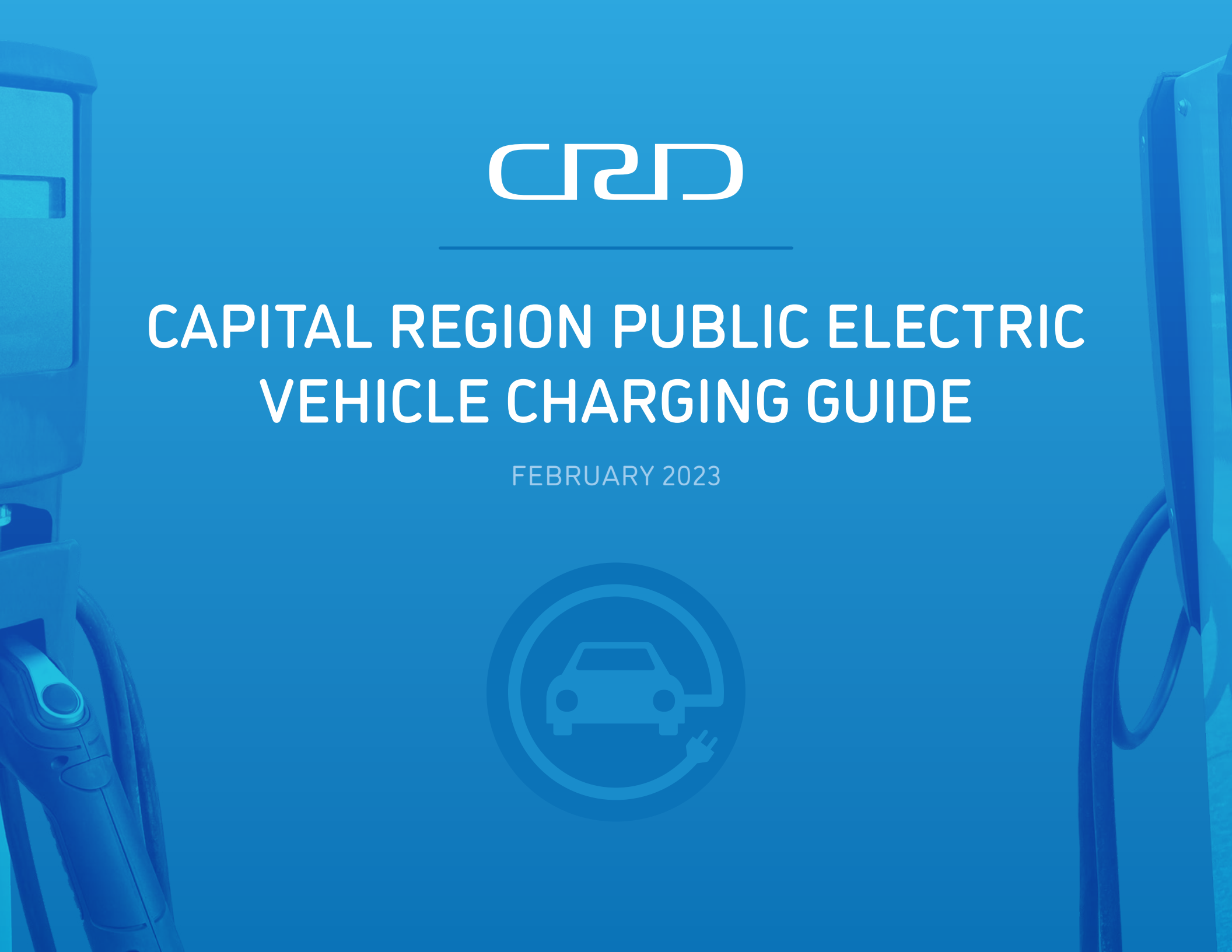
CAPITAL REGION PUBLIC ELECTRIC VEHICLE CHARGING GUIDE

FEBRUARY 2023



Acknowledgements

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CRD
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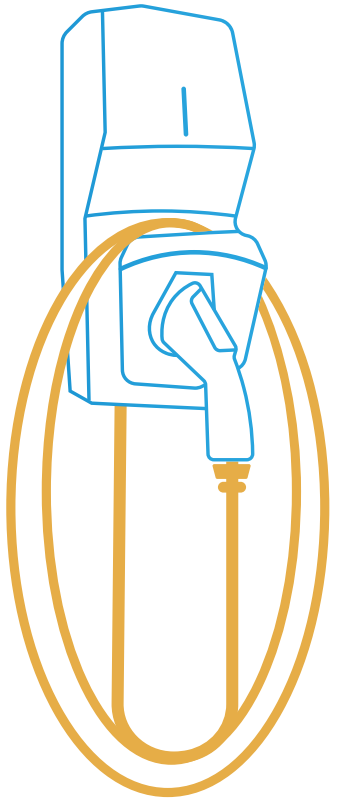


EV Charging Stations 101

LEVEL 2 CHARGING STATION

Uses a 208-to-240-volt circuit like those used for clothes dryers to provide 6.6 to 7.2 kW of power. These are appropriate in locations where cars park for one or more hours, which allows EV drivers to top up their charge while shopping, recreating, or working.

LEVEL 3 (DIRECT CURRENT FAST CHARGER)

Uses a 400 volt or higher circuit to provide 25 to 350 kilowatts of power. These are appropriate in locations where cars park for one hour or less, which allows EV drivers to charge "on-the-go" like at a traditional gas station or if drivers lack a dedicated charging option at home.

Who is this guide for?

Business Owners and Organizations

Private businesses, non-profit organizations, public institutions, and others in the capital region that are interested in installing publicly accessible EV charging stations on or near their properties.

Commercial Property Owners / Managers

Larger-scale commercial property owners and property management firms in the capital region that are interested in installing publicly accessible EV charging stations on or near their properties (e.g., shopping centres, strip malls, etc.).

Local Governments

Capital region local governments that are working to expand the provision of publicly accessible EV charging stations on municipally owned properties (e.g., municipal hall, public parks, and recreation centres).

1.0

INTRODUCTION

INTRODUCTION

Overview & Purpose

The capital region of British Columbia has experienced significant electric vehicle (EV) sales over the past several years. In the Capital Regional District's (CRD) 2021 Climate Action Strategy, low-carbon mobility was identified as one of six distinct goals to adapt, mitigate, and reduce climate change impacts. To achieve this goal, local governments support, endorse, and encourage active, public, and zero-emission transportation options across the region.

> *The Electric Vehicle Infrastructure Roadmap (Capital Regional District, 2021) set ambitious targets for the capital region, including a goal that 25% of all light-duty vehicles are electric by 2030.*

Local governments have been leaders in installing and operating the public charging network to date; however, it will be critical to mobilize other sectors, including private industry, the not-profit sector, and other key players to provide public charging options to achieve the regional target. As of January 2023, there were an estimated 296 Level 2 charging ports and 35 Direct Current Fast Charger (DCFC) ports in the capital region. The CRD Electric Vehicle Infrastructure Roadmap estimates the need for 770 new public Level 2 ports and 132 new DCFC ports by 2030 to accelerate adoption toward the regional EV goal.

To that end, the EV Infrastructure Roadmap identified that the CRD should develop locally relevant resources and technical standards to address information gaps, encourage consistency, and support evaluation among the private sector in the region.

The purpose of the Public Electric Vehicle Charging Guide is to build on the EV Infrastructure Roadmap and to support the region's residents, businesses, and visitors in accessing a reliable EV network now and in the future.

Esquimalt Gorge Pavilion, Esquimalt

Objectives of the Guide

There are three primary objectives of the Public Electric Vehicle Charging Guide:

ACCESSIBILITY

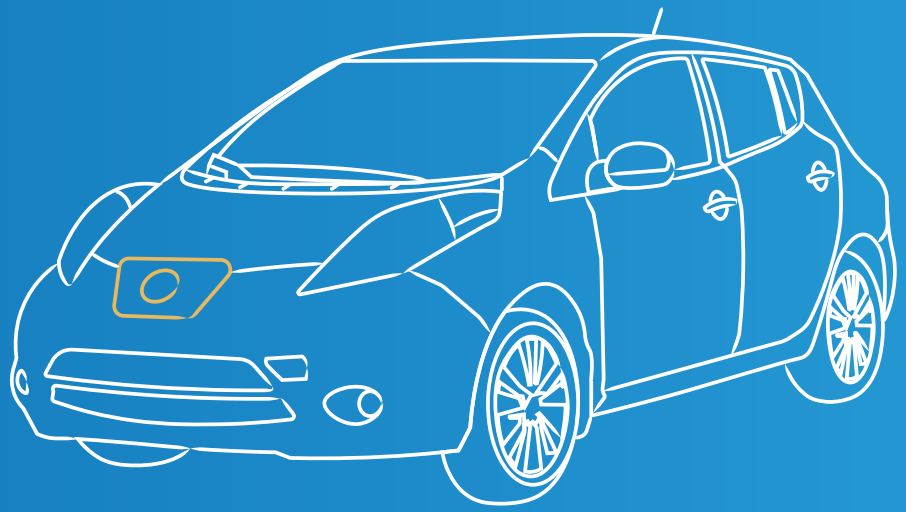
Increase the share of publicly accessible EV charging stations in the capital region

CONSISTENCY

Ensure a more consistent design for all new EV charging stations, including Level 2 and DCFC stations

EVALUATION

Evaluate the overall performance of the regional EV charging network using consistent performance indicators



What is a publicly accessible EV charging network?

The presence of a public EV charging network is a critical consideration for prospective EV owners. **Publicly accessible stations are on public or private property and are freely available for any EV user in the community to access***. These stations are typically located at public parking facilities, shopping centres and other businesses, gas stations, and civic/municipal facilities (e.g., municipal halls, parks, recreation/community centre, or curbside). Stations on public property may be owned directly by local government, provincial government, or a service/utility provider (e.g., BC Hydro, FortisBC).

In contrast, private EV charging stations are restricted to certain user groups, such as residents, employees, or are exclusive to patrons only. These stations are on private property such as residential properties (e.g., single-detached house, multi-family residential building), workplaces (e.g., office building), and businesses that restrict EV charging to their clientele (e.g., restaurant, hotel/tourist destination).

** Some public charging stations may be restricted to certain vehicle manufacturers*

Publicly Accessible EV Charging Station Examples

- Public parking facilities
- Shopping centres and other businesses
- Gas stations
- Civic/municipal facilities (e.g., municipal halls, parks, recreation/community centre, or curbside)

Private EV Charging Station Examples

- Residential properties (e.g., single-detached house, multi-family residential building)
- Workplaces (e.g., office building)
- Businesses that restrict EV charging to their clientele (e.g., hotels)

Public parking facility, gas station, civic/municipal facility

Shopping centre and businesses

Businesses that restrict to clientele

Residential properties and workplaces

FULLY PUBLIC

FULLY PRIVATE

Hillside Mall, Victoria

What are the benefits of installing a publicly accessible charging station?

There are many benefits associated with a publicly accessible EV charging network, including:

Generate Revenue

Eligible site host can recover capital and operational costs through the use of the charging station itself. This includes user fees and/or claiming credits through the Low Carbon Fuel Standard program (see section 3.4)

Adding a station can also attract customers by providing an amenity and contributing to an organization's reputation on sustainability.

Support Customers and Clientele

Site hosts can track and monitor how often and how long EV drivers are accessing their property and using an EV charging station. Evaluating usage trends can support internal business planning for when to install new stations and support proactive maintenance efforts to ensure a reliable charging experience for drivers.

Increases the Profile of EVs

More charging stations in the network can support more EV drivers on the road, which creates more public awareness and understanding of EVs as a transportation option.

2.0

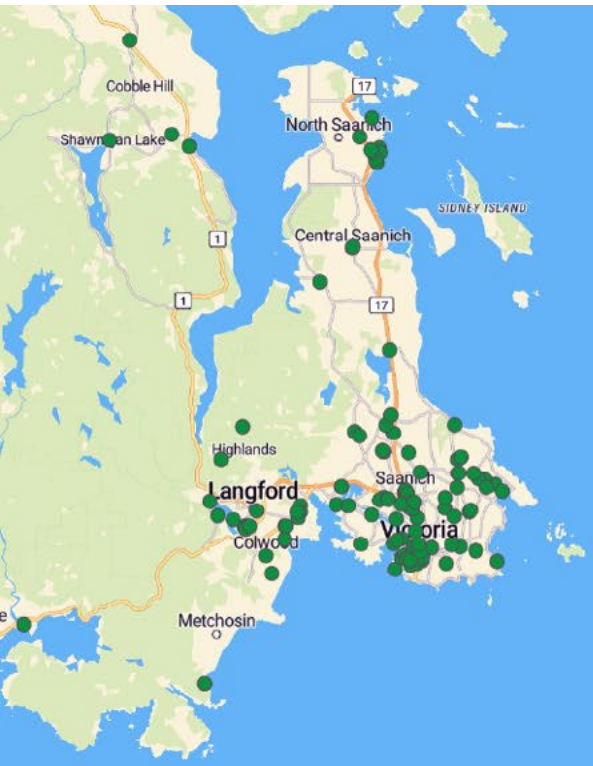
THE REGIONAL EV CHARGING LANDSCAPE

THE REGIONAL EV CHARGING LANDSCAPE

Publicly accessible and private EV charging options are rapidly expanding in response to growing demand for electric vehicles. This section outlines where publicly accessible EV charging stations are typically found in the region and where there are gaps.

Natural Resources Canada (NRCan) provides a public tool called the Electric Charging and Alternative Fuelling Stations Locator.[1] It provides an up-to-date summary of EV charging and alternative fuelling stations across Canada, including station name, fuel type (e.g., electric, biodiesel, CNG, ethanol, hydrogen, LNG, propane), its street address / location, geographic coordinates, and the network service provider. Existing station hosts in the database are contacted at least once a year to verify they are still operational and providing the fuel specified.

Within the capital region, EV charging stations are located at a variety of publicly accessible locations. **Each station location shown was cross-referenced with PlugShare**[2]**, which maintains a public database of EV charging stations and indicates whether the station is intended for customer/guest use only or not.** Apps such as PlugShare are how most EV drivers find a charging station and know their real-time availability.



Publicly accessible EV charging stations in the capital region fall under the following categories*:

22%	MUNICIPAL PARKING
18%	SINGLE BUSINESS
16%	POST-SECONDARY INSTITUTION
14%	CIVIC FACILITY
13%	HOTEL / TOURIST DESTINATION
12%	SHOPPING CENTRE/STRIP MALL
3%	OTHER
3%	CURBSIDE (ON-STREET)

* *As of January 2023*

[1] *https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/electric-charging-alternative-fuelling-stationslocator-map/20487*

[2] *https://www.plugshare.com*

3.0

RESOURCES FOR PROSPECTIVE STATION INSTALLERS

3.1

GETTING STARTED

TYPICAL INSTALLATION PROCESS

The typical installation process for an EV charging station includes four phases. Each phase provides an estimated timeline, activities to undertake, and details to consider. It is important to note that the timelines associated with each phase are estimates and timelines can vary for each project.

PHASE 01	PHASE 02	PHASE 03	PHASE 04
PROJECT SCOPING	**DESIGN DEVELOPMENT**	**CONSTRUCTION MANAGEMENT**	**OPERATION AND MANAGEMENT**
• Assess need, potential location, and potential funding sources • Review the CRD funding guide and design guidelines • Review local zoning bylaw requirements and contact your local government to confirm permitting and approval requirements	• Select an electrical engineer and design team • Determine whether or not a BC Hydro service upgrade is required • Select equipment and a charging service provider • Develop technical design • Submit permit applications to local government (e.g., development permit, building permit, and electrical trade permit) • Issue for construction drawings, signed & sealed by an electrical engineer	• Select contractor (tender process is typically 2 to 3 weeks) • Obtain electrical trade permit • Procure equipment and materials • Start construction (typically 3 to 8 weeks duration, beginning after contract award and mobilization)	• Set-up station and subscribe with EV network service provider • Perform regular maintenance and ensure station is operating properly • Review energy metering/ tracking and billing • Claim credits through the BC Low Carbon Fuel Standard to earn revenue
• *1-2 months*	• *2-3 months...* • *...or 6-8 months if a BC Hydro service upgrade is required to facilitate the additional electrical load*	• *2-8 months**	• *Ongoing*

* *Construction timelines can vary substantially depending on supply chain and local contractor availability. Prospective installers should work with their consultant to obtain the latest information regarding anticipated timelines.*

OTHER COMMON CONSIDERATIONS

Zoning and local regulations

Check the zoning bylaw and standards of the local government that your property falls under. The following items may require a variance permit or development permit and should be coordinated with the local government in the early stages of design:

- Removal, relocation and/or displacement of trees due to the placement of EV chargers or supporting infrastructure (e.g., digging underground for electrical conduit or other equipment)
- Installation of signs required for all EV charging parking stalls
- Installation of lighting to improve security and safety of users within the vicinity
- Ensuring compliance with parking stall dimensions after installation of EV charging station (e.g., the station itself, wheel stop or bollard, etc.)
- Protection for EV charging station such as rubber bumpers, bollards, wheelstops, and/or curbs
- Modifications to sidewalks and pedestrian & cycling paths
- Relocation or coordination with existing underground services or utilities such as stormwater drains and sanitary sewers

Securing a quality EV consultant and/or contractor

When selecting a consultant and/or contractor to design and build your EV charging station, it is recommended to obtain a minimum of three quotes to compare between experience and price.

Considerations during this process should focus on the consultant/ contractor's experience, including:

- Number of sites completed to demonstrate depth of experience
- Location of sites completed to demonstrate understanding of local bylaws & standards and community-specific considerations
- Similar jobs completed with success, including references
- Team members and individual experience

OTHER COMMON CONSIDERATIONS, CONT'D

Anticipating costs and payback periods

Costs

Installation costs of EV charging stations can vary significantly depending on a number of factors. A common range of installation costs seen in the capital region recently have been between $8,000 and $18,000 per station.

The following items can contribute to varying costs and should be considered prior to parking stall selection:

- Distance between the charging station and the electrical room
- Electrical distribution available, including both physical breaker space and available capacity (BC Hydro data or private metering, if available)
- Quantity of chargers and economies of scale
- Whether digging underground will be required
- Proximity to trees, landscaping, and existing infrastructure
- Signage, lighting, auxiliary protection of chargers, etc.

Rebates, Credits, and payback periods

There are several opportunities available to reduce the upfront costs of new installations as well as operational expenses. These include funding programs (see section 3.3) and BC's Low Carbon Fuel Standard (LCFS) program (see section 3.4).

The table below illustrates a suggested way of thinking about costs and payback periods associated with EV charging stations.

Due to the number of factors that affect installation costs, these figures are meant to be illustrative only and prospective installers should conduct their own costing analyses.

LEVEL 2 CHARGING STATION SIMPLE PAYBACK

	Lower-range values	Upper-range values
INSTALLATION COST	$8,000 / stall	$18,000 / stall
INSTALLATION REBATE (NRCan)	$5,000	$5,000
ANNUAL OPERATIONAL REVENUE FROM LCFS (assuming 5,000 kWh/year usage)	$2,000 / yr	$2,000 / yr
SIMPLE PAYBACK (YEARS)	1.5	6.5

Note: This does not include ongoing maintenance costs

3.2

EV CHARGING STATION DESIGN GUIDELINES

GUIDELINES OVERVIEW

The EV Charging Station Design Guidelines provide high-level guidance for publicly accessible EV charging stations in several common archetypes and locales in the capital region. They provide the main elements to consider from a design perspective when prospective site hosts are considering installing a station. More technical details are provided in the supplemental *Capital Region Public Electric Vehicle Charging Archetypes: Technical Guidelines*.

GUIDELINE STRUCTURE

To enhance usability, the guidelines are organized in the same way for each archetype.
The diagram below illustrates the repeating structure used in each archetype guideline page:

COMMON DESIGN CONSIDERATIONS

In addition to the design guidance for specific archetypes that is provided on the following pages, there are some common design considerations that apply to all archetypes as well. These include:

Accessibility: Accessible stalls for people with disabilities should be considered prior to commencement of all projects. Improved accessibility for all stalls also benefits everyone and should be incorporated in the design where possible. Some items to consider include the following:

- Accessible stall dimensions need to comply with local bylaws and standards
- Accessible stalls should be located close to buildings and primary entrances; add EV stations to existing accessible stalls to avoid converting 2 standard stalls to make 1 larger EV accessible stall
- EV station placement and height are appropriate to ensure someone can reach the charger from a seated position (e.g., if the charger is on top of a curb, avoid recessing the charger)
- EV stations must have a clear path of travel for people to access the charger (e.g., eliminating obstacles such as bollards, curbs, benches, etc.)
- Cable management to reduce tripping hazards

Load Sharing: A technology that allows multiple electric vehicles to charge on the same circuit. In most cases, this will dramatically lower installation costs and allow existing electrical capacity to serve more vehicles while not hindering performance.

Dual-Header Charger: To save costs on construction and materials, many manufacturers offer solutions to install two chargers at one location and split between two stalls. Combine this feature with load-sharing for the most economical installation.

Metering and Smart Chargers: Manufacturers may provide complete charging solutions which include built-in metering to understand energy usage, internal load sharing, user interfaces, and data collection. There are multiple benefits associated with smart chargers, including generating Low Carbon Fuel Standard (see section 3.4) credits and the ability to understand how well your charging station is performing (see section 3.5).

Longevity: location of new EV charging stations should be carefully considered to ensure they are compatible with future plans where possible. This minimizes the need to relocate a station after it has been installed, which can be expensive due to the amount of infrastructure required. For example, if there are plans to redevelop a portion of a surface parking lot with a new building in the next few years, that particular area may not be appropriate for a charging station. Similarly, stations installed on the curbside are likely a permanent fixture for the foreseeable future and should not conflict with any other needs that may arise (e.g., pedestrian and cycling facilities, trees and landscaping).

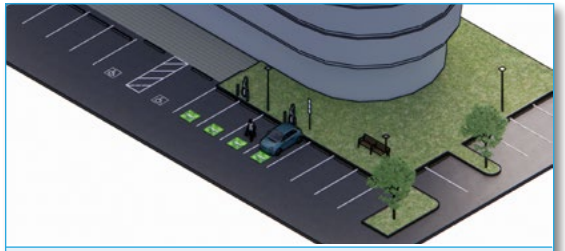
EV CHARGING DESIGN GUIDELINE ARCHETYPES

The EV Guidelines in this section provide high-level design guidance for publicly accessible EV charging stations in several common archetypes and locales in the capital region.

These archetypes are briefly described below. You can click on the image of the archetype relevant to you to be directed to that respective set of guidelines.

ARCHETYPE 1
SURFACE PARKING LOT (LARGE)

- Surface parking lot
- Commercial centre (e.g., shopping mall)



ARCHETYPE 2
SURFACE PARKING LOT (MEDIUM)

- Surface parking lot
- 1 to 10 establishments or commercial units

ARCHETYPE 3
SURFACE PARKING LOT (SMALL)

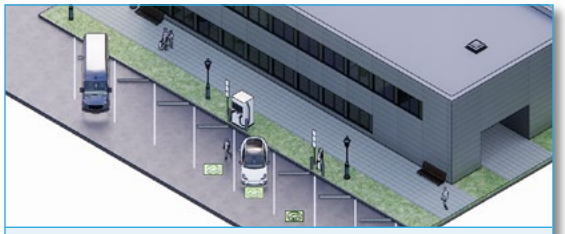
- Surface parking lot
- 1 establishment or commercial unit

ARCHETYPE 4
UNDERGROUND PARKING FACILITY

- Underground facility (e.g., publicly accessible parkade)

ARCHETYPE 5
ON-STREET PARALLEL PARKING

- On-street parking spot
- Parallel parking orientation

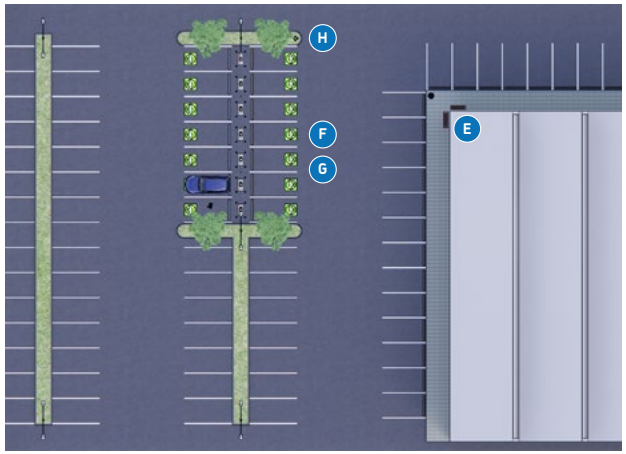


ARCHETYPE 6
ON-STREET ANGLED AND PERPENDICULAR PARKING

- On-street parking spot
- Angled parking orientation

ARCHETYPE #1 | SURFACE PARKING LOT – LARGE

This archetype includes surface parking lot sites with commercial centres.



A. Lighting

LED light fixtures provide security and improve visibility of an EV station.

B. Signage

Use *EV Charge Station ID + No Parking Sign* standard (MOTI Sign Series Zi-129-LRD) or as required by local bylaws and standards.

C. Cable Management

Auto recoil systems can improve the appearance of an EV station, eliminate a tripping hazard, and reduce potential damage to cables.

D. Charger Protection

Wheel stops and/or bollards can prevent vehicles from bumping into EV stations and causing damage. These must be installed as required by local bylaws and standards.

E. Proximity

Locate EV parking stalls close to buildings and existing electrical infrastructure to reduce installation costs.

F. Orientation

Identify appropriate design solutions when retrofitting an existing parking lot to ensure EV stations are appropriately oriented to parked vehicles.

G. Size

Parking stalls with EV stations must be sized according to local bylaws and standards.

H. Placement

Install EV stations on the edge of parking stall rows and ideally away from trees and existing infrastructure. Ensure stations are not blocking a pedestrian path. Allow for future expansion by installing next to standard or accessible stalls.

- *For funding options and opportunities, see Section 3.3*
- *For more information about signage, see the Capital Region Local Government Electric Vehicle + Electric Bike Infrastructure Planning Guide*
- *For technical design details, see the Capital Region Public Electric Vehicle Charging Archetypes: Technical Guidelines*

Additional Features and Options

- Metering of individual chargers to understand usage and billing
- Load sharing to optimize charging times while reducing costs
- Dual-headed chargers to service more stalls per EV charging station

How to Proceed

- Obtain drawings of property
- Contact a local electrical engineer to discuss practical options and start design

Example of a shopping centre parking lot with EV charging (Hillside Mall, Victoria)

Refer to Common Considerations page for information on accessible design, load sharing, and using smart and dual-headed chargers.

ARCHETYPE #2 | SURFACE PARKING LOT – MEDIUM

This archetype includes surface parking lot sites with 1 to 10 commercial units.

A. Lighting

LED light fixtures provide security and improve visibility of an EV station.

B. Signage

Use *EV Charge Station ID + No Parking Sign* standard (MOTI Sign Series Zi-129-LRD) or as required by local bylaws and standards.

C. Cable Management

Auto recoil systems can improve the appearance of an EV station, eliminate a tripping hazard, and reduce potential damage to cables.

D. Charger Protection

Wheel stops and/or bollards can prevent vehicles from bumping into EV stations and causing damage. These must be installed as required by local bylaws and standards.

E. Proximity

Locate EV parking stalls close to buildings and existing electrical infrastructure to reduce installation costs.

F. Orientation

Identify appropriate design solutions when retrofitting an existing parking lot to ensure EV stations are appropriately oriented to parked vehicles.

G. Size

Parking stalls with EV stations must be sized according to local bylaws and standards.

H. Placement

Install EV stations near commercial unit entrances and ideally away from trees and existing infrastructure. Ensure stations are not blocking a pedestrian path. Allow for future expansion by installing next to standard or accessible stalls.

- *For funding options and opportunities, see Section 3.3*
- *For more information about signage, see the Capital Region Local Government Electric Vehicle + Electric Bike Infrastructure Planning Guide*
- *For technical design details, see the Capital Region Public Electric Vehicle Charging Archetypes: Technical Guidelines*

Additional Features and Options

- Metering of individual chargers to understand usage and billing
- Load sharing to optimize charging times while reducing costs
- Dual-headed chargers to service more stalls per EV charging station

How to Proceed

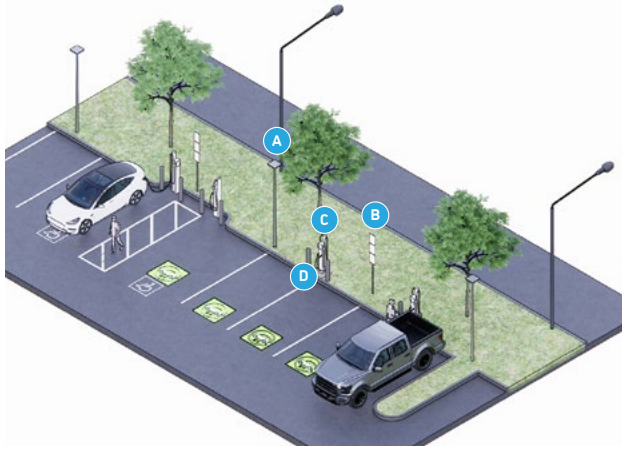
- Obtain drawings of property
- Contact a local electrical engineer to discuss practical options and start design

Examples of parking lots shared by several businesses with EV charging (Anytime Fitness at 5120 Cadboro Bay Road [top] and Saanich Plaza [bottom])

Refer to Common Considerations page for information on accessible design, load sharing, and using smart and dual-headed chargers.

ARCHETYPE #3 | SURFACE PARKING LOT – SMALL

This archetype includes surface parking lot sites with single establishments.



A. Lighting

LED light fixtures provide security and improve visibility of an EV station.

B. Signage

Use *EV Charge Station ID + No Parking Sign* standard (MOTI Sign Series Zi-129-LRD) or as required by local bylaws and standards.

C. Cable Management

Auto recoil systems can improve the appearance of an EV station, eliminate a tripping hazard, and reduce potential damage to cables.

D. Charger Protection

Wheel stops and/or bollards can prevent vehicles from bumping into EV stations and causing damage. These must be installed as required by local bylaws and standards.

E. Proximity

Locate EV parking stalls close to buildings and existing electrical infrastructure to reduce installation costs.

F. Orientation

Identify appropriate design solutions when retrofitting an existing parking lot to ensure EV stations are appropriately oriented to parked vehicles.

G. Size

Parking stalls with EV stations must be sized according to local bylaws and standards.

H. Placement

Install EV stations at accessible stalls next to standard stalls to provide charging for all drivers. Should ideally be away from trees and existing infrastructure. Ensure stations are not blocking a pedestrian path.

- *For funding options and opportunities, see Section 3.3*
- *For more information about signage, see the Capital Region Local Government Electric Vehicle + Electric Bike Infrastructure Planning Guide*
- *For technical design details, see the Capital Region Public Electric Vehicle Charging Archetypes: Technical Guidelines*

Additional Features and Options

- Metering of individual chargers to understand usage and billing
- Load sharing to optimize charging times while reducing costs
- Dual-headed chargers to service more stalls per EV charging station

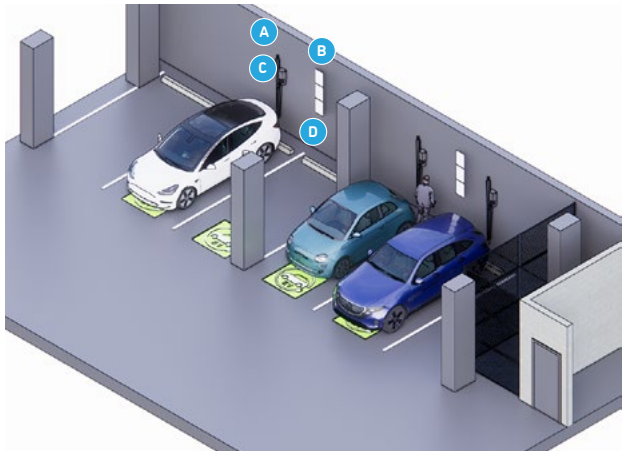
How to Proceed

- Obtain drawings of property
- Contact a local electrical engineer to discuss practical options and start design

Example of a single establishment with a dedicated off-street parking lot with EV charging (Esquimalt Gorge Park & Pavilion)

Refer to Common Considerations page for information on accessible design, load sharing, and using smart and dual-headed chargers.

ARCHETYPE #4 | UNDERGROUND PARKING FACILITY



A. Wall Mount

Install EV stations on the wall to reduce installation costs and maintain a seamless appearance.

B. Signage

Use *EV Charge Station ID + No Parking Sign* standard (MOTI Sign Series Zi-129-LRD) or as required by local bylaws and standards.

C. Cable Management

Auto recoil systems can improve the appearance of an EV station, eliminate a tripping hazard, and reduce potential damage to cables.

D. Charger Protection

Wheel stops and/or bollards can prevent vehicles from bumping into EV stations and causing damage. These must be installed as required by local bylaws and standards.

E. Proximity

Locate EV parking stalls close to a base building electrical room to reduce installation costs.

F. Orientation

Install EV stations on stalls adjacent to a wall to reduce costs and improve appearance.

G. Location

Install EV stations close to the parkade entrance and/or on the primarily accessed parkade floor (e.g., P1) with directional signage to increase public visibility.

H. Placement

Install EV stations on the edge of parking stall rows. Ensure stations are not blocking a pedestrian path. Allow for future expansion by installing next to standard or accessible stalls.

- *For funding options and opportunities, see Section 3.3*
- *For more information about signage, see the Capital Region Local Government Electric Vehicle + Electric Bike Infrastructure Planning Guide*
- *For technical design details, see the Capital Region Public Electric Vehicle Charging Archetypes: Technical Guidelines*

Additional Features and Options

- Metering of individual chargers to understand usage and billing
- Load sharing to optimize charging times while reducing costs
- Dual-headed chargers to service more stalls per EV charging station

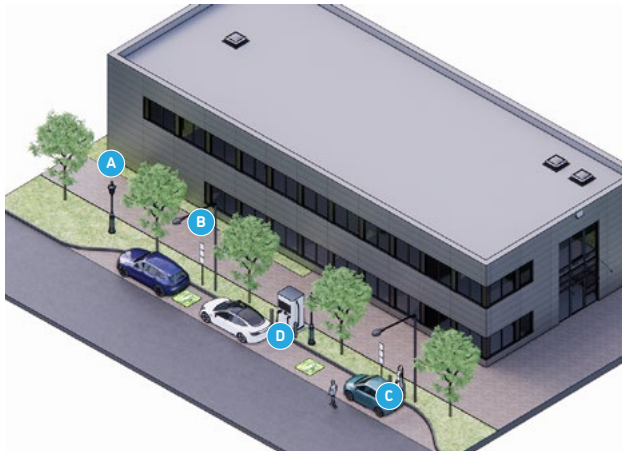
How to Proceed

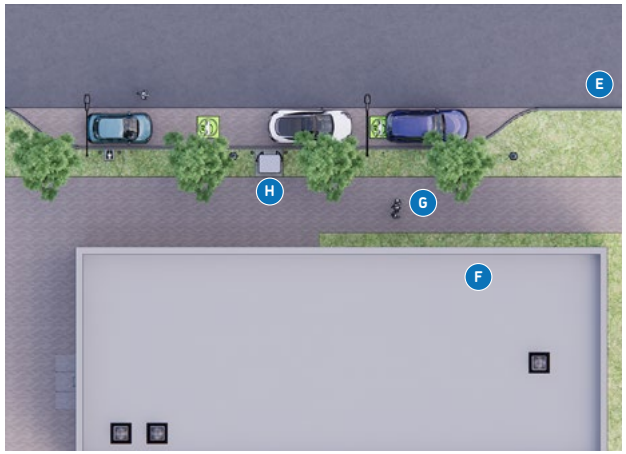
- Obtain drawings of property
- Contact a local electrical engineer to discuss practical options and start design

Examples of underground parking with EV charging (Centennial Square Parkade [top] and Tesla Supercharging hub at Uptown Mall [bottom])

Refer to Common Considerations page for information on accessible design, load sharing, and using smart and dual-headed chargers.

ARCHETYPE #5 | ON-STREET PARALLEL PARKING





A. Lighting

Street lighting provide security and improve visibility of an EV station.

B. Signage

Use *EV Charge Station ID + No Parking Sign* standard (MOTI Sign Series Zi-129-LRD) or as required by local bylaws and standards.

C. Cable Management

Auto recoil systems can improve the appearance of an EV station, eliminate a tripping hazard, and reduce potential damage to cables.

D. Charger Protection

Bollards can prevent vehicles from bumping into EV stations and causing damage. These must be installed as required by local bylaws and standards.

E. Proximity

Locate EV parking stalls close to buildings and existing electrical infrastructure with sufficient capacity to reduce installation costs.

F. Placement

Locations next to parks, stores, or other high-usage parking areas with longer stay times will promote charging.

G. Conflicts

Locate and design EV parking stalls that minimize impact to adjacent pedestrian & cycling facilities (e.g., sidewalks, bike lanes) and existing trees.

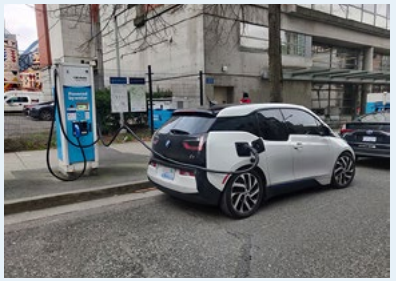
- *For funding options and opportunities, see Section 3.3*
- *For more information about signage, see the Capital Region Local Government Electric Vehicle + Electric Bike Infrastructure Planning Guide*
- *For technical design details, see the Capital Region Public Electric Vehicle Charging Archetypes: Technical Guidelines*

Additional Features and Options

- Metering of individual chargers to understand usage and billing
- Load sharing to optimize charging times while reducing costs
- Dual-headed chargers to service more stalls per EV charging station

How to Proceed

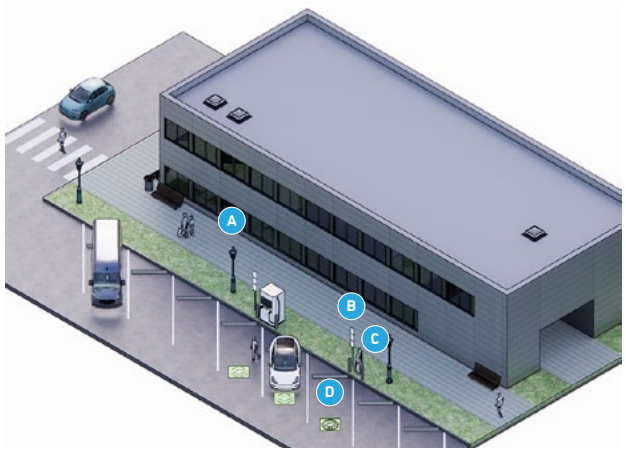
- Engage with local municipality to understand public right-of-way considerations, including: (1) potential constraints that would prohibit installation of a new station; (2) permitting requirements; (3) if the municipality has interest in cost-sharing for equipment purchasing and installation; and (4) ownership and maintenance requirements.
- Contact a local electrical engineer to discuss practical options and start design

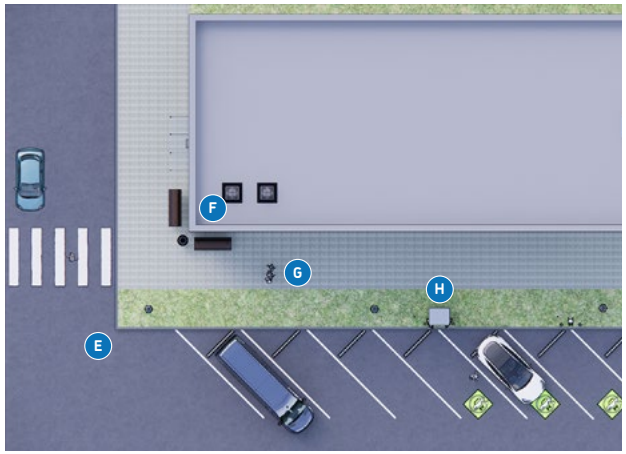


Example of on-street parallel parking with EV charging (Homer Street, Downtown Vancouver)

Refer to Common Considerations page for information on accessible design, load sharing, and using smart and dual-headed chargers.

ARCHETYPE #6 | ON-STREET ANGLED AND PERPENDICULAR PARKING





A. Lighting

Street lighting provide security and improve visibility.

B. Signage

Use *EV Charge Station ID + No Parking Sign* standard (MOTI Sign Series Zi-129-LRD) or as required by local bylaws and standards.

C. Cable Management

Auto recoil systems can improve the appearance of an EV station, eliminate a tripping hazard, and reduce potential damage to cables.

D. Charger Protection

Wheel stops and/or bollards can prevent vehicles from bumping into EV stations and causing damage. These must be installed as required by local bylaws and standards.

E. Proximity

Locate EV parking stalls close to buildings and existing electrical infrastructure with sufficient capacity to reduce installation costs.

F. Placement

Locations next to parks, stores, or other high-usage parking areas with longer stay times will promote charging.

G. Conflicts

Locate and design EV parking stalls that minimize impact to adjacent pedestrian & cycling facilities (e.g., sidewalks, bike lanes) and existing trees.

H. Placement

Angled and perpendicular parking EV charging options should be avoided in favour of parallel parking as the location of charging ports on a vehicle can vary (e.g., front, rear, side), which can make accessing and using these stalls difficult or not practical.

- *For funding options and opportunities, see Section 3.3*
- *For more information about signage, see the Capital Region Local Government Electric Vehicle + Electric Bike Infrastructure Planning Guide*
- *For technical design details, see the Capital Region Public Electric Vehicle Charging Archetypes: Technical Guidelines*

Additional Features and Options

- Metering of individual chargers to understand usage and billing
- Load sharing to optimize charging times while reducing costs
- Dual-headed chargers to service more stalls per EV charging station

How to Proceed

- Engage with local municipality to understand public right-of-way considerations, including: (1) potential constraints that would prohibit installation of a new station; (2) permitting requirements; (3) if the municipality has interest in cost-sharing for equipment purchasing and installation; and (4) ownership and maintenance requirements.
- Contact a local electrical engineer to discuss practical options and start design

Example of on-street perpendicular parking with EV charging (Store Street, Downtown Victoria).

Refer to Common Considerations page for information on accessible design, load sharing, and using smart and dual-headed chargers.

ADDITIONAL CONSIDERATIONS FOR ON-STREET PARKING ARCHETYPES #5/6

On-street EV charging stations have unique design considerations to take into account, particularly related to accessibility and integration with the public realm. This page provides additional design guidance for publicly accessible EV charging stations in these locations.

A. Protected Bike Lanes

Protected bike lanes add a physical separation between the sidewalk area to the street/parking stall. Consider the following:

- Using cable management systems to eliminate loose cables which can lead to unnecessary damage and tripping hazards for cyclists and people using wheeled mobility devices
- Providing separation between the drive lane and bike lane to reduce potential collisions with adjacent vehicular traffic
- Digging underground will likely be required which could result in temporary modifications to the bike lane

B. Boulevard and Public Green Space Parking

Green space and parks are a suitable location to install EV charging stations due to the typical length of stay and ample space available. Consider the following:

- Using cable management systems to eliminate loose cables which can lead to unnecessary damage and tripping hazards
- Identify space requirements of EV stations and electrical infrastructure to not consume valuable green space
- Install EV stations to not impede on existing trees and/or lead to their removal

C. Areas with High Parking Occupancy

On-street parking locations with a high concentration of destinations and commercial activity are often busy with an appropriate length of stay. Consider the following:

- Using cable management systems to eliminate loose cables which can lead to unnecessary damage and tripping hazards
- Identify space requirements of EV stations and electrical infrastructure to not reduce clear space for walking
- Installing close to existing electrical infrastructure will reduce costs and construction times
- Locate and design EV parking stalls that minimize impact to adjacent pedestrian & cycling facilities (e.g., sidewalks, bike lanes) and existing trees

3.3

CURRENT FUNDING PROGRAMS

CURRENT PROGRAMS AVAILABLE TO SUPPORT PUBLIC EV CHARGING STATION INSTALLATIONS

The Funding Landscape

The funding landscape for publicly accessible EV charging stations continues to grow and change, with funding programs available from federal, provincial, and municipal sources currently available. Programs available as of January 2023 are summarized in this section.

Current Federal and Provincial Programs

There are three main programs available:

- Zero Emission Vehicle Infrastructure Program (ZEVIP) from Natural Resources Canada (NRCan) - See Page 26
- CleanBC Go Electric Program from the Province of BC - See Page 27
- CleanBC Go Electric Public Charger Program from the Province of BC - See Page 28

Funding programs, including eligibility and funding amounts, are subject to change. It is therefore recommended to visit the websites provided on each funding page to ensure you have access to the most up to date information.

Municipal Programs

Municipalities typically structure funding programs as top-up offers for the federal and provincial programs. Top-up programs are subject to change, and it is recommended to contact your local municipality to see if there are any current offers. See www.crd.bc.ca/charge for more information.

ZERO EMISSION VEHICLE INFRASTRUCTURE PROGRAM

NATURAL RESOURCES CANADA (NRCAN)

Description

The Zero Emission Vehicle Infrastructure Program (ZEVIP) is a $680 million initiative by Natural Resources Canada (NRCan). Its objective is to address the lack of charging and refuelling stations in Canada (one of the key barriers to zero emission vehicle adoption) by increasing the availability of localized charging and hydrogen refuelling opportunities where Canadians live, work, and play. The program ends in 2027.

Eligibility

The program targets multiple infrastructure streams, including:

- Public places (e.g. service stations, retail, restaurants, arenas, libraries, medical offices, park and ride etc.)
- On-street
- Workplaces
- Multi-Unit Residential Buildings
- Commercial and Public Fleets

Funding Amounts

The Program provides funding amounts of:

- 50% of Total Project Costs (75% for indigenous entities) up to a maximum of $5,000,000 per project and up to a maximum of two million dollars $2,000,000 per project for Delivery Organizations
- Level 2 Connector maximum of $5,000 per connector
- Fast Charger (20kW to 49 kW) maximum of $15,000 per charger
- Fast Charger (50kW to 99 kW) maximum of $50,000 per charger
- Fast Charger (100kW to 199 kW) maximum of $75,000 per charger
- Fast Charger (200kW and above) maximum of $100,000 per charger

Eligible Costs

Eligible costs include:

- Salary and benefits
- Professional services (e.g. marketing, data collection, logistics, printing, distribution)
- Reasonable travel costs, including transportation, meals, and accommodation
- Capital expenses, including informatics and other equipment or infrastructure
- Rental fees or leasing costs
- License fees and permits
- Costs associated with Environmental Assessments
- GST, PST and HST net of any tax rebate to which the recipient is entitled
- Overhead expenses directly related to the project, included in the 15% maximum of NRCan funding, will be considered to a maximum of 15% of Eligible Expenditures

Delivery Organizations

Third-party delivery organizations are available to distribute ZEVIP funds to ultimate recipients to install electric vehicle charging infrastructure projects. This can make the funding administration easier and more efficient. A list of these delivery organizations is available at the ZEVIP website.

Natural Resources Canada | Ressources naturelles Canada

Canada

FOR MORE INFORMATION: *More information about the ZEVIP, including how to apply and service standards, can be found at: https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876*

CLEANBC GO ELECTRIC PROGRAM

PROVINCE OF BC

The CleanBC Go Electric EV Charger Rebate Program provides rebates towards the cost of the purchase and installation of eligible electric vehicle (EV) charging equipment, and support services for multi-unit residential buildings and workplaces seeking solutions for their EV charging needs. The program is administered by BC Hydro.

Eligibility

Applicant must be a Workplace with all the following:

- Be located in B.C.
- Have a minimum of 5 employees that work primarily based on the premises
- Be constructed no later than August 31, 2021; this rebate is intended for retrofit solutions only, new builds are ineligible
- Have dedicated parking for employees: the rebated charging stations must be dedicated for the use of employees only (not fleet vehicles), during employee working hours

Funding Amounts

The Program provides funding amounts of:

- Installation costs of eligible, new, Level 2 charging equipment up to 50% of costs (75% for indigenous businesses), up to a maximum per station of $2,000 ($4,000 for dual port chargers)
- Maximum reimbursement up to $14,000 per workplace

Eligible Costs

Eligible costs include:

- Purchase of the charging station
- Labour and construction costs for the installation of the charging station, and associated conduit by a licensed electrical contractor
- Site assessments of the building's requirements and costs to install EV charging infrastructure. A site assessment to include:
  - » Analysis of electrical capacity
  - » Review of panel capacity
  - » Review of physical electrical set up in building and identifying points of interconnection
- Identification of potential design options for up to 100% electrification
- Electrical and other related permits
- Parking and electrical design to accommodate the charging stations and conduit
- EV parking signage
- Cost of network connection fees (maximum of 2 years to be considered towards eligible costs)

FOR MORE INFORMATION: *More information about the CleanBC Go Electric Program can be found at: https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/power-smart/electric-vehicles/EV-incentive-program-guide.pdf*

CLEANBC GO ELECTRIC PUBLIC CHARGER PROGRAM

PROVINCE OF BC

The CleanBC Go Electric Public Charger Program is a sub-program of the CleanBC Go Electric Program and is intended to increase the number of public Direct Current Fast Charger (DCFC) stations throughout BC to support the growing number of ZEVs on the road.

Eligibility

Applicant must be all the following:

- Be the current site owner or have approval (in writing) from the site owner to install the charging infrastructure for a minimum ten-year period
- Be a business, not-for-profit, local government, Indigenous community, utility or public sector organization located and operating in B.C.

Funding Amounts

The Program provides funding amounts of:

- 50% of Total Project Costs (90% for Indigenous entities) up to a maximum of $80,000 per charge port
- Level 2 Connector maximum of $5,000 per connector
- Fast Charger (20kW to 49 kW) maximum of $20,000 per connector
- Fast Charger (50kW to 99 kW) maximum of $50,000 per connector
- Fast Charger (100kW or above) maximum of $80,000 per connector
- Fast Charger (200kW and above) maximum of $100,000 per connector

Eligible Costs

Eligible costs include:

- Dual standard DCFC equipment
- Level 2 stations (co-located with DCFCs only, or meeting requirements in section 3.2.1 of the Program Guide)
- Installation costs such as labour and materials, including:
  - Necessary electrical equipment (e.g. cabling and conduit, transformer)
  - Earthworks
  - Paving of one parking space per charger
  - Curb and/or protective bollards around chargers
  - Lighting directly above or adjacent to chargers (within 5 m)
  - Network equipment (e.g. cellular booster)
  - Wayfinding and on-site signage pertaining to the chargers (e.g. location, output, time limits, instructions for use)
  - Site markings (e.g. pavement painting)
  - One security camera per charger
- Project management and engineering design fees
- Tesla CHAdeMO adapter
- Utility provider fees for electrical connection
- Network service provider initial sign-up fees
- Equipment warranty

FOR MORE INFORMATION: *More information about the CleanBC Go Electric Public Charger Program can be found at: https://pluginbc.ca/wp/wp-content/uploads/2020/12/ProgramGuide_GoElectricBC_Public_Charger__FINAL_2022_03_30.pdf*

3.4

ACCESSING CREDITS THROUGH BC'S LOW CARBON FUEL STANDARD

LOW CARBON FUEL STANDARD

PROVINCE OF BC

What does a prospective site host need to know?

GENERAL INFORMATION

To claim credits, a prospective site host will require a registered EV charging station (referred to under the LCFS as *fuel supplier equipment*) that has a metering system to ensure accurate and reliable measurement of the quantity of electricity provided.

This can be achieved with a *networked* or *smart* charging station. This means the EV charging station has the ability to provide utilization data on its overall performance and is designed to be compliant with the Open Charge Point Protocol (OCPP), which allows a charging station to communicate with a charging network that is operated by a network service provider.

Networked stations can provide information on the station's usage metrics such as:

- Charging utilization
- Charging session counts
- Charging session length
- Energy dispensed

The LCFS is not intended to serve as a grant, rebate, or funding program; as such, it is not a stable source of funding for a prospective site host or fuel supplier as it is subject to a credit market, which can be volatile. However, by participating in the program, a site host can generate revenue which can help offset operating costs and/or recover some of the initial capital costs.

The Low Carbon Fuel Standard was introduced by the province in 2018 to reduce the carbon intensity of transportation fuels. Fuel suppliers, which can include gasoline stations and EV charging stations generate credits for supplying fuels with a carbon intensity below the provincial targets and receive debits for supplying fuels with a carbon intensity above the target.

All of the details of the province's LCFS program, including how to register, report, and claim credits is available on the provincial website: *https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels/requirements*

HOW MUCH REVENUE COULD BE GENERATED FROM THE CREDITS?

Example: The LCFS carbon intensity limit in 2022 for gasoline was 78.2 g CO2e/MJ. The energy density for electricity is 3.6 MJ/kWh. Assuming that a site host's charging stations dispense 20,000 kWh over the course of year, they would be eligible for 18 credits. The average credit price in Q3 of 2022 was approximately $450, so 18 credits would work out to approximately $8,000.

These are point-in-time figures provided as a reference point for information. Energy dispensed, and ultimately revenue, will depend on the specific utilization of stations and potential changes to the credit market.

Carbon Intensity Limit for Gasoline (g CO2e/MJ)	Energy Density for Electricity (MJ/kWh)	Eligible Credits (assuming charging stations dispense 20,000 kWh/year)	Potential Revenue (based on the average credit price being $447.97 in Q3 of 2022)
78.20	3.6	18	$8,000

https://www2.gov.bc.ca/gov/content/industry/electricity-alternative-energy/transportation-energies/renewable-low-carbon-fuels/requirements

Aspects of the LCFS process include:

- Reporting requirements
- Data management
- Sale of credits: A credit aggregator pools and sells LCFS credits on behalf of site hosts that generate credits, and then return credit revenue to those same site hosts

The revenue generated from the sale of credits will depend on the market price of those credits.

In our review of the current market, there is typically an aggregation fee of 30% and a brokerage fee of 10%. So, the aggregator typically gets 40% of the revenue with 60% going to the site host.

SHOULD I HIRE AN AGGREGATOR?

The overall registration, administration, and management of LCFS credits can be a complex process. If your organization has an energy manager or an electric mobility coordinator, they would be well suited to manage the LCFS process to help claim and sell credits in the market.

However, for site hosts who have limited resources and staff, a third-party credit aggregator may be a better option as they can handle all relevant aspects of the LCFS process.

3.5

UNDERSTANDING EV CHARGING STATION USAGE

UNDERSTANDING EV CHARGING STATION USAGE

What do site hosts need to know?

GENERAL INFORMATION

Tracking the usage of EV charging stations allows site hosts to understand whether their stations are meeting their organizational needs and objectives, such as generating revenue and/or providing a service to the public. If a site host operates a networked or smart charging station, the network service provider can provide an online performance dashboard that gives access to detailed information about station usage.

At minimum, site hosts should review the following metrics periodically to understand how well their stations are performing in terms of:

1. **Charging station uptime:** amount of time a station is up and is available to be used for charging. This can be used to understand the reliability and level of maintenance required for a station.
2. **Charging utilization:** ratio of charging time to charging station uptime. As charging utilization goes up, drivers are charging more and longer. This can be used to decide whether to expand by adding additional stations to better meet demand.
3. **Charging session count:** number of unique charging events. As charging counts goes up, the more drivers are charging. This can be used to understand the frequency and time periods of usage.
4. **Charging session length:** length of time a vehicle is plugged into a station. This can be used to determine whether restrictions should be implemented to limit who and how long drivers can charge to ensure everyone has an opportunity to charge their vehicle.
5. **Energy dispensed:** amount of energy delivered by a station to vehicles that are charging. This can be used to understand the amount of energy used and potential revenue opportunities through the BC Low Carbon Fuel Standard program (see section 3.4).

Site hosts can work with their network service provider to receive information on other metrics that may be useful (e.g., revenue earned) and what appropriate targets may be for a given metric to ensure stations are serving the needs and objectives of a site host. Collecting this information does not reveal any personal information about who is using the charging station, which respects the privacy of the driver.

BENEFITS OF TRACKING USAGE

Tracking and monitoring the performance of EV stations will help site hosts to:

- **Evaluate usage trends and reliability to support internal business planning** for when to install new stations and support proactive maintenance efforts of existing stations to ensure a reliable charging experience for drivers.
- **Evaluate the potential return on investment and support business case development.** A site host could introduce a usage fee to recover operating costs or earn revenue through the BC Low Carbon Fuel Standard program.

4.0

APPENDICES AND ADDITIONAL RESOURCES

4.1

GLOSSARY

GLOSSARY

Level 2 Charging Station: Uses a 208-to-240-volt circuit like those used for clothes dryers to provide 6.6 to 7.2 kW of power (can be up to 19.2 kW). These are appropriate in locations where cars park for one or more hours, which allows EV drivers to top up their charge while shopping, recreating, or working. A typical EV charges 30 to 500 km per hour.

Level 3 (Direct Current Fast Charger): Uses a 400 volt or higher circuit to provide 25 to 350 kilowatts of power (typically ranges from 50 to 100 kW in the capital region). These are appropriate in where cars park for one hour or less, which allows EV drivers to charge "on-the-go" like at a traditional gas station or if drivers lack a dedicated charging option at home. A typical EV charges 200 to 500 km per hour at 50 kW.

Load Sharing: A technology that allows multiple electric vehicles to charge on the same circuit. In most cases, this will dramatically lower installation costs and allow existing electrical capacity to serve more vehicles while not hindering performance.

Networked Charging Station or Charging Station: Electric vehicle charging stations that are connected remotely to a network of charging stations that allows for payment, load sharing, access to online management tools, and access to detailed information about the usage of stations.

Network Service Provider: Supplies and operates charging station infrastructure and manages EV charging station performance data.

Open Charge Point Protocol: The OCPP is a protocol allowing for communication between an electric vehicle charging station and the charging station management system. It allows operators for electric vehicle charging stations to gain access to real-time information on station performance.

Publicly Accessible EV Charging Station: Stations that are on public or private property and are typically located at public parking facilities, shopping centres and other businesses, gas stations, and civic / municipal facilities (e.g., municipal halls, parks, recreation / community centre, or curbside). Stations on public property may be owned directly by local government, provincial government, or a service/utility provider (e.g., BC Hydro, FortisBC).

Range Anxiety: Range anxiety refers to the fear of running out of battery power before the next opportunity is available to charge an electric vehicle.

Site Host: Owns an electric vehicle charging station and has access to charging station performance data from the network service provider. A site host typically includes a local government, Crown corporation, First Nation, post-secondary institution, private business, or not-for-profit organization.

4.2

CAPITAL REGION EV CHARGING LANDSCAPE DETAILS

As of January 2023, there are approximately 296 Level 2 charging station ports and 35 DCFC ports located across the capital region that are publicly accessible. For the Level 2 stations:

22% Most stations (22%) are in a municipally owned parking facility, including a surface parking lot or parkade

18% About 18% are in a parking lot owned typically by a single business, which could include a gas station, grocery store, financial institution, or restaurant

16% Post-secondary institutions make up 16% of the total Level 2 charging station ports

14% About 14% of the stations are located at a civic facility, which includes a recreation centre, public park, and library

13% 13% are located at a hotel or tourist destination, such as Ogden Point

12% 12% are in a shopping centre or strip mall parking lot

3% About 3% of the stations are in the 'other' category, which is a catch-all category including Government House, the Victoria Conference Centre, and other sites

3% 3% of the stations are located on-street (curbside)

The majority of DCFC ports are located at shopping centres, gas stations, and/or at a municipal parking facility. The regional EV charging landscape for publicly accessible charging stations indicates that about 35% of the Level 2 ports are located on a municipal property and/or civic facility with about 30% located on a private property that is publicly accessible (e.g., shopping centre, off-street parking lot owned by a business). Even though 13% of the Level 2 chargers are at hotels and tourist destinations, access to charging at hotels is typically for guests only but in some instances members of the public are permitted to charge there.

In order to reach the CRD's target of 770 new public Level 2 ports and 132 DCFCs ports by 2030, greater uptake will be needed on private properties where stations can be publicly accessible, including shopping centres, off-street parking lot owned by a business, and strip malls. Curbside charging opportunities are also limited in the capital region and could grow significantly with more collaboration between private property owners and local government.

Achieving the regional charging station targets will require dedicated access to funding and consistent design of stations to grow the regional network.

Simplified categories	Locations	Share of Total	Level 2 charger	Level 2 share of total	DCFC charger	DCFC share of total
Single Business *(e.g., gas station, grocery store, business w/ dedicated parking lot)*	24	21%	52	18%	6	17%
Municipal Parking	23	20%	64	22%	4	11%
Hotel / Tourist Destination	17	15%	39	13%	2	6%
Shopping Centre/ Strip Mall	14	12%	36	12%	19	54%
Post-secondary Institution	11	9%	46	16%	0	0%
Public Park	10	9%	14	5%	2	6%
Recreation Centre	7	6%	24	8%	0	0%
Curbside Charger	4	3%	8	3%	2	6%
Library	2	2%	3	1%	0	0%
Other	5	4%	10	3%	0	0%
Total	**117**	**100%**	**296**	**100%**	**35**	**100%**

CAPITAL REGION PUBLIC ELECTRIC VEHICLE CHARGING GUIDE

FEBRUARY 2023