



# COUNTY OF SANTA CRUZ

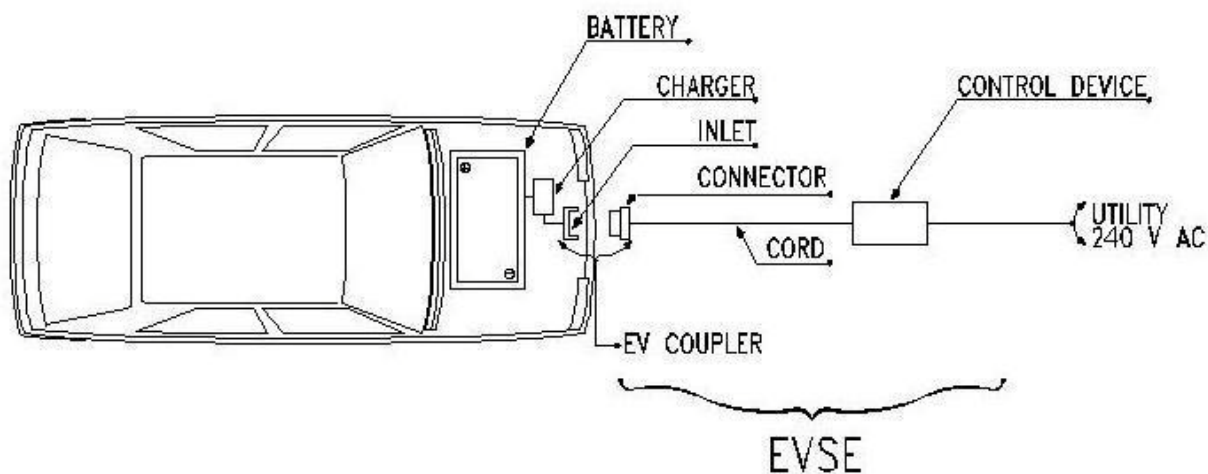
## PLANNING DEPARTMENT

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## ELECTRICAL VEHICLE CHARGING SYSTEM

### EV Sample Charging System:



The chargers for Level 1 and 2 systems are actually located on-board the vehicle. The Electric Vehicle Supply Equipment (EVSE) is the interface device between the vehicle charging system and the household power. EVSE consists of the connector, cord, control device, and interface to the household power. The connector at the vehicle is typically a standard SAE J1772 coupler (with adapters available for those vehicles using a different style connector). At the other end, the device may be directly hard-wired to the home or it may be connected via a cord and plug.

Level-1 systems operate on a standard 120 volt wall outlet. This outlet may be existing on the premises, but consideration needs to be given to the minimum amperage requirements of the EVSE and what other electrical loads are on the circuit. It is recommended that a circuit dedicated solely to the EVSE be used. The installation of a new outlet for this purpose would require a permit and inspection. Load calculations should be performed to determine adequacy of the electric service, however for a Level-1 system the additional load on most residential electrical services is likely negligible.

Plug-in Hybrid Vehicles (that use both gas and electric), and those people not concerned about long charging times, may be served adequately by Level-1 EVSE.

Level 2 systems are commonly desired because of the lesser time needed to charge the vehicle. They can range from a 30-amp system all the way up to 100-amps. Thus the size of the system, and the home's capacity to support it, are critical to code compliance. Level-2 systems and circuits will always require a permit and inspection. In some cases the home's electric service may need to be upgraded. Load calculations on the home are the only way to determine if the existing electrical service has the capacity

for a Level-2 charger. There are devices available that remove an existing load from the dwelling in order to facilitate the load of the charger. These devices do not allow both loads (such as an electric dryer) to operate simultaneously; therefore, the larger of the two loads can be used in the calculations. Such devices should be UL listed to applicable product safety standards.

#### **GUIDELINE AND CHECKLIST:**

Unless an existing circuit is determined to be adequate for a Level-1 EVSE device, an electrical permit is required for an EVSE system or for the installation of a circuit/outlet for a cord and plug connected unit.

The following information is required for a permit:

1. Owner should work with a contractor or EVSE professional to determine the vehicle's specific needs and vehicle owner's expectations. Referencing the vehicle's owner's manual may provide valuable information on charging. Once the details have been determined then the permit process may proceed.
2. Identify the make and model of the proposed EVSE system. The system must be listed by an approved nationally recognized testing laboratory in accordance with UL 2202, "Standard for Electric Vehicle (EV) Charging System Equipment".
3. Identify the EVSE location on the permit application. EVSE shall be installed in accordance with manufacturer's installation instructions and be suitable for the environment (indoor/outdoor).
4. Identify if the system is Level-1 or Level-2.
5. Provide the required circuit ampacity identified on the EVSE documentation. Identify the amperage rating of the circuit on the permit application. Use this rating for the load calculations.
6. Provide existing electrical service panel information and load calculations for the residence. Include EVSE load and circuit size to determine if an electrical service panel upgrade is required. See the [Electrical Load Calculation Worksheet](#)
7. Contact the local utility company and advise them of the additional loads on the electric service. Identify if a second electric meter is required to be installed because of electric utility rate for EV charging. See the [Service Requirement form](#)
8. Manufacturer installation instructions must be available for the inspector at the site.
9. Electrical wiring and installation shall be in conformance with the current edition of the California Electrical Code, including Article 625.

#### **CODES AND REFERENCES:**

**California Electrical Code**

**California Green Building Standards Code**

**UL 2202 listed EV charging system**

**Zero-Emission Vehicles in California: Community Readiness Guidebook**

**([https://www.opr.ca.gov/s\\_zero-emissionvehicles.php](https://www.opr.ca.gov/s_zero-emissionvehicles.php))**

**Typical EVSE Location**

