

# **ELECTRIC VEHICLE SUPPLY EQUIPMENT [EVSE]**

**PERMITTING &  
INSPECTION GUIDELINES**

**FOR PERMITTING AND INSPECTING  
LEVEL 2 EVSE, 120V OUTLETS, OR  
240V OUTLETS IN MULTIFAMILY AND  
OFFICE BUILDINGS**

**2020 NATIONAL ELECTRICAL CODE,  
2021 INTERNATIONAL BUILDING CODE, AND  
2017 ICC A11.7.1**

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### REVIEWED BY

#### **Pete Jackson**

Electrical Specialist  
City of Bakersfield

#### **Bryan Holland**

Senior Technical Field  
Representative *National  
Electrical Manufacturers  
Association*

#### **Keith Winston**

Code Official and Solar  
Coordinator  
*Department of Community  
and Regulatory Affairs  
Washington, DC*

#### **Sustainable Energy Action Committee EV Working Group**

**Tesla**

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# INTRODUCTION

More and more, buildings are incorporating charging capabilities to accommodate the growing market for electric vehicles. This is a new aspect of building operations that a growing number of jurisdictions will need to address. This guide provides an overview of code requirements for the installation of **Level 2 Electric Vehicle Supply Equipment (EVSE)** installations and **120V or 240V outlets** intended to power a light-duty (e.g., cars, vans, SUVs, pickup trucks) Electric Vehicle (EV). By providing a specific and replicable list of permitting and inspection requirements, local jurisdictions can reduce informational barriers and help ensure the design and installation of EV charging infrastructure are consistent and code-compliant. This guide references the most applicable requirements for the 2020 National Electrical Code (NEC), the 2021 International Building Code (IBC), and the 2021 International Fire Code (IFC) as they apply to EVSE installations. Not all requirements are covered by these checklists, but they do include the most important life and safety requirements of the installation and can be used to highlight “common mistakes” made by installers. While these guidelines are geared primarily toward implementing the 2020 NEC, 2021 IBC, and 2017 ICC A117., jurisdictions enforcing and contractors using earlier editions of these codes can make use of these guidelines.



# HOW TO USE THIS GUIDE

Read this guide for an overview of requirements for the installation of Level 2 Electric Vehicle Supply Equipment (EVSE) installations and 120-volt (120V) or 240-volt (240V) outlets to power an electric vehicle (EV). The process described in this guide can be adopted as-is, used as a reference, or adapted to incorporate specific local requirements. Designers, contractors, and building owners can use this guide to gain an understanding of what to expect in the permitting and inspection processes.

Building departments can use this guide as a starting point for conducting a plan review and inspection for solar and energy storage installations. When adopting or adapting this guide, building departments and their permit applicants are advised to reference all applicable local codes and requirements, including different cycles of the referenced codes as needed.

The replicable lists of permitting and inspection requirements in this guide can be used to reduce informational barriers and help ensure the design and installation of EV charging infrastructure is consistent and code-compliant.

Any building department implementing a new permitting and inspection process based on this guide is advised to provide communication, coordination, and education to key stakeholders in order to support successful implementation, including, but not limited to, the following:

- Communicate intentions with the utility company.
- Inform the Fire Department of any changes.
- Provide training to plan reviewers.

## **This guide has limitations on its intended use, including the following:**

✘ This EVSE permitting and inspection guide does not include requirements for any service upgrades or other electrical work. If the required load calculation demonstrates a service upgrade is needed, this streamlined permitting and inspection guide cannot be used to determine code compliance of the service upgrade.

✘ Where electrical service or metering upgrades are required, another permit may be required before this guide can be followed.

✘ This EVSE permitting and inspection guide does not include requirements for indoor installation of infrastructure for EV batteries that require additional ventilation, including flooded lead-acid or nickel-iron batteries.

✘ The electrical requirements in this guide primarily focus on the requirements in Article 625: Electric Vehicle Power Transfer System of the National Electrical Code.

## **Additional general electrical requirements detailed in chapters one through four of the National Electrical Code also apply but are not listed throughout this guide. These include, but are not limited to, the following:**

- Electrical equipment is installed in a neat and workmanlike manner. (NEC 110.12)
- Electrical connections of the circuit conductors and equipment grounding conductor connections are secure. (NEC 110.14. 250.148(A))
- Installed branch circuit wiring is properly secured, supported, and routed to prevent physical damage. (NEC 300.11)

# PERMIT SUBMISSION REQUIREMENTS



## TO APPLY FOR AN EVSE PERMIT, SUBMIT THE FOLLOWING:

### 1) Electrical permit application

### 2) Site plan (see Figure 8) drawn to scale showing:

- a) Property lines, adjacent streets, lot dimensions and the north arrow
- b) Primary use of the space or area where the EVSE will be installed
- c) Location of the proposed EVSE equipment on the property
- d) Number of proposed EVSE chargers
- e) Dimensioned parking spaces, and
- f) Aisle width behind the parking spaces

### 3) Electrical line diagram (see Figure 7) with:

- a) EVSE wiring configuration
- b) EVSE specifications (manufacturer, maximum kW rating, voltage and ampacity, cable management system, if applicable)
- c) Mounting details (e.g., wall, pedestal with footing details)
- d) NEMA enclosure type
- e) Conductors, cables, and raceway types, sizes, and markings
- f) Wiring routes and requirements for their installation (e.g. within framing, mounted to structures, underground, etc.)
- g) Type and size rating of overcurrent protection and disconnects and
- h) Location of additional meters, main electrical service panel, distribution panels or subpanels

### 4) Load calculation

### 5) Transformer specification sheets, if applicable

### 6) EVSE specification sheets and installation manuals

### 7) Specification sheet for automatic load management system and splice when sharing a circuit for load management if applicable

# GENERAL INSTALLATION GUIDE



## MINIMUM EVSE REQUIREMENTS

- 1 EVSE installed according to manufacturer's installation instructions. (NEC 110.3(B))
- 2 EVSE is suitable for the environment (indoor/outdoor) in which it will be installed. (NEC 110.28)
- 3 EVSE has a Nationally Recognized Testing Laboratory (NRTL) approved listing mark. (UL 2202/UL 2594)(NEC 625.5)
- 4 If EVSE with adjustable amperage setting is installed, equipment is fixed in place and adjusting means is accessible by qualified personnel with the use of a tool or password-protected commissioning software. (NEC 625.42)

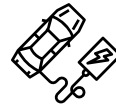


**FIGURE 1:  
EXAMPLE  
UL LISTING**



## PUBLIC PARKING ACCESSIBILITY

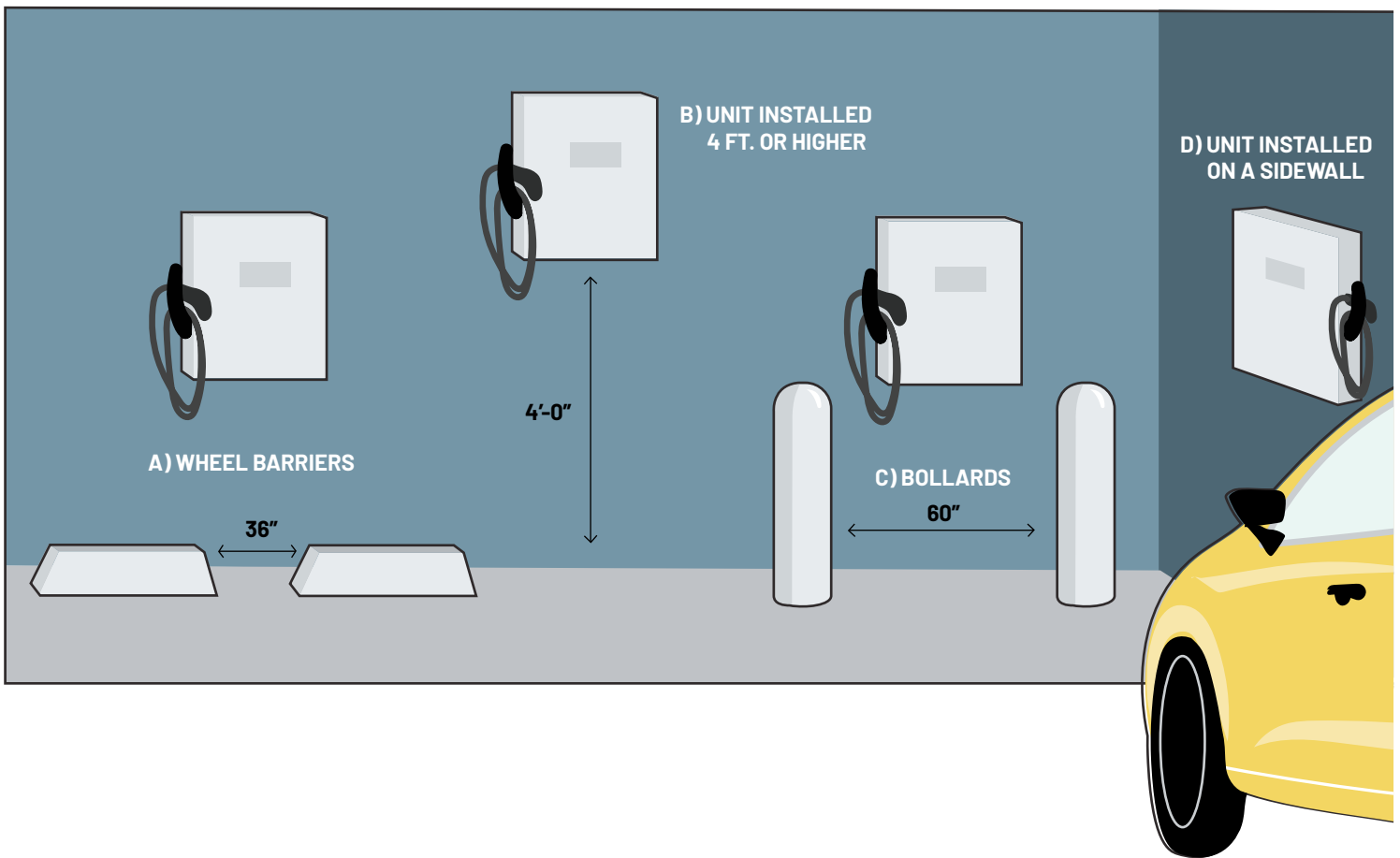
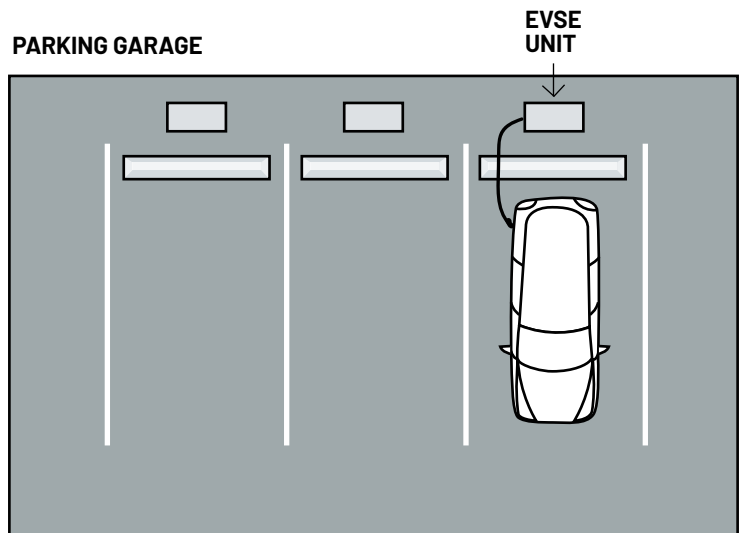
- 5 **Offices:**
  - a) Number of EVSE spaces matches approved floor plan. 5% of EVSE public parking spaces, not less than one, for each type of EVSE are accessible. (IBC 1107.2.1)
  - b) All accessible EVSE spaces are at least 11 feet wide with an adjoining access aisle that is at least 5 feet wide (this is equivalent to the requirements for an accessible van parking space). (IBC 1107.2.2)
- 6 **Multifamily:**
  - a) Number of EVSE spaces matches approved floor plan. 2% of EVSE parking spaces, not less than one, for each type of EVSE are accessible (IBC 1106.3)
  - b) One in every six EVSE accessible spaces are at least 11 feet wide with an adjoining access aisle that is at least 5 feet wide to accommodate an accessible van (IBC 1106.6)
  - c) All other EVSE accessible spaces are 8 feet wide with access aisles that are 5 feet wide. Adjacent aisles can be shared between two spaces (ICC A117.1 502.2, 502.3)
- 7 In ADA accessible parking/charging spaces, EVSE is located such that ADA routes maintain a pathway of 4 feet at all times if in a publicly accessible location (ICC A117.1 403.5.1).



## LOCATION AND EVSE INSTALLATION REQUIREMENTS

- 8 Permanently installed EVSE are located at a height of (NEC 625.50):
  - a) Indoor location: 1.5 feet or more above floor level
  - b) Outdoor location: 2 feet or more above grade level
- 9 When unobstructed, outlet or EVSE for ADA accessible parking spaces are located at a height of less than 4 feet. (ICC A117.1 309.3, 308.2.1)
- 10 Output cable to EV meets one of the following: (NEC 625.17)
  - a) Does not exceed 25' in length, or
  - b) Where equipped with a cable management system that is part of the EVSE, cord length can exceed 25 feet (NEC 625.17)
- 11 The EVSE is protected from vehicular impact through one of the following:
  - a) Installation in a location not subject to vehicular impact such as a side wall or 4 feet or more above floor level
  - b) Wheel barriers
  - c) Bollards, or
  - d) Other approved barrier (NEC 110.27(B))

# FIGURE 2: APPROVED BARRIERS





# ELECTRICAL REQUIREMENTS

- 12 The electrical service rating is greater than or equal to the electrical service load as demonstrated by electrical service load calculations. (NEC 220)
- 13 EVSE has a sufficient rating to supply the load served. (NEC 625.42)
- 14 Service and feeder are sized for EVSE to be considered continuous loads unless an automatic load management system (ALMS) is used. If an ALMS is used, the maximum equipment load on the service/feeder matches the maximum load permitted by the ALMS. (NEC 625.42)
- 15 The required overcurrent protection for the proposed EVSE:
  - a) Is rated for continuous duty
  - b) Has a rating of 125% or more of the maximum load of the equipment specification based on Table 1. (NEC 625.41)

**TABLE 1: REQUIRED OVERCURRENT PROTECTION DEVICE (OCPD) SIZE**

Maximum EVSE current	Required OCPD Size
16A	20A
24A	30A
30A	40A
32A	40A
40A	50A
80A	100A

- 16 If the EVSE is rated more than 60 amps or more than 150V to ground, the disconnecting means is able to be locked in the open position and is in an easily accessible location not protected by locked doors or other obstructions. (NEC 625.43, NEC 110.25)
- 17 Circuits serving EVSE do not supply any other outlets or loads. (NEC 625.40)
- 18 Circuit conductors are sized at 125% or more of EVSE maximum internal field selected current setting. (NEC 210.19(A)(1), NEC 215.2(A), NEC Table 310.16)
- 19 All electrical materials, devices, fittings, and associated equipment are listed and labeled. (NEC 625.5)
- 20 Underground wiring methods meet minimum cover requirements in Table 2 below. Insulated conductors and cables must be suitable for use in wet locations and protected from physical damage. (NEC 300.5, NEC 310.10)





# TABLE 2: UNDERGROUND WIRING METHOD MINIMUM COVER REQUIREMENT



DEPTH	IN TRENCH BELOW 2 INCH SLAB	UNDER A BUILDING	UNDER 4"+ CONCRETE WITH NO VEHICULAR TRAFFIC	ALL OTHER LOCATIONS, SUCH AS PARKING LOTS
0"				
4"			 (IN RACEWAY)	
6"			 (DIRECT BURIED)	
12"				
18"				
24"				

## WIRING METHOD TYPES

- Direct Burial Cables or Conductors
- Rigid Metal or Intermediate Metal Conduit
- Nonmetallic Raceways Listed for Direct Burial Without Concrete Encasement or Other Approved Raceways
- 120V Branch Circuit and maximum OCPD of 20 amps

**21 Portable EVSE** is connected by one of the following: (NEC 625.44(A))

- a) A nonlocking, 2 pole, 3-wire grounding-type receptacle outlet rated at 125V, single phase, 15 or 20 amps
- b) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125V, single phase, 15 or 20 amps
- c) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250V, single phase, 30 or 50 amps
- d) A nonlocking, 2-pole, 3-wire grounding-type outlet rated at 60V DC maximum, 15 or 20 amps



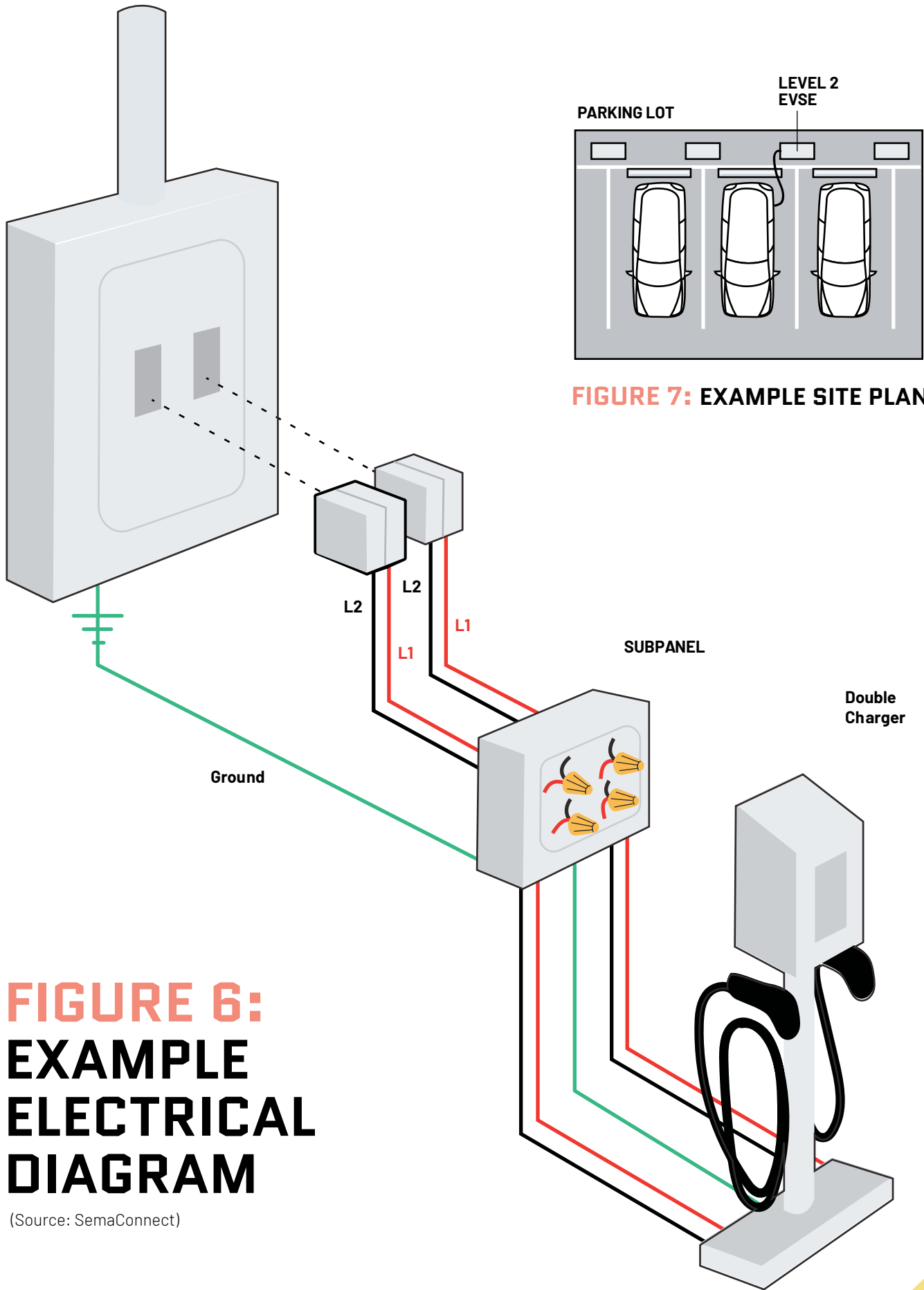
**22 Fastened-in-place EVSE** are connected by one of the following: (NEC 625.44(B))

- a) A nonlocking 2 pole, 3-wire grounding-type receptacle outlet rated at 125V or 250V, single phase, up to 50 amps
- b) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated at 250V, three-phase, up to 50 amps
- c) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated at 250V, single phase, 30 or 50 amps
- d) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 V DC maximum, 15 or 20A amps

**23 Fixed EVSE** are permanently wired and fixed in place to the supporting surface (NEC 625.44 (C))

**24** Receptacles have GFCI protection. (NEC 625.54)

**25** All receptacles installed in a wet location for EV charging have a weatherproof enclosure with the attachment plug cap inserted or removed. If an outlet box hood is installed, it is extra duty. (NEC 625.56)



**FIGURE 7: EXAMPLE SITE PLAN**

**FIGURE 6:  
EXAMPLE  
ELECTRICAL  
DIAGRAM**

(Source: SemaConnect)





# PERMITTING + INSPECTION CHECKLIST



# PERMITTING CHECKLIST



## MINIMUM EVSE REQUIREMENTS

- 1 EVSE installed according to manufacturer's installation instructions.
- 2 EVSE is suitable for the environment (indoor/outdoor) in which it will be installed.
- 3 EVSE has a Nationally Recognized Testing Laboratory (NRTL) approved listing mark. (UL 2202/UL 2594)



## PUBLIC PARKING ACCESSIBILITY

- 4 **Offices:**
  - a) Number of EVSE spaces matches approved floor plan. 5% of EVSE public parking spaces, not fewer than one, for each type of EVSE are accessible
  - b) All accessible EVSE spaces are at least 11 feet wide with an adjoining access aisle that is at least 5 feet wide (equivalent to the requirements for an accessible van parking space)
- 5 **Multifamily:**
  - a) Number of EVSE spaces matches approved floor plan. 2% of EVSE parking spaces, not fewer than one, for each type of EVSE are accessible
- 6 In ADA-accessible parking/charging spaces, EVSE is located such that ADA routes maintain a pathway of 4 feet at all times if publicly accessible.
- b) One in every six EVSE-accessible spaces are at least 11 feet wide with an adjoining access aisle that is at least 5 feet wide to accommodate an accessible van
- c) All other EVSE-accessible spaces are 8 feet wide with access aisles that are 5 feet wide. Adjacent aisles can be shared between two spaces



## LOCATION AND EVSE INSTALLATION REQUIREMENTS

- 7 Permanently installed EVSE are located at a height of:
  - a) Indoor location: 1.5 feet or more above floor level
  - b) Outdoor location: 2 feet or more above grade level.
- 8 When unobstructed, outlet or EVSE for ADA accessible parking spaces are located at a height of less than 4 feet.
- 9 Output cable to EV meets one of the following:
  - a) Does not exceed 25' in length
  - b) Is equipped with a cable management system that is part of the EVSE
- 10 The EVSE is protected from vehicular impact through one of the following:
  - a) Installation in a location not subject to vehicular impact such as a side wall or 4 feet or more above floor level
  - b) Wheel barriers
  - c) Bollards or
  - d) Other approved barrier



## ELECTRICAL REQUIREMENTS

- 11 Electrical service rating is greater than or equal to the electrical service load as demonstrated by electrical service load calculations.
- 12 EVSE has a sufficient rating to supply the load served.
- 13 Service and feeder are sized for EVSE to be considered continuous loads unless an automatic load management system (ALMS) is used. If an ALMS is used, the maximum equipment load on the service/feeder matches the maximum load permitted by the ALMS.
- 14 The required overcurrent protection for the proposed EVSE are:
  - a) Rated for continuous duty
  - b) Have a rating of 125% or more of the maximum load of the equipment specification based on Table 1 below
- 15 If the EVSE is rated more than 60 amps or more than 150V to ground, the disconnecting means is able to be locked in the open position and is in an easily accessible location not protected by locked doors or other obstructions.
- 16 Circuits serving EVSE do not serve any other outlets or loads.
- 17 Circuit conductors are sized at 125% or more of EVSE nameplate current
- 18 Underground wiring methods meet minimum cover requirements in Table 2. Insulated conductors and cables are suitable for use in wet locations and protected from physical damage.
- 19 Portable EVSE is connected by one of the following:
  - a) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125V, single phase, 15 or 20 amps
  - b) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250V, single phase, 15 or 20 amps
  - c) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250V, single phase, 30 or 50 amps
  - d) A nonlocking, 2-pole, 3-wire grounding-type outlet rated at 60V DC maximum, 15 or 20A
- 20 Fastened-in-place EVSE are connected by one of the following:
  - a) A nonlocking 2, pole, 3-wire grounding-type receptacle outlet rated at 125V or 250V, single phase, up to 50 amps
  - b) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated at 250V, three-phase, up to 50 amps
  - c) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated at 250V, single phase, 30 or 50 amps
  - d) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 V DC maximum, 15 or 20A amps
- 21 Fixed EVSE are permanently wired and fixed in place to the supporting surface.



# INSPECTION CHECKLIST



## HELPFUL TIP

Numbers that correspond to the requirement in the permitting checklist are provided next to the same requirement in the field inspection checklist.



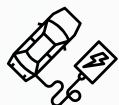
## MINIMUM EVSE REQUIREMENTS

- 1** Specifications of EVSE match the approved plans:
  - a) Maximum kW rating
  - b) Voltage
  - c) Ampacity
  - d) Manufacturer
  - e) NEMA enclosure type
- 2** EVSE installed according to manufacturer's installation instructions. (1)
- 3** EVSE is suitable for the environment in which it is installed (indoor and outdoor). (2)
- 4** EVSE has a Nationally Recognized Testing Laboratory (NRTL) approved listing mark. (UL 2202/UL 2594). (3)
- 5** If EVSE with adjustable amperage setting is installed, equipment is fixed in place and adjusting means is accessible by qualified personnel with the use of a tool or password-protected commissioning software.



## PUBLIC PARKING ACCESSIBILITY

- 6 Offices:**
  - a) Number of EVSE spaces matches approved floor plan. 5% of EVSE public parking spaces, not fewer than one, for each type of EVSE are accessible
  - b) All accessible EVSE spaces are at least 11 feet wide with an adjoining access aisle that is at least 5 feet wide (equivalent to the requirements for an accessible van parking space)
  - b) One in every six EVSE-accessible spaces are at least 11 feet wide with an adjoining access aisle that is at least 5 feet wide to accommodate an accessible van
  - c) All other EVSE-accessible spaces are 8 feet wide with access aisles that are 5 feet wide. Adjacent aisles can be shared between two spaces
- 7 Multifamily:**
  - a) Number of EVSE spaces matches approved floor plan. 2% of EVSE parking spaces, not fewer than one, for each type of EVSE are accessible
- 8** In ADA-accessible parking/charging spaces, EVSE is located such that ADA routes maintain a pathway of 4 feet at all times if publicly accessible (6)



## LOCATION AND EVSE INSTALLATION REQUIREMENTS

- 9** EVSE installation location matches approved floor plan.
- 10** Permanently installed EVSE are located at a height of: (4)
  - a) Indoor location: 1.5 feet or more above floor level
  - b) Outdoor location: 2 feet or more above grade level
- 11** When unobstructed, outlet or EVSE for ADA-accessible parking spaces are located at a height of less than 4 feet. (8)
- 12** Output cable to EV meets one of the following: (9)
  - a) Does not exceed 25 feet in length
  - b) Is equipped with a cable management system that is part of the EVSE
- 13** The EVSE is protected from vehicular impact through one of the following: (6)
  - a) Installation in a location not subject to vehicular impact such as a side wall or 4 feet or more above floor level
  - b) Wheel barriers
  - c) Bollards
  - d) Other approved barrier



## ELECTRICAL REQUIREMENTS

- 14** Electrical service rating is greater than or equal to the electrical service load. (11 and 13)
- 15** Overcurrent protection are the type and rating according to the approved plan. (14)
- 16** For EVSE rated greater than 60 amperes or 150 volts, a disconnecting means is able to be locked in the open position and is located in an easily accessible location not protected by locked doors or other obstructions. (15)
- 17** Circuits serving EVSE do not serve any other outlets or loads. (16)
- 18** Circuit conductors are the type and size according to the approved plan. (17)
- 19** All electrical materials, devices, fittings, and associated equipment are listed and labeled.
- 20** Underground wiring methods meet minimum cover requirements according to the approved plan. Insulated conductors and cables are suitable for use in wet locations and protected from physical damage. (18)
- 21** Portable and fastened-in-place EVSE are connected to the wiring system according to the approved plans. (19 and 20)
- 22** Fixed EVSE are permanently wired and fixed in place to the supporting surface. (21)
- 23** Receptacles have GFCI protection.
- 24** All receptacles installed in a wet location for EV charging have a weatherproof enclosure with the attachment plug cap inserted or removed. If an outlet box hood is installed, it is extra duty.





# RESOURCES

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<b>Agency</b>			
Division			
Contact			
Email			
Phone			





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Forth is a nonprofit organization dedicated to the equitable advancement of electric transportation. Forth builds program and policy models that increase access to electric cars and charging, advance EV policy, and facilitate strategic partnerships. The Forth Roadmap Conference is among the nation's leading electric transportation conferences. Visit [forthmobility.org](https://forthmobility.org) to learn more.



New Buildings Institute (NBI) is a nonprofit organization working to advance energy efficiency and decarbonization of the built environment. Our efforts are imperative to keeping energy costs affordable, cutting carbon emissions that are fueling climate change, and delivering on improved health, safety, and resiliency for all. We work collaboratively with industry market players—governments, utilities, advocates, AEC professionals, and others—to drive leading-edge design, innovative technologies, and public policies and programs for scale. Throughout its 25-year history, NBI has become a trusted and independent resource helping to create buildings that are better for people, communities, and the planet. Visit [newbuildings.org](https://newbuildings.org) to learn more.

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