CYCLE PLAN

May 2017

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CHILLIWACK

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CHILLIWACK

Cycle Plan

1 May 2017

drdul
community
transportation planning

ISL Engineering
and Land Services

Inspiring sustainable thinking

On 16 May 2017, the recommendation that

"Council accept the Final Draft Cycle Vision Plan May 2017 and authorize staff to proceed implementing Quick Wins as outlined in the plan, utilizing available 2017 capital funds"

was approved unanimously by Council.

Contents

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1 Introduction

Cycling has become a practical and attractive mode of transportation in Chilliwack. The City has added more than 180 km of bicycle lanes and shoulder bikeways on urban and rural roads, created bicycle routes on low-volume neighbourhood streets, and developed a network of pathways and trails. Development of bicycle facilities is guided by the 2014 *Bicycle Transportation Plan*, which identifies priorities for future additions to the bicycle network, plus a range of supporting actions.

Despite this progress, cyclists, residents, elected officials and City staff recognize that more can be done to create safe cycling facilities and encourage more people to cycle for work, school, utilitarian and recreational purposes. In particular, there is a strong desire for bicycle facilities that offer protection from motor vehicle traffic. Cyclists and residents have seen what other cities are doing with cycle tracks, protected intersections and separated facilities, and they like what they see and want something similar in Chilliwack. The challenge and opportunity this presents for the City is to determine what types of protected or separated facilities are appropriate for conditions in Chilliwack, what conditions are each best suited to, and how can they be implemented on Chilliwack roads.

This document presents an update of the 2014 *Bicycle Transportation Plan*. The primary purpose of this update is to identify what can be done to advance cycling in Chilliwack, specifically:

- How can we accommodate cyclists of all ages and abilities?
- What protected bicycle facilities are appropriate, and in what conditions?
- What else can we do to encourage cycling?
- How can we best prioritize investments in cycling?

The Cycle Plan contains the following key components:

- Goals and objectives to encourage cycling and improve safety for cyclists.
- A continuous and functional network of bicycle routes that cyclists can use to travel throughout Chilliwack. The plan is focused on eliminating gaps on and between existing routes, and improving routes to incorporate protection for cyclists from motor vehicle traffic.
- Supporting programs and actions to complement the network of bicycle routes and facilities, including wayfinding and signage, bicycle parking, transit integration, community engagement, marketing, education and enforcement, maintenance and monitoring.
- An implementation plan with priorities for protected facilities, bicycle lanes, crossings, pathways and other bicycle facilities to maximize safety and connectivity benefits for cyclists and the City's return on investment. The implementation plan highlights several "quick win" projects that can be undertaken immediately.
- Guidance for designing, constructing and maintaining bicycle facilities, based on state-of-the-art guidelines used in North America, but adapted to conditions in Chilliwack.

1.1 Cycle Vision Chilliwack

Before work began on an updated Cycle Plan, the City hosted "Cycle Vision Chilliwack" on Saturday 15 October 2016. The purpose of this event was to present actions and innovative ideas that have been used successfully elsewhere to advance cycling, and solicit input from the community as to what they would like to see in the updated Cycle Plan.

Over 100 cyclists, residents, business owners and others attended Cycle Vision Chilliwack. Everyone was asked to compete a survey (on-line or in hard copy). For those who couldn't attend the event, presentation material was made available on the City's website, with a link to the online survey.

157 people responded to the survey. Almost three-quarters of respondents were frequent cyclists who ride at least once a week. Most ride for exercise, entertainment, shopping and socializing. Slightly more than a third (37%) commute to work by bicycle, and 10% commute to school.

Feedback from the Cycle Vision survey is summarized in Tables 1.1 and 1.2, ranked by factors very important to infrequent cyclists. As expected, a lack of bicycle facilities is an important factor preventing people from cycling, or cycling more, but interestingly a lack of bicycle parking and concerns about bicycle theft are even more of a barrier to cycling than a lack of facilities. It is worth noting that both frequent and infrequent cyclists responded similarly to this question.

Table 1.1 – Factors preventing cycling (Cycle Vision survey, October 2016)

	Very important	Moderately important
Distracted and aggressive drivers	**59%**	36%
Nowhere to safely park bicycle	**57%**	31%
Concerned about bicycle theft	**56%**	34%
Not enough bicycle routes on roads	**54%**	32%
Not enough pathways and trails	**44%**	37%
Bicycle routes don't go where want to go	**44%**	33%
Uncomfortable riding in traffic	**32%**	36%

Table 1.2 – Factors encouraging cycling (Cycle Vision survey, October 2016)

	Infrequent Cyclists	Frequent Cyclists
More shoulder bikeways on rural roads	**74** + 21 = 95%	**60** + 30 = 90%
Wider lanes on roadways	**69** + 22 = 91%	**61** + 32 = 93%
More painted bicycle lanes	**67** + 23 = 90%	**65** + 29 = 94%
Safe crossings at major roads	**68** + 14 = 82%	**68** + 20 = 88%
Protected bicycle lanes and cycle tracks	**65** + 22 = 87%	**61** + 32 = 93%
Stronger enforcement of motorist violations	**57** + 31 = 88%	**63** + 26 = 89%
Secure bicycle parking	**54** + 35 = 89%	**69** + 15 = 84%
	Very important + moderately important	

When asked what would encourage them to cycle more, infrequent cyclists (those who ride less than once a week) indicated that they simply want more bicycle routes, both protected and un-protected. Frequent cyclists (those who ride at least once a week) want better facilities, specifically protected bicycle lanes, safe crossings and secure parking.

A second Cycle Vision event was held at City Hall on 1 April 2017, at which the draft Cycle Plan was presented. Approximately 50 people attended, and 25 responses were received from the community, including written comments submitted at the Cycle Vision event as well as emails sent to the City after the event. Key feedback included:

- All comments were positive and supportive of the draft Cycle Plan. Several people thanked the City for developing the plan and hosting the Cycle Vision events.
- The Sardis Rail Trail and protected bicycle facilities were the routes most frequently mentioned and desired by respondents.
- There were many comments regarding maintenance of bicycle facilities, particularly snow removal and sweeping. These comments were likely prompted by the recent harsh winter.
- There were several requests for a means of notifying interested persons of important events related to the Cycle Plan. Several persons also indicated a willingness to participate and volunteer in bicycle-related initiatives.
- A number of specific suggestions regarding routes, facilities and supporting actions were incorporated into the Cycle Plan.

1.2 Goals and Objectives

This section describes the goals for the Cycle Plan, as well as several supporting objectives. These goals and objectives are informed by other City plans, including:

- The *Bicycle Transportation Plan* (2014) describes a vision of Chilliwack as "a safer, bicycle friendly community." The plan establishes several goals to "provide an effective mode of alternative transportation," to "accommodate riders of all demographics," to "create a safe and enjoyable bicycle network system" and "improve cycling connectivity between neighbourhoods," to "provide clear and easily accessible information regarding bicycle routes and paths," and to "integrate cycling into the overarching transportation network."
- The City's *2040 Official Community Plan* (2015) establishes a goal to "build healthy attractive communities," and in support of this the OCP emphasizes "a multi-modal mobility system that gives due priority to active transportation (cycling and walking) to promote health." Of particular relevance to the Cycle Plan is the subsequent mobility policies to "improve the standards and connectivity of the bicycle route network" and "design roadways for multi-modal purposes, supporting vehicular traffic as well as walking, cycling" and other modes.
- The *Downtown Land Use and Development Plan* (2009) establishes the following access and mobility objective: "Prioritize walking, cycling, and transit use within the downtown to provide safe, convenient, and pleasant access for people of all ages and abilities."

Based on the relevant goals from other plans, two primary goals are established for the updated Cycle Plan:

- **Encourage more cycling**. The primary goal of the Cycle Plan is to increase cycling in Chilliwack. Developing more bicycle routes and facilities, combined with supporting actions, will increase the number of bicycle trips and increase the share of all vehicle trips made by bicycle. More cycling and more bicycle facilities will in turn increase awareness of cycling as a viable mode of transportation, and help encourage more people to cycle for work, school, utilitarian and recreational purposes.
- **Improve safety for cyclists.** Studies have repeatedly found that the most significant deterrent to cycling is "fear of traffic." Improving safety by improving the design of bicycle facilities will not only help to minimize conflicts between cyclists, motorists and other road users and reduce injuries, but will also reduce the fear of traffic for many cyclists and potential cyclists, thereby increasing the number of bicycle trips.

A number of objectives derive from and support the goals to encourage cycling and improve safety:

- Design facilities to attract and accommodate cyclists of all ages and abilities.
- Establish a continuous network of on-road and off-road bicycle routes in both the rural and urban areas of Chilliwack.
- Provide bicycle racks in commercial areas, at community facilities and in other locations where racks are needed, and provide secure bicycle parking in high-use locations.
- Clearly identify the bicycle network, and provide easy access to wayfinding and other information regarding cycling.
- Incorporate bicycles into facilities for other modes, such as walking and transit, and into other plans, such as parks and greenways.
- Prioritize the implementation of bicycle facilities so as to maximize benefits for cyclists and the community.
- Conduct regular maintenance of bicycle facilities to maintain safety and comfort for cyclists and preserve the City's investment.
- Engage the community as the Cycle Plan is implemented.
- Undertake awareness and education actions to improve motorists' respect for and behaviour towards cyclists.

Specific objectives for the update of the Cycle Plan that support these goals and objectives include:

- Identify improvements to existing routes – on-street facilities, off-street pathways, crossings, signage and pavement markings.
- Identify new routes and connections to add to the bicycle network.

- Identify supporting infrastructure, such as bicycle parking.
- Identify "quick win" projects that can be undertaken immediately.
- Determine priorities for implementing key bicycle projects.
- Develop design guidelines to address a wide range of circumstances, including "interim" conditions (on-street facilities, off-street pathways, crossings, signage, pavement markings).

2 Cycling Network

This section describes the network of bicycle routes, which is the key component of the updated Cycle Plan. The City has established a solid foundation for the bicycle network, with over 180 km of bicycle lanes and shoulder bikeways on urban and rural roads, plus bicycle routes on neighbourhood streets, pathways and trails. The focus now is to eliminate gaps on existing routes, such as where bicycle lanes are discontinued at an intersection or where there is only a shoulder bikeway on one side of a rural road, and to eliminate gaps between existing routes, so as to create a continuous and functional network that cyclists can use to travel throughout Chilliwack. The focus is also on improving existing facilities to increase cyclist comfort and safety, and implementing new protected facilities that separate cyclists from motor vehicle traffic. This focus on eliminating gaps and improving facilities will achieve the goals established in Section 1 of attracting more people to cycling, increasing the number of cycling trips, and making conditions safer for cyclists.

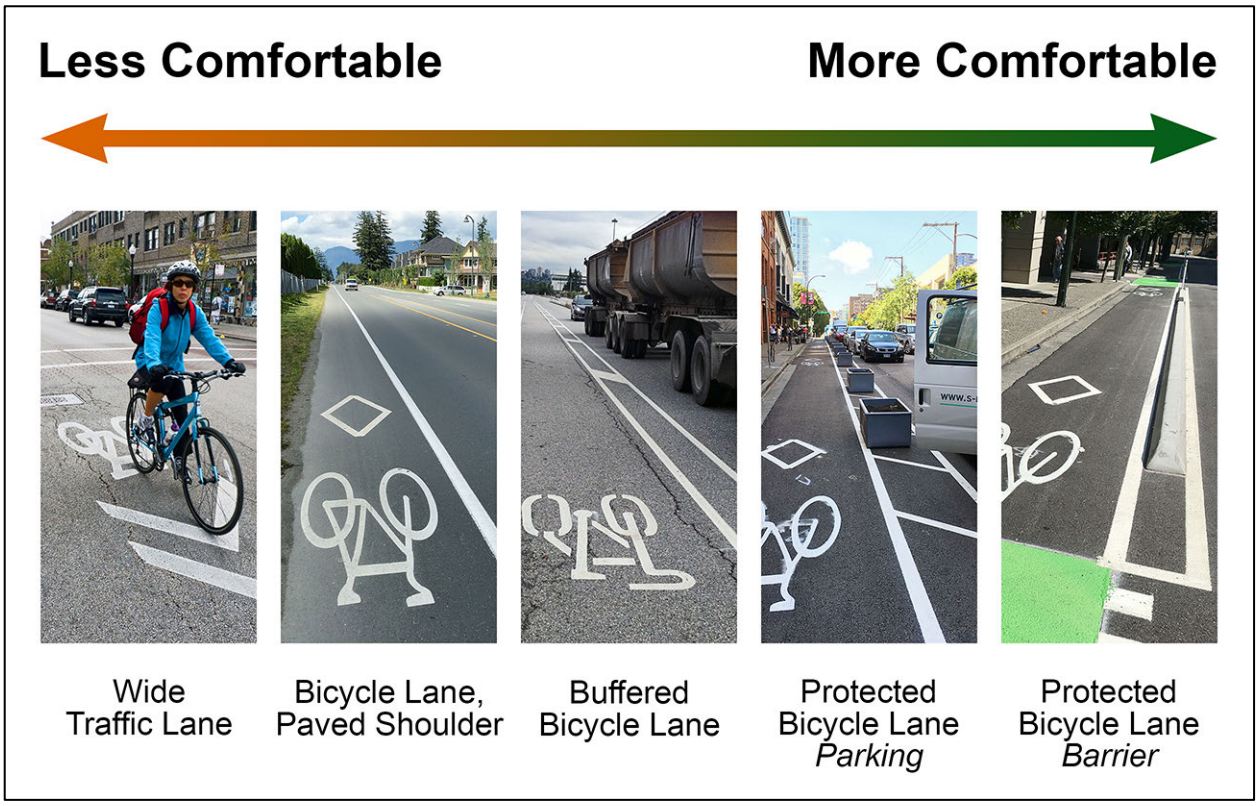
2.1 Types of Bicycle Facilities

This section describes the various types of bicycle facilities that are currently used in Chilliwack, and facilities that are used in other communities and could be used in Chilliwack.

At present, bicycle facilities on City streets include delineated bicycle lanes on major roads, wide traffic lanes on minor roads, and paved shoulders on rural roads. While these types of facilities create extra space on the road for cyclists, they do not offer any protection from traffic. Feedback from the community documented in Section 1 indicates a strong desire for bicycle facilities that incorporate some form of protection. As Figure 2.1 illustrates, protected facilities are more comfortable for cyclists, increasing perceptions of safety and attracting a wider range of ages and cycling abilities.

It is important to recognize, however, that protected facilities are not always appropriate in every situation. The challenge in developing the bicycle network is to determine what types of protected facilities are appropriate for conditions in Chilliwack, what conditions each is best suited to, and how can they be implemented on Chilliwack roads. Buffered bicycle lanes, protected one-way bicycle lanes and two-way cycle tracks all have their place, and each can be the optimum configuration in the right circumstances. But in most cases they also mean that something has to be removed from the road to make room for the protected bicycle facility, such as removing a lane of traffic, turn lanes or parking, and it is important to consider whether the benefits of the protected facility outweigh the impacts of removing other transportation facilities. In some cases, depending on the frequency of intersections and driveways, a protected facility might not be able to offer much protection on a particular road, and other options such as bicycle lanes or even a different route should be considered instead. Lastly, but no less important is that the cost of protected facilities is considerably higher than the cost of conventional or buffered bicycle lanes, and as discussed in Section 4, it is important to consider the relative “return on investment” that each type of facility offers on a specific route in order to determine which is the optimum choice.

Figure 2.1 – Cycling comfort spectrum



2.1.1 Bicycle Lanes and Protected Facilities

Different types of bicycle lanes include lanes delineated with paint, and lanes with some form of protection between cyclists and traffic:

- **Bicycle lanes** are painted lanes designated for exclusive use by bicycles. A solid white line separates a bicycle lane from the adjacent traffic lane, and the line is dashed where motor vehicles may cross the bicycle lane (such as to turn right). Bicycle lanes typically range from 1.2 m to 1.8 m wide. Figure 2.2 illustrates a typical bicycle lane in Chilliwack.
- **Buffered bicycle lanes** provide more separation for cyclists, typically with a painted buffer zone approximately 0.5 m wide. Buffers may be located to the left of cyclists to provide separation from adjacent traffic, and/or to the right to provide separation from parked vehicles and the threat of an open car door, as shown in Figure 2.3.
- **Protected bicycle lanes** are located within the roadway but are physically separated from motor vehicle traffic lanes or parked cars by some type of barrier, which can be as simple as flexible plastic pylons, or as substantial as a raised concrete curb. Protected bicycle lanes typically range from 1.5 m to over 2.0 m wide, and the barrier can be up to 1.0 m wide to ensure that the open door of a parked car does not extend into the bicycle lane. Figure 2.4 illustrates a bicycle lane protected by parked vehicles, with a "door zone" buffer. Figure 2.5 illustrates a bicycle lane protected from adjacent traffic by a barrier.

Figure 2.2 – Conventional bicycle lane (Tyson Road, Chilliwack)

Figure 2.3 – Buffered bicycle lane (Vancouver)

Figure 2.4 – Protected bicycle lane with parking (Vancouver)

Figure 2.5 – Protected bicycle lane with barrier (Vancouver)

- **Cycle tracks** are similar to protected bicycle lanes, but are designed for two-way bicycle use. They are typically used on one-way streets to enable cyclists to also travel in the opposite direction of traffic. Cycle tracks typically range from 3.0 m to over 4.0 m wide, and the barrier protecting the cycle track can be up to 1.0 m wide. Figure 2.6 illustrates a two-way cycle track.

Figure 2.6 – Cycle track (Seattle WA)

2.1.2 Other On-Road Facilities

Other types of on-road bicycle facilities include:

- **Bicycle boulevards** are routes on neighbourhood streets with low traffic volumes and speeds of 50 km/h or less. While bicycle boulevards typically only include signs and pavement markings identifying the route, traffic calming measures may also be used to improve safety for cyclists and other road users. Figure 2.7 shows a typical bicycle boulevard.
- **Shared lanes** are wider traffic lanes that are intended for cyclists and motorists to share, and are typically marked with "sharrow" symbols on the road and "share the road" signs. Shared use lanes typically range from 4.0 m to 4.5 m wide, compared with 3.5 m for a standard traffic lane. Figure 2.8 shows an example of a shared lane with a "sharrow" marking on the pavement and a "share the road" sign.
- **Shoulder bikeways** are paved shoulders on roads without curbs, typically in rural areas, and are often shared with pedestrians. Shoulder bikeways typically range from 1.2 m to 1.8 m wide, with wider shoulders on roads with higher speed limits. Figure 2.9 shows a typical shoulder bikeway on a rural road in Chilliwack.

Figure 2.7 – Bicycle boulevard (Vancouver)

Figure 2.8 – Shared lane (Calgary AB)

Figure 2.9 – Shoulder bikeway (Prest Road, Chilliwack)

2.1.3 Off-Road Facilities

The two types of off-road bicycle facilities are pathways and trails:

- **Pathways** are hard-surfaced facilities that are shared by cyclists, pedestrians and other non-motorized modes of transportation, including persons using wheelchairs and other mobility aids. Pathways are separated from roadways, although they may be located parallel to a roadway. They can be constructed of asphalt, concrete or fine crushed aggregate, and typically range from 2.5 m to over 4.0 m wide. An example of a pathway is the Sardis Rail Trail, shown in Figure 2.10.
- **Trails** are soft-surfaced facilities, typically dirt, gravel or other natural materials. Cyclists on mountain bikes and similar bicycles capable of off-road riding can navigate trails, but they are generally not suitable for road bikes. Trails are also used by pedestrians, but are not usually accessible to persons with disabilities. An example of a trail is the Rotary Trail along the Vedder River, shown in Figure 2.11.

Figure 2.10 – Pathway (Sardis Rail Trail, Chilliwack)

Figure 2.11 – Trail (Vedder River Rotary Trail, Chilliwack)

2.1.4 Crossings

Crossing treatments are applied where on-street bicycle routes and off-street pathways intersect major roads. The type of crossing treatment in a particular location depends on the width of the intersecting road, the volume of traffic, and the number of cyclists, pedestrians and others using the crossing.

Marked crossings are the most basic type of crossing treatment, and are identified only with signs and pavement markings. They are located at an intersection, or midblock between intersections where a pathway intersects the road. Marked crossings can be supplemented with the following features to reduce crossing distances, slow motorists at the crossing, and increase the visibility of cyclists and pedestrians.

- **Curb extensions** are extensions of the curb on one or both sides of the roadway, narrowing the width of the road to as little as 6 m. They reduce the crossing distance and increase the visibility of cyclists and pedestrians at the crossing. Figure 2.12 shows an example of curb extensions used on nearside corners at a crossing so as to accommodate farside bus stops.
- **Median islands** are raised islands on the roadway centreline, separating opposing directions of traffic, with gaps in the island for cyclists and pedestrians. They make it easier for cyclists and others to cross by providing a safe refuge in the middle of the roadway so they can cross one direction of traffic at a time. Figure 2.13 shows a typical configuration of a median island crossing (but with U.S. signs).
- **Flashing lights** supplement signs at marked crossings, and are activated by cyclists and pedestrians before they enter the crossing. Flashing lights have been shown to increase the proportion of motorists that yield to cyclist and pedestrians at crossings, particularly the new rectangular rapid flashing beacons (RRFBs) shown in Figure 2.14. The City does not currently use flashing lights at pedestrian and bicycle crossings, and as recommended in Section 5.4 the City should consider flashing lights as they are a cost-effective means of improving safety and enhancing the bicycle network.

Figure 2.12 – Crossing with nearside curb extensions (New Westminster)

Figure 2.13 – Crossing with median islands (Portland OR)

Figure 2.14 – RRFB flashing lights (Abbotsford)

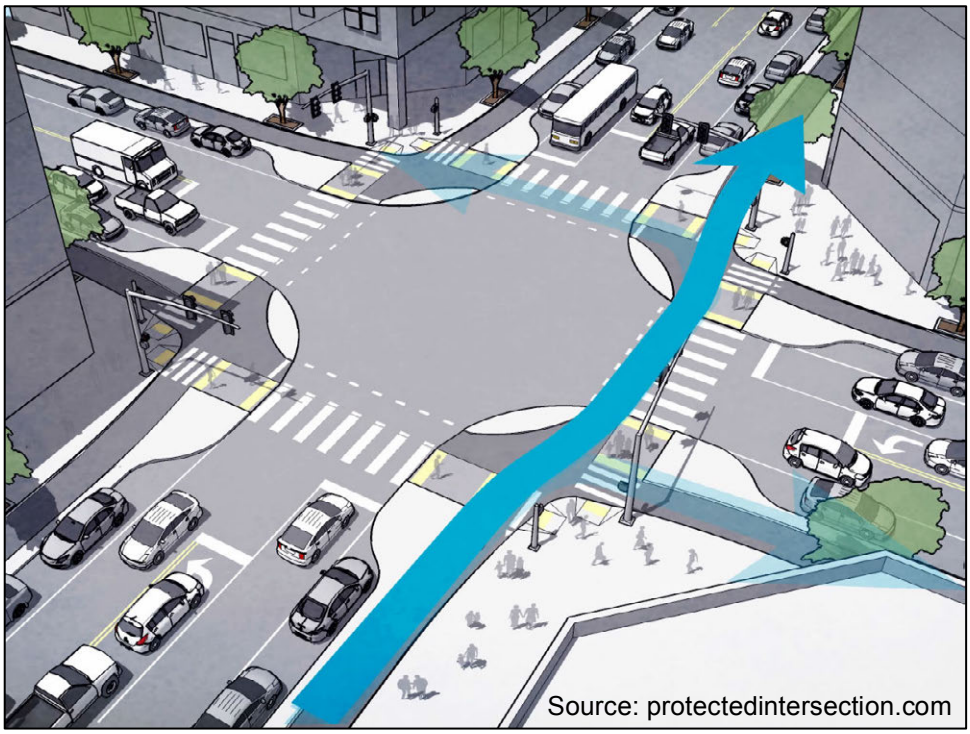
Signalized intersections and crossings incorporate traffic signals and are typically located on major roads with multiple traffic lanes, and high traffic volumes or speeds. Signalized intersections can be enhanced with the following features:

- **Bike boxes** position cyclists ahead of stopped vehicles at an intersection to help them make left turns, or to avoid conflicts with right-turning vehicles, as shown in Figure 2.15.
- **Hook turns** enable cyclists to make left turns without having to weave across one or more lanes of motor vehicle traffic. Instead, cyclists stop on the right side of the road at an intersection, turn 90 degrees to the left and either push a button to actuate the signal or wait for a gap in traffic to cross where there is not a signal. Hook turns can be used at both unsignalized and signalized intersections, and are particularly effective at T-intersections as shown in Figure 2.16.
- **Protected intersections** incorporate several features to improve safety for cyclists, including protective islands on corners where cyclists wait for signals to change. Figure 2.17 is a conceptual illustration of a protected intersection where two bicycle routes with protected bicycle lanes meet.

Figure 2.15 – Bike box (Portland OR)

Figure 2.16 – Bicycle hook turn (Vancouver)

Figure 2.17 – Protected intersection concept



Grade-separations include overpasses and underpasses. Due to their cost, grade-separations are generally used only where there are large numbers of cyclists and pedestrians, to cross high-volume, high-speed roadways or active railway tracks. Examples of grade-separations in Chilliwack include the underpasses under the CNR rail line at Edwards and Charles Streets, and the planned Sardis Rail Trail overpass over Highway 1.

2.2 Bicycle Network

This section describes the future bicycle network, which provides the basis for identifying specific bicycle projects in Section 2.3.

2.2.1 Existing Bicycle Network

The existing bicycle network incorporates a mix of delineated bicycle lanes on major roads, wide traffic lanes on minor roads, paved shoulders on rural roads, designated routes on low-volume neighbourhood streets, and off-road pathways and trails. The network provides connections for cyclists in all urban and rural areas of Chilliwack, as well as connections to Abbotsford, Harrison, Kent and Hope.

The network is by no means complete, and the 2014 *Bicycle Transportation Plan* identifies a number of priority routes and facilities to be developed in the near future. These include:

- The Sardis Rail Trail. The first phase of the SRT was constructed between Webb Avenue and Luckakuck Way in 1992. The next phase will extend the SRT across Highway 1 to Airport Road – construction will begin in 2017 and is anticipated to be completed in 2018. Subsequent phases will extend the SRT to the south, connecting to the Vedder River Trail system.
- Bicycle lanes on urban roads, which in some cases will require removing some on-road parking, such as on Airport Road and Broadway.
- Shoulder bikeways on rural roads, in particular Keith Wilson Road west of Lickman Road and Chilliwack Central Road.
- Minor road markings and sign installations.

The update of the Cycle Plan builds on the existing network, incorporates the priorities previously identified, and adds more new and improved routes to address other shortcomings in the existing network, including:

- **Gaps** in the network that make it difficult for cyclists to use bicycle routes, and create safety concerns for cyclists due to a lack of bicycle facilities, particularly at intersections and other locations with a higher potential for conflicts, where bicycle facilities are needed most. Projects to eliminate specific gaps in the network are described in detail in Section 2.3, which include (but are not limited to) the following types of gaps:
    - Gaps where an existing bicycle route simply ends, without having reached a major destination or an intersecting bicycle route, and cyclists are left to find their way to their destination, or to where another section of bicycle route begins. For example, the bicycle lanes on Young Road currently end north of 3rd Avenue, with no facilities for cyclists to continue north. Similarly, the shoulder bikeway on Keith Wilson Road currently end at Lickman Road, with no bicycle facility the remainder of the way to the Abbotsford boundary (in the 2014 *Bicycle Transportation Plan*, the City identified Keith Wilson Road between Lickman Road and the Vedder River as a priority for shoulder bikeways).
    - Gaps where bicycle lanes end just before an intersection and resume on the far side, typically because there is not sufficient road width to continue the bicycle lanes through the intersection (typically because of the addition of turn lanes at the intersection), such as on Knight Road at Vedder Road. Similarly, gaps where bicycle lanes or shoulder bikeways end at a bridge and resume on the other side, such as on the Lickman Road overpass over Highway 1 where there is no additional road space for cyclists (northbound cyclists are directed onto the narrow sidewalk across the bridge, while there is no facility or alternative for southbound cyclists). It is important to note that in this example, the bridge is the jurisdiction of the Ministry of Transportation and Infrastructure.
    - Gaps where there is a bicycle facility on one side of the road but not on the other, such as on Teskey Way east of Promontory Road where there is a bicycle lane on the north side of the road for westbound cyclists, but no facility on the south side of the road.

- Gaps on an important link in the network where there is no bicycle facility at all, such as Broadway and the eastern part of Airport Road (in the 2014 *Bicycle Transportation Plan*, the City has identified Broadway and Airport Road as priorities for bicycle facilities).

- **Crossings,** or more accurately a lack of crossing treatments at major roads and intersections, which means a greater potential for conflicts for cyclists crossing these major roads. This includes locations where there are no crossing treatments, as well as locations where existing crossings can be improved to better accommodate cyclists. The lack of adequate crossing treatments not only creates safety concerns for cyclists, but also discourages cyclists from using bicycle routes. Specific crossing projects are identified in Section 2.3.
- **Signage.** Few bicycle routes are signed, and those that are signed are not well signed, and not many are identified with pavement markings. As well, there is little directional signage indicating routes to major destinations. As a result, cyclists sometimes find it difficult to follow the bicycle route network, and cyclists and non-cyclists may not be aware of all route options. In addition, there is not a map identifying designated routes and "other routes used by cyclists" in Chilliwack (the only route map available is a "cycling guide" map in the appendices of the 2014 *Bicycle Transportation Plan*). Projects to improve signage and wayfinding are described in Section 3.1.

2.2.2 Future Bicycle Network

The "Future Bicycle Network" map in the Appendix illustrates the future bicycle network, which includes five categories of routes:

- **The Sardis Rail Trail** (SRT) is the spine of the future bicycle network, providing a direct, traffic-free north-south connection that is attractive to cyclists of all ages and abilities. Particularly appealing will be the crossing of Highway 1 under construction in 2017, which will enable cyclists to travel between Chilliwack and Sardis without having to ride on major roads across the highway. The SRT will also connect with core, neighbourhood and recreational routes along its length, which can function as feeder routes for cyclists wishing to access the SRT.
- **Protected routes** that incorporate some form of protection from motor vehicle traffic, and as a result will be attractive to cyclists of all ages and abilities. The first phases of the protected route network identified on the "Future Bicycle Network" map include Mary Street, Princess Avenue, College Street and Young Road. It is expected that when these facilities have been implemented and the City has gained experience designing, operating and maintaining protected bicycle facilities, additional protected routes can be developed and the "Future Bicycle Network" map updated accordingly.
- **Core routes** connect key destinations, commercial areas and neighbourhoods throughout the City, as well as neighbouring municipalities. These routes are generally on arterial and major collector roads, and may include bicycle lanes (conventional and buffered), shoulder bikeways, and short pathways to connect routes. The core route network includes the proposed extension of Airport Road west to Eagle Landing Parkway.

- **Neighbourhood routes** provide local access within urban neighbourhoods and rural communities and connect to other routes. Neighbourhood routes incorporate bicycle boulevards and wide traffic lanes on local streets, and bicycle lanes and shoulder bikeways on arterial and collector roads. The most notable example of a neighbourhood route is via Garrison Boulevard, Miller Drive and Wiltshire Street, providing local access within Sardis and Vedder. Vedder Road is identified as a neighbourhood route as the SRT and other routes provide parallel alternatives that are far more attractive to cyclists of all ages and abilities. The City is constructing bicycle lanes incrementally, but given the costs and constraints in the corridor it will likely be considerable time before a continuous route can be created along Vedder Road. In the rural areas, Prest and Lickman Roads are identified as neighbourhood routes because they do not connect directly into the urban area and are therefore not as significant within the network as core routes such as Chilliwack River Road and Evans Road.
- **Recreational routes** are used primarily by cyclists riding for recreational and fitness purposes, and include paved shoulders, low-traffic roads and off-road pathways and trails shared with pedestrians and other active transportation modes.

The "Trail Connections" map in the Appendix is a simplified version of the "Future Bicycle Network" map, highlighting the connections between the Sardis Rail Trail and recreational trails along the Vedder and Fraser Rivers. To the north, protected facilities and other bicycle routes provide several connections from the SRT to the Experience the Fraser route. To the south, in the interim until the SRT is extended to the Vedder River, the Dieppe–Garrison–Miller–Wiltshire neighbourhood route provides the connection to the Vedder River.

Subsequent sections describe specific projects to implement the future bicycle network.

2.3 Bicycle Projects

This section identifies specific projects to improve connectivity, access and safety for cyclists by eliminating gaps in the bicycle network, improving existing routes, and adding new bicycle routes, crossings and supporting infrastructure.

2.3.1 Sardis Rail Trail

As described in Section 2.2, the Sardis Rail Trail (SRT) is the spine of the future bicycle network. The existing section of the SRT between Webb Avenue and Luckakuck Way will be extended north across Highway 1 to Airport Road in 2017/2018. Not only will this extension improve access for cyclists between downtown Chilliwack and Sardis, but together with the proposed protected bicycle lanes on Airport Road and Broadway (described below in Section 2.3.2) this will provide an enhanced connection to the Experience the Fraser route via Menzies Street.

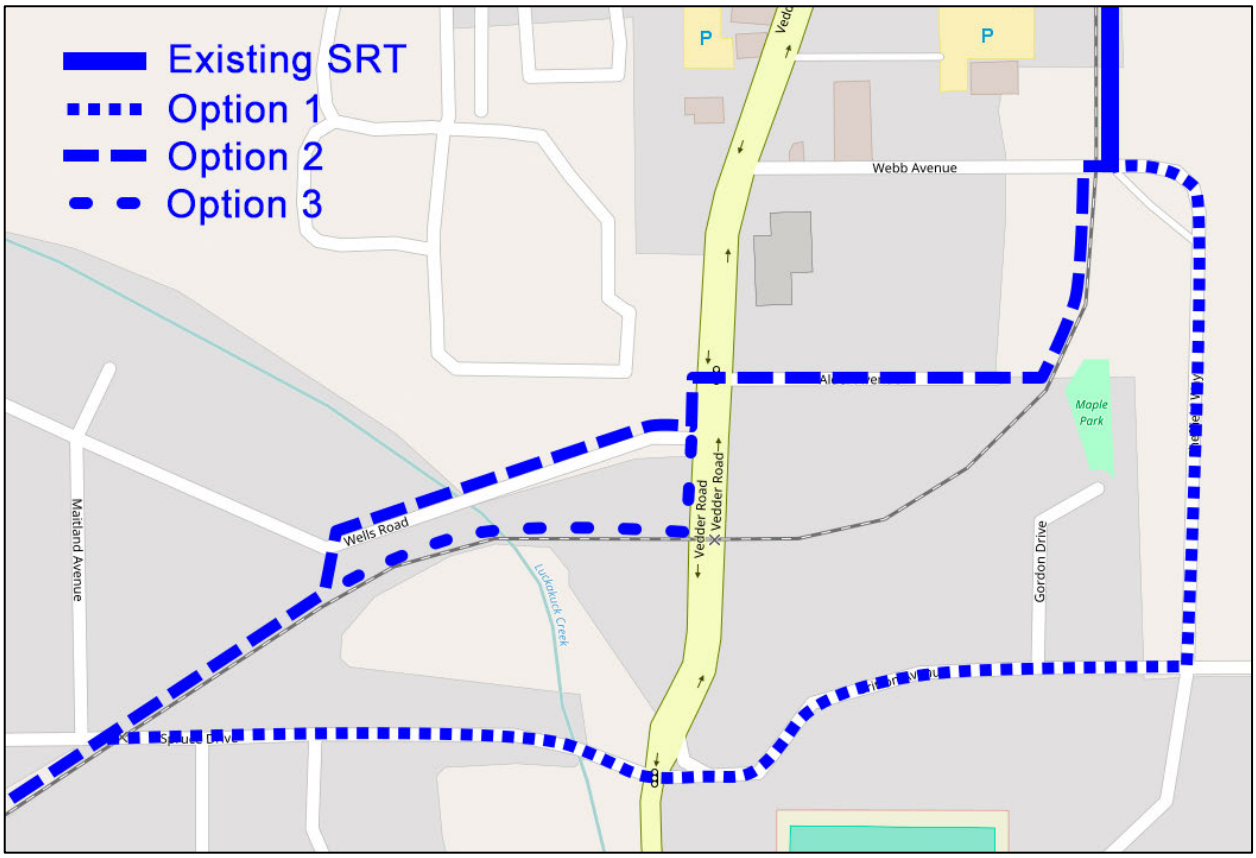
Subsequent phases of the Sardis Rail Trail include:

- South from Webb Avenue across Vedder Road. The design of this section of the SRT is challenging, as it is not possible for the SRT to cross Vedder Road on the railway alignment

because of the resulting proximity of the SRT crossing signals to the railway crossing signals. Three options for the SRT to cross Vedder Road are illustrated in Figure 2.18:

- *Option 1:* The existing route for cyclists connecting between the SRT and the bicycle boulevard on Wilshire Street is via Sheffield Way, Britton Avenue and Spruce Drive. The key issue with this route is that there are no bicycle facilities on Britton Avenue and across the Vedder Road intersection. In order to maintain the separation and protection afforded on other sections of the SRT it would be desirable to construct protected bicycle facilities on Britton Avenue and Spruce Drive east of the SRT. This would be a costly project that would require road widening, and would also impact parking.
- *Option 2:* The alternative option would be to direct cyclists along Alder Avenue to use the existing pedestrian signal at Vedder Road (adding pushbuttons for cyclists). A new off-road pathway would be necessary to replace the sidewalk on the west side of Vedder Road between Alder Road and Wells Road, which would connect to a pathway or protected bicycle facility on Wells Road. The connection back to the railway alignment would be 250 m west of Vedder Road. Not only would this option avoid the railway crossing on Vedder Road, but it would also avoid the section of the SRT across Luckakuck Creek, where the railway tracks are on an embankment. The challenge would be that the pathway on the west side of Vedder Road might encroach on the Stó:lō Nation's property, and negotiations to construct the pathway could take some time.
- *Option 3:* A variation of Option 2 would direct cyclists to the existing pedestrian signal at Alder Avenue, and would extend a new pathway on the west side of Vedder Road south to the railway corridor. Not only would this option encroach on the Stó:lō Nation's property, it would also impact the automobile dealership on the west side of Vedder Road, and would require constructing the SRT pathway along the railway corridor across Luckakuck Creek.

Figure 2.18 – Sardis Rail Trail options at Vedder Road



- Further south across Spruce Drive, Evans Road, South Sumas Drive, Lickman Road and Keith Wilson Road. The pathway would likely be on the west side of the railway tracks in this section of the SRT, as the alignment of the railway tracks is on the east side of the corridor. The design of the pathway crossings at all of these locations other than Evans Road would be relatively straightforward and similar to existing crossings on the SRT, and could be enhanced with flashing lights if desired. Because Evans Road is a four-lane road a pedestrian signal would be necessary for the pathway crossing.
- As the "Future Bicycle Network" map in the Appendix illustrates, extending the SRT north from Airport Road to Hocking Avenue will add an important connection to the bicycle network. At Hocking Avenue, northbound cyclists heading to downtown Chilliwack can travel west via McIntosh Drive and the underpass under the railway tracks at Edwards Street, or east via Elm Drive and Chilliwack Central Road to the underpass at Charles Street (cyclists can also travel across the railway tracks via Young Road).
- The SRT could eventually be extended north from Hocking Avenue across the CNR tracks to connect to Railway Avenue, Louis Lane, Alexander Avenue, Birch Street, Cheam Avenue and finally Salish Pond Park and the library.
- The SRT could eventually be extended southwest to the municipal boundary if Abbotsford develops its portion of the rail trail through to the U.S. border as has been suggested.

2.3.2 Protected Facilities

The "Future Bicycle Network" map in the Appendix identifies the first phases of a protected bicycle route network in downtown Chilliwack, a detail of which is shown below in Figure 2.19. It is important to choose carefully when identifying roads where protected bicycle facilities could be implemented, especially for the first protected facilities in the City as they will be the subjects of much public scrutiny. Generally, protected facilities are:

- More attractive in urban areas where there are few or no low-traffic routes for cyclists.
- More effective on higher-use, higher-traffic urban roads where the added protection would be seen as a significant enhancement.
- Less effective with frequent driveways and intersections, as these reduce the continuity of protection and impact other uses such as on-road parking, which must be restricted in advance of every driveway and intersection.
- Less effective where there are many bus stops, loading zones or passenger zones.
- Easier to implement on roads with excess width, as protected facilities require more width which otherwise can mean a loss of parking, or fewer or narrower traffic lanes.

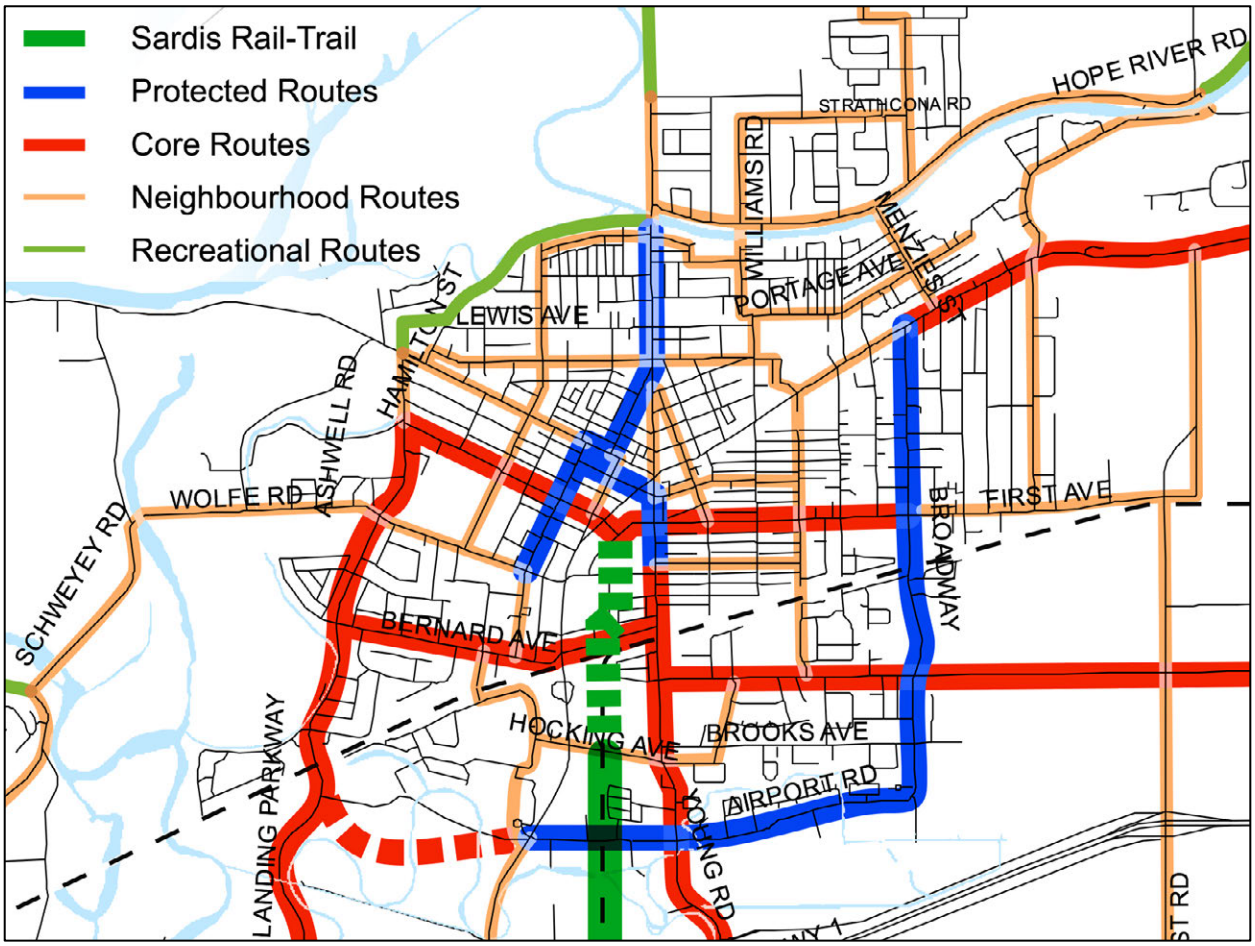
Candidates for the first protected bicycle facilities in Chilliwack are shown in Figure 2.20 and include:

- **Mary Street** between Hodgins Avenue and Wellington Avenue. Mary Avenue is a well-used minor collector road that would be an attractive alternative route to Yale Road through the downtown. The section from Hodgins Avenue to Spadina Avenue is a one-way northbound bus route, and there is one bus stop at Patten Avenue. There is a small loading zone on the east side at Kipp Avenue.

  Mary Street is approximately 16 m wide, with angled parking on the east side and parallel parking on the west side. The 16 m width would allow for protected bicycle lanes while retaining parking on one or both sides of the road with the following approximate dimensions (exact dimensions should be confirmed through detailed design, at which time the exact number of parking stalls that would be affected can be determined):

  - *Option 1:* 16.0 m = 0.3 m gutter + 1.7 m bicycle lane + 1.0 m buffer + 2.5 m parking + 2 x 4.0 m traffic lanes + 0.5 m barrier + 1.7 m bicycle lane + 0.3 m gutter. This option would involve removing the existing angled parking on the west side of the road. It would also eliminate left turn lanes, but the wider traffic lane widths would enable motorists to pass vehicles stopped to make a left turn.
  - *Option 2:* 16.0 m = 0.3 m gutter + 1.3 m bicycle lane + 0.75 m buffer + 2.4 m parking + 2 x 3.25 m traffic lanes + 2.4 m parking + 0.75 m buffer + 1.3 m bicycle lane + 0.3 m gutter. This option would retain parking on the west side of the road (but would convert it to parallel parking) and would eliminate left turn lanes. This option involves dimensions for the protected facilities that are less than the minimums identified in Section 5.

Figure 2.19 – Protected bicycle network, first phases



- **Princess Avenue** between Young Road and Mary Street. Princess Avenue is a well-used minor collector road that would provide an attractive east-west alternative route to 1st Avenue and Yale Road. Princess Avenue is approximately 14.5 m wide between Young and Yale Roads, and 11 m wide west of Yale Road. These widths would allow for protected bicycle lanes with the following approximate dimensions (exact dimensions should be confirmed through detailed design):
  - 14.5 m = 0.3 m gutter + 1.5 m bicycle lane + 0.5 m barrier + 3.3 m traffic lane + 3.3 m turn lane + 3.3 m traffic lane + 0.5 m barrier + 1.5 m bicycle lane + 0.3 m gutter. This option would involve the removal of the existing parking on the north side of the road.
  - 11.0 m = 0.3 m gutter + 1.4 m bicycle lane + 0.5 m barrier + 2 x 3.3 m traffic lanes + 0.5 m barrier + 1.4 m bicycle lane + 0.3 m gutter. This option would involve the removal of the existing parking on the south side of the road.
- **Young Road** south of Princess Avenue to 3rd Avenue where the existing bicycle lanes on Young Road end. There are currently two southbound traffic lanes and one northbound traffic lane in this section of Young Road. Protected bicycle lanes could be implemented by removing one of the southbound traffic lanes as it is not needed for traffic capacity. It might

also be necessary to narrow the remaining traffic lanes and turn lanes slightly so as to create sufficient space on each side of the road for a 1.5 m bicycle lane plus a 0.5 m barrier (exact dimensions should be confirmed through detailed design).

The protected bicycle lanes on Young Road could later be extended south from 3rd Avenue across the CNR tracks to Airport Road as a subsequent phase of the protected bicycle route network.

- **Wellington Avenue** between Mary and College Streets is a major collector road. A protected facility is required in this section of Wellington Avenue to connect the protected facilities on Mary and College Streets. Wellington Avenue is approximately 14.5 m wide with parking on both sides. A protected facility could be implemented as follows (exact dimensions should be confirmed through detailed design):
  - *Option 1:* 14.5 m = 0.3 m gutter + 1.5 m bicycle lane + 1.0 m buffer + 2.4 m parking + 2 x 3.5 m traffic lanes + 0.5 m barrier + 1.5 m bicycle lane + 0.3 m gutter.
  - *Option 2:* 14.5 m = 0.3 m gutter + 3.6 m cycle track + 1.1 m barrier + 2 x 3.5 m traffic lanes + 2.5 m parking.
  - Both options would involve removing the existing parking on one side of the road.
- **College Street** is a local street on the west side of Chilliwack Central Elementary School that connects to Young Road and provides an attractive alternative route through the area (Young Road south of Mellard Avenue on the east side of the school is too narrow for bicycle facilities). College Street is approximately 13.4 m wide, with parking on both sides, a loading zone on the west side at the Chilliwack Victory Church, and a school bus loading zone on the east side. A protected facility could be implemented as follows (exact dimensions should be confirmed through detailed design):
  - *Option 1:* 13.4 m = 0.3 m gutter + 1.3 m bicycle lane + 0.8 m buffer + 2.4 m parking + 2 x 3.25 m traffic lanes + 0.5 m barrier + 1.3 m bicycle lane + 0.3 m gutter. This option involves dimensions for the protected facilities that are less than the minimums identified in Section 5.
  - *Option 2:* 13.4 m = 0.3 m gutter + 3.5 m cycle track + 0.6 m barrier + 2 x 3.3 m traffic lanes + 2.4 m parking.
  - *Option 3:* 13.4 m = 0.3 m gutter + 3.2 m cycle track + 1.0 m barrier + 2.4 m parking + 2 x 3.25 m traffic lanes.
  - All options would involve removing the existing parking on one side of the road, and possibly relocating a loading zone.
- **Young Road** from Mellard Avenue north to Hope Slough is a minor arterial road approximately 11.0 m wide. A protected facility on this section of Young Road would connect to the protected facility on College Street and to the neighbourhood bicycle route on Nowell Street. A protected facility could be implemented as follows (exact dimensions should be confirmed through detailed design):
  - 11.0 m = 0.3 m gutter + 1.4 m bicycle lane + 0.5 m barrier + 2 x 3.3 m traffic lanes + 0.5 m barrier + 1.4 m bicycle lane + 0.3 m gutter.

- This section of Young Road is a bus route, and buses would stop in the traffic lane.
- Parking would be prohibited on both sides of of Young Road.

- **Airport Road and Broadway** from Yale Road to Yale Road are minor arterial roads approximately 14.0 m wide south of Cedar Avenue (except at First Avenue and Chilliwack Central Road where the road widens), and approximately 11.5 m north of Cedar Avenue. Protected bicycle lanes could be implemented on Airport Road and Broadway with buffered sections in locations with frequent residential driveways, and protected sections at intersections, at commercial driveways and on horizontal curves. Alternatively, a protected two-way cycle track could be implemented on one side of the road. Protected facility widths would be as follows (exact dimensions should be confirmed through detailed design):
  - *Option 1:* 14.0 m = 0.3 m gutter + 1.5 m bicycle lane + 0.9 m buffer + 2.4 m parking + 2 x 3.3 m traffic lanes + 0.5 m barrier/buffer + 1.5 m bicycle lane + 0.3 m gutter.
  - *Option 2:* 14.0 m = 0.3 m gutter + 1.5 m bicycle lane + 0.3 m barrier/buffer + 3.3 m traffic lane + 3.2 m turn lane + 3.3 m traffic lane + 0.3 m barrier/buffer + 1.5 m bicycle lane + 0.3 m gutter.
  - *Option 3:* 14.0m = 2.5 m parking + 2 x 3.5 m traffic lanes + 0.7 m barrier/buffer + 3.5 m cycle track + 0.3 m gutter.
  - *Option 4:* 11.5 m = 0.3 m gutter + 1.5 m bicycle lane + 0.5 m barrier + 2 x 3.45 m traffic lanes + 0.5 m barrier + 1.5 m bicycle lane + 0.3 m gutter.
  - Airport Road and Broadway are a bus route, and buses would stop in the traffic lane.
  - Existing parking would be removed on one side of Airport Road and Broadway south of Cedar Avenue. Parking would be prohibited on both sides of Broadway north of Cedar Avenue.

As the descriptions above indicate, implementing protected bicycle facilities often means reducing or removing on-road parking and impacts to other uses, and as a result it should be expected that there may be opposition to protected facilities from some members of the community. A community engagement strategy is an essential component of any bicycle project for which there could be significant impacts, particularly for protected facilities as there are no local examples that residents and business operators would be familiar with. If it is not desirable or feasible to implement one of the protected facilities described above, the route can be developed to a lesser standard (such as conventional bicycle lanes). Protected facilities on the route can be re-considered at a future date as cyclists and the community gain experience with protected facilities elsewhere in the City.

2.3.3 Core Routes

Core routes in urban areas where new bicycle lanes and shoulder bikeways should be implemented or improved include (but are not limited to) the following. Where road widths permit, buffers should be included between bicycle lanes and traffic lanes and/or parking:

- **Spadina Avenue** between Ashwell Road and Yale Road (bicycle lanes already exist between Yale Road and First Avenue). Implementing bicycle lanes on Spadina Avenue would require parking removal on one side of the road between Mary Street and Yale Road. Between Courbould Street and Mary Street where Spadina Avenue is divided, bicycle lanes could likely be implemented without impacting parking.
- **Ashwell Road** Between Spadina Avenue and Amadis Crescent. Extending the existing bicycle lanes on Ashwell Road north to Spadina Avenue would require widening this section of Ashwell Road. This would require discussions with adjacent First Nations as the Ashwell Road right-of-way is narrow and bicycle lanes cannot be constructed entirely within the road right-of-way.
- **First Avenue** between Spadina Avenue and Broadway. Implementing bicycle lanes would require widening or reconfiguring First Avenue from Spadina Avenue to east of Yale Road, and would require prohibiting parking on one side of the road east of Yale Road.
- **Chilliwack Central Road** between Young Road and Broadway. Implementing bicycle lanes would involve pavement markings and signage with only spot widening required at Yale Road, and would require prohibiting parking on one side of the road.
- **Bernard Avenue and Railway Avenue.** The bicycle lanes on Railway Avenue are continuous from Young Road to just east of the Yale Road overpass. Extending the bicycle lanes along Bernard Avenue to Ashwell Road would require prohibiting parking along much of Bernard Avenue.
- **Knight Road** between Evans Road and Topaz Drive. There is a short section of bicycle lanes immediately east of Evans Road. These could be extended to Topaz Drive by prohibiting parking on one side of the road to create space for the bicycle lanes. The westbound bicycle lane on Knight Road to the east currently ends before the Topaz Drive intersection. There is sufficient width to extend the bicycle lane to Topaz Drive if the traffic lanes and turn lanes on Knight Road were reconfigured and shifted to the south.
- **Stevenson Road** between Evans Road and Higginson Road (east of Vedder Road). Implementing bicycle lanes on Stevenson Road would require widening the road at Vedder Road and prohibiting parking on one side of the road between Evans Road and Vedder Road.
- **Tyson Road** between Insley Avenue (north of South Sumas Road) and Evans Road. Implementing bicycle lanes in this section would require prohibiting parking on both sides of the road. Alternatively, southbound cyclists could be directed to continue on Evans Road to South Sumas Road and then east to Tyson Road so that only the northbound bicycle lane would need to be continuous on Tyson Road north of South Sumas Road.
- **Watson Road and Promontory Road** between Tyson Road and Chilliwack River Road. The westbound shoulder bikeway west of Vedder Road is narrow and should be widened. To

extend the bicycle lanes through the Vedder Road intersection and past Vedder Elementary School would require road widening. West of Chilliwack River Road object markers should be added to the utility poles that encroach on the westbound shoulder bikeway on the north side of Promontory Road.

- **Teskey Way** east of Promontory Road to Hudson Road. There is no eastbound bicycle lane to match the existing westbound bicycle lane. An alternative to widening the road is to widen the asphalt sidewalk on the south side of the road to create a multi-use pathway, and direct eastbound cyclists to the pathway.
- **Yarrow Central Road** through the Yarrow commercial district from Community Street to west of Eckert Street.

Core routes in rural areas where new shoulder bikeways should be implemented or improved include (but are not limited to):

- Chilliwack Central Road east of Broadway to Ford Road.
- Ford Road and McGrath Road south of the CNR railway (bicycle lanes already exist on McGrath Road north of the railway tracks).
- Chilliwack River Road between Knight and McGuire Roads. This project involves relocating several utility poles and/or enclosing some sections of ditch, and will require discussions with adjacent First Nations as the road right-of-way is too narrow for shoulders to be constructed entirely within the right-of-way.
- Sumas Prairie Road north of Keith Wilson Road to Yale Road.
- Keith Wilson Road west of Lickman Road to the Vedder River bridge.
- Boundary Road north of No. 3 Road to the Vedder River bridge. This project includes moving 23 utility poles on the east side of the road, as there is a ditch on the west side that limits the extent to which the road can be widened on that side.
- Vedder Mountain Road. Spot widening is required in at least two locations to maintain a continuous shoulder bikeway of adequate width.

Key bridges where bicycle facilities should be incorporated include (but are not limited to):

- **Keith Wilson Road** over the Vedder River incorporates a narrow sidewalk on the north (westbound) side of the bridge behind a barrier, with little additional width on the road for cyclists. Rather than widening or replacing the bridge, a more feasible option might be to construct a separate pedestrian cyclist bridge with connections to Keith Wilson Road, Boundary Road and the Vedder River Trail.
- **Young Road** over Hope Slough incorporates a narrow sidewalk on the west (southbound) side of the bridge behind a barrier, with little additional width on the roads for cyclists. Protected facilities are proposed on Young Road south of the bridge, and there are bicycle lanes on the north side of the bridge (with a short section missing northbound immediately north of the bridge). Ultimately, widening or replacing the bridge would allow the protected facilities to be extended north across Hope Slough, but as the bridge is short it would be

acceptable to accommodate cyclists on the road across the bridge with sharrow pavement markings and "Share the Road" signs.

- **Lickman Road** over Highway 1 is identified as a neighbourhood route in the future bicycle network, but is an important connection across Highway 1 to the core route on Yale Road and Luckakuck Way. Northbound cyclists are directed onto the narrow sidewalk on the east side of the bridge, which is not protected by a barrier. There are neither facilities nor provisions for southbound cyclists. The bridge is under the jurisdiction of the Ministry of Transportation and Infrastructure, and the interchange is planned for complete reconstruction in 2030.
- **The Rosedale Bridge** on Highway 9 over the Fraser River. Although the bridge is outside the City boundary and is the jurisdiction of the Ministry of Transportation and Infrastructure, it is an important regional connection to Agassiz, Harrison Hot Springs and other locations on the north side of the Fraser River. Planned improvements to the bridge include new cantilevered pathways for cyclists and pedestrians on both sides of the bridge, to be completed by 2019. Coincident with these improvements will be a need to improve connections for cyclists to the bridge from the Experience the Fraser trail and Camp River Road, which will require discussions with adjacent First Nations.

2.3.4 Intersections and Crossings

There are a number of locations on key bicycle boulevard routes where crossing treatments could be implemented to enable cyclists of all ages and abilities to easily cross intersecting major roads. Crossing treatments could include curb extensions, median islands, flashing amber lights and green pavement colouring. These locations include (but are not limited to):

- On the Berkeley/Clarke route at Young Road.
- On the Reece Avenue route at Young Road.
- On the Edwards/Mary route at Bernard Avenue (at both Edwards Street and Mary Street).
- On the Charles Street route at First Avenue and Chilliwack Central Road (at both Charles Street and Elm Drive).
- On the Dieppe/Garrison/Miller/Wiltshire route at Stevenson Road, South Sumas Road and Watson Road (at both Garrison Boulevard and Miller Road).

Crossing treatments should also be implemented on the Sardis Rail Trail where it crosses Knight Road and Webb Avenue. These treatments could include multi-use crossing signs (the modified RA-4 signs illustrated in Section 5.3.3) accompanied by pavement markings with elephants feet and green pavement colouring to draw motorists' attention to the SRT crossings.

Cyclist pushbuttons and/or detector pavement markings and signs should be added at existing signalized intersections to enable cyclists to actuate the signals, on side street legs of the intersection to which the signal does not recall. These intersections include (but are not limited to):

- Charles Street at Yale Road.

- Garrison Boulevard and Dieppe Place at Keith Wilson Road.
- Hocking Avenue, Southlands Drive and Airport Road at Young Road.
- Knight Road, Spruce Drive, Stevenson Road, Watson Road and Thomas Road at Vedder (implemented in conjunction with road widening to extend bicycle lanes through the intersections across Vedder Road as described in Section 2.3.3).

Locations where hook turns could be constructed to facilitate cyclist left turns (with bicycle pushbuttons at signalized intersections) include:

- Yale Road westbound to Broadway southbound. This hook turn would facilitate the connection for southbound cyclists between the Experience the Fraser route and the Sardis Rail Trail via Menzies Street and the proposed protected bicycle lanes on Broadway and Airport Road.
- Yale Road eastbound to Menzies Street northbound. This hook turn would facilitate the connection between the SRT and the ETF for northbound cyclists.
- Spruce Drive westbound to Wilshire Street southbound.
- Watson Road westbound at Garrison Boulevard and eastbound at Miller Road.
- Promontory Road eastbound to Chilliwack River Road northbound.

Hook turns would also be useful on northbound and southbound on Vedder Road at Highway 1 to guide cyclists across the on-ramps and off-ramps. Bicycle lanes should cross the ramps at 90 degrees, incorporating jug handle lanes as needed to allow cyclists to orient themselves correctly before crossing, and optionally with green pavement colouring in the crossing. Additionally, where cyclists are directed across an island, curb ramps should be added for cyclists.

Angled rail crossings present a hazard to cyclists whose wheels can get caught in the flangeway of the rail. Locations where a “jug handle” bicycle lane should be constructed with an alignment that crosses the railway track at or close to 90 degrees include:

- Yale Road in Rosedale.
- McGrath Road.
- Spruce Drive.
- South Sumas Road.

2.3.5 Spot Improvements

In addition to the projects identified above, there are a number of locations where relatively minor spot improvements should be undertaken. These include (but are not limited to):

- Airport Road eastbound at Young Road. The bicycle lane should be repainted to be between the right turn lane and through traffic lane (the existing configuration is between the right turn lane and the curb).

- Vedder Road southbound at Keith Wilson Road. The bicycle lane should be repainted to be between the right turn lane and through traffic lane.
- The connection through Vedder Middle School that is part of the Dieppe–Garrison–Miller–Wiltshire neighbourhood route is chained off at times when school is not in session, obstructing access for cyclists who must ride on the sidewalk or through the landscaping around the chain. The route through the school property should be improved and a solution identified that maintains access for cyclists and pedestrians at all times, through an agreement with the school district.
- Vedder Road south of Keith Wilson Road on the east side. Vehicles are parked at ninety degrees to the road, and often partially obstruct the shoulder bikeway. A white line should be painted on the right edge of the shoulder and bicycle symbol pavement markings added to indicate the extent of the shoulder bikeway and discourage motorists from parking in the bikeway.
- Rotate catchbasin grates 180 degrees where slots on the leading edge of the grate are parallel to the direction of travel so as not to endanger cyclists by trapping bicycle tires in the grate. An example of this is on Yale Road eastbound at Nevin Road.
- Flexible plastic posts can be installed on bicycle lane lines where necessary to prevent motorists from driving in the bicycle lane or cutting across the bicycle lane when turning at a corner. One location where a plastic post has been used is on Topaz Drive northbound at Knight Road. Additional locations where plastic posts would be beneficial include:
    - Young Road at Hocking Avenue on the northeast corner, to direct northbound motorists away from the bicycle lane.
    - Ashwell Road and Eagle Landing Parkway on horizontal curves where motorists drive across the bicycle lane.
    - Promontory Road east of Chilliwack River Road on horizontal curves.

3 Supporting Actions

This section presents a range of supporting programs and actions to complement the network of bicycle routes and facilities described in Section 2. Undertaking these actions will help the City to maximize its return on investment in bicycle routes and facilities, and help to encourage more people to cycle in Chilliwack.

3.1 Wayfinding and Signage

Currently, there is very little wayfinding information available to cyclists in Chilliwack. There are few bicycle route signs and pavement markings, no destination signs, and no stand-alone bicycle route map. The lack of wayfinding information and signage means that it is not always easy to find bicycle routes or navigate the network.

One of the objectives identified in Section 1 is to "clearly identify the bicycle network, and provide easy access to wayfinding and other information regarding cycling." There are several benefits to doing so:

- Identify cycling opportunities for cyclists and non-cyclists alike, and thereby encourage more people to cycle more often.
- Help cyclists navigate the network safely and efficiently.
- Alert motorists to the potential presence of cyclists on roads.

This section is an overview of key actions the City can undertake to improve wayfinding information and signage, and it provides high-level guidance regarding how routes are identified, signs are located and destinations are indicated. Detailed guidance regarding wayfinding for cyclists and bicycle signage and pavement markings is available from the following sources:

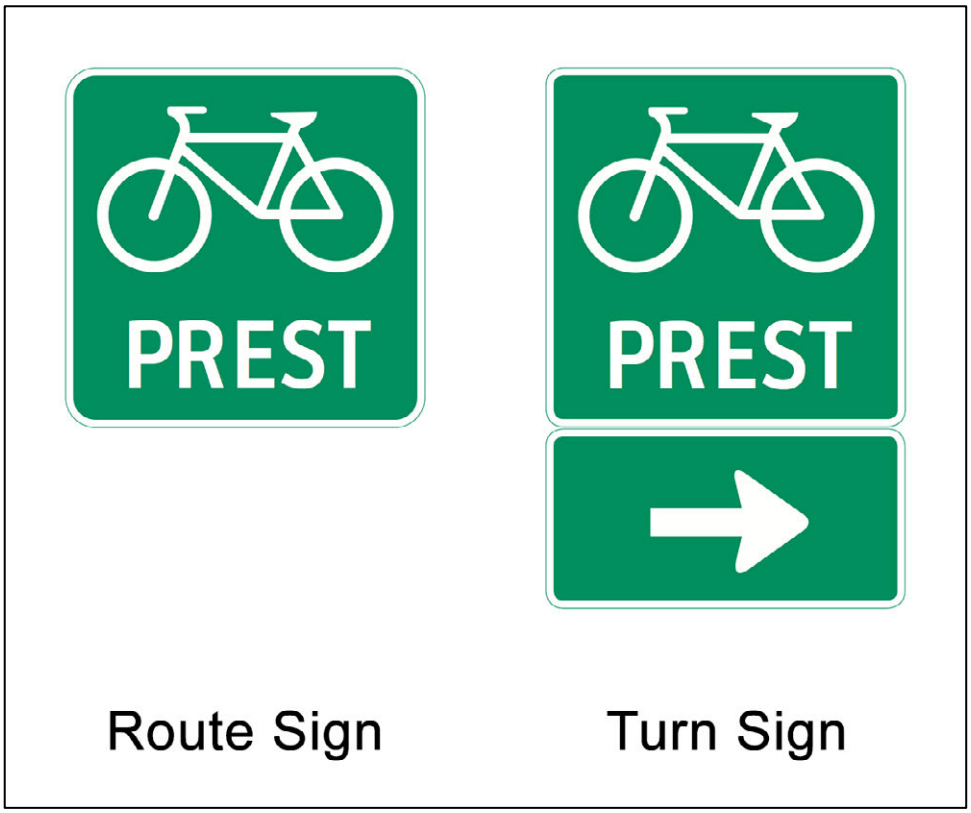
- TransLink's *Wayfinding Guidelines for Utility Cycling in Metro Vancouver* (2013).
- The Transportation Association of Canada's *Bikeway Traffic Control Guidelines for Canada* (2012).
- The Ministry of Transportation and Infrastructure's *British Columbia's Bicycle Traffic Control Guidelines* (2012).
- The National Association of City Transportation Officials' *Urban Bikeway Design Guide* (2014).

Bicycle route signs are the most important wayfinding device. Bicycle route signs should be located at regular intervals on all bicycle routes so as to identify them as routes to cyclists, motorists and non-cyclists. Bicycle route signs can be supplemented with identification (a name or number identifying the bicycle route) and destination information. Key guidelines regarding bicycle route signs include:

- Bicycle route signs should be installed after every significant intersection, or where there are large distances between intersections, at intervals of approximately 200 m in urban areas and 400 m in rural areas.
- A bicycle route name (or number) can be included on a bicycle route sign above or below the bicycle symbol, as shown in Figures 3.1 and 3.2. This is a modified version of the standard TAC IB-23 bicycle route sign, with the route name in place of the word "Route."
    - A route name is desirable as it creates an identity and a memorable reference for the route. Names should be short (ideally one word), relevant to the area where the route is located, and distinctive. For example, a bicycle route along Prest Road and Teskey Way could be named "Prest" as Prest Road comprises the majority of the route, and is a well-known distinctive name with a clear geographic identity.
    - Route numbers can be used instead of or in addition to names, and should follow a clear pattern (such as even numbers for east-west routes and odd numbers for north-south routes). It is also advisable to leave gaps in the numbering system to allow for additional routes to be inserted in the future.
- Any supplementary signs, such as a TransCanada Trail sign, should be installed below the bicycle route sign. Alternatively, a supplementary logo or symbol can be included on a bicycle route sign below the route name.
- A bicycle route "turn sign" with an arrow indicating a turn (on a tab or on the sign itself) should be located in advance of a turn onto another street or other change in direction that could confuse cyclists. An example turn sign is illustrated in Figure 3.2.

Figure 3.1 – Bicycle route sign with route name (Maple Ridge)

Figure 3.2 – Bicycle route signs



- A "decision sign" should be located in advance of an intersection with another bicycle route, with names and arrows indicating key destinations straight ahead, to the left and to the right (in that order). Decision signs should be 600 mm wide (as compared with 450 mm for standard bicycle route signs). A template for a decision sign is illustrated in Figure 3.3.
- A "confirmation sign" should be paired with a turn sign or decision sign. When paired with a turn sign, it should be installed after a turn or change in direction in the route, and can simply be a bicycle route sign with the route name. When paired with a decision sign, confirmation signs should be installed after the intersection in all directions indicated on the decision sign, and can include key destinations supplemented with distances and travel times. Such confirmation signs should be 600 mm wide (as compared with 450 mm for standard bicycle route signs). A template for a confirmation sign is illustrated in Figure 3.3.
- To further highlight bicycle routes and provide additional guidance for cyclists on a route, bicycle symbols can be added to street name blades along a bicycle route, as shown in Figure 3.4.

Figure 3.3 – Bicycle decision and confirmation signs

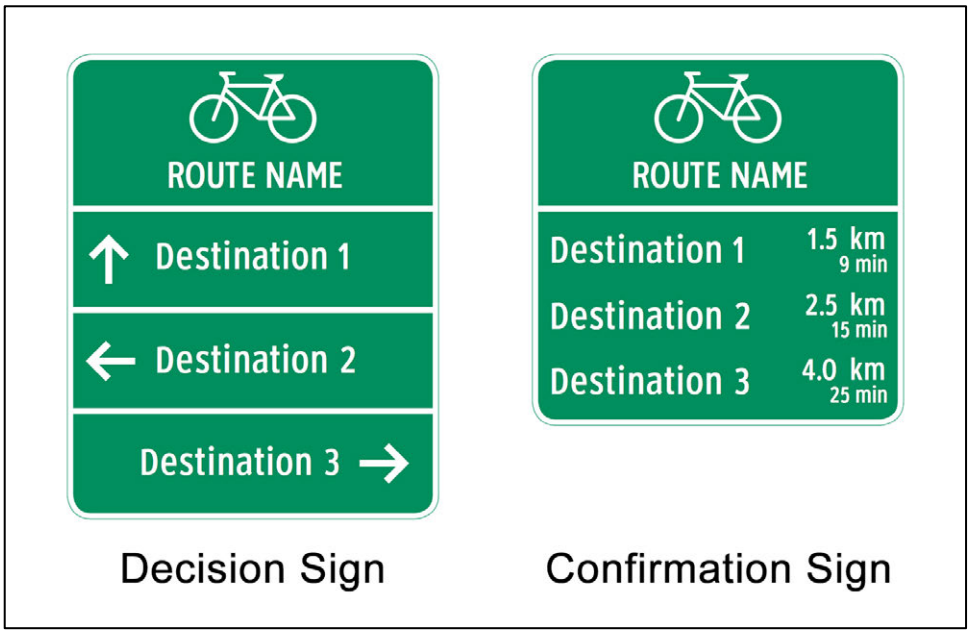


Figure 3.4 – Bicycle route street sign (Burnaby)

In addition to standard pavement markings for bicycle lanes, shared lanes, multiuse crossings and other facilities, the following signs and pavement markings can be used to aid wayfinding:

- A bicycle symbol with an arrow can be used in advance of a turn to supplement a turn sign, or can be used to indicate where a bicycle route continues straight onto a different facility such as a path, as illustrated in Figure 3.5.
- A sharrow can be used as confirmation after a turn onto a bicycle boulevard or other road where there is no delineated bicycle facility, to supplement a confirmation sign.
- Signs and pavement markings at roundabouts indicating to cyclists, motorists and pedestrians that cyclists have the option of riding on the roadway through the roundabout, or dismounting and using the sidewalk and crosswalks as a pedestrian.
- "Share The Road" signs can be used on roads that are regularly used by cyclists but do not incorporate bicycle facilities or have substandard bicycle facilities that have not yet been upgraded. As illustrated in Figure 3.6, "Share the Road" signs can also incorporate a pedestrian icon in situations where there are not sidewalks and pedestrians may be walking in the road or on the shoulder. On narrow roads where cyclists may obstruct motor vehicles, requiring them to change lanes to pass, "Bicycles May Use Full Lane" signs can be used to advise motorists and cyclists that cyclists are permitted to occupy the traffic lane.

Figure 3.5 – Bicycle pavement markings with turn arrows

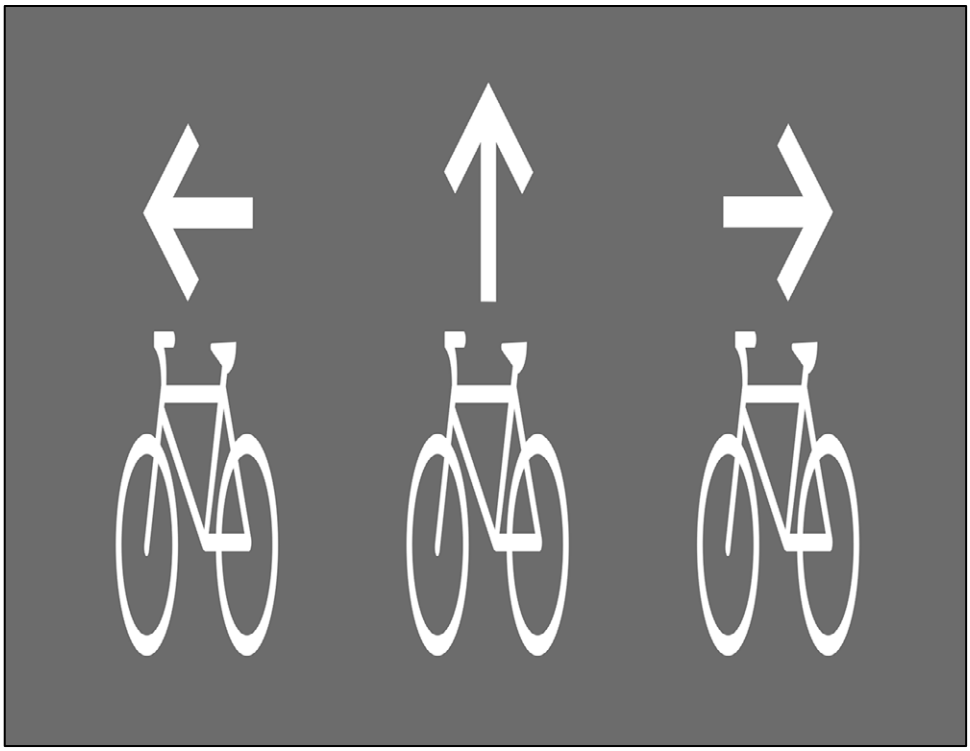
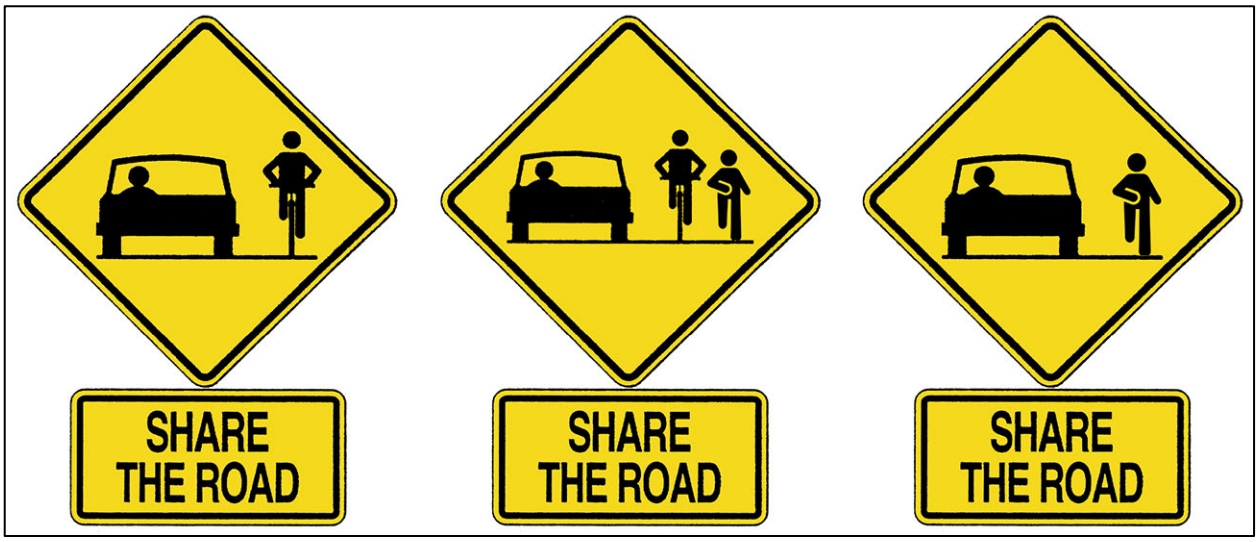


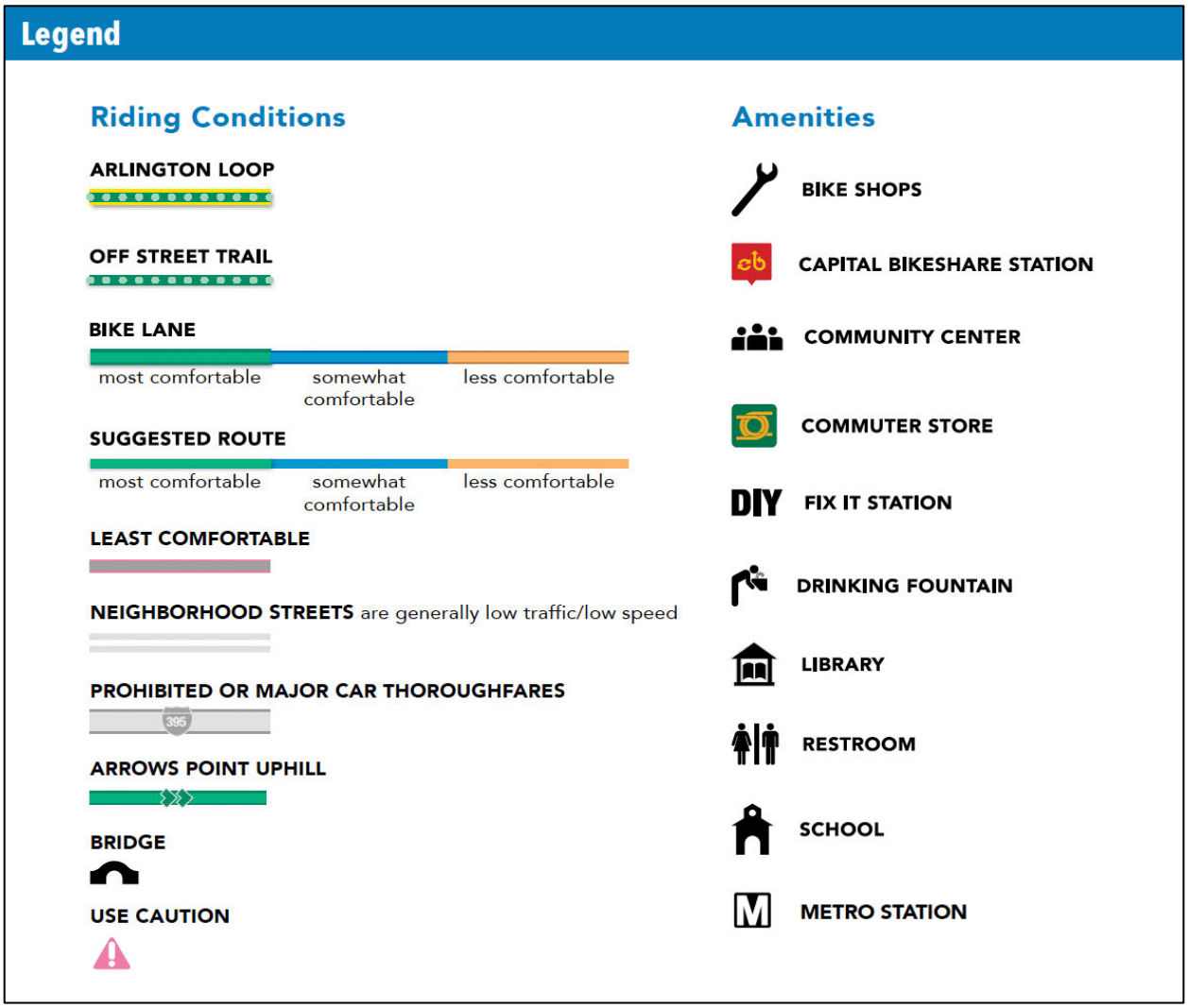
Figure 3.6 – Share the Road signs for bikeways and walkways



A bicycle route map is an important wayfinding resource. Options for maps include:

- A printed, folding bicycle route map that cyclists can carry with them (also available on-line in PDF format). The map should differentiate routes according to the level of comfort and degree of protection, as shown in the example in Figure 3.7. Locations should be clearly indicated where there is a bicycle facility on one side of the road but not the other. The map should also identify selected "suggested routes commonly used by cyclists" that are not designated bicycle routes but provide important connections between bicycle routes. Steep uphill sections should also be marked with arrows.
- Smartphone apps that display a cyclist's location on a route map and offer navigation aids similar to automobile GPS navigation systems. The City does not need to create its own app, as there are a number of existing third-party apps available that incorporate data from OpenCycleMap, Google Maps and other mapping services.

Figure 3.7 – Bicycle map legend indicating level of comfort (Arlington County VA)



3.2 Bicycle Parking

Bicycle parking is an important component of the bicycle network. The benefits of bicycle parking include:

- Encourage bicycle use, particularly for commuting (to work and school) and utilitarian purposes such as shopping.
- Facilitate multi-modal travel by bicycle and transit.
- Minimize the risk of vandalism and theft of bicycles.
- Organize parked bicycles to optimize the use of available space and avoid obstructing others.
- Discourage cyclists from locking bicycles to trees, fixtures, traffic signs and other objects that could be damaged as a result.

There are two primary types of bicycle parking:

- Bicycle racks are intended primarily for convenience, and are used by cyclists to lock their bicycles with their own locks. Racks are usually located outdoors, and are typically provided for cyclists to use free of charge. Racks can be covered to protect bicycles from rain and snow, as shown in Figure 3.8, and can be installed in a "corral" on the road in place of one or two automobile parking spaces as shown in Figure 3.9. Artistic racks can function as public art in addition to providing parking for bicycles.
- Secure parking protects bicycles from vandalism and theft. There are many different forms of secure parking, including freestanding bicycle lockers, bicycle racks in a cage or enclosure, and locked rooms in buildings dedicated to bicycle parking. Secure parking facilities typically protect bicycles from weather and may be located indoors, and a fee may be charged to use secure bicycle parking. Examples of secure parking are shown in Figures 3.10 and 3.11.

  The City should consider offering development incentives or density bonuses to encourage developers to provide secure bicycle parking in new and renovated developments, and at employment centres to also provide end-of-trip facilities including showers, changerooms and clothing lockers.

It is important when implementing bicycle parking to follow best practices and guidelines (such as those published by the Association of Pedestrian and Bicycle Professionals) to optimize the configuration of parking, maximize security, avoid impacting other street uses, and minimize costs.

In high-use locations, bicycle parking can be supplemented with maintenance stands, tools and compressed air, as shown in Figure 3.12, which cyclists can use to fill tires and perform simple repairs. Bicycle parking should be identified with signs indicating the locations of bicycle racks and secure parking. Figure 3.13 illustrates the standard TAC IC-19 bicycle parking sign.

Figure 3.8 – Covered bicycle parking (Victoria)

Figure 3.9 – On-road bicycle corral (Portland OR)

Figure 3.10 – Bicycle lockers (Calgary AB)

Figure 3.11 – Bicycle cage in parkade (University of British Columbia)

Figure 3.12 – Bicycle maintenance stand, tools and air (Vancouver)

Figure 3.13 – Bicycle parking sign

3.3 Integrating Cycling with Transit

Integrating cycling with transit can provide the following benefits:

- Extend the catchment area for transit services by enabling persons who live beyond walking distance from a bus stop or whose destination is beyond walking distance to still use transit.
- Enable cyclists to bring their bicycles on the bus and avoid leaving their bicycles parked where they could be stolen or vandalized.
- Provide cyclists with the option to take transit to avoid riding after dark, up hills, in poor weather, or in areas without comfortable bicycle routes (such as narrow roads with high traffic volumes).
- Provide an option for cyclists who have mechanical problems with their bicycles or who need to get home or to a child's school quickly in an emergency.

The City and BC Transit have equipped all transit buses with bicycle racks that hold two bicycles per bus. Other actions the City can undertake to better integrate cycling and transit include:

- Provide bicycle racks at high-use bus stops and other bus stops where there is space for a rack and the bicycles that would be locked to it. An example of a bus stop with bicycle racks and other passenger amenities is shown in Figure 3.14.
- Provide bicycle lockers at high-use bus stops where cyclists would want to park their bicycles for longer periods of time, such as at FVX stops. Figure 3.15 shows bicycle lockers at a transit exchange.
- Develop bicycle routes that provide direct access to high-use bus stops.

Figure 3.14 – Bicycle racks at bus stop (Boulder CO)

Figure 3.15 – Bicycle lockers at transit exchange (Burnaby)

3.4 Community Engagement

It will be important to engage the community as components of the Cycle Plan are designed and implemented, particularly protected bicycle lanes, cycle tracks and other facilities that might impact on-road parking, loading and other uses. Through a comprehensive community engagement program, residents, business operators and others can be informed about upcoming projects and their intended benefits, potential issues can be identified and resolved, and channels of communication can be established to help ensure that a bicycle project is successful.

The key steps in a community engagement program include:

- Identify potential impacts and those who might be impacted. These can range from wide-scale impacts that might affect an entire neighbourhood to localized impacts that might only affect a small area or a few people. The most common impacts associated with bicycle facilities are loss of on-road parking, changes to access and loading for adjacent properties, utility relocations, and property impacts for off-road pathways.
- Identify and contact stakeholders, including (but not limited to) residents, business owners and operators, First Nations, organizations representing seniors, school students and persons with disabilities, transportation agencies, environment and sustainability organizations, and community service groups. Stakeholders include those who might be impacted by a bicycle project as well as those who would benefit or otherwise have an interest in the project. A terms of reference should be distributed to stakeholders to describe how they will participate in the process and what their responsibilities are, including a responsibility to share information and report back to their respective organizations.
- Determine and undertake appropriate community engagement activities. These activities provide the opportunity to identify issues, present options, invite new ideas and establish a foundation for on-going communication and liaison with stakeholders. Community engagement should begin early in the project process to ensure that stakeholders are involved in key decisions and that all potential options are considered. Community engagement activities include:
    - Communications activities to reach as many persons as possible with as much information as possible, particularly those who are most likely to be impacted. These can include, for example, announcements and information on the City's website, direct mail, mailing lists and newsletters (on-line and in print), social media postings and traditional media releases, advertisements and articles in newspapers and on radio and television, and posters at community centres.
    - Consultation activities to solicit input from the community, in response to the information previously communicated as well as to information presented as a part of consultation events. These can include, for example, open houses, public meetings, workshops and site tours, steering committees, focus groups and on-line wikis, and surveys (on-line and in print).
- Refine plans and report back. Community engagement is iterative, and continues until the project is constructed and often afterwards. After each community engagement event the

input that was received should be documented and communicated back to stakeholders and participants. Changes to designs and other actions arising from the input should be highlighted so that the community can see how their input has been used to improve the project.

3.5 Marketing, Education and Enforcement

This section describes actions and programs that support cycling but do not involve infrastructure. These actions include marketing, education and enforcement efforts. The 2014 *Bicycle Transportation Plan* identifies a range of such actions that the City and others can undertake, and these are incorporated in the discussion below.

Marketing can encourage cycling and support the City's other bicycle initiatives by:

- Increasing awareness of bicycle facilities, particularly protected and off-road facilities that are attractive to cyclists and non-cyclists alike.
- Encouraging cyclists to take steps to minimize bicycle theft, such as locking their bicycles properly, using secure parking, and registering their bicycles with the police.
- Promoting the benefits and advantages of cycling, including lower travel costs, travel times compared to other modes, fitness and health, and environmental footprint.
- Encouraging motorists and others to treat cyclists with respect.
- Motivating businesses to offer bicycle racks and other incentives for customers who arrive by bicycle, and to offer specific goods and services targeted to cyclists, such as sales and repair of bicycles, bicycle tourism and accommodations.
- Encouraging cyclists, residents, businesses and other members of the community to participate in planning bicycle routes, facilities and programs.

Marketing actions that the City and others can undertake to encourage cycling in Chilliwack include:

- Wayfinding information, including a bicycle map available in print, on-line and through smartphone apps, and add bicycle route data to mapping services such as OpenCycleMap and Google Maps, as described in Section 3.1.
- Advertisements informing cyclists and others of key safety improvements, such as the opening of a new pathway or protected bicycle lanes, or upgrading of an existing route.
- Contests that invite the entire community to participate, such as naming bicycle routes or creating a "brand" for cycling in Chilliwack.
- Events such as "Bike to Work Week," "Bike to School Week," "Bike to Shop Day" and a "Commuter Challenge," with prizes for participation and achieving specific targets.
- An annual bicycle awards program that recognizes individuals, businesses and organizations that have made a significant contribution to cycling.

- Bicycle rallies and organized rides, desirably with a visible presence and strong support from local businesses, the City and other organizations.
- Promotion of bicycle tourism opportunities, such as the Experience the Fraser bicycle route and mountain biking trails, and events such as the Circle Farm Tour.
- An "Adopt-a-Trail" program for sections of the Sardis Rail Trail, as discussed in Section 3.5.

Education actions include marketing efforts and instructional programs:

- Instructional materials distributed in print, on-line and in other media that advise cyclists, motorists and others about safe cycling techniques, the rules of the road, and bicycle equipment, maintenance and security. The best example is *Bike Sense,* which is the premier safety and operations manual for cycling in B.C. As well, the Chilliwack Safer City website provides educational materials regarding cycling intended for both cyclists and motorists.
- Skills courses designed for a particular group such as students, adult cyclists and non-cyclists. These include, for example, the Can-Bike course in defensive cycling for advanced and beginner cyclists who ride in traffic, and the Kids on Wheels course for pre-school children. Some courses are already provided locally through service clubs, schools and the RCMP, and the Chilliwack Safety Village at Fairfield Park provides opportunities for "hands on" training in a safe environment.

Enforcement actions are not intended to punish cyclists or discourage people from cycling, but rather to encourage cyclists to ride in a safe, predictable manner for the benefit and safety of all cyclists, motorists, pedestrians and other road users. Enforcement actions should be preceded by marketing and education actions, and should focus on selected infractions so as to raise awareness of unsafe practices and common causes of collisions. For example, enforcement of helmet laws (with warnings for first violations) can be undertaken as a preventive measure to highlight the benefits of wearing a helmet and encourage helmet use.

3.6 Maintenance

Maintenance is an important supporting action. As one of the objectives established in Section 1 indicates, "regular maintenance of bicycle facilities [will] maintain safety and comfort for cyclists and preserve the City's investment." This section describes key maintenance practices to support the City's efforts in developing and maintaining a bicycle network.

Typical maintenance practices include:

- Maintain road and pathway surfaces where cyclists ride free of hazards such as uneven or damaged asphalt, and lips around catchbasins and manhole covers.
- Repaint bicycle pavement markings, particularly in intersections and other locations with a higher potential for conflicts.
- Clear vegetation from in front of bicycle signs, and wash, adjust or replace signs as needed.

- Sweep all protected facilities and bicycle lanes at regular intervals to remove debris. Sweeping is particularly important where gravel is routinely spread onto bicycle lanes and paved shoulders from adjacent properties, and during the fall when accumulated wet leaves can pose a safety hazard for cyclists, as shown in Figure 3.16.
- Trim vegetation along pathways, and on bicycle routes where vegetation encroaches into a bicycle lane. Any debris resulting from trimming should be cleared from the path or road, particularly where blackberry bushes are trimmed as the thorns can puncture bicycle tires.
- Clear snow from high-priority bicycle routes in winter to maintain access for cyclists to key facilities. These include the Sardis Rail Trail, protected bicycle facilities, and high-use bicycle lanes. The City is currently undertaking a review of snow clearing policies.
- Clean, paint and repair bicycle racks as needed.
- Promote the City's info@chilliwack.com email address as a means of reporting and responding to maintenance and safety concerns on bicycle routes and facilities, evaluating reported issues and tracking their resolution.

Figure 3.16 – Leaves accumulated in cycle track (Vancouver)

To help raise awareness of the facility and reduce maintenance costs, the City could consider establishing an Adopt-a-Trail program for the Sardis Rail Trail, whereby local bicycle groups, neighbourhood associations, businesses and others can be designated as responsible for sections of the pathway, and undertake regular clean-up of litter, pet waste and encroaching vegetation.

Where construction projects occur on or adjacent to protected bicycle facilities, bicycle lanes and pathways, the City should (or should require the contractor to) maintain access for cyclists through or around the construction zone. Temporary signs should be used to identify the detour route through the construction zone, as shown in Figure 3.17, and to advise cyclists of hazards or the need to dismount and walk their bicycles.

Figure 3.17 – Bicycle route detour sign (Vancouver)

3.7 Monitoring

A monitoring program is essential to ensure that the Cycle Plan is implemented as intended, and to determine whether the plan is achieving the goals of improving safety for cyclists and encouraging more cycling. A monitoring program will also enable City staff to justify continued expenditures and allocation of resources for bicycle facilities and programs. Monitoring also provides a means of identify changing conditions which would require changes to the Cycle Plan.

Monitoring should be undertaken on an annual basis. The first year of monitoring will establish baseline conditions, against which information collected in subsequent years will be compared. After data have been collected and summarized in the first year, it will also be possible to establish targets to be achieved within a specific time period.

3.7.1 Measures of Success

In order to clearly and reliably gauge the success of the Cycle Plan, the monitoring program should collect data that can be used to calculate the following performance measures:

- **Mode share.** Data available from Statistics Canada indicate the proportion of trips made by bicycle. As of 2011 (the most recent census data available), 1.7% of all trips to work in Chilliwack are made by bicycle. A trend increase in the bicycle mode share of all trips and of work trips will be a key indicator of the success of the Cycle Plan.
- **Cyclist volumes.** Annual counts of bicycles at selected locations on the bicycle network — including on-street routes and pathways — will provide an indication from year-to-year of the increase in bicycle use. A trend increase in the numbers of cyclists will be a key indicator of the success of the Cycle Plan.
- **Kilometres of routes.** The number of kilometres of bicycle routes on-road and off-road – should be recorded each year. Over time, this will provide a measure of the expansion of the bicycle network.
- **Bicycle parking.** Similarly, the number of bicycle rack spaces and secure bicycle parking spaces should be recorded each year.
- **Cyclist satisfaction.** Annual or bi-annual surveys of cyclists should be used to indicate satisfaction with bicycle facilities and various features of the bicycle network, and to identify major issues. Satisfaction should be rated on a scale of 1 to 5, where 5 indicates very satisfied. Continued increases in satisfaction ratings will be a key indicator of the success of the Cycle Plan.
- **Bicycle crashes.** Although bicycle crashes are typically not reported, and even when reported are often poorly recorded, a year-to-year summary of numbers and locations of bicycle crashes is useful in identifying safety-related issues and trends.

3.7.2 Data Collection

To provide the data needed to calculate the performance measures described above, the following data should be collected each year:

- **Bicycle counts** have historically only been undertaken as part of applications for shared funding on shoulder paving projects, with follow-up counts later as projects are completed. The number and scope of bicycle counts should be expanded, and desirably should be undertaken across one or more cordons so that shifts in bicycle travel to a new or improved route do not skew usage calculations. For consistency, counts should be undertaken at the same locations each year, and at the same times of the year and the same times during the day. The optimum time to undertake counts is in late September, as schools and post-secondary institutions are in session at this time, and the weather is conducive to cycling.

  Bicycle counts should be undertaken at approximately a dozen locations throughout the urban areas of Chilliwack, in particular on protected and separated facilities, plus a half-dozen locations in the rural areas. Where possible, bicycle counts should be incorporated into annual traffic counts that are currently undertaken by the City so as to minimize data collection costs. Additionally, if it is possible to isolate bicycles in the data available from the Wavetronix Smart Sensor traffic detectors this would provide additional bicycle count data from an exiting source and would further help to minimize data collection costs.

The preferred means of undertaking bicycle counts is with an automatic counter placed across a protected facility, bicycle lane or pathway, as illustrated in Figure 3.18. Automatic counters can be used to collect data for several consecutive weeks, to provide a complete picture of bicycle volumes at various times of the day, on different days of the week and in different weather conditions.

- **Bicycle surveys** should be undertaken annually or bi-annually to determine cyclists' travel patterns, to identify key origins and destinations, to measure cyclists' satisfaction levels, to identify bicycle network needs and priorities, and to collect other data needed to calculate the performance measures described above. These surveys could be conducted on-line and/or via survey forms distributed along bicycle routes, through bicycle stores and through local employers.

These data should be supplemented with travel data available from Statistics Canada and other agencies.

Figure 3.18 – Automatic counter across bicycle lane (Vancouver)

4 Implementation

This section identifies "quick win" projects that can be undertaken immediately, and other priority bicycle projects that offer the greatest benefits for cyclists and the community. Cost estimates and options for funding these projects are also presented.

4.1 Quick Win Projects

Among the bicycle projects identified in Section 2.3, there are a number of "quick win" projects that can be implemented immediately. Some of these projects are low cost, most are relatively simple to implement, and all would be effective demonstration projects for the types of enhanced bicycle facilities that could be implemented throughout Chilliwack. More complex or costly projects that would be undertaken in subsequent years are described in Section 4.2.

Implementing some of the "quick win" projects will require reducing or removing on-road parking and may also impact other uses. For these projects in particular, a community engagement strategy (as described in Section 3.4) is an essential component of the project that will help to inform the community of the changes and benefits of the project, and identify and resolve potential issues prior to implementation.

"Quick win" projects are summarized in Table 4.1 and are described below.

- **Protected facilities** in downtown Chilliwack, to improve safety for cyclists and encourage others to cycle for work, school and utilitarian purposes. Candidates for the first demonstration phases of the protected bicycle facility network are described in Section 2.3.2. In order of priority, these include:
    - Airport Road and Broadway from Young Road to Yale Road. This is an important connection between the Sardis Rail Trail and the Experience the Fraser route, and protected bicycle lanes on this route would be less complex to implement as compared with other protected facilities below. As such it is a good candidate for the first implementation and demonstration of protected bicycle facilities.
    - Mary Street between Hodgins Avenue and Wellington Avenue.
    - College Street adjacent Chilliwack Central Elementary School.
    - Wellington Avenue connecting the protected facilities on Mary and College Streets.
    - Young Road from Mellard Avenue north to Hope Slough.
    - Princess Avenue between Young Road and Mary Street.
    - Young Road south of Princess Avenue to 3rd Avenue where the existing bicycle lanes on Young Road end.

Table 4.1 – "Quick win" projects

Rural Roads	Urban Roads		Spot Improvements	Off-Road Facilities
	Arterials and Collectors	Local Streets		
Key shoulder bikeways 90-degree rail crossings Bicycle route signage	Demonstration protected bicycle facilities Bicycle lanes through parking removal Bicycle route signage	Crossing treatments Bicycle route signage Sharrow paint markings	Pushbuttons and detector markings Crossing treatments Bicycle racks Flexi-posts	Sardis Rail Trail extension to Airport Rd Sardis Rail Trail enhancement

- **Bicycle lanes** on core routes in urban areas, with buffers between the bicycle lanes and traffic lanes and/or parking where road widths permit (in some locations, implementing bicycle lanes will require removing existing on-road parking), in order of priority:
  - Knight Road between Evans Road and Topaz Drive.
  - Spadina Avenue between Ashwell Road and Yale Road.
  - Chilliwack Central Road between Yale Road and Broadway.
  - Bernard Avenue.
  - Stevenson Road between Evans Road and Vedder Road (continuation of the bicycle lanes across Vedder Road to Higginson Road is identified as a priority project in Section 4.2.).
- **Shoulder bikeways** on core routes on rural roads, with priority on the only section of Chilliwack River Road without a shoulder bikeway between Knight Road and McGuire Road.
- **Crossing treatments** on key local street bicycle boulevard routes, with priority on the Dieppe/Garrison/Miller/Wiltshire route at Stevenson Road, South Sumas Road and Watson Road (at both Garrison Boulevard and Miller Road), and the Berkeley/Clarke route at Young Road.
- **Crossing treatments** incorporating marked crossings and green pavement colouring where the Sardis Rail Trail crosses Knight Road and Webb Avenue.
- **90-degree railway crossings** to improve cyclist safety at Spruce Drive and South Sumas Road in Sardis, and Yale Road and McGrath Road in Rosedale.
- **Bicycle route signage** and pavement markings to guide cyclists on the bicycle route network and encourage others to cycle, accompanied by a bicycle route map available on-line, through mapping services such as OpenCycleMap, and in print.
- **Cyclist pushbuttons** and/or detector pavement markings and signs at:
  - Charles Street at Yale Road.
  - Garrison Boulevard and Dieppe Place at Keith Wilson Road.
  - Hocking Avenue, Southlands Drive and Airport Road at Young Road.

- **Hook turns** to facilitate cyclist left turns, in order of priority:
  - Yale Road westbound to Broadway southbound.
  - Yale Road eastbound to Menzies Street northbound.
  - Spruce Drive westbound to Wilshire Street southbound.
  - Watson Road westbound at Garrison Boulevard and eastbound at Miller Road.
  - Promontory Road eastbound to Chilliwack River Road northbound.
  - Northbound and southbound Vedder Road at Highway 1 to guide cyclists across the on-ramps and off-ramps.
- **Other spot improvements** including reconfiguring bicycle lanes adjacent to right turn lanes, adding pavement markings where vehicles parked on adjacent properties intrude into the shoulder bikeway, rotating incorrectly installed catchbasin grates, and flexible plastic posts where needed to discourage motorists from driving in or cutting across bicycle lanes.
- **Sardis Rail Trail** projects planned for 2017/2018 include extension of the SRT north across Highway 1 to Airport Road, and enhancement of the existing section of the SRT to add curves to the alignment, lighting and landscaping.

Table 4.2 summarizes estimated order-of-magnitude costs of the "quick win" projects identified above (except the Sardis Rail Trail), which total an estimated $3.5 million. For most projects, costs of protected bicycle facilities, bicycle lanes and shoulder bikeways are based on unit costs for four classes of works:

- Class 1 = $15,000/lane km. Pavement markings and sign installation with no road construction.
- Class 2 = $50,000/lane km. Bicycle facilities with only pavement markings and sign installation along the majority of the route, with localized improvements including protection, intersection modifications and spot widening.
- Class 3 = $150,000/lane km. Construction of bicycle facilities involving typical road base preparation, paving, concrete, pavement markings and signs. These projects are generally undertaken within the road right-of-way or on public property.
- Class 4 = $300,000/lane km. Bicycle facility construction that requires major construction, including intersection changes, ditch piping or relocation, overpass or bridge construction, right-of-way purchase, utility pole relocation and so forth. Many of these projects are undertaken as part of larger reconstruction projects.

Higher units costs are assigned to some projects where the extent of construction exceeds the above classes, such as on Chilliwack River Road where additional costs would be incurred to move utility poles and enclose ditches. Costs for crossing treatments and spot improvements are based on typical costs incurred by the City, and represent average costs of various types of treatments.

Table 4.2 – Estimated costs of "quick win" projects

Project	Description	Quantity	Unit Cost	Total Cost
Protected facilities				
Mary-College-Young	Hodgins–Hope Slough	3.8 lane km	$150,000	$570,000
Princess-Young	Mary–3rd Ave	1.4 lane km	$150,000	$210,000
Airport-Broadway	Young–Yale	7.0 lane km	$50,000	$530,000
Bicycle lanes				
Spadina Ave	Ashwell–Yale	2.1 lane km	$15,000	$32,000
Bernard Ave	Ashwell–Yale	2.6 lane km	$15,000	$39,000
Chilliwack Central Rd	Yale–Broadway	2.5 lane km	$15,000	$38,000
Knight Rd	Evans–Topaz	1.4 lane km	$15,000	$21,000
Stevenson Rd	Evans–Vedder	2.6 lane km	$15,000	$39,000
Shoulder bikeways				
Chilliwack River Rd	Knight–McGuire	2.8 lane km	$400,000	$1.120,000
Crossings	Bicycle boulevards	5 crossings	$50,000	$250,000
	90° railway crossings	4 crossings	$50,000	$200,000
	Pushbuttons/markings	5 intersections	$10,000	$50,000
	Hook turns	9 hook turns	$15,000	$135,000
Signage		50+ km	$5,000	$250,000
Spot improvements		5+ locations	$2,000	$10,000
Total				**$3,494,000**

4.2 Priority Projects

This section identifies other priority projects involving bicycle lanes, pathways, crossings and other facilities to be undertaken after the "quick win" projects described in Section 4.1. In general, these projects are more costly or complex than the "quick win" projects. These other priority projects have been identified based on five criteria:

- Provide protection from traffic, such as off-road pathways, protected on-road facilities.
- Are part of the core route network.
- Facilitate travel on neighbourhood routes where they intersect with major roads.
- Eliminate gaps in the network, such as bicycle lanes that do not continue through signalized intersections, facilities that are missing on one side of a road.

These priority projects include:

- **Protected facilities.** In future years the primary protected facility project will be the extension of the Sardis Rail Trail north from Airport Road to Hocking Avenue, and south from Webb Avenue to the Vedder River. The other key protected facility identified in Section 2.3 is a multi-use pathway on the south side of Teskey Way between Promontory Road and Hudson Road to complement the existing westbound bicycle lane.

- **Bicycle lanes** on core routes in urban areas, with buffers between the bicycle lanes and traffic lanes and/or parking where road widths permit. These projects will require road widening and/or removing existing on-road parking:
  - Ashwell Road between Spadina Avenue and Amadis Crescent.
  - First Avenue between Spadina Avenue and Broadway.
  - Stevenson Road across Vedder Road to Higginson Road (bicycle lanes from Evans Road to Vedder Road are identified as a "quick win" project in Section 4.1).
  - Tyson Road between Insley Avenue (north of South Sumas Road) and Evans Road.
  - Watson Road and Promontory Road between Tyson Road and Chilliwack River Road.
  - Yarrow Central Road through the Yarrow commercial district from Community Street to west of Eckert Street.
- **Shoulder bikeways** on core routes on rural roads:
  - Chilliwack Central Road east of Broadway to Ford Road.
  - Ford Road and McGrath Road south of the railway tracks.
  - Sumas Prairie Road north of Keith Wilson Road to Yale Road.
  - Keith Wilson Road west of Lickman Road to the Vedder River bridge.
  - Boundary Road north of No. 3 Road to the Vedder River bridge.
  - Vedder Mountain Road, where spot widening is required in at least two locations.
- **Crossing treatments** on local street bicycle boulevard routes where they cross major roads, and pushbuttons or detector markings and signs at signalized intersections.
- **Bridges,** including improvements to the Keith Wilson Road bridge over the Vedder River and the Young Road bridge over Hope Slough, as well as a new bridge over Hope Slough at Williams Street.
- **Bicycle route signage** and pavement markings to guide cyclists on the bicycle route network and encourage others to cycle, accompanied by a bicycle route map available on-line, through mapping services such as OpenCycleMap, and in print.

Table 4.3 summarizes the estimated order-of-magnitude costs of priority projects, which total an estimated $30.2 million. The costs of pathways, bicycle lanes and shoulder bikeways are based on unit costs for the same four classes of works as used in Section 4.1. Higher units costs are assigned to some projects where the extent of construction exceeds these classes. Costs for the south extension of the Sardis Rail Trail and Williams Street Bridge reflect currently budgeted costs. Costs for crossing treatments represent average costs of various types of treatments, while costs for bridge improvements are order-of-magnitude amounts for budgeting purposes only.

Table 4.3 – Estimated costs of priority projects

Project	Description	Quantity	Unit Cost	Total Cost
Protected facilities				
Sardis Rail Trail south		8.0 km	$1,000,000	$8,000,000
SRT to Hocking		0.5 km	$1,000,000	$500,000
Teskey Way pathway		0.7 km	$150,000	$105,000
Bicycle lanes				
Ashwell Rd	Spadina–Amadis	0.5 lane km	$500,000	$250,000
First Ave	Spadina–Broadway	3.0 lane km	$150,000	$450,000
Stevenson Rd	Vedder–Higginson	0.3 lane km	$300,000	$90,000
Tyson Rd	Insley–Evans	0.4 lane km	$50,000	$20,000
Watson-Promontory	Tyson–Chilliwack R Rd	4.8 lane km	$150,000	$720,000
Yarrow Central Rd	Community–Eckert	0.9 lane km	$50,000	$45,000
Shoulder bikeways				
Chilliwack Central Rd	Broadway–Ford	18.2 lane km	$400,000	$7,280,000
Ford & McGrath Rds	Chilliwack Cent.–CNR	4.6 lane km	$300,000	$1,380,000
Sumas Prairie Rd	Keith Wilson–Yale	6.4 lane km	$150,000	$960,000
Keith Wilson Rd	Lickman–Vedder R	10.1 lane km	$500,000	$5,050,000
Boundary Rd	No. 3 Rd–Vedder R	3.1 lane km	$300,000	$930,000
Vedder Mountain Rd	Spot widening	2 spots	$100,000	$200,000
Crossings	Bicycle boulevards	10+ crossings	$50,000	$500,000
	Pushbuttons/markings	10+ intersect's	$10,000	$100,000
Bridges	Keith Wilson at Vedder R	1 improved		$2,000,000
	Young at Hope R	1 improved		$500,000
	Williams at Hope R	1 new bridge		$850,000
Signage		50+ km	$5,000	$250,000
Total				**$30,180,000**

4.3 Funding

Table 4.4 summarizes current funding allocated for bicycle projects. Construction of new and improved on-road bicycle facilities is currently funded at $700,000 annually, with plans to increase to $1,000,000 annually in 2022. Off-road pathways, trails and bridges are funded separately, with $500,000 in annual funding allocated to the Sardis Rail Trail beginning in 2017 (this is in addition to funding already allocated for the extension north to Airport Road which will be constructed in 2017). The total funding for bicycle projects from 2017 through 2026 amounts to $16.85 million.

As described in Sections 4.1 and 4.2, "quick win" projects and other priority projects are estimated to cost $3.5 million and $30.2 million respectively. In addition, the Hope River Trail boardwalk is estimated to cost $2.2 million. Current funding for bicycle facilities will fund less than half of these projects through to 2026, which means that at an annual funding of $1.5 million from 2027 onwards, it would take another 12 years until 2038 to complete the remaining priority projects.

Table 4.4 – Current bicycle project funding ($1,000s)

	2017	2018	2019	2020	2021	2022–26
Sardis Rail Trail • South • South enhancement	 $500 $300	 $500	 $500	 $500	 $500	 $500/yr
Bicycle routes	$700	$700	$700	$700	$700	$1,000/yr
Other projects • Hope River Trail • Williams St bridge					 $2,200 $850	
Totals	**$1,500**	**$1,200**	**$1,200**	**$1,200**	**$4,250**	**$1,500**

Potential sources of additional funding that could be accessed to supplement the increased funding plan presented in Table 4.5 include:

- **BikeBC.** Through this program, the Ministry of Transportation and Infrastructure provides cost-share funding for cycling infrastructure. Local governments must describe how a project encourages cycling, increases safety, and contributes to increased physical activity and healthy living as part of active community plans, and how a project can increase bicycle tourism opportunities. For the 2017–18 fiscal year, the BikeBC program will distribute a total of $8 million in funding throughout B.C.
- **New Building Canada Fund – Small Communities Fund** also provides funding for bicycle infrastructure projects. The provincial and the federal governments will each allocate approximately $109 million to support infrastructure projects in communities with a population of less than 100,000 people. This 10-year funding program runs until 2024.
- **City Parks Operations** periodically funds trails or walkways that also provide connections within the bicycle network.
- **Federal gas tax funding.** The City may make application for a portion of the gas tax revenue collected in Chilliwack for transportation related projects.
- **Green Municipal Fund.** The Government of Canada endowed the Federation of Canadian Municipalities with $550 million to create the Green Municipal Fund (GMF). Through the Fund, municipalities may be eligible for funding for municipal environmental improvement projects.
- **Service clubs.** Local clubs like Rotary, Kiwanis and Lions clubs may contribute to certain projects, such as the Vedder Rotary Trail.
- **ICBC.** Road projects that can contribute to insurance claim reductions may be eligible for ICBC Road Improvement Project funding. For example, bicycle lanes that increase the width of a vehicle recovery zone are often eligible for funding from ICBC.

5 Guidelines

This section presents design guidance for bicycle facilities in Chilliwack. These guidelines are intended to supplement current guidelines published by the Transportation Association of Canada (TAC), the Ministry of Transportation and Infrastructure (MoTI), the National Association of City Transportation Officials (NACTO) and other agencies. Consequently, the content of this section does not repeat TAC, MoTI and NACTO guidelines, but rather provides guidance regarding the applicability of specific facilities to conditions in Chilliwack. This includes:

- The design of protected bicycle facilities, and the conditions in which they are appropriate in Chilliwack.
- Options for removing on-road parking to create bicycle lanes.
- The design of shoulder bikeways on rural roads.
- Crossing treatments appropriate to use in Chilliwack, including flashing amber lights.
- Appropriate locations to use green paint markings.

5.1 Protected Facilities

As described in Section 2.1, the following buffered and protected bicycle facilities are appropriate to use in Chilliwack:

- **Buffered bicycle lanes,** which are essentially a conventional bicycle land with a wide painted buffer instead of a white line between the bicycle lane and the adjacent traffic lane, as illustrated in Figure 5.1.
- **Protected bicycle lanes,** which are similar to buffered lanes but also incorporate some form of protection or barrier in the buffer zone between the bicycle lane and the adjacent traffic lane. Where the bicycle lane is adjacent the traffic lane with no on-road parking, protection can be as simple as flexible plastic posts at regular intervals, or some form of barrier, as illustrated in the top half of Figure 5.2. Barriers need not be continuous along the entire length of the protected bicycle lane, but can be localized in key locations such as immediately before and after intersections and driveways, and in locations where it is desirable to prevent motorists from driving or parking in the bicycle lane, as in the example in Figure 5.3. Where the bicycle lane is adjacent to parked vehicles, a painted buffer is sufficient as illustrated in the bottom part of Figure 5.2, as the parked vehicles provide protection for cyclists. Posts, planter boxes or a raised island can also be used in the buffer zone for additional protection and to prevent motorists from parking in or too close to the bicycle lane.
- **Cycle tracks,** which are two-way bicycle facilities protected by barriers, posts, planter boxes, raised islands or parked vehicles, as illustrated in Figure 5.4.

Figure 5.1 – Buffered bicycle lanes

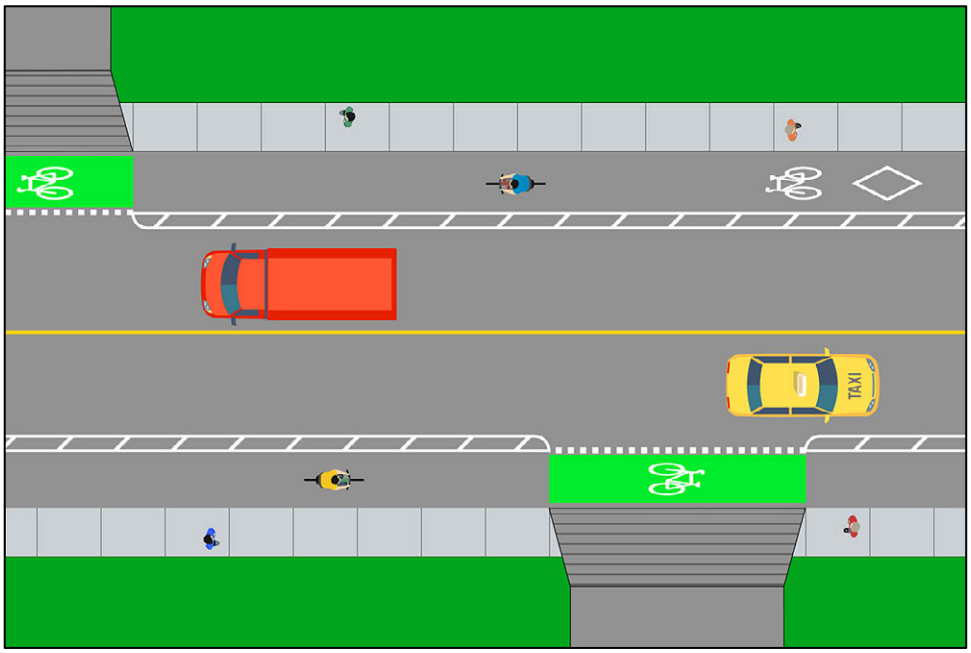


Figure 5.2 – Protected bicycle lanes

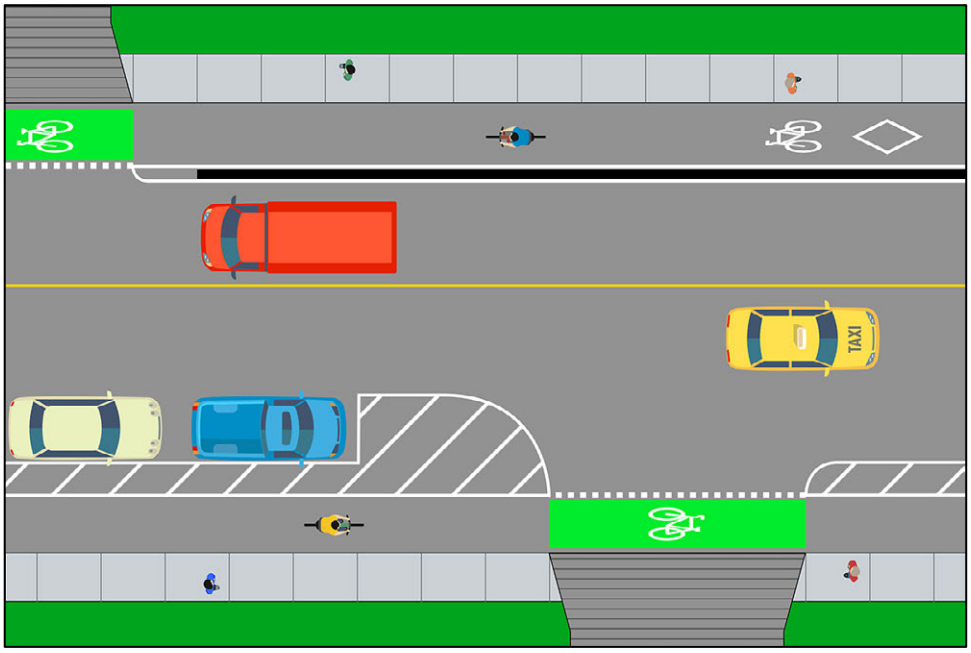
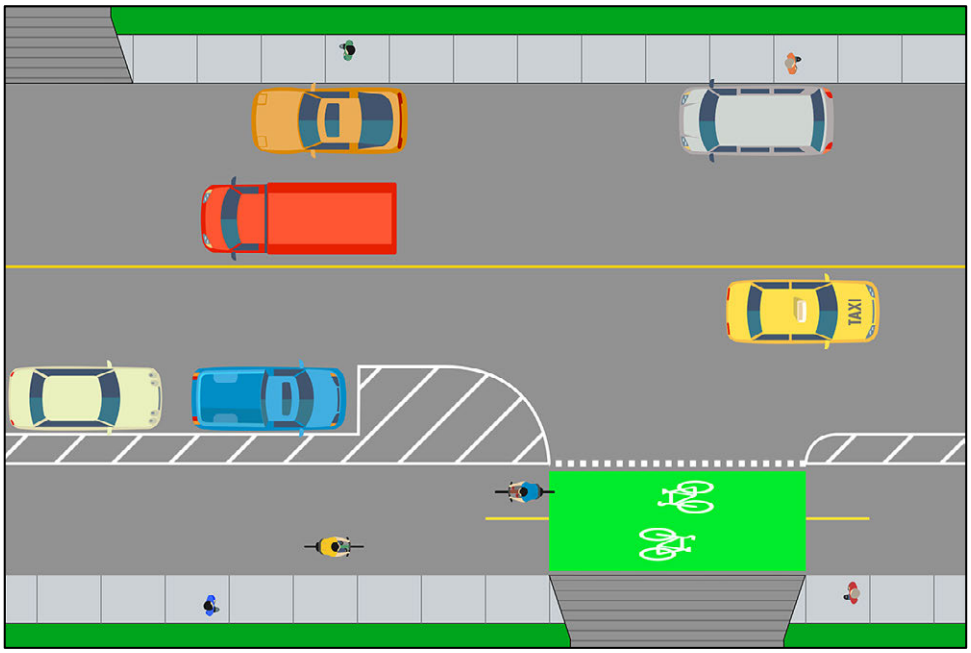


Figure 5.3 – Bicycle lane with localized protection (Vancouver)

Figure 5.4 – Protected cycle track



Appropriate conditions for buffered and protected bicycle facilities are summarized in Table 5.1. Specific notes regarding these conditions include:

- Cycle tracks are not appropriate in rural areas (buffered or protected bicycle lanes and shoulder bikeways are preferred) as they are not consistent with motorists' expectations and result in complicated intersection configurations that can be problematic on higher-speed rural roads and at night when there is typically little illumination on rural roads.
- Protected bicycle lanes and cycle tracks should be used where there are sufficient traffic volumes and conflicting movements that the added protection would be seen as a significant enhancement. In general, this means on arterial and major collector roads – protected facilities are not beneficial on local streets and low-volume collector roads unless used on one-way streets to provide contraflow access for cyclists.
- A protected facility might not provide much benefit if it is constructed parallel to an off-road pathway, such as the Sardis Rail Trail, which provide a higher level of protection and comfort for most cyclists. In such a situation, the preferred approach would be to implement conventional bicycle lanes on an arterial or major collector road that parallels a pathway, and instead invest financial resources in improving the pathway where possible.
- Although cycle tracks are better-suited to one-way roads (preferably on the right side of the road to be consistent with motorists' expectations of where cyclists are typically positioned), they can be used on two-way roads. Additional design treatments may be required with two-way cycle tracks on two-way roads, such as continuous barriers, access restrictions or separate signal phases for conflicting motor vehicle movements at intersections, to minimize the potential for conflicts at intersections and driveways.
- Buffered bicycle lanes can only be located to the left of parked vehicles, as is the case with conventional bicycle lanes (if located to the right of parked vehicles it would be a protected bicycle lane). The buffer between the bicycle lane and parked vehicles should be wider than the buffer between the bicycle lane and traffic lane, to provide sufficient clearance from open car doors (Table 5.2 indicates suggested dimensions for buffers).
- All types of buffered and protected facilities are compatible with bus stops. With buffered bicycle lanes, as with conventional bicycle lanes, buses can either stop in the bicycle lane, or can cross the bicycle lane to a bus bay. With protected facilities, the preferred approach is to construct a raised island between the protected facility and the bus zone where passengers can board and alight from the bus. In some cases this might require shifting the alignment of the protected facility to the right to create sufficient width for the bus stop island. The protected facility can also be ramped up to the elevation of the bus stop island to improve accessibility for transit passengers and to indicate to cyclist to expect pedestrians in the elevated section.
- Passenger zones and loading zones can be accommodated on protected facilities in a manner similar to bus stops, with a raised island for passengers and loading/unloading of goods, and an elevated bicycle facility.
- Buffered bicycle lanes are compatible with farm vehicles and other slow-moving vehicles, as the absence of any barrier or protection means the vehicle can pull to the right and drive in the bicycle lane as needed to let other traffic pass. Protected facilities are compatible with

trucks and other large vehicles provided that their turning paths are considered in the design of barriers and other forms of protection.

Table 5.1 – Protected bicycle facility conditions

Facility	Areas	Road Classes	Traffic	Parking	Bus Stops	Passenger/ Loading Zones	Large/ Other Vehicles
Buffered bicycle lanes	Urban Rural	Arterial Collector	1-way 2-way	Yes (to left)	Yes	Yes	Trucks Farm
Protected bicycle lanes	Urban Rural	Arterial Collector	1-way 2-way	Yes	Yes	Yes	Trucks
Cycle track	Urban	Arterial Collector	1-way	Yes	Yes	Yes	Trucks

Table 5.2 compares suggested dimensions for protected facilities in Chilliwack with dimensions in TAC and NACTO guidelines (TAC draft upcoming *Geometric Design Guide*, NACTO *Urban Bikeway Design Guide*). It is important to note that the actual dimensions of a protected bicycle facility should be determined based on site-specific conditions, including the road width, traffic lane widths, presence of on-road parking, and adjacent sidewalks, boulevards and utilities. Given such site-specific conditions, it may be necessary and acceptable to use dimensions less than the suggested minimums indicated in Table 5.2.

Table 5.2 – Protected bicycle facility dimensions

Facility	Chilliwack (suggested)	TAC (draft)	NACTO
1-way buffered bicycle lanes	1.5–1.8 m	1.5 m practical min. 1.8 m rec'd min. 2.1 m rec'd max.	1.5 m min 2.1 m
1-way protected bicycle lanes	1.5–2.1 m	1.5 m practical min. 1.8 m rec'd min. 2.5 m rec'd max.	1.5 m 2.1 m high bike vol.
2-way cycle track	3.0–3.6 m	2.4 m practical min. 3.0 m rec'd min. 3.6 m rec'd max.	2.5 m min. 3.6 m
Buffer/barrier	0.5 m paint (bike lane) 0.5 m barrier (bike lane) 1.0 m barrier (cycle track) 1.0 m paint (with parking)	0.3 m min. 1.0 m barrier 1.0 m paint	0.9 m barrier 0.9 m paint
Dimensions of facilities adjacent curbs exclude the width of the gutter			

Where protected bicycle lanes and cycle tracks are adjacent to parked vehicles, parking should be restricted at least 6 m in advance of driveways and intersections so as to maintain adequate sight lines for right-turning motorists to see cyclists travelling in the same direction. Parking can be restricted with signs and painted gore areas as illustrated in Figures 5.2 and 5.4, or additionally with raised islands, planter boxes or other objects.

Where appropriate and particularly for the first protected facilities, the City should consider low-cost "interim" implementation options pending eventual "permanent" installation. For example, painted markings, flexible plastic posts, plastic truck curbing, planter boxes and other devices can be used to delineate and protect bicycle lanes at low cost, and allow for adjustments to be made to the geometry of a facility if necessary. Figure 5.5 shows an example of a low-cost "interim" installation using only flexible posts and reflectors.

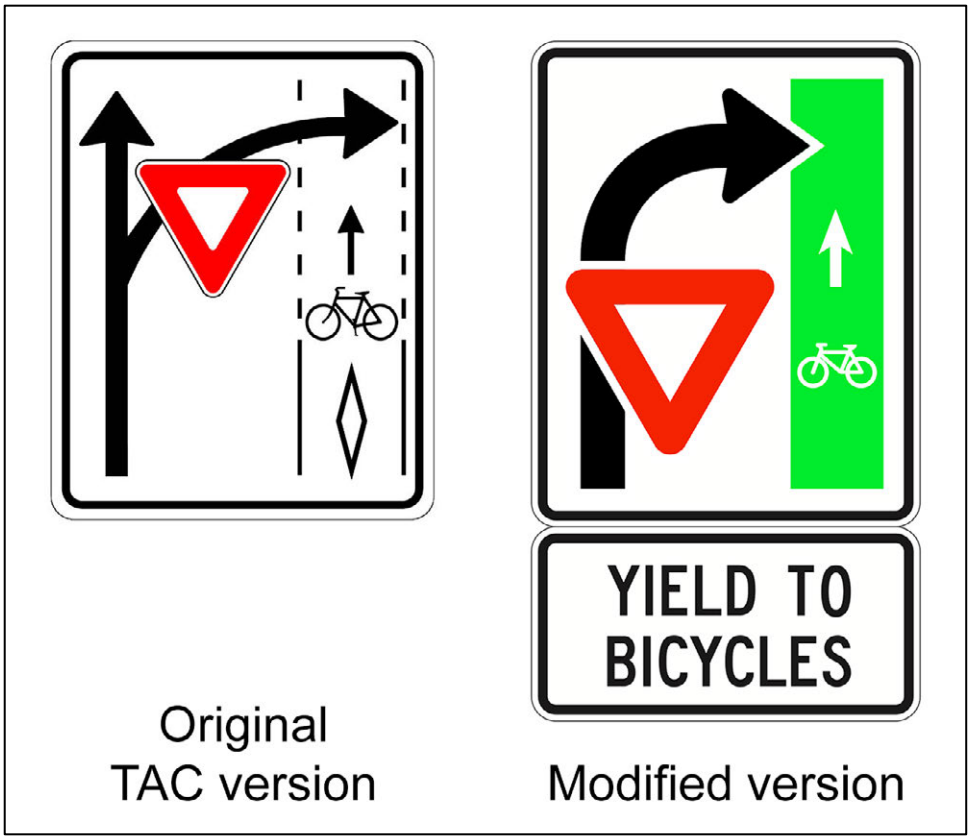
Conventional bicycle lanes can be converted to protected bicycle lanes, but to do so generally requires that traffic lanes, turn lanes and parking be narrowed to provide the additional width needed for a protected facility, or the road be widened. For example, on Vedder Road where the standard design is a 1.5 m bicycle lane with a 0.6 m utility strip and a 1.5 m sidewalk up to the property line, it would not be possible to widen the road to provide the additional 0.5 m required for the barrier between the protected bicycle lane and traffic lane, unless all utilities could be undergrounded or relocated to easements outside the road right of way, which is unlikely. Instead, it would be necessary to narrow each of the four traffic lanes by 0.25 m to create space for a 0.5 m barrier on each side of the road to protect the bicycle lane.

Figure 5.5 – Low-cost "interim" protected bicycle lane (Seattle WA)

Signs and pavement markings for protected facilities are the same as for conventional bicycle lanes and other on-road facilities. One variation from current sign guidelines is a modified version of the RB-37 "Yield to Bicycles" sign. The TAC version of the sign is confusing, as the black right turn arrow overlaps the bicycle lane, which suggests that right turning vehicles have priority. In the modified version illustrated in Figure 5.6, the black arrow only touches the bicycle lane but does not extend across it, and the straight portion of the black arrow is

eliminated as there is no conflict with cyclists for motorists continuing straight. Where green pavement colouring is used, the bicycle lane on the sign should also be coloured green. An optional tab with the text "Yield to Bicycles" can be included.

Figure 5.6 – RB-37 Yield to bicycles sign, TAC and modified versions



5.2 Bicycle Lanes and Shoulder Bikeways

This section provides specific guidance relevant to conditions in Chilliwack regarding bicycle lanes on urban roads and shoulder bikeways on rural roads.

Table 5.3 provides a summary of the road conditions in which various types of bicycle facilities are appropriate on urban roads. It is important to note that the guidelines in Table 5.3 are not "cast in stone" and that other factors can affect the choice of facility, including, for example, road width, intersection and driveway spacing, truck traffic and transit service.

Table 5.3 – Bicycle facility applicability to road conditions

	Protected Facilities	Buffered Bicycle Lanes	Conventional Bicycle Lanes	Wide Traffic Lanes	Bicycle Boulevard
Classification					
• Major arterial	✓	✓	✓		
• Minor arterial	✓	✓	✓		
• Major collector	✓	✓	✓	✓	
• Minor collector				✓	✓
• Local					✓
Average daily traffic					
• > 6,000 vpd	✓	✓	✓		
• 1,500–6,000 vpd	✓	✓	✓	✓	
• < 1,500 vpd				✓	✓
Parking	✓	✓	✓		✓

One of the ways to implement bicycle lanes on urban roads is to remove parking to create sufficient width for bicycle lanes. The standard width of a parking lane in Chilliwack is 2.5 m. Removing one or both parking lanes, and adjusting the widths of remaining parking and traffic lanes can create width for bicycle lanes as described in the following examples:

- Example 1 – A two-lane road with parking on both sides. Remove parking on one side of the road, reduce the width of parking on the other side to 2.4 m (the recommended minimum width for on-road parking) and reduce the width of the two traffic lanes to 3.25 m (the recommended minimum width for traffic lanes on a two-lane road). This would allow for 1.5 m bicycle lanes on both sides (plus the 0.3 m width of the gutter on the side where parking was removed).
- Example 2 – A two-lane road with parking on one side. Remove the parking, reduce the traffic lane widths to 3.3 m and implement buffered bicycle lanes 1.5 m wide (plus the 0.3 m width of the gutters) with 0.5 m buffers between the bicycle lanes and traffic lanes.
- Example 3 – A two-lane road with parking on both sides. Remove all parking, and in place of each 2.5 m parking lane implement buffered bicycle lanes 1.7 m wide (plus the 0.3 m width of the gutters) with 0.5 m buffers between the bicycle lanes and traffic lanes.
- Example 4 – A four-lane road with no parking. Reduce the number of traffic lanes to two and the width of the traffic lanes from 3.6 m to 3.4 m, and add a parking lane on one side 2.4 m wide. Add a buffered bicycle lane 1.5 m wide (plus the 0.3 m width of the gutter) with a 0.5 m buffer on the side without parking, and add a double-buffered bicycle lane 1.5m wide with a 0.5 m buffer on the left and a 0.9 m buffer on the right adjacent the parking lane.
- The recommended minimum 3.25 m width for traffic lanes on two-lane roads provides sufficient width for two large vehicles (trucks or buses) travelling in opposite directions to safely pass each other without having to move to the right away from the road centreline. While it is possible to reduce traffic lane width to less than 3.25 m as some other municipalities have done, this is only recommended on multi-lane roads with two or more

traffic lanes in each direction, where large vehicles can stagger their positions on the road relative to other vehicles.

- The recommended minimum 2.4 m width for on-road parking reflects the width of a large pickup truck (measured to the driver's side mirror) parked 10 cm of the curb.

On rural roads the key design issue is the width of the shoulder bikeway:

- Paved shoulder bikeways should be a minimum of 1.5 m wide, consistent with the minimum width of a bicycle lane on an urban road and with TAC and other guidelines. As per standard design practices, the 1.5 m dimension is measured from the centre of the white paint line separating the shoulder from the traffic lane (which is typically 100 mm wide) to the edge of the pavement.
- Situations will arise where it is not possible to achieve the minimum 1.5 m width, or where it would be costly to relocate utility poles or construct culverts to do so. In such situations, the shoulder bikeway can be reduced to a width as narrow as 1.2 m for short distances. A "Bicycle Lane Narrows" sign should be used to advise cyclists where the shoulder is narrowed significantly, as shown in Figure 5.7. Object markers (TAC sign WA-36R) should be used to identify any obstructions within 0.5 m of the shoulder bikeway, as in the example in Figure 5.8.

Figure 5.7 – "Bicycle lane narrows" warning sign (Vancouver)

Figure 5.8 – Reduced width shoulder bikeway with object marker (Vancouver)

5.3 Intersections and Crossings

This section provides guidance regarding various aspects of intersections and crossings.

5.3.1 Flashing Lights

Flashing light crossings incorporate pedestrian-activated amber flashing lights mounted at the side of the road, plus on the median if there is one. Optionally, overhead signs and flashing lights can be included to supplement side-mounted signs, in locations where the visibility of side-mounted signs and lights may be affected, or where there is a need for additional visibility and advance warning of the crossing. Figure 5.9 shows an example of a flashing light crossing incorporating conventional round amber lights, in this case in a solar-powered installation.

Figure 5.9 – Flashing light crossing (Nanaimo)

A recent development is rectangular rapid flashing beacons (RRFBs), which replace the round amber lights in a conventional flashing light crossing with a pair of rectangular amber lights that flash in a wig-wag pattern similar to that used on emergency vehicles. Figure 5.10 shows a pair of RRFBs mounted below a pedestrian crossing sign. The primary benefit of RRFBs is that they significantly increase the rate at which motorists yield to pedestrians at marked crosswalks without flashing lights or with conventional amber flashing lights. RRFBs are in use in Abbotsford, New Westminster and a number of communities across Canada, and tests of RRFBs in Calgary show yield rates of 95% or higher in most locations.

Figure 5.10 – RRFBs (University of British Columbia)

Flashing light crossings are currently not used in Chilliwack because of a concern that they do not force motorists to stop to the extent that a pedestrian signal does. Although a pedestrian signal imposes an additional requirement on motorists by requiring them to stop regardless of whether or not there is a pedestrian present, because of this and because of their cost, pedestrian signals would be an excessive measure in many cases.

Unmarked crosswalks exist by default at every intersection, and motorists are required to yield to pedestrians crossing in an unmarked crosswalk. The purpose in adding signs and pavement markings at a crosswalk is to increase the visibility of the crossing to approaching motorists, and to encourage pedestrians to cross a road at a specific location. Flashing lights further increase the visibility of a crossing, particularly at night, and also provide the additional benefit of clearly indicating to motorists that a pedestrian is present. Flashing lights offer significant safety benefits compared with marked crossings that incorporate only signs and pavement markings.

Flashing lights are preferred to pedestrian signals in many cases for the following reasons:

- They do not impose a delay on pedestrians as signals do. Pedestrians who become tired of waiting for a signal may decide to cross before the signal changes, potentially endangering themselves.
- Flashing light crossings can be installed in locations without power, suing solar-powered equipment.
- Flashing light crossings cost considerably less than pedestrian signals.

Flashing amber lights should only be used at crossings on two-lane roads. They should not be used on multilane roads with two or more lanes in one or both directions due to the "multiple lane threat," in which a vehicle stops in one lane, a pedestrian or cyclist begins crossing and is struck by a vehicle in the second lane that did not stop. Many jurisdictions no longer use marked crossings or flashing light crossings on multilane roads for this reason.

5.3.2 Signal Actuation

There are a number of ways in which cyclists can actuate traffic signals. The most common are:

- Roadside pushbuttons similar to the pushbuttons provided for pedestrians, an example of which is shown in Figure 5.11.
- In-pavement detector loops, which are smaller versions of the detectors used in traffic lanes, sized to fit a bicycle lane. As few cyclists understand how detector loops work, it is important to supplement bicycle detectors with pavement markings indicating the optimum position for a bicycle on the detector as shown in Figure 5.12, and signs explaining how to use the detector, such as the sign shown in Figure 5.13.

Other actuation methods, such as video detection of cyclists, offer promise but are not yet affordable or reliable enough to be recommended for cyclist signal actuation. As part of its on-going efforts to upgrade and expand the traffic signal system, the City may at some point wish to test video detection of cyclists to determine if the technology is feasible for widespread use in Chilliwack.

Figure 5.11 – Bicycle pushbutton (Maple Ridge)

Figure 5.12 – Bicycle detector marking (Boulder)

Figure 5.13 – Bicycle detector sign (Vancouver)

5.3.3 Multi-use Crossings

Multi-use crossings are crossings used by both cyclists and pedestrians, such as where a multi-use pathway crosses a road. In British Columbia, the *Motor Vehicle Act* permits cyclists to ride across a crosswalk if directed to use the crosswalk as part of a designated bicycle facility. Many motorists, cyclists and pedestrians do not understand this, however, and it is therefore desirable to communicate to pedestrians, cyclists and motorists that cyclists can ride across a multi-use crossing, and that motorists should yield to cyclists in the crossing. This can be accomplished through signage, as illustrated by the examples in Figures 5.14 (the modified RA-4 sign is MoTI sign R-111-1), 5.15 and 5.16.

Figure 5.14 – Modified RA-4 crosswalk sign (Pitt Meadows)

Figure 5.15 – Cyclists may use crosswalk sign (Vancouver)

Figure 5.16 – Bicycles may use crosswalk sign (New Westminster)

5.3.4 Green Pavement Colouring

Green pavement colouring indicates conflict zones where the path of motor vehicles crosses the path of cyclists, such as at right and left turns at intersections and into driveways, and at midblock crossings. Although some municipalities have taken to marking every possible conflict zone with green paint, this approach is not recommended for the following reasons:

- Marking every conflict zone saturates roads with green paint, and as a result obscures the conflict zones that need extra attention. The risk in marking all conflict zones is that motorists will become desensitized to the green paint and will ignore the markings, and the benefit of highlighting conflict zones – especially those that require extra attention – is lost. A similar argument is often made to avoid too many traffic signs on roads.
- Marking every conflict zone is costly. The green epoxy paint is expensive, and can quickly consume funds for cycling facilities that could provide a greater return on investment if invested in protected lanes, crossings and other facilities. Recent quotes for green pavement colouring in other municipalities range from $\$150/m^2$ to as high as $\$300/m^2$. Assuming a median cost of $\$200/m^2$ means that green pavement colouring in a typical right turn lane could cost $5,000, and a driveway could cost $3,000. The cost of green paint on a typical bicycle route on an arterial road through a commercial area could exceed $50,000/km.

The preferred approach is to use green pavement colouring judiciously, marking only unusual situations that represent a non-standard condition that motorists or cyclists would not anticipate, and therefore need to be alerted to. The following is the hierarchy of conditions in which green paint should be used, ranked from most appropriate to least effective:

- A non-standard weaving or merging condition that requires additional attention for motorists and cyclists. An example of this is where a bicycle lane crosses an on-ramp, such as in Figure 5.17. In contrast, the typical configuration of a bicycle lane adjacent a right turn lane is a standard condition for which there is less need for green pavement colouring (as discussed below).
- At multi-use crossings in unexpected locations, such as in Figure 5.18 where the crossing is located at the end of a bridge. A local example of this is the existing Sardis Rail Trail crossings, as they are located adjacent to railway crossings and the risk is that motorists approaching the crossing are focused on the railway crossing and do not see the multi-use SRT crossing. In this situation, green paint would be effective at drawing motorists' attention.
- Where a protected bicycle lane or cycle track crosses a commercial driveway or other commercial or industrial access, such as in Figure 5.19.
- Through an intersection, as shown in Figure 5.20.
- At right turn lanes approaching an intersection, where motorists must weave across the bicycle lane to enter the right turn lane. Local examples of such a configuration are northbound on Ashwell Road at Hodgins Avenue, and southbound on Eagle Landing Parkway at the entrance to the Walmart Supercentre. Also where cyclists must cross channelized right turn lanes, as shown in Figure 5.21, or as in the local example southbound on Young Road at Hocking Avenue.

- Across multi-family residential driveways.
- Across single-family residential driveways with sight distance limitations or other unusual conditions.

Figure 5.17 – Green pavement marking across on-ramp (Vancouver)

Figure 5.18 – Green pavement colouring in multi-use crossing (Canmore AB)

Figure 5.19 – Green pavement marking and sign at commercial driveway (Vancouver)

Figure 5.20 – Green pavement marking through intersection (Seattle WA)

Figure 5.21 – Green pavement marking across channelized right turn lane (Langford)

5.3.5 Railway Crossings

Railway crossings present a hazard when the tracks cross at an angle to the road. Cyclists can safely cross railway tracks at or close to 90 degrees, but when crossing tracks at an angle a wheel can fall into the flangeway of the rail, throwing the cyclist off balance. A cyclist could be seriously injured or killed as a result by falling and hitting their head or falling in front of adjacent motor vehicles.

The solution at an angled railway crossing is to construct a "jug handle" bicycle lane with an alignment that crosses the railway track at or close to 90 degrees, as shown in Figures 5.22 and 5.23 (the green paint in the latter example is not necessary). Other solutions such as flangeway fillers can only be used on very low speed spur lines, and therefore are not likely feasible at rail crossings in Chilliwack.

Figure 5.22 – Bicycle lane at angled railway crossing (Surrey)

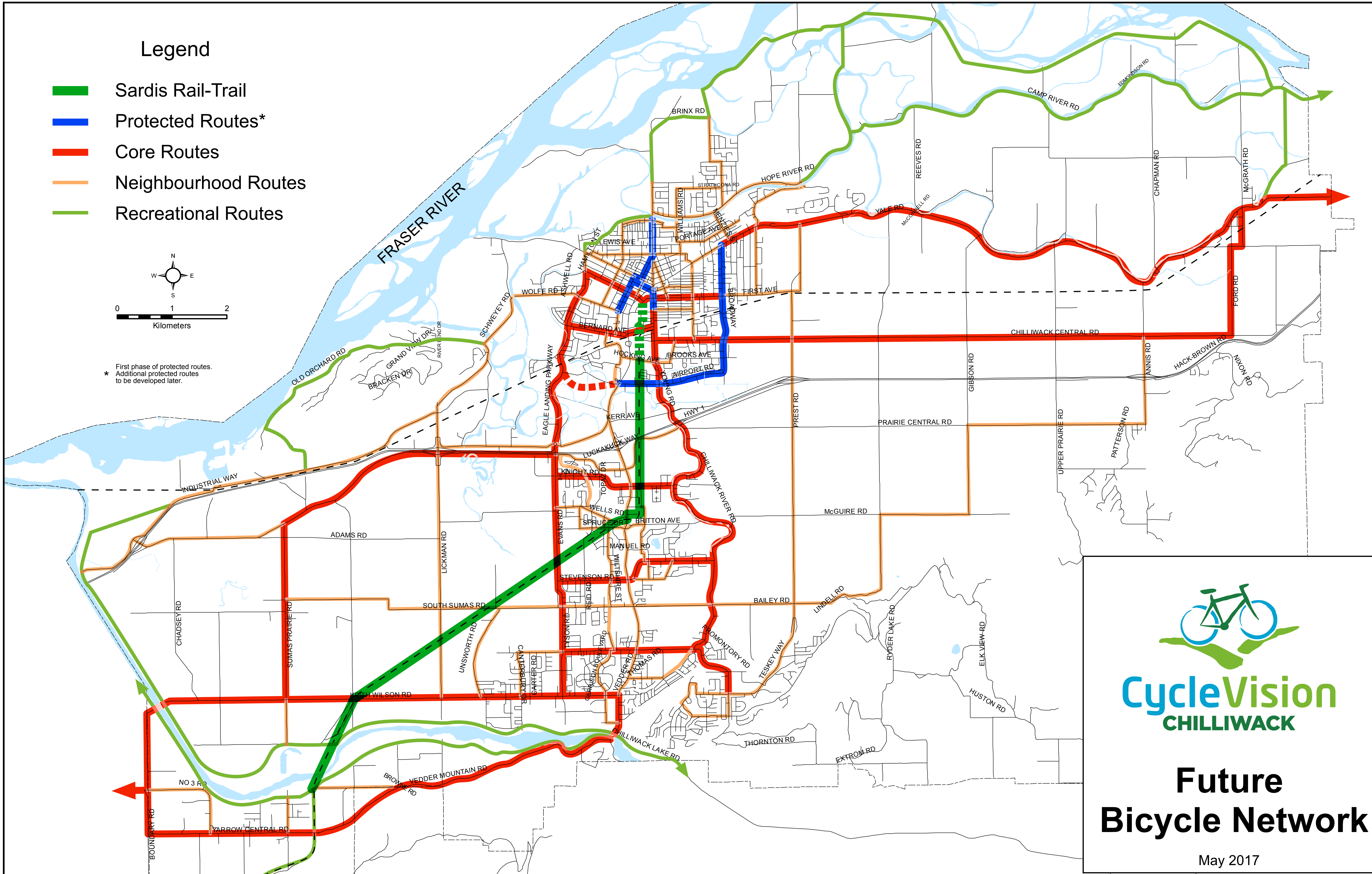
Figure 5.23 – Bicycle lane at angled railway crossing (Langford)

Appendix

Future Bicycle Network Map

Trail Connections Map

Priority Bicycle Projects Map


Legend
Sardis Rail-Trail
Protected Routes*
Core Routes
Neighbourhood Routes
Recreational Routes
N
W
E
S
0
1
2
Kilometers
* First phase of protected routes. Additional protected routes to be developed later.
FRASER RIVER
OLD ORCHARD RD
GRAND VIEW DR
BRACKEN DR
RIVER BEND DR
SCHWEYEY RD
WOLFE RD
ASHWELL RD
HAMILTON ST
LEWIS AVE
BRINX RD
WILLIAMS RD
STRATHCONA RD
HOPE RIVER RD
MENZIES ST
PORTAGE AVE
FIRST AVE
BROADWAY
BERNARD AVE
HOCKING AVE
BROOKS AVE
AIRPORT RD
YOUNG RD
EAGLE LANDING PARKWAY
KERR AVE
HWY 1
LUCKAKUCK WAY
KNIGHT RD
TOPAZ DR
WELLS RD
SPRUCE DR
BRITTON AVE
MANUEL RD
EVANS RD
STEVENSON RD
WILTSHIRE ST
REID RD
TYSON RD
GARRISON BOULEVARD
VEDDER RD
THOMAS RD
CANTERBURY DR
CARTER RD
CHILLIWACK RIVER RD
PROMONTORY RD
TESKEY WAY
CHILLIWACK LAKE RD
THORNTON RD
EXTROM RD
LINDELL RD
BAILEY RD
McGUIRE RD
PREST RD
PRAIRIE CENTRAL RD
CHILLIWACK CENTRAL RD
YALE RD
McCONNELL RD
REEVES RD
CAMP RIVER RD
EDMONDSON RD
CHAPMAN RD
McGRATH RD
FORD RD
GIBSON RD
ANNIS RD
HACK-BROWN RD
NIXON RD
UPPER PRAIRIE RD
PATTERSON RD
RYDER LAKE RD
ELK VIEW RD
HUSTON RD
INDUSTRIAL WAY
ADAMS RD
LICKMAN RD
SOUTH SUMAS RD
CHADSEY RD
SUMAS PRAIRIE RD
UNSWORTH RD
KEITH WILSON RD
NO 3 RD
BOUNDARY RD
YARROW CENTRAL RD
BROWNE RD
VEDDER MOUNTAIN RD
CycleVision
CHILLIWACK
Future
Bicycle Network
May 2017

Legend

- Sardis Rail-Trail
- Experience the Fraser
- Vedder River Trail
- Protected Bicycle Routes*
- Other Bicycle Routes

N W E S

0 1 2

Kilometers

* First phase of protected routes. Additional protected routes to be developed later.

FRASER RIVER

BRINX RD
HOPE RIVER RD
CAMP RIVER RD
EDMONDSON RD
REEVES RD
CHAPMAN RD
McGRATH RD
YALE RD
McCONNELL RD
STRATHCONA RD
WILLIAMS RD
HAMILTON ST
LEWIS AVE
PORTAGE AVE
SHEFFIELD RD
SCHWEYEY RD
WOLFE RD
FIRST AVE
BERNARD AVE
HOCKING AVE
BROOKS AVE
AIRPORT RD
YALE RD
BROADWAY
CHILLIWACK CENTRAL RD
FORD RD
HACK-BROWN RD
NIXON RD
GIBSON RD
ANNIS RD
PRAIRIE CENTRAL RD
UPPER PRAIRIE RD
PATTERSON RD
PREST RD
EAGLE LANDING PARKWAY
KERR AVE
HWY 1
LUCKAKUCK WAY
KNIGHT RD
TOPAZ DR
CHILLIWACK RIVER RD
McGUIRE RD
WELLS RD
SPRUCE DR
BRITTON AVE
EVANS RD
MANUEL RD
WHITE ST
STEVENSON RD
REID RD
TYSON RD
BAILEY RD
LINDELL RD
RYDER LAKE RD
ELK VIEW RD
HUSTON RD
PROMONTORY RD
TESKEY WAY
THOMAS RD
VEDDER RD
GARNET ROAD
CANTERBURY DR
CARTER RD
UNSWORTH RD
LICKMAN RD
ADAMS RD
SOUTH SUMAS RD
CHADSEY RD
SUMAS PRAIRIE RD
KEITH WILSON RD
CHILLIWACK LAKE RD
THORNTON RD
EXTROM RD
VEDDER MOUNTAIN RD
BROOKE RD
NO 3 RD
YARROW CENTRAL RD
BOUNDARY RD
INDUSTRIAL WAY
OLD ORCHARD RD
GRAND VIEW DR
BRACKEN DR
RIVER BEND DR
SCHWEYEY RD

CycleVision CHILLIWACK

Trail Connections

May 2017

Legend

Existing Routes	Priority Facilities	
		Sardis Rail-Trail
		Protected Routes
		Core Routes
		Neighbourhood Routes
		Recreational Routes
		Crossings and Other Projects

N
W E
S

0 1 2
Kilometers

FRASER RIVER
OLD ORCHARD RD
BRACKEN DR
GRAND VIEW DR
RIVER END DR
SCHWEYEY RD
INDUSTRIAL WAY
BRINX RD
HOPE RIVER RD
STRATHCONA RD
McADAMS RD
LEWIS AVE
PORTAGE AVE
HAMILTON ST
SCHWELL RD
WOLFE RD
FIRST AVE
BERNARD AVE
HOCKING AVE
BROOKS AVE
AIRPORT RD
HOCKING RD
HWY 1
KERR AVE
EAGLE LANDING PARKWAY
LUCKAKUCK WAY
KNIGHT RD
TOPAZ DR
WELLS RD
SPRUCE DR
BRITTON AVE
MANUEL RD
STEVENSON RD
REID RD
WATSON RD
CANTERBURY DR
GARTER RD
GARRISON WOODWARD RD
VEDDER RD
THOMAS RD
ADAMS RD
LICKMAN RD
EVANS RD
WATSON RD
SOUTH SUMAS RD
CHADSEY RD
SUMAS PRAIRIE RD
UNSWORTH RD
KEITH WILSON RD
BOUNDARY RD
NO 3 RD
YARROW CENTRAL RD
BROWN RD
VEDDER MOUNTAIN RD
CHILLIWACK LAKE RD
CHILLIWACK RIVER RD
PROMONTORY RD
TESKEY WAY
PREST RD
McGUIRE RD
BAILEY RD
LINDELL RD
RYDER LAKE RD
ELK VIEW RD
HUSTON RD
THORNTON RD
EXTROM RD
PRAIRIE CENTRAL RD
UPPER PRAIRIE RD
PATTERSON RD
GIBSON RD
YALE RD
McCONNELL RD
REEVES RD
CAMP RIVER RD
EDMONDSON RD
CHAPMAN RD
McGRATH RD
FORD RD
CHILLIWACK CENTRAL RD
HACK-BROWN RD
NIXON RD
ANNIS RD

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Priority Bicycle Projects

May 2017