Congratulations on joining the exciting transition to electric vehicles! Adding an electric vehicle (EV) charging station to your commercial or employee parking lot will set you apart as a pioneer in alternative energy transportation. Because cars are often parked at work or for shopping several hours each day, parking lots are an ideal place to install a charging station. This guide provides useful planning tips to help you with a successful installation.

1. Charging Times and Specifications—Charging times vary by battery size and voltage

Future EV-drivers will likely be driving either a battery electric vehicle (BEV), a plug-in hybrid electric vehicle (PHEV), or an electric motorcycle. Charging times will vary, based on battery size and level of electricity at the charging station (see Table 1 on the next page for charging specifications). BEVs have a large battery requiring powerful charging. PHEVs have a smaller battery and an auxiliary gas engine; the smaller battery requires less powerful charging. Electric motorcycles also have small batteries and require less powerful charging. PHEVs and electric motorcycles can be efficiently charged using a standard 120 volt circuit. BEVs require at least a 240 volt circuit for a quick charge.

Charging Systems and Length of Stay

Before deciding on the Level 1, 2, or 3 charging, it is important to understand how the electric vehicle industry is evolving. Battery capacities will likely continue to increase, and more powerful or technologically sophisticated chargers may become more common.

If your typical customer will need charging for very long stays (over 8 hours), such as all-day employee parking or long-term airport parking, then Level 1 charging station should be adequate. If you choose Level 1, however, it should be capable of being upgraded to Level 2. If your typical customer will need charging for medium length stays (2-4 hours), such as visits to shopping malls, movie theaters, or sports venues, then Level 2 charging would be more appropriate. Level 2 charging may offer the most efficient and cost effective level of...
charging, because it can efficiently charge BEVs step down in voltage to provide Level 1 charging for PHEVs and smaller EVs. A combination of Level 2 and Level 1 charging stations may also be sufficient.

Note that installing a standard Level 1 charging outlet in a commercial or employee lot may inadvertently invite use by non-EV individuals, such as recreational vehicles, construction equipment, or outdoor appliances. It is recommended that property owners offering Level 1 charging properly sign and monitor their charging spaces to ensure proper use.

### Table 1: EV Charging Times and Specifications
(Note: this is the infrastructure needed for a single space)

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>CHARGING SPECIFICATION</th>
<th>TIME*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Requires a standard 15 or 20 amp breaker on a 120 volt circuit with a ground fault interrupter (GFI). The circuit should not be used for other parking lot purposes, such as lighting or signage.</td>
<td>16-32 hrs (BEVs) 3-15 hrs (PHEVs)</td>
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<tr>
<td>2</td>
<td>Requires a dedicated 40 amp breaker on a 240 volt circuit with a GFI. A wall-mounted or bollard-type charging station assembly will be required. (EV charging stations are a &quot;continuous load&quot; as defined by the National Electric Code. The contact points for typical 240 volt outlets, like those used for large mechanical equipment, are not designed for continuous loads, or for repetitive plugging and unplugging as would be normal with EV charging. Charging a vehicle directly into a 240 volt outlet with a standard extension cord is considered hazardous and is not allowed under any circumstances.)</td>
<td>4-6 hrs (BEVs) 1-2 hrs (PHEVs)</td>
</tr>
<tr>
<td>3</td>
<td>Requires a 60 or higher amp dedicated breaker on a 480 volt circuit with special grounding equipment. (National standards are still under development and will not be available until 2011-2012.)</td>
<td>25-40 min (BEVs) 20 min (PHEVs)</td>
</tr>
</tbody>
</table>

* Times represent a full charge from zero life to full. Partial recharging will be shorter

2. **Making your parking lot EV-Ready**

#### Utility Coordination

One of the first phone calls to make when planning for an EV charging station is to your electric utility provider. Your electric utility will be able to inform what your capacity is. It may be useful to discuss establishing a dedicated meter for EV charging stations to help you track the energy cost associated with charging. The direct sale of electricity by owners and operators of electric vehicle infrastructure could trigger the jurisdiction of the Utilities and Transportation Commission and additional regulatory hurdles. However, you may be able to recover some of your investment cost by charging a flat fee for the use of an EV charging space.

#### Charging Station Location and Design

There are several important considerations when choosing the location and design of your charging station. First, the location should be easy to find and conveniently accessed. In a very large parking lot, such as at a shopping mall, it may be more beneficial to place a few charging stations at several locations, rather than all the charging stations in one place. Consider way finding signs to direct your
customers or employees to the charging stations.

Certain design elements can enhance the quality of the user’s experience, such as clear signage and good lighting. Lighting can help customers read instructions and information about the charging station, while also improving safety and helping prevent vandalism.

Installing wheelstops (see Figure 3), will help protect the charging equipment and position the EV in the best place for charging. Cars located close to the charging station will reduce the likelihood that an outstretched charging cord could present a tripping hazard. See [insert local EV code citation] for construction details for parking lot EV charging stations.

**Signage**

As mentioned above, way finding signs can help direct drivers to your charging stations. Signs can also notify drivers of the parking restrictions for a charging stall. When deciding how to regulate parking at an EV charging stall, it is important to consider the overall impacts to parking supply. Stalls reserved only for EV charging may be vacant most of the time until EV use is widespread. In small parking lots, an option may be to allow joint use of a parking stall by EV and non-EV users. For example, a sign allowing “30 Minute Parking, Unless Charging” will allow short term parking by any vehicle, and high turnover would lessen the wait for an EV owner to gain access for unlimited charging.

**Accessibility**

When siting one or multiple EV charging stations, you must meet the state’s code requirement and guidance for accessibility.

**Cost Recovery**

Each property owner may choose whether to offer charging as a complementary service or to charge a flat fee for use of the parking space. If you wish to charge a fee, the vendor providing the charging system can also assist with the development of a fee collection plan. Options for fee collection include: credit/debit card readers; pay-to-park kiosks; radio-frequency identification cards linked to a subscription service, and standard parking meters.

**Data Collection and Communications**

When installing a new charging station, it may be useful to include internet or some other communication capability. Communications abilities will allow you to collect data to understand the usage of your charging station. You may also choose to offer your customers the ability to track charging progress through wireless communication-based smart phone applications. Your charging station vendor can advise you on options for data collection and communications.

**Maintenance Plan**

A maintenance plan should be created for each parking lot containing charging stations. At minimum, each charging station should clearly display contact information for the station manager in case of charger malfunction or damage. If a charging station includes a card
reader or pay-to-park kiosk, regular maintenance of these systems will ensure the security of financial information.

**Contractor Assistance**

The previous sections discuss important design considerations when planning an EV charging station. The design phase will likely require assistance from one or more tradespeople. For example, an electrical contractor should assess necessary energy upgrades and help prepare plans for permitting, and an engineer may also be required to design trenching to bring electricity to the charging station, and to design lighting, shelter, and other components.

3. How to get a Permit and Inspection

*Permits can be straightforward and easy to obtain; all work must be inspected*

Before beginning to install your level charging equipment or conducting any other electrical upgrades or installations, you will need to ensure that an electrical work permit is in place.

All electrical work must be inspected and approved by the authority having jurisdiction (AHJ). Labor & Industries inspects electrical permits throughout Washington State, but there are some jurisdictions that do their own inspections. These jurisdictions can be viewed on the Labor and Industries website at: [http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermInsp/CityInspectors/default.asp](http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermInsp/CityInspectors/default.asp).

It is the installer’s responsibility to obtain electrical permits and request inspections. Only property owners or their electrical contractors can buy an electrical permit and perform electrical work. You can find out if you as a property owner or your employee qualifies to perform electrical work on your property, or if you will be required to hire an electrical contractor, by referring to [RCW 19.28.261](http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermInsp/CityInspectors/default.asp).

If you feel unsure or are not qualified to do your own electrical work, you should hire a licensed electrical contractor. You can ensure electrical contractors are properly licensed and are using certified electricians by checking their status and violation history at: [http://www.lni.wa.gov/TradesLicensing/Contractors/HireCon/default.asp](http://www.lni.wa.gov/TradesLicensing/Contractors/HireCon/default.asp).

Prior to concealing any portion of the electrical installation the installer must request an electrical inspection from the AHJ. Any corrections written must repaired within 15 days, and require a reinspection.

Permitting requirements vary between inspection authorities. As mentioned above, check to make sure you know which electrical permitting jurisdiction covers your property before preparing your permit application.

- [Hyperlink to applicable EV ordinance]
- [Hyperlink to applicable Electrical Code]

To purchase a Labor and Industries electrical permit or call for an electrical inspection visit: [http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermInsp/PermitInspect/Default.asp](http://www.lni.wa.gov/TradesLicensing/Electrical/FeePermInsp/PermitInspect/Default.asp).

**Contact Information:**

[Add information for permit and inspection authority:
- Name
- Phone numbers—is there a question hotline?
- Address
- Hours and days of services]