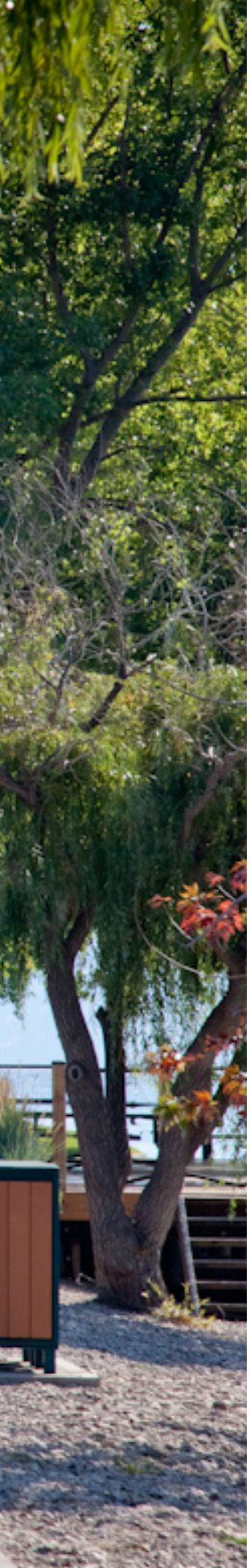
E

MULTI-USE FACILITIES

Off-street pathway, Peachland, B.C.



E.1

GENERAL DESIGN GUIDANCE

Multi-use facilities are generally defined as facilities that can be used by more than one user group. Multi-use facilities include multi-use pathways, separated bicycle and pedestrian pathways, and shared spaces. This chapter provides general design guidance for multi-use facilities, including the context for when each of these multi-use facilities as applicable, a general discussion on user types, and additional considerations when designing multi-use facilities.

The Design Guide provides guidance on the following three types of multi-use facilities:

Multi-use pathways (Chapter E.2) are off-street pathways that are physically separated from motor vehicle traffic and can be used by any non-motorized user. This includes people walking, cycling, skateboarding, kick scootering, in-line skating, and using other active modes. Multi-use pathways may also be referred to as shared-use pathways, multi-use trails, and boulevard multi-use pathways. Typically, multi-use pathways accommodate bi-directional travel for all users. Multi-use pathways can be located in a variety of contexts, including rail corridors, greenway corridors, utility corridors, parks, along waterfronts, and adjacent to a road or highway.

Separated bicycle and pedestrian pathways (Chapter E.3) are similar to multi-use pathways. The key difference is the provision of a separation between people cycling from other users. The type of separation between users can vary from a painted line or visual separation to a vertical or horizontal feature. Separated bicycle and pedestrian pathways can be located in a variety of contexts, including rail corridors, greenway corridors, parks, along waterfronts, and adjacent to a road.

Shared spaces (Chapter E.4) are roads in which the living environment dominates over the vehicular movements. A shared space functions first as a meeting place, playground, pedestrian area, and extension of any surrounding residences. The road is shared among people walking, cycling, and driving motor vehicles. Shared spaces can differ in many ways. However, in general, they are places in which all modes can share in the same space, but with the possibility for more clearly designated zones in which some modes may be excluded or where others are encouraged to navigate.

APPLICABILITY

Multi-Use Pathways

Multi-use pathways can be installed within or adjacent to different types of rights-of-way and in various land-use settings. They can be found in a number of contexts, including but not limited to: rail corridors, greenway corridors, utility corridors, parks, along waterfronts, and adjacent to a road or highway.

Because multi-use pathways are typically bi-directional, special consideration should be given to confirm the appropriateness of installing them adjacent to roads with two-way motor vehicle traffic where motor vehicle speeds and volumes are high, and where there are numerous intersections, alleyways, and driveways. Refer to **Chapter G.5** for more detail on off-street crossings.

Generally, multi-use pathways located adjacent to a roadway would be considered appropriate when:

- Motor vehicle traffic is one way; or
- Motor vehicle volumes are greater than 4,000 vehicles per day.

Multi-use pathways can be considered in other conditions, including adjacent to roads with two-way motor vehicle traffic, provided intersection and crossing conflicts are mitigated. Multi-use pathways are typically not considered necessary adjacent to roads with volumes of less than 4,000 vehicles per day.

When multi-use pathways are being considered within linear rights-of-way, such as rail and greenway corridors, the number and location of intersections and crossings are particularly important, as is the available right-of-way width and number of anticipated users.

Separated Bicycle and Pedestrian Pathways

For the purpose of the Design Guide separated bicycle and pedestrian pathways are considered different facilities depending on the land-use and roadway context within which they are located.

Not Adjacent to a Road

Separated bicycle and pedestrian pathways can be implemented in similar settings to multi-use pathways, including through park space, within greenway and rail corridors, and along waterfronts. The key difference between multi-use pathways and separated bicycle and pedestrian pathways is that people cycling are separated and have their own designated space. Pathways within this context are discussed in more detail in **Chapter E.3**.

Similar to multi-use pathways, when considering the location and design of separated bicycle and pedestrian pathways that are being considered within linear rights-of-way, the number and location of intersections and crossings are particularly important. Other important factors include the available right-of-way width and number of anticipated users.

Adjacent to a Road in a Built-Up Land-Use Context

In areas where separated bicycle and pedestrian pathways are being considered adjacent to a road, particularly in a built up land-use context, separating people cycling from other road users is particularly important. Uni-directional bicycle pathways are more appropriate within this context, as people cycling will be travelling adjacent to a road. Uni-directional separated bicycle pathways, which are also referred to as sidewalk level protected bicycle lanes in this context in the Design Guide, allow people cycling to travel in the same direction as motor vehicle traffic and also provide greater access to destinations than a bi-directional multi-use or bicycle only pathway on one side of the road. In some contexts, such as areas with fewer motor vehicle interactions, bi-directional bicycle pathways may be considered. Design guidance for separated bicycle pathways in this context are provided in the discussion on sidewalk level protected bicycle lanes in **Chapter D.3**.

Shared Spaces

Shared spaces can allow motor vehicle access, but generally have no or limited function for through motor vehicle traffic. Shared spaces are suitable on one-way roads or roads with no directional dividing line where operating motor vehicle speeds are less than 30 km/h and motor vehicle volumes are less than 1,000 vehicles per day.

ADDITIONAL CONSIDERATIONS

Maintenance

Maintenance of multi-use facilities is an important consideration and can be particularly challenging. In many jurisdictions, winter maintenance procedures may differ for roads, sidewalks, and pathways with different agencies or departments that may be responsible for maintenance in each of these contexts. A jurisdiction would need to review its operational procedures and clearly define the responsibility for snow clearing on multi-use facilities. Refer to **Chapter I.3** for more details regarding maintenance.

Amenities, Wayfinding, and Branding

Providing amenities along multi-use facilities can help to enhance the comfort and function of the facility by making it feel like a destination in itself. Amenities can include benches, picnic tables, rest areas, shelters, drinking fountains, public toilets, bicycle parking, and recycling and garbage receptacles. These amenities can help to extend the amount of time someone may choose to spend using a facility.

When installing amenities, it is important to ensure that they are accessible to all users and to consider

Multi-use pathway signage, City of North Vancouver, B.C.

the location in which they are installed. Preferred locations include:

- Areas where people are inclined to stop, such as scenic areas and lookouts, the top of a hill, or in front of a natural attraction;
- Near existing amenities or destinations; and
- Areas that are sheltered from wind and inclement weather.

More information about pedestrian amenities can be found in **Chapter C.3**.

Wayfinding on multi-use facilities is also an important consideration to ensure users are aware of destinations along the facility and connections to the larger active transportation network. Branding pathway and other multi-use facilities can help with wayfinding and promotion. More guidance on wayfinding can be found in **Chapter H.3**.

Lighting

Lighting is important to identify potential hazards and to ensure that users are visible to each other and to motor vehicle traffic at intersections and crossings. Providing well-lit multi-use facilities can help make the facility safe and comfortable in all seasons and at all times of day. This is especially applicable for pathways that are intended for commuter use. However, providing lighting along the length of a multi-use pathway may be cost prohibitive and may require additional maintenance. More guidance about lighting design, application, and staging, including future- proofing pathways for the future addition of lighting, can be found in **Chapter H.4**.

Controlling Access

Access control devices are often used at locations where multi-use facilities intersect roads. These devices restrict access by unauthorized motor vehicles while still accommodating periodic access (such as maintenance and emergency vehicles). They can also visually indicate to users of the multi-use facility the need to slow down as they approach intersections and road crossings. There are a number of physical

features and treatments that can be used as access control devices.

Controlling access is a more significant consideration during the design of multi-use pathways and separated bicycle and pedestrian pathways. The nature of a shared space is to provide access for all modes and not restrict access. However, providing clear gateway features at the entrance to shared spaces is critical. More information about gateway features for shared spaces can be found in **Chapter E.4**.

For pathways, current best practice is to avoid the use of rigid bollards or maze gates at pathway points of entry unless there is a demonstrated history of motor vehicle encroachment, and/or a collision history. The use of rigid bollards or maze gates (offset gates) for controlling speed of pathway users is also not appropriate, as the slowing effect is achieved by creating a potential safety hazard to the pathway users. Bollards and other obstructions placed within the operating space of a bicycle facility have been shown to present a significant injury risk to bicycle users. Refer to **Chapter G.5** for further details about access restrictions.

Research Note

The Cyclists' Injuries & the Cycling Environment (BICE) study conducted for the Cycling in Cities Program at the University of British Columbia found that 12% of all cycling injury collisions requiring emergency room treatment were a result of impacts with infrastructure such as bollards, street furniture, curbs, fences, speed bumps, or stairs. Maze gates can also impact snow clearing as it creates a barrier, which may lead to lower operational standards for people cycling.

Multi-use pathway, Saanich, B.C.

Galloping Goose Trail, Victoria, B.C.

E.2

MULTI-USE PATHWAYS

Multi-use pathways are off-street pathways that are physically separated from motor vehicle traffic and can be used by any non-motorized user. This includes people walking, cycling, and using other forms of active transportation such as skateboarding, kick scootering, and in-line skating Multi-use pathways may also be referred to as shared-use pathways, multi-use trails, and boulevard multi-use pathways.

Typically, multi-use pathways accommodate bi-directional travel for all users, although there are some cases where bicycle travel may be uni-directional. Multi-use pathways may be installed in a variety of land-use contexts and environments, including but not limited to:

- Parallel to an adjacent **roadway or highway** (most appropriate when unbroken by frequent driveways and alleyways);
- Parallel to or within **rail corridors**;
- Within **utility corridors**;
- Within **greenway corridors**; or
- Other contexts such as within **park sites** or **adjacent to water features** such as rivers, lakes, or the ocean.

Longer pathways will often use a variety of rights-of-way and pass through many diverse environments. This section discusses multi-use pathways under local and regional government jurisdiction Refer to **Chapter F.1** for guidance on multi-use pathways along or adjacent to roadways under provincial jurisdiction.

In many communities, multi-use pathways are considered a comfortable active transportation facility appropriate for people of all ages and abilities. However, multi-use pathway conditions may feel less comfortable if there is a high volume and a diverse mix of users, as this can make the pathway feel congested and can be uncomfortable if the speed differential between users is high. The growth in popularity of electric bicycles and small, one-person electric vehicles has the potential to compound this conflict. Obstructions and other physical features commonly located along multi-use pathways, including signage, bollards, and overgrown vegetation, may create safety hazards and should be managed or positioned appropriately.

Research Note

Research at the Cycling in Cities Program at the University of British Columbia found an increased injury risk associated with multi-use pathways as compared to bicycle pathways, which separate bicycle users from other modes.[1] This was due to the increased potential for conflicts with other pathway users. The planning and design of multi-use pathways must be done with the same care and attention to different user needs as the design of other transportation facilities. As such, the intended function and use of the pathway is a key consideration that is addressed at the facility planning stage and is necessary to inform facility design. Multi-use pathway infrastructure needs to serve the intended use while minimizing potential conflicts between users of varying speeds, abilities, and purposes. When designing a multi-use pathway, design professionals must consider how to balance the number of expected users with the intended purpose of the facility.

1 Kay Teschke et al., 'Bicycle Crash Circumstances Vary by Route Type: A Cross-sectional Analysis', BMC Public Health, 14:1205 (2014): 1471-2458.

BENEFITS + LIMITATIONS

Benefits

- Separated from motor vehicle traffic and generally have limited impacts on roadway operations, except at crossing points.
- Physical separation from motor vehicle traffic helps to increase the real and perceived safety along the corridor. They are typically considered appropriate for people of all ages and abilities.
- Can encourage recreational walking and cycling trips and are appealing to families and less experienced bicycle users.
- Can be a tourist attraction and destination by providing a long-distance route to or within a natural or recreation area.
- Can provide continuous and direct routes with minimal stops and jogs.
- May be cost effective if utilizing existing corridors or upgrading existing facilities.

Limitations

- There is potential for conflict between different pathway users. The speed differential associated with people cycling and pathway users of different skill or fitness levels can be a risk. This is an issue along the corridor and at intersections. These conflicts can be mitigated by separating users.
- Potential conflicts with motor vehicles at intersections, mid-block crossings, alleyways and driveways.
    - *Conflicts can be more significant if bicycle traffic is bi-directional.*
    - *There may also be issues with pathway user visibility at crossings.*
    - *Crossings at major roads can be inconvenient and unsafe.*
    - *May need to reduce the number of existing accesses and alleyways in urban areas.*

    - *Crossings at intersections can impact road operations as additional signalization and protected phasing may be necessary to promote safety.*
    - *May not be considered all ages and abilities facilities if conflicts at intersections and crossings are not mitigated.*
- Additional lighting needs to be considered to ensure hazards and pathway users are visible along the corridor and at crossings.
- Ongoing operations and maintenance costs can be greater than some on-street facilities. Drainage can be a concern, particularly in the winter with ice accumulation. Additional snow removal or clearance from the pathway may be required. Vegetation may encroach on the pathway and debris may collect, requiring frequent maintenance.
- A bi-directional pathway located on one side of the road does not provide equal access and connection to the other side.
- May not be attractive to people cycling for commuter purposes.
- Costs are highly variable and based on existing conditions. Costs can be greater where property needs to be acquired or utilities need to be relocated.

TYPES OF USERS

Multi-use pathways are intended to be used by a wide range of users with varying ages, abilities, operating speeds, and dimensions. The full range of active transportation users is outlined in **Section B**. Notable potential uses of multi-use pathways include horseback riding and winter-based modes, such as snowshoeing, cross-country skiing, and kicksledding. Electric bicycles and small, one-person electric vehicles also warrant special consideration as well. See **Chapter H.5** for more details on these new mobility modes.

Multi-use pathways are used for a wide variety of trip purposes. As such, user behaviour, such as travel speed and willingness to make stops, varies considerably. It is intended that users share the multi-use pathway in an equal manner – no one user type is given priority over another.

In some communities, multi-use pathways may also be used by motorized vehicles such as all-terrain vehicles (ATVs), utility-terrain vehicles (UTVs), off-road motorcycles, and snowmobiles. As the intent of this guide is to focus on active modes, design guidance for multi-use pathways that facilitate motorized vehicles is not included in the Design Guide.

Off-street pathway groomed for cross-country skiing, Fort McMurray, AB
Source: Amie McGowan

TYPICAL APPLICATIONS

There are several different contexts where multi-use pathways are appropriate and can be installed. Specific applications of multi-use pathways are described in more detail below.

Highway Corridors

Multi-use pathways may be located adjacent to provincial highways and other roadways under provincial jurisdiction. More information about considerations for pathways adjacent to or within provincial rights-of-way can be found in **Chapter F.1**.

Road Corridors

Multi-use pathways can be located adjacent to the road within the road right-of-way in urban, suburban, and rural contexts. Multi-use pathways can be installed parallel to the road with a horizontal buffer separation in the Street Buffer Zone, or they can be located directly adjacent to the road with vertical separation. Pathways that follow roadway corridors are considered to be an attractive option as they provide the benefits of a direct route offered by on-street facilities, while providing a high level of comfort for users.

Multi-use pathways that are located adjacent to a road can be considered along corridors where the number of interactions with motor vehicles (such as at driveways, alleyways, and intersections) are kept to a minimum, and where the interactions that already exist are mitigated. As such, considerations for multi-use pathways adjacent to an existing road should include: reviewing the number of locations of possible interactions with motor vehicles, pedestrian volumes, proximity to the road, access to destinations, and whether land use is road oriented. In cases where there are a higher number of interactions with motor vehicles and/or higher anticipated volumes of certain types of users, separated pedestrian and bicycle pathways are recommended, as described further in **Chapter E.3**.

Multi-use pathways that are located within a road right-of-way can be considered when the following conditions apply:

- There is sufficient right-of-way width;
- The pathway is located outside of the highway clear zone (see **Chapter F.1**);
- The pathway will be separated from all motor vehicle traffic;
- There is a limited number of crossings (such as intersections, alleyways, and driveways);
- Pathway continuity can be provided;
- The pathway can be terminated at each end of the corridor onto roads or other pathways;
- There is adequate access to local cross-streets and other facilities along the corridor; and/or
- The land use along the corridor is not built up.

If a multi-use pathway is located within an urban land-use context, separating bicycle users from other users is generally recommended. If the boulevard right-of-way is available, a sidewalk level protected bicycle lane would be the preferred facility over a multi-use pathway. Design guidance on this facility can be found in **Chapter D.3**.

When a multi-use pathway is located adjacent to a road, there is typically some form of separation between the pathway and the motor vehicle lane in the Street Buffer Zone. A variety of treatments can be used in the Street Buffer Zone including a landscaped boulevard, vertical objects such as barriers, fences, or wooden posts, or a strip of grass. When selecting the type of Street Buffer Zone treatment, ongoing operations and maintenance costs, the horizontal clearance, as well as obstructions to signage and sightlines should be considered.

Rail Corridors

Multi-use pathways in rail corridors include pathways that are located within abandoned rail corridors or adjacent to active rail corridors. Rail corridors have

gentle grades, an existing base and sub-base, access to the centre of communities, and typically offer scenic views, making them good multi-use pathway routes. There can, however, be challenges to installing multi-use pathways within rail corridors, including personal security concerns associated with lighting and isolation, emergency services access, maintenance access, right-of-way acquisition or easement, potential environmental contamination, land ownership, rehabilitation issues, and liability (e.g. who is at fault in the event of an injury on multi-use pathways located within a rail right-of-way).

Greenway Corridors and Waterfronts

Greenway corridors can include multi-use pathways that are incorporated into linear natural areas such as parks or conservation areas, along stream or river valley corridors, along waterfronts including beaches and shorelines, or along dykes and canals. Similarly, as seen with rail corridors, personal safety concerns and lighting can be an issue associated with facilities at these locations. Other issues can include managing potential environmental impacts, reducing stormwater runoff, and protecting against erosion. Additionally, network connections and facilitating trips being made for transportation purposes can be a challenge.

DESIGN GUIDANCE

Width

The desirable width of a multi-use pathway (see **Table E-20**) is influenced by a number of factors, including:

- Adjacent land uses;
- Available space/right-of-way;
- Topography;
- Location of the pathway (adjacent to a major road, local road, or located within another context); and
- Anticipated volume and type of users.

Because multi-use pathways can be considered all ages and abilities facilities, they often attract a variety of users, some of which may operate at slower speeds. As a result, providing sufficient space to pass others is an important consideration when designing this type of facility. In addition, planning for pathway maintenance – including snow storage and the width of maintenance equipment, such as sweepers and snow plows suitable for maintaining pathways – is another important consideration.

Highway Corridor

Guidance on the width of multi-use pathways within or adjacent to provincial roadways is discussed in **Chapter F.1**.

Road Corridors

For bi-directional multi-use pathways adjacent to arterial and collector roads, the desirable width is 4.0 metres (see **Figure E-58**). For multi-use pathways along local roads or within rural contexts, the desirable width is 3.0 metres.

The constrained limit width of a multi-use pathway is 3.0 metres. The minimum width of a multi-use pathway is 2.7 metres, based on the operating envelope of a single bicycle user (1.2 metres) and the operating envelope of two people walking abreast (1.5 metres).

In more urban settings, connectivity to the active transportation network and accessibility to land use are important considerations for pathway users. A pathway on only one side of the road is only appropriate where there are limited or no destinations on the other side, or if it is physically impossible to provide a facility on both sides. If 4.0 metres is available on both sides, a separate sidewalk and uni-directional sidewalk level protected bicycle lane should be considered.

The recommended width of the buffer in the Street Buffer Zone varies based on the characteristics of the road. On arterial, collector, and rural roads, the desirable buffer is 2.0 metres or greater, with a constrained limit of 0.6 metres. On lower volume local roads, the desirable width is 1.5 metres or greater, with a constrained limit of 0.6 metres. This space can be used for landscaping, road trees, lighting, and snow storage in winter months.

All Other Contexts

Multi-use pathways in all other contexts include pathways located within parks, rail and greenway corridors, and along waterfronts. For bi-directional multi-use pathways in all other contexts, the recommended width of the multi-use pathway is 3.0 metres. An additional 0.6 metres should be provided on both sides of the multi-use pathway for additional clear width. When steep side slopes or large drops are present, the shoulder width should be increased to 1.5 metres on each side (discussed in more detail in the Side Slope section on page E19).

It is important to monitor multi-use pathway use to determine if the width of the facility is appropriate for the number and ratio of users over time. While the Design Guide identifies desirable and constrained limit widths, if space is available, providing a wider facility should be considered particularly if a high volume of users is anticipated.

Table E-20 // Multi-Use Pathway Width Guidance

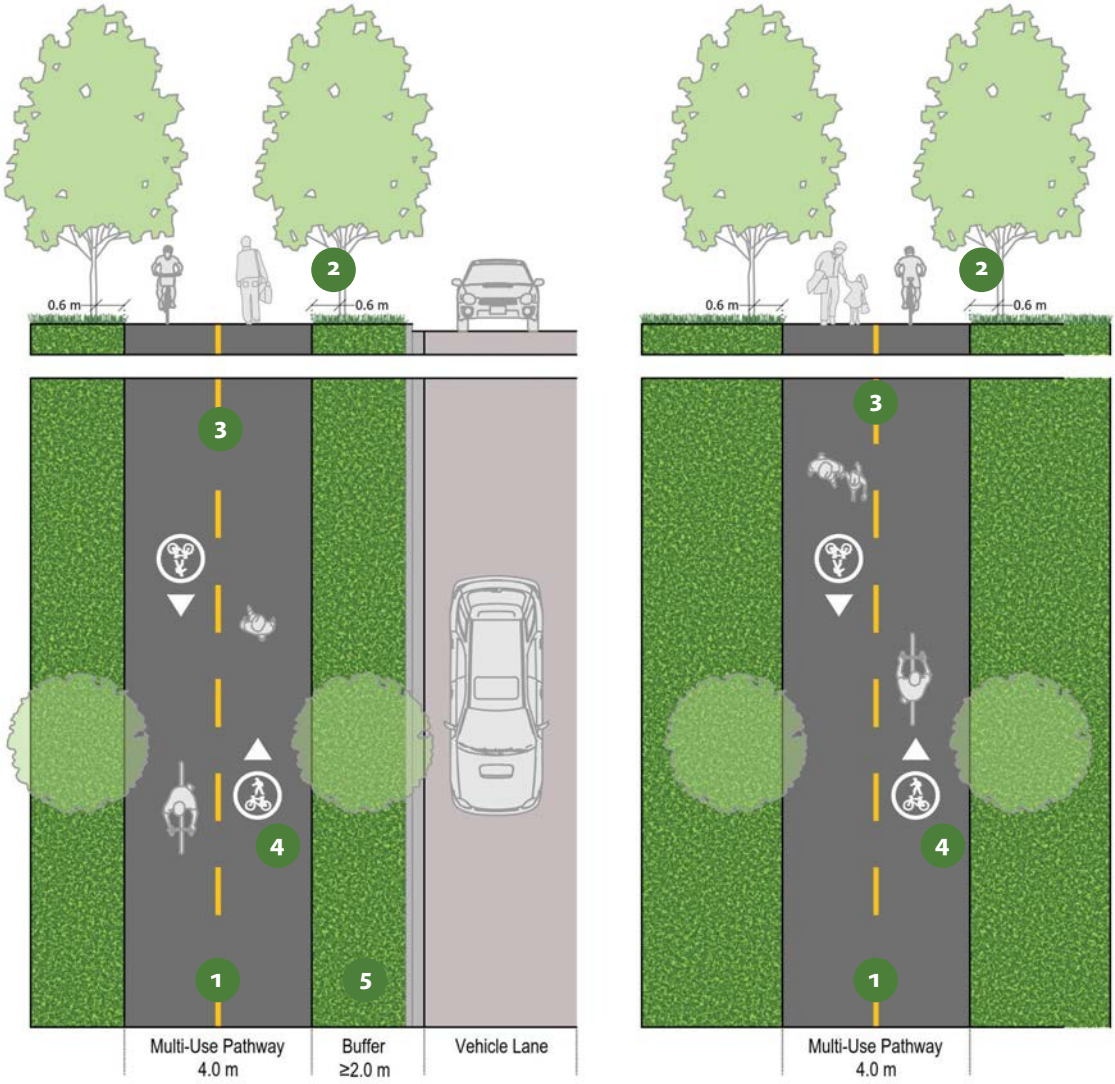
CONTEXT	DESIRABLE (M)	CONSTRAINED (M)
Highway Corridor		
See **Chapter F.1**		
Roadway Corridor (Arterial and Collector Roads)		
Pathway Width	4.0	3.0
Street buffer Zone Width*	≥ 2.0	0.6
Roadway Corridor (Local Roads)		
Pathway Width	3.0 – 4.0**	3.0
Street Buffer Zone Width*	≥ 1.5	0.6
All Other Contexts		
Pathway Width	3.0 – 4.0**	2.7
Lateral Clearance	0.6***	0.6

*Where a paved shoulder is present, the separation distance begins at the outside edge of the shoulder. The paved shoulder is not included as part of the separation distance.

** For high volume facilities with a variety of different user types, consider using widths at the higher end of the design domain.

*** Desirable lateral clearance increases depending on side slope (see side slope section below).

Saanich, B.C.



Roadway Context (Arterial or Collector)

Non-Roadway Context

1. Desired width of 4.0 metres
2. Horizontal buffer of 0.6 metres on both sides of pathway
3. Optional dashed directional dividing line striping to separate direction of travel
4. Pavement markings providing guidance for types of users and direction of travel
5. Buffer from motor vehicle travel lanes

Figure E-58 // Multi-use Pathway Cross-Section - Desired Widths and Key Features

Separating Pathway Users

The decision to separate bicycle users from other users is based on a number of factors including: right-of-way width available, the total volume of current and anticipated pathway users, and the ratio of pedestrians to all daily pathway users. If the required space is available, it is recommended to provide separation between bicycle users and other pathway users. This can help to enhance pathway safety and make the facility more comfortable for all users.

For multi-use pathways that have already been constructed, the *TAC Geometric Design Guide for Canadian Roads* provides the following guidance for when to separate users:

- Where there is a high percentage of pedestrians (more than 20% of users) and total user volumes greater than 33 persons per hour per metre of pathway width; or
- Where there is a low percentage of pedestrians (less than 20% of users) and a total user volume greater than 50 persons per hour per metre of pathway width.

In locations where no pathway is currently in place, existing and future land use should be considered as well as ridership numbers on existing facilities within a similar context to obtain an understanding of projected volumes. The width of the pathway is also another important consideration for separating users, as indicated in **Table E-21.** This table applies the guidance described on the left from the TAC *Geometric Design Guide for Canadian Roads* and summarizes when separation is required based on pathway width. For example, if a 3.0 metre pathway has more than 1,000 daily users, and at least 20% of those users are pedestrians (at least 200 pedestrians), then it is recommended that separate pedestrian and bicycle pathways be provided. If the ratio of pedestrians to bicycle users is smaller, then a higher number of pathway users may be appropriate before separation is needed. For example, if the same 3.0 metre pathway has higher volumes (more than 1,500 users), but with a lower mix of pedestrians (less than 20%), then it is recommended that separate pedestrian and bicycle pathways be provided.

More generally, communities such as the City of Vancouver and guidance from Australia suggest that if there are 1,500 combined users on a facility that is between 3.0 to 4.0 metres in width, and if space is available, separation of people walking and cycling is recommended.

The type of separation provided can vary. Separation can involve anything from painted lines to physical separation. More information about types of separation is provided in **Chapter E.3**

Table E-21 // Calculation Guidance for Separating Pathway Users

USER RATIO FOR SEPARATION	DAILY ANTICIPATED USER VOLUME FOR VARIOUS PATHWAY WIDTHS (USERS)		
	3m	3.5m	4m
More than 20% of users are pedestrians and total user volumes are greater than 33 persons per peak hour	1,000	1,200	1,400
Less than 20% of users are pedestrians and total user volume is greater than 50 persons per peak hour	1,500	1,750	2,000

Direction

Multi-use pathways typically accommodate bi-directional travel for all users. However, there may be some cases where bicycle travel is limited to uni-directional. When considering a bi-directional facility, particularly if it is adjacent to a roadway, it is important to review all constraints and challenges with contraflow travel by all users of the pathway. Contraflow bicycle movements in particular requires special attention at intersections, alleyways driveways, and other conflict points as people walking and driving may not anticipate contraflow movements. Appropriate sight distances between motorists and bicycle users are important to allow both parties to react accordingly.

Potential conflicts can be mitigated through additional signage and pavement markings, as well as adjusting signal phasing at intersections. Protected signal phasing may be provided if warranted; alternatively, a leading signal phase may be provided for people walking and cycling. Refer to **Chapter G.2** for more detail on signal phasing strategies.

Surface Material

As multi-use pathways are intended to be accessible and accommodate a wide range of users and trip purposes, asphalt is the preferred surface type. Asphalt surface treatment provides a smooth continuous surface that is accessible for all user groups at a relatively modest cost. Asphalt is a resilient and flexible material that can last a decade or longer if installed properly.

There are some contexts where other materials such as compact aggregate, paving stones, saw cut concrete, stabilized earth, or other special treatments may be considered. These materials may be appropriate for multi-use pathways through parks, plazas, as well as other environmental and context sensitive areas. As discussed in **Chapter C.4**, unpaved pathways are lower cost and add an extra degree of flexibility to pathway design in rural and suburban areas. However, it is important to note that these surface materials can have an impact on varying types of users. They can be challenging for those with limited mobility or visual impairments, people using mobility aids, and can cause discomfort for people cycling by creating additional vibrations. They are not recommended if the pathway is intended to be accessible and used for a variety of trip purposes.

Design Speed

The design speed of a multi-use pathway should be able to accommodate the preferred speed of the fastest pathway users, while also considering the need to control speeds in a multi-use setting. There is no single design speed that works for all contexts. However, the following guidance can be used to determine the appropriate design speed:

- For most off-street pathways in relatively flat areas with grades of less than 2%, a design speed of 30 km/h is generally sufficient for the common user. The minimum design speed should be no lower than 20 km/h, except in rare circumstances where the context and user types support a lower speed. Lower design speeds (20 km/h) should be considered along paved pathways and where multiple conflict zones occur, such as driveways, intersections, and where there is a mix of users.
- In areas of hilly terrain and long steep grades, the design speed of multi-use pathways should be based on the anticipated travel speed of bicycle users travelling downhill. Upright bicycle users are generally considered the critical users on most multi-use pathways with respect to design speed guidelines. In most cases, 50 km/h is the maximum design speed that should be used.

Longitudinal Grade

Longitudinal grade is an important consideration for both accessibility and drainage. A minimum grade of 0.6% is required to facilitate drainage. The recommended longitudinal grade for a multi-use pathway, where feasible, is 0.6%, as a flatter pathway

is easier to navigate for a pathway user. The ideal longitudinal grade from a pathway user perspective is 4.0% or less. The recommended maximum longitudinal grade of a multi-use pathway is 5%.

When a pathway is any steeper than 5%, flatter resting areas should be provided at set intervals, depending on the severity of the longitudinal grade. For pathways with grades between 5% and 6%, a flatter resting area of 3% or less should be provided every 100 metres. For pathways with grades between 6% and 8%, a flatter rest area should be provided every 50 metres. Where a pathway has grades steeper than 8%, alternative treatments should be explored, such as including switch backs or locating the pathway along a route with a flatter grade.

Cross Slope

The recommended minimum and maximum cross slope for a multi-use pathway is 2% to ensure adequate drainage and to ensure that the multi-use pathway will be accessible for people in wheelchairs or with other mobility challenges. The maximum cross slope is 5%, which should only be used for short distances, such as across driveways.

Typically, the cross slope should angle in one direction, as this design is easier for maintenance and snow removal.

Side Slope

The side slope that is located alongside a multi-use pathway can present a hazard to pathway users when the slope reaches a certain percentage and creates a drop off. For example, a multi-use pathway may run alongside a ditch. If a pathway user were to veer off the pathway and into the ditch, this has the potential to cause injury to the pathway user.

As outlined in the section on page E15, multi-use pathways should have a minimum of 0.6 metres of clear space on either side of the facility. At certain side slope thresholds, this space should be increased to 1.5 metres. If 1.5 metres of clear space cannot be provided in these settings, a railing or barrier should be installed to help mitigate potential hazards. The railing or barrier should be located at least 0.6 metres from the pathway. Side slope considerations are shown in **Figures E-59** to **E-61**. A minimum railing height of 1.4 metres should be used on multi-use pathways in order to accommodate people cycling.

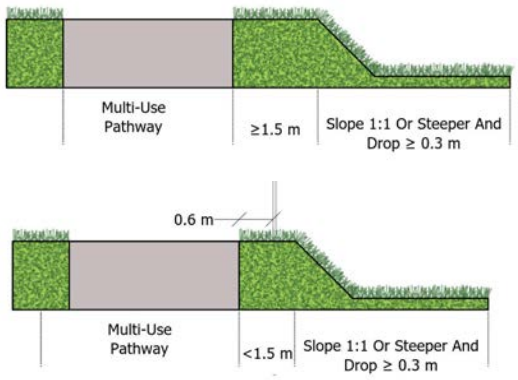


Figure E-59 // Side slope of greater than 1:1 and a drop off greater than or equal to 0.3 metr3s

Source: Adapted from Trails in Alberta Highway Rights-of-Way, Figure 4.3

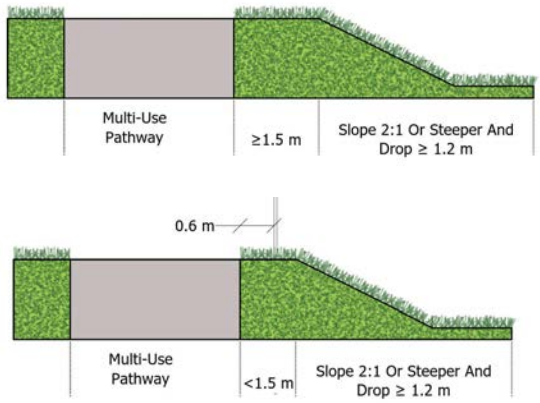


Figure E-60 // Side slope of greater than 1:2 and a drop off greater than or equal to 1.2 metres; or

Source: Adapted from Trails in Alberta Highway Rights-of-Way, Figure 4.3

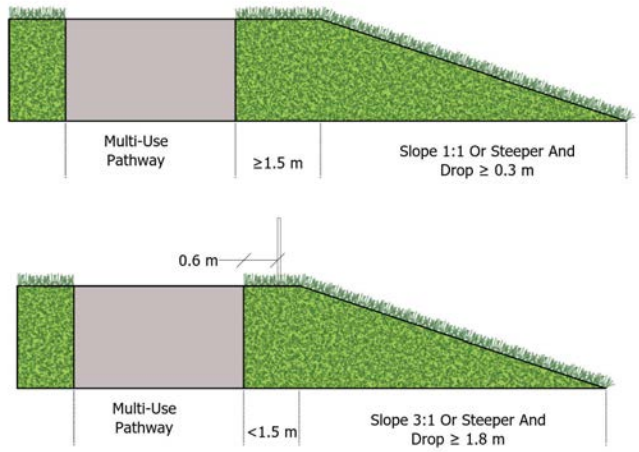


FIGURE E-61 // SIDE SLOPE OF GREATER THAN 1:3 AND A DROP OFF GREATER THAN OR EQUAL TO 1.8 METRES, TO A HAZARD (SUCH AS A WATER BODY)

Source: Adapted from Trails in Alberta Highway Rights-of-Way, Figure 4.3

Sight Distance

Multi-use pathway sight distance is the length of the pathway that is observable by a user. Providing appropriate sight distance allows the pathway user to recognize an obstruction such as debris, other pathway users, and intersections, with enough time to take the appropriate action to avoid conflict. Similarly, it allows motorists to recognize pathway users at crossings or intersections and react accordingly. This section focuses on appropriate sight distance for pathway users along the corridor. Design guidance for sight distances at intersections and crossings is included in **Chapter G.1**. There are three sight distances to consider for pathway design that are discussed in this section.

Stopping Sight Distance

Stopping sight distance provides adequate space for users to react to and make a fully controlled stop before encountering a conflict along a pathway. This can be calculated based on a user's speed, the coefficient of friction between a vehicle's tires and the pathway surface, and the vertical grade of the pathway. Section 5.5.2 of the TAC *Geometric Design Guide for Canadian Roads* includes an equation that should be referenced to determine stopping sight distance for multi-use pathways:

$$SSD = 0.694V + \frac{V^2}{255\left(f + \frac{G}{100}\right)} \qquad (5.5.1)$$

Where: SSD = stopping sight distance

V = design speed or velocity (km/h)

F = coefficient of friction

G = grade (m/m; % upgrade is positive and downgrade is negative)

Source: TAC *Geometric Design Guide for Canadian Roads*, Section 5.5.2

The first term in the expression is the distance travelled during a perception-reaction time of 2.5 s. The second term is the distance travelled after brakes are engaged.

Sight Distance on Vertical Crest Curves

Vertical crest curves can pose limitations on available sight distance and make it difficult for pathway users to identify hazards at ground level if the vertical curve is small. Section 5.5.4.2 of the TAC *Geometric Design Guide for Canadian Roads* includes an equation that should be referenced to determine the appropriate length of a crest vertical curve in order to ensure adequate sight distance for multi-use pathway (see **Table E-22**).

TABLE E-22 // CREST VERTICAL CURVES FOR BICYCLES (PAVED SURFACE, WET CONDITIONS)

MINIMUM CURVE LENGTH									
Algebraic Changes of Grade - A (%)	Design Speed (km/h)								
	10	15	20	25	30	35	40	45	60
2	-	-	-	-	-	-	-	-	11
5	-	-	-	-	15	32	51	71	100
10	-	-	13	27	44	69	102	145	199
16	-	10	22	40	67	104	153	-	-
20	3	14	20	54	-	-	-	-	-
25	8	18	37	-	-	-	-	-	-

Source: TAC *Geometric Design Guide for Canadian Roads*, Table 5.4.2

Notes (from TAC *Geometric Design Guide for Canadian Roads*, Table 5.5.4):

Above the heavy line, stopping sight distances are greater than the curve length:

$$L = 2(SSD) - \frac{274}{A} \qquad (5.5.4)$$

Where: SSD = minimum stopping sight distance from Table 5.5.1 of the 2 of the TAC *Geometric Design Guide for Canadian Roads*

A = algebraic difference in grades (%)

Below the heavy line, stopping sight distances are less than the curve length:

$$L = \frac{A(SSD)^2}{274} \qquad (5.5.5)$$

For multi-use pathways, the height of the eye is taken to be 1.37 metres and the object height is taken to be zero metres. Note that where a multi-use pathway is expected to have a significant number of users that are children, a lower eye height may be appropriate.

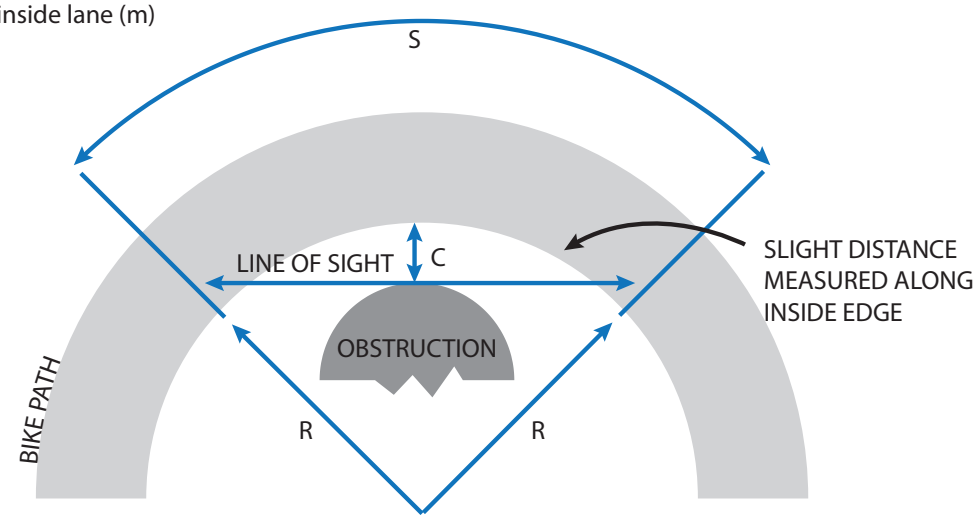
Horizontal Sightline Offset

The horizontal sightline offset (HSO) is the minimum lateral clearance that should be provided for line-of-sight obstructions at the inside of horizontal curves (see **Figure E-62**). Objects found to be between the centreline of the inside of a curve and the HSO limit are considered a sightline obstruction to pathway users and should be eliminated where feasible. Examples of obstructions that may be found within the HSO include barriers, bridges, cut slopes, and trees or brush. On narrower pathways, users will likely travel closer to the centre of the pathway, creating a higher chance of collisions occurring on curves.

Where feasible, it is recommended that the HSO be calculated based on the summation of the individual stopping sight distances of pathway users travelling in both directions along the curve. Section 5.5.3.2 of the TAC *Geometric Design Guide for Canadian Roads* includes an equation that should be applied to determine the appropriate horizontal sightline offset, which is based on stopping sight distance.

$$C = R\left[1 - \cos\left(\frac{90S}{\pi R}\right)\right] \qquad (5.5.3)$$

S = stopping sight distance (m)
R = radius of inside lane (m)
C = distance from inside lane (m)



NOTE: Formula applies only when
'S' ≤ length of circular curve

Figure E-62 // Horizontal Sightline Offset for Off-Street Pathways

Source: TAC *Geometric Design Guide for Canadian Roads*, Figure 5.5.1

Drainage

Providing proper drainage along a multi-use pathway is important to ensure that the facility can be used safely by all users all year-round. Proper drainage can also help ensure the durability of the pathway and help to reduce maintenance costs. Additional drainage design considerations should be given to pathways located in drainage ditches and/or low-lying areas. Opportunities to mitigate deterioration from weather events and annual precipitation can also be considered during the design process.

Overland drainage (surface runoffs) should be designed such that water does not run across the pathway, as this can lead to pooling or ice formation on the pathway. In addition, the overland drainage should not be directed such that it compromises the pathway subgrade, in particular during freeze/thaw cycles. Ditches or curbs and culverts can be used to redirect up-slope drainage so that it does not drain across the pathway. The pathway should be sloped or crowned, allowing water to drain off. Consideration of whether to crown or slope the pathway will depend on a number of factors including the adjacent landscape condition, the longitudinal grade, and the horizontal curvature of the pathway. Additionally, construction costs and site challenges, including accommodating drainage on both sides of the pathway, can make crown construction challenging. Where crowned construction is not feasible, a sloped pathway may be appropriate.

General drainage principles for multi-use pathways include:

- Ensure surface water flows away from the pathway by angling side slopes down and away from the edge of the pathway;
- Ensure subsoil drains away from pathway edge by placing and compacting subgrade in such a way that water flows down and away from the area directly beneath the pathway;
- Prevent water from becoming trapped in the subsoil by using a sandy/gravely subsoil; when this is not possible, take extra precaution to ensure that surface run-off does not run across the pathway;
    - *Where ditches are implemented, the ditch bottom should be maintained at a lower elevation than the aggregate base layer.*
- Prevent stormwater from running across the pathway surface by intercepting water with a ditch and locating the ditch bottom as far away from pathway edge as possible; and
- Keeping water moving off the pathway by providing a cross-slope on the pathway.

If drainage grates are required, they should be placed outside of the travel path for pathway users. If grates must be placed on the multi-use pathway, they should be bicycle-friendly, including grates that have horizontal or diagonal slats on them or no grate, so that bicycle tires and assistive devices do not fall through the vertical slats. Catch basins should be regularly cleared of debris so that drainage is not compromised.

SIGNAGE

The Shared Pathway sign (MUTCDC RB-93; B.C. B-G-002 Series) indicates that both people walking and cycling are permitted to use the pathway.

The Pathway Organization sign (MUTCDC RB-94; B.C. B-G-003 Series) indicates to people walking and cycling how to share a pathway on which there is a designated area provided for each.

PAVEMENT MARKINGS

Pathway Markings

Multi-use pathway symbols along the pathway can be used to supplement signage and enhance awareness of the shared-use function of the pathway. If multi-use pathway symbols are being installed along the pathway, markings should be placed every 50 to 100

metres, depending on the context; tighter spacing may be considered near sharp corners and in areas of high conflict. Multi-use pathway symbols should also be used at pathway entrances and on the far side of crossings.

Directional Centreline Striping

Centreline striping is generally not recommended along multi-use pathways. Although the use of a centreline can reduce the possibility of a conflict between users travelling in different directions, it can contribute to conflicts that arise when faster moving pathway users cross the centreline to pass slower moving users. Many pathway users also disregard centrelines, which can create conflicts. In addition, a centerline implies a 'rule' that is likely to generate complaints but not be enforced.

However, in certain scenarios, centreline striping may provide safety and wayfinding benefits. Centreline striping is recommended when multi-use pathways are located on hills with a grade steeper than 5%, at locations where passing is dangerous due to space constraints and limited visibility, and/or as a way of wayfinding and demarcating the pathway at locations such as pathway access points and at intersections. The wayfinding benefits can be especially important where the pathway is not lit. Centreline striping is also recommended at locations where pathways experience high bi-directional volumes and where a pathway is commuter-oriented or a high volume of commuters are present, as the centreline may help to delineate space and minimize conflicts.

Hazard Striping

Longitudinal or traverse hazard striping should be added around objects on the pathway to guide users away from the hazard.

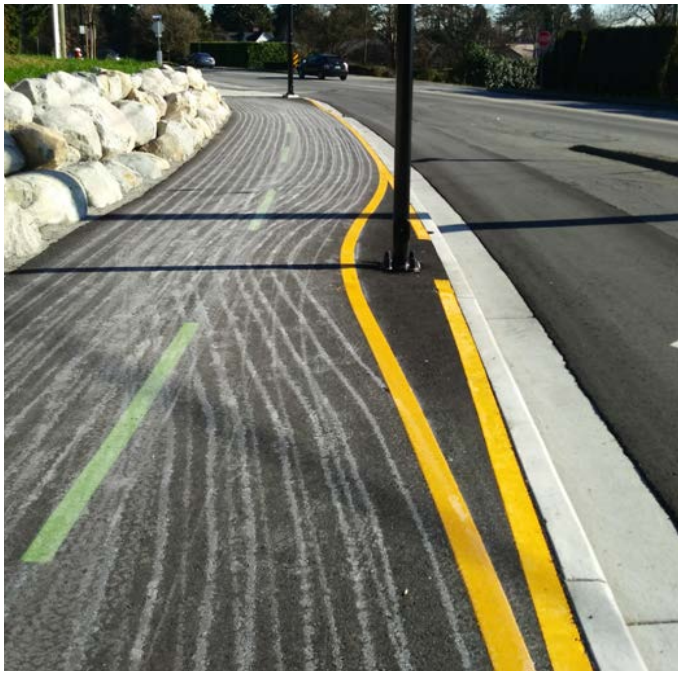
Edge Line Striping

Longitudinal or traverse edge line or fog line striping may be added to help delineate the edge of a pathway. This is especially applicable when the pathway is adjacent to a hazard such as a fence or drop off, or where the pathway is not well lit. Edge line striping will require increased maintenance to ensure that the lines are visible in all seasons.

Intersection and Conflict Zone Markings

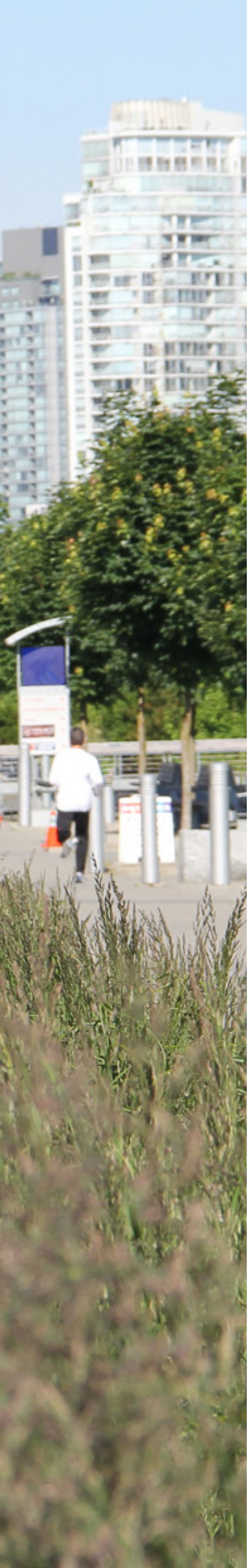
There are two types of pavement markings that are most often used at intersections and conflict zones along multi-use pathways: pedestrian crosswalks and cross-rides for people cycling. Pedestrian crosswalks are typically marked with either parallel white painted lines aligned along the crossing direction or zebra pavement markings that are painted perpendicular to the crossing pedestrian crossing direction (see **Chapter G.3** for more details). Cross-ride pavement markings (also called elephant's feet) are white broken lines painted along the cycling crossing direction and can either be installed on the outside of a crosswalk or alone. Cross-rides are not currently described in the *B.C. Motor Vehicle Act* but have been used in a number of B.C. municipalities (see **Chapter G.4** for more details).

For multi-use pathways, green conflict zone pavement markings should be reserved for conflict points with motorists, including driveways and intersections where the bicycle and pedestrian facilities have been separated. See **Chapters G.4** and **G.5** for more information on conflict zone markings and off-road pathway crossings.



Signage and pavement markings on the Green Necklace Pathway in North Vancouver, B.C., showing shared pathway signage (top left), multi-use pathway pavement marking and green directional centre line striping (special colour used as pathway branding/wayfinding) (top right), hazard striping (bottom left) and edge line striping (bottom right).

Seaside separated off-street pathway, Vancouver, B.C.
Source: City of Vancouver



E.3

SEPARATED BICYCLE + PEDESTRIAN PATHWAYS

Separated bicycle and pedestrian pathways function similar to multi-use pathways. The key difference is the provision of separation between people cycling and other users. The type of separation between users can range from a painted line or visual separation to a vertical or horizontal feature.

Separated bicycle and pedestrian pathways can be located in a variety of contexts, including those similar to multi-use pathways. This includes rail corridors, greenway corridors, parks, and along waterfronts.

Separated bicycle and pedestrian pathways can also be located adjacent to a road. If the facility is located adjacent to a road, and the bicycle users and other users are separated by a painted line, then the facility design guidance (with the exception of width) would be the same as a multi-use pathway as described in **Chapter E.2**. If a separated bicycle and pedestrian pathway is located adjacent to a roadway and users are separated by some type of physical separation, the facility would be considered a sidewalk level protected bicycle lane with an adjacent sidewalk. Guidance for these facilities can be found in **Chapter D.3** and **Chapter C.2** respectively.

Regardless of land-use context, a bicycle pathway should always be located parallel to a pedestrian pathway or a sidewalk. If a parallel facility for pedestrians is not provided, it is likely that a bicycle pathway will be used by pedestrians and function as a multi-use pathway.

BENEFITS + LIMITATIONS

Separated bicycle and pedestrian pathways share many of the same benefits and limitations as multi-use pathways, as outlined in **Chapter E.2**. The key benefits and limitations as compared to multi-use pathways are listed below.

Benefits compared to multi-use pathways

- Separated bicycle and pedestrian pathways create a more comfortable environment and minimize the potential safety conflicts between people walking and faster-moving active transportation users, such as people cycling, in-line skaters, and other modes.
- These benefits are especially important where greater separation from motor vehicles and pedestrians is warranted, such as along pathways with high volumes of active transportation users.

Limitations compared to multi-use pathways

- Additional space and engineering treatments are required for separated bicycle and pedestrian pathways. This can be more costly especially if more property needs to be acquired.
- Separate facilities may require different levels of snow and ice control, including the use of specialized maintenance equipment to clear the width of the facility.
- Visual cues are needed to ensure separation is clear. In addition to visual cues, tactile cues can be provided to reinforce that there are two facilities with different user groups.

TYPES OF USERS

The difference between multi-use pathways and separated bicycle and pedestrian pathways is that the latter has space allocated to bicycle users that is separate from other users. As a result, two active transportation facilities are provided: a bicycle pathway that should be designed for the exclusive use of bicycle users, and a parallel pathway, sidewalk, or trail for people walking and other users. The type of pedestrian facility, and the type of users, is typically dependent on the context and location of the facility.

Bicycle pathways help to reduce the potential for conflict between people cycling and other non-motorized users. It is possible that other non-motorized users, including people using wheelchairs, scooters, and other mobility devices, may find bicycle pathways attractive depending on the location, surface material, and width of the pedestrian facility. Therefore, a bicycle pathway must be accompanied by a pedestrian facility that is equally as convenient, appealing, and connected.

TYPICAL APPLICATIONS

Separated bicycle and pedestrian pathways may be installed in a variety of contexts, within different types of rights-of-way, and in a variety of land-use settings. Two of the most typical applications of separated bicycle and pedestrian facilities are described below.

Not Adjacent to a Road

Separated bicycle and pedestrian facilities can be implemented in similar settings to multi-use pathways, such as through park spaces, within greenway and rail corridors, and along waterfronts. The difference in these contexts is that people cycling are separated and have their own designated space. This separation can be provided at the time of installation or retrofitted as the volume of multi-use pathway users exceeds threshold values as discussed in **Chapter E.2**.

Adjacent to a Road

In areas with built-up land use and where the bicycle and pedestrian pathway is located adjacent to a road, separating bicycle users from other road users is particularly important. A multi-use pathway is not ideal in situations where the pathway space is being used for utilitarian purposes such as access to homes and shops, patio space, etc.

Therefore, uni-directional bicycle pathways are more appropriate within this context. Uni-directional pathways travel in the same direction as motor vehicle traffic and also provide greater access to destinations than a bi-directional multi-use or bicycle pathway on one side of the road. In some contexts, such as areas with fewer motor vehicle interactions, bi-directional bicycle pathways may be considered. Design guidance for bicycle pathways can also be found in the section on sidewalk level protected bicycle lanes in **Chapter D.3**.

DESIGN GUIDANCE

As noted previously, additional design guidance for sidewalks can be found in **Chapter C.2** and additional design guidance for sidewalk level protected bicycle lanes can be found in **Chapter D.3**. This section focuses on guidance for designing separated bicycle and pedestrian pathways. Specifics on design speed, longitudinal grade, cross slope, side slope, sight distance, and drainage can be found in **Chapter E.2**. This section also provides design guidance on the types of separation that can be used to separate bicycle users from other users.

Bicycle Pathways

Direction of Travel

Both uni-directional and bi-directional bicycle travel can be considered for bicycle pathways. When considering a bi-directional facility, it is important to review the challenges associated with having contraflow bicycle travel. Contraflow movements require special attention at intersections, alleyways, driveways, and other conflict points as people walking and driving may not anticipate contraflow bicycle movements. Recommended widths for bicycle pathways and pedestrian pathways are provided in **Table E-23** and **E-24**, respectively.

Width

For uni-directional bicycle pathways, the desirable width of the pathway component is 2.0 metres to allow for two bicycles to pass each other or for side-by-side cycling. If bicycle volumes are expected to exceed 150 people cycling per peak hour of bicycle traffic, a width of 2.5 to 3.0 metres may be more appropriate. The constrained limit width of a uni-directional bicycle pathway is 1.8 metres. The absolute minimum width is 1.5 metres and should only be used for segments of the pathway that are less than 100 metres in length.

For bi-directional bicycle pathways, the desirable width is 4.0 metres with a constrained width of 3.0 metres. If bicycle volumes are expected to exceed 350 people cycling in both directions per peak hour of bicycle traffic, a width of 4.5 metres may be more appropriate. The absolute minimum width of a bi-directional bicycle pathway is 2.4 metres and should only be used for segments of the pathway that are less than 100 metres in length.

An additional 0.6 metres wide should be provided on both sides of the bicycle pathway for additional clear width4

Table E-23 // Bicycle Pathway Width Guidance

FACILITY	DESIRABLE (m)	CONSTRAINED LIMIT (m)
Bicycle Pathway (Uni-Directional Bicycle)	2.0*	1.8
Bicycle Pathway (Bi-Directional Bicycle)	4.0	3.0

*If uni-directional bicycle pathway has greater than 150 bicycle users per peak hour for bicycle traffic, or there is a desire for side-by-side riding, then pathway should be 2.5 metres to 3.0 metres.

Surface Material

The preferred material for a bicycle pathway is asphalt. In natural or environmentally sensitive areas, compact aggregate or other special treatments may be considered but they should be firm, stable, and slip-resistant.

Pedestrian Pathways

Pedestrian pathways can take a number of different forms depending on the context of the location. If they are located adjacent to a road in a built-up land-use context, the pedestrian facility is likely to take the form of a sidewalk (see **Chapter C.2**). The information below outlines design guidance for a pedestrian pathway within a park/greenway context, similar to a multi-use pathway. For the purpose of the Design Guide, which is focused on providing active transportation facilities that welcome people of all ages and abilities, the guidance on this section focuses on providing pedestrian pathways that are universally accessible and can be used in all seasons by a variety of user types (excluding people cycling).

Direction of Travel

Pedestrian pathways should be designed to be bi-directional and allow people to travel side-by-side and for passing users travelling in the opposite directions.

Width

The desirable width for a pedestrian pathway is between 2.4 metres to 3.0 metres. For pathways with higher volumes, additional space may be required. For example, the preferred width of the pedestrian pathway in newer areas of the Seaside Greenway in the City of Vancouver is 4.5 metres or wider. The constrained limit width of a pedestrian pathway is 1.8 metres; however, this may need to be wider to account for higher volumes and a mixture of users.

Table E-24 // Pedestrian Pathway Width Guidance

FACILITY	DESIRABLE (M)	CONSTRAINED LIMIT (M)
Pedestrian Pathway (Adjacent to a Separated Bicycle Pathway)	2.4 – 3.0*	1.8

*For high volume facilities with a variety of different user types, use the higher end of the design range

An additional 0.6 metres wide should be provided on both sides of the pedestrian pathway for additional clear width.

Surface Material

To ensure the pedestrian facility is accessible and can accommodate a variety of users, the preferred pathway material is asphalt or concrete. Like bicycle pathways, if the pedestrian pathway is located in a natural or environmentally sensitive area, other materials may be considered. However, it is important to recognize the trade-offs and the intended users of the facility.

SEPARATION

When to Separate

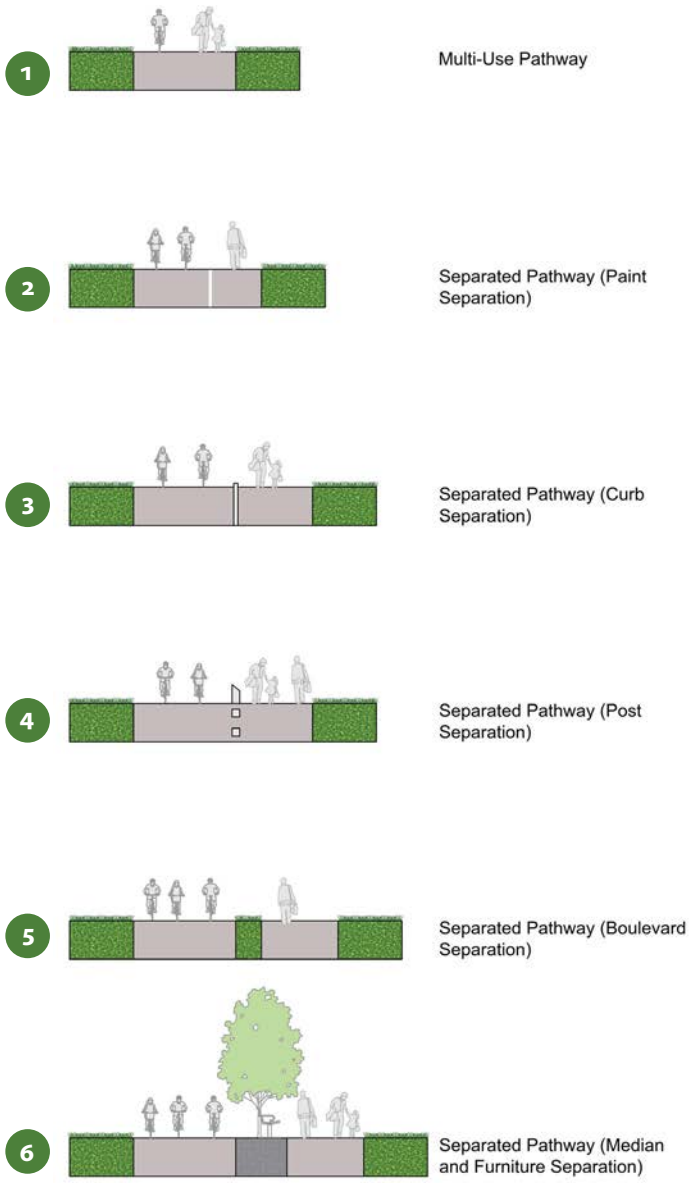
Guidance on when bicycle users should be separated from other pathway users can be found in **Chapter E.2**.

Types of Separation

This section provides guidance on the space or treatment that can be used to separate bicycle users from other pathway users. For guidance on the separation between bicycle facilities and sidewalks located adjacent to roads, refer to **Chapter D.3**.

When the volume of users on a multi-use pathway is (or is expected to be) high, separating bicycle users from other pathway users may be required. This can be done by providing a painted line or visual separation or by providing a physical separation between users (see **Figure E-63**). There are varying levels of separation between users that range in cost and the amount of space separating users. The levels of separation and some of the considerations associated with each are described on the next page.

Figure E-63 // Types of Pathway Separation between People Walking and Cycling



1 Multi-Use Pathway (no separation)

- See **Chapter E.2**

2 Paint Separation

- Provides a visual cue to pathway users that a separate space is designated for different user types.
- Can be difficult to detect the presence of the separated bicycle pathway with this type of treatment as there is no physical separation between users. As a result, there is likely to be encroachment of users into both spaces.
- Has a minimal impact on the overall width of the facility.
- Paint can be applied to an existing multi-use pathway with limited service interruption or cost.

3 Curb Separation

- Provides physical separation and a detectable separation between facilities, creating a clear indication to pathway users of the separate facilities.
- Depending on the width of the curb, this treatment may not require widening the pathway.
- Can make the width of the two facilities feel more constrained with less room to maneuver when passing.
- Can create an obstruction if visibility of the separation treatment is limited due to lighting or weather conditions.
- Can impact pathway drainage and restrict crossing opportunities.

4 Post Separation

- Provides a vertical separation between facilities.
- Creates breaks in the separation to allow users to cross into or over the adjacent facility.
- Can create an obstruction if visibility of the separation treatment is limited due to lighting or weather conditions. Reflective materials should be applied to ensure visibility.

- This type of treatment has a minimal impact on drainage.

5 Boulevard Separation

- Provides a buffer space between the two facilities, resulting in a greater degree of separation.
- Can be a grass boulevard but also creates space for landscaping, vegetation, and facilitates drainage.
- Increased maintenance may be required to prevent overgrown vegetation and ensure upkeep.

6 Median and Furniture Separation

- Provides the highest degree of separation between users.
- Offers space to provide furniture, lighting, and other amenities for pathway users.
- Creates an inviting environment and provides opportunities to enhance the character of the facility.
- Requires a significant amount of right-of-way.

If a buffer is provided between users, it is recommended that the buffer be between 0.5 to 1.0 metres in width. Buffers can take the form of an elevated curb, planters, a landscaped buffer with vegetation, or a swale.

One key consideration for designing buffers adjacent to pedestrian facilities is to provide a detectable edge to allow people with limited vision to distinguish between the bicycle pathway and the pedestrian pathway. For people with visual impairments, it can be difficult or impossible to detect the presence of a separated bicycle pathway, particularly when the bicycle pathway is at the same elevation as the pedestrian facility. These pedestrians may inadvertently encroach onto the bicycle pathway without realizing they have done so. This is a significant limitation of using paint as a form of separation.

If an edge is added to the buffer for detection, consideration also needs to be made to ensure the design can accommodate those with limited or restricted mobility and does not present a tripping hazard to any users.

It is also important that crossing locations are provided with gaps in the separation to allow users to cross over the respective facilities.

SIGNAGE

If the separated bicycle pathway is separated by paint or situated close to the sidewalk or pedestrian pathway, then the Pathway Organization sign (MUTCDC RB-94; B.C. B-G-003 Series) can be used. Wayfinding signage can also be used to identify the intended users of the facilities. Custom pathway organization signage has been used in a number of communities to help with pathway branding.

PAVEMENT MARKINGS

Pathway Markings

Bicycle Pathways

Bicycle pathway symbols along the pathway can be used to supplement signage and enhance awareness of the function of the pathway. If bicycle pathway symbols are being installed along the pathway, spacing should be placed every 50 to 100 metres, depending on context; tighter spacing may be considered near sharp corners and in areas of high conflict. Bicycle pathway symbols should also be used at pathway entrances and on the far side of crossings. On bi-directional bicycle pathways, stencils are paired and centered in the right half of the facility in each direction. Bicycle stencils should be oriented in the travel direction and directional arrows can be used on bicycle only pathways.

Pedestrian Pathways

Pedestrian pathway symbols can be used to supplement signage and enhance awareness of the function of the pathway. If pedestrian pathway symbols

are being installed along the pathway, spacing should be placed every 50 to 100 metres. A single pedestrian stencil may be placed in the centre of the pedestrian facility. The orientation of the stencil may alternate along the length of the corridor (for example, along the pathway, half of the stencils will be upward facing for pathway users travelling in opposite direction).

Pavement Marking Separating Users

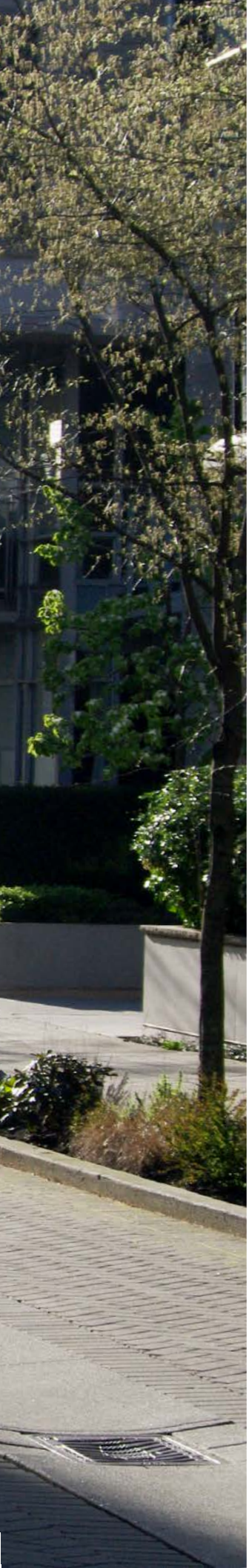
If the separation between the bicycle pathway and the pedestrian pathway is a painted line, this line is typically 20 cm wide.

Directional Dividing Line for Bicycle Facility

Centreline striping is not always necessary on separated bicycle pathways. However, in certain scenarios, centreline striping may provide safety and wayfinding benefits. Centreline striping is recommended when bicycle pathways are located on hills with a grade steeper than 5%, at locations where passing is dangerous due to space constraints and limited visibility, and/or as a way of wayfinding and demarcating the pathway at locations such as pathway access points and at intersections.

Spirit Trail signage, District of West Vancouver, B.C.

Walter Hardwick Avenue shared space, Vancouver, B.C.



E.4

SHARED SPACES

A shared space is a road in which the living environment dominates over the vehicular movements. A shared space functions first as a meeting place, playground, pedestrian area, and extension of any surrounding residences. The road is shared among people walking, cycling, and driving motor vehicles. Shared spaces are applicable along short blocks, with 200 to 400 metres between cross streets.

Shared spaces can differ in many ways, but can generally be described as places in which all modes share the same space and where pedestrians are prioritized. Shared spaces function more so as an extension of the surrounding land uses than a transportation facility. Shared spaces may be completely open for all modes, or in some cases, there may be designated zones that exclude or encourage certain modes and activities. Shared spaces are also known by the Dutch term 'woonerf,' which translates to 'living yard' or 'living road.' They are common across the Netherlands – where they were formally established in the 1970s – and can be found across Europe and internationally, with many recent applications in North America. They are intended to function foremost as public spaces, with the following functions:

- Socializing;
- Recreation;
- Shopping; and
- Acting as an extension of surrounding land uses (such as residences, commercial and retail activity, offices, and entertainment venues)

The essence of the shared space concept is to provide fewer traditional traffic management tools (such as curbs, signage, and lane markings) and replace them with pedestrian elements such as street furniture, trees, and other placemaking elements. This less structured environment relies on social behaviour to navigate conflicts and encourages users to operate more cautiously than usual, scanning for unexpected events and relying on eye contact and behavioural cues to navigate conflicts. This can result in slower, more comfortable environments.

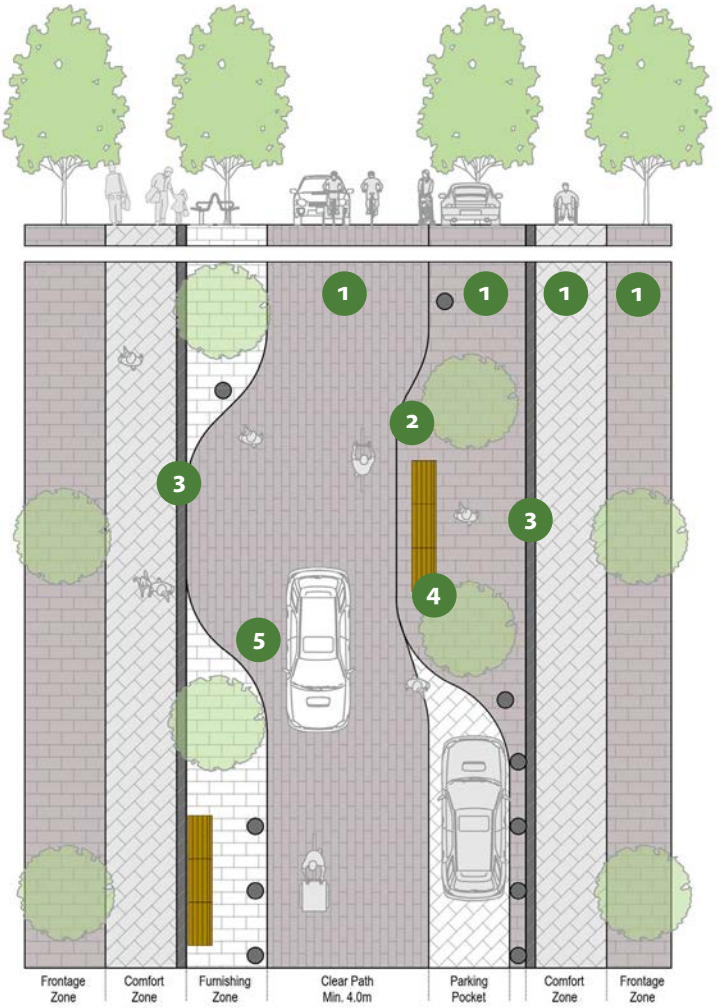
In commercial settings, shared spaces can add vibrancy through outdoor seating, patios, artwork, and landscaping that helps to attract people and encourage lingering. In residential settings, shared spaces can serve as extensions of the front yard, providing a space for play and socializing with neighbours.

TYPICAL APPLICATIONS

Shared spaces can allow motor vehicle access, but generally have no or limited function for through motor vehicle traffic. They function best where there are high pedestrian volumes and limited demand for motor vehicle through traffic. Shared spaces are suitable on one-way roads or roads with no directional dividing line where operating motor vehicle speeds are less than 30 km/h and motor vehicle volumes are less than 1,000 vehicles per day. During peak times, motor vehicle volumes should be less than 100 motor vehicles per hour. Shared spaces can be implemented on any width of road, but may be more complicated to manage on wider roads. A shared space should be no more than 400 metres in length between cross streets, with a preferred length of 200 metres between cross streets. This allows motor vehicles to quickly exit the shared environment if they want to proceed at a faster speed, reducing motorist frustration.

Figure E-64 shows a conceptual shared space layout with key features. In some contexts, shared spaces may be completely closed off to motor vehicle traffic for specific portions of the day. Treatments such as regulatory signage at the shared space entrance, bollards, or movable planters can be used to regulate the space. Shared spaces may also restrict access to personal motor vehicles but permit commercial vehicles, taxis, and transit vehicles (although shared spaces are typically not appropriate along transit routes). Along shared commercial roads, consideration should be given to providing loading and unloading, either within the shared space or along adjacent roads.

Shared spaces should not be implemented in isolation but should instead be considered as part of a wider walking and/or cycling network strategy. Shared spaces can also be suitable for cycling and can provide access to destinations along shared commercial roads. However, they may not offer the same directness or speed as an on-street bicycle facility, as they are pedestrian-focused and encourage slower cycling.



1. Distinct surface material and patterns for each zone
2. Lack of curb between Clear Path and other zones.
3. Optional detectable edge surface treatment for visibility
4. Amenities such as benches and street trees to define space
5. Flexible and meandering road helps to reduce vehicle speeds

Figure E-64 // Shared Space Conceptual Layout and Key Features

BENEFITS + LIMITATIONS

Benefits

- Creation of flexible, public, and social spaces provides unique placemaking and beautification opportunities, encouraging social interaction.
- Potential for increased commercial and retail activity in the road, which may contribute to economic benefits and increased vibrancy.
- Lower motor vehicle speeds and volumes contribute to a quieter, safer, and more comfortable road for active transportation users. International studies on shared spaces have shown reductions in both the number and severity of collisions compared to traditional roads.[2]
- Lack of curb can make it easier to navigate for people with mobility impairments, but may present concerns for people with visual impairments (as described below).

Social interactions along a private shared street, Vancouver, B.C.

Limitations

- Limitations to motor vehicle access may have impacts on the broader transportation network.
- Limited access for emergency vehicles and larger motor vehicles, including delivery trucks. Shared spaces should not by implemented on emergency access routes or bus routes.
- Potential for motor vehicle traffic to shift to adjacent road(s).
- Reduced on-street motor vehicle parking capacity. Parking demand and available on- and off-road capacity in the surrounding area should be assessed prior to shared space implementation.
- May require additional maintenance.
- Can be costly to retrofit existing roads.
- Unique accessibility considerations.

ACCESSIBILITY CONSIDERATIONS

Shared space design requires special consideration for universal accessibility. Given the shared nature of the road and the less structured operating environment, it is crucial that all users are aware of the road's unique function. Design professionals should also ensure that motor vehicle speeds and volumes will remain

2 Eran Ben-Joseph, 'Changing the Residential Road Scene,' Journal of the American Planning Association 61, no. 4 (1995): 504.

sufficiently low to ensure a comfortable environment for pedestrians and other active transportation users of all ages and abilities, including children and people with disabilities. While the entire road is intended to be shared, portions of the shared space may be physically separated from motor vehicle traffic to provide areas for resting and play. Design guidance for separating space is provided later in this chapter.

Special consideration should also be given to accommodating people with visual impairments. Visually impaired people should be actively involved in the shared space design process, including testing detectable surface materials. Potential concerns for visually impaired people using shared spaces include the following:

- **Safe Spaces**
  - *Lack of pedestrian-only space free of conflict with other modes – this can be partly addressed by creating a Comfort Zone (see page E40 for design guidance).*
  - *Lack of clear path without obstacles.*
- **Negotiation Between Users**
  - *Negotiation between users can be difficult for people with visual impairments, as it relies on eye contact, hand signals, and other visual cues.*
- **Pattern of Use**
  - *Traffic along shared spaces operates in a more informal, atypical manner compared to conventional roads. Shared spaces maintain a corridor for movement while also consisting of open spaces for a range of activities.*
  - *Traffic patterns can be difficult to detect by ear, especially when there are quiet electric vehicles and bicycles. Rain, snow, and background noise can also make it difficult to hear traffic movements.*
- **Orientation and Wayfinding**
  - *Typical orientation and wayfinding cues may be missing from shared spaces These include curbs, curb ramps, score lines, crosswalks, TWSIs, and other detectable surfaces.*
  - *Street furniture, utilities, and landscaping elements may not be organized in a typical or intuitive manner.*
  - *Low motor vehicle volumes and speeds can make it difficult to use the sound of traffic to navigate.*
- **Surface Materials**
  - *Coloured, patterned, and textured surface materials are often used on shared spaces, both for aesthetics and for delineating space. For people with vision impairments, it may be difficult to interpret the surface materials; dark lines may look like a step or grade change, while patterns may be visually confusing.*
  - *Puddles, snow, and debris can make it difficult to detect changes in surface material under foot or cane.*
- **Crossing Locations**
  - *Crossing locations, either at intersections or mid-block, may not be well defined along shared spaces, making it challenging to know when and where to cross safely.*

In order to mitigate some of these concerns and improve navigation for people with vision impairments, design professionals should aim to provide multiple layers of navigational information when designing shared spaces These navigational layers include:

- **Aligning streetscape features** to provide a reasonably direct and clear pedestrian route.
- **Providing shoreline edge cues** such as detectable changes in surface material and tactile direction indicators.

- Ensuring the **consistent and appropriate application of TWSIs**.
- Ensuring **adequate visual and tactile contrast** in surface materials.
- Utilizing **signage and pavement markings** where appropriate.;
- Providing **audible information** such as accessible pedestrian signals and environment information (see **Chapter G.2**.
- Providing **tactile and/or electronic wayfinding** information.

DESIGN GUIDANCE

Shared space design is flexible and contextually sensitive, and should consider adjacent land uses, road characteristics, multi-modal circulation patterns, available right-of-way, and other factors. The design of a shared space should be intuitive, using design features to simply and effectively convey the expected behaviour for users. There should be a balance between creating an open, flexible space and providing sufficient structure and predictability to ensure that people of all ages and abilities are able to safety navigate the space. Key shared space design considerations include: gateway features, road geometry, providing a dedicated pedestrian zone, streetscape, and social space – each of which are described below.

Gateway Features

- Shared spaces should include dedicated **signage, pavement markings, and/or gateway features** that clearly indicate to all users that they are entering or exiting a shared space environment. Custom 'Shared space signs have been used in communities such as Victoria and Colwood to signal the entrance to shared spaces
- A **grade change** relative to adjacent roads can help motorists recognize the transition between shared and separated space.
- **Entrances can be narrowed** using curb extensions or street furniture in order to reduce motor vehicle speeds.
- The **surface material** should be changed to one with a noticeably different colour and/or texture from the standard road surface.
- Consider providing **information kiosks, tactile maps or wayfinding**, or other tools at the entrance to provide visually impaired people with layout and wayfinding information about the shared space Information can be provided about the shared space to map and app providers such as Google Maps and Apple Maps to ensure their platforms are up to date.
- The **transition** from shared to separated space should be made clear to people with vision impairments in order to prevent them from inadvertently walking into motor vehicle traffic.

Gateway signage for a shared space in Colwood, B.C.

A grade change at the gateway may serve this purpose if it is steep enough to be detectable. A tactile attention indicator, detectable edge treatment, or a detectable change in surface materials may also be used. When tactile attention indicators are used to indicate the transition, they should align with a marked crosswalk. Tactile attention indicators should not be used across the entire entrance to a shared space, as pedestrians may interpret that to mean they area at a safe crossing location.

Road Geometry

- **Operating motor vehicle speeds** should be between 10 km/h and 30 km/h. In addition to utilizing geometric design elements, consideration should be given to posting speed limits of 30 km/h or less, where feasible. Note that roadways under provincial jurisdiction may not be posted at speeds below 50 km/h except in special circumstances.
- Include **traffic calming treatments** that lower motor vehicle speeds and discourage through traffic. Traffic calming treatments should be separated by no more than 50 metres to prevent long stretches of clear road. Applicable treatments include:
  - *Narrowing the shared travel lane and creating visual 'side friction' by placing street furniture, bollards, street trees, on-street motor vehicle parking, or other obstacles;*
  - *Staggering groups of obstacles on alternating sides of the road to create a chicane effect to reduce sightlines and slow motor vehicle speeds;*
  - *Adding curves or chicanes;*
  - *Reducing corner radii; and*
  - *Applying different pavement treatments.*
- Maintain a **clear path width** of at least 4.0 to 5.5 metres for motor vehicles on two-way shared spaces or 3.0 metres on one-way shared spaces Clear path widths should consider transit vehicles, if applicable. The clear path width can be defined by street furniture, utilities, landscaping, and/or surface materials.
- **Emergency access** should be provided by including staging areas for emergency vehicles every 30 metres along the shared space Emergency staging areas should be a minimum of 6.0 metres wide.

Comfort Zone

- Where there is sufficient right-of-way available, an accessible Comfort Zone can be provided on one or both sides of the shared space The Comfort Zone is the shared space equivalent of the Pedestrian Through Zone, providing a clear path of travel for pedestrians. This space is beneficial to pedestrians who are not comfortable in a shared environment, including people with vision impairments.
- Since there is no curb, the Comfort Zone can be separated from the shared Traffic Zone using street furniture, bollards, and/or street trees.
- The Comfort Zone should have a clear width of at least 1.8 metres.
- Detectable surfaces or tactile direction indicators may be used along the Comfort Zone to define the edges and aid navigation. The detectable surface should be used on the road side of the Comfort Zone, rather than the building side, in order to align pedestrians at crossings.
  - *Tactile attention indicators should not be used along the edge of the Comfort Zone and should be reserved for designated crossing areas.*
- Where Comfort Zones are used, mid--block crossings may also be provided to ensure that people with vision impairments can safely access both sides of the shared space at regular intervals.

- *Crossings may be considered along shared spaces that are longer than 100 metres, particularly where motor vehicle volumes are higher or in commercial or mixed-use locations;*
- *Tactile attention indicators or score lines should be used to help people detect the crossing and align themselves properly;*
- *Ideally, crossings should be perpendicular to the Comfort Zone, to be consistent with standard road alignments; and*
- *See* **Chapter G.3** *for detailed guidance on pedestrian crossings.*

Streetscape

- **Grade differences** between the curb and the road should be eliminated or reduced, which increases accessibility for people walking and using mobility devices.
- Shared streets may be completely open, with no **delineation between spaces or modes**. In some cases, there may be designated zones that exclude or encourage certain modes and activities – for example, the inclusion of a Comfort Zone, as described above. Regardless of the delineation of space, pedestrian activities dominate over through movements – motor vehicles may travel through the road, but they are never the priority.
- **Coloured and/or textured surface materials** should be used to delineate space and notify all users of the shared space environment.
  - *Colour can be used to indicate dedicated spaces for parking, activities, and through movement; visually narrow the clear path to help slow motor vehicles; and dictate priority of movement at crossings.*
  - *Texture can apply as a speed control device – the tactile and auditory feedback provided by rougher surface materials such*

Surface materials differ in colour and texture by area, Colwood, B.C.

as cobblestone will encourage slower bicycle and motor vehicle speeds. The surface material should not be so rough that it becomes uncomfortable for people cycling. Smoother surfaces should be provided in areas that are dedicated to pedestrian use. Texture changes can also indicate crossings and intersections.

- **Ample lighting** is important to ensure adequate visibility between all shared users. Pedestrian-scale lighting may be used to make the shared space more inviting.
- If provided, **on-street motor vehicle parking** should be placed in intermittent pockets along the shared space so that it does not become the dominant element. Parking spaces should be clearly demarcated from the streetscape using alternative surface materials or physical elements.
- **Drainage and maintenance considerations** should be considered when selecting and placing road elements and surface materials. Streetscape design should facilitate snow and ice clearing, and consideration should be given to snow storage locations where necessary. All surface materials should be compatible with snow clearing equipment.
- Special considerations may be required for **vegetation and landscaping**, including planters, hanging baskets, and rain gardens. Permeable surface materials may also be considered.

Shared street in London, England
Source: mrlaugh (Flickr)

Case Study

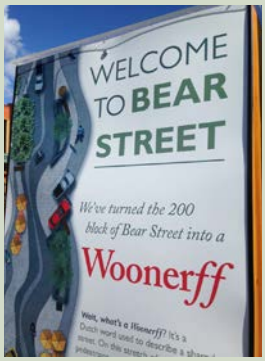
Local, National, and International Shared Spaces

Shared spaces are most common in the Netherlands and other international locales, but the concept has made its way to North America. Some examples of shared spaces exist in B.C., although they range in design and application:

- **Colwood, B.C.**: Colwood has implemented a shared residential road, featuring a Comfort Zone, shared Traffic Zone, and dedicated on-street parking areas, delineated with pavement materials and bollards.

- **Vancouver, B.C.**: Walter Hardwick Avenue in Vancouver's Olympic Village showcases certain shared space design elements, including level grades, brick pavers, bollards, and landscaping that alters from side to side, creating a slight chicane that slows motor vehicle traffic.

- **Banff, Alta:** The Town of Banff has recently completed a four-year seasonal pilot project that explored tuning Bear Road into a shared space, with the intent of making it a livelier and more vibrant commercial road. During the summers of 2015 to 2018, the town replaced 16 on-street parking stalls with landscaping, public seating, commercial patios, and bicycle parking. The approach was to gradually introduce change and trial shared space design elements, then collected public and stakeholder feedback. The town is now moving forward with design options for a more permanent shared space, with construction slated to begin in 2020. The Banff shared space project is a great example for similar smaller and resort communities in B.C.



Bear Street 'Woonerff' signage and concept design
Source (both images): Town of Banff

- **International Examples:** Shared spaces originated in Europe. As a result, there are a number of examples throughout the continent. A few European examples are featured here. Additionally, Bell Road in Seattle, Washington represents a recent Cascadian example of a shared space.

Göteborg, Sweden
Source: La Citta Vita (Flickr)

Bilbao, Spain
Source: Eric Fischer

Activated alleyway, Vancouver, B.C.

Social Space

- In addition to including a designated space for through movement, shared spaces may include flexible social spaces that can be used for gathering, eating, shopping, and play. As social interaction increases and greater numbers of people utilize the road, the perception of safety will increase.
- Social spaces should be protected by street furniture, trees, or bollards, while still allowing for pedestrian permeability.
- The clear travel path and on-street parking should not be located too close to buildings, as this area should be reserved as social space.
- There should be an interface between the shared space and the land uses along it, enabling direct access to buildings and encouraging interaction. Land uses, whether residential or commercial, should essentially spill out into the road.
- Shared spaces are well suited to hosting programed events such as festivals, farmers' markets, and other public events. A clear, accessible route for pedestrians should be maintained at all times.

ALLEYWAYS

Alleyways are narrow, low speed, and low volume roads that provide access to residential and commercial buildings. They can serve a number of additional purposes, including providing motor vehicle parking, loading, utility access, waste collection, and emergency access. Additionally, alleyways can provide valuable active transportation connections and may be more comfortable to use than adjacent roads. Alleyways function as a shared space, typically containing only a shared Traffic Zone without separation for people walking or cycling.

Alleyways represent a significant and underutilized piece of public infrastructure that could be better utilized for active transportation, housing, and placemaking. In many urban areas, the growth of garden suites, alleyway houses, accessory units, and other forms of infill housing has elevated the importance of alleyways, with many homes now designed to face a alleyway rather than a road. It is important to ensure that these residences are accessible via active modes of transportation, while still accommodating utilitarian uses.

In non-residential areas, alleyways can be activated using tactical urbanism techniques to create vibrant social spaces, on either a temporary or permanent basis. Alleyways such as Fan Tan Alley in Victoria are permanently used for commercial access, whereas the Alley Oop and Ackery's Alley projects in Vancouver provide exciting placemaking opportunities while still serving deliveries, utilities, and garbage pickup in the early morning hours. These alleys can also serve as valuable pedestrian and cycling connections.

Enhanced residential alleyway, Vancouver, B.C.

Case Study

Residential Alleyway Improvement

Jepson-Yung Lane, behind Vancouver's Mole Hill Community Housing Society, is an excellent example of an enhanced residential alleyway. The alleyway is designed to serve infill housing that is part of the Mole Hill Community Society, providing valuable outdoor space to residents while also serving as a calm, attractive thoroughfare for pedestrians. Jepson-Yung Lane, along with a number of other alleyways in Vancouver's West End, was given a name in 2018 as part of the City's Alleyway 2.0 initiative, which seeks to create infill housing and make alleyways more walkable public spaces. The new alleyway names honour locally significant women, Indigenous persons, and members of the LGBTQ2S+ community.

Alleyways, especially in downtown cores, are often perceived as unappealing and unsafe areas. However, Jepson-Yung Lane between Bute Road and Thurlow Road has been redesigned as a shared space that feels safe and welcoming. It contains community gardens, public seating, pedestrian scale lighting, bicycle parking, and even a small book exchange, all while maintaining motor vehicle access, parking, and garbage pickup. Landscaping and road elements have been placed to create a gentle curve, helping to maintain low motor vehicle speeds.

Jepson-Yung Lane is lush and green, a stark contrast to most other alleyways in Vancouver's downtown. A study comparing Jepson-Yung Lane to an adjacent hardscape lane found that people were 50% happier, 70% more trusting of strangers, and 110% more likely to pick up garbage in Jepson-Yung lane than in the adjacent hardscape lane[21]. Researchers suspect that the presence of lush, attractive greenery, in addition to evidence of local culture and signs of maintenance by local residents, contributed to these results.

1 'Happy Roads: Green Alleyway vs. Hardscaped Alleyway,' Happy City, accessed April 4, 2019, *https://thehappycity.com/project/happy-roads/*


Mole Hill Book Exchange

Case Study

Laneway Living Rooms

In the summer of 2017, the Vancouver Public Space Network (VPSN), with support and funding from VIVA Vancouver, hosted the Laneway Living Room project, which activated two alleyways with themed parties: 'Grandma's House' and 'Backyard BBQ.' The idea was to take the concept of 'roads as places' and bring two traditionally private spaces – the living room and backyard – and make them public, inviting people into the otherwise underutilized alleyways to eat, socialize, and play.

VPSN and VIVA Vancouver used 'lighter, quicker, cheaper' tactical urbanism techniques to transform the alleyways, using materials such as milk crates, pallets, refurbished furniture, decorative lighting, and small purchases from flea markets and thrift stores. These photos compare the alleyways on a regular day to their fun, transformed state.

Grandma's House:

Before

After

Source (all images): Paul Krueger

Backyard BBQ:

Before

After

Source (all images): Paul Krueger