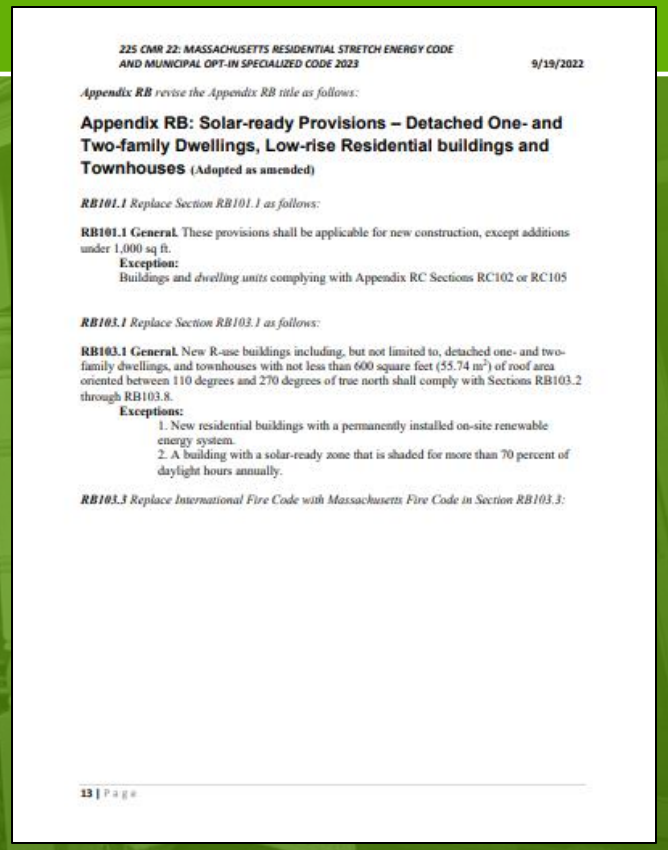
Massachusetts Amendments



225 CMR 22: MASSACHUSETTS RESIDENTIAL STRETCH ENERGY CODE
AND MUNICIPAL OPT-IN SPECIALIZED CODE 2023 9/19/2022

Appendix RB revise the Appendix RB title as follows:

Appendix RB: Solar-ready Provisions – Detached One- and Two-family Dwellings, Low-rise Residential buildings and Townhouses (Adopted as amended)

***RB101.1** Replace Section RB101.1 as follows:*

RB101.1 General. These provisions shall be applicable for new construction, except additions under 1,000 sq ft.

Exception:
Buildings and *dwelling units* complying with Appendix RC Sections RC102 or RC105

***RB103.1** Replace Section RB103.1 as follows:*

RB103.1 General. New R-use buildings including, but not limited to, detached one- and two-family dwellings, and townhouses with not less than 600 square feet (55.74 m^2) of roof area oriented between 110 degrees and 270 degrees of true north shall comply with Sections RB103.2 through RB103.8.

Exceptions:
1. New residential buildings with a permanently installed on-site renewable energy system.
2. A building with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually.

***RB103.3** Replace International Fire Code with Massachusetts Fire Code in Section RB103.3:*

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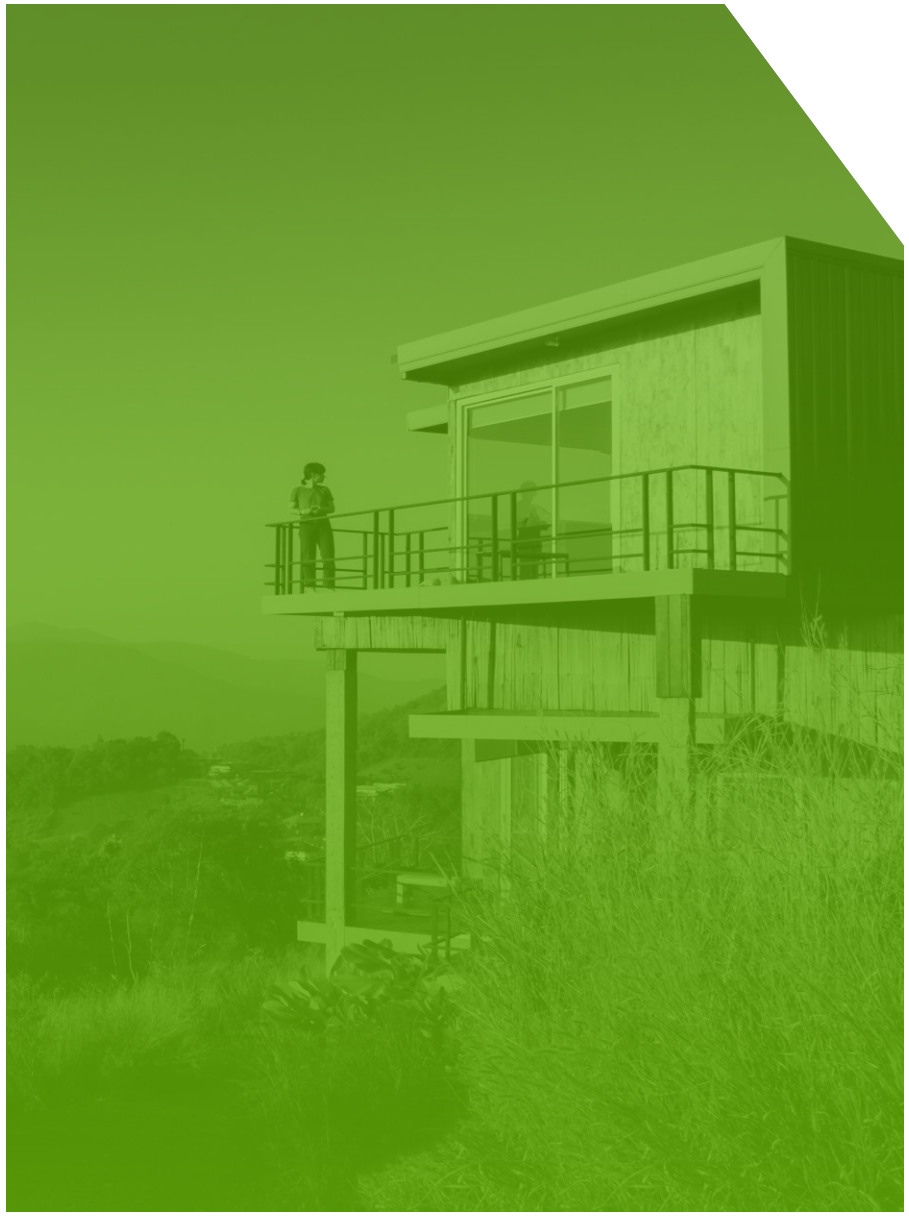


RB 101 Scope

Applicability

- New construction
- Detached one- and two-family dwellings
- Townhouses
- Residential buildings ≤ 3 stories
- Additions > 1,000 ft^2

Exceptions

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

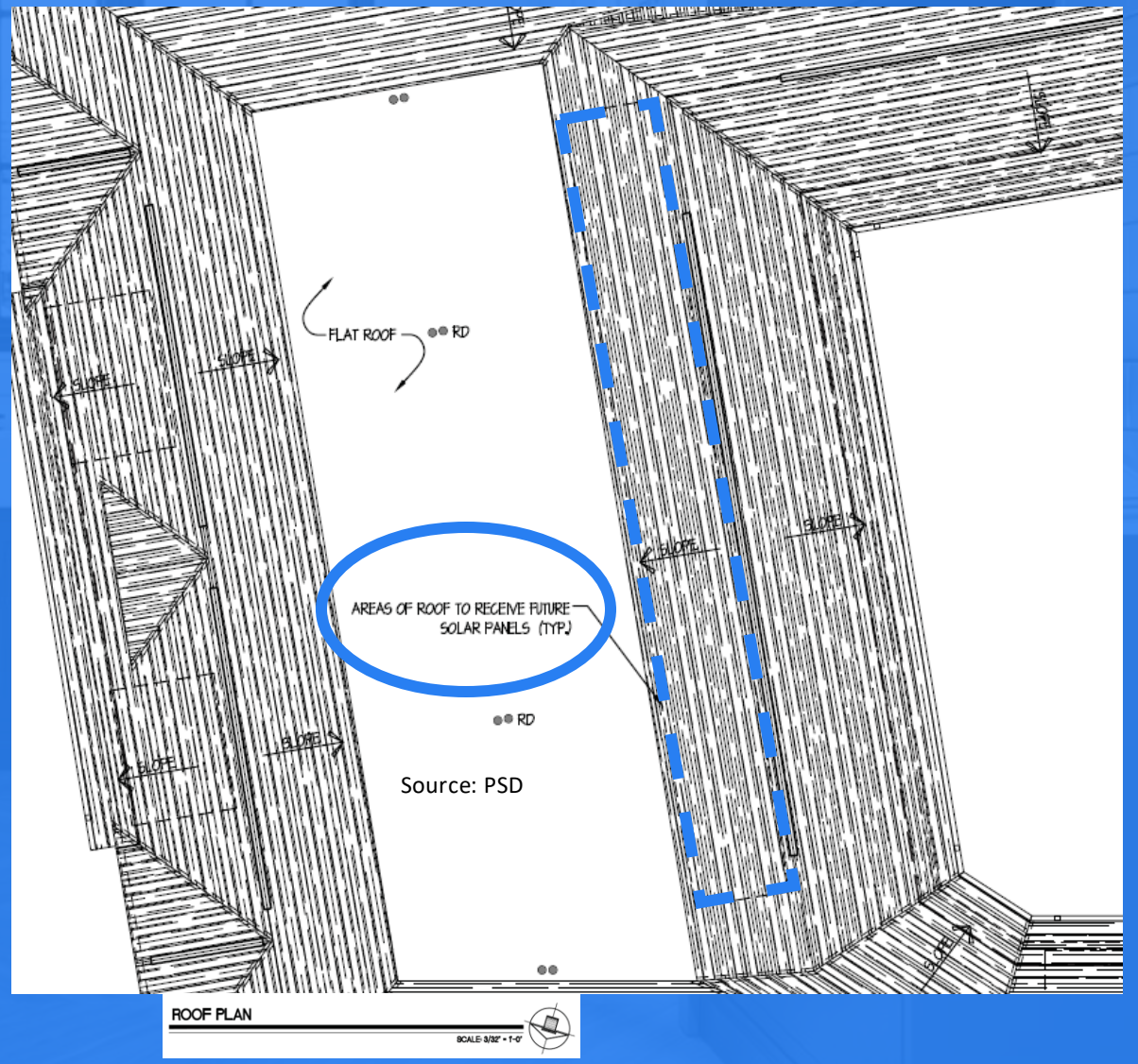
Appendix RB: Solar-Ready Provisions

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

Appendix RB: Solar-Ready Provisions
RB103.3 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.



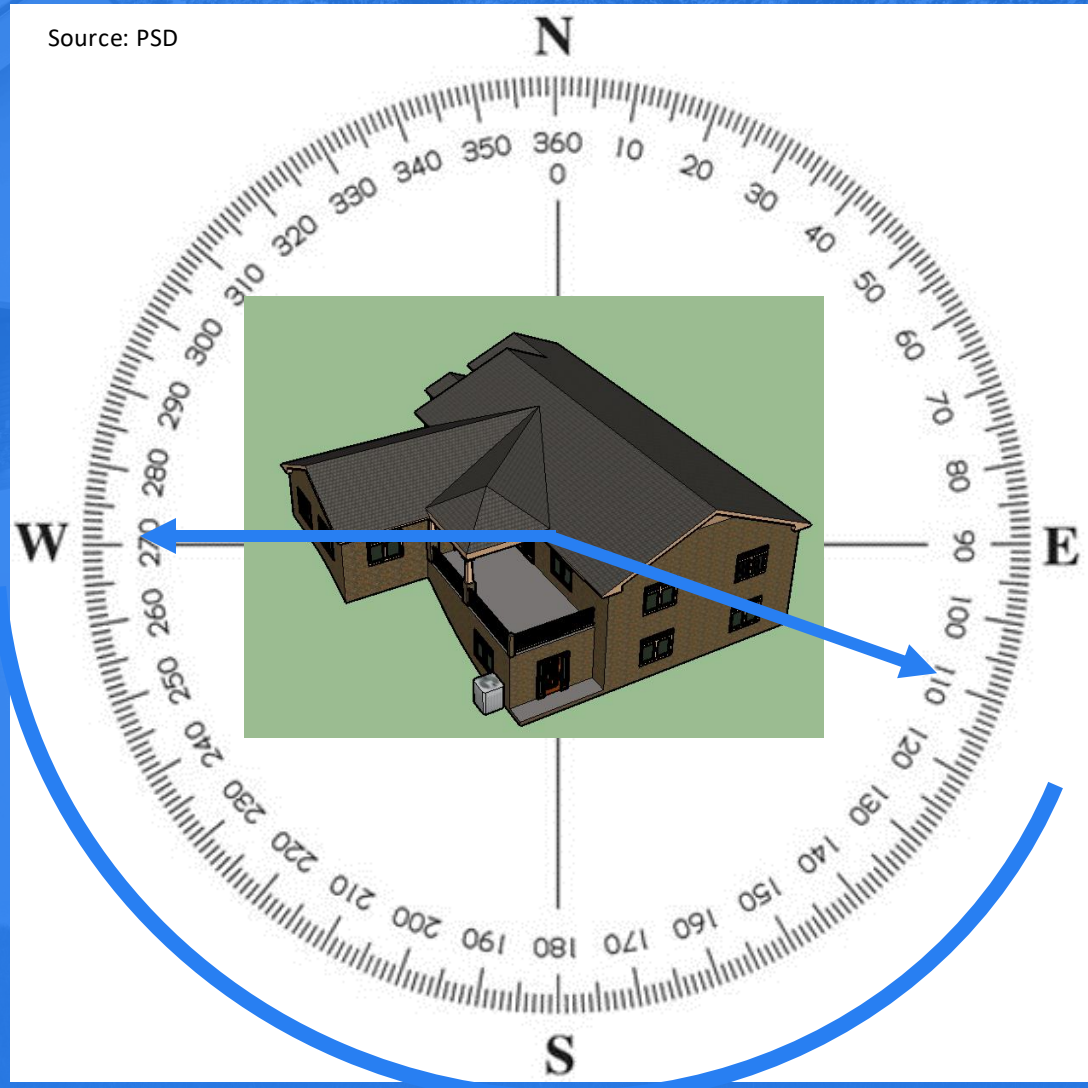
Source: PSD

Section RB103 Solar Ready Zone

RB103.1 General.

The Solar-ready Zone Provisions apply only to:

Buildings with ≥600 square feet of roof area oriented between 110 degrees and 270 degrees of true north



Solar-Ready Zone - Exceptions

Exception 1:

Buildings with permanently installed on-site renewable energy systems

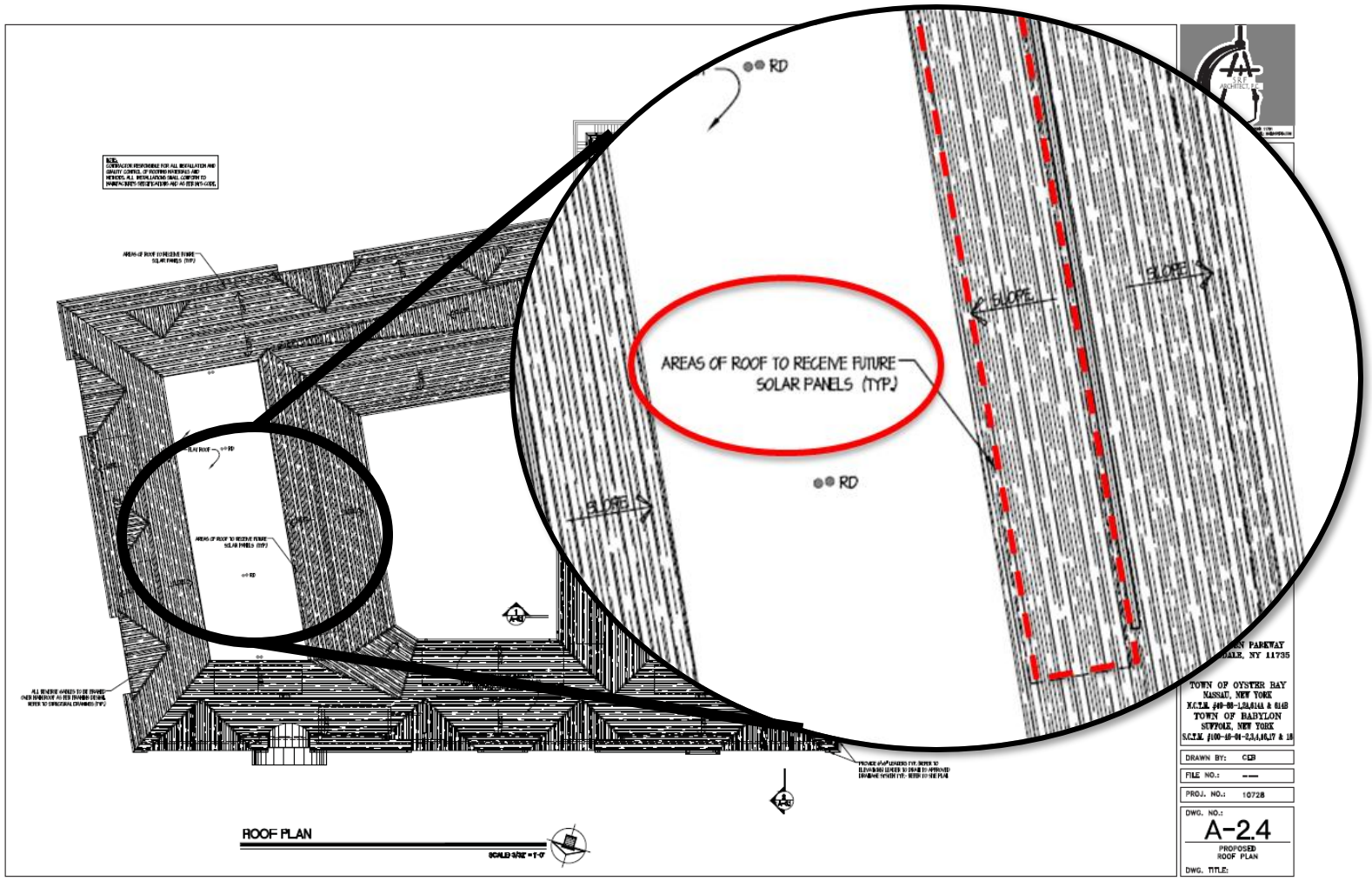
Source: PSD

Exception 2:

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

Source: PSD

Solar-Ready Zone – Construction Documentation



RB103.2 Construction documentation requirements

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

Source: PSD

Solar-Ready Zone – Solar-Ready Zone Area

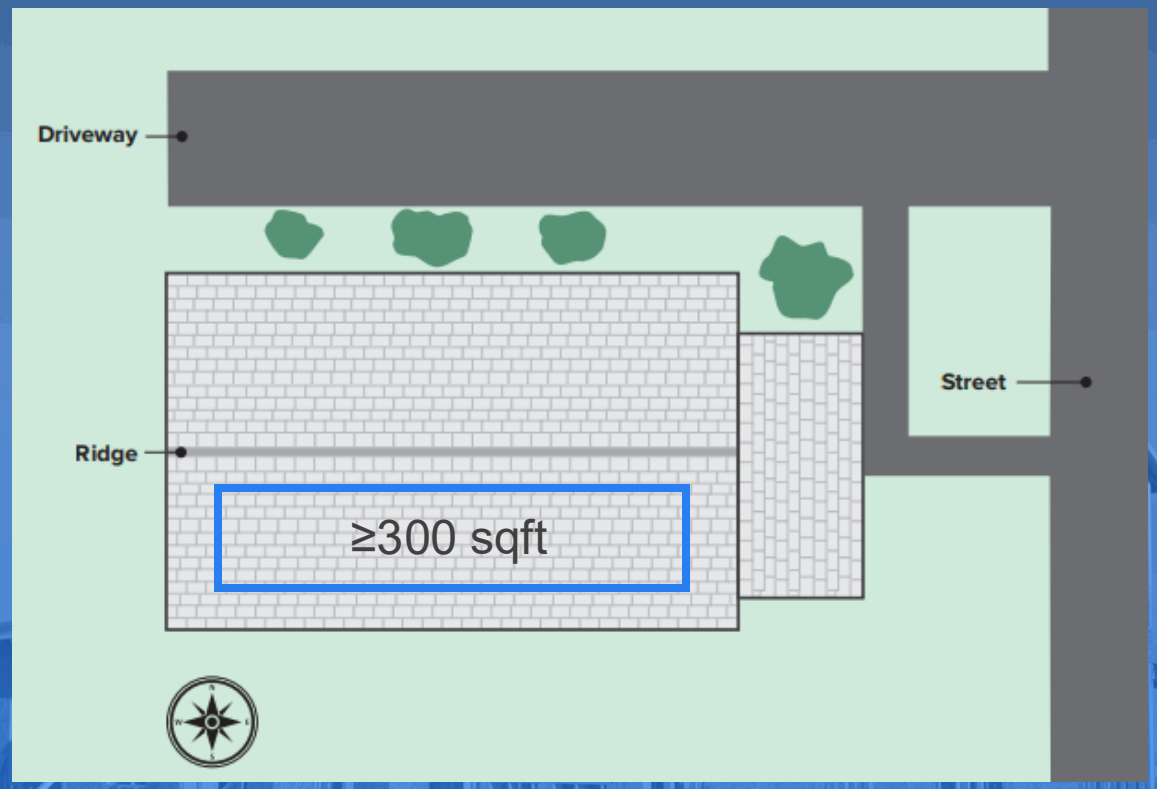
RB103.3 Solar-ready zone area

Minimum solar-ready zone area

= 300 square feet

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

Applies to all residential buildings except townhouses



Source: PSD

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 Massachusetts Fire Code

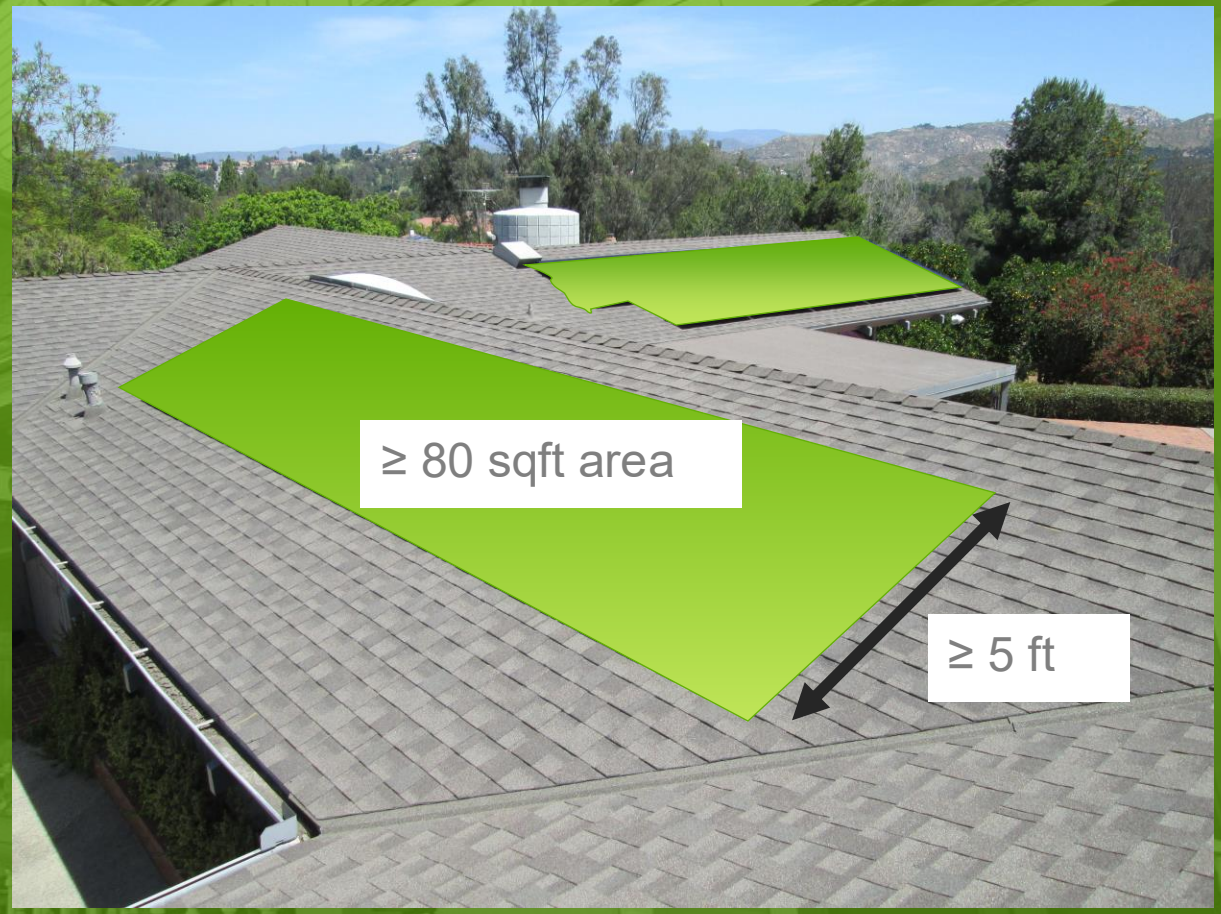
Source: PSD

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 Massachusetts Fire Code.



Source: PSD

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

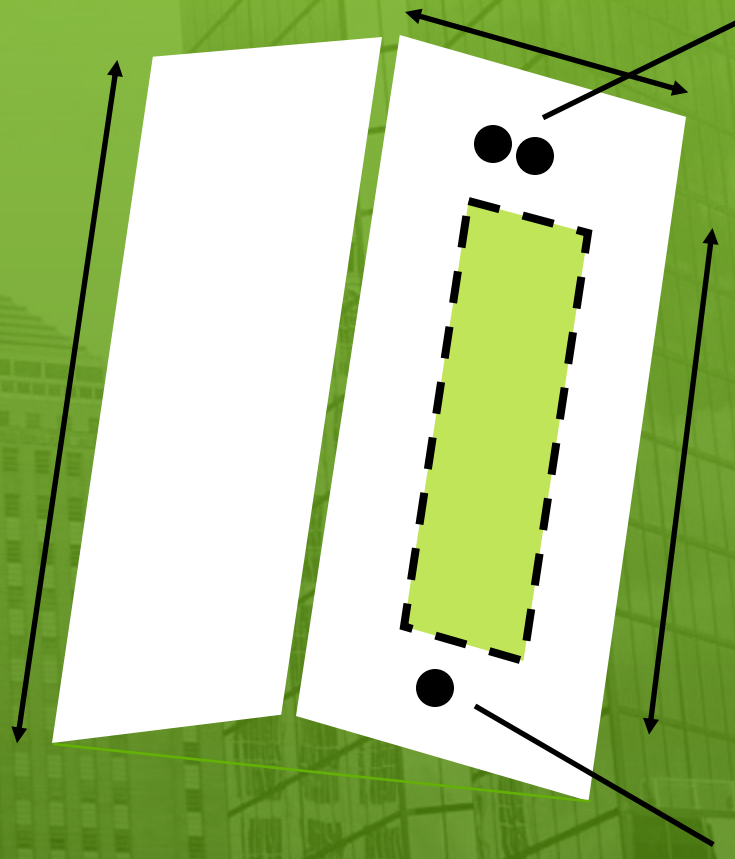
D. Widths of not less than 4 feet

E. Widths of not less than 5 feet

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



Poll Question #3

Townhomes 2000 ft^2 or less, minimum solar-ready zone equals ____?

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

Solar-Ready Zone – Shading

RB103.5 Shading

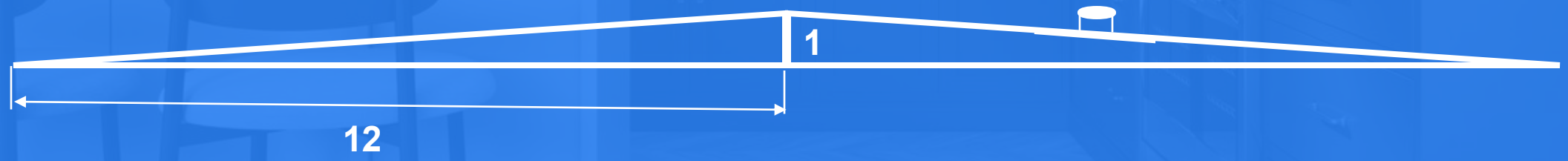
- The solar-ready zone shall be set back from any permanently affixed object, such as a chimney on the building that is located south, east, or west of the solar-ready zone
- Setback must be at least 2X the object's height
- Objects may include taller portions of the building, parapets, chimneys, antennas,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

Source: PSD

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 ≤ 1 in 12.**
- **Sleeve shall be sized to accommodate the future photovoltaic system conduit, but not less than 1.25” in diameter**

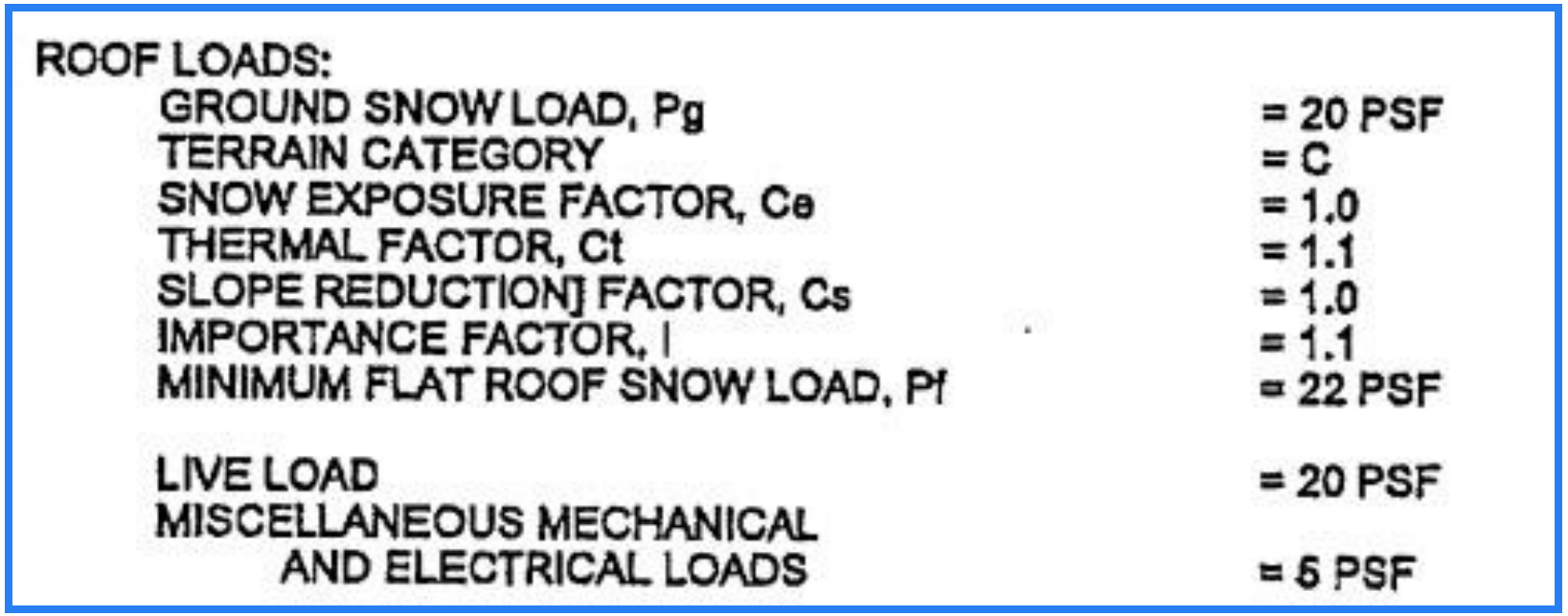


A 1 in 12 roof pitch is considered a flat roof

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



ROOF LOADS:

GROUND SNOW LOAD, Pg	= 20 PSF
TERRAIN CATEGORY	= C
SNOW EXPOSURE FACTOR, Ce	= 1.0
THERMAL FACTOR, Ct	= 1.1
SLOPE REDUCTION] FACTOR, Cs	= 1.0
IMPORTANCE FACTOR, I	= 1.1
MINIMUM FLAT ROOF SNOW LOAD, Pf	= 22 PSF
LIVE LOAD	= 20 PSF
MISCELLANEOUS MECHANICAL AND ELECTRICAL LOADS	= 5 PSF

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

Appendix RB: Solar-Ready Provisions

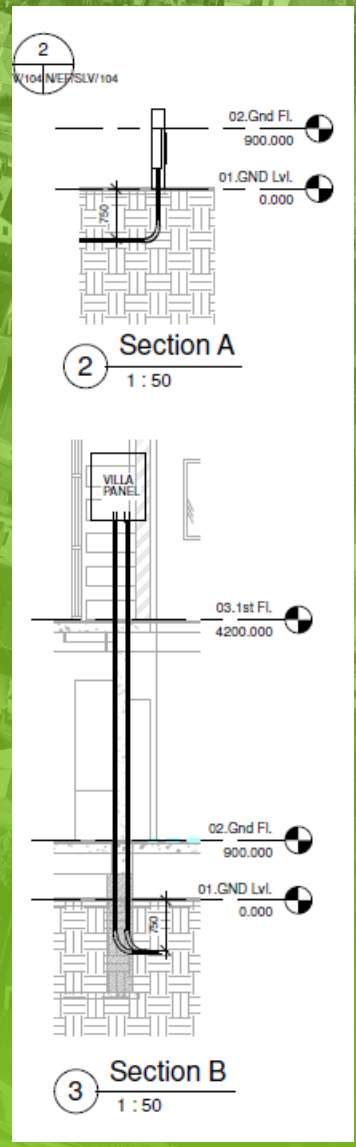
RB103.8 Interconnection Pathway

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)



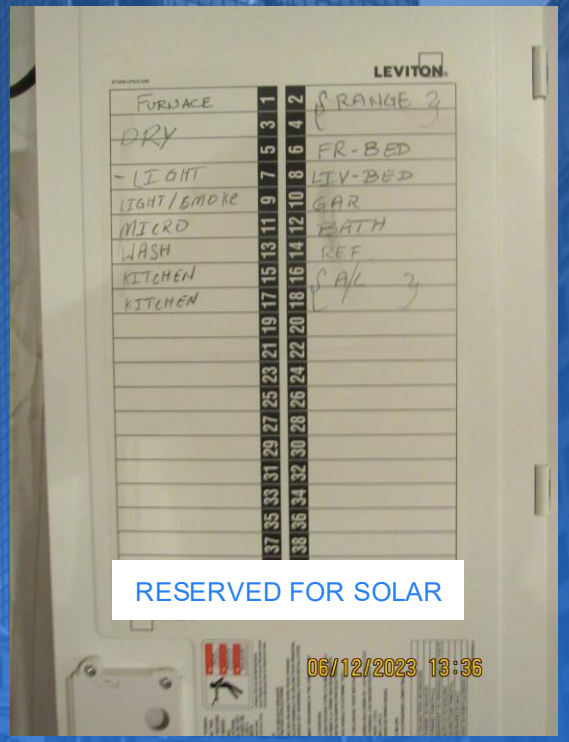
Source: PSD

Appendix RB: Solar-Ready Provisions

RB103.9 Electrical Service Reserved Space

Electric Service Reserved Space – the main electric service panel shall have a reserved space to allow installation of a dual-pole breaker

Source: PSD



Source: PSD

Appendix RB: Solar-Ready Provisions

RB103.10 Construction Documentation Certificate

A permanent certificate, indicating the solar-ready zone and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

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: 2025 MA Strech Code Appendix RB Section RB103.3

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: 2025 MA Stretch Code Appendix RB Section RB103.4

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.

Code Reference: 2025 MA Stretch Code Appendix RB Section RB103.6

FAQ Solar-Ready

Q

Does conduit need to be installed from the roof to the electrical panel?

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: 2025 MA Stretch Code Appendix RB Section RB103.6

FAQ Solar-Ready

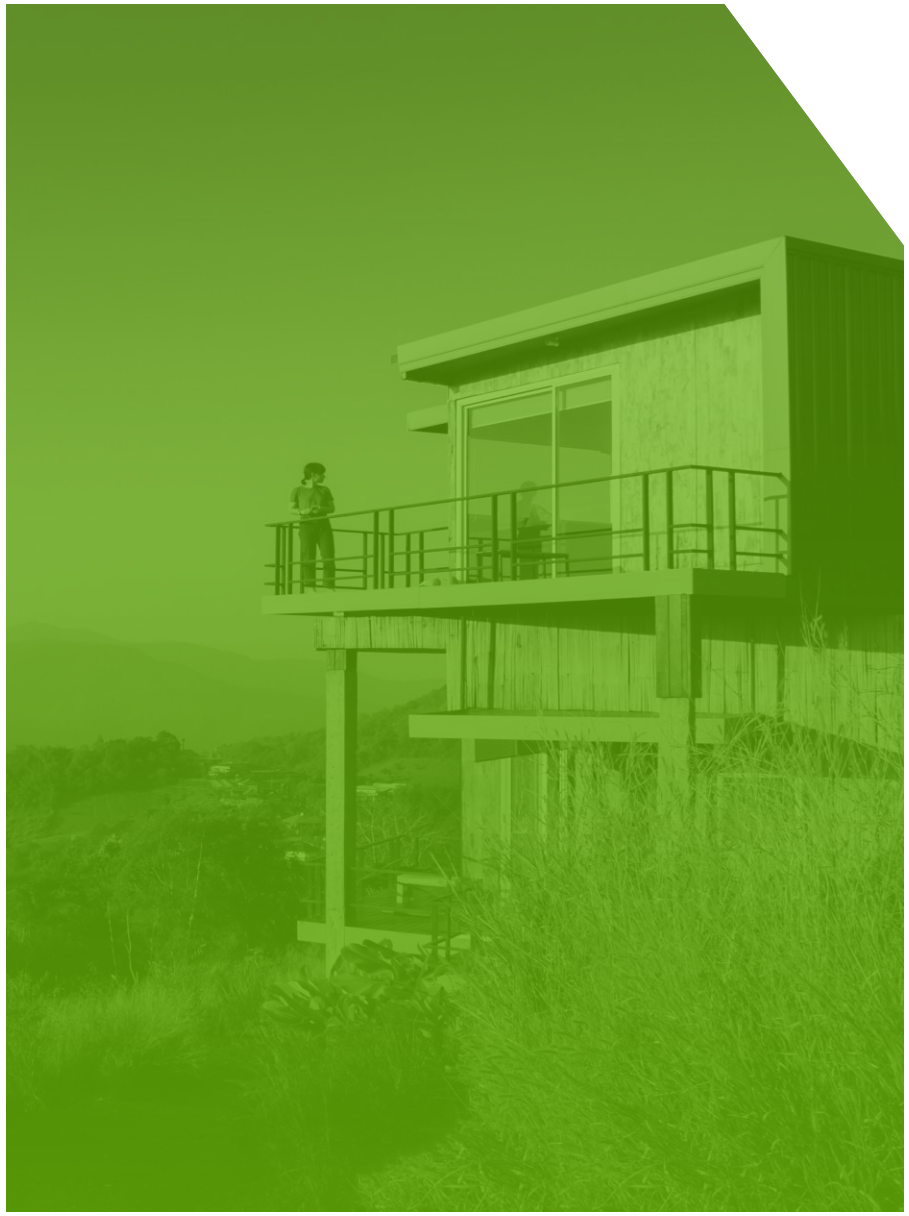
Q

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: 2025 MA Stretch Code Appendix RB Section RB103.1, RB103.6, RB103.8, and RB103.9



Solar-Ready Summary

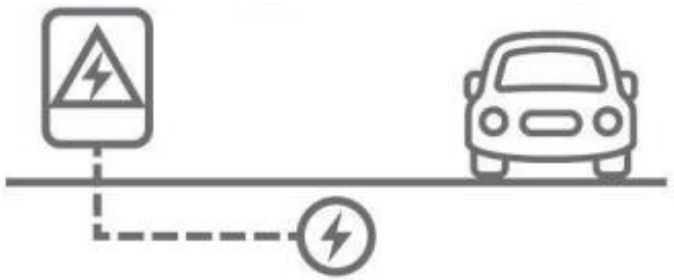
- Solar-ready requirements are found in 2021 IECC Appendix RB and Mass amendments
- Requirements apply to homes with 600 sqft of roof oriented 110º to 270º of true north
- The minimum solar-ready zone area is 300 sqft (150 sqft for townhouses ≤ 2K sqft)
- The minimum area for a single subzone is 80 sqft
- 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 low-sloped and flat roofs

EV Ready Spaces

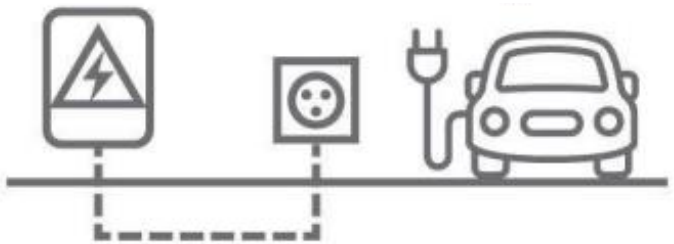
R404.4 Wiring for Electric Vehicle Charging Spaces

EV Ready Spaces

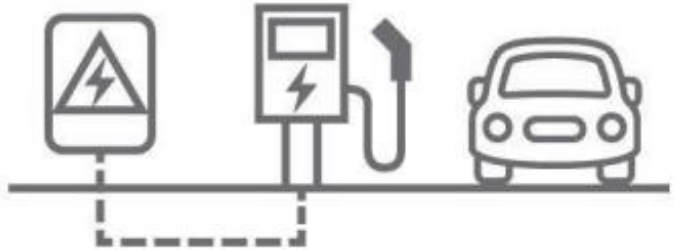
- The Stretch Code requires EV-ready spaces
- This includes electric service capacity and wiring to the space terminating in a receptacle or J plug
- Full electric vehicle service equipment is optional



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)

Definitions

ELECTRIC VEHICLE.

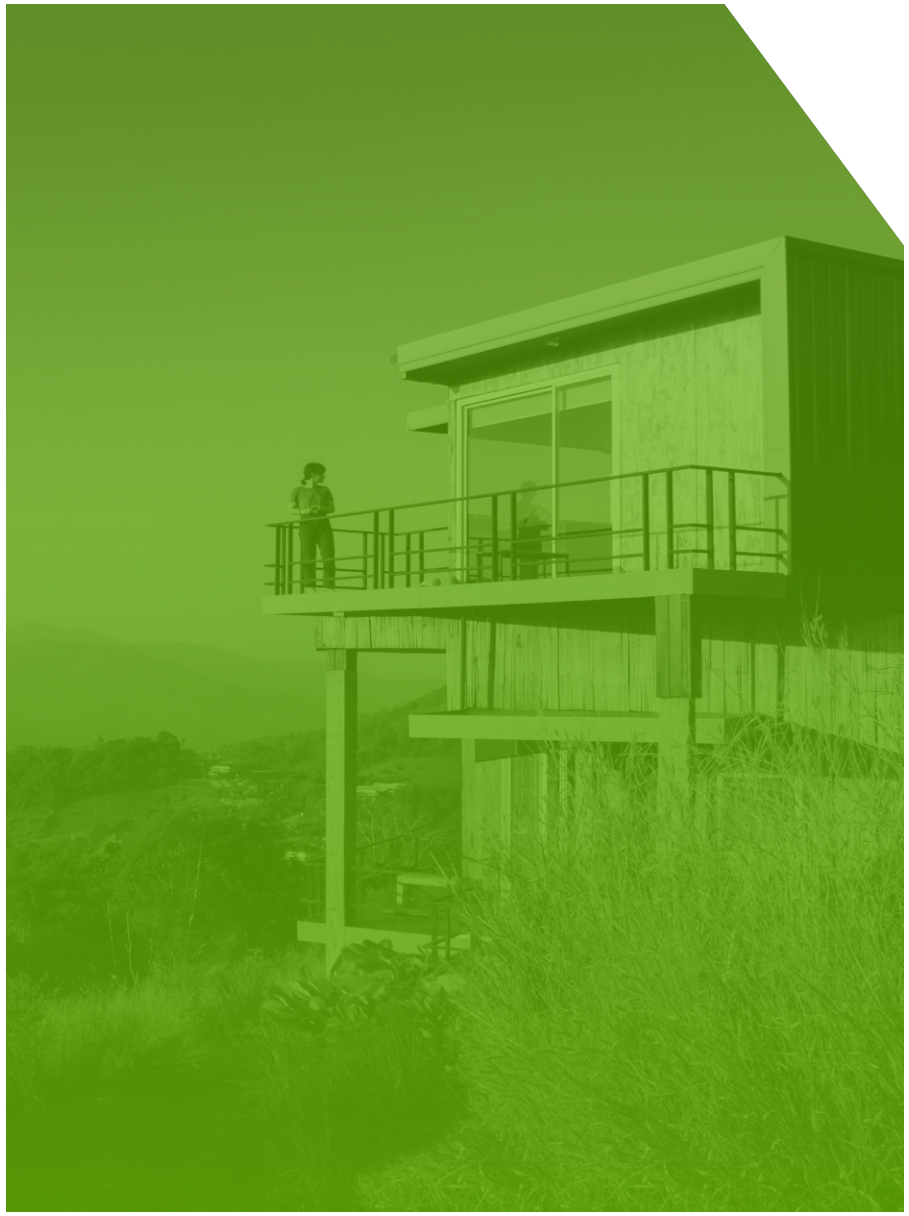
An automotive-type vehicle for on-road use

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.

Source: PNNL Building America Solutions Center



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.

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 or J3400 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.
- Standard SAE J3400 is from Tesla's North American Charging Standards

Source : PSD

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

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 all installed spaces served with a 40-amp, 208/240-volt circuit with a minimum capacity of 9.6 kVA.

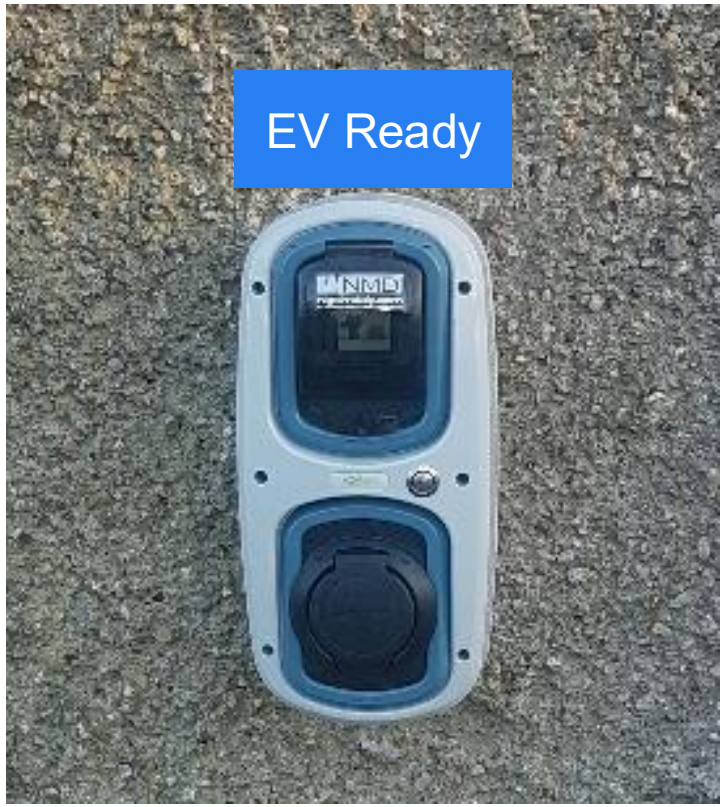
EV Ready Spaces – Identification in Service Panel or Subpanel

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

Source: PSD

EV Ready Spaces – Marking of Termination Location

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



Source: PSD

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 or SAE J3400 electrical connector.

Source: PSD

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.

Source: PSD

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.

Source: Microsoft images

EV Ready - Exceptions

Exception 3:
R-1, and R-2 multi-family properties may elect to comply with Commercial EV ready requirements in C405.13

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.

Source: MA Doer

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.

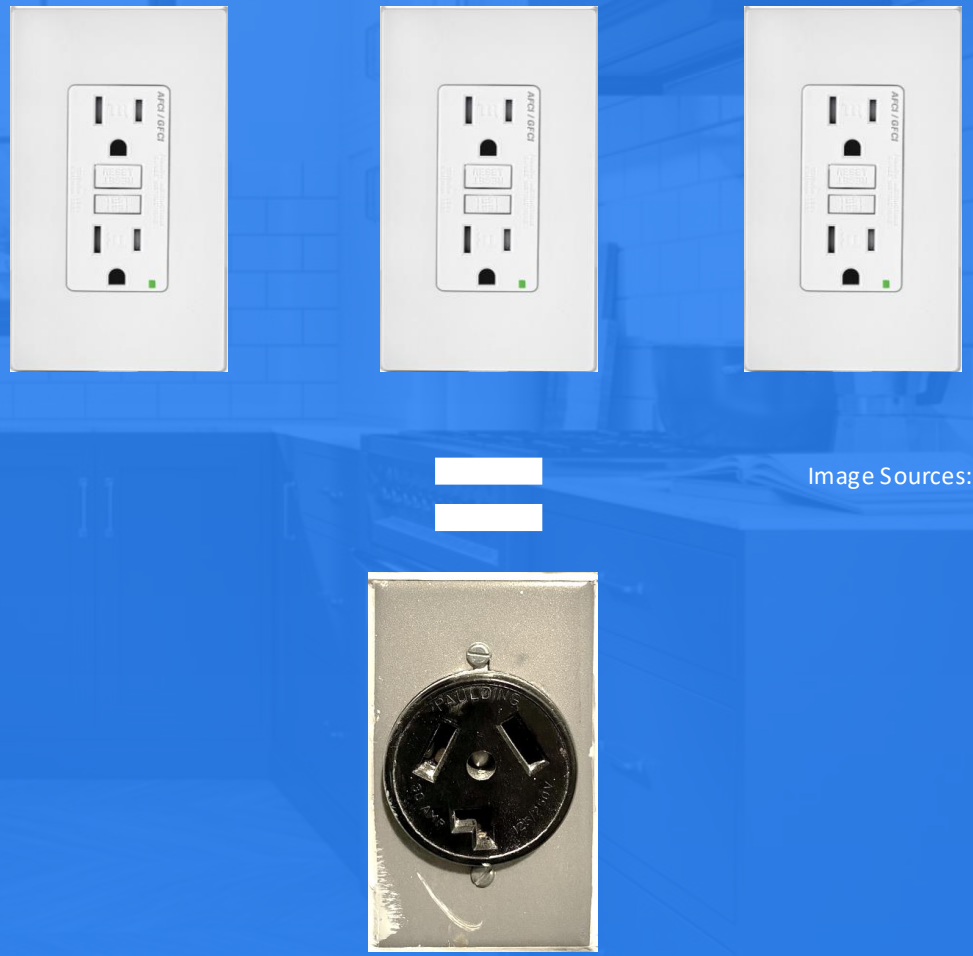


Image Sources: PSD

Poll Question #4

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

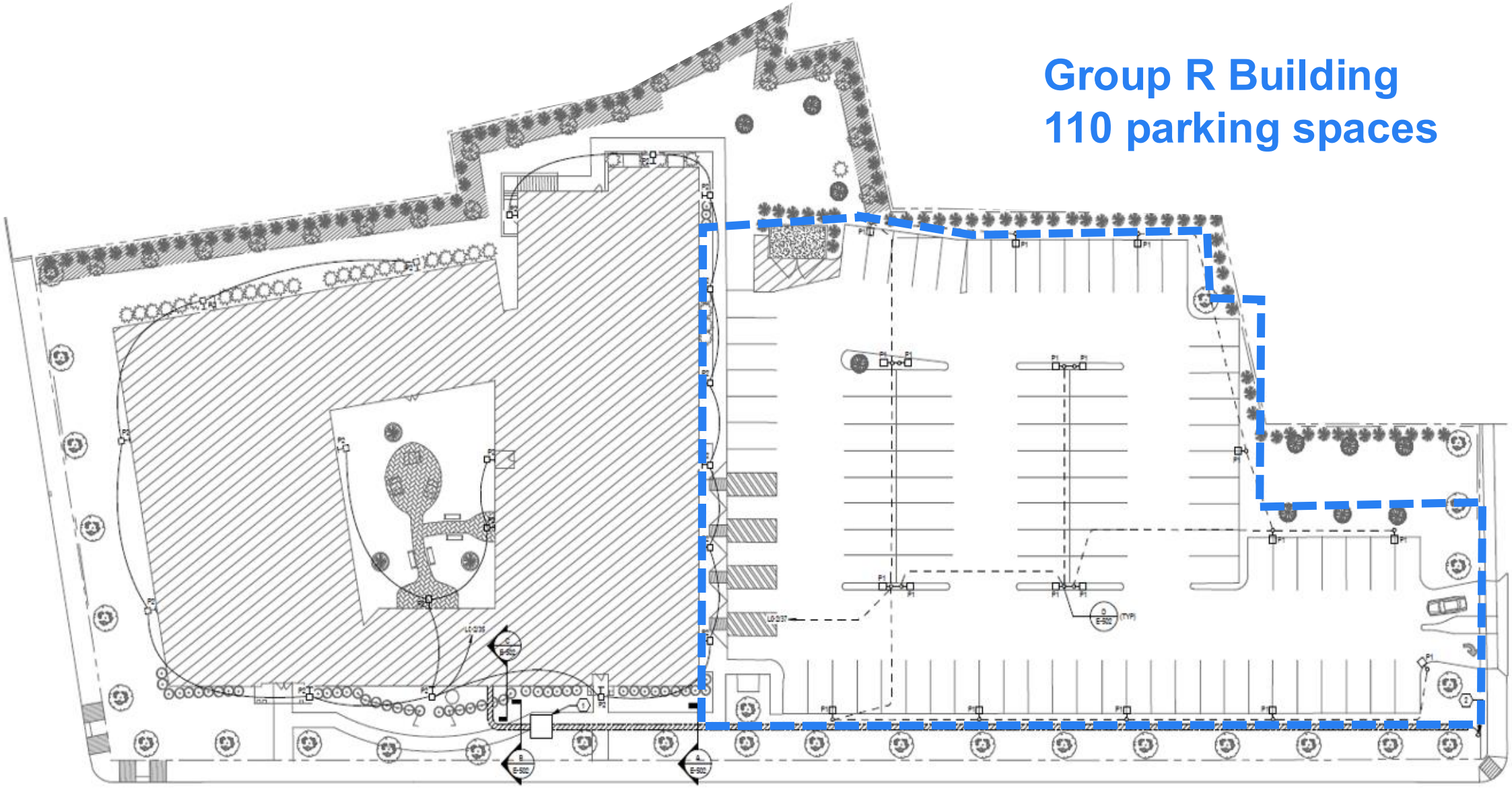
A. 11

B. 22

C. 33

D. 44

Group R Building
110 parking spaces



Source: PSD

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 ≥ 20% EV Ready Spaces

110 x 0.20 = 22

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

Mass Save Incentive Programs

Residential Rebates and Incentives

Rebates for appliances, heating systems and more.

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

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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Cape Light Compact

EVERSOURCE

Liberty

nationalgrid

Unitil

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

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)

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

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