

# Accessible EV Charging: Design Event

## Background

On September 12, 2023, the City of Vancouver and SPARC BC partnered to host an event to test mock-ups of accessible electric vehicle (EV) charging stall designs. BC Hydro attended and provided fast charging cables. At present, the City of Vancouver does not have accessibility guidelines for EV charging stalls, and there is minimal accessible charging in Vancouver, if any. The purpose of the guidelines is to make EV charging more accessible for people with disabilities (with a focus on mobility needs).

Feedback collected from the event will be used to inform the City of Vancouver’s accessibility guidelines and will be shared with other jurisdictions that are creating accessible EV charging design guidelines. The City’s accessibility guidelines will apply to new City-owned EV chargers only.

## Participants

Seven participants tested the designs. Three of them were in sedans, three were in regular sized vans with ramps, and one was in a larger van with a lift ramp. Three participants were in manual wheelchairs, three used power wheelchairs, and one did not use a mobility aid. One participant had an electric vehicle. Several passersby also engaged with staff and showed interest in EV charging.

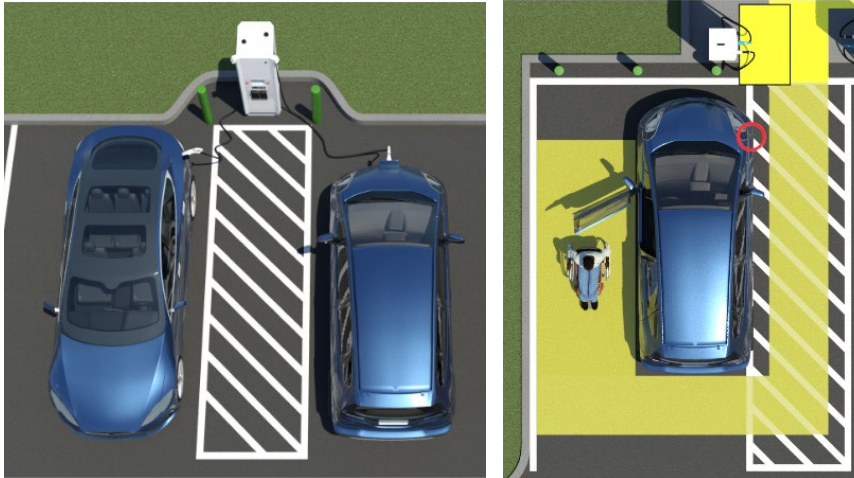
## Designs

The event took place at a parking lot at Spanish Banks, and three accessible charging stall designs were tested (see table below). Participants parked their vehicles at each of the stations, exited their vehicles, moved towards the charger, accessed the cable, "charged" their car, and returned the cable. Participants were asked about their experience testing each design and about their overall experience. Feedback was digitized and analyzed.

*Accessible EV Charging Stall Mock Up Designs:*

Stall	Width	Charger type	Configuration
1	Van accessible (5 m)	Level 2 (long cable)	In front of stalls, Perpendicular*
2	Accessible (4 m)	DCFC (short, heavy cable)	In between stalls, Parallel*
3	Van accessible (5 m)	DCFC (short, heavy cable)	In between stalls, Parallel*

\* Examples of perpendicular (left) and parallel (right) approaches:



Images from the [ADA](#)

## Results

### Station 1

Van accessible, charger in front of parking stall, Level 2 charger (lighter cable)



### Parking the car and accessing the charger

	Enough space to park?	Enough space to move from car to charger?
Yes – plenty of room	7	6
Somewhat - could manage but it felt tight	0	1
No – not enough room	0	0

### Parking:

- All participants liked the width of the spot but noted that it is difficult to find spaces this large in the public realm.

**Moving between car and charger:**

- The width allowed for travel between the car and charger, however there were still challenges depending on where the charge port of the car was located, or if the car had a ramp.
- Depending on where the charge port of the car was, participants may have had to close the ramp to access the charger.

**Accessing and carrying the cable**

	<i>How easy was it to access the cable?</i>	<i>How easy was it to bring the cable to and from the car?</i>
Easy	2	4
Could be better, but I was able to reach it	3	2
Difficult	2	1

- The longer, lighter cable allowed for more flexibility in how the participants parked, as it could be carried further. However, it got caught on some wheelchairs and was awkward to uncoil and recoil.
- The height of the cable connector was too high for some participants, and due to the angle and the release button on the connector, it was difficult for some to get the connector off the charger.
- The “bollards” (cones) made it difficult to access this charger, especially for those in wheelchairs.

**Station 2**

*Accessible, charger beside parking stall, DC fast charger (heavier cable)*



**Parking the car and accessing the charger**

	<i>Enough space to park?</i>	<i>Enough space to move from car to charger?</i>
Yes – plenty of room	4	3
Somewhat - could manage but it felt tight	1	2
No – not enough room	2	2

**Parking:**

- Many participants had enough space to park, but some found it difficult.
- One participant did not have enough room to park and use their ramp to get out of the vehicle (ramps require at least 8 ft from lift).

**Moving between car and charger:**

- Some participants felt it was awkward to maneuver towards the charger, especially for those with larger cars and ramps.
- For those with ramps, it may not be possible to access the charger if there were a car parked in the next stall.

**Accessing and carrying the cable**

	<i>How easy was it to access the cable?</i>	<i>How easy was it to bring the cable to and from the car?</i>
Easy	0	0
Could be better, but I was able to reach it	3	0
Difficult	3	6

- The DCFC charger was heavy and stuff, which made it difficult for all participants to bring to and from the charger (or in one case, not possible).
- Carrying the cable while maneuvering a wheelchair proved to be especially difficult, and the cable often got in the way of the wheelchair.
- Some participants had to use their knees or shoulders to carry the cable. This could lead to getting dirt on clothes.
- Reach height and the ease of using the button to release the cable should be considered.
- The surface was slightly sloped compared to Station 1, and this created more of a challenge. Some vehicle ramps are not meant to be extended on sloped surfaces.

**Station 3**

*Van accessible, charger beside parking stall, DC fast charger (heavier cable)*



### ***Parking the car and accessing the charger***

	Enough space to park?	Enough space to move from car to charger?
Yes – plenty of room	5	4
Somewhat - could manage but it felt tight	0	1
No – not enough room	1	2

#### ***Parking:***

- Most participants thought there was enough room to maneuver.
- The slight slope caused additional challenges (especially for participants in manual wheelchairs).
- The shorter cable reduced the flexibility of how to park in relation to the charger (e.g., would need to park closer to the charger, but this may not leave enough room for the ramp or to maneuver).

#### ***Moving between car and charger:***

- The extra space provided more options to travel towards the charger.
- While the space was large enough for most, if there was a wall or a car parked in the next stall, it may be difficult to maneuver to the charger.
- There was not enough space for the larger van. While there may have been enough space for the ramp to extend, the participant may have hit the EV charger as they tried to exit the vehicle due to the orientation of the charger.

### ***Accessing and carrying the cable***

	How easy was it to access the cable?	How easy was it to bring the cable to and from the car?
Easy	1	2
Could be better, but I was able to reach it	2	0
Difficult	4	5

- Similar to Station 2, participants found the cables heavy and awkward to manage, and connector height and slope are important factors for those in wheelchairs.
- Some participants felt that the parallel approach and lack of bollards made it easier to get closer to the cable.

### **General feedback**

In general, participants noted that it requires more planning to park a car in order to charge, as one would need to consider the orientation of the charger and charge port of the car, and the ramp (if present). Participants also noted that while bollards could aid with visibility, they would need to be placed wide enough to allow users in wheelchairs to access the cable. Some participants noted they would prefer not to have bollards. Ramps are typically on passenger side, but the charge port on the car could be in various places. Some participants noted that they would like to see accessible EV

charging design features as requirements rather than guidelines, and to standardize this across Metro Vancouver if possible.

### Overall Design

	STATION 1	STATION 2	STATION 3
Easiest Design	6	0	1
Most Difficult Design	1	3	2



#### Easiest Design:

- Most participants chose Station 1 because the cable was lighter and longer, but they still noted that a management system and lower access point would be desired.
- The van accessible width of the space allowed for a ramp and more maneuverability.
- The participant that selected Station 3 appreciated the width and preferred the parallel approach.



#### Most Difficult Design:

- Stations 2 and 3 proved to be the most difficult due to the heavy and rigid cable.
- Station 2 was slightly more difficult to use due to the size of the stall (4 m vs. 5 m); it would not be usable for those with ramps if there was another car in the next stall.

## Other Considerations

### ***Marked Access Aisle***

Yes	5
Not sure	0
No	0
Other	2

- Participants preferred to have a marked aisle rather than one larger stall, as it adds a visual cue and would prevent people from parking too close.
- Suggestions to share one marked space between two stalls.

### ***Safety and comfort***

Participants noted that light, cable management, and an even and level surface would ensure safety. Weather protection could provide additional comfort.

### ***Interest in switching to an EV in the future***

Yes	3
Not sure	2
No	1
Other	1

Many participants noted barriers including a lack of accessible EV charging stalls, no access to home charging, and the capital cost of EVs. Those who were unsure had questions around adequate grid capacity and battery range for longer trips. The participant who was not interested cited the cost to modify the car for their access needs and uncertainty about whether accessible charging stalls would be reserved for people with disabilities as barriers. One participant already drives an EV.

### ***Space to move between car and charger***

The van accessible stalls provided the best flexibility and maneuverability.

### ***Accessing the cable***

Some participants found it easier to reach for the cable with the parallel approach, and many participants noted the lack of bollards also made it easier. Participants generally preferred the Level 2 cable, due to it being lighter and less awkward to manage. The DC fast charger cable was difficult for those in wheelchairs to manage. A cable management system would be preferred in all cases. Reach height and surface slope must be considered. A larger stall allows participants to reach the cable more easily (provides more flexibility).

## Conclusion

There is no one-size-fits-all approach that will be best for everyone. In general, a larger stall size (van accessible) served most people and allowed for more flexibility. Having a variety of orientations of chargers available to suit different people in different situations would be helpful. For larger cars with ramps, more participants found that having the charger in front of the parking stall allowed for more flexibility, however some participants preferred having the charger in between the stalls. DC fast charging cables were difficult (or in some cases impossible) to manage and carry between the car and charger. The larger stall made it slightly easier to manage the heavier cables (more room to maneuver). A cable management system is strongly required to ensure accessibility for all charger types. Cable height and surface slope also must be considered. Participants would prefer to have a marked access aisle and lighting, and where possible, weather protection.