

Permit for Charging Equipment Installation Electric Vehicle Supply Equipment (EVSE)

Jurisdiction: City, State

Compliance with the following permit will allow the installation and operation of electric vehicle charging equipment at a residence in the City, State jurisdiction. This permit addresses one of the following situations:

- Only an additional branch circuit would be added at the residence
- A hard-wired charging station would be installed at the residence. The attached requirements for wiring the charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) ® NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at www.nfpa.org/70.

This permit contains a general reference to the NEC or electrical code used in the jurisdiction. All work and installed equipment will comply with the requirements of the NEC or the electrical code used in the jurisdiction. The jurisdiction maintains the authority/responsibility to conduct any inspections deemed necessary to protect public safety. The charging station installer shall also be responsible for notifying or coordinating any work with the utility company where needed.

Section 1 of the permit application requires basic identifying information be submitted. Note that there is a separate portion of the form requesting information on the property owner who may not be the individual requesting the installation.

Section 2 of the permit application identifies which code needs to be complied with depending on whether a branch circuit and meter or a hard-wired charging station is being installed.

The technical installation requirements address the following specific elements of electric vehicle charging station safety:

- Listing and labeling requirements
- Wiring methods
- Breakaway requirements
- Overcurrent protection
- Indoor siting
- Outdoor siting

Section 3 consists of standard certification statement that could be modified as needed by the jurisdiction. By signing the certification statement, the applicant agrees to comply with the standard permit conditions and other applicable requirements. This consent would give the jurisdiction the option of allowing the applicant to proceed with installation and operation of the charging equipment.

Section 4 of the document gives an example of a checklist the jurisdiction could develop to track key information on the application. The example under section 4 contains only a few items of the many that the jurisdiction might wish to track.

This permit package also includes a schematic drawing depicting a typical indoor installation. In this installation the wiring path follows the exterior of the structure, and the charging station is located indoors. The NEC® allows for interior wiring and outdoor installations. The purpose of the schematic is only to show how the charging station equipment could be arranged and is not intended to convey any permit requirements.

Application for Installation of Electric Vehicle Charging Equipment

NOTICE: The system must be installed in compliance with NFPA 70, National Electric Code, Article 625 or applicable Electrical Code currently adopted and enforced within the jurisdiction of installation. All associated work with circuits, electrical service and meters shall be completed in compliance with NFPA 70, national electric code, or applicable electrical code currently adopted and enforced within the jurisdiction of installation.

Section 1: Permit Applicant Information

Name:		
Installation Street Address (P.O. box not acceptable):	Contact Person:	Phone Number: () -
City:	County:	State: ZIP Code:
Owner Name:	Street Address:	Phone Number: () -
City:	State:	ZIP Code:
Submitter's Name/Company	Street Address:	Phone Number: () -
City:	State:	ZIP Code:
General description of equipment to be installed:		

Section 2: Permit Code Information

Requirements for wiring the charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) ® NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of an electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at www.nfpa.org/70.

NEC® Chapter or Article	DESCRIPTION
Chapter 2 and 3	Branch Circuit A new electrical box added on a branch circuit shall comply with NFPA 70 National Electrical Code® Chapter 2 Wiring and Protection and Chapter 3 Wiring Methods and Materials and all administrative requirements of the NEC or the electrical code in effect in the jurisdiction
625.4	VOLTAGES Unless other Voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, and 600 Volts shall be used to supply equipment
625.5	LISTED OR LABELED All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.

625.9	<p>WIRING METHODS The electric vehicle coupler shall comply with 625.9(A) through (F).</p> <p>(A) Polarization. The electric vehicle coupler shall be polarized unless part of a system identified and listed as suitable for the purpose.</p> <p>(B) Noninterchangeability. The electric vehicle coupler shall have a configuration that is noninterchangeable with wiring devices in other electrical systems. Nongrounding-type electric vehicle couplers shall not be interchangeable with grounding-type electric vehicle couplers.</p> <p>(C) Construction and Installation. The electric vehicle coupler shall be constructed and installed so as to guard against inadvertent contact by persons with parts made live from the electric vehicle supply equipment or the electric vehicle battery.</p> <p>(D) Unintentional Disconnection. The electric vehicle coupler shall be provided with a positive means to prevent unintentional disconnection.</p> <p>(E) Grounding Pole. The electric vehicle coupler shall be provided with a grounding pole, unless part of a system identified and listed as suitable for the purpose in accordance with Article 250.</p> <p>(F) Grounding Pole Requirements. If a grounding pole is provided, the electric vehicle coupler shall be so designed that the grounding pole connection is the first to make and the last to break contact.</p>
625.13	<p>ELECTRIC VEHICLE SUPPLY EQUIPMENT Electric vehicle supply equipment rated at 125 volts, single phase, 15 or 20 amperes or part of a system identified and listed as suitable for the purpose and meeting the requirements of 625.18, 625.19, and 625.29 shall be permitted to be cord-and-plug-connected. All other electric vehicle supply equipment shall be permanently connected and fastened in place. This equipment shall have no exposed live parts.</p>
625.14	<p>Rating Electric vehicle supply equipment shall have sufficient rating to supply the load served. For the purposes of this article, electric vehicle charging loads shall be considered to be continuous loads.</p>
625.15	<p>Markings The electric vehicle supply equipment shall comply with 625.15(A) through (C).</p> <p>(A) General. All electric vehicle supply equipment shall be marked by the manufacturer as follows: FOR USE WITH ELECTRIC VEHICLES</p> <p>(B) Ventilation Not Required. Where marking is required by 625.29(C), the electric vehicle supply equipment shall be clearly marked by the manufacturer as follows: VENTILATION NOT REQUIRED The marking shall be located so as to be clearly visible after installation.</p> <p>(C) Ventilation Required. Where marking is required by 625.29(D), the electric vehicle supply equipment shall be clearly marked by the manufacturer, "Ventilation Required." The marking shall be located so as to be clearly visible after installation.</p>
625.16	<p>Means of Coupling The means of coupling to the electric vehicle shall be either conductive or inductive. Attachment plugs, electric vehicle connectors, and electric vehicle inlets shall be listed or labeled for the purpose.</p>
625.17	<p>Cable The electric vehicle supply equipment cable shall be Type EV, EVJ, EVE, EVJE, EVT, or EVJT flexible cable as specified in Article 400 and Table 400.4. Ampacities shall be as specified in Table 400.5(A)(1) for 10 AWG and smaller, and in Table 400.5(A)(2) for 8 AWG and larger. The overall length of the cable shall not exceed 7.5 m (25 ft) unless equipped with a cable management system that is listed as suitable for the purpose. Other cable types and assemblies listed as being suitable for the purpose, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted.</p>
625.18	<p>Interlock Electric vehicle supply equipment shall be provided with an interlock that de-energizes the electric vehicle connector and its cable whenever the electrical connector is uncoupled from the electric vehicle. An interlock shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes.</p>
625.19	<p>Automatic De-Energization of Cable The electric vehicle supply equipment or the cable-connector combination of the equipment shall be provided with an automatic means to de-energize the cable conductors and electric vehicle connector upon exposure to strain that could result in either cable rupture or separation of the cable from the electric connector and exposure of live parts. Automatic means to de-energize the cable conductors and electric vehicle connector shall not be required for portable cord-and-plug-connected electric vehicle supply equipment intended for connection to receptacle outlets rated at 125 volts, single phase, 15 and 20 amperes.</p>

625.21	<p>Overcurrent Protection Overcurrent protection for feeders and branch circuits supplying electric vehicle supply equipment shall be sized for continuous duty and shall have a rating of not less than 125 percent of the maximum load of the electric vehicle supply equipment. Where noncontinuous loads are supplied from the same feeder or branch circuit, the overcurrent device shall have a rating of not less than the sum of the noncontinuous loads plus 125 percent of the continuous loads.</p>
625.22	<p>Personnel Protection System The electric vehicle supply equipment shall have a listed system of protection against electric shock of personnel. The personnel protection system shall be composed of listed personnel protection devices and constructional features. Where cord-and-plug-connected electric vehicle supply equipment is used, the interrupting device of a listed personnel protection system shall be provided and shall be an integral part of the attachment plug or shall be located in the power supply cable not more than 300 mm (12 in.) from the attachment plug.</p>
625.23	<p>Disconnecting Means For electric vehicle supply equipment rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be provided and installed in a readily accessible location. The disconnecting means shall be capable of being locked in the open position. The provision for locking or adding a lock to the disconnecting means shall be installed on or at the switch or circuit breaker used as the disconnecting means and shall remain in place with or without the lock installed. Portable means for adding a lock to the switch or circuit breaker shall not be permitted.</p>
625.25	<p>Loss of Primary Source Means shall be provided such that, upon loss of voltage from the utility or other electrical system(s), energy cannot be back fed through the electric vehicle and the supply equipment to the premises wiring system unless permitted by 625.26.</p>
625.26	<p>Interactive Systems Electric vehicle supply equipment and other parts of a system, either on-board or off-board the vehicle, that are identified for and intended to be interconnected to a vehicle and also serve as an optional standby system or an electric power production source or provide for bi-directional power feed shall be listed as suitable for that purpose. When used as an optional standby system, the requirements of Article 702 shall apply, and when used as an electric power production source, the requirements of Article 705 shall apply.</p>
625.28	<p>Hazardous (Classified) Locations Where electric vehicle supply equipment or wiring is installed in a hazardous (classified) location, the requirements of Articles 500 through 516 shall apply.</p>
625.29	<p>Indoor Sites Indoor sites shall include, but not be limited to, integral, attached, and detached residential garages; enclosed and underground parking structures; repair and nonrepair commercial garages; and agricultural buildings.</p> <p>(A) Location. The electric vehicle supply equipment shall be located to permit direct connection to the electric vehicle.</p> <p>(B) Height. Unless specifically listed for the purpose and location, the coupling means of the electric vehicle supply equipment shall be stored or located at a height of not less than 450 mm (18 in.) and not more than 1.2 m (4 ft) above the floor level.</p> <p>(C) Ventilation Not Required. Where electric vehicle nonvented storage batteries are used or where the electric vehicle supply equipment is listed or labeled as suitable for charging electric vehicles indoors without ventilation and marked in accordance with 625.15(B), mechanical ventilation shall not be required.</p> <p>(D) Ventilation Required. Where the electric vehicle supply equipment is listed or labeled as suitable for charging electric vehicles that require ventilation for indoor charging, and is marked in accordance with 625.15(C), mechanical ventilation, such as a fan, shall be provided. The ventilation shall include both supply and exhaust equipment and shall be permanently installed and located to intake from, and vent directly to, the outdoors. Positive pressure ventilation systems shall be permitted only in buildings or areas that have been specifically designed and approved for that application. Mechanical ventilation requirements shall be determined by one of the methods specified in 625.29(D)(1) through (D)(4).</p> <p>(1) Table Values. For supply voltages and currents specified in Table 625.29(D)(1) or Table 625.29(D)(2), the minimum ventilation requirements shall be as specified in Table 625.29(D)(1) or Table 625.29(D)(2) for each of the total number of electric vehicles that can be charged at one time.</p> <p>(2) Other Values. For supply voltages and currents other than specified in Table 625.29(D)(1) or Table 625.29(D)(2), the minimum ventilation requirements shall be calculated by means of general formulas stated in article 625.39(D)(2).</p> <p>(3) Engineered Systems. For an electric vehicle supply equipment ventilation system designed by a person qualified to perform such calculations as an integral part of a building's total ventilation system, the minimum ventilation requirements shall be permitted to be determined in accordance with calculations specified in the engineering study.</p> <p>(4) Supply Circuits. The supply circuit to the mechanical ventilation equipment shall be electrically interlocked with the electric vehicle supply equipment and shall remain energized during the entire electric vehicle charging cycle. Electric vehicle supply equipment shall be marked in accordance with 625.15. Electric vehicle supply equipment receptacles rated at 125 volts, single phase, 15 and 20 amperes shall be marked in accordance with 625.15(C) and shall be switched, and the mechanical ventilation system shall be electrically interlocked through the switch supply power to the receptacle.</p>

625.30	<p>Outdoor Sites Outdoor sites shall include but not be limited to residential carports and driveways, curbside, open parking structures, parking lots, and commercial charging facilities.</p> <p>(A) Location. The electric vehicle supply equipment shall be located to permit direct connection to the electric vehicle.</p> <p>(B) Height. Unless specifically listed for the purpose and location, the coupling means of electric vehicle supply equipment shall be stored or located at a height of not less than 600 mm (24 in.) and not more than 1.2 m (4 ft) above the parking surface.</p>
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Section 3: Certification Statement

I hereby certify that the electrical work described on this permit application shall be/has been installed in compliance with the conditions in this permit, NFPA 70, National Electrical Code®, Article 625, or applicable electrical code currently adopted and enforced within the jurisdiction of installation. Furthermore, all associated work with circuits, electrical service and meters shall be/has been completed in compliance with NFPA 70, National Electrical Code® , or applicable electrical code currently adopted and enforced within the jurisdiction of installation. By agreeing to the above requirements, the licensee or owner shall be permitted to install and operate the charging station. The licensee also insures that appropriate load calculations have been done to insure that the residence has adequate electrical capacity to support electric vehicle charging equipment.

Existing circuits provided for garages may supply other loads and may not have sufficient capacity for electric vehicle charging equipment.

In some older installations the residential electrical service may not have sufficient capacity to supply electric vehicle charging equipment. Capacity problems are likely to be encountered on 60 ampere services or on 100 ampere services with multiple 240 volt loads. In such cases load calculations must be performed to insure adequate capacity.

Signature of Licensee:	Date:
Signature of Owner:	Date:

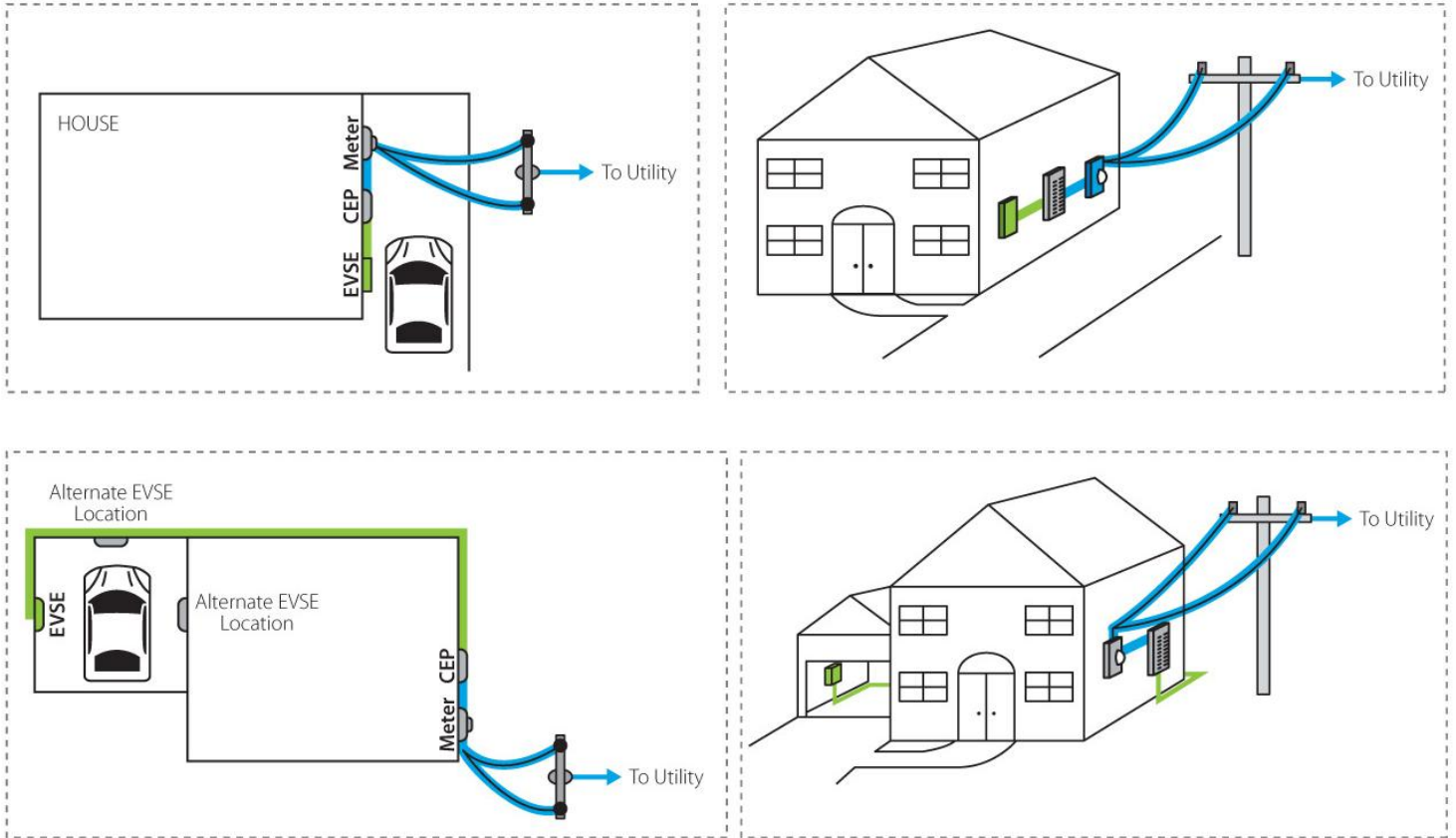
Section 4: Jurisdiction Checklist

Information each jurisdiction would add to permit:

- Date utility notified of work completed
- Information on installation sent to tax assessor
- Indoor/outdoor location
- Modification to existing service required
- Other items as determined by the jurisdiction

Figure 1. Typical Electric Vehicle Charging Equipment Installations

Typical Electric Vehicle Charging Equipment Installation





ELECTRIC VEHICLE SERVICE EQUIPMENT OVER THE COUNTER PERMIT WORKSHEET

This worksheet may be used to obtain an electrical permit to install Electric Vehicle Service Equipment (EVSE) in a garage or carport serving a single family home, or within a private garage serving a condominium provided the electrical service or subpanel serving the installation is rated for 100 Amps or more.

NOTE:

1. Permits for battery chargers or EVSE installations within common area garages or parking areas require a plan to be submitted for review.
2. Installations served by an electrical service of subpanel rated for less than 100 Amps can not be permitted using this worksheet as justification, using the Standard Method of Part III Feeders and Service Load Calculations of Article 220 of the California Electrical Code is required.

PROJECT ADDRESS	
THE PROPOSED INSTALLATION WILL SERVE (Check one)	
<input type="checkbox"/> SINGLE FAMILY DWELLING; The location of the EVSE is within a private garage or carport.	
<input type="checkbox"/> CONDOMINIUM; The location of the EVSE is within a private garage.	
ELECTRIC SERVICE (Check the size of the electric service or subpanel serving the proposed installation)	
<input type="checkbox"/> 100 Amps	<input type="checkbox"/> 200 Amps <input type="checkbox"/> OTHER; Specify: _____
ELECTRIC VEHICLE SERVICE EQUIPMENT - The EVSE must be listed and installed per its listing and rated for outdoor use if not within an enclosed garage.	
EVSE NAMEPLATE RATING (Check one)	
<input type="checkbox"/> 20 Amps/120 volts <input type="checkbox"/> 20 Amps/240 volts <input type="checkbox"/> 40 Amps/240 volts	
If the service size is 100 Amps or greater, and the EVSE does not exceed 20 Amps, no additional information is necessary.	
If the EVSE exceeds 20 Amps, complete the following EVSE LOAD CALCULATION WORKSHEET to demonstrate the current electrical service or subpanel capacity is sufficient.	
_____ SIGNATURE	_____ PRINT NAME
_____ DATE	

EVSE LOAD CALCULATION WORKSHEET

PROJECT ADDRESS _____

GENERAL LIGHTING LOAD Your home's square footage: _____ X 3 VA = _____
 Small appliance branch circuits (2 min.) 1500 VA X _____ circuits _____
 Laundry circuit 1500 VA X _____ circuit(s) _____

APPLIANCES AND EQUIPMENT - Values are minimums, use actual values if known to be greater. Enter N/A if not present at project site.

Microwave (in dedicated space)	1300	
Compactor	1000	
Dishwasher	1200	
Disposal	800	
Proposed EVSE circuit	7200	
Pool/Spa Pump 1 horsepower	1920	
Pool/Spa Pump 1.5horsepower	2400	
Pool/Spa Pump 2 horsepower	2880	

*Attach additional sheets if needed

Subtotal (A) _____

Subtotal (A) minus 10,000 VA _____ **X 0.40 =** _____ *plus 10,000*

Subtotal (B) _____

Total A/C Load, use nameplate rating or A/C circuit breaker rating (C) _____

D = (B) + (C) _____

Total demand is $D / 240V =$ _____ Amps. If this value is less than the rating of the existing electrical service or subpanel **NO** service or subpanel upgrade is necessary. If the value is greater, an EVSE permit may only be issued if a panel upgrade is included with the work; a subpanel upgrade requires a plan submittal.

PLAN CHECKER NOTES _____



Community Development Department • Building Inspection Division
500 Castro Street • Post Office Box 7540 • Mountain View, California 94039-7540 • 650-903-6313 • FAX 650-903-6474

ELECTRIC VEHICLE CHARGER INSTALLATION SUBMITTAL REQUIREMENTS FOR ONE-TO-TWO FAMILY DWELLINGS

The following plan check submittal requirements are provided to help get your electric vehicle charger installation through the Building Division review and permitting process. Your cooperation in providing this information will ensure that your project qualifies for over-the-counter review. Designated appointment time must be requested by the applicant, this over-the-counter review service is available Fridays, between 1:00 pm – 3:00 pm.

Planning review and approval is required for properties managed by an HOA. Please provide a letter of approval or documentation to the Planning Division prior to your appointment time. For questions please contact the Planning and Zoning Division directly at (650) 903-6306.

SUBMITTAL REQUIREMENTS

Provide two (2) complete sets of plans, load calculations, and manufacture cutsheets or specifications. Both sets of plans must be wet-signed by the designer/architect, contractor or homeowner. All plans submitted must be legible; the documentation provided will be digitally imaged as a permanent record for the property.

SITE PLAN

Show the location of:

- a. Existing or proposed structure(s) for which the electric vehicle charger shall be affixed
- b. Parcel dimensions and outline
- c. Label street(s) frontage and access
- d. Location and size of main service panel
- e. Location and size of subpanel, existing and/or proposed
- f. Location of electric vehicle charger
- g. Pathway for electrical connection to EV

ELECTRICAL

Provide a single line diagram with the following items:

- a. Existing or proposed main service panel size
- b. Panel schedule
- c. Dedicated circuit for electric vehicle charger
- d. Wiring method and sizing
- e. Grounding and disconnect

Provide a load calculation breakdown:

- a. Design your project using CEC Article 625 and NEC 220

SYSTEM INFORMATION

Provide manufacturers cut sheets and listing information for all components:

- a. All UL listed equipment

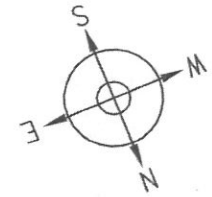
For additional questions regarding the submittal requirements, review and permitting process, contact the Building Division at (650) 903-6313 during regular business hours.

NEIGHBOR

BACK YARD

HOUSE

ABC STREET



MAIN PANEL

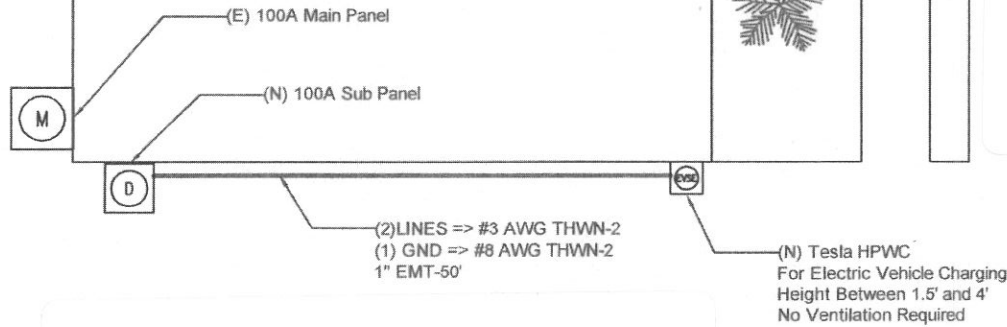
- Challenger
- Panel rated for 100A

SUB PANELS

- #1 : Challenger - 100A feeder breaker inside the main - located inside the house
- #2 : Murray - 100A feeder breaker inside the main - located outside in drive way

LEGEND

- Main Panel
- Load Center
- J-Box
- AC Disconnect
- EV Outlet
- Transfer Switch
- Conduit & Conductors
- Trench
- Tree



DRIVE WAY

NEIGHBOR

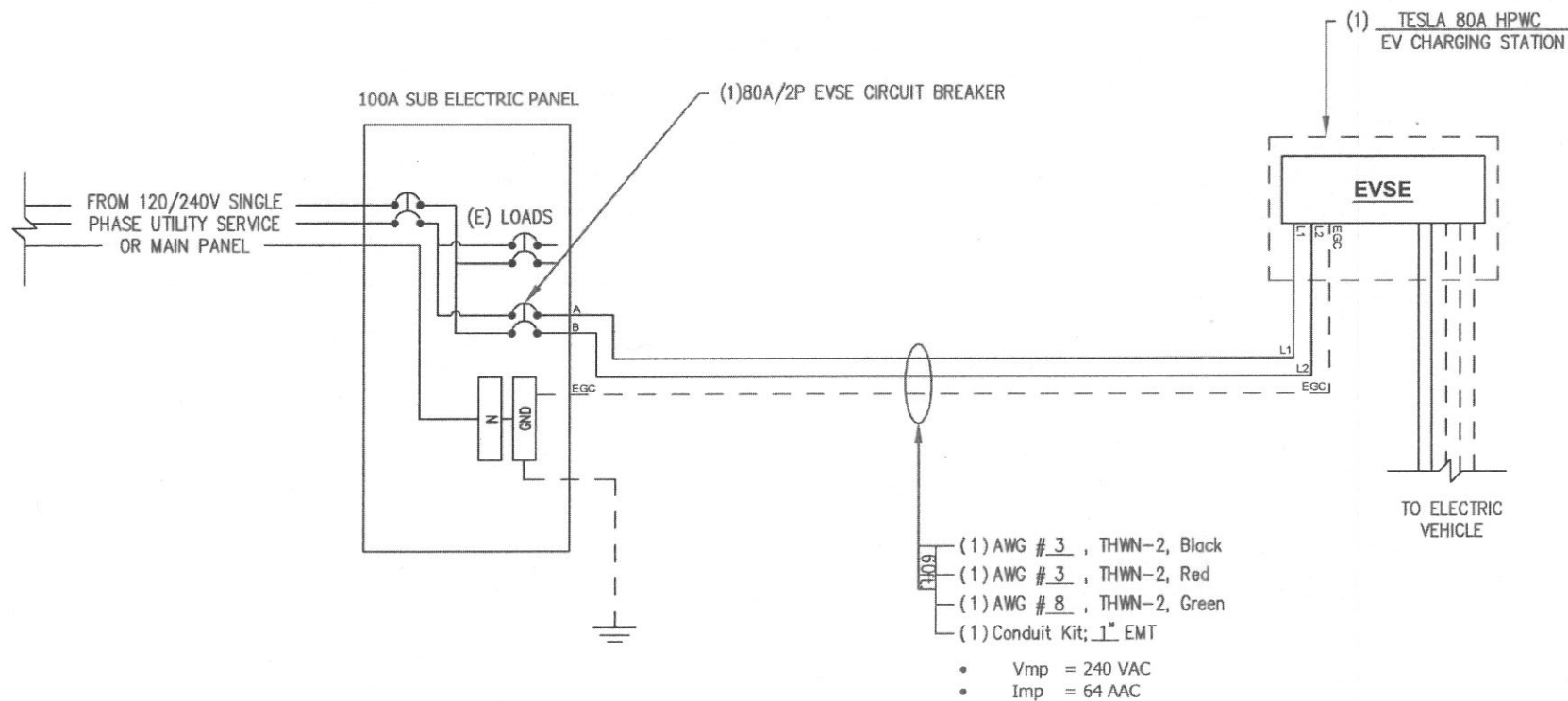
Site Plan

MAIN PANEL SERVICE RATING:
100A

CIRCUIT VOLTAGE/AMPERAGE:
240V/80A

CHARGER:
TESLA 80A HPWC

Mr. and Mrs. Smith
1234 ABC Street
Mountain View, CA 94042



Single-Line Diagram

AHL: Mountain View
MAIN PANEL SERVICE RATING: 100A
CIRCUIT VOLTAGE/AMPERAGE: 240V/80A
CHARGER: TESLA 80A HPWC

PREMISE OWNER: Mr. and Mrs. Smith 1234 ABC Street Mountain View, CA 94042
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NEC 220.83 - Adding a Circuit to an Existing Dwelling Unit

Square Feet: **2,100** Panel Breaker Rating: **100 A** L1/L2: **240 Vac**

NEC 220.83(A)(1) "General lighting and general use receptacles ... @ 3 volt/amperes per square foot as determined by 220.12"

2,100 square feet x 3w/sq ft **6,300 VA**

NEC 220.83(A)(2) Small appliance and laundry branch circuits @1500VA per 20 amp circuit

Number of circuits **3** x 1500= **4,500 VA**

NEC 220.83(A)(3)(b) "Household Range(s), wall-mounted oven(s), and counter-mounted cooking unit(s)"

Oven	7,680 VA
Microwave	0 VA
<hr/>	
	7,680 total VA

NEC 220.83(A)(3)(a) "All other appliances that are permanently connected, fastened in place, or connected to a dedicated circuit, at nameplate rating"

Dishwasher/Disposal	2,800 VA
Refrigerator	1,760 VA
Cooktop/Hood	1,760 VA
Washer	1,760 VA
Dryer	800 VA
Jacuzzi	1,500 VA
	0 VA
	0 VA
	0 VA
	0 VA
	0 VA
Tesla HPWC	15,360 VA
EVSE 1:	VA
EVSE 2:	VA
<hr/>	
	25,740 total VA

Total of non air-conditioning loads: **44,220** total VA

First 8kVA of load at 100% **8,000 VA**

Remainder of load at 40% **14,488 VA**

Adjusted total of non air-conditioning load **22,488 VA**

NEC 220.83(B) "Where additional air-conditioning equipment or electric space-heating equipment is to be installed..."

A/C Equipment Unit #1 and #2	0 VA
A/C Equipment Unit #3 and #4	0 VA
<hr/>	
Total of A/C Loads and All Other Loads:	22,488 total VA

Total Proposed Calculated Load:	93.70 Amps
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Load Calculation(s)



**Community Development
Building Permits and Inspection
General Information: (916) 875-5296
www.building.saccounty.net**

Full Service Center 827 7 th Street, Room 102 Sacramento, CA 95814 (916) 875-5296 M-F 8:30am-4:30pm	East Area Service Center 5229 Hazel Ave, Ste. B Fair Oaks, 95628 (916) 875-2367 M&T 9am-4pm
Bradshaw Campus 9700 Goethe Road, Ste. A Sacramento, CA 95827 (916) 875-5296 M-F 8:30am-4:30pm	North Area Service Center 3331 Peacekeeper Way McClellan, CA 95652 (916) 874-2424 W&Th 9am-4pm

**COMMERCIAL & RESIDENTIAL PLUG-IN ELECTRIC VEHICLE (PEV)
INFRASTRUCTURE PERMITTING CHECKLIST ***
New Installations

Plans shall consist of the following:

Commercial: 3 sets of plans on 18"x24" to 36" x 48" sheets, or Electronic Submittal.

Residential: 3 sets of plans on 11"x17" to 36"x48" sheets, or Electronic Submittal.

Req'd General Information (required to be included on the drawings):

- Site address on all plan sheets.
- Site/lot plan drawn to scale, show all allowed parking.
- Vicinity map.

- Show protection from physical damage, per current codes.
- Electrical site plan that shows the location of PEV charging equipment.
- Location of existing service/meter panel and Utility Transformer.
- Single-line-diagram and Panel Schedule.
- Show Existing/New lighting to avoid tripping hazards from cords etc.
- Show dimension of PEV Parking Stall/Space.
- Show the location of any Hazardous Materials on site.
- PEV Charging Equipment cut-sheets for each type of unit proposed.
- Provide details that height of all controls and connectors, including cord management.
- Show that a minimum of 36" pathway is maintained at all times.
- Commercial – Show compliance with the current Accessibility Codes.
- Identify appropriate codes.
- Sacramento Municipal Utility District (SMUD) approval may be required.

- Structural calculations (if applicable).

Plan review and zone check fees must be paid upon submittal of plans.

***AKA ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE) SUBMITTAL LIST**

Accepted: Date _____ B.I. Initials _____

INSTALLATION CHECKLIST FOR MULTI-UNIT DWELLING ELECTRIC VEHICLE CHARGING STATION (EVCS)

Adapted from materials developed by SANDAG, available at <http://www.sandag.org/pluginsd>

Installations must be completed by a licensed electrical contractor (C-10). (Local Regulations, California Electrical Code CEC Article 625) Plans must show conformance with the California Electrical Code Title 24, Part 3, the California Building Code (Volume 1 and 2), Title 24, Part 2, and other applicable local municipal codes.

Submittal Documents required*

- Permit Application**
 - i. Include job address (a unique address for the EVCS installation that is used for billing), parcel number, existing use, description of work, name, address, and contact information of the applicant and the owner.
- Plan Sets (#, size of plans)**
 - a. Site/Plot Plan**
 - i. Show full property extent (property lines, parking areas, structures, etc.).
 - ii. List relevant property information, such as existing parking counts and ratios.
 - iii. Provide a detailed site plan showing where the charging unit is located within the parking garage or lot, and any necessary accessibility improvements
 - iv. As required by type of EVCS, installation mounting method, and local jurisdiction requirements provide necessary structural details.
 - b. Electrical Plan**
 - i. Provide a complete electrical single line drawing showing the main service, sub panels and disconnecting means as applicable, and proposed EV charging unit, include; size of overcurrent protection devices (in amperes) for main service, sub panels, disconnects and EV charger circuit supply, show conduit sizes and types, and conductor sizes and types.
 - ii. Provide a trenching detail and call out trench work in the scope of work on the plan if trenching is required. Trenching may result in a structural plan review if conduit trenches undermine foundations.
 - iii. Note electrical feeder requirements when trenching structure to structure (CEC 225). The feeder from structure to structure should be noted in the scope of work. Verify that trenching is in compliance of minimum cover requirements for wiring methods or circuits (18" for direct burial per CEC 300).
 - iv. Provide EVSE manufacturer's specification sheets showing Nationally Recognized Testing Laboratory (NRTL) approved listing mark for indoor or outdoor (UL 2202/UL 2594).
- Electrical Load Calculation Worksheet**
 - i. Include existing and proposed load to estimate if existing electrical service will handle the new load from EVCS and wiring methods. Note: Unless electrical service equipment is 100% rated, the calculated load demand on the main

service shall not exceed 80% of the nameplate rating of the main service over-current protection device (OCPD).

***All plans and documents listed above must be provided for multi-unit dwelling electric vehicle charging stations at time of permit submittal prior to issuance.**

Pre-Installation Work

1. Determine units to be installed. Follow all manufacturer specifications for installation. Must be NRTL listed and suitable for the location, indoor or outdoor.
2. Conduct site assessment and submit quote to customer for approval of work and utility upgrades or new service if applicable. Assess the site for:
 - a. All electrical system elements (main service, sub-panels, disconnecting means, etc.)
 - b. Current electrical code deficiencies
 - c. Existing electrical load
 - d. Wet and dry utility locations (affecting trench paths for electrical)
 - e. Presence of corrosive conditions (e.g. salt air, etc.) affecting recommended equipment
 - f. Water drainage (to avoid locating EVCS in areas with possible standing water)
 - g. Site accessible parking, and / or accessibility of proposed EVCS
 - i. Site slope at proposed EVCS location
 - ii. Surface conditions
 - iii. Access path(s) connectivity to on-site uses
 - h. Visibility of proposed EVCS from uses on site, and/or from public rights-of-way (safety)
 - i. Site lighting for use of EVCS and general safety
 - j. Placement of EVCS to serve only one versus multiple parking stalls (dependent on hosts intended use of the EVCS)
 - k. EVCS protection from vehicle damage through proper placement, and then physical protection (e.g. wheel stops, bollards)
 - l. EVCS orientation
 - i. Facilitating ease of human interface
 - ii. Minimizing sun exposure on digital screens
 - iii. Facilitating ease of cable management
 - m. Placement and/or screening of electrical support equipment (e.g. transformers, meter pedestals/cabinets, etc.) as it relates to site aesthetics
 - n. Need for signage and / or stenciling at the EVCS location(s), and / or as directional signage on large sites
3. Complete permit application from local jurisdiction and electrical load calculation for proposed stations (Include load calculations for EVCS):
 - a. Mandatory requirements for new construction in new multifamily dwellings of 17 or more units to be EV Capable. 3% of the total parking spaces, but not less than one, shall be capable for supporting future EVCS. (CALGreen Code Section 4.106.4.2)
4. Contact electrical utility for service work order for utility upgrades/notification of new service. File Service and Meter Request Form.
 - a. Ensure utility work order is approved. Any work on the utility side of the electric service requires a work order and disconnect/re-connect.

- b. Following utility approval, permit is approved, issued and appropriately posted.
- 5. Construction plans indicate requirements for types of wiring and installation siting. Show compliance with requirements of NFPA 70, CEC Article 625.
- 6. Construction plans show compliance with the California Building Code Title 24, Part 2, Section 11B-812 and Section 11B-228.
 - a. Signage for EVCS (International Symbol of Accessibility (ISA) signage for ADA accessible spots be provided in compliance with Section 11B-812.8).
 - b. For a facility for public and common use, minimum number of EVCS required to comply with Section 11B-812.

Equipment and Scheduling

- 7. Schedule all necessary contract work for installation of new service (if applicable), and pulling wires from electric panel(s) / meter pedestals to parking structure(s) or lot(s):
 - a. Boring, trenching, concrete and/or paving restoration if these operations are included in project scope
 - b. Indoor-rated EVCS can be installed in a garage (CEC 625.29)
 - c. Outdoor installations require outdoor-rated EVCS (CEC 625.30)
 - d. Coordinate with property manager, Homeowners Association, property owner(s), and/or tenants for scheduling installation
- 8. Coordinate with the utility for markings of existing power lines, gas lines or other infrastructure is completed and utilize “call before you dig” services (811), service upgrade, new service/meter pull.

Installation

- 9. Secure the construction area appropriately (e.g. temporary fencing, barriers and signage) for safe working conditions. Prepare mounting surface prior to installation.
- 10. Remove material to run conduit and/or wiring (i.e., drywall, insulation, pavers, concrete, pavement, earth, etc.).
- 11. Install rough electrical conduit, boxes and fittings, subpanels etc. in walls, ceilings, floors and trenches to be covered.
- 12. Request a rough inspection from the building inspection office prior to covering any rough electrical installations.
- 13. Install charging unit(s) per manufacturer instructions and permitted construction plans. (CEC 110.3)
 - a. Install circuit conductors of appropriate size to comply with rating of the overcurrent protection. Securely fasten wiring to the structure. (CEC 300.11, CEC 210.19, CEC 215.2(A), CEC 110.3(B); CEC 310.15(B))

- b. Identify and install properly sized equipment grounding conductor with the branch circuit. Connect at the EVCS and panelboard or service. (CEC 250.110, 112, 114, 119, 120, 122; CEC 300.3(B))
 - c. Bring grounded conductor to the service disconnect and bond to the enclosure. (CEC 250.24 (C))
 - d. Install overcurrent protection for any newly installed service equipment and conductors. (CEC 230.90, 91)
 - e. Install disconnect in proper readily accessible location for EVCS that is rated more than 60 amperes or more than 150 Volts to ground (CEC 625.23) If additional service disconnects are installed, verify that they are grouped and do not exceed the maximum number of service disconnects. (CEC 230.71, 72)
 - f. Identify branch circuit device and disconnects. (CEC 408.4 (A); CEC 110.22(A))
 - g. Install properly sized supply-side bonding jumpers. (CEC 250.50, 104(A) and (B))
14. Install wheel blocks/safety bollards as needed, and per approved plans. (CEC 110.27(B))
15. Perform finish work to repair existing surfaces, infrastructure, and landscaping, and parking lot striping (if applicable).
16. Make electrical connection and schedule for inspection with local jurisdiction Building Inspector

INSTALLATION CHECKLIST FOR NON-RESIDENTIAL ELECTRIC VEHICLE CHARGING STATION (EVCS)

Adapted from materials developed by SANDAG, available at <http://www.sandag.org/pluginsd>

Installations must be completed by a licensed electrical contractor (C-10). (Local Regulations, California Electrical Code CEC Article 625) Plans must show conformance with the California Electrical Code Title 24, Part 3, the California Building Code (Volume 1 and 2), Title 24, Part 2, and other applicable local municipal codes.

Submittal Documents required*

- Permit Application**
 - a. Include job address (a unique address for the EVCS installation that is used for billing), parcel number, existing use, description of work, name, address, and contact information of the applicant and the owner.
- Plan Sets (#, size of plans)**
 - a. **Site/Plot Plan**
 - i. Show full property extent (property lines, parking areas, structures, etc.).
 - ii. List relevant property information, such as existing parking counts and ratios.
 - iii. Provide a detailed site plan showing where the charging unit is located within the parking garage or lot, and any necessary accessibility improvements
 - iv. As required by type of EVCS, installation mounting method, and local jurisdiction requirements provide necessary structural details.
 - b. **Electrical Plan**
 - i. Provide a complete electrical single line drawing showing the main service, sub panels and disconnecting means as applicable, and proposed EV charging unit, include; size of overcurrent protection devices (in amperes) for main service, sub panels, disconnects and EV charger circuit supply, show conduit sizes and types, and conductor sizes and types.
 - ii. Provide a trenching detail and call out trench work in the scope of work on the plan if trenching is required. Trenching may result in a structural plan review if conduit trenches undermine foundations.
 - iii. Note electrical feeder requirements when trenching structure to structure (CEC 225). The feeder from structure to structure should be noted in the scope of work. Verify that trenching is in compliance of minimum cover requirements for wiring methods or circuits (18" for direct burial per CEC 300).

- iv. Provide EVSE manufacturer's specification sheets showing Nationally Recognized Testing Laboratory (NRTL) approved listing mark for indoor or outdoor (UL 2202/UL 2594).
- **Electrical Load Calculation Worksheet**
 - a. Include existing and proposed load to estimate if existing electrical service will handle the new load from EVCS and wiring methods Note: Unless electrical service equipment is 100% rated, the calculated load demand on the main service shall not exceed 80% of the nameplate rating of the main service over-current protection device (OCPD).

***All plans and documents listed above must be provided for non-residential electric vehicle charging stations at time of permit submittal prior to issuance.**

Pre-Installation Work

1. Determine unit to be installed. Follow all manufacturer specifications for installation. Must be NRTL listed and suitable for the location, indoor or outdoor.
2. Conduct site assessment and submit quote to customer for approval of work and utility upgrades or new service if applicable. Assess the site for:
 - a. All electrical system elements (main service, sub-panels, disconnecting means, etc.)
 - b. Current electrical code deficiencies
 - c. Existing electrical load
 - d. Wet and dry utility locations (affecting trench paths for electrical)
 - e. Presence of corrosive conditions (e.g. salt air, etc.) affecting recommended equipment
 - f. Water drainage (to avoid locating EVCS in areas with possible standing water)
 - g. Site accessible parking, and / or accessibility of proposed EVCS
 - i. Site slope at proposed EVCS location
 - ii. Surface conditions
 - iii. Access path(s) connectivity to on-site uses
 - h. Visibility of proposed EVCS from uses on site, and/or from public rights-of-way (safety)
 - i. Site lighting for use of EVCS and general safety
 - j. Placement of EVCS to serve only one versus multiple parking stalls (dependent on hosts intended use of the EVCS)
 - k. EVCS protection from vehicle damage through proper placement, and then physical protection (e.g. wheel stops, bollards)
 - l. EVCS orientation
 - i. Facilitating ease of human interface
 - ii. Minimizing sun exposure on digital screens
 - iii. Facilitating ease of cable management
 - m. Placement and/or screening of electrical support equipment (e.g. transformers, meter pedestals/cabinets, etc.) as it relates to site aesthetics

- n. Need for signage and/or stenciling at the EVCS location(s), and / or as directional signage on large sites
3. Complete permit application from local jurisdiction and electrical load calculation for proposed stations:
 - a. Mandatory requirements for new construction to be EV Capable (CALGreen Code Section 4.106.4 and 5.106.5.3)
 - b. Comply with zoning setbacks and easements. (Local Regulations)
4. Contact electrical utility for service work order for utility upgrades/notification of new service. File Service and Meter Request Form.
 - a. Ensure utility work order is approved. Any work on the utility side of the electric service requires a work order and disconnect/re-connect.
 - b. Following utility approval, permit is approved, issued and appropriately posted.
5. Construction plans show compliance with the California Building Code Title 24, Part 2, Section 11B-812 and Section 11B-228:
 - a. Signage for EVCS (International Symbol of Accessibility (ISA) signage for accessible spots be provided in compliance with Section 11B-812.8)
 - b. For a facility for public and common use, minimum number of EVCS required to comply with Section 11B-812.
6. Construction plans must show compliance with requirements of NFPA 70, CEC Article 625.

Equipment and Scheduling

7. Schedule all necessary contract work for installation of new service (if applicable), and pulling wires from electric panel/meter pedestal to parking structure or lot:
 - a. Boring, trenching, concrete and/or paving restoration
 - b. Coordinate with building managers, tenants and/or property owner(s) for scheduling installation, including site cleanup/closeout
8. Coordinate with the utility for markings of existing power lines, gas lines or other infrastructure is completed and utilize “call before you dig” services (811), service upgrade, new service/meter pull.

Installation

9. Secure the construction area appropriately (e.g. temporary fencing, barriers and signage) for safe working conditions. Prepare mounting surface prior to installation.

10. Remove material to run conduit and/or wiring (i.e., drywall, insulation, pavers, concrete, pavement, earth, etc.).
11. Install rough electrical conduit, boxes and fittings, subpanels etc. in walls, ceilings, floors and trenches to be covered.
12. Request a rough inspection from the building inspection office prior to covering any rough electrical installations.
13. Install charging unit(s) per manufacturer instructions and permitted construction plans. (CEC 110.3)
 - a. Install circuit conductors and wiring of appropriate size to comply with rating of the overcurrent protection. Securely fasten wiring to the structure. (CEC 300.11, CEC 210.19, CEC 215.2(A), CEC 110.3(B); CEC 310.15(B))
 - b. Identify and install properly sized equipment grounding conductor with the branch circuit. Connect at the EVCS and panelboard or service. (CEC 250.110, 112, 114, 119, 120, 122; CEC 300.3(B))
 - c. Bring grounded conductor to the service disconnect and bond to the enclosure. (CEC 250.24 (C))
 - d. Install overcurrent protection for any newly installed service equipment and conductors. (CEC 230.90, 91)
 - e. Install disconnect in proper readily accessible location for EVCS that is rated more than 60 amperes or more than 150 Volts to ground (CEC 625.23) If additional service disconnects are installed, verify that they are grouped and do not exceed the maximum number of service disconnects. (CEC 230.71, 72)
 - f. Identify branch circuit device and disconnects. (CEC 408.4 (A); CEC 110.22(A))
 - g. Install properly sized supply-side bonding jumpers. (CEC 250.50, 104(A) and (B))
14. Install wheel blocks/safety bollards as needed, and per approved plans. (CEC 110.27(B))
15. Perform finish work to repair existing surfaces, infrastructure, and landscaping, and parking lot striping (if applicable).
16. Make electrical connection and schedule for inspection with local jurisdiction Building Inspector.