Exterior Design Elements

1. Introduction

This discussion paper will provide information on exterior design elements such as parking lots, bike lanes, sidewalks and electric vehicles (EV) charging stations. Specifications to enhance the accessibility of bike lanes and parking lots are presented below. This discussion paper will also present international best practices for consideration on how EV charging stations can be installed without creating accessibility barriers.

2. Parking Lots

To accommodate people with a varying range of abilities (including blindness), designated parking spaces and passenger pick-up/drop-off zones for people with disabilities should be located close to a building entrance.

Where a parking lot serves several buildings, designated parking spaces should be located next to the shortest pedestrian path of travel that leads to these buildings.

Paths of travel should be distinctly marked and physically separated from vehicular traffic. They should not require pedestrians to navigate along vehicular roadways or behind parked cars.

Spatial requirements of accessible parking spaces are also important. Wider parking spaces make exiting and entering vehicles easier for some people with guide dogs or those using mobility devices. Parking spaces should be at least 3,600 mm wide and within close proximity to entrances.

When parking lots are situated next to walkways, concrete wheel stops should be used to prevent car bumpers from protruding onto or obstructing the path of travel. Wheel stops should be painted bright yellow or another colour that contrasts with their immediate surroundings. The wheel stops should be positioned so that the front ends of vehicles don't protrude onto an adjacent sidewalk. If this isn't possible, consider placing bollards to prevent vehicles from impeding the path of travel.

3. Bike Lanes

Bike lanes are a popular cycling infrastructure that have been implemented worldwide. Bike lanes are commonly delineated by painted lines, signage or barriers such as vertical posts,

medians or a well-marked buffer zone. Bike lanes are typically located next to the travel lane of motor vehicles and flow in the same direction. The purpose of a bike lane is to designate a space solely for a cyclist–a space where bicyclists feel safe to coexist with vehicle traffic.

It is important to note that bike lanes are only safe if they have been designed effectively and with careful consideration. Investing in safe cycling infrastructure is essential for protecting cyclists from injuries caused by motor vehicles. Safe cycling infrastructure also supports active transportation and results in an overall healthy and environmentally friendly city.

Bike infrastructure must not only ensure the safety of cyclists but the safety of pedestrians as well. A variety of cycling infrastructure and street design implemented in cities has caused accessibility concerns for pedestrians, especially for people with disabilities.

3. 1. Accessibility Issues among Cycling Infrastructure

3.1.1 Bus Stop Bypass

In order to accommodate cyclists many cities around the world have implemented a bus stop bypass. A bus stop bypass is a bike lane that cuts through the pavement and runs behind a bus stop shelter. Bike lanes run adjacent to the road, creating an 'island' blocked off from the rest of the pavement (Transport for all, 2016). For more information visit: https://www.transportforall.org.uk/news/tfl-stop-building-floating-bus-stops-until-safety-concerns-are-dealt-with/

These bus stop bypasses were designed to accommodate cyclists traveling at high speeds and for cyclists to avoid the challenge of overtaking buses while they were stationed picking up passengers.

Individuals impacted by blindness or low vision are the most disadvantaged by this design. For people who are blind and rely on public transit, they will have to dodge cyclists while boarding or exiting the bus (Transport for all, 2016).

According to Getting to the Curb, A Guide to Building Protected Bike Lanes That Work for Pedestrians by the Senior & Disability Pedestrian Safety Workgroup of the San Francisco Vision Zero Coalition, authored by Natasha Opfell, individuals who are blind or impacted by low vision may feel lost when looking for the transit island or existing a bus onto a transit island. When departing a bus, they may not realise they are on a “floating” bus stop, they may not know where and when to cross safely to get to the sidewalk, and they may be unable to identify bus stops if they have been relocated to a transit island.

Seniors and people with mobility disabilities will also be at a disadvantage as they may cross the bicycle freeway at a slower pace, which could result in serious injury if a cyclist does not slow down.

For more information about the document "*Getting to the Curb, A Guide to Building Protected Bike Lanes That Work for Pedestrians*" visit: https://walksf.org/wp-content/uploads/2019/12/getting-to-the-curb-report-final-walk-sf-2019.pdf

United Kingdom

Cycling infrastructure across cities in the UK have failed to consider the needs of pedestrians with disabilities, especially those impacted by blindness and low vision.

The Mayor of London introduced the Mini-Holland scheme as part of the city's approach of decreasing trips made by vehicles. In an effort to create a bike-friendly city, London has introduced bus stop bypasses in a variety of towns within the city.

The introduction of such infrastructure has resulted in distress for people with disabilities as getting to and from the bus stop is a serious safety risk.

Example of a bus stop bypass in Cambridge.
Source: Road.cc

London's bus stop bypasses do include TWSIs however, there is nothing to tell a cyclist that they must stop to give a right of way to pedestrians as some bike lanes do not include zebra crossing or signage.

Victoria, BC

Bus stop bypasses were also implemented in Victoria, BC to accommodate cyclists and increase the number of bikes on the road.

In order to get to the bus stops along Pandora Street, people have to cross a two-way bike lane. This presented issues for pedestrians who were blind as most cyclists did not stop for

pedestrians to cross. Bikes are also silent due to motor vehicles drowning them out, making it harder for people who are blind to tell when it is safe to cross to get to the bus stop.

Victoria's bike lanes are also designed at the same level as the sidewalk, creating further navigational challenges for people who are blind.
Because the bike lane is not sunken into the pavement, there is no edge, therefore the bike lane is not detectable by cane, which could potentially lead to injury.

Example of one of the bus stops by pass in Victoria. The bike lane is the same level as the sidewalk causing further accessibility concerns for pedestrians who are blind.
Source: Times Colonist

Recommendations

Bike lanes must be designed to ensure that cyclists are traveling at a safe speed when approaching areas where pedestrians are crossing the bike lane (Opfell, 2018). A narrowed lane, speed bumps, rumble strips, zebra crossings, signage and light signals are helpful tools to increase the safety of pedestrians.

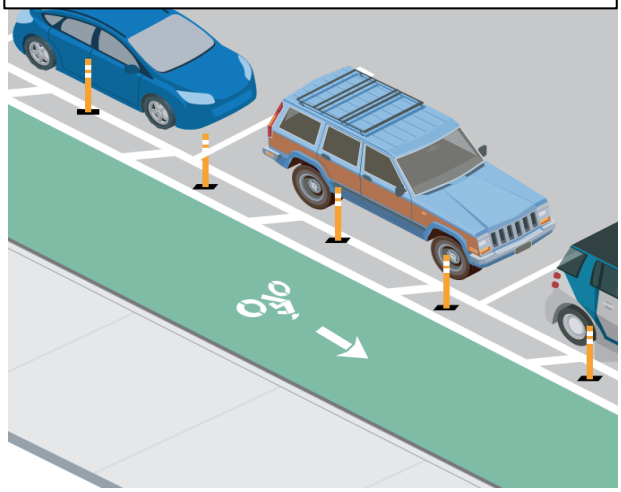
Planners, designers, transportation advocates, and engineers must ensure the safety of people with disabilities. Community engagement must be the primary approach when designing new infrastructure. Government agencies that design streets must prioritize the safety of pedestrians and work closely with people with disabilities, seniors and disability organizations.

3.1.2 On Street Parking

On street parking is another accessibility issue caused by bike lanes. When parking is moved on the other side of a bike lane, pedestrians who want to get out or in their car must cross a lane of bike traffic. Having parking on the other side of a bike lane also increases the distance one must travel from their vehicle to the sidewalk (Opfell, 2018). This creates accessibility concerns for wheelchair users, seniors and people with disabilities who have trouble with long distances.

The document *Getting to the Curb, A guide to Building Protected Bike Lanes That Work for Pedestrians* states that buffers must be wide enough to keep both pedestrians and cyclists safe from bumping into one another. If a buffer is too narrow, it will be uncomfortable and

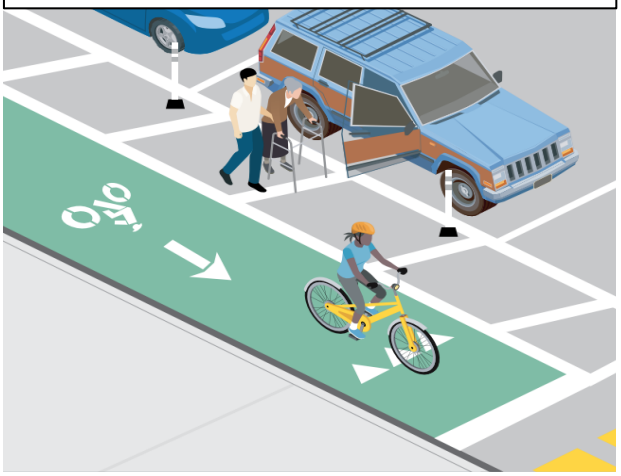
Bad example. Buffer is too narrow, posts are blocking access to vehicle loading and unloading. Posts are also obstructing the buffer/ path of travel.
Source: Walksf, 2018



dangerous for people who are loading and unloading to and from their car. Buffers should also lead to a safe and accessible crossing path.

Many bike lanes also include temporary posts to add light protection and designate the cycle track. When posts are used next to parking and loading areas, ensure wide space between the posts so they do not block the opening of doors or interfere with the deployment of lifts or ramps for wheelchair users.

Good example. Posts are spaced with enough room for vehicles doors to fully open. The buffer is much wider giving people more room to exist or enter their vehicle (also room for lifts or ramps to used)
Source: Walksf, 2018



3. Sidewalks

A lot of useful information can be integrated into a sidewalk's infrastructure. Wayfinding cues can be incorporated into the surface to assist pedestrians, including directional changes, nodes to indicate decision-making areas, entrances to key facilities and buildings, sidewalk/road boundaries and more.

Information can be communicated through the use of textural and/or colour changes in the sidewalk's infrastructure. In some cases, information such as street names is being integrated into sidewalks that approach intersections. Nodes can indicate to pedestrians that multiple routes of travel are in the area.

Ensure sidewalks are kept free of obstructions to create an accessible pathway for people of all abilities.

4. Electric Vehicle Charing Solutions

EV charging stations have sparked accessibility concerns after Vancouver City Council voted for EV chords to be allowed on the city's sidewalks.

The demand of EV is projected to increase substantially within the next few years with many cities around the world adopting policies and goals to create an electric vehicle future. Readily, on-street accessible charging will be the key element of creating a sustainable EV market to meet the demand of EV's and meet the goals put forward by municipalities. In Ottawa for instance, they made it their target goal that by the year 2040, every vehicle sold must be able to drive without generating CO2 emissions (Tchir, 2019).

International best practices are listed below. These best practices are cost efficient and developed as a solution to accommodate residents who do not have access to garages or private driveways while fixing the challenge of trailing cables on city sidewalks hindering walkability and accessibility.

4.1 International Best Practices

4.1.1 Lamp Post Charging - "Electric Avenue W9"

Westminster, UK

"Electric Avenue, W9' gives us a glimpse into the future of streets in Westminster, where we hope to provide the infrastructure needed for our residents to make the switch to cleaner, greener transport." (Schmidt, 2020).

Photo of lamp post charging infrastructure in Westminster.
Source: Siemens, 2022.

The UK now offers EV owners comprehensive EV charging infrastructure that accommodates residents who do not have access to off street parking (driveways, garages). Siemens, a tech giant company and Ubitricity have converted 24 lamp posts along 800 metres of Sutherland Avenue. The name of the project is 'Electric Avenue W9' and gives a glance of the future streets in Westminster (Cooper, 2020).

In March of 2020, the UK has converted all the lamp post on a central London residential street into "hidden" EV chargers. The street of Sutherland Avenue in Westminster has converted 24 lamp posts along the kilometre-long avenue into electric charging stations, thus, jumping the number of lamp post charging points in Westminster City to nearly 300 (Schmidt, 2020).

Lamp post charging is convenient and solves the problem of not having trailing cables on the sidewalk which hinders accessibility.

For more information on UK's lamppost charging infrastructure visit: https://new.siemens.com/uk/en/company/topic-areas/sustainable-energy/smart-ev-charging-infrastructure-for-cities.html

4.1.2 Wireless Charging Pads

England and Scotland

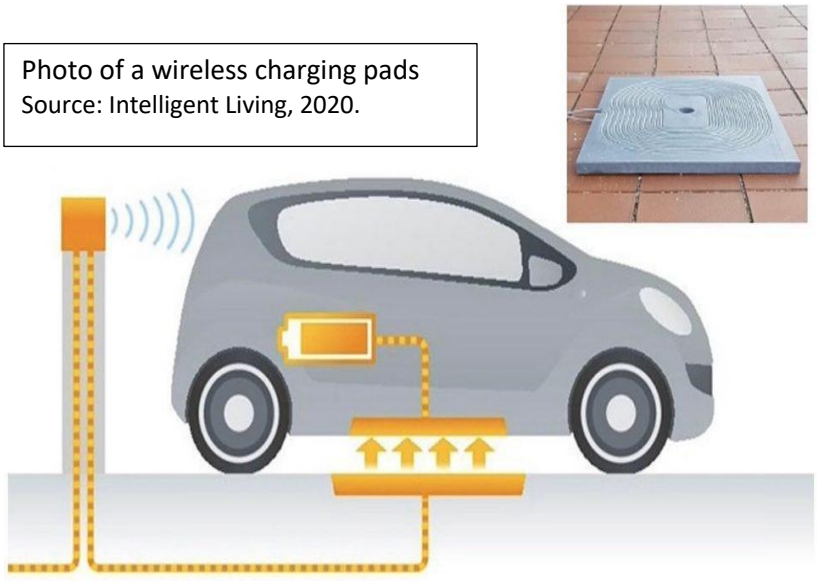


Photo of a wireless charging pads
Source: Intelligent Living, 2020.

Connected Kerb is a charging station company that has partnered with Munich-based Management, to test run new wireless charging systems in Greater London, the English Midlands and Scotland. They installed induction pads on residential streets, at car parks and at taxi ranks.

The wireless charging pads are a simple and convenient concept. EV owners simply charge their vehicles by driving over the inductive pad which is sunk into the road.

Wireless charging pads makes it easier for wheelchair users, seniors and people with mobility disabilities to charge their vehicles as no plugs or cables are needed. Wireless charging also benefits pedestrians, especially pedestrians impacted by blindness and low vision since no trailing cables clutter the sidewalk which could create tripping hazards.

These charging pads last longer compared to traditional charging as they are less likely to be damaged by elements and vandalism (Lempriere, 2020). Furthermore, this way of charging does not add clutter and or disruption to the streetscape.

Connected Kerb's CEO Chris Pateman-Jones believes that these induction charging pads will soon become the norm over the coming years, stating that they are similar in performance to traditional charging, however, they are much more convenient and easier to use. Pateman also mentioned that this way of charging is more accessible compared to traditional plug-in charging stations. Currently, many people who do have a disability are excluded from the market due to trailing cables and general accessibility issues (Lempriere, 2020). Induction will enable efficient charging that is simple for everyone to use.

How does it work?

The wireless charging pad has an induction coil that produces an alternating electromagnetic field. The coil in the pad is coupled by a second induction coil in the EV, thus converting the field back to electricity, which then charges the vehicle (Lempriere, 2020).

4.1.3 Overhead Charging

Holland, UK

Photo of ChargeArm, overhead charging.
Source: ChargeArm, 2021.

Many municipalities have prohibited having cables over the sidewalk due to its potential safety hazard. Having cords or other obstructions placed on a sidewalk would create tripping hazards for people who are blind or those who have other disabilities.

In order to combat this problem, a Holland based company has developed ChargeArm as a solution to the issue. ChargeArm works by sending a charging wire up to 2.2 metres across the footpath from a private property to a car (Electric Brighton, 2020). The system mechanically elevates the charging cable, allowing walkers, strollers, and wheelchairs to continue using the pathway without being obstructed by trailing cables (Electric Brighton, 2020). ChargeArm is a safer, more sustainable alternative to traditional plug-in charging and guarantees a much longer life for charging cables since having cables on the ground can be subject to excessive wear and tear when rolled over the curb, especially in municipalities with harsh weather.

For more information about ChargeArm, click the link to visit the ChargeArm website: https://chargearm.com/

4.1.4 Pop Up Chargers

UK

Photo of pop-up charger when in use.
Source: Urban Electric, 2022

EV charging stations have sparked a long-term debate due to the increasing concern that charging infrastructure will bring additional clutter to city streetscapes. Pop-up chargers have been installed in the UK to help solve this problem. The pop-up charger was produced by the UK company Urban Electric. In 2020, these pop-up chargers were deemed a success after a trial run, implementing prototype pop-up charging "hubs" along city streets in the UK.

Photo of pop-up charger when not in use.
Source: Urban Electric, 2022

These pop-up chargers are embedded into the pavement. When the charger is not in use, it is discreet with very minimum streetscape impact, which is proved to be very appealing to residences as walkways are clear of obstructions. The charger only pops up when needed and is operated by a smartphone app. The company states that this method of charging is a simple process. EV owners who wish to charge their vehicle by the pop-up charging hub will need a standard type 2 charging cable, payment card and the Urban Electric app to identify and activate charging points.

For more information on Urban Electric's Pop-Up chargers, click the link to visit the Urban Electric website: https://www.urbanelectric.london/.

4.1.5 Charge Fairy

UK

Charge Fairy is a convenient service that brings electricity directly to a person's EV. For seniors, and people with disabilities, this service provides easy access to charging. For wheelchair users, people with mobility disabilities and for people who are low sighted, dragging the chords themselves can be challenging. Charge Fairy is a convenient option and is great for people with various abilities.

Charge Fairy will also use your usage data to predict when your vehicle needs to be charged again and will securely charge your car overnight, therefore your EV will always be charged and ready to go.

For more information visit:
https://chargefairy.com/

Photo of the pink Charge Fairy van charging an electric vehicle.
Source: Charge Fairy, 2022