ELECTRIC VEHICLE CHARGING INFRASTRUCTURE GUIDELINES

The intent of this electric vehicle (EV) charging infrastructure design and installation guideline document is to support private and public infrastructure that accommodates and encourages use of electric vehicles. The following are guidelines but are not required. This guideline document is subject to change as technological advances evolve charging infrastructure for electric vehicles.

(A) Definitions.

(a) *Charging level* means the standardized indicators of electrical force, or voltage, at which an electric vehicle's battery is recharged. Level 1, Level 2, and direct current (DC) are the most common charging levels, and include the following specifications:

(a) Level 1 (L1) means electrical service and charging equipment operating on 120v outlets.
(b) Level 2 (L2) means electrical service and charging equipment operating on 240v outlets.
(c) Direct current fast charger (DCFC) means electrical service and charging equipment operating on outlets greater than 240v.

(b) *Electric vehicle (EV)* means a vehicle that operates, either partially or exclusively, on electrical energy from the electrical grid or an off-grid source that is stored on-board for motive purposes. 'Electric vehicle' includes:
(a) Battery electric vehicle.
(b) Plug-in hybrid electric vehicle.

(c) *Electric vehicle charging infrastructure* means the conduit/wiring, structures, machinery, and equipment necessary to support electric vehicle charging.

(d) *Electric vehicle charging station (EVCS)* means a public or private parking space that is served by electric vehicle supply equipment that has as its primary purpose the transfer of electric energy to a battery or other energy storage device in an electric vehicle.

(e) *Electric vehicle supply equipment (EVSE)* means any equipment or electrical component used in charging electric vehicles at a specific location. EVSE does not include equipment located on the electric vehicle itself.

(f) *EV-capable space* means a parking space which is provided with electrical panel capacity to support a future minimum 40-ampere, 208/240-volt branch circuit for each future EVCS, and the installation of raceways, both underground and surface mounted, to support future EVSE.

(g) *EV-installed space* means a parking space which is provided with EVSE.

(h) *EV-ready space* means a parking space which is provided with one 40-ampere, 208/240-volt dedicated branch circuit for each future EVCS. The circuit should terminate in a suitable termination point such as a receptacle, junction box, or an EVSE, and be located in close proximity to the proposed location of the EVCS. The circuit should have no other outlets. The service panel should include an over-current protective device and provide sufficient capacity and space to accommodate the circuit and over-current protective device and be located in close proximity to the proposed location of the EVCS.

(B) General recommendations for Single-Family or Two-Family Dwellings.

(a) EVSE should be located in a garage, or on the exterior wall of the home or garage adjacent to a parking space.

(C) General recommendations for Multiple-Family and Non-Residential Structures.

(a) **Signage.**

(a) Wayfinding signage is encouraged to help electric vehicle drivers navigate to an EVCS.
(b) Charging station signage should indicate the space is for electric vehicle charging purposes.
(c) Signage should provide information regarding:
  (i) Voltage and charging levels;
  (ii) Hours of operation, if applicable;
  (iii) Usage fees, if applicable;
  (iv) Safety information; and
  (v) Contact information to report problems with the charging equipment.

(d) Pavement markings painted on the surface of a parking space may be used to further indicate that the space is for electric vehicle charging purposes.

(b) **Location.** EVCS equipment should be:

(a) Located in a parking island;
(b) Mounted to an adjacent structure; or
(c) Protected by a curb, wheel stops, or concreted-filled bollards if located directly in a parking lot.

(c) **Accessibility.** The following best practices for consideration of individuals protected under the Americans with Disabilities Act (ADA) are encouraged with regard to EVCS outlets and connector devices:

(a) The EVSE should be located so it is accessible for a person in a wheelchair on an access aisle, and the EVSE should not encroach on the access aisle.
(b) Reach, range, and turning radius requirements from ADA are good standards for accessing the equipment.
(c) EVSE-protective bollards and wheel stops should not obstruct the use of the charging station.
(d) Charging equipment may be shared between accessible EVCS and regular EVCS.
(e) It is recommended that at least one accessible EVCS be included when providing multiple charging stations. If installing only one EVCS, strong consideration should be given to making it accessible.

(d) **Design.**

(a) The EVCS should be designed to minimize potential damage by accidents and vandalism, and to be safe for use in inclement weather.
(b) EVSE cords should be retractable or have a place to hang the connector and cord sufficiently above the pedestrian surface as to minimize tripping hazards. Any cords connecting the charger to a vehicle should be configured so that they do not cross a driveway, sidewalk, accessibility routes, or passenger unloading area.
(c) The EVCS should have adequate lighting available for ease of night time use.

(e) Maintenance.

(a) The EVCS should be maintained in all respects, including operation of the charging equipment.
(b) A phone number or other contact information should be provided on the equipment to report problems.

(D) Recommended electric vehicle make-ready standards.

In order to proactively plan for and accommodate anticipated future growth in market demand for electric vehicles, it is encouraged that all new and expanded development parking areas add the electrical infrastructure necessary to support the future installation of electric vehicle charging stations. This may include increasing electrical panel capacity, installing conduit or raceway, or other actions. Installing electric vehicle charging infrastructure during construction is significantly more cost effective than retrofitting parking areas to be EV-ready.

(a) Recommended electric vehicle parking capacity and minimum parking recommendations.

(a) Multiple-Family and Non-Residential Structures:

The following table outlines the number and/or percentage of recommended EVSE-installed, EV-ready, and/or EV-capable spaces as a portion of total parking spaces. Parking spaces equipped with electric vehicle charging infrastructure count toward meeting minimum parking space requirements.

Total number of parking spaces	Recommended EVSE-installed spaces	Recommended EV-ready spaces	Recommended EV-capable spaces
1	1	1	--
2-10	1	2	--
11-15	1	2	1
16-19	1	2	2
21-25	2	3	2
26+	5% of total parking spaces	10% of total parking spaces	10% of total parking spaces

(i) Where the number of EV-ready spaces exceeds the recommendation, additional EV-ready spaces count towards the recommended number of EV-capable spaces.
(ii) Spaces that terminate with Level 2 EVSE are considered EV-ready spaces and count towards the recommended number of EV-ready spaces.

(E) Sources cited.

This document was prepared by Shannon Reidlinger, Senior Community Development Specialist, and adapts electric vehicle charging infrastructure guidelines from the following compiled sources:

(a) Bloomington, MN, City Code § 21.302.13
(b) Lakeville, MN, Zoning § 11-19-15

(c) Minneapolis, MN, Zoning Code § 541.410
(d) Ross, B., & Cooke, C. (2019). Summary of best practices in electric vehicle ordinances. Great Plains Institute.
(e) Salcido, V.R., Tillou, M., & Franconi, E. (2021, July). Electric vehicle charging for residential and commercial energy codes. Pacific Northwest National Laboratory.
(f) St. Louis Park, MN, Zoning Code § 36-361