BRITISH COLUMBIA ACTIVE TRANSPORTATION DESIGN GUIDE

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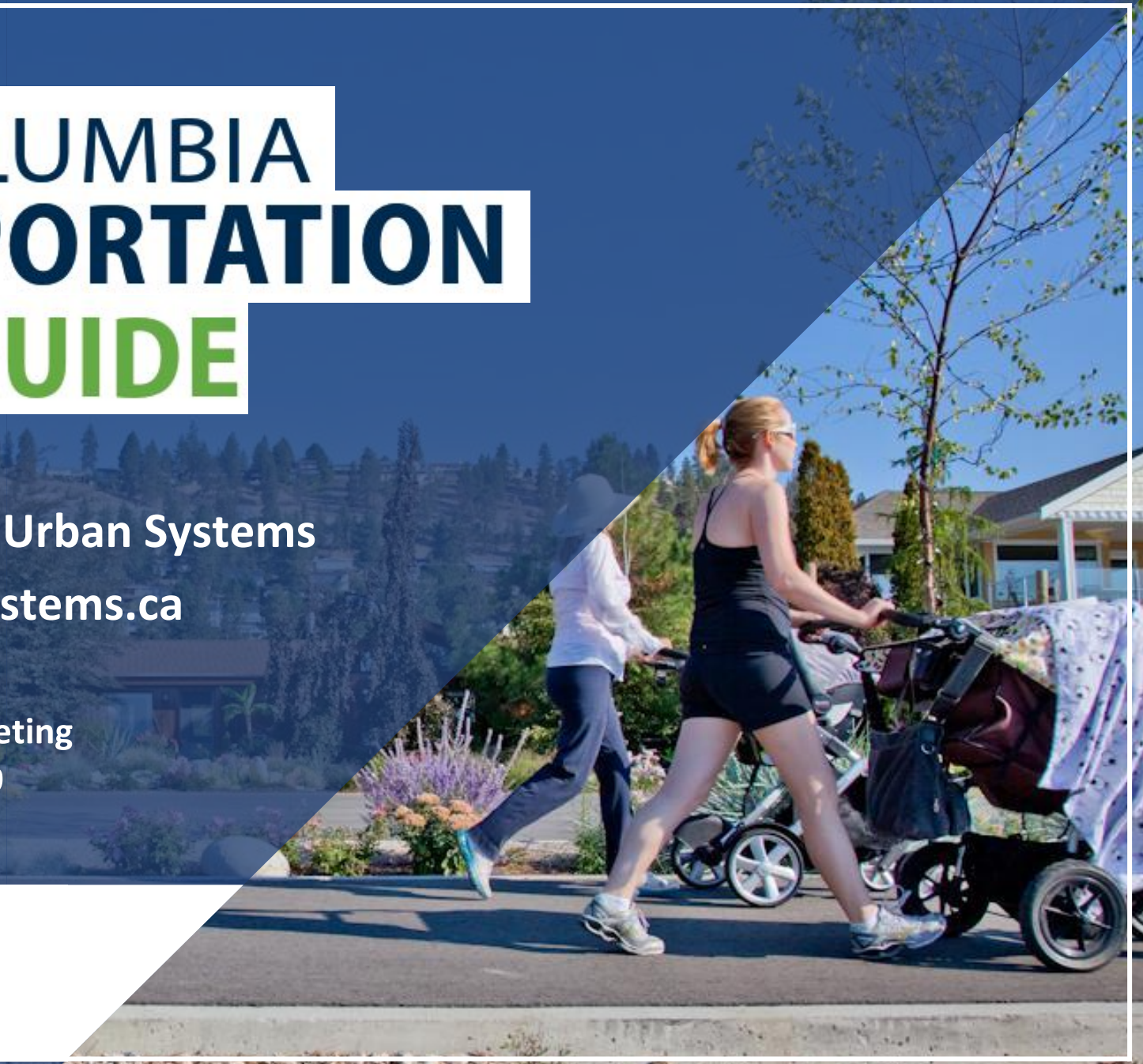
HUB All Committee Meeting
November 28, 2019



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Agenda

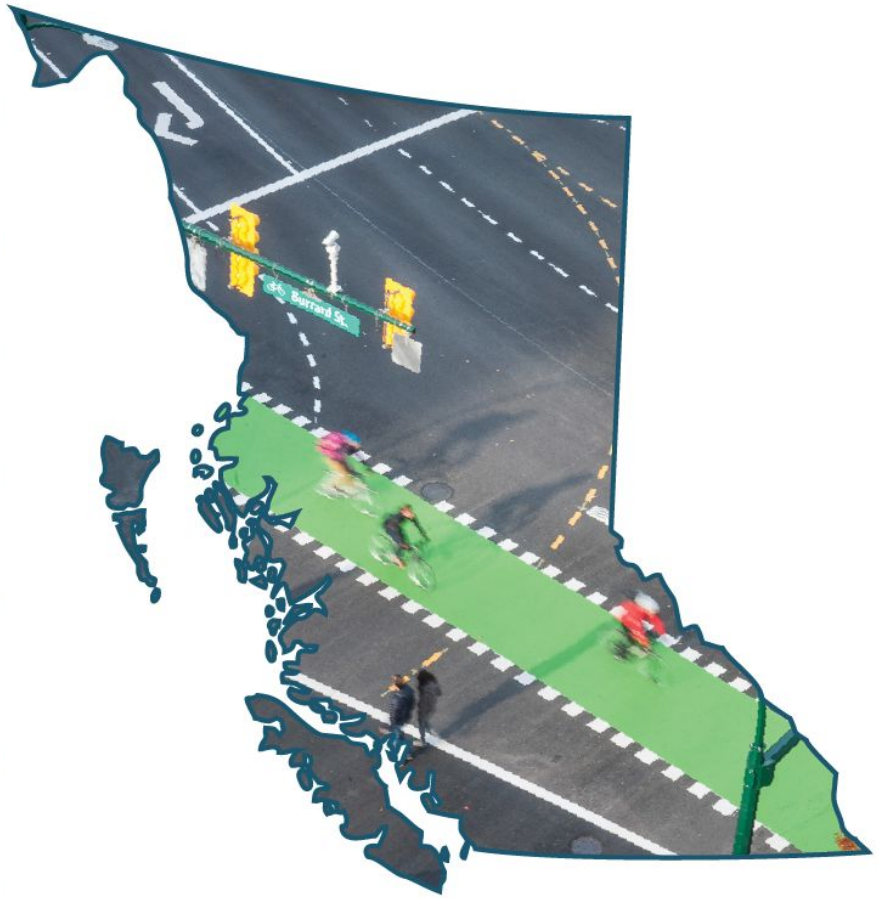
1. **Alignment with Provincial Initiatives**
2. **Purpose and How To Use the Guide**
3. **Design Guide Overview**

ALIGNMENT WITH PROVINCIAL INITIATIVES

Alignment with Provincial Initiatives

cleanBC
Active Transportation

- SUSTAINABLE TRANSPORTATION
- CLEANER AND MORE EFFICIENT TECHNOLOGY
- INTRODUCING NEW CLEAN ENERGY OPTIONS
- REDUCING AND MAKING BETTER USE OF WASTE
- SIGNIFICANTLY INCREASING INDUSTRIAL ELECTRIFICATION
- REDUCING EMISSIONS FROM FORESTRY, LAND USE, AND AGRICULTURE
- IMPROVING COMMUNITY DESIGN AND SERVICES



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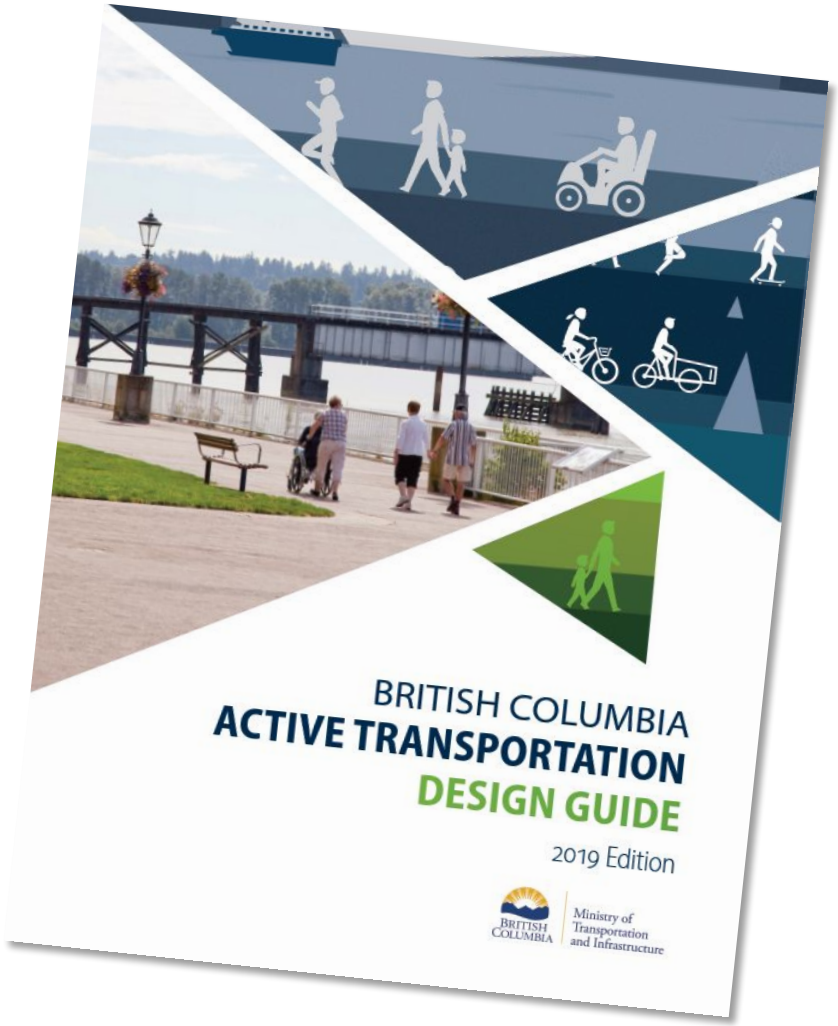
Alignment with Provincial Initiatives



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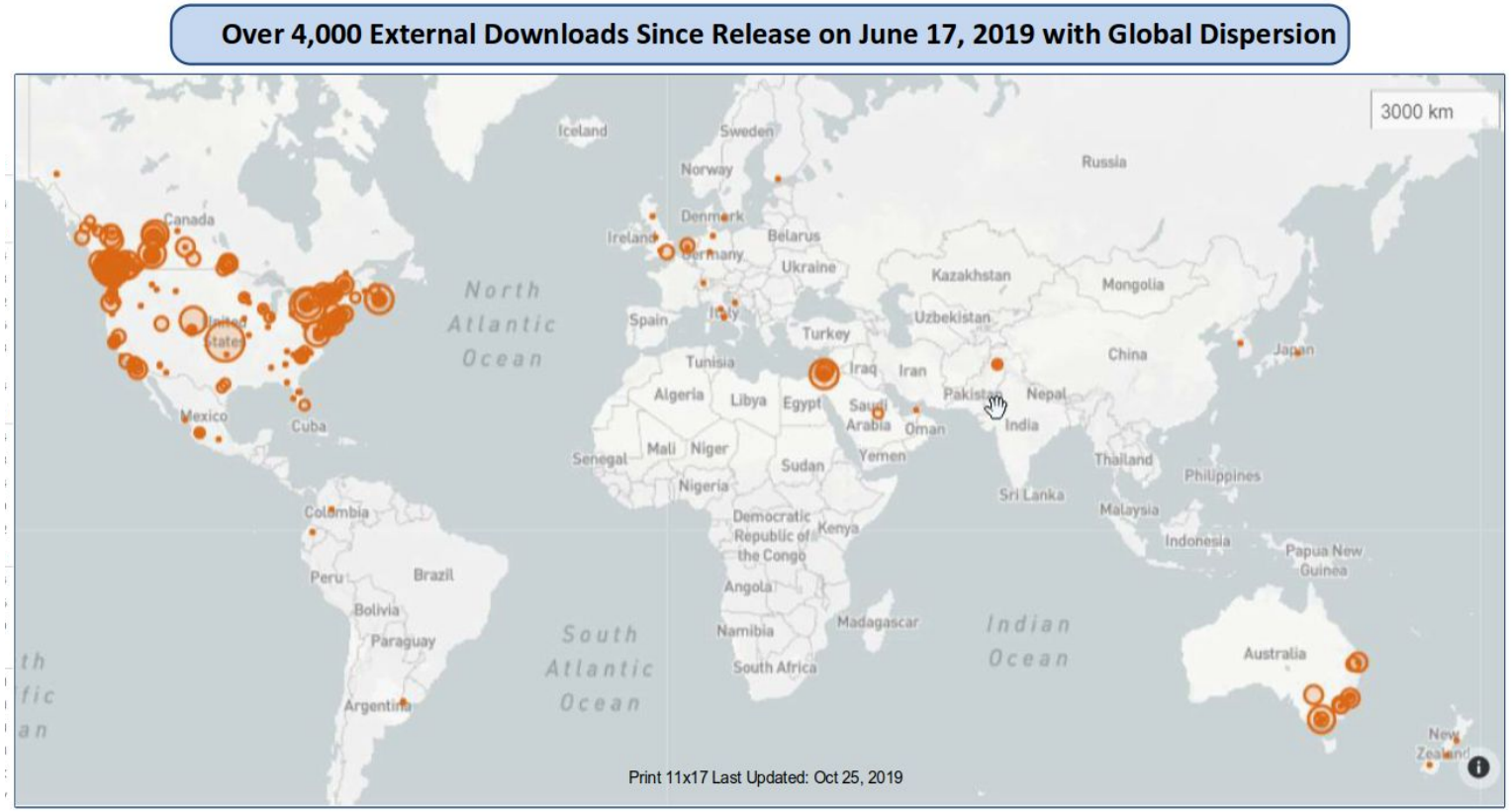
Active Transportation Design Guide

- 2019 edition released in June 2019
- MOTI will seek input on the 2019 edition through on-line portal over the next year
- MOTI will update the guide based on input received

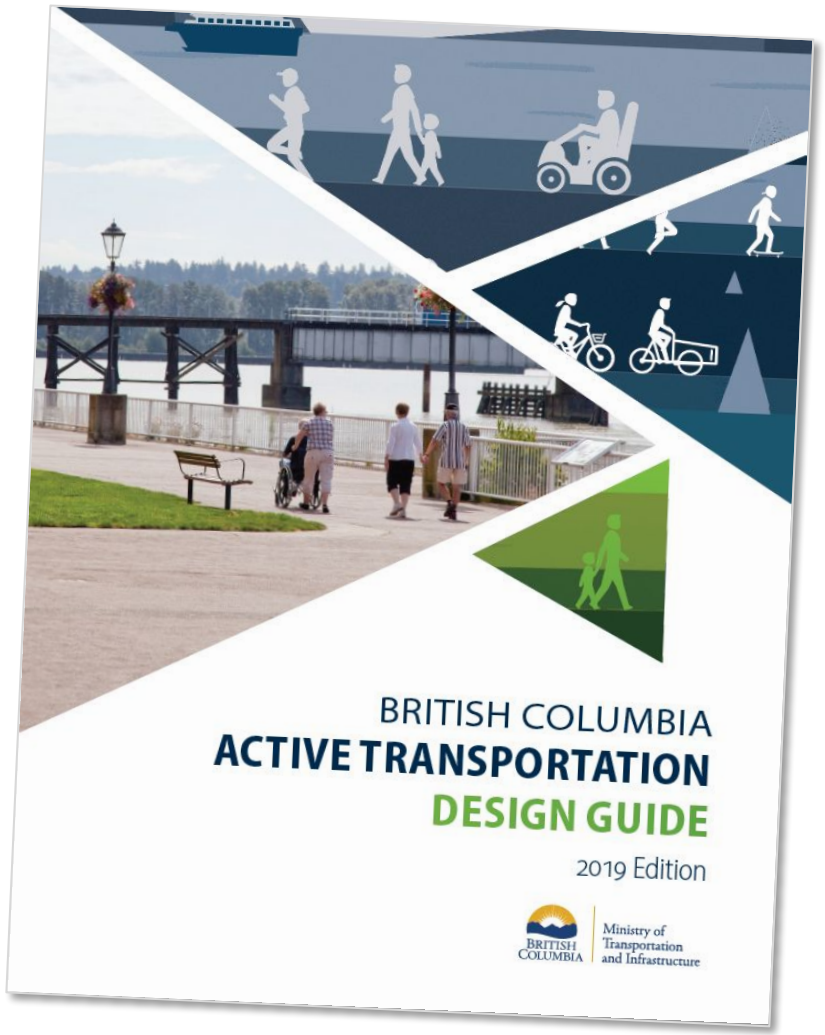


https://www2.gov.bc.ca/gov/content/transportation/funding-engagement-permits/funding-grants/active-transportation-infrastructure-funding/forms-resources/active-transportation-design-guide

PURPOSE AND HOW TO USE THE GUIDE

Purpose of Design Guide

- Best practice design guidance for design professionals across BC
- Practical guidance related to operations, maintenance, and management of active transportation infrastructure
- BC-specific, context sensitive, and province-wide
- Published for free, online



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How To Use the Guide

9 Sections & 39 Chapters

A. OVERVIEW and CONTEXT

B. PLANNING FRAMEWORK

C. PEDESTRIAN FACILITIES

D. CYCLING FACILITIES

E. MULTI-USE FACILITIES

F. CONTEXT SPECIFIC APPLICATIONS

G. INTERSECTIONS + CROSSINGS

H. AMENITIES + INTEGRATION

I. POST IMPLEMENTATION

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How To Use the Guide

Colour-coded sections with section cover pages for document navigation

Sub-chapter listing for each section for organization

How To Use the Guide

B.3

UNIVERSAL DESIGN

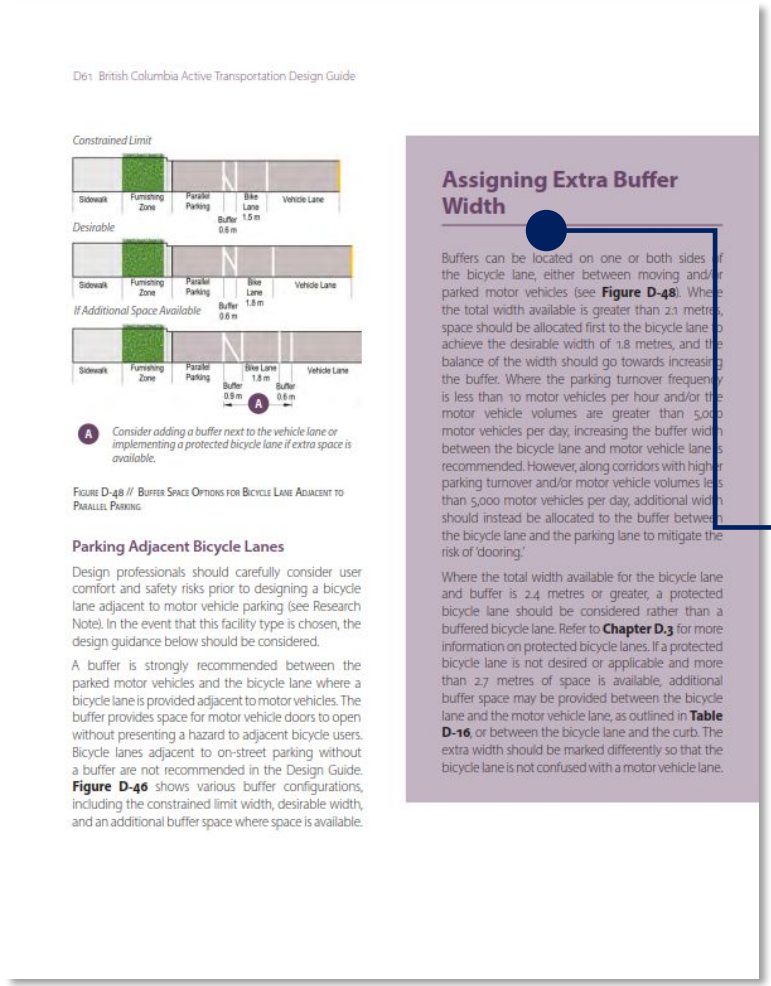
Universal design ensures that the built environment is accessible to people of all ages and abilities, regardless of any type of physical or cognitive impairment. Universal design is a fundamental design principle that should be applied in all contexts but is especially important for designing active transportation facilities and accommodating people walking.

This chapter describes the importance of providing universal accessibility and introduces key universal design principles and strategies. It also provides an overview of the various accessibility challenges that should be considered in the design of active transportation facilities, including impairments to mobility, vision, hearing, comprehension, and strength and dexterity.

Chapter Cover Page

Brief Chapter Introductions

How To Use the Guide



D61 British Columbia Active Transportation Design Guide

Constrained Limit

Desirable

If Additional Space Available

A *Consider adding a buffer next to the vehicle lane or implementing a protected bicycle lane if extra space is available.*

FIGURE D-48 // BUFFER SPACE OPTIONS FOR BICYCLE LANE ADJACENT TO PARALLEL PARKING

Parking Adjacent Bicycle Lanes

Design professionals should carefully consider user comfort and safety risks prior to designing a bicycle lane adjacent to motor vehicle parking (see Research Note). In the event that this facility type is chosen, the design guidance below should be considered.

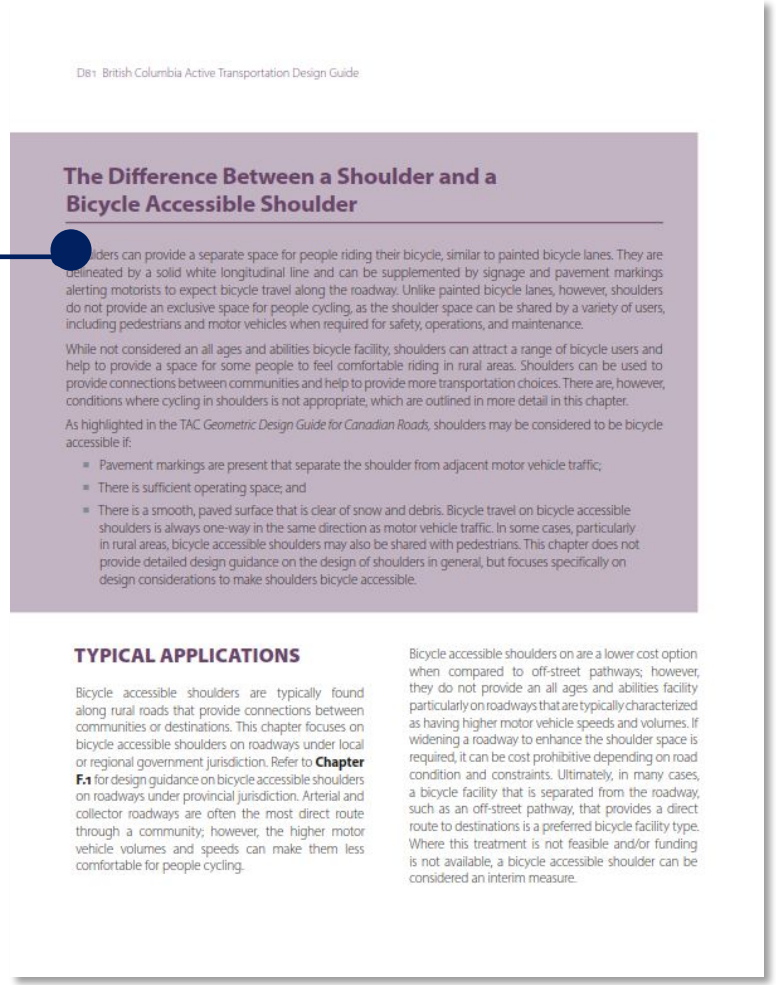
A buffer is strongly recommended between the parked motor vehicles and the bicycle lane where a bicycle lane is provided adjacent to motor vehicles. The buffer provides space for motor vehicle doors to open without presenting a hazard to adjacent bicycle users. Bicycle lanes adjacent to on-street parking without a buffer are not recommended in the Design Guide. **Figure D-46** shows various buffer configurations, including the constrained limit width, desirable width, and an additional buffer space where space is available.

Assigning Extra Buffer Width

Buffers can be located on one or both sides of the bicycle lane, either between moving and/or parked motor vehicles (see **Figure D-48**). Where the total width available is greater than 2.1 metres, space should be allocated first to the bicycle lane to achieve the desirable width of 1.8 metres, and the balance of the width should go towards increasing the buffer. Where the parking turnover frequency is less than 10 motor vehicles per hour and/or the motor vehicle volumes are greater than 5,000 motor vehicles per day, increasing the buffer width between the bicycle lane and motor vehicle lane is recommended. However, along corridors with higher parking turnover and/or motor vehicle volumes less than 5,000 motor vehicles per day, additional width should instead be allocated to the buffer between the bicycle lane and the parking lane to mitigate the risk of 'dooring.'

Where the total width available for the bicycle lane and buffer is 2.4 metres or greater, a protected bicycle lane should be considered rather than a buffered bicycle lane. Refer to **Chapter D.3** for more information on protected bicycle lanes. If a protected bicycle lane is not desired or applicable and more than 2.7 metres of space is available, additional buffer space may be provided between the bicycle lane and the motor vehicle lane, as outlined in **Table D-16**, or between the bicycle lane and the curb. The extra width should be marked differently so that the bicycle lane is not confused with a motor vehicle lane.

Key Tips and Critical Information Highlighted in Text Boxes



D81 British Columbia Active Transportation Design Guide

The Difference Between a Shoulder and a Bicycle Accessible Shoulder

Shoulders can provide a separate space for people riding their bicycle, similar to painted bicycle lanes. They are delineated by a solid white longitudinal line and can be supplemented by signage and pavement markings alerting motorists to expect bicycle travel along the roadway. Unlike painted bicycle lanes, however, shoulders do not provide an exclusive space for people cycling, as the shoulder space can be shared by a variety of users, including pedestrians and motor vehicles when required for safety, operations, and maintenance.

While not considered an all ages and abilities bicycle facility, shoulders can attract a range of bicycle users and help to provide a space for some people to feel comfortable riding in rural areas. Shoulders can be used to provide connections between communities and help to provide more transportation choices. There are, however, conditions where cycling in shoulders is not appropriate, which are outlined in more detail in this chapter.

As highlighted in the TAC *Geometric Design Guide for Canadian Roads*, shoulders may be considered to be bicycle accessible if:

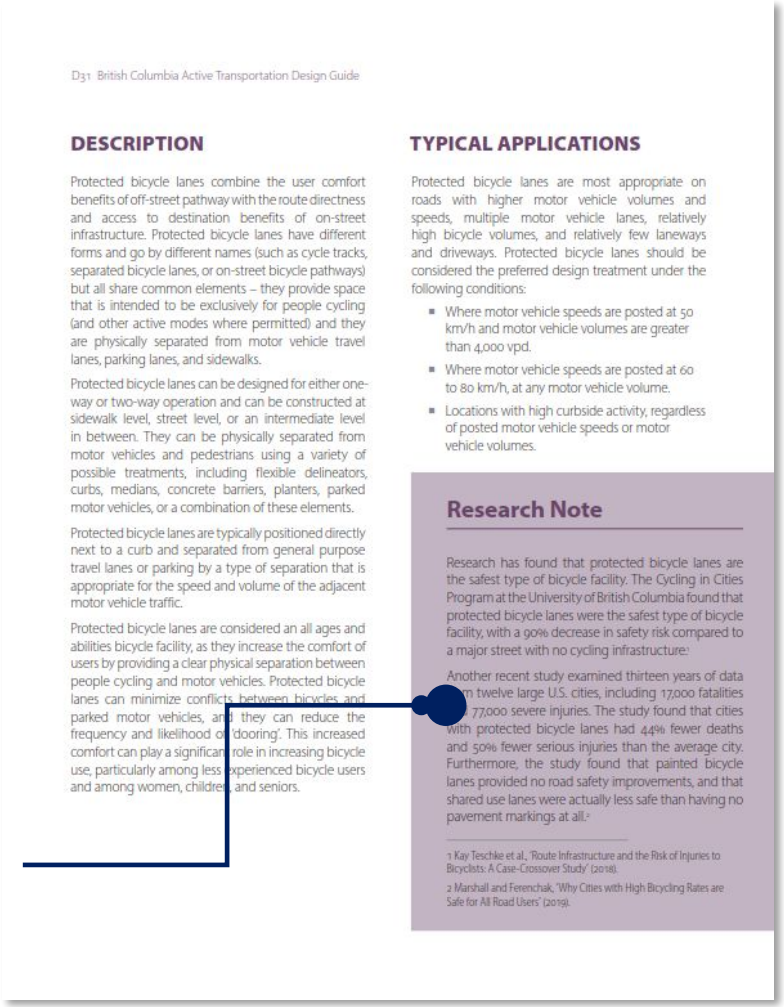
- Pavement markings are present that separate the shoulder from adjacent motor vehicle traffic;
- There is sufficient operating space; and
- There is a smooth, paved surface that is clear of snow and debris. Bicycle travel on bicycle accessible shoulders is always one-way in the same direction as motor vehicle traffic. In some cases, particularly in rural areas, bicycle accessible shoulders may also be shared with pedestrians. This chapter does not provide detailed design guidance on the design of shoulders in general, but focuses specifically on design considerations to make shoulders bicycle accessible.

TYPICAL APPLICATIONS

Bicycle accessible shoulders are typically found along rural roads that provide connections between communities or destinations. This chapter focuses on bicycle accessible shoulders on roadways under local or regional government jurisdiction. Refer to **Chapter F.1** for design guidance on bicycle accessible shoulders on roadways under provincial jurisdiction. Arterial and collector roadways are often the most direct route through a community; however, the higher motor vehicle volumes and speeds can make them less comfortable for people cycling.

Bicycle accessible shoulders on are a lower cost option when compared to off-street pathways; however, they do not provide an all ages and abilities facility particularly on roadways that are typically characterized as having higher motor vehicle speeds and volumes. If widening a roadway to enhance the shoulder space is required, it can be cost prohibitive depending on road condition and constraints. Ultimately, in many cases, a bicycle facility that is separated from the roadway, such as an off-street pathway, that provides a direct route to destinations is a preferred bicycle facility type. Where this treatment is not feasible and/or funding is not available, a bicycle accessible shoulder can be considered an interim measure.

How To Use the Guide



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DESCRIPTION

Protected bicycle lanes combine the user comfort benefits of off-street pathway with the route directness and access to destination benefits of on-street infrastructure. Protected bicycle lanes have different forms and go by different names (such as cycle tracks, separated bicycle lanes, or on-street bicycle pathways) but all share common elements – they provide space that is intended to be exclusively for people cycling (and other active modes where permitted) and they are physically separated from motor vehicle travel lanes, parking lanes, and sidewalks.

Protected bicycle lanes can be designed for either one-way or two-way operation and can be constructed at sidewalk level, street level, or an intermediate level in between. They can be physically separated from motor vehicles and pedestrians using a variety of possible treatments, including flexible delineators, curbs, medians, concrete barriers, planters, parked motor vehicles, or a combination of these elements.

Protected bicycle lanes are typically positioned directly next to a curb and separated from general purpose travel lanes or parking by a type of separation that is appropriate for the speed and volume of the adjacent motor vehicle traffic.

Protected bicycle lanes are considered an all ages and abilities bicycle facility, as they increase the comfort of users by providing a clear physical separation between people cycling and motor vehicles. Protected bicycle lanes can minimize conflicts between bicycles and parked motor vehicles, and they can reduce the frequency and likelihood of 'dooring'. This increased comfort can play a significant role in increasing bicycle use, particularly among less experienced bicycle users and among women, children, and seniors.

TYPICAL APPLICATIONS

Protected bicycle lanes are most appropriate on roads with higher motor vehicle volumes and speeds, multiple motor vehicle lanes, relatively high bicycle volumes, and relatively few laneways and driveways. Protected bicycle lanes should be considered the preferred design treatment under the following conditions:

- Where motor vehicle speeds are posted at 50 km/h and motor vehicle volumes are greater than 4,000 vpd.
- Where motor vehicle speeds are posted at 60 to 80 km/h, at any motor vehicle volume.
- Locations with high curbside activity, regardless of posted motor vehicle speeds or motor vehicle volumes.

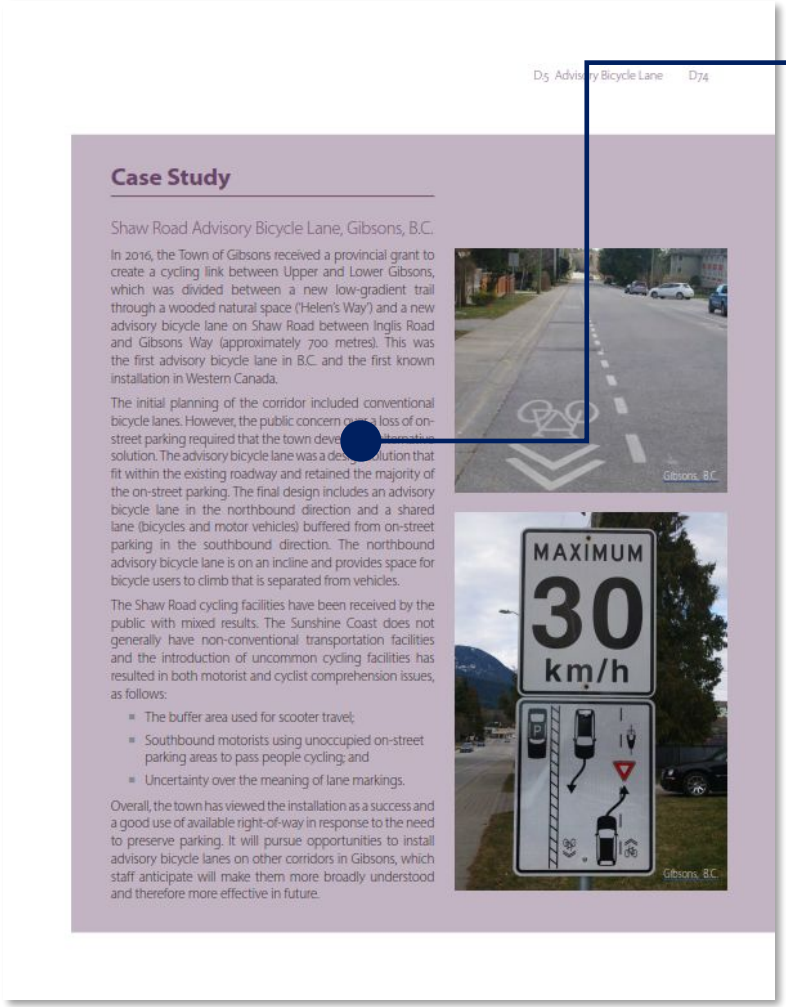
Research Note

Research has found that protected bicycle lanes are the safest type of bicycle facility. The Cycling in Cities Program at the University of British Columbia found that protected bicycle lanes were the safest type of bicycle facility, with a 90% decrease in safety risk compared to a major street with no cycling infrastructure.[1]

Another recent study examined thirteen years of data from twelve large U.S. cities, including 17,000 fatalities and 77,000 severe injuries. The study found that cities with protected bicycle lanes had 44% fewer deaths and 50% fewer serious injuries than the average city. Furthermore, the study found that painted bicycle lanes provided no road safety improvements, and that shared use lanes were actually less safe than having no pavement markings at all.[2]

1 Kay Teschke et al., 'Route Infrastructure and the Risk of Injuries to Bicyclists: A Case-Crossover Study' (2012).

2 Marshall and Ferenchak, 'Why Cities with High Bicycling Rates are Safe for All Road Users' (2019).



D5 Advisory Bicycle Lane D74

Case Study

Shaw Road Advisory Bicycle Lane, Gibsons, B.C.

In 2016, the Town of Gibsons received a provincial grant to create a cycling link between Upper and Lower Gibsons, which was divided between a new low-gradient trail through a wooded natural space ('Helen's Way') and a new advisory bicycle lane on Shaw Road between Inglis Road and Gibsons Way (approximately 700 metres). This was the first advisory bicycle lane in B.C. and the first known installation in Western Canada.

The initial planning of the corridor included conventional bicycle lanes. However, the public concern over a loss of on-street parking required that the town develop an alternative solution. The advisory bicycle lane was a design solution that fit within the existing roadway and retained the majority of the on-street parking. The final design includes an advisory bicycle lane in the northbound direction and a shared lane (bicycles and motor vehicles) buffered from on-street parking in the southbound direction. The northbound advisory bicycle lane is on an incline and provides space for bicycle users to climb that is separated from vehicles.

The Shaw Road cycling facilities have been received by the public with mixed results. The Sunshine Coast does not generally have non-conventional transportation facilities and the introduction of uncommon cycling facilities has resulted in both motorist and cyclist comprehension issues, as follows:

- The buffer area used for scooter travel;
- Southbound motorists using unoccupied on-street parking areas to pass people cycling; and
- Uncertainty over the meaning of lane markings.

Overall, the town has viewed the installation as a success and a good use of available right-of-way in response to the need to preserve parking. It will pursue opportunities to install advisory bicycle lanes on other corridors in Gibsons, which staff anticipate will make them more broadly understood and therefore more effective in future.

Case Studies to provide real world examples and applications

Research Notes to provide evidence-based support for recommendations

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Figure G-90 // Protected Intersection Key Features

PROTECTED INTERSECTIONS

Protected intersections are intersections that use a number of enhanced design elements, to provide increased protection for people walking and cycling as shown in **Figure G-90**:

1. Corner refuge islands
2. Forward bicycle queuing areas
3. Setback of bicycle and pedestrian crossings
4. Pedestrian refuge islands
5. Bicycle-friendly signal phasing.

Protected intersections provide a high level of safety and comfort for people cycling by clearly indicating right-of-way, promoting predictable movements, reducing the distance and time during which people on bicycles are exposed to conflicts, and adding protected design elements to the intersection. These design elements result in intuitive, low-stress movements in all directions. Conflicts between right turning vehicles and through bicycle users approaching an intersection are eliminated, while conflicts at the intersection itself are mitigated by adding physical protection for bicycle users and reorienting motor vehicles to increase visibility and encourage eye contact between users. Signal phasing may be used to completely eliminate all conflicting movements (see **Chapter G.2**).

Protected intersections are the preferred intersection treatment for people of all ages and abilities.

Annotated graphics and renderings to make complex topics easier to understand

DESIGN GUIDANCE

This section provides geometric design guidance for the different types of bicycle lanes. More detailed design guidance on bicycle lane treatment at intersections, transitions, and crossings is provided in **Chapter G.4**.

Curbside Bicycle Lanes

Figure D-47 and **Table D-16** provide design guidance for unbuffered and buffered curbside bicycle lanes. Detailed guidance is provided on page D60.

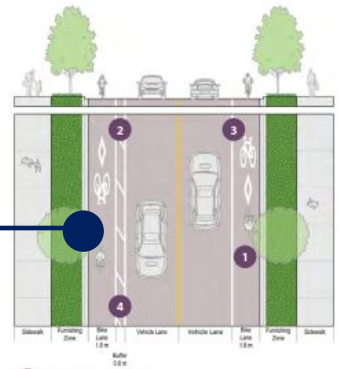
Table D-16 // Curbside Bicycle Lane Width Guidance

FACILITY	DESIRABLE (M)	CONSTRAINED LIMIT (M)
Curbside bicycle lane	1.8*	1.5**
***Buffer (between bicycle lane & motor vehicle lane)	0.6	0.3

*For any width greater than 1.8 metres, a buffer should be provided to avoid the bicycle lane being mistaken or used for other purposes, such as parking or motor vehicle travel.

**The absolute minimum width of an unbuffered curbside bicycle lane is 1.2 metres. A bicycle lane width between 1.2 metres and 1.5 metres should only be considered for short distances (less than 100 metres), in constrained areas, and when reasonable consideration has been given to an alternate design.

*** Where motor vehicles speeds are 50 km/h or greater, adding a buffer is strongly recommended.



1. *Desirable width of 1.8 metres*
2. *For widths greater than 1.8 metres, provide buffer between motor vehicle travel lane and bicycle lane.*
3. *100-200 mm solid white longitudinal line*
4. *If buffer space is provided, diagonal hatch markings can be provided for buffers of at least 0.6 metres*

Figure D-47 // Curbside Bicycle Lane Cross-Section - Desired Widths and Key Features

BC ACTIVE TRANSPORTATION DESIGN GUIDE OVERVIEW

Types of Active Transportation

Walking

Cycling

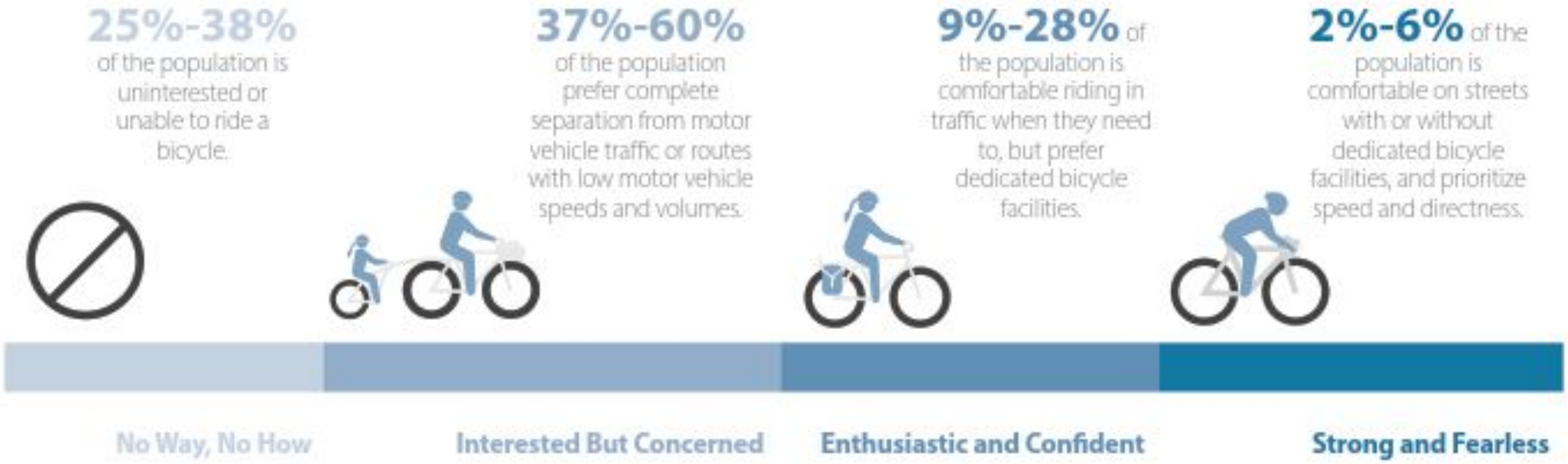
Rolling

Winter-based Modes

Water-based Modes

Small, one-person electric vehicles

Planning for All Ages + Abilities



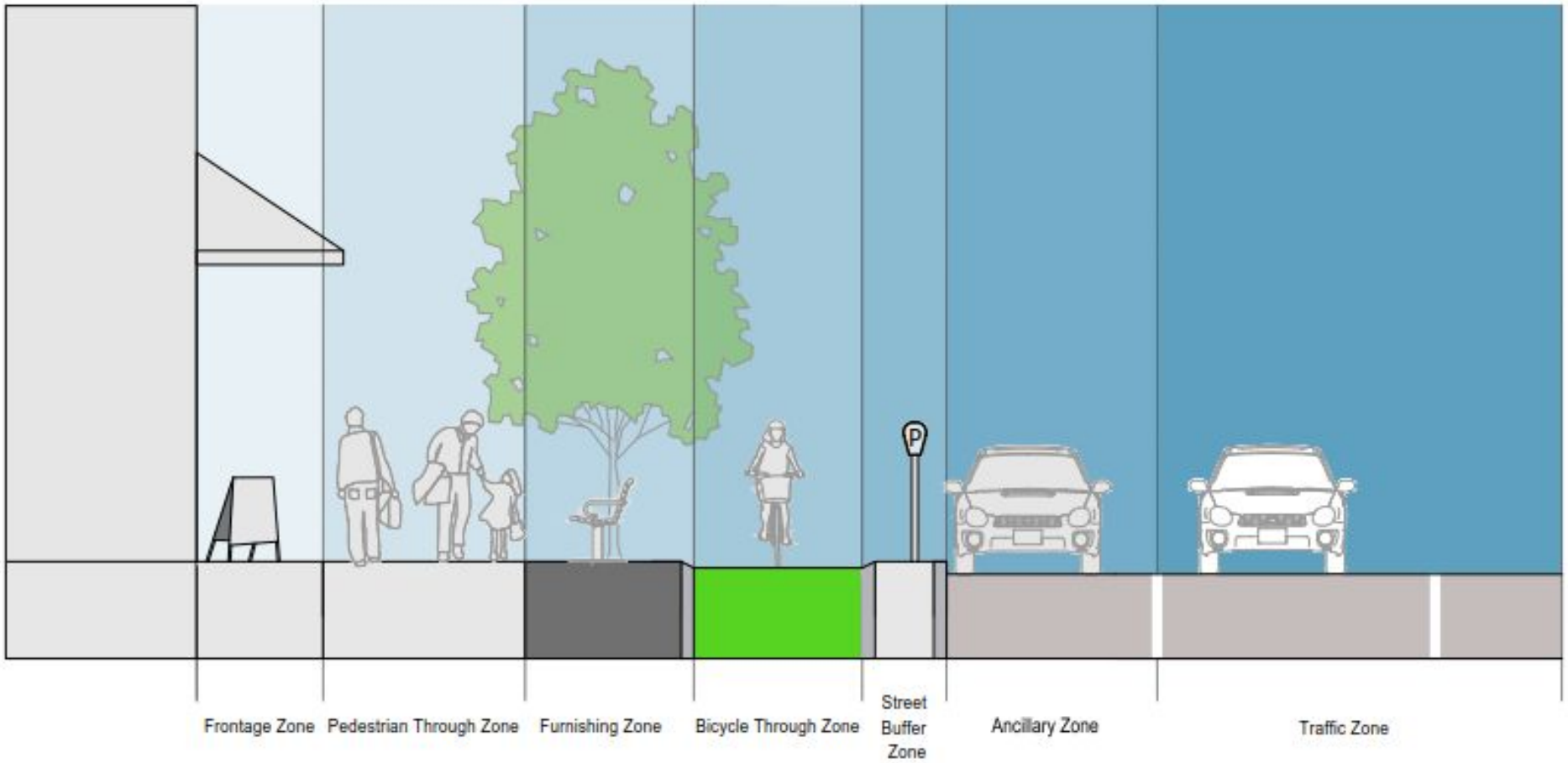
Key Topics / Areas of Interest

1. Defining the Street
2. Bicycle Facility Selection
3. All Ages and Abilities Bicycle Facilities
4. Protected Intersections
5. Emerging Trends

Topic no.1

Defining the Street

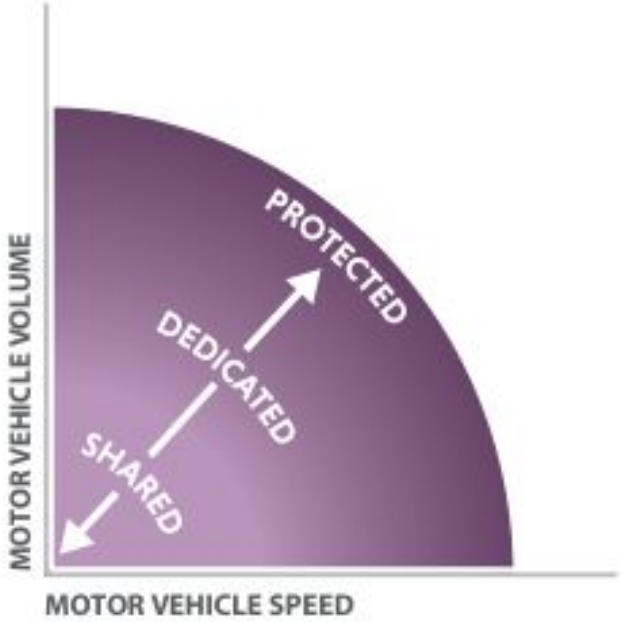
Urban



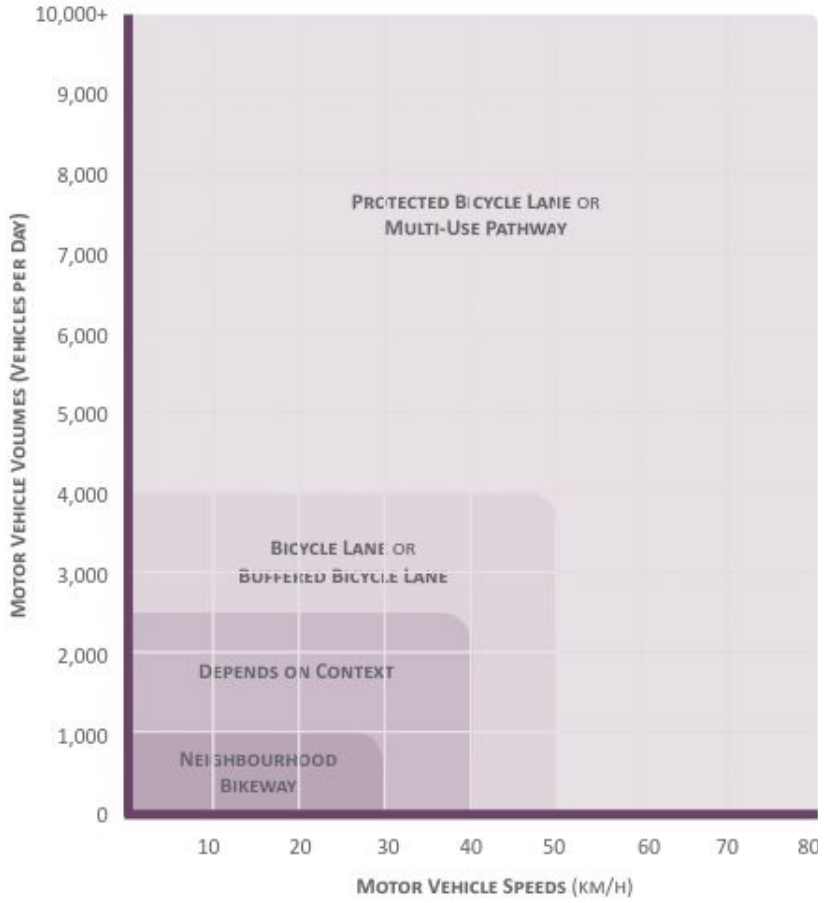
Topic no.2

Bicycle Facility Selection

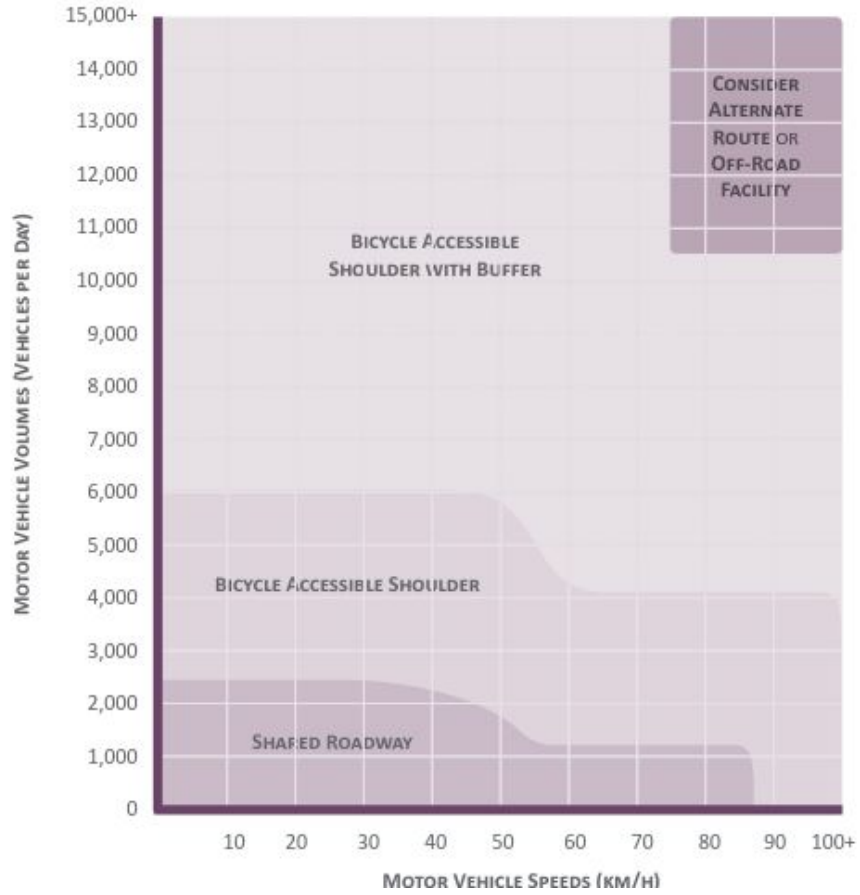
Facility Selection



Urban & Suburban



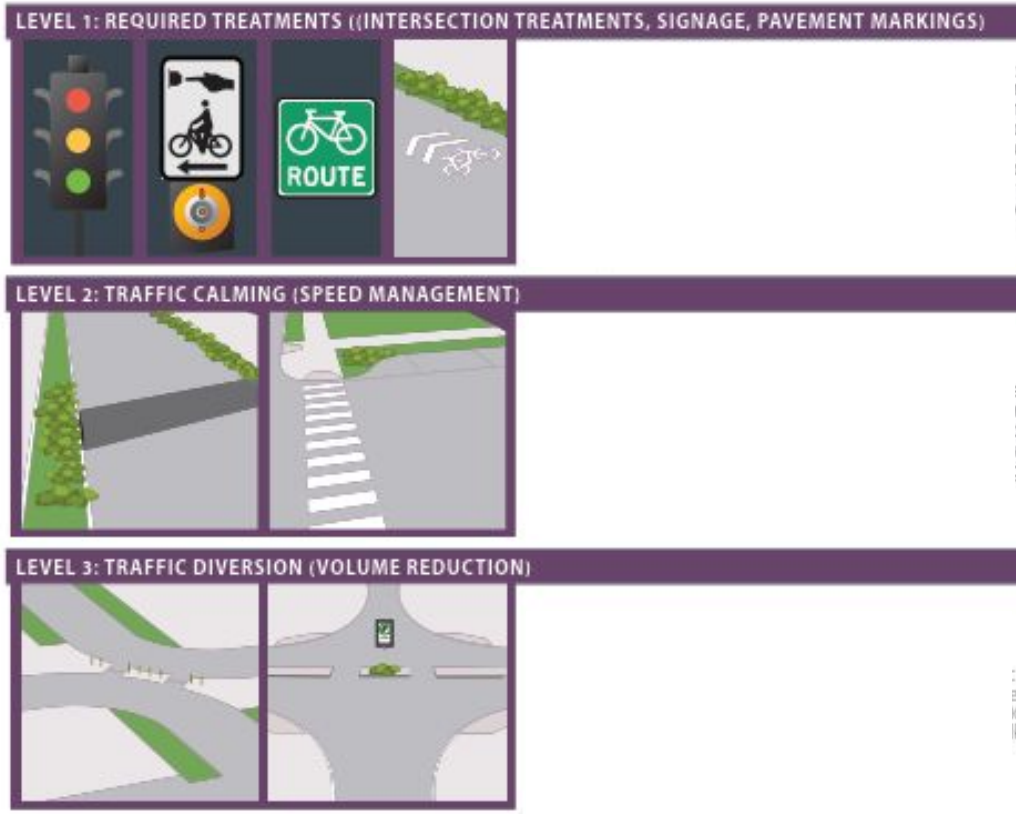
Rural



Topic no.3

All Ages and Abilities Bicycle Facilities

Neighbourhood Greenways



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Topic no.3

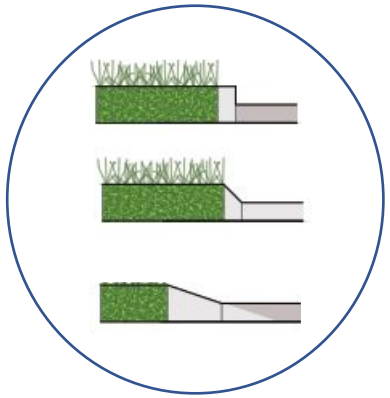
All Ages and Abilities Bicycle Facilities

Protected Bicycle Lanes

Intermediate Level

Sidewalk Level

Street Level



Sidewalk Level (No Buffer)

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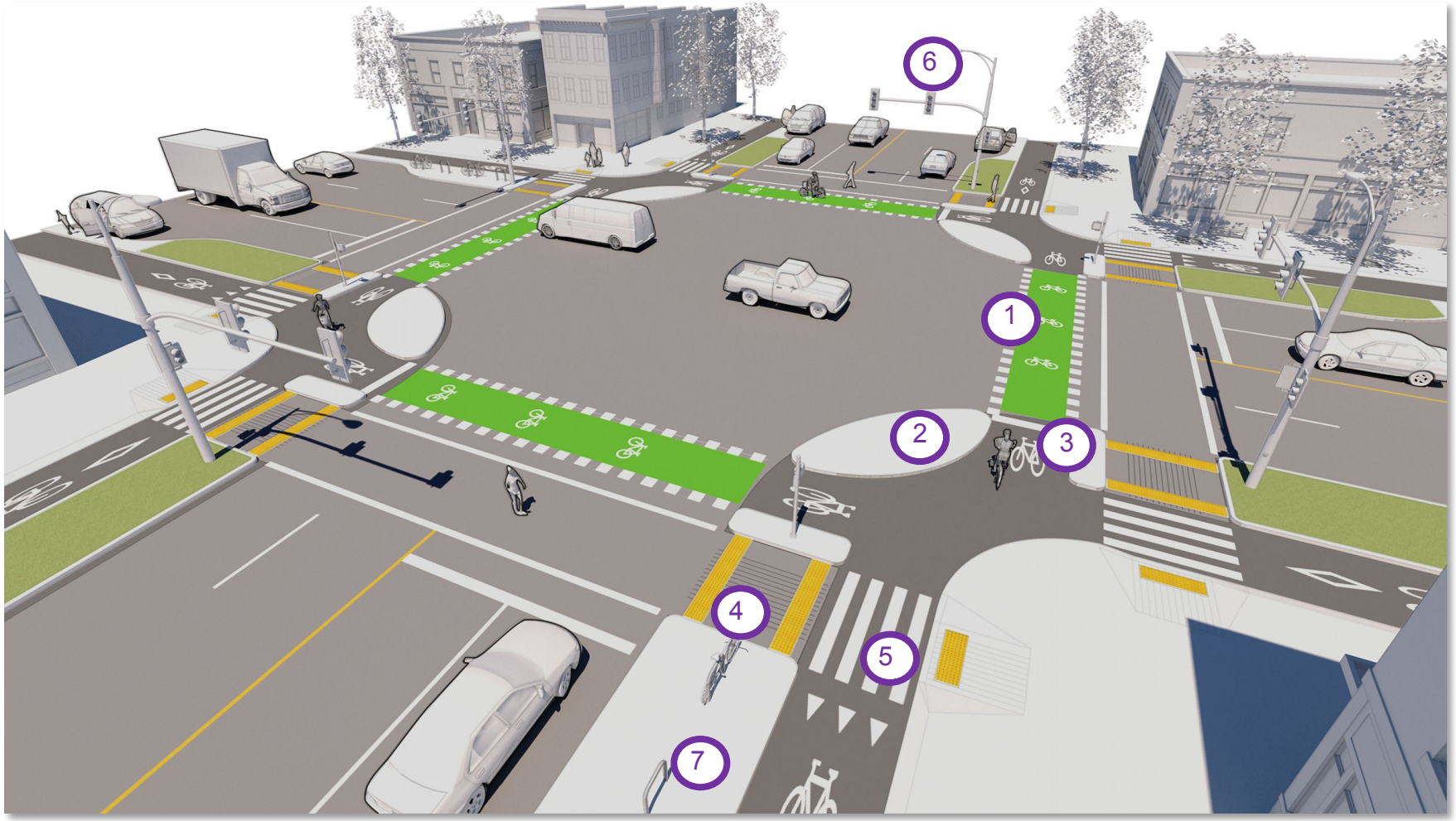
Topic no.4

Protected Intersections



1. Crossing Setback
2. Corner Island
3. Bicycle Queuing Area
4. Pedestrian Waiting Areas
5. Crosswalk Markings
6. Signal Phasing
7. Amenity Zone

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Topic no.5

Emerging Trends

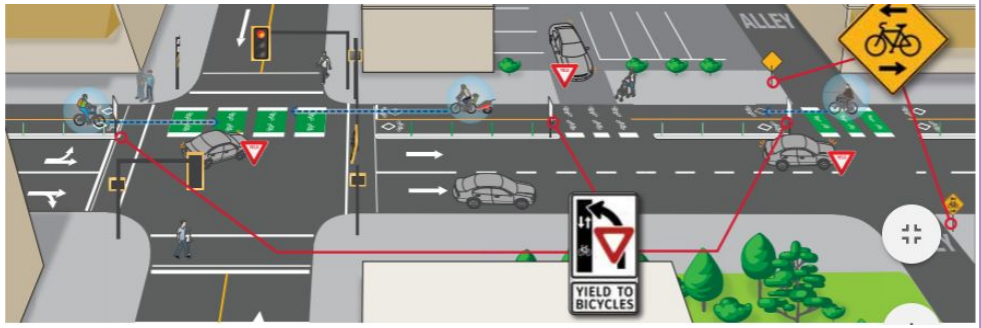
Rapid Implementation

Topic no.5

Emerging Trends

Celebrating & Launching

- **Launch Celebrations**
- **Ambassadors**
- **Ongoing Community Programming**
- **New Facility Education**



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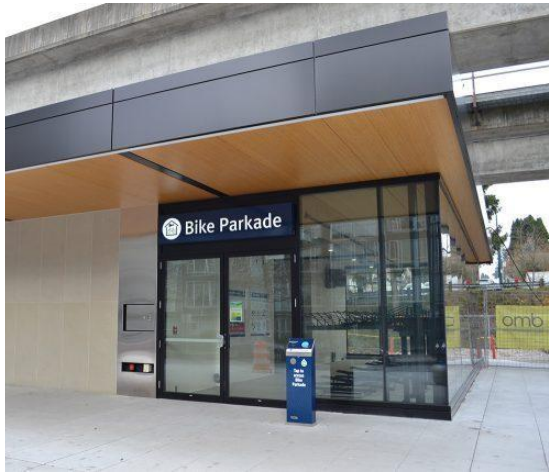
Topic no.5

Emerging Trends

Multi-Modal Integration



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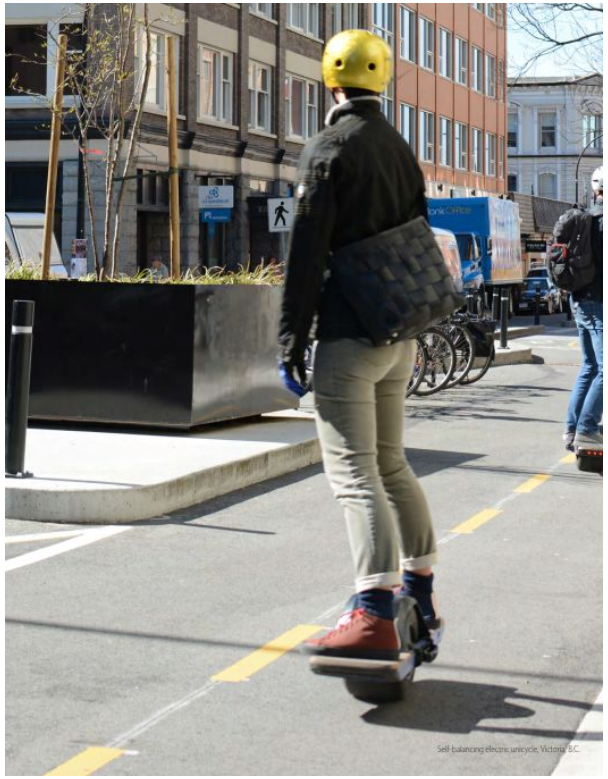
Topic no.5

Emerging Trends

New Mobility



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HUB All Committee Meeting
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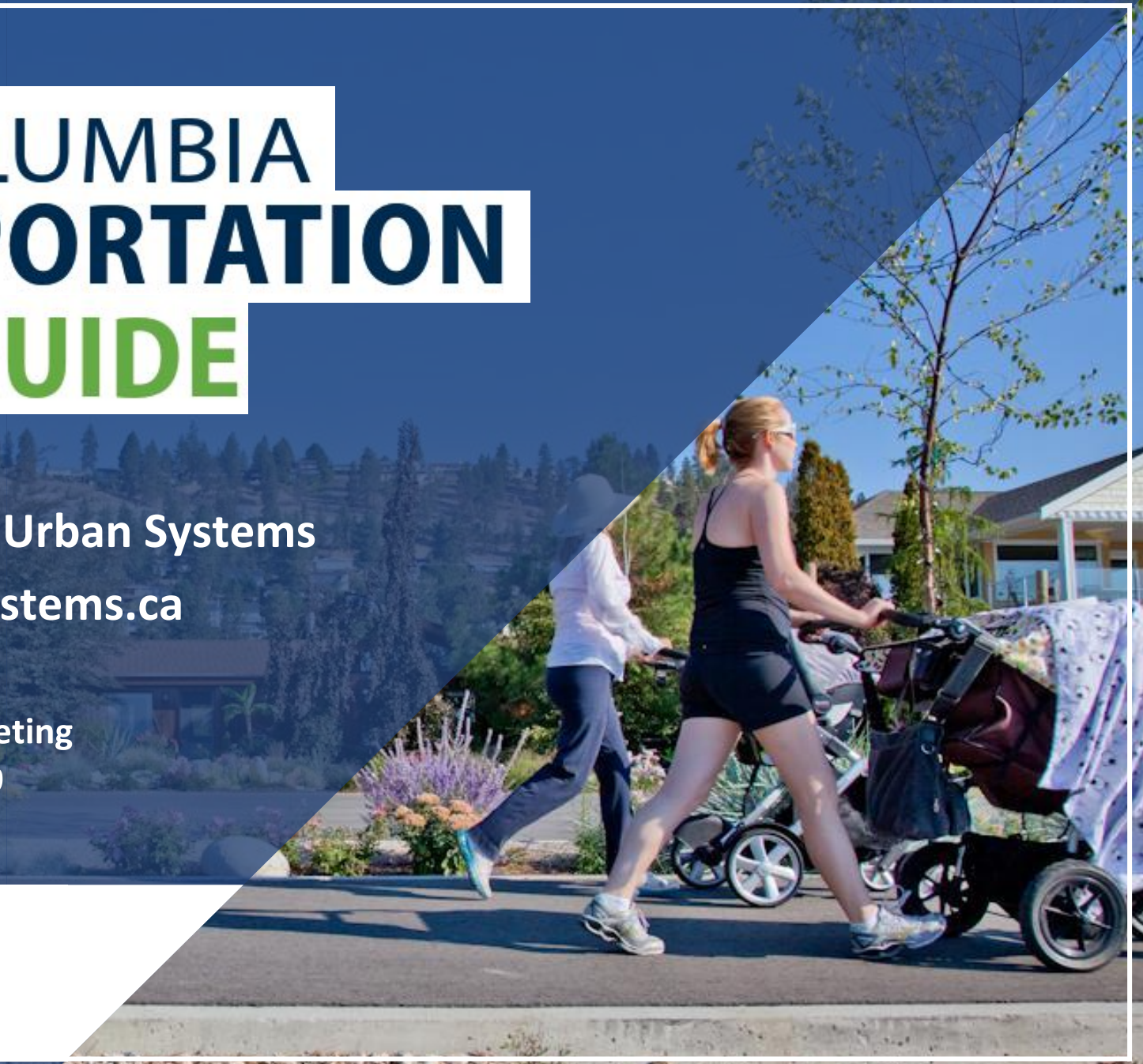

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