



City of Kamloops

Electric Vehicle Charging Infrastructure Guidelines for Residential Development



Canada's Tournament Capital

1.0 Introduction

1.1 Objective

This document is supplementary to, and is to be read in conjunction with, vehicle parking and electric vehicle (EV) charging infrastructure requirements in Kamloops Zoning Bylaw No. 55, Division 4, Off-Street Parking, Sections 4.22 and 4.23.

The requirements for technical matters outlined in this document are specified by the Development, Engineering, and Sustainability Director, as amended.

For convenience, definitions for capitalized terms used in this document are provided in Table 1.

1.2 Background

EVs offer a more sustainable alternative to fossil fuel powered vehicles. The use of EVs instead of conventional internal combustion engine vehicles helps improve air quality, combat climate change, and reduce noise, among other benefits. The City's [EV & E-Bike Strategy](#) and [Community Climate Action Plan](#) (CCAP) support policies that encourage the uptake of EVs.

The availability of EV charging at home and on the go is an important factor in an individual's decision to purchase an EV. New homes and multi-family residential buildings can be equipped with EV charging infrastructure at a relatively modest cost compared to a retrofit.



The CCAP's Big Move 3 target is that by 2050, 85% of kilometres driven by Kamloops-registered passenger vehicles will be by zero-emissions vehicles.

Table 1: Terms and definitions.

Term	Definition
Electric Vehicle (EV)	Vehicle that uses electricity for propulsion and that can use an external source of electricity to charge the vehicle's batteries.
EV Capable	A state of EV readiness that requires the following at time of construction: sufficient spare electrical capacity, wiring and/or continuous conduit(s) or raceway(s) (as applicable) from the panel board and terminating at a junction box (or boxes) near the designated EV parking space(s), including allocating space for all additional electrical and EV charging infrastructure required to energize the circuit and supply power to future Level 2 EVSE(s) and EVEMS.
Energized Outlet	Connected point in an electrical wiring installation at which current is taken and a source of voltage is available for Electric Vehicle Supply Equipment.
EV Energy Management System (EVEMS)	System used to control EV Supply Equipment loads through the process of connecting, disconnecting, increasing, or reducing electric power to the loads and consisting of any of the following: (a) a monitor(s); (b) communications equipment; (c) a controller(s); (d) a timer(s); and (e) other applicable device(s).
EV Supply Equipment (EVSE)	Complete assembly consisting of cables, connectors, devices, apparatus, and fittings that are installed for the purpose of power transfer and information exchange between the branch circuit and the EV.
Level 2 Charging	Level 2 EV charging level as defined by SAE International's J1772 standard. See call-out box on following page for description.
Residential Use	Occupancy or use of a building or part thereof as a dwelling, including single-family and multi-family residential.

2.0 EV Charging Infrastructure Requirements

2.1 Part 9 (Standard) Residential Use Development

To ensure new homes are built with ready access to a power supply capable of providing Level 2 EV charging, the following requirements must be met:

- An electrical wire rated for 60A shall be installed at time of construction (not required to be energized), originating from an electrical panelboard and terminating at a junction box near the parking space(s) to ensure that a minimum of one parking space per dwelling unit (or the total number of residential vehicle parking spaces required, whichever is less) is capable of supplying power to a Level 2 EV charger when it is installed by a future owner/occupant(s).
- Parking space required for a residential suite is exempt from this requirement.

2.2 Part 3 (Complex) Residential Use Development

To ensure new buildings are designed and constructed with sufficient electrical capacity, physical space, and other infrastructure needed to enable access to a power supply capable of providing Level 2 EV charging, the following requirements must be met:

- An EV Capable Plan, completed by a registered professional engineer, shall be submitted at time of Building Permit application, specifying the electrical design, BC Hydro service capacity and other infrastructure needed to ensure that a minimum of one parking space per dwelling unit (or the total number of residential vehicle parking spaces required, whichever is less) is capable of supplying power to a Level 2 EV charger when it is installed by a future owner/occupant(s).
- Parking space designated for visitor parking is exempt from this requirement.
- Electrical cables, conduit or raceway, as specified in the EV Capable Plan, shall be designed, and installed at time of construction (as applicable) such that any future wiring needed to supply power to the EV charger(s) will not require substantial disruption of building finishes, concrete, or landscaping.
- Compliance with the EV Capable Plan must be demonstrated prior to final inspection, including but not limited to electrical service capacity and allocation of physical space for all electrical and EV charging infrastructure as specified in the EV Capable Plan.



What is Level 2 Charging?

Level 2 Charging consists of 208V or 240V AC, ranging from 16A to 80A maximum continuous current. See [SAE International's J1772 Standard](#) for a detailed definition.

Charge Method: AC Level 2

Nominal Supply Voltage (V):
208V to 240V AC

Max Current (Amps-continuous): ≤ 80A

The amperage rating for EV circuits required by most EVSE is 40A, although this may differ depending on the system design.

Note:

- The requirements for Part 9 and Part 3 residential use developments can be found in the City of Kamloops' [Zoning Bylaw No. 55](#) (Division 4; Sections 4.22 and 4.23).
- Sections 4.22 and 4.23 of Zoning Bylaw No. 55 do not apply to parking spaces required for units included in a development for which, on or before January 1, 2023:
 - a development permit has been authorized
 - a building permit application has been accepted for the development in accordance with the City's Building Bylaw 11-80

2.2.1 EV Capable Plan Requirements (Part 3 residential development)

An EV Capable Plan outlines a strategy for satisfying the EV Charging Infrastructure Requirements for Part 3 Residential Use Development and identifies the electrical service capacity and infrastructure required at time of construction. Documentation of the EV Capable Plan shall be provided to the strata corporation or building owner(s) by the developer.

The EV Capable Plan must be prepared by a registered professional engineer and include the following:

1. Company Details

- a. Date the EV Capable Plan was prepared
- b. Name, company and contact information (phone and email) of the registered professional engineer who created the plan
- c. The electronic signature of the engineer declaring they understand and have met the EV Charging Infrastructure Requirements for new residential use development pursuant to Kamloops Zoning Bylaw No. 55, Division 4, Off-Street Parking, Section 4.23

2. Project Details

- a. Property address
- b. Number of dwelling units
- c. Number of parking stalls
- d. Number of parking stalls to have access to a power supply capable of providing Level 2 EV charging
- e. Number of EVSE to be installed at time of construction (if applicable)

3. Electrical Capacity (kW)

- a. Required electrical main service size
- b. Projected peak demand on the main service
- c. Main service spare capacity after all required stalls are equipped with EVSE as per the EV Capable Plan

4. Recommended Solution

The recommended solution must be compliant with all relevant codes, manufacturer requirements, standards and bylaws, meet or exceed the EV Charging Infrastructure Requirements for Part 3 Residential Use Developments, and specify the following:

- a. Identify the EVSE-to-circuit breaker ratio of the recommended solution (e.g. 4 chargers per 40A breaker) and explain how it satisfies the minimum charger performance standard outlined in Table 2.
- b. Provide calculation of total potential EVSE load based on the recommended number of EVSEs per circuit.
- c. Provide a clear statement that the electrical main service is sufficient (as designed and installed at time of construction) and provide justification.
- d. Identify any metering needed (including allocation of required physical space) to allow billing to the appropriate individual EVSE users or as desired by the building owner or strata corporation.
- e. In buildings with shared parking areas, outline how the EV charging infrastructure is to be separately metered from the common area loads to distinguish between common area energy usage and EV charging energy usage.
- f. For solutions where integration of EVEMS is required, the EV Capable Plan should identify (where applicable) communications equipment, control systems, licensing/permitting, and all other information needed to install, commission and operate the system.
- g. Outline technical specifications of EVSE model(s) that are compatible with the recommended solution, including EVEMS and networking equipment (if applicable)
- h. Identify safety, maintenance, and accessibility considerations
- i. Include plan drawings¹ showing:
 - i. overall parking layout
 - ii. location of EV capable stalls
 - iii. approximate location of conduit/raceway and junction boxes to be installed at time of construction
 - iv. physical space allocated for future EV charging infrastructure

Table 2: Minimum Charging Performance Standard	
Circuit capacity (A)	Maximum number of EVSE (40A rating) per branch circuit
20	1
30	2
40	4
50	5
60	6
70	8
80	10
90	11
100	12
125	16
150	20
Note: alternate configurations may be accepted if it can be shown they will not result in excessive load sharing or an insufficient charge rate provision to each EVSE.	

¹ See sample in Appendix A: EV-Capable Parking Stall and EVSE Plan

- j. Include a single-line diagram² showing applicable electrical infrastructure for the building, including but not limited to:
 - v. panelboards, cable/conduit sizes, overcurrent protection devices, and disconnecting means
 - vi. EVSE and EVEMS
 - vii. Metering equipment, communications equipment, and control systems

5. Cost Estimate for Budgeting Purposes

- a. Include a class 'D' cost estimate (+/- 50%) for the electrical infrastructure, communication/network equipment (if applicable), and all other required devices that are not being installed at time of construction (i.e. will be the responsibility of the future owner/operator) but are required to energize and commission the EV charging system as per the EV Capable Plan.



What is EVEMS?

Also known as load sharing, smart charging, or power sharing.

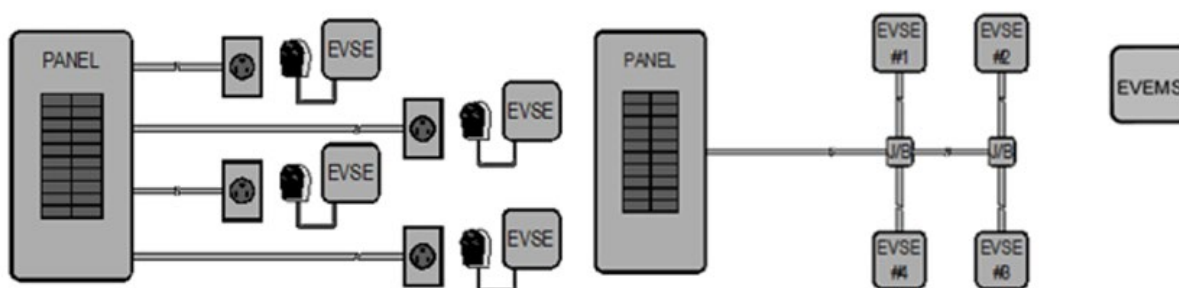
It is used when multiple EVSE is supplied from a single branch circuit to control demand and ensure the circuit rating is not exceeded.

Its use avoids using dedicated circuits for each EV charging stall, which can be helpful in multi-unit residential buildings and/or when there is limited electrical capacity.

2.2.2 EV Energy Management Systems

Where an EV Capable Plan specifies the use of EVEMS to satisfy Kamloops' EV Charging Infrastructure Requirements, the following conditions must be met:

- Compliance with the minimum charging performance standards outlined in Table 2 and assurance that sufficient amperage is available to supply all future EVSE users under average use conditions.
- Specifications for communication equipment, control systems, licensing/permitting, physical space allocation, etc. that is required for the proper function of the EVEMS must be included in the EV Capable Plan.



Dedicated circuits (left) compared to an electric vehicle energy management system (EVEMS) (right), showing the reduction in electrical infrastructure required for the EVEMS. (EVSE: electric vehicle supply equipment)

Image/description courtesy of: [Residential Electric Vehicle Charging: A Guide for Local Governments](#)

² See sample in Appendix B: Single-line Diagram

3.0 Guidelines, Best Practices & Resources

3.1 EV Charging System Management Guidelines

It is recommended to address the following in strata rules, lease agreements, rental agreements, and/or bylaws:

- Clear delineation of which party (e.g. strata or unit owner or tenant) is responsible for EVSE purchase and installation, and a clear description of the appropriate permissions and procedures that ensure accessibility to the electrical infrastructure for the purpose of EV charging
- Clear delineation of who owns the EVSE. Consideration should be given to how the parking stall, electrical infrastructure, and EVSE are defined as common property, fixtures, or chattels
- Establish billing rules and procedures
- Where an EVEMS is implemented,
 - Installed EVSE must be compatible with that EVEMS
 - Consideration for who will supply, install, own, manage and operate the EVEMS should be given.

3.2 Best Practices

- Label all electrical infrastructure in a conspicuous manner to deter non-EV use as per the Canadian Electrical Code (Section 86-306): "Each receptacle for electric vehicle charging be labelled in a conspicuous, legible, and permanent manner, identifying it as an electric vehicle supply equipment receptacle".
- EVSE should be installed in such a manner as to prevent mechanical damage from vehicles.
- Wiring should be copper and ran in electrical metallic tubing (EMT) where possible.
- Junction boxes for EVSE should be 4-11/16" x 4-11/16" and installed in an accessible location in close proximity to the parking stall.
- Where two adjacent parking stalls in a private personal garage are accessible to only one household, place the junction box in equal proximity to both parking stalls to facilitate the charging of two vehicles.

4.0 Information & Resources

- [Zoning & Property Information \(City of Kamloops\)](#)
- [Residential EV Charging: A Guide for Local Governments \(BC Hydro\)](#)
- [Guide to EV Charging in Multi-Unit Residential Buildings \(NRCan\)](#)
- [EV Energy Management Systems Process – FAQ \(Technical Safety BC\)](#)
- [Go Electric \(Clean BC\)](#)

Below is an example of an acceptable plan showing required EV-capable parking spaces, junction boxes, and future EVSE.



Appendix B: Single-line Diagram

Below is an example of an acceptable single-line diagram showing all EV charging system electrical infrastructure for a building.

