Part 3:
Solar and EV Ready

mass save®

2025 Commercial Stretch Code

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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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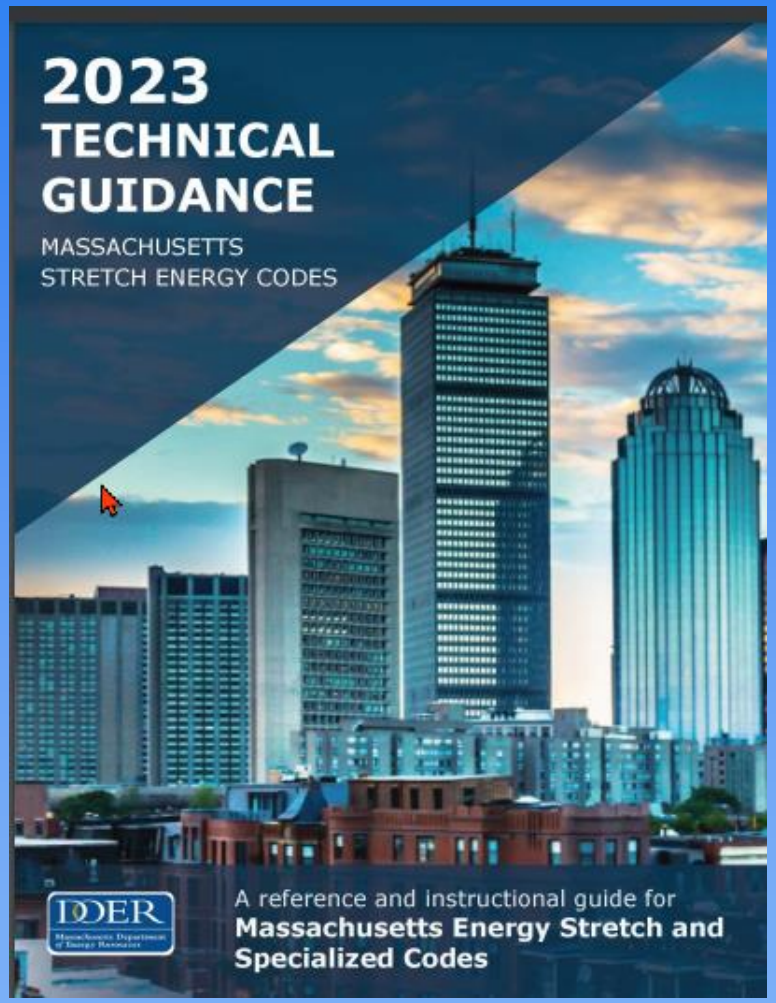
Massachusetts Department of Energy Resources (DOER)

Some of the content of this course is sourced from 2023 Technical Guidance provided by Massachusetts Department of Energy Resources (DOER)



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
- Appendix CB Solar Ready
- EV Ready
- Municipal Opt-In Specialized Stretch Code
- Summary

Learning Objectives

Know when a project is exempt from the requirements to provide solar ready zones.

Learn how to calculate the solar ready zone when required on a commercial building.

Be able to determine the requirements for compliance with the EV Ready Space requirement.

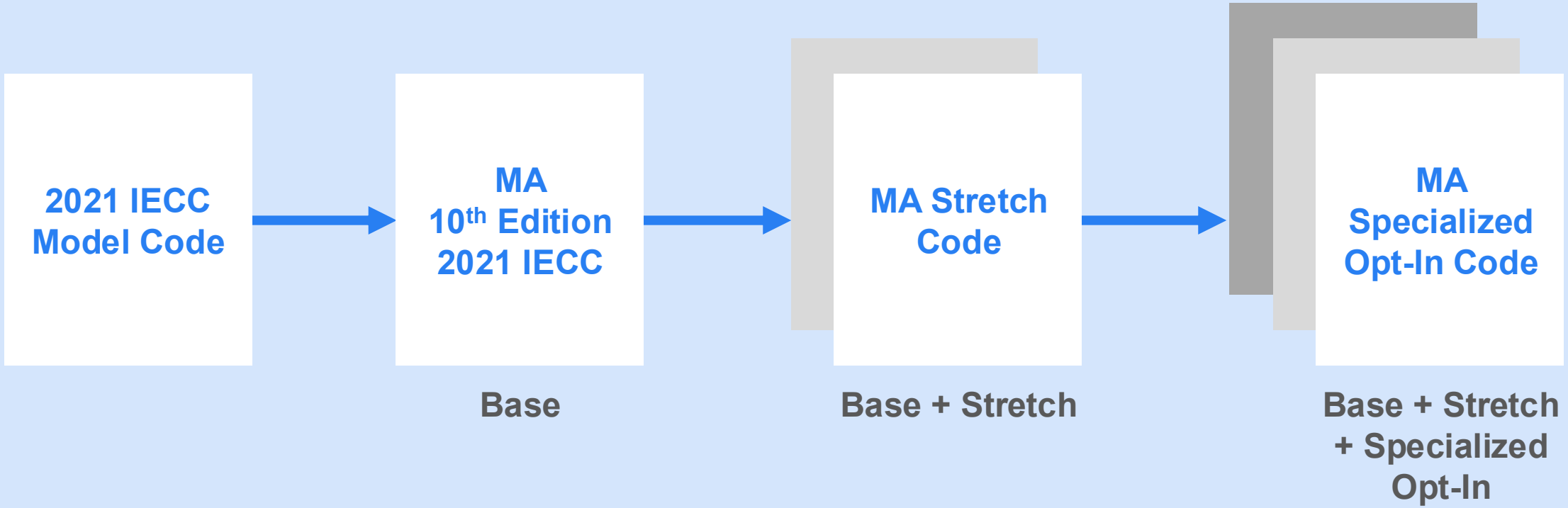
Gain knowledge of electrical load management for EV parking demands.

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

The 2025 Massachusetts Energy Code



Overview of Changes

July 2024

- Stretch code updates have gone into effect as of 2/14/25
- Impacts buildings with permit dates after July 1, 2024

All-electric homes qualify for a three-point increase in maximum HERS Index

February 14, 2025

Update to Stretch code:

- Introduced new Embodied Carbon Credit for new construction
- Maximum HERS Index revised for large alterations and additions

Commercial Provisions

Chapter 1 [CE]
Scope and Administration

Chapter 2 [CE]
Definitions

Chapter 3 [CE]
General Requirements

Chapter 4 [CE]
Commercial Energy Efficiency

→ EV Ready Requirements

Chapter 5 [CE]
Existing Buildings

Chapter 6 [CE]
Reference Standards

Appendix CB
Solar Ready Zone-Commercial

MA Stretch Energy Code

The Commercial Stretch Energy Code…

- Is developed by the MA Department of Energy Resources (DOER)
- Results in greater energy savings than the Base Energy Code
- Requires compliance with 2021 IECC as amended for MA
- Includes Appendix CB: Solar-Ready Zone in its entirety
- Includes EV Ready requirements (Chapter 4)
- Is adopted at the level of the local jurisdiction

Poll Question #2

The current version of the commercial stretch code started when?

A. January 1, 2023

B. July 1, 2023

C. June 1, 2023

D. June 31, 2023

Appendix CB
Solar-Ready Zone
Commercial

Definitions

Chapter 2 definitions applicable to Solar Ready and EV Ready:

- Electric Vehicle
- Electric Vehicle Supply Equipment (EVSE)
- EV Ready Space
- Automatic Load Management System (ALMS)
- On-site Renewable Energy
- Renewable Energy Resources
- Vegetative Roof

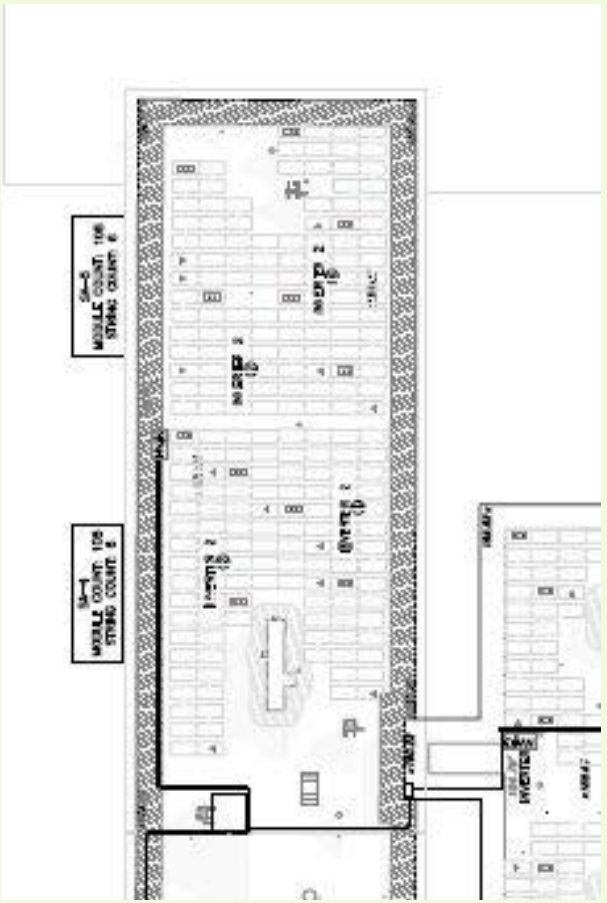
Appendix CB

Appendix CB – Solar-Ready Zone: Commercial

- Adopted ***unamended*** from 2021 IECC Appendix CB
- Ability to plan ahead
- Solar-ready zones and roof load documentation helps solar contractors with future installs
- Easy identification of unobstructed areas
- Easy identification of pathway to run conduits and wiring

Source: Google Maps

Source PSD



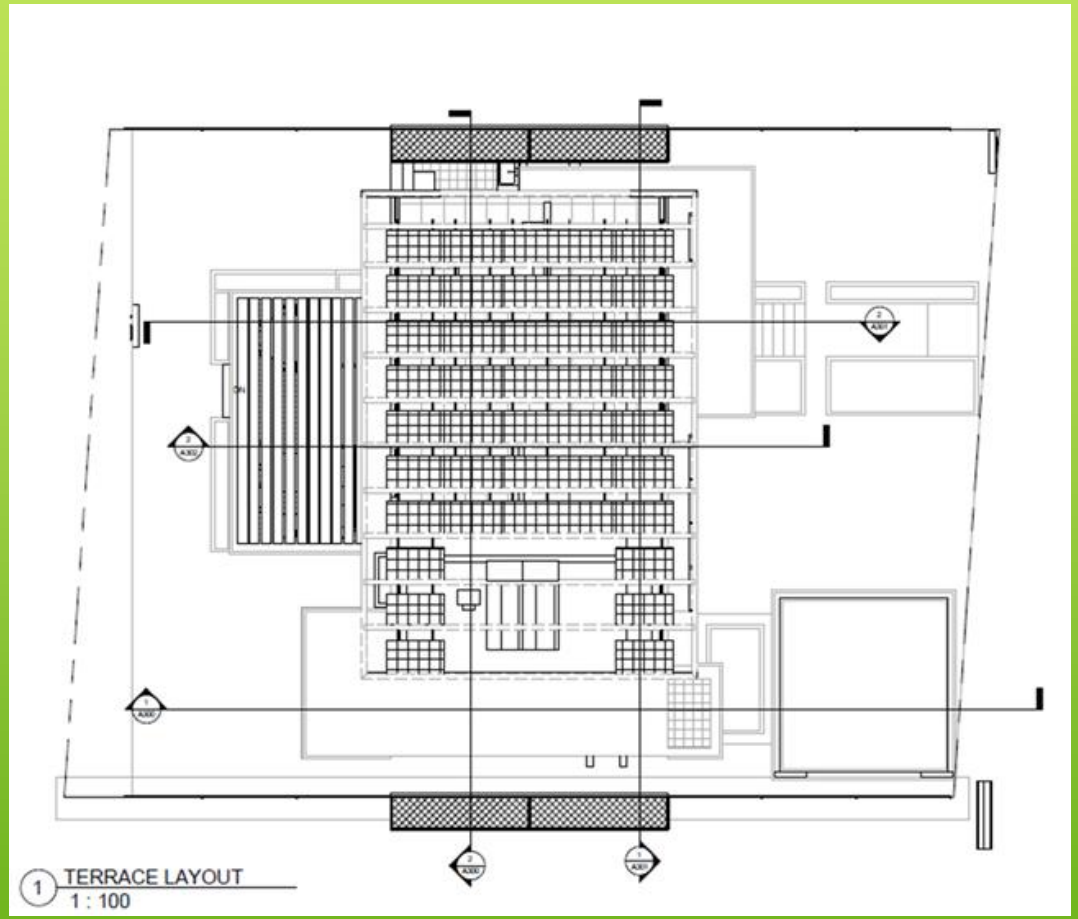
CB101 Scope

These provisions shall be applicable to new construction, ***not*** additions.

CB102 Definition

Solar-Ready Zone:

A section of sections of the roof or building overhand designated and reserved for the future installation of a solar photovoltaic or solar thermal system.



Source: PSD

Appendix CB: Solar-Ready Provisions

Applies to all Commercial and Multi-family Buildings*

- ≤ 5 stories in height above grade plane
- Oriented between 110˚ and 270˚ of true north or have low slope roofs**

* Multi-family buildings greater than 3 stories and classified as commercial buildings

** A roof having a slope less than 2 units vertical in 12 units horizontal

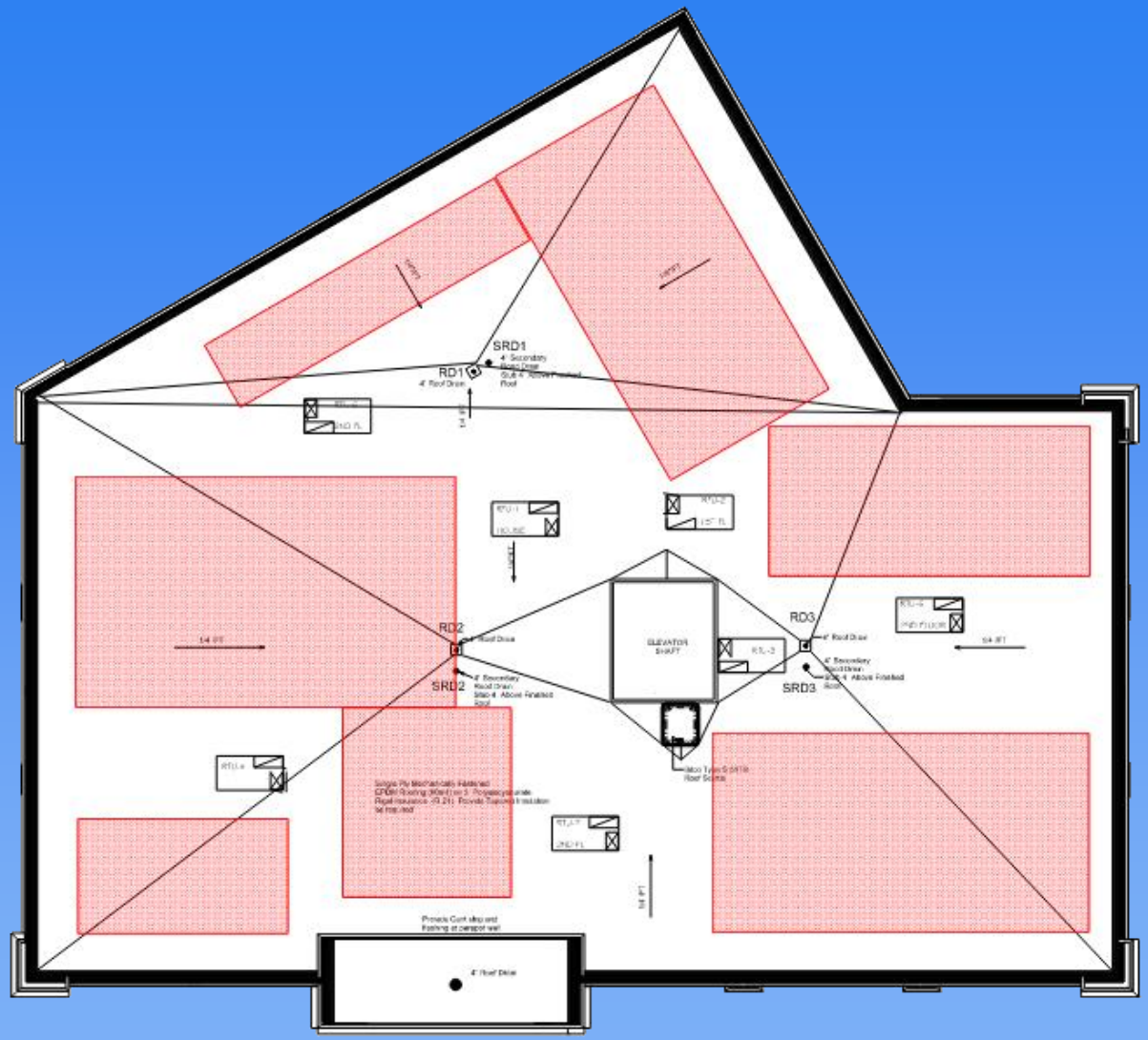
Source: PSD

Eligible Orientation for Solar Zone

Appendix CB: Solar-Ready Provisions

Solar-Ready Zone Area

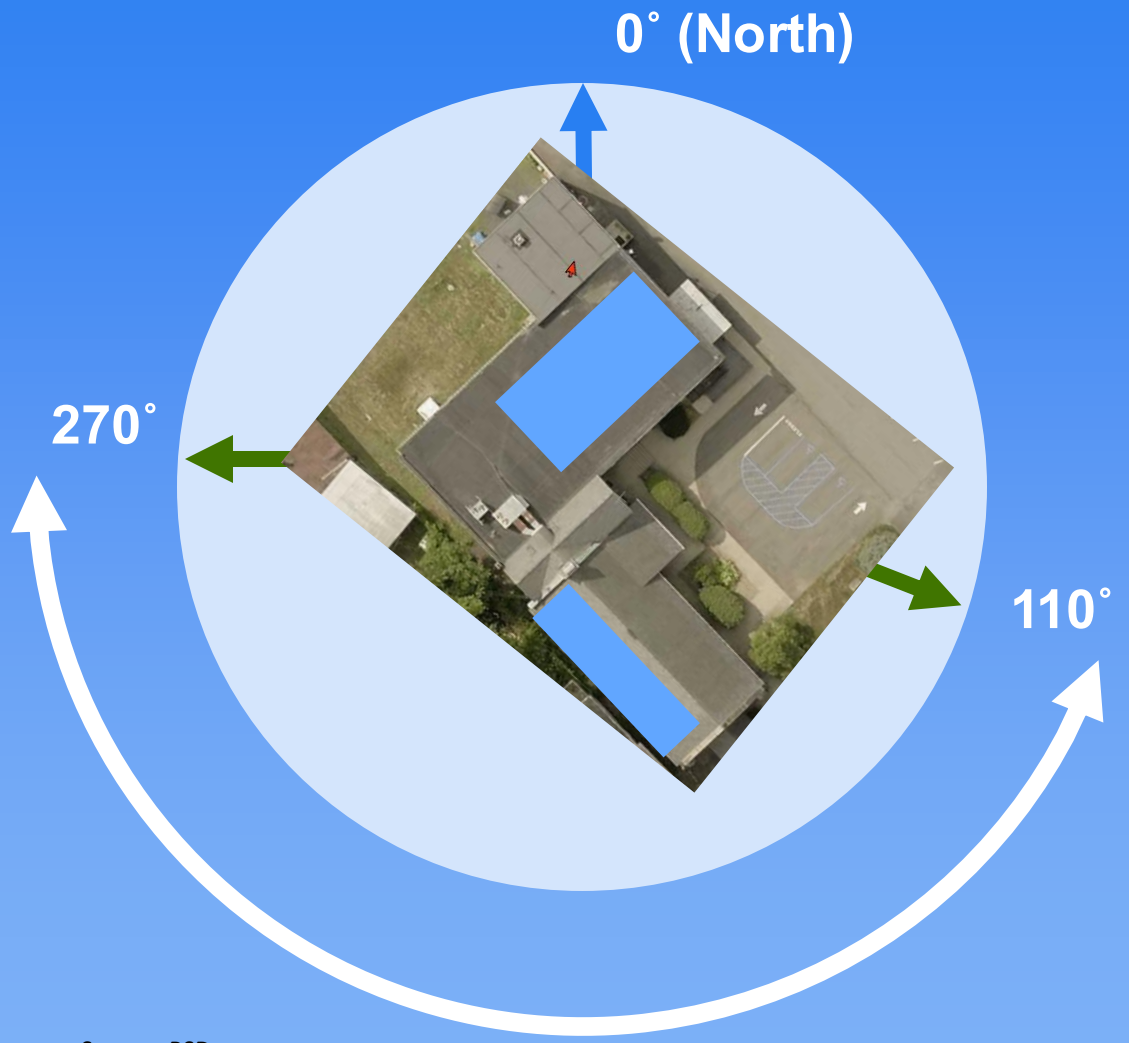
- Total area shall not be less than 40% of the gross roof area. Can be a single area or several smaller areas. Each area must be at least 5’ in width.
- Shall be free from obstructions including pipes, vents, ducts, equipment, skylights and roof-mounted equipment. Objects may include taller portions of the building, parapets, chimneys, antennas, signage, trees and roof plantings.



Source: PSD

Appendix CB: Solar-Ready Provisions

This building is oriented between 110˚ and 270˚ of True North and portions have a Low Slope Roof



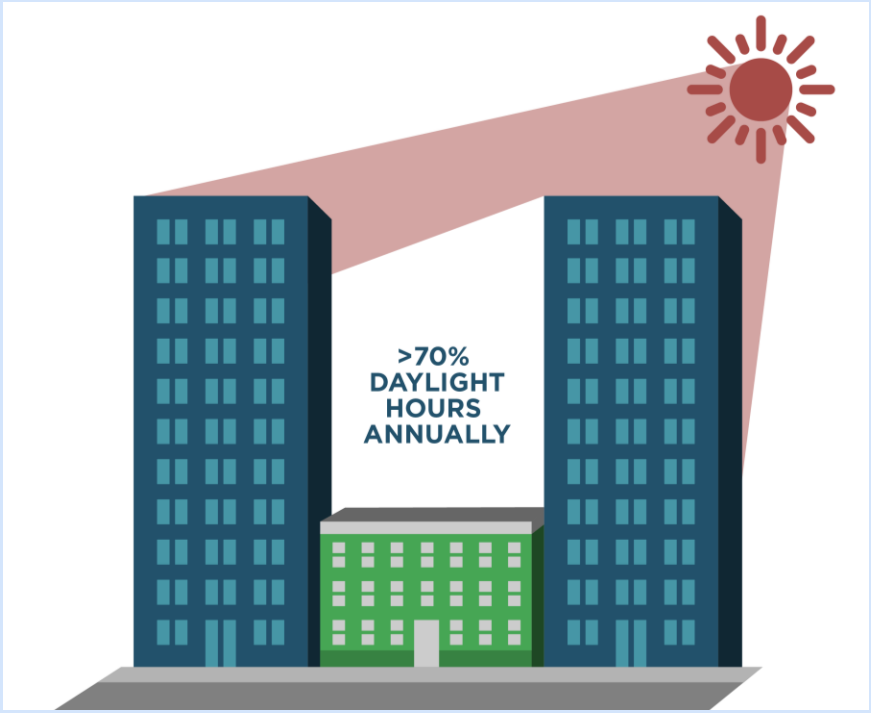
Source: PSD

Appendix CB: Solar-Ready Provisions – Exceptions

There are four exceptions to the Solar-Ready Zone requirement:

1. Building has permanently installed, on-site renewable energy system.

Source: PSD

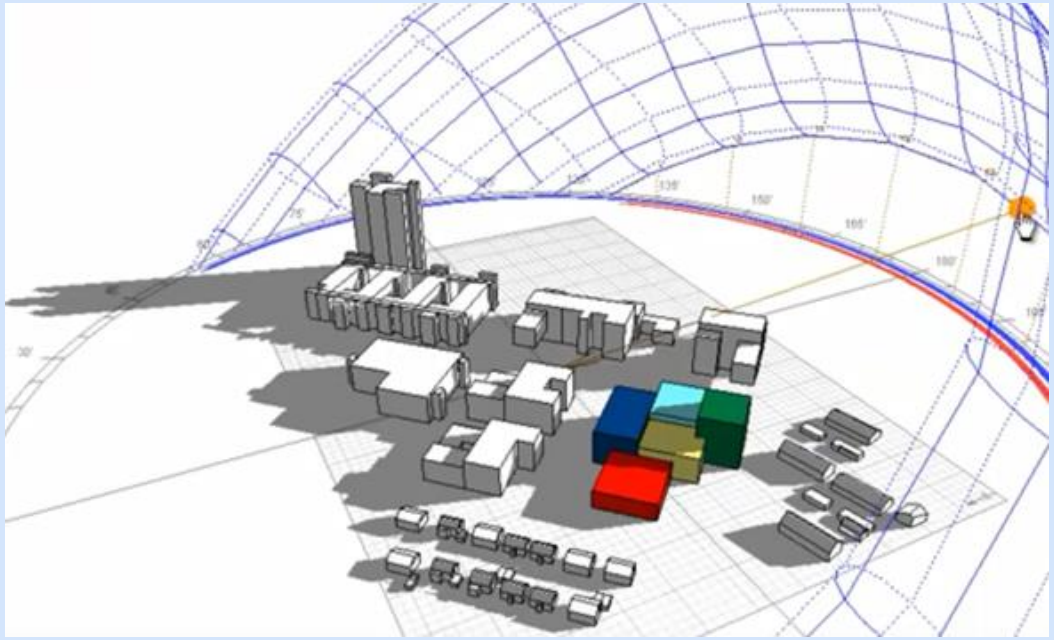


2. Building solar-ready zone is shaded for more than 70% of daylight hours annually.

Appendix CB: Solar-Ready Provisions – Exceptions

There are four exceptions to the Solar-Ready Zone requirement:

Source: Ecotect



3. Incident solar radiation is not suitable as certified by a licensed design professional.

4. Solar zone area cannot be met because of extensive rooftop equipment, skylights, vegetative roof areas, or other obstructions.

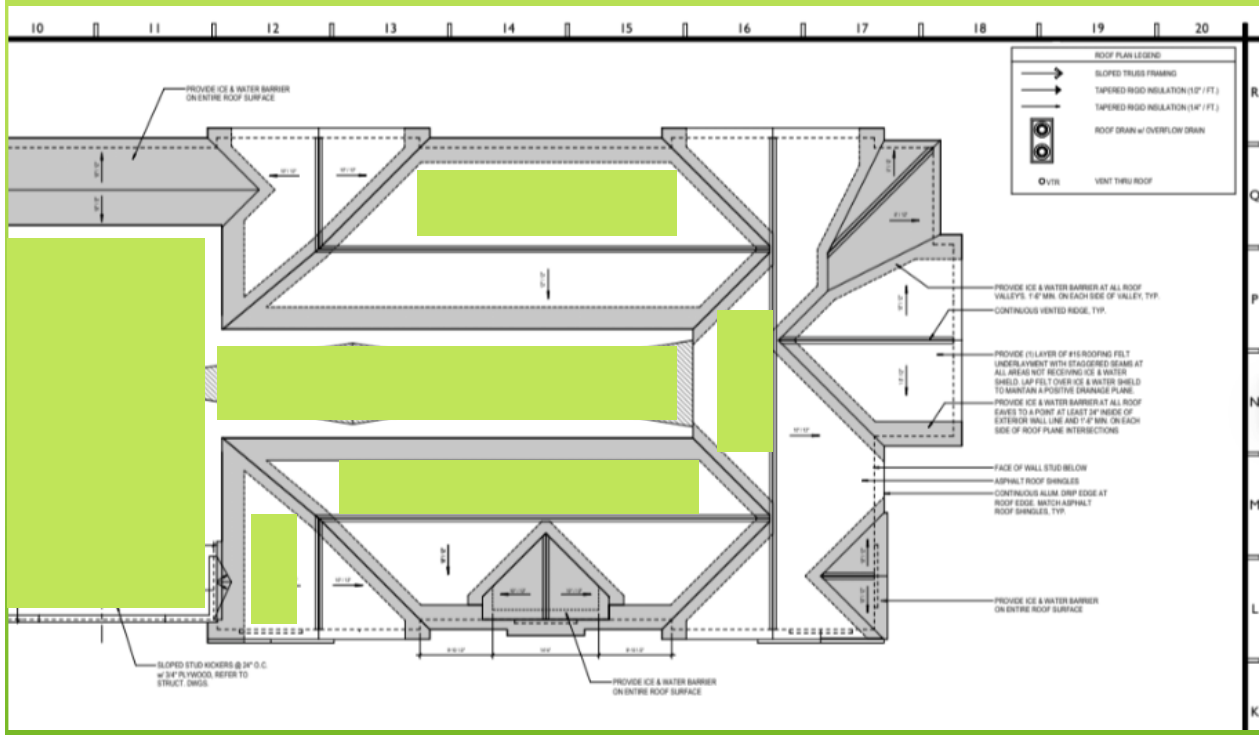
Appendix CB: Solar-Ready Provisions

CB103.2 Construction Document Requirements:

- Construction documents shall indicate the solar-ready zone(s)

While not specifically required by code, CDs should show:

- Area calculations showing area of zones
- Approximate dimensions of zones
- Obstructions
- Required pathways



Source: PSD

Appendix CB: Solar-Ready Provisions

CB103.4 Obstructions

Solar-Ready Zones shall be free from obstructions including:

- Vent pipes
- Flue vents
- Ducts
- HVAC Equipment
- Skylights
- Elevator penthouses
- Roof-mounted equipment


Source: PSD

Source: Google Maps

Appendix CB: Solar-Ready Provisions

Roof Loads and Documentation – Structural design loads shall be indicated on the CDs. A dead load of 5 PSF shall be included in the gravity load calculations.

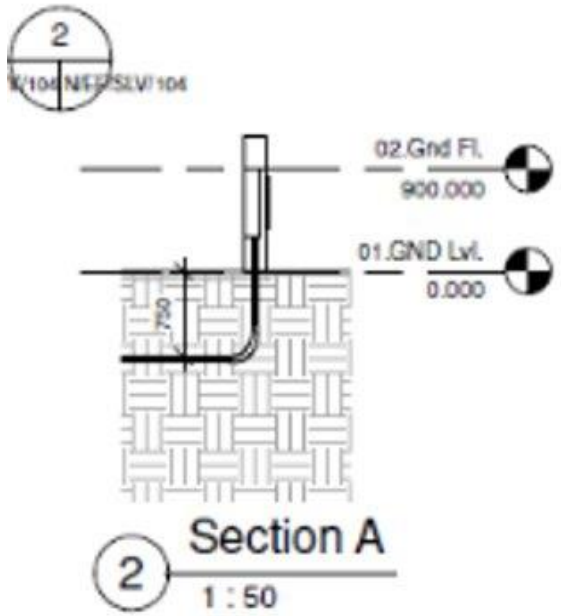
Roof Loads:

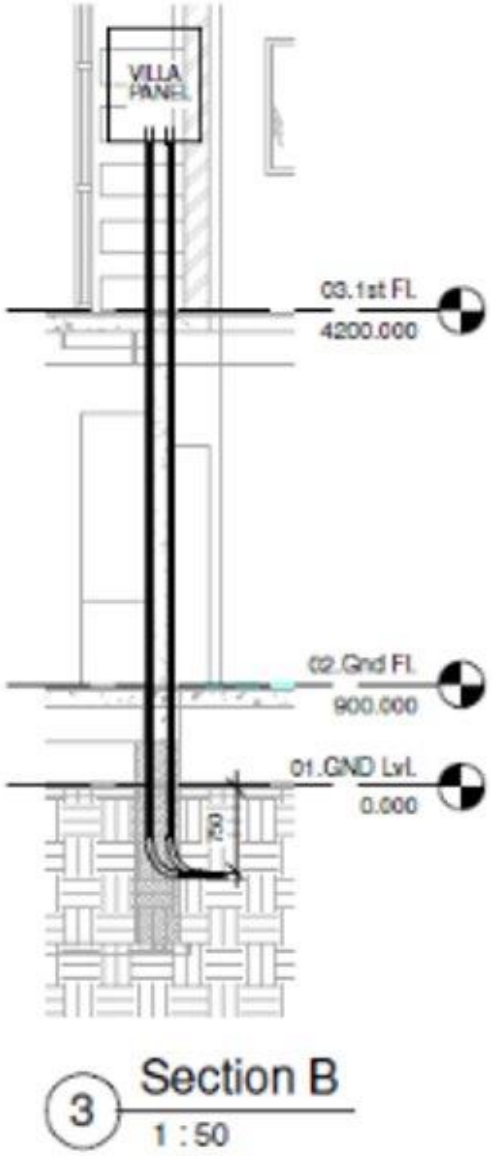
Ground Snow Load, Pg	= 20 PSF
Terrain Category	= C
Snow Exposure Factor, Ce	= 1.0
Thermal Factor, Ct	= 1.1
Slope Reduction Factor, Cs	= 1.0
Importance Factor, I	= 1.1
Minimum Flat Roof Snow Load, Pf	= 22 PSF
Live Load	= 20 PSF
Miscellaneous Mechanical and Electrical Loads	= 5 PSF
Future Solar	**= 5 PSF**

Source: PSD

Appendix CB: Solar-Ready Provisions

Interconnection Pathway – CDs shall delineate pathways for routing of conduit or piping the solar-ready zone to the electric service panel

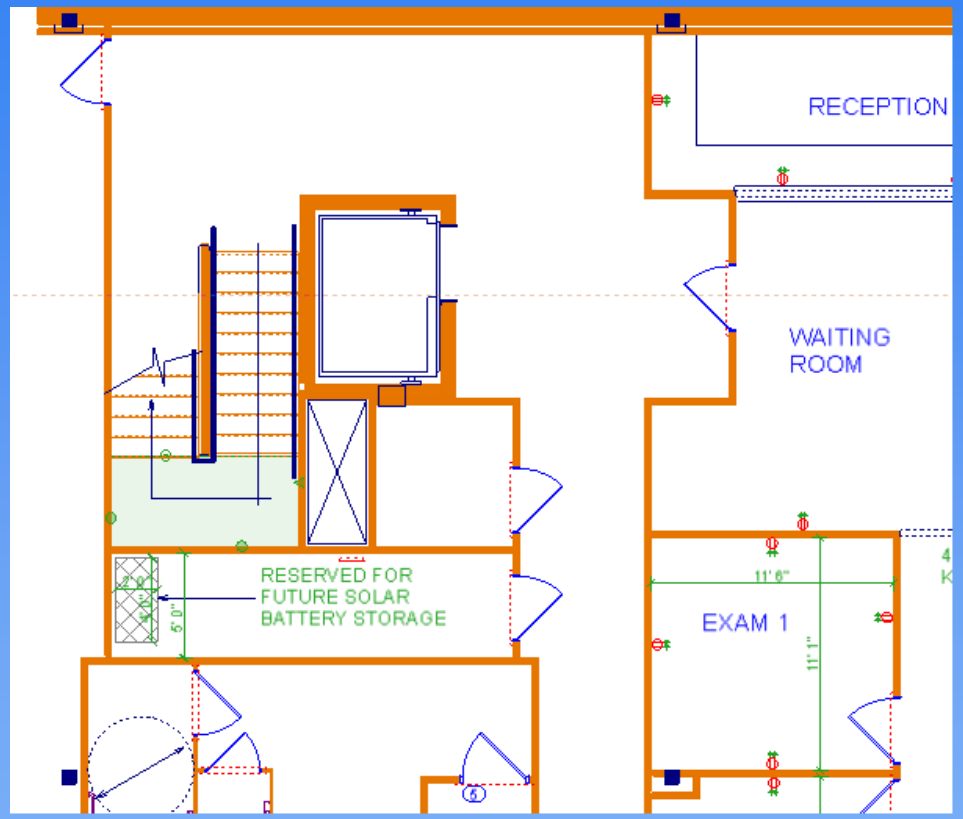




Source: PSD

Appendix CB: Solar-Ready Provisions

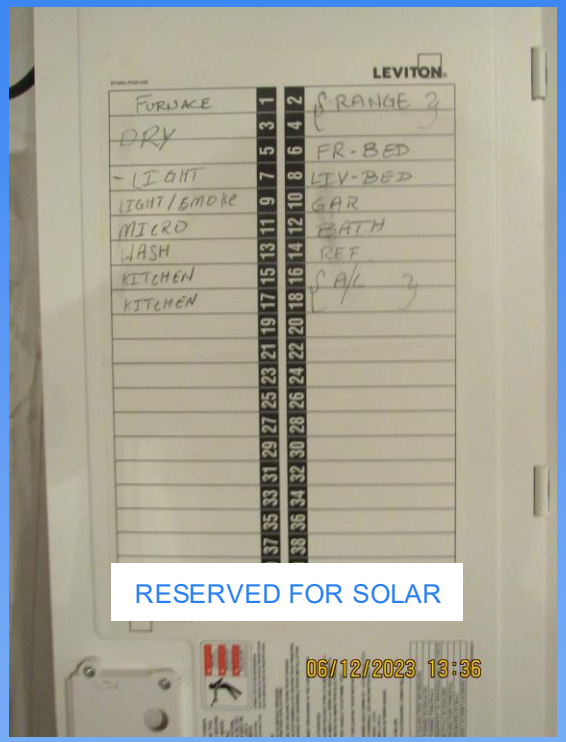
Electric Energy Storage System-Ready Area: the floor area should not be less than 2’ x 4’. The locations and layout shall be depicted on the CDs.



Source: PSD

Appendix CB: Solar-Ready Provisions

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



Source: PSD

Appendix CB: Solar-Ready Provisions

Construction Documentation Certificate – a permanent certificate showing the solar-ready zone, the structural loading, the interconnection pathway is to be posted by the electrical distribution panel

Solar-Ready Zone Certificate

This permanent certificate, indicating the solar-ready zone and other requirements of this section, shall be posted at a conspicuous location (electrical distribution panel, water heater, etc.) by the builder/registered design professional.

Solar-Ready Zone

Example:

- Four story building
- Low slope roof
- Vegetative roof
- Obstructions preventing clear solar-ready zone area
- Orientation – Does not matter because low slope roof

Determination:

Solar-ready Zone not required

Source: PSD

Solar-Ready Zone

Example:

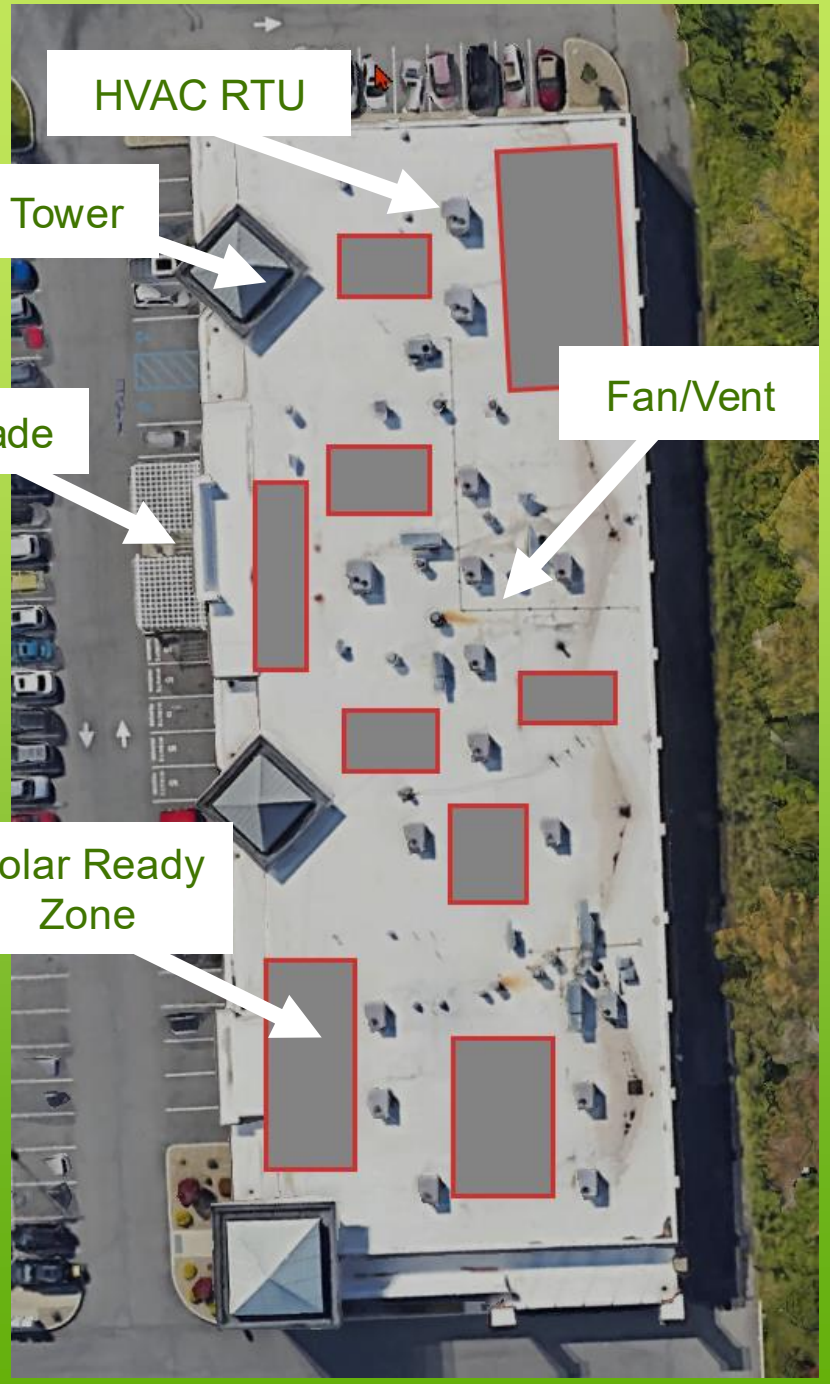
- One Story (Retail Strip Mall)
- Overall Area 35,960 ft^2
- Low slope roof
- Obstructions limiting clear solar-ready zone area
- Orientation – Does not matter because low slope roof

Determination:

Solar-ready Zone Required

35,960 ft^2 x 0.40 = 14,384 ft^2

Solution – multiple zones totaling 14,400 ft^2 +/-, minimum dim. 5 ft.



Source: PSD

Poll Question #3

Renovations of an existing building require identification of a solar ready zone.

A. True

B. False

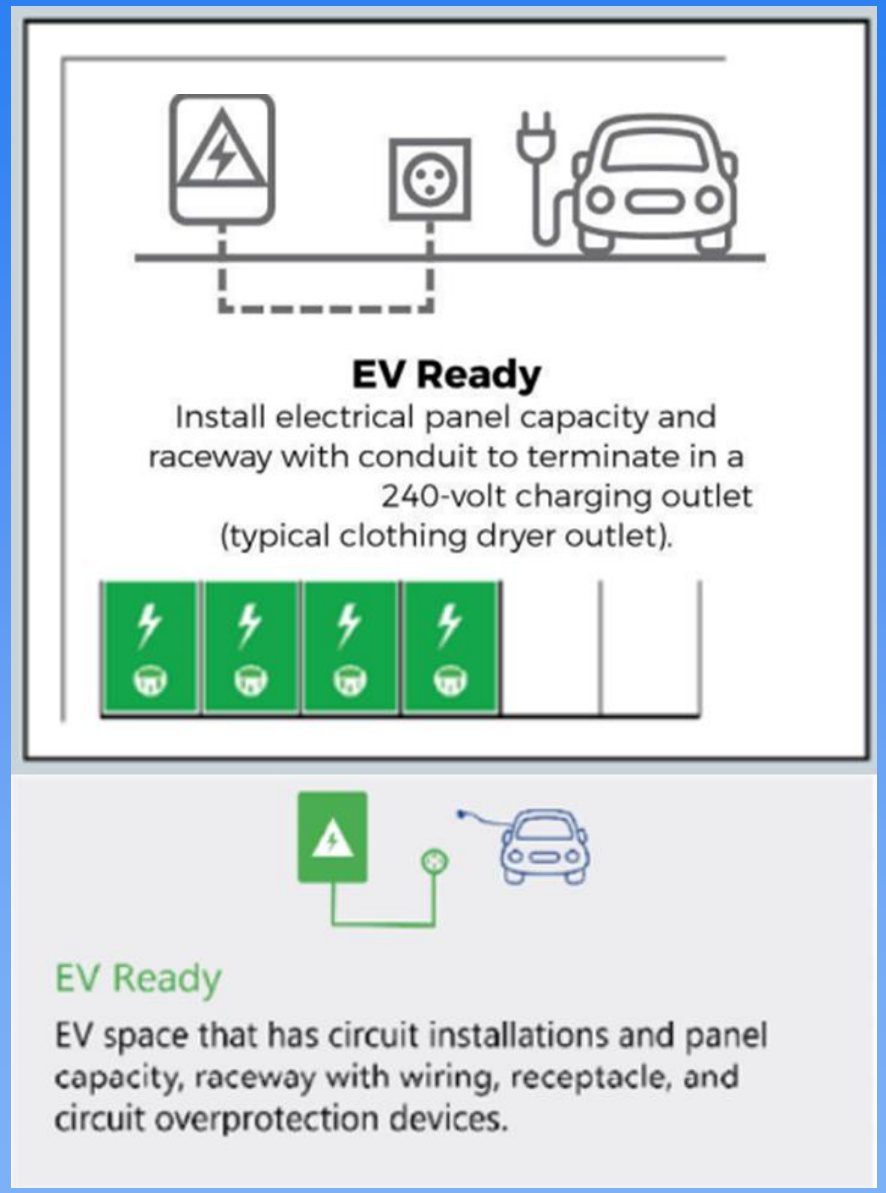
EV Ready

EV Ready Parking Spaces

("EV Ready Spaces")

EV Ready Spaces shall be provided in accordance with Table C405.13

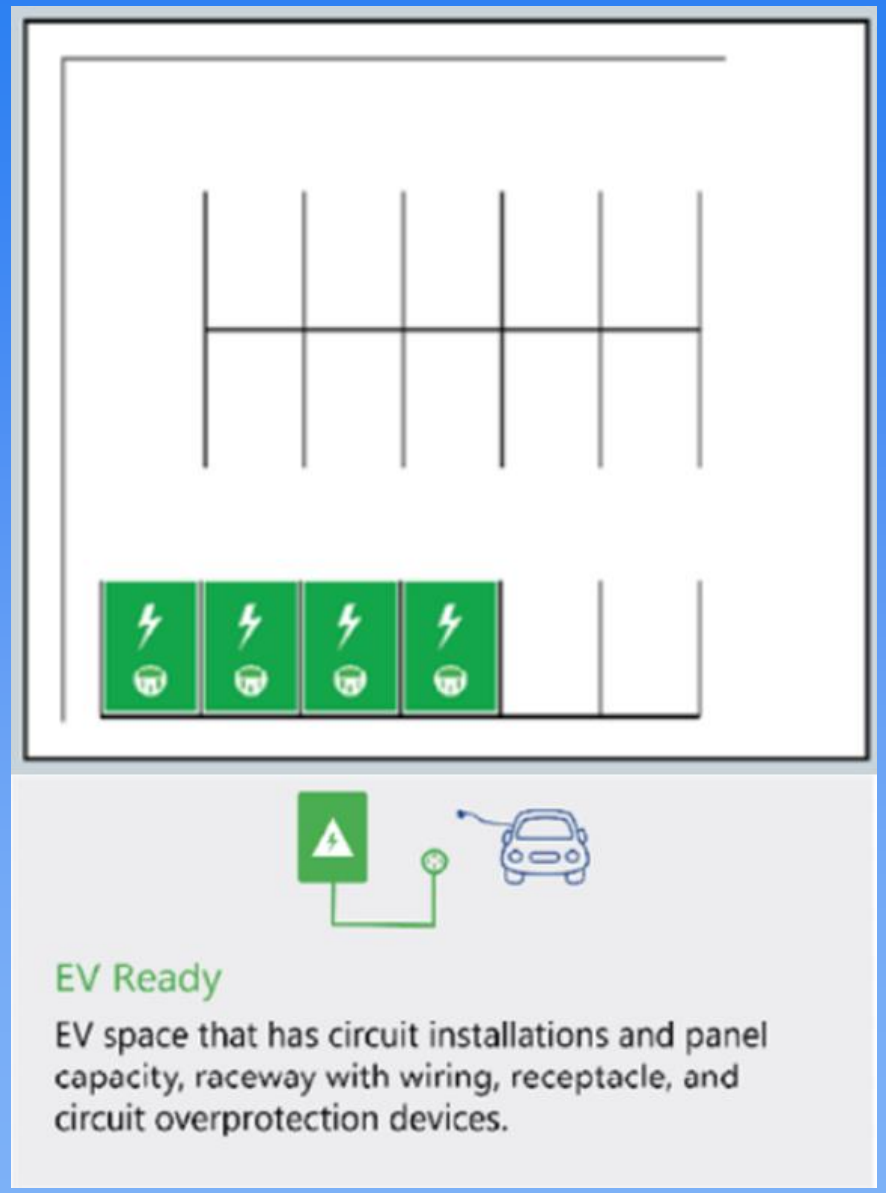
- AC Level II spaces
- The dedicated branch circuit shall be identified as "EV READY" in the service panel or subpanel directory, and the termination location shall be marked as "EV READY."
- The circuit shall terminate in a NEMA receptacle, outlet or a Society of Automotive Engineers (SAE) standard J1772 or J3400 electrical connector.



Source: MA DOER

EV Ready Parking Spaces

- Automatic Load Management System (ALMS) can be used to service multiple spaces using a higher amperage circuit
- CDs to show details and calculations
- EV Spaces are required for all compliance paths.



Source: MA DOER

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.

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

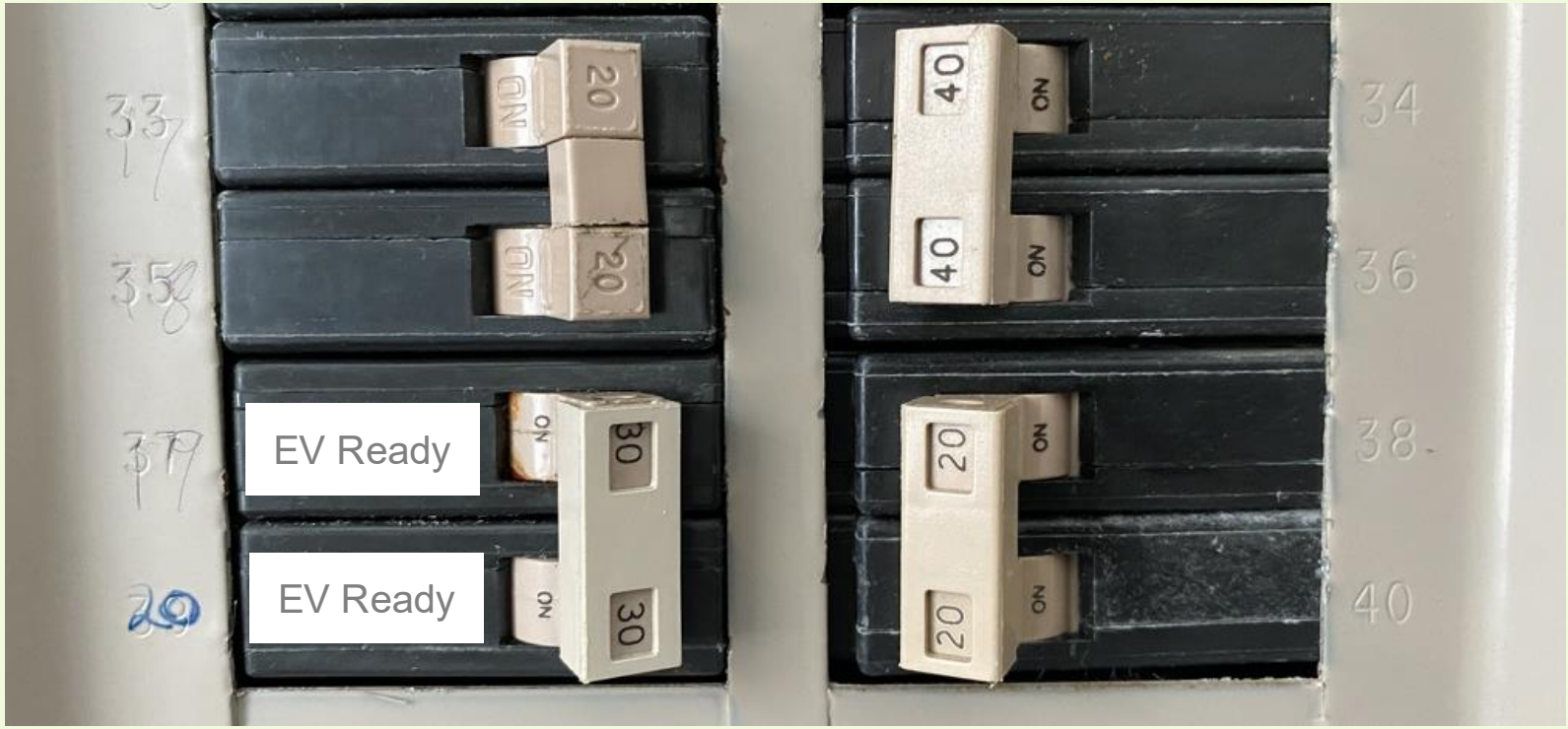
ELECTRIC VEHICLE READY PARKING SPACE (“EV Ready Space”)

- 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 Society of Automotive Engineers (SAE) J1772 is the International and North American standard for EV plugs, known as a J plug.
- Standard Society of Automotive Engineers (SAE) J3400 is based on Tesla's North American Charging Standard (NACS)

Source: PSD

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

C405.13 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 J3400 electrical connector.

Source: PSD

EV Ready Spaces – Marking of Termination Location

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

Source: PSD

EV Ready Spaces

Table C405.13 EV Ready Space Requirements

Occupancy Classification Group	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

EV Ready – Exceptions

Exception 1:

Parking and garage spaces exclusively for retail sale or vehicle service.

Exception 2:

Parking facilities ≥ 4 spaces providing fast charging EVSE w/ 150 kW to each space

Source: PNNL Building America Solutions Center

Source: Microsoft images

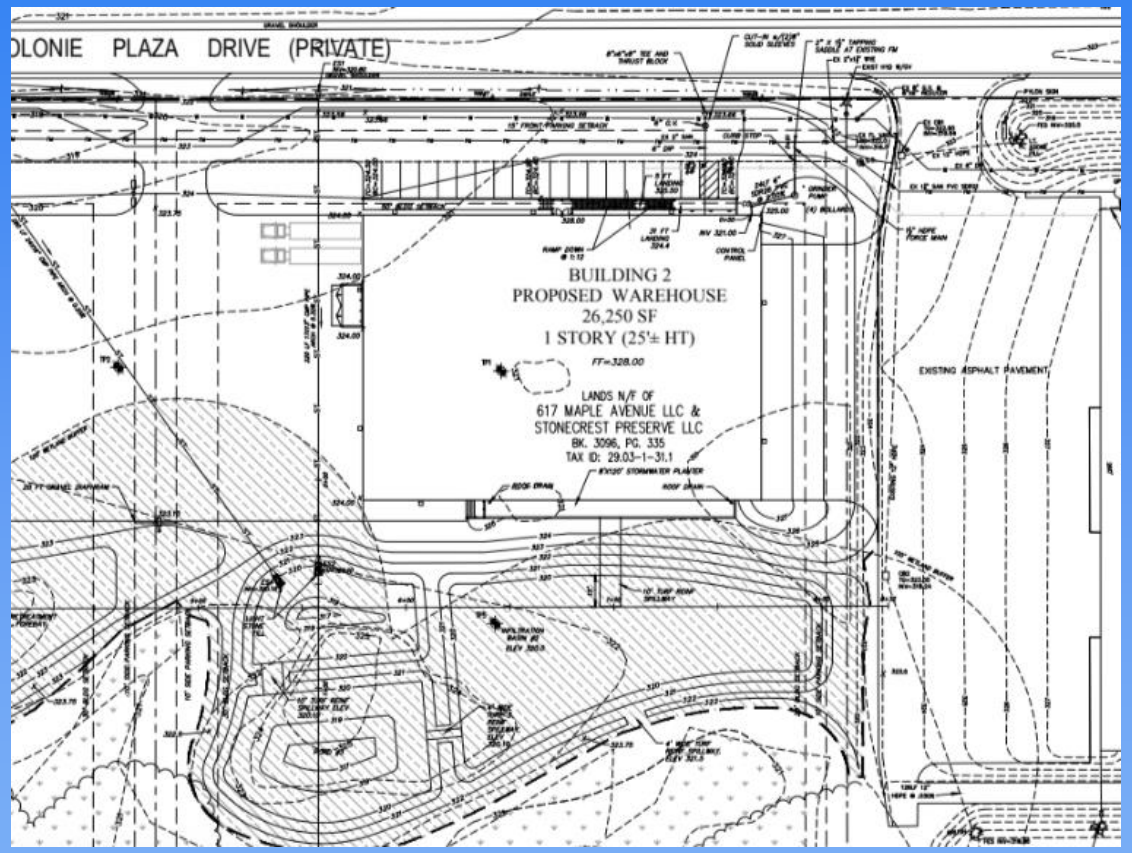
EV Ready – Exceptions

Exception 3:

One or more Level II spaces may be substituted w/ multiple AC Level I spaces. Ratio of 3 AC Level I for each AC Level II spaces.

Exception 4:

Parking spaces specifically designated for medium or heavy-duty vehicles are excluded from EV-ready space percentage calculation.



Source: PSD

EV Ready Parking Spaces

Example

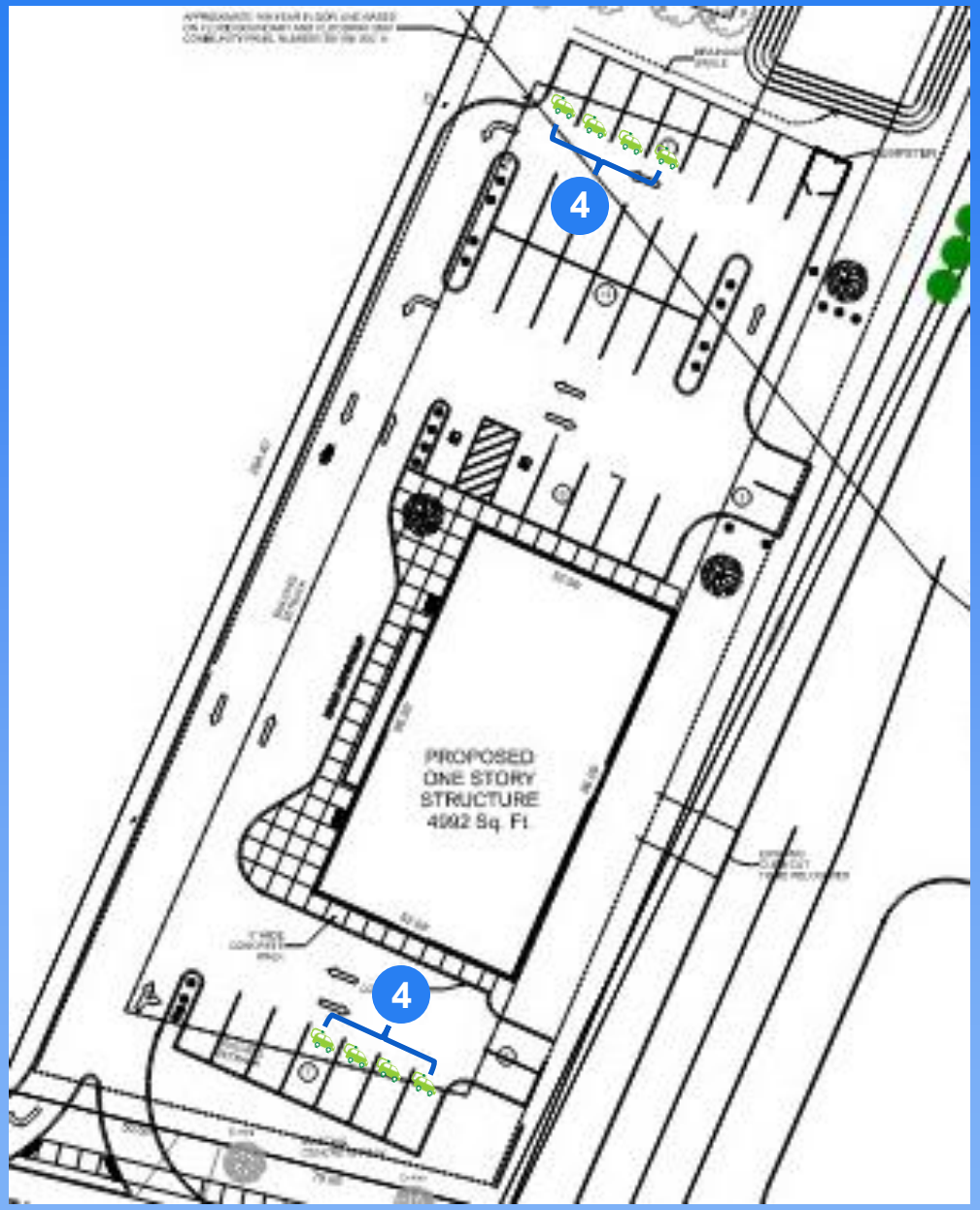
Occupancy: Business B

EV Space Requirement: 20% of total spaces

Total Parking Spaces: 36

Total Required EV Spaces:

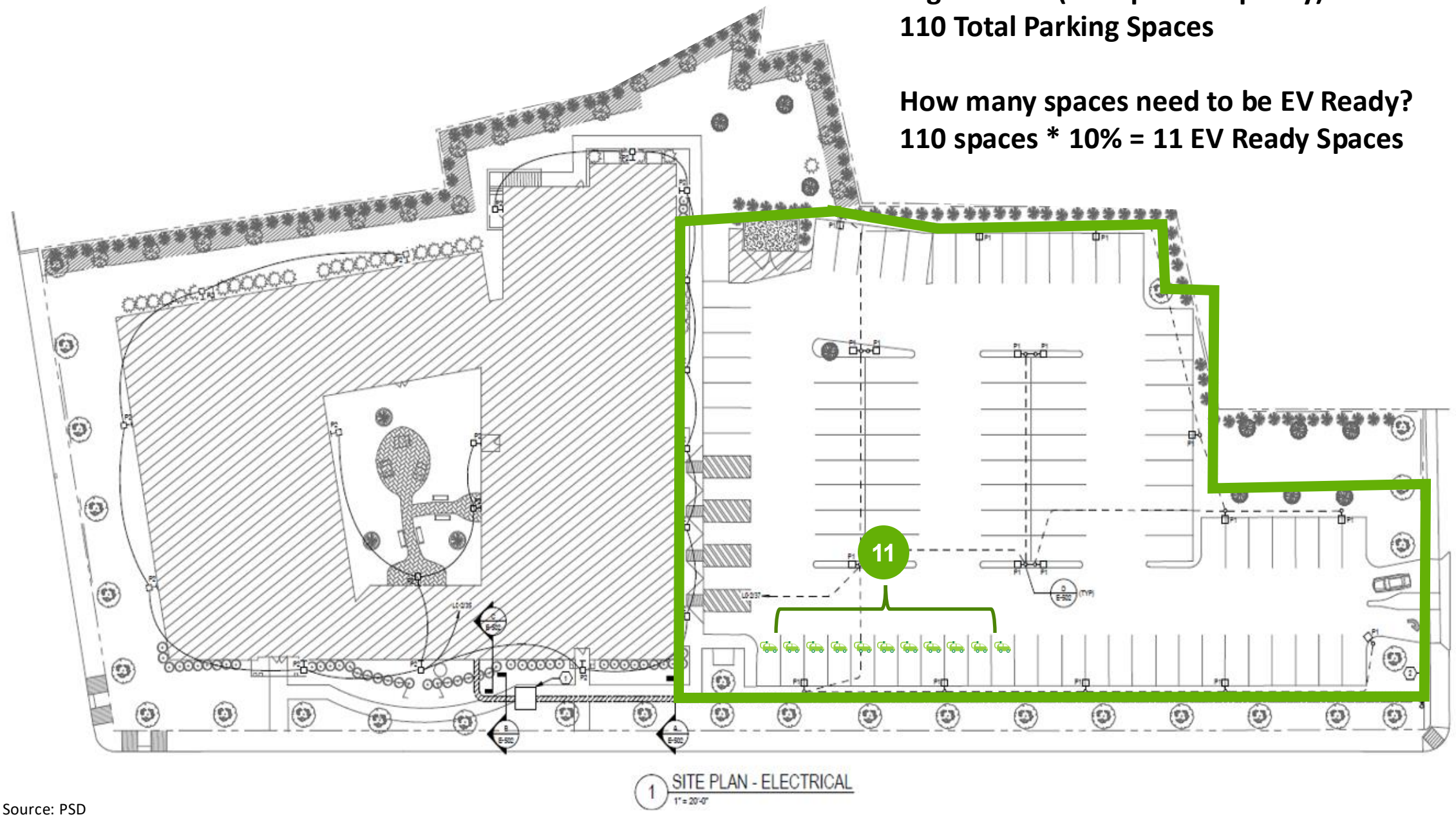
36 x 20% = 7.2 (round up to 8)



Source: PSD

High School (Group E Occupancy)
110 Total Parking Spaces

How many spaces need to be EV Ready?
110 spaces * 10% = 11 EV Ready Spaces



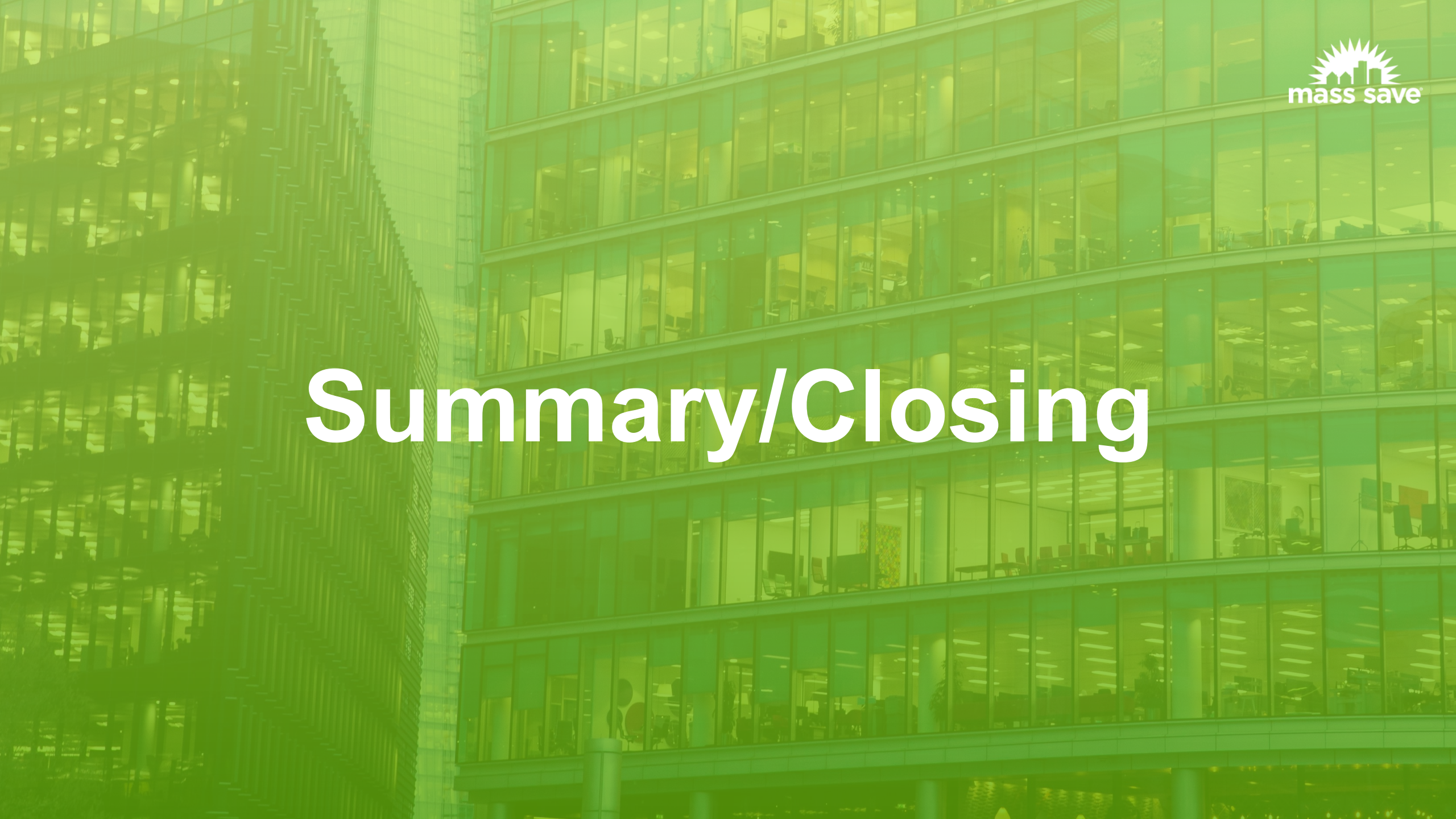
Source: PSD

Poll Question #4

Automatic Load Management System (ALMS) can be used to service multiple spaces using a higher amperage circuit.

A. True

B. False



Summary/Closing

Commercial Overview Summary

- Solar-Ready provisions have been adopted unamended from the 2021 IECC.
- Solar-Ready Zones equaling a minimum of 40% of unobstructed roof area is required on buildings 5 stories or less with orientation between 110° and 270° of True North.
- Orientation does not apply to low slope roofs.
- A dead load of 5 PSF is required to be built in to solar-ready required buildings. Documentation of this load is to be provided on certificate.
- EV-Ready parking spaces are required.
- Automatic Load Management System (ALMS) can be used to distribute loads for spaces between circuits.

Mass Save Incentive Programs

Residential Rebates and Incentives

Rebates for appliances, heating systems and more.

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

Commercial New Construction or Major Renovation Program

Choose Your Path to Generate Energy Savings and Reduce Carbon

A Pathway for Every Project

Mass Save Sponsors offer the highest incentives for projects with the lowest EUIs and greatest levels of decarbonization.

Path 1, Net Zero and Low EUI Buildings (10,000 ft^2 or greater)	Path 2, Whole Building Energy Use Intensity (EUI) Reduction Approach (50,000 ft^2 or greater)	Path 2, High Performance Buildings
Receive expert net zero building technical assistance and the highest new construction/major renovation project incentives available. Set an ultra-low EUI and save. We provide support through a post occupancy period to help you make sure the building performs at the level you expect.	In this path for larger, complex building projects, your incentives will be greater with the lowest design EUIs. We offer technical support and energy modeling services to help you succeed.	For whole building projects of any size where customers do not wish to set and pursue an EUI target, projects that are not whole buildings (e.g., tenant fit outs, open air parking garages), projects that are process-load heavy buildings (e.g., cannabis, industrial), and projects where customers are only interested in one-off measures.

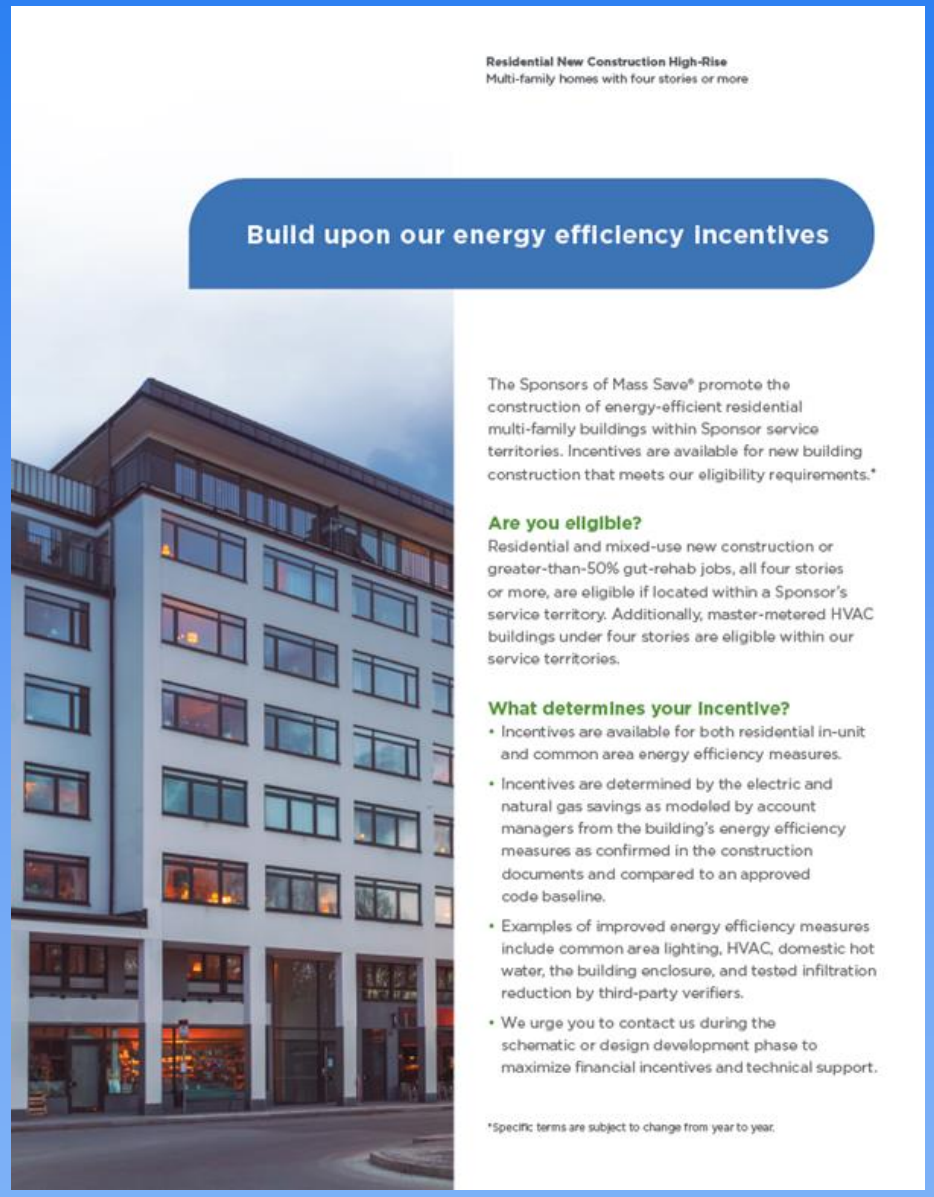
High-Rise Path Overview

Eligibility

- 4+ stories and 5+ units with residential-metered heat
- All multi-family with commercially-metered heat
- New construction and ≥ 50% rehab projects
- Must register prior to construction start

Enrollment process

- Work with a dedicated ICF Account Manager
- Verification completed utilizing architect and/or engineer approved submittals



Residential New Construction High-Rise
Multi-family homes with four stories or more

Build upon our energy efficiency incentives

The Sponsors of Mass Save® promote the construction of energy-efficient residential multi-family buildings within Sponsor service territories. Incentives are available for new building construction that meets our eligibility requirements.*

Are you eligible?
Residential and mixed-use new construction or greater-than-50% gut-rehab jobs, all four stories or more, are eligible if located within a Sponsor's service territory. Additionally, master-metered HVAC buildings under four stories are eligible within our service territories.

What determines your incentive?

- Incentives are available for both residential in-unit and common area energy efficiency measures.
- Incentives are determined by the electric and natural gas savings as modeled by account managers from the building's energy efficiency measures as confirmed in the construction documents and compared to an approved code baseline.
- Examples of improved energy efficiency measures include common area lighting, HVAC, domestic hot water, the building enclosure, and tested infiltration reduction by third-party verifiers.
- We urge you to contact us during the schematic or design development phase to maximize financial incentives and technical support.

*Specific terms are subject to change from year to year.

Available Incentives

- Provides incentives for both residential in-unit and common area energy savings.
- Building Envelope
- Domestic Hot Water Production
- HVAC Systems
- Motors & Drives
- Lighting & Controls
- Plumbing Fixtures
- And more

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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