A Report Prepared for

City of Castlegar

Pedestrian & Bicycle MASTER PLAN

0841.0063.01 / December 2007

URBANSYSTEMS®

#500 - 1708 Dolphin Avenue
Kelowna BC V1Y 9S4
Telephone: 250-762-2517
Fax: 250-763-5266

TABLE OF CONTENTS

APPENDICES

EXECUTIVE SUMMARY

To be included in Final

1.0 INTRODUCTION

Compared to other modes of transportation, walking and cycling have a number of significant benefits. Facilities for pedestrian and cyclists consume relatively low amounts of space, and the required investment for such facilities is low in comparison with that required for other modes. Walking and cycling are healthy modes of transportation that virtually all segments of the population are able to participate in. Many segments of the population, such as children, the elderly, and the disabled, have limited or no access to automobiles, and adequate pedestrian and cycle routes help to ensure equitable access to community amenities for these individuals. Further, the environmental impacts of walking and cycling are negligible. Every trip that is made by foot or bicycle instead of automobile helps to reduce traffic congestion and vehicle emissions, and helps to achieve a more balanced transportation system. A Pedestrian and Bicycle Master Plan will provide the overall vision that is required for the systematic implementation of a safe, feasible and convenient bicycle and pedestrian network.

In 2006, the City of Castlegar completed a community survey as part of its Official Community Plan update. This survey showed that Castlegar residents have a number of concerns that could be addressed in part by improving the City's pedestrian and bicycle network. Survey respondents expressed concern over sprawl and distance to shopping/amenities, and they expressed a desire for compact, pedestrian oriented shopping. Survey respondents also indicated further need for trails, and suggested that transportation/traffic movement is a quality of life aspect that needs improvement.

The Pedestrian and Bicycle Master Plan will build on trail planning already undertaken by the City of Castlegar and Selkirk College, expanding on this work to identify all types of pedestrian and bicycle facilities that the City may wish to develop, such as walkways, bicycle lanes, and multi-use trails. The Pedestrian and Bicycle Master Plan includes the following:

- **Overall Walking/Cycling Route Network** – This represents the ultimate vision for bicycle and pedestrian facilities within the City of Castlegar. It identifies which pedestrian and bicycle facilities are appropriate, and gives guidance on where these facilities are to be implemented. The overall network provides for inter-connected walking and cycling routes throughout the City. On-street routes, bicycle lanes, multi-use pathways and trails, and community walkway links were considered and developed in order to provide direct access to major destinations and recreational areas throughout the City. The network also considers opportunities to facilitate the long-term development of 'great streets' that accommodate a multitude of users and encourage compact, pedestrian-oriented development. The walking/cycling network is broken down by facility type (e.g. bike lanes, shared facilities, off road pathway, trails), indicating where each type of facility is envisioned.

- **Comprehensive Design Guidelines** – Design guidelines applicable to the City of Castlegar were established in order to provide further guidance in the implementation of each type of recommended pedestrian and bicycle facility. Based on best practices, the guidelines consider form and character of various facilities, and facility treatments were generalized as prototypes.

Crossing treatments, signage and markings, trail concepts, and character areas are all considered in the Design Guidelines.

- **Implementation Strategy** – A prioritized list of recommended upgrades was generated to provide an implementation strategy that the City can adopt in order to achieve its ultimate vision for a complete pedestrian and bicycle network. The recommendations were prioritized into short term, medium term, and long term projects, with corresponding cost estimates. The implementation strategy proposed allows the City to plan and budget for expected future bicycle and pedestrian facility needs over the planning horizon, and to allow for a systematic approach to the construction of new facilities. The strategy considers means to acquire or secure tenure for proposed routes, and it also examines funding opportunities and risk management considerations. A section by section description of major pedestrian and bicycle facilities are provided, identifying the following:

    - Location and length of the section;
    - Landscape character of the section;
    - Preferred route and/or route options;
    - Physical barriers and conditions (for trail development);
    - Land ownership and tenure; and,
    - Proposed facility treatment and associated cost (based on unit costs provided by the City).

1.1 Goals & Objectives

Two primary goals of the plan are:

- **Increase bicycle and walking trips.** The primary goal of the Pedestrian and Bike Plan is to increase bicycle use and walking in Castlegar. Developing more bicycle routes and facilities — combined with awareness and education activities — will increase the number of bicycle and pedestrian trips and increase the share of all vehicle trips made by bicycle and walking.

- **Improve safety** for cyclists and pedestrians. A 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 and other road users and reduce injuries, but will also reduce the fear of traffic for many cyclists and potential cyclists, increasing the number of bicycle trips.

Specific objectives in support of the goals of the Pedestrian and Bicycle Master Plan include:

- Connecting existing facilities and neighbourhoods;
- Encouraging compact development in the City Centre and in neighbourhood centres;
- Benefiting as much of the Castlegar population as possible;
- Integrating the City's existing transportation network;

- Inspiring residents to utilize pedestrian and cycle networks to meet their day to day transportation needs, whether for commuting or recreation;
- Providing a viable alternative to the automobile;
- Determining priorities for implementation;
- Preparing order of magnitude cost estimates for priority improvements; and,
- Developing design guidelines to address a wide range of circumstances, including 'interim' conditions for on-street facilities, off-street pathways, crossings, signage, and pavement markings.

1.2 Planning Principles

The development of the Bicycle and Pedestrian Master Plan was based on several fundamental principles of bicycle and pedestrian planning, as described below. These principles are based on experience in communities in British Columbia and across North America, and are consistent with current planning practices.

- **Crossing treatments are essential.** Locations where pedestrians cross arterial and collector roads are where the majority of collisions occur between motor vehicles and pedestrians. To maximize safety for pedestrians, and to avoid creating barriers to walking within Castlegar, a range of crossing treatments should be used at arterial and collector road crossings.

- **The bicycle network should accommodate all cyclists.** This means cyclists of all skill levels, riding for all purposes. This includes children and adults, novice and experienced cyclists. It includes cyclists commuting to work and school, cyclists riding to the store or a medical appointment, for example, and recreational cyclists, including mountain bikers riding to trails.

- **Cyclists should be accommodated on roadways where possible.** This means that unless it is extremely difficult to do so, space should be provided for cyclists on all arterial and collector roads. This approach recognizes that cyclists fare best when they are treated as vehicles and integrated with other vehicle traffic. Studies of crashes and safety issues indicate that cyclists are generally safer riding on roadways than on pathways. The reason for this is that cyclists share pathways with pedestrians and many other types of users, which can increase the potential for conflicts and crashes. In addition to safety considerations, travel times for cyclists are typically minimized when cyclists travel on roadways.

- **Bicycle and pedestrian routes should form a continuous network,** using local streets where appropriate to bridge gaps in the network. Many cyclists who are attracted to pathways are cyclists who would not be comfortable riding on arterial or collector roads. Recognizing this, these cyclists should be able to ride to destinations throughout Castlegar on a combination of pathways and local streets, without the need to travel along arterial and collector roads.

Although local streets may be used to complete gaps in the pathway network, desirably a continuous pathway connection should be provided.

- **The pedestrian and bicycle network should serve all important destinations.** Just as the road network provides access to commercial, office, institutional, cultural and recreational destinations throughout the community, so should the bicycle and pedestrian network. Desirably, each important destination is served by an on-street bicycle route and a walkway/pathway connection.

- **The "quality" of the walking and cycling experience is important.** The "quality" of the cycling and walking experience is determined by perceptions of safety, traffic volumes, noise and aesthetics. Although providing a direct route and avoiding steep grades are important, some pedestrians and cyclists will prefer a longer route or one with steeper grades if it is perceived as significantly safer, has lower traffic volumes, and provides a more enjoyable walking and cycling experience.

- **Facilities should be developed to an acceptable standard.** No-one would consider constructing a road to be used by motor vehicles with lane widths narrower than the minimum standard, or without traffic signals at major intersections, for example. The road would not be safe. For the same reason, pedestrian and bicycle facilities should not be constructed to less than the minimum standard — they would not be safe, either. Constructing bicycle and pedestrian facilities to acceptable standards maximizes safety for pedestrians and cyclists, increases the attraction of the bicycle and pedestrian facilities to potential pedestrians and cyclists, minimizes maintenance costs and helps to avoid expensive liability claims.

2.0 PEDESTRIAN FACILITIES

This Section describes various on-street pedestrian facilities, including sidewalks and crossings. **Section 6.0** summarizes specific design guidelines for various on-street pedestrian facilities.

2.1 Existing Facilities

The current issue with pedestrian facilities within the City of Castlegar is that they are not continuous or are lacking in areas that require them the most. For instance, in the downtown area of Castlegar sidewalk exists along 7th Avenue however there is a large gap between 8th Street and 10th Street. This is a concern as this corridor is a route to schools located on 7th Avenue at 7th Street (Twin Rivers Elementary, Stanley Humphries Secondary School and Castlegar Primary School). As well, there are no pedestrian facilities along 5th Street to make a connection with the Millennium Walkway.

In the south of Castlegar, sidewalks are lacking completely at Kinnaird Elementary school at 10th Avenue and 23rd Street. The skewed intersection and presence of young children emphasize the importance of a sidewalk in this area.

In many instances the existing sidewalk is substandard, being too narrow or in poor shape. This is especially true along 7th Avenue between 10th and 11th Streets. In some cases sidewalk in disrepair has been overlaid with asphalt (9th Avenue).

Columbia Avenue runs straight through Castlegar and is a busy corridor. Pedestrian crossings are already established along Columbia Avenue and are sufficiently spaced to provide adequate crossing opportunities. There are nine traffic signal crossings, three marked crossings, and four pedestrian crossings with flasher.

In 2002 the 'Columbia Avenue Operational and Safety Review' report for ICBC identified high risk collision areas. High collisions between 3rd and 4th Streets along Columbia resulted in an investigation. The report found that the pedestrian crosswalk across Columbia Avenue was on the north side of the intersection but recommended that it be moved to the south side. While the crosswalk is still on the north-side, a

mid-block curb extension on the west side of Columbia was constructed. Curb extensions help to make pedestrians wishing to cross the road more visible to vehicles and reduce the curb-to-curb crossing distance thereby minimizing the time spent on the roadway.

Other issues identified in the Safety Review included:

- 24th Street at Columbia – Aside from the actual intersection configuration, issues for pedestrians included the pedestrian crossing equipment located in the shoulder increasing the risk of pedestrians waiting here to cross the road. This intersection has since been upgraded to a traffic signal.
- 18th Street to 21st Street along Columbia – Next to the Monte Carlo Inn a significant drop between the sidewalk and parking lot was identified as a problem for wheelchair users. The suggested mitigation measure was to provide a guardrail or to widen the sidewalk to avoid pedestrians and wheelchairs falling into the parking area.
- 32nd Street at Columbia – It was observed that signage for the crosswalk was out of view for vehicles on Highway 22 and that pedestrians that cross at the sidewalk are directed towards the 32nd Street stop line where no sidewalk had been provided. It was recommended to move the crosswalk southwards and to provide sidewalk on the east side of Columbia.

2.2 Sidewalks

Sidewalks are located within the road right-of-way and provide pedestrian only access along the same direct routes used by vehicles. They are typically located directly behind the curb and gutter on urban roads. The minimum standard for sidewalk width is 1.5 metres; however, a width of 1.8 metres or more (depending on predicted usage) is preferable in multi-family or commercial areas. Sidewalks are recommended on both sides of all arterial roads and on at least one side of a collector road within the City of Castlegar.

2.3 Crossings

Where on-street and off-street facilities cross major roadways, special crossing treatments are usually required. Different types of crossing facilities are recommended, depending on the function, traffic volumes, and speeds of the roadway as well as the type of pedestrian and bicycle facility and the crossing demand.

Four types of crossings are typically considered, including:

- **Marked crossings** are used on lower-volume roadways, where there is a need to identify the crossing to motorists. Crosswalk signage and pavement markings can be supplemented with enhancements, including flashing amber lights and overhead internally-illuminated signs, which also shine light onto the crossing area.

- **Median islands** at marked crossings make it easier for pedestrians, cyclists and others to cross the roadway, as they only need to wait for a gap in one direction of traffic in order to cross half the road at a time. These are also referred to as pedestrian refuge areas.

- **Signalized crossings** are used where the number of persons crossing the roadway is higher, and where traffic volumes and speeds are higher. Signals can only be activated by pedestrians and cyclists who must push a button – motor vehicles on the side street cannot activate the signals.

- **Grade-separated crossings** (overpasses and underpasses) are expensive, and are typically used only where there is a high volume of high-speed motor vehicle traffic, with no opportunity for a signalized at-grade crossing.

2.4 Other Pedestrian Facilities

Another pedestrian facility that exists today within the City of Castlegar is the 'Cobra Climb' staircase that starts at 10th Avenue and goes up to connect at 26th Street. Originally intended to provide access for school children, the staircase is now used by fitness enthusiasts.

3.0 BICYCLE FACILITIES

On-street facilities are those that are located on roadways. These include shared routes, marked wide curb lanes, bicycle lanes and paved shoulders, as described below. **Section 6.0** summarizes specific design guidelines for various on-street facilities.

3.1 Existing Facilities

Within the City of Castlegar dedicated bicycle facilities exist along 5th Street (9th Avenue to Millennium Walkway) and 6th Street (11th Avenue to 7th Avenue) without evident connections or routes. Bicycle lanes also exist along 6th Avenue from 24th Street to the north. Aside from this, shared bike lanes exist along Columbia Avenue except within the area of the interchange of Highway 3. Aside from connecting the existing bicycle links, thought will be given to alternative bicycle routes parallel to the high traffic volume Columbia Avenue.

3.2 Bicycle Routes

Shared Routes

Shared routes are typically applicable on low traffic volume roads such as local streets and lower-volume collector roads. When traffic volumes and speeds are generally low, cyclists and motorists are able to safely share the road without the need for physical improvements to the roadway. In most cases, the only improvement needed is signage identifying the road as a bicycle route and alerting motorists to the presence of cyclists on the road. No additional road space is provided for pedestrians or cyclists. Traffic calming measures such as traffic circles, speed humps and obstructions can be used to reduce motor vehicle speeds and volumes on shared routes if needed.

Shared routes are applicable within Castlegar due to the high number of local streets with low traffic volumes. They have the added benefit of being low cost and low maintenance. Shared routes can be successfully implemented on many existing roads, in particular on residential streets.

Marked Wide Curb Lanes

A marked wide curb lane is essentially a wide travel lane, with the addition of bicycle lane symbols marked on the pavement at regular intervals. The symbols identify the right side of the lane as the area used by bicycles, and serve to alert motorists to the potential presence of bicycles even when there are no bicycles on the roads. Because an area of the roadway is identified for bicycle use, marked wide curb lanes are attractive to cyclists who are uncomfortable riding in traffic and feel the need for an identified bicycle facility.

Marked wide curb lanes do not include a white line separating bicycles from other traffic, which means cyclists may travel in the lane where they feel most comfortable. Many motorists – and even cyclists – interpret the white line of a bicycle lane to mean that cyclists are confined to the bicycle lane. With marked wide curb lanes, on the other hand, motorists and cyclists both recognize that cyclists are free to ride elsewhere on the roadway as necessary (such as to make a left turn, avoid an obstacle such as a parked car, or when traveling through an intersection). Marked wide curb lanes are typically utilized on roads with low to medium traffic volumes, where on-street parking, frequent transit stops, or large proportions of turning vehicles exist. Lanes are 4.3 m wide for vehicles and cyclists to share which allows for vehicles to safely overtake cyclists without having to cross into adjacent lanes.

Paved Shoulders

On rural arterial and collector roads without curb and gutter, bicycles and pedestrians may travel on the paved shoulder. Paved shoulders are a shared facility, and must provide adequate width for both pedestrians and cyclists. A minimum width of 1.5 metres is recommended. Paved shoulders may be signed and/or have stencils but this is not necessary. Particular attention must be made to ensure that parking is prohibited on the paved shoulders dedicated to pedestrian and bicycle use, and that the shoulders are maintained throughout the year.

Bicycle Lanes

Bicycle Lanes are separate travel lanes designated for the exclusive use of bicycles only on urban roads where there is curb and gutter. In most cases, they are located on the right-hand side of the road, adjacent the curb. In general, bicycle lanes are preferred for roadways that have higher volumes, higher speeds, no on-street parking and limited driveway and/or bus service. The lanes are a minimum width of 1.5 metres and are identified with solid white lines, bicycle stencils and appropriate signage.

3.3 Other Bicycle Facilities

End-of-trip facilities are an important component of the Bicycle and Pedestrian Master Plan wherever possible. End-of-trip facilities are specific to bicycle use, and include bike storage facilities such as racks and lockers.

Examples of End of Trip Facilities

4.0 THE PEDESTRIAN AND BICYCLE ROUTE NETWORK

Based on the goals and objectives of this plan, a proposed Pedestrian and Bicycle Route network was developed for the City of Castlegar, illustrated in ***Appendix A***. This proposed network considered the various pedestrian and bicycle planning principles described in Section 1.2, and incorporated both existing facilities and new proposed facilities. As a key component of the overall Pedestrian and Bicycle Master Plan, the Route Network represents the ultimate vision for walking and cycling facilities and connectivity within the City of Castlegar. It will be used to guide the improvement of the existing system and will incorporate both existing and proposed on-street routes, designated bike lanes, multi-use pathways, trails, sidewalks, and crossing treatments. The Pedestrian and Bicycle Route Plan will also be use to identify and evaluate proposed improvements, working towards a prioritized list of projects. The process of developing the route network and determining the resulting high priority projects is describes in the following sections.

4.1 Existing Route Inventory

The first step in the development of the Pedestrian and Bicycle Route Network was to identify existing bicycle and pedestrian facilities within the City of Castlegar. Using available mapping data and during field visits throughout the city, the following key routes were identified.

- **Columbia Avenue** – The City of Castlegar is a long and narrow community, running predominately north-south along the west side of the Columbia River. As the only continuous north-south corridor in the community, Columbia Avenue (also provincial Highway 22 south of Highway 3) represents a critical transportation connection for all travel modes and forms the 'spine' of Castlegar's transportation network. To the south, Columbia Avenue (Highway 22) is primarily a two lane rural arterial with paved shoulders from the City's southern limits to 37th Street. From here sidewalks are also found along the roadway all the way through the Highway 3 connection and into Castlegar's downtown core. North of Highway 3 (between 17th Street and 7th Street), Columbia Avenue is a two lane city arterial with designated bike lanes, sidewalks on both sides, and numerous pedestrian crossing locations. A gap in the provision of adequate on-street bicycling facilities was found between 20th Street and 17th Street along Columbia Avenue. In this area, Columbia Avenue widens to four lanes through the commercial areas and the connection to Highway 3. While sidewalks are provided on both sides, no provision for on-street cycling is made.

- **6th Avenue** – Designated bike lanes are provided for this collector road between Highway 3 and 24th Street.
- **5th Street -** Designated bike lanes are provided between 9th Avenue and the Millennium Walkway, however no sidewalks are currently in place.
- **6th Street -** Designated bike lanes are provided between 11th Avenue and 7th Avenue, however no sidewalks are currently in place.
- **Other Facilities** – as previously noted a disconnected system of sidewalk is in place along various other streets and roadways including 7th Avenue, 9th Avenue, 3rd Street, 4th Street, and 8th Street. In addition, existing sidewalks are found on the Highway 3 Bridge over the Columbia River and on one side of the 20th Street overpass over Highway 3.


6th Avenue


6th Street

Based on this inventory of existing facilities, potential new/improved pedestrian and bicycle routes were identified and prioritized. These new or improved routes were established based on the goals and objectives of this plan. In particular, four main considerations were made in the development and selection of new/improved pedestrian and bicycle routes:

- Identifying any gaps in the existing network, including discontinuities in existing on and off-road facilities.
- Ensuring that all major generators of pedestrian and bicycle trips in the City of Castlegar are served by some sort of pedestrian or bicycle facility These major generators include Parks and Recreation areas (including Millennium Park and Zuckerberg Island), Commercial Centres, schools, and other public institutions (libraries and health care facilities).
- Providing an alternate route to on-street facilities on high-volume arterials (i.e. Columbia Avenue), where possible.
- Ensuring connectivity to major regional routes and origins/destinations (i.e. Selkirk College)

4.2 Key Network Components

The proposed Pedestrian and Bicycle Route Network is illustrated in ***Appendix A***, key components of the proposed network (including new connections and improvements to existing routes) were identified. A summary of key components are described in the following sections.

4.2.1 5th Avenue & 6th Avenue

In order to continue with an alternate bicycle route parallel to Columbia Avenue, shared bike lanes are proposed for 6th Avenue (between 24th Street and 27th Street) and 5th Avenue (between 27th Street and Schofield Creek). Given the low traffic volumes, initially the existing road cross section could be used for the shared on-street bicycle route with only the addition of appropriate signage and pavement markings. However, as this corridor is intended for future improvement to meet the city's collector standard, future improvements could include widening of the asphalt surface and sidewalks. This route would also be intended to connect to Columbia Avenue near 37th Avenue (Southridge Drive) with development in the Schofield Creek area. A new pedestrian crossing of Columbia Avenue (Highway 22) would be recommended to connect this route to the Southridge neighbourhood.

4.2.2 Connors Road & 17th Street

A shared on-street bicycle route is proposed for Connors Road from the south end of Connor Drive (near Highway 3) across the railway tracks and along 17th Street to Columbia Avenue. This route would provide an alternate bicycle route around the Highway 3 Commercial area where limited on-street bicycle facilities exist. When connected to 6th Avenue and 5th Avenue this route would form a parallel bicycle route to the busy Columbia Avenue arterial that would be more suitable for recreational and family oriented cycling.

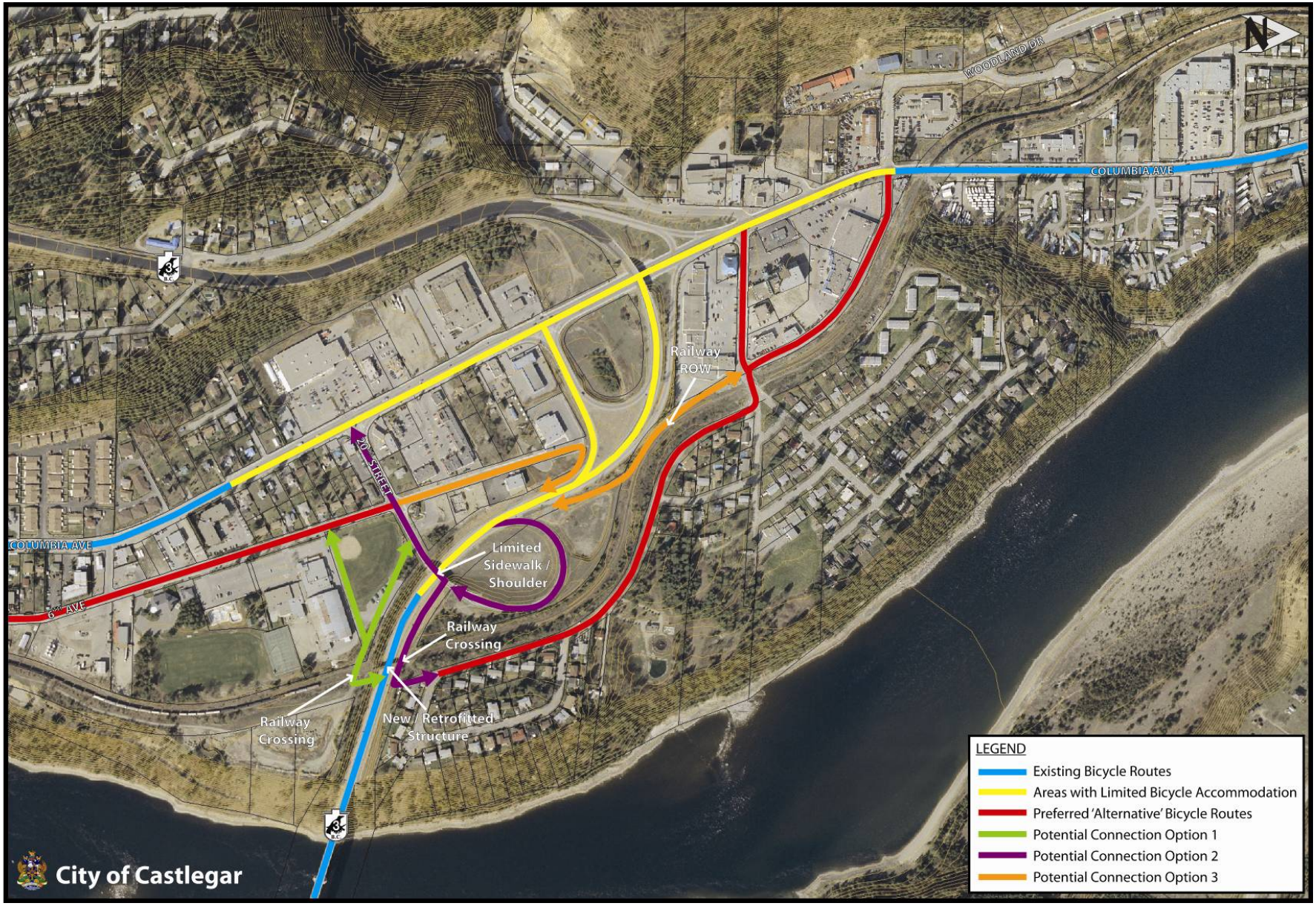
4.2.3 20th Street / Connors Road Connection

In order to connect the 6th Avenue and Connors Road bicycle routes a new connection is required across Highway 3. Several potential connections were considered in this area, illustrated in **Figure 5.1**, however a connection using the 20th Street overpass, Option 2, was determined to be preferred. Using the 20th Street overpass (where a sidewalk exists in one direction) it would be possible to create a bicycle/pedestrian only link that would be uninterrupted by the Highway 3 corridor. This connection would require the construction of a pedestrian/cyclist only crossing of the CPR railway and the construction of a short multi-use pathway between the overpass and Connors Road. Preliminary discussions with CPR have indicated that this option would be feasible with appropriate design and safety considerations.


20th Street Overpass


Existing Path and Rail Crossing

Figure 5.1: Highway 3 / Columbia Ave – Pedestrian & Bicycle Connectivity



4.2.4 7th Avenue / 9th Street

Designated bike lanes between 3rd Street and 9th Street are proposed along 7th Avenue to serve the schools in the area and to provide connectivity to key recreational destinations (Millennium Park and Zuckerberg Island). Sidewalks are also proposed to complete the existing sidewalks on 7th Avenue between 3rd and 4th Streets and between 8th and 10th Street. In addition, designated bike lanes are recommended on 9th Street to connect the 7th Avenue corridor to Columbia Avenue. For the purposes of this assignment the estimated costs of these projects have been combined.

4.2.5 3rd Street

Sidewalks are proposed along 3rd Street between 7th Avenue to 2nd Avenue (Millennium Park). While designated bike lanes are in place along much of 5th Street, no sidewalk connects the downtown area to the important recreational destination at Millennium Park and the Millennium Park Walkway. 3rd Street was selected for this pedestrian route, over 5th Street, in order to reduce right-of-way requirements and to more optimally connect to one end of the Millennium Walk.

4.2.6 9th Avenue

Designated bike lanes are recommended for 9th Avenue (between 3rd Street and 6th Street) connecting the downtown core to the key 7th Avenue corridor. These routes would also connect several important destinations, including the Library, schools, and Millennium Park.

4.2.7 Columbia Avenue (Downtown)

Shared bike route signage and pavement marking are recommended along Columbia Avenue (between 7th Street and 3rd Street) where no designated bike lanes exist. Since this segment of Columbia Avenue is primarily urban with numerous intersections, on street parking, and lower speeds, designated bike lanes are not required. However, as a key component of the network cyclist should be encouraged to use this segment of the Columbia Avenue and signing and pavement markings should reflect this.

4.2.8 Columbia Avenue (at Highway 3)

Designated bike lanes are recommended for Columbia Avenue (Highway 22) between 20th Street and 17th Street. While sidewalks are provided on both sides of the corridor, no provision is made for on-street cycling. As the 'spine' of the transportation network it is important that this gap in cycling facilities be addressed allowing for a continuous north-south bicycle route along Columbia Avenue. Although alternate bicycle routes are proposed on other parallel streets, Columbia Avenue would remain the most direct and efficient route for cyclists. While vehicle traffic on this arterial would be too busy for many users (recreational cyclists and families), commuters and other devoted cyclists would likely still find Columbia Avenue the most attractive route. In consultation with the Ministry of Transportation, the addition of dedicated bicycle lanes should be investigated.

4.2.9 Woodland Drive

A future collector road connection is planned along Woodland Drive to the west of Columbia Avenue. An existing gravel road/trail is found in this area that is frequently used by both pedestrian and cyclists. It is recommended that this route be formalized with the use of appropriate signage and maintenance. Future extension of Woodland Drive to a collector road standard should included the provision of sidewalks and shared bike lanes. As a parallel link to Columbia Avenue this route forms an addition alternative route to the busy Columbia Avenue corridor.

4.2.10 10th Avenue

Sidewalks are also recommended along 10th Avenue to connect the existing sidewalks on 24th Street at Kinnaird Elementary School to the 'Cobra Climb'. The existing sidewalks along 24th Avenue connecting Columbia Avenue to Kinnaird Elementary School and further up the hill toward 14th Avenue should be maintained, although the proposed connection via the 'Cobra Climb' may be a more attractive alternative for some users.

4.2.11 14th Avenue

A future extension of 14th Avenue to the Southridge neighbourhood is part of the City's community plan. It is recommended that when this connection is made that sidewalks be included. While an existing gravel road is found along this potential alignment, it is recommended that this connection be made as part of future development in the area. Given the significant grades required to access this new connection, this was not considered a key part of the proposed bicycle network, however as this road will likely function at a collector standard, shared bicycle lanes should be considered.

4.2.12 17th Street

Sidewalks are recommended to complete the short section between Columbia Avenue and Woodland Drive on 17th Street. This connection would be most beneficial when Woodland Drive is extended towards the north and downtown Castlegar.

4.2.13 Millennium Park Walkway to Zuckerberg Island

A key trail connection identified for the proposed route network, is the connection of the Millennium Walkway to Zuckerburg Island. Both these locations are heavily used recreational areas within the city and despite their relative proximity, no direct connection exists between them. Although an informal pathway does exist at this time, a formal facility would be of great benefit to recreational users. At this time, we have proposed a gravel pathway along the river. Although the Millennium Walkway is a paved surface, this treatment was not considered necessary since the Zuckerburg Island trails are also gravel. This short trail segment could also be part of a future 'Riverfront Trail' system that continues along the Columbia River to the south. Due to property requirements, environmental considerations, and difficult topography this connections could be

quite costly. A less desirable but more feasible alternative could be the use of the local street system to connect the two locations.

5.0 IMPLEMENTATION

It is recommended that a strategy be put in place to provide guidance and planning for the future implementation of the Bicycle and Pedestrian Master Plan within the City of Castlegar. Although this study identifies many routes and potential upgrades, it would not be possible for the City of Castlegar to incorporate them all at once. The availability of funds and staff resources, as well as the time required for design, construction, consultation with users adjacent to pedestrian and bicycle routes, property acquisition, and coordination with other plans all add to the overall time required to implement the Plan. An implementation strategy has been developed that not only considers these factors, but ensures that the most important components of the Bicycle and Pedestrian Network are given the highest priority and are implemented early on in the process.

5.1 Priorities

As described previously, each of the proposed new/upgraded pedestrian and bicycle routes was ranked and prioritized based on a series of criteria including safety, demand, network function, appeal and implementation feasibility. It is recommended that all of the high priority routes be considered and implemented in advance of proceeding to the medium and lower ranked routes. However, it is noted that opportunities may arise, for example through development, where the implementation of a lower ranked route would be prudent earlier and exceptions can be made.

Each of the high priority bicycle and pedestrian routes identified in the screening process was investigated and evaluated in detail in order to prioritize and estimate the cost of their implementation. The criteria which were used in prioritizing the high priority routes included the following:

- **Safety** (weighting = 3). This is a measure of the potential for improvement in safety which implementation of the bicycle/pedestrian facility could provide. It considers current safety conditions on the route which cyclists and pedestrians currently use in the absence of the proposed facility.

- **Demand** (weighting = 2). This is a measure of existing usage in the corridor (if any) and potential future usage. It includes an assessment of nearby generators and adjacent land uses.

- **Network** Function (weighting = 2). This is a measure of the relative importance of the route within the overall bicycle and pedestrian network. High rated routes would be those which provide a critical link in the network, whereas low rated connections would be those with minimal network importance.

- **Appeal** (weighting = 1). This is a measure of the potential appeal of a route to cyclists and pedestrians, and considers aspects such as aesthetics, grade, adjacent traffic volumes and land uses, and other factors affecting the quality of the cycling/walking experience. High rated routes

would be those which would have a strong appeal to all users (skilled and novice, adult and child, commuting and recreational), whereas low rated routes would have negligible appeal to users.

- **Implementation Feasibility** (weighting = 2). This is a measure of the ease of constructing the bicycle/pedestrian facility. This considers issues such as property acquisition, topography constraints, environmental implications and jurisdictional issues.

Each high priority route was rated on a scale of 1 through 5 for each criterion, where 5 reflects an excellent rating and 1 reflects a poor rating. Criteria were weighted as indicated to emphasize the most important factors. **Appendix B** provides a summary of the rating values used for each criteria. A summary of the results of this prioritization are shown in **Table 5.1**.

Table 5.1: Proposed Route Priority Evaluation Summary

ROUTE	FACILTY TYPE	Safety	Demand	Network Function	Appeal	Implement. Feasibility	OVERALL RATING	OVERALL RANKING	Priority
	WEIGHTING:	**3**	**2**	**2**	**1**	**2**			
7th Avenue & 9th Street	Sidewalk and Bike Lanes	5	5	4	4	4	**4.5**	**1**	**High**
3rd Street	Sidewalk	4	4	5	4	4	**4.2**	**2**	**High**
20th Street - Connors Road Connection	Multi-use Path / Rail Crossing	4	4	5	5	3	**4.1**	**3**	**High**
Columbia Avenue	Bike Lanes	5	4	4	2	3	**3.9**	**4**	**Medium**
5th & 6th Avenue	Shared Bike Route	3	3	4	4	5	**3.7**	**5**	**Medium**
Connors Road & 17th Street	Shared Bike Route	3	3	4	4	5	**3.7**	**6**	**Medium**
9th Avenue	Bike Lanes	3	3	4	4	4	**3.5**	**8**	**Medium**
Millennium Walk to Zuckerberg island	Trail	2	5	4	5	2	**3.3**	**7**	**Medium**
14th Avenue Extention	Sidewalk	2	3	3	3	4	**2.9**	**9**	**Low**
17th Street	Sidewalk	3	2	2	2	4	**2.7**	**10**	**Low**
Woodland Drive Extension	Sidewalk and Shared Bike Route	2	3	2	3	4	**2.7**	**11**	**Low**
10th Avenue	Sidewalk	2	2	2	3	4	**2.5**	**12**	**Low**

5.2 Cost Estimates

Cost estimates were completed for each of the top routes. These costs are order of magnitude estimates, and are intended to provide guidance for budgeting purposes only. More detailed estimates should be prepared as the proposed routes are advanced to the next phase of design. A contingency of 40% was included in all costs to account for unknowns at this time. Unless specifically described, utility impacts, property acquisition, geotechnical and environmental considerations were not considered in these estimates. A summary of estimated costs are shown in **Table 5.2**, detailed descriptions of each project's estimated cost and corresponding assumptions can be found in **Appendix C**.

Table 5.2: Estimated Costs for Proposed Routes (2007 Dollars)

ROUTE	FACILTY TYPE	Cost Estimate	Overall Ranking	Project Size
7th Avenue & 9th Street	Sidewalk and Bike Lanes	$842,527	1	Large
3rd Street	Sidewalk	$759,577	2	Large
20th Street - Connors Road Connection	Multi-use Path / Rail Crossing	$314,244	3	Large
Columbia Avenue	Bike Lanes	$38,920	4	Medium
5th & 6th Avenue	Shared Bike Route	$12,740	5	Small
Connors Road & 17th Street	Shared Bike Route	$5,390	6	Small
9th Avenue	Bike Lanes	$132,133	8	Medium
Millennium Walk to Zuckerberg island	Trail	$297,920	7	Large
14th Avenue Extention	Sidewalk	Not Available	9	Medium
17th Street	Sidewalk	$143,027	10	Medium
Woodland Drive Extension	Sidewalk and Shared Bike Route	Not Available	11	Medium
10th Avenue	Sidewalk	$771,808	12	Large

5.3 Funding Opportunities

In the future, the City of Castlegar may wish to explore funding strategies for the provision of bicycle and pedestrian facilities, including:

- Partnership Opportunities – Partnership opportunities exist, particularly with stakeholder and neighbourhood groups. Opportunities also exist for funding partnerships between local, provincial, and federal governments. A summary of potential funding opportunities is shown in **Table 5.3**.

- Development – As development and/or redevelopment occurs adjacent to a proposed route, the opportunity exists to incorporate a portion of the upgrade into the developer's requirements for

on or off-site improvements, or collect funding for such. In addition, property can be acquired for proposed future bicycle and pedestrian route upgrades through redevelopment.

- Development cost charges for transportation projects – For any pedestrian and bicycle network improvements that are required as a result of new development, there are opportunities to collect development cost charges to help fund these improvements. Depending on the nature of projects, they can be included in a roads DCC or a parks DCC.

The following table provides an overview of potential funding options for bicycle and pedestrian network improvements in Castlegar.

Table 5.3: Funding Opportunities

Funding Opportunity	Overview	Project Eligibility	Application Deadline
Small Community Grants	In 2005, the Province announced a commitment to double the 2005 grant amounts by 2009, and it is working towards this goal. Small Community Grants are intended to fund local services in small and medium-sized municipalities.	Guaranteed funding (Castlegar received $307,523 in 2006)	N/A
New Deal Gas Tax Revenue Sharing	Through the New Deal for Cities and Communities, the federal government has committed $635 million over a five year period, starting in 2005/2006, to BC municipalities and regional districts. Guaranteed funding is provided through the Community Works Fund, outlined below. **Community Works Fund** Guaranteed funding to support local priorities that are in alignment with the desired outcomes of reduced Greenhouse Gas emissions, cleaner air, and cleaner water.	Guaranteed funding (estimated 2007-2008 allocation of $151,100; to escalate to over $300,000 by 2009-2010)	N/A
Cycling Infrastructure Partnerships Program	This is a cost-shared program where the provincial government will partner with local governments in the construction of new transportation cycling infrastructure. The goal is to promote transportation cycling (as opposed to recreational cycling) as a means of reducing traffic congestion and Greenhouse Gas emissions. To be eligible, local governments must have a formalized adopted Bicycle Network Plan and proposals must be "shelf ready". Projects must be completed by March 31, 2009.	High	Jan. 31/08
Green Cities / LocalMotion Fund	At UBCM conventions, the Province provides Green City Awards to communities that encourage physical activity, energy conservation, and environmental benefits. To provide funding for initiatives that encourage physical activity, the Province announced a LocalMotion Fund of $10 million per year for four years ($40 million in total) to help build bike paths, walkways, greenways, improved accessibility for persons with disabilities, and support programs to get kids playing in communities and parks. For such projects, the Province will provide 50 percent of capital funding, up to $1 million per year.	High	Mar. 31/08

5.4 Promotion and Education

The success of cycling and walking as modes of transportation throughout the City of Castlegar is highly dependant on not only increasing and upgrading the existing pedestrian and bicycle facilities, but on a raised awareness of their location and availability. In addition, in order for the facilities to be safe and function as they are intended, cyclists, pedestrians and motorists should be educated on the rules and rights of each roadway user.

It is recommended that the City of Castlegar include a promotion and education program as part of their strategy to implement the proposed Bicycle and Pedestrian Master Plan. The program should consider the following two components:

- **Promotion** – The best way to promote the existing Pedestrian and Bicycle Route Network is through the distribution of route maps, indicating where existing routes are, as well as the major generators such as schools, parks, neighbourhoods and trails. These maps would be updated as appropriate as new routes are implemented. Circulation of the route maps could be via City Hall, the City of Castlegar's website, the special interest groups or schools. Alternatively, the City of Castlegar could partner with Regional District to produce route maps of the entire Region, incorporating Castelgar's network. Promotion of the Pedestrian and Bicycle Route Network is an important component of the implementation of the Pedestrian and Bicycle Master Plan, as a method of advertising the presence of safe and attractive facilities to residents.

- **Education** – In order to feel safe using the recommended pedestrian and bicycle facilities throughout the City of Castlegar, users must be comfortable with the rules and regulations, particularly for on-street bicycle routes. Through the study process, residents also identified that the education process must go both ways – motorists should be accepting and knowledgeable of the rights of bicyclists and pedestrians within the road right-of-way, for vulnerable road users to feel safe on the roadway. This can be achieved through the following:

    - Signage to increase motorists awareness of cyclists and pedestrians on the road, and to provide direction to cyclists and pedestrians on where to cross the road, where in the road right-of-way they are permitted, and in what direction to travel.
    - Inclusion of bicycle and pedestrian rules and regulations with the route maps
    - Periodic announcements, information pamphlets or articles in the local newspaper
    - Information on the City of Castlegar's website
    - Enforcement

5.5 Maintenance

Maintenance of bicycle and pedestrian facilities is particularly important, as vulnerable road users are extremely susceptible to poor road and pavement conditions. Debris swept to the sides of roadways – such as loose gravel, broken glass and snow – can easily destabilize a bicycle or puncture a tire. Other problems such as potholes, encroaching vegetation and pavement break-up are also common bicycle hazards. Multi-use pathways, unless cleared of snow during the winter months, become unusable, forcing cyclists and pedestrians to utilize the roadways that they are trying to avoid.

A maintenance program is important to ensure that facilities are adequately maintained, and to minimize potential liability for the City of Castlegar. Such a program should include:

- **Designating responsibilities for maintenance of specific bicycle facilities.** Typically, this function would fall under Public Works. General maintenance responsibilities for bicycle facilities should include, but would not be limited to:
    - Regular sweeping of on-street routes and off-street pathways
    - Repairing broken asphalt, potholes and cracks in the road or pathway surface
    - Installing, maintaining and replacing route signs and pavement markings
    - Replacing hazardous sewer grates with bicycle friendly grates
    - Removing or cutting back encroaching vegetation which can impair sight lines or reduce the width of a facility
    - Replacing burned out street lights
    - Installing bicycle racks
    - Snow removal

- **Establishing a reporting mechanism.** Cyclists and pedestrians should be given the opportunity to notify the appropriate contact person with regard to maintenance problems.

- **Establishing a regular maintenance schedule.** A maintenance schedule, which reflects varying seasonal maintenance demands should be developed for the City of Castlegar. Resources should be allocated for maintenance crews to be able to respond to unscheduled maintenance requests.

- **Responding quickly to maintenance requests.** Prompt follow-up enhances the importance of the entire bicycle and pedestrian program. If maintenance requests are not followed up on in a timely manner, the City of Castlegar could be held liable for any subsequent injury to a cyclist or pedestrian. In some cases, a cyclists or pedestrian's request may warrant a more prompt response than a motorist's request. For example, while a pothole may only create some minor discomfort for a motorist, it may present a much greater danger for a cyclist, causing them to

either lose control or swerve into the path of a motor vehicle. By responding quickly to the request, the City of Castlegar can encourage the importance of cycling or walking as viable modes of transportation.

- **Providing for cyclists and pedestrians during road construction projects.** Often, road construction projects eliminate the travel portion at the side of roads typically used by bicycles and pedestrians. On all roads, when motorized traffic is detoured, temporary signage should be installed which also directs cyclists and pedestrians to detours. When motorized traffic is not detoured, cyclists and pedestrians should be directed onto the roadway and integrated with other traffic, with appropriate 'share the road' signage.

6.0 TRAILS

A number of trails exist within the area however the predominant trails within the City of Castlegar include Selkirk College, Waldie Island and the Millennium Walkway and Zuckerberg Island.

The following trails exist within the City Castlegar and surrounding areas:

- Millennium Walkway and Zuckerberg Island Trails – The Walkway is a 1.8 km long paved river trail close to the downtown. A short dirt path from the Walkway gains access to Zuckerberg Island. This trail includes lighting, benches, interpretive signs and a footbridge.
- Selkirk College Trails – Enhanced trails (those with interpretive signage) at the college range in length from 5 – 9 km and follow the Columbia and Kootenay Rivers.

- Waldie Island Trail – This non-cycling trail is 1.5 km long and runs through a wildlife refuge. Access to the island is prohibited.
- Skattebo Reach Trail – This 12 km non-cycling trail follows the Kootenay River past the old Doukhobor Bridge to Glade.
- Brilliant Overlook Trail – A 330 m climb is involved with this non-cycling trail on the east side of the Kootenay River.
- Doukhobor Waterline Trail – This 13 km trail is on the east side of the Kootenay River, running parallel with McPhee Creek.
- Dove Hill and Elk Cutoff Trails – The 2.8 km Dove Hill and 2.2 km Elk Cutoff Trails are located in east Castlegar by the Castlegar Golf Course.
- Merry Creek Trails – These 5 km trails are west of Castlegar around Merry Creek.
- Syringa Creek Park Trails - The Yellow Pine Trail (2.5 km) and the Syringa Creek Trail (3.3 km) are non-cycling and are located in Syringa Creek Provincial Park.
- Ward's Ferry Trail – This 8 km riverside trail is located north of Glade.
- Columbia Trail – This 22 km trail on the east side of the Columbia River connects Castlegar to Trail.
- Mel De Anna Trail – The 5 km trail is located east of Castlegar by Highway 3.

The Castlegar Friends of Parks and Trails Committee were contacted and indicated the following:

- The number one priority is to extend the Millennium trail south towards Trail, BC;

- There is a need for a north-south trail through Castlegar for walkers, joggers and cyclists. The trail should be located on the river side of town. A trail on the west side of town, although suggested, was not as popular a choice.
- Preservation of the existing trails along the natural gas line and the Castlegar waterline in the south side of town is a priority.
- Protection of the existing trails in the Riverbend area is a priority. This new subdivision is in the process of development and contains trails in the gullies and elsewhere which people use.
- Residents of Castlegar use a variety of trails, approximately 100 kilometres long, which are located just outside the city. Development of trails in the area south of Syringa Creek, the Lion's Head area and on the Ootischenia Bench will be of benefit to the residents of Castlegar.

6.1 Riverfront Trails

In March of 2007 the *Columbia Riverfront Trails Plan* was created for the City of Castlegar. The purpose of the *Columbia Riverfront Trails Plan* was to create a plan that would showcase the Columbia River and opportunities for interaction via a trail network. The plan states that riverfront trails are aesthetically pleasing and would help to enhance the existing trail network in Castlegar as well as increase the quality of life of Castlegar's residents. The plan also points out that property values could increase and recreation-based businesses could be encouraged through the creation of a riverfront trail.

The *Columbia Riverfront Trails Plan* recommends connecting the Millennium Walkway to Zuckerberg Island as it is heavily used by the community and acts as an important link in the trail system. The plan focuses on a 1.5 km stretch between Zuckerberg Island and Merry Creek. This stretch has the possibility to connect:

- The Ridgewood, Silverwood and Pinewood neighbourhoods to the walkway and downtown,
- Regional Commercial Area businesses to the downtown,
- Residents connected to amenities within the downtown (schools, post office, library, etc.). Students would have the option to walk or cycle to school,
- Other trails such as the Woodland Rights of Way trails and the Merry Creek Bike Trail to the city, and
- Residents and visitors to the forest ecosystems and the Columbia River surrounding Castlegar.

The *Columbia Riverfront Trails Plan* also highlights issues that would be encountered should construction occur.

- The primary issue would be acquisition of land for the trail where it passes through private property which could be solved by acquiring easements or covenants. This only occurs in the south segment of Merry Creek in the proposed riverfront trail network.
- Damage, garbage litter, graffiti and other unwanted items to the properties surrounding the trail.

- Steep-moderate slopes exist in portions of the proposed riverfront trail. First of all it should be determined if the slopes can support a trail and that erosion does not become significant. A suggested solution would be to construct retaining walls.
- Preservation of the riparian area due to the increased use and impact from residents and trail users. This can be mitigated by implementing trail signage and markers to define the trail.
- The water level of the Columbia River was also noted as an obstacle for the riverfront trail. It was indicated that the range of historic water levels should be investigated as well as to looking into any future dam projects.

The *Columbia Riverfront Trails Plan* also lists recommendations for the implementation of the pathway

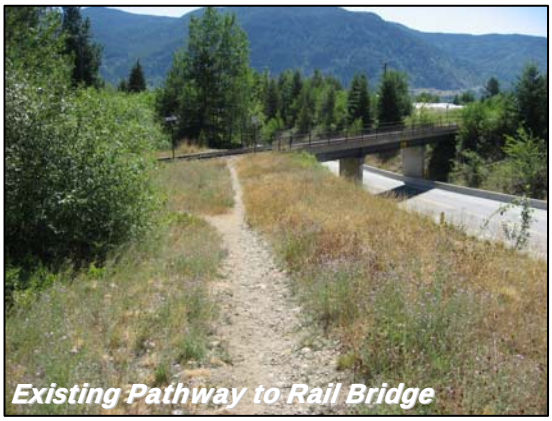
- To preserve privacy along private properties, the trail could be designed to be unlighted and have designated hours of public use. Retaining existing vegetation or replanting areas adjacent to the trail could cushion the increase of human traffic.
- Regular maintenance will help to preserve the riparian area.
- Easements, covenants or other forms of land acquisition will be required for the section within Merry Creek.
- The City should carry out a feasibility study to determine if the Columbia River water fluctuations and the steep-moderate slope sections will present problems for the riverfront trail.
- To reduce erosion of the trail, culvert and drainage ditches could be implemented provided applicable provincial and federal regulations have been followed.
- To connect the Millennium Walkway to Zuckerberg Island the City should purchase the property that the trail currently occupies or uses the road network for a trail connection. For instance Yew Street could be used as a connection to mitigate any ownership issues that may arise.
- A wildlife biological investigation should be conducted. The trail should be designed to minimize the area of impact on wildlife and the ecology of the area.

Future riverfront trail opportunities as presented within the Plan include:

- Extension of the trail south to Kinnaird Bridge to connect with Selkirk College trails,
- Connect Selkirk College to the Brilliant Terrace and Doukhobor sites using the Doukhobor swinging bridge,
- Creation of a loop link (Brilliant terrace region and Waldie Island area using the Railway Bridge across the Columbia River),
- Tie into the proposed trail system on the west side of the Columbia River from Castlegar to Trail, and
- Connect the Millennium Walkway with Waldie Island trails by extending the Walkway west on First Street across the train bridge.

6.2 Other Trails

A trail connection for consideration is an adjacent trail link beside the CP Rail line, specifically as the rail line crosses a bridge over Highway 3. If an opportunity exists to rehabilitate this bridge or construct an adjoining trail pathway, then this link could essentially connect north and south Castlegar without requiring the use of Columbia Avenue.


Existing Pathway to Rail Bridge

Two unofficial gravel trails exist within Castlegar. The first connects the two Woodland Drive roads in the north of Castlegar, while in the south the gravel trail connects 14th Avenue. These trails are beneficial connections in the overall pedestrian and bicycle route network.


Existing Gravel Trails

6.3 Trail Recommendations

While a riverfront trail would be a pleasant addition to the City of Castlegar, there are many difficulties in having it come to fruition. The foremost issue with implementing a riverfront trail would be private property acquisition as this would be a costly endeavour. Constructability is also a key issue as the topography of riverfront land within Castlegar can consist of steep grades. Due to cost, property acquisition, and constructability issues, the riverfront trail in its entirety will not be included within the prioritized projects described by Pedestrian and Bike Master Plan. The only component that will be included is the extension of Millennium Trail to Zuckerberg Island. The long term vision for a riverfront trail through the entirety of the City of Castlegar is supported and opportunities to protect land or complete sections of the overall vision should be investigated and considered as they present themselves. For this reason the potential location of this trail has been shown on the Pedestrian and Bike Master Plan to help guide future land use decisions. As this trail would likely be a significant undertaking it is

recommended that it be considered in separate phases which may be more achievable as individual projects. A suggested phasing strategy has been shown taking into account the location of potential trip generators and key destinations. The proposed phasing of the 'Riverfront Trail' is as follows and is illustrated in the Pedestrian and Bicycle Master Plan found in **Appendix A**.

Phase 1 – Millennium Walk to Zuckerberg Island
Phase 2 – Zuckerberg Island to Merry Creek
Phase 3 – Merry Creek to Community Complex
Phase 4 – Community Complex to 1st Avenue
Phase 5 – 1st Avenue to Twin River Estates
Phase 6 – Twin River Estates
Phase 7 – Twin River Estates to Blueberry

Finally, a significant trail system exists in the hills to the west of Castlegar both north and south of Highway 3. As it is likely that future development will occur in this area, it is recommended that some of these trails be preserved as key segments of the overall bicycle and pedestrian network. Suggested trails that were mapped by the City of Castlegar (Selkirk College) have been highlighted and are illustrated in **Appendix A**.

7.0 DESIGN GUIDELINES

7.1 Introduction

This section presents a comprehensive set of guidelines for the design and construction of bicycle and pedestrian facilities. These guidelines are intended to supplement the following current design guidelines:

- *Geometric Design Guide for Canadian Roads*, Transportation Association of Canada, 1999
- *Bikeway and Traffic Control Guidelines for Canada*, Transportation Association of Canada, 1998

As such, current TAC guidelines are not repeated in this section, and the designer is requested to consult the above documents if the required guideline is not found in this section. The design guidelines presented in this section are based on state-of-the-art guidelines used in B.C. and elsewhere in North America, and address situations not encompassed in the TAC guidelines.

These design guidelines should be used for the implementation of bicycle and pedestrian facilities throughout the City of Castlegar. Although these guidelines are intended to maximize safety and improve access and efficiency for all users, it should be recognized that the consideration of costs and impacts may result in modified designs. However, in areas where cost or impacts are prohibitive to achieving a design guideline, the City of Castlegar may wish to consider alternate routes, rather than using a modified standard.

7.2 On-Street Facilities

On-street facilities described in this section include shared routes, marked wide curb lanes, conventional bicycle lanes and paved shoulders. Crossings are discussed separately in **Section 7.5**.

The guidelines presented in this section identify minimum or “desired” dimensions for on-street bicycle and pedestrian facilities. They also include “interim” guidelines where applicable. The intent of these interim guidelines is to indicate minimum acceptable conditions for on-street facilities in situations where these are retrofit to existing roads — which will be the majority of cases. It is expected that at some time in the future when the opportunity arises (such as through road reconstruction or redevelopment of adjacent land uses, for example), an on-street facility constructed to interim guidelines would be upgraded to meet the “full” guidelines described in this section.

7.2.1 Shared Routes

Shared routes make use of collector roads and local streets with low traffic volumes. Because fewer motor vehicles use these roads, bicycles, pedestrians and motor vehicles can safely share the road space. Consequently, it is not necessary to provide extra width for bicycles or designate

specific areas of the roadway for bicycle or pedestrian use. All that is required is "bicycle and pedestrian route" signage, as described in **Section 7.5**.

7.2.2 Marked Wide Curb Lanes

A marked wide curb lane is wider than a standard travel lane, to provide sufficient width for an automobile to safely overtake a bicycle, without crossing over into the adjacent or oncoming traffic lane. This shared use of a wider curb lane also helps to assimilate bicycles into the domain of the automobile, fostering a mutual respect between motorists and cyclists. This helps to reduce confusion and conflicts between bicycles and motorists at intersections, where the majority of problems with conventional bicycle lanes occur.

A marked wide curb lane incorporates bicycle symbols stencilled on the right side of the lane at regular intervals (See **Section 7.5** for a further description). This identifies the right side of the lane as the area used by bicycles, which serves to alert motorists to the potential presence of bicycles even when there is no bicycle on the road. The roadway stencils are also a means of increasing awareness of bicycle facilities and encouraging cycling. Unlike a conventional bicycle lane, marked wide curb lanes do not include a white line separating bicycles from other traffic.

Situations where marked wide curb lanes are the preferred method of bicycle facilities include the following:

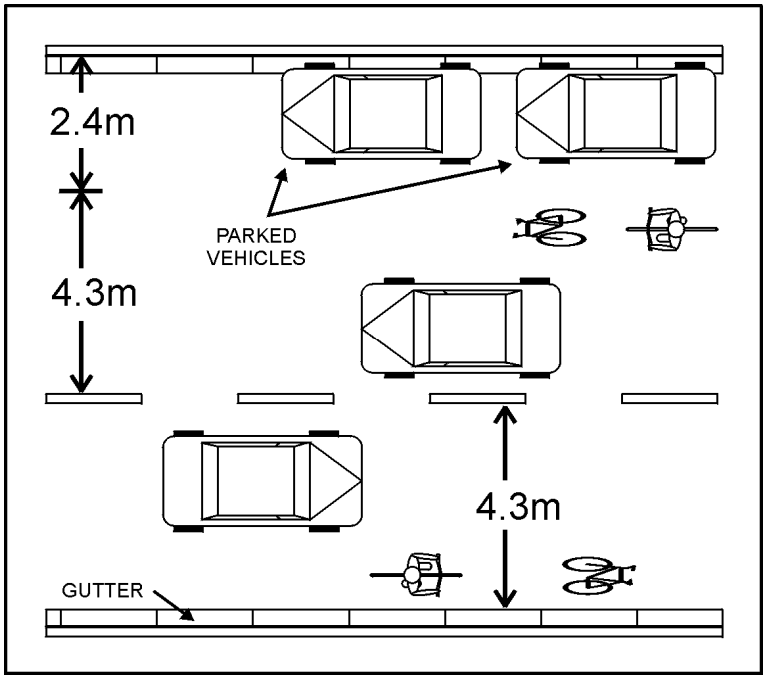
- Roadways with low to moderate traffic volumes
- Roadways with high volumes of turning movements (to/from driveways and intersections)
- Where on-street parking is provided
- Where frequent bus stops are provided

A width of 4.3 m (not including the gutter) is recommended for marked wide curb lanes, as illustrated in **Figure 7.1**. The width of a marked wide curb lane should not exceed 4.5 m, as this would enable vehicles to pass other vehicles on the right.

- It is important that the width of the gutter is not included in the 4.3m width. For safety reasons, cyclists will not ride in the gutter or even within 20 cm to 30 cm of the gutter. Gutters typically collect debris, the surface of the gutter is often not level with the asphalt road surface, and joints in the concrete gutter create bumps.

- If on-street parking exists along the route, a width of 2.4 m should be allowed for parked vehicles, in addition to the 4.3 m required for the wide curb lane with stencils. Where on-street parking is provided, this standard allows enough width for cyclists to avoid conflicts with opening car doors. As illustrated in **Figure 7.1**, the 2.4 m width of the parking lane includes the gutter.

Figure 7.1: Marked Wide Curb Lane Dimensions

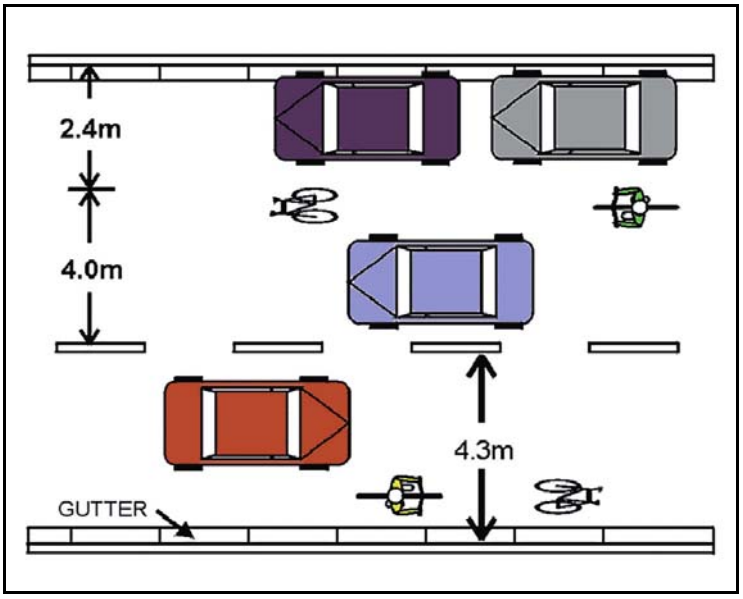


- In situations where marked wide curb lanes are constructed as interim facilities to be replaced at a later date by an improved bicycle facility, the following minimum dimensions apply, as illustrated in **Figure 7.2**:

    - Minimum 4.3 m including the gutter
    - Minimum 4.0 m adjacent on-street parking
    - Minimum 4.0 m adjacent a shoulder provided as a pedestrian facility
    - Minimum 4.5 m adjacent a wall, railing or other barrier over 150 mm in height

- Where a marked wide curb lane ends and the travel lane is reduced to a width of less than 4.0 m, a “Road Narrows” warning sign should be posted in advance to inform cyclists of the road narrowing.

Figure 7.2: Dimensions for Interim Marked Wide Curb Lanes



7.2.3 Bicycle Lanes

Bicycle lanes are separate travel lanes on the roadway for cyclists, identified with a solid white line that is dashed at intersections to indicate where motor vehicles may cross the lane for turning movements. Specific guidelines for bicycle lanes include:

- Bicycle lanes should never be planned for two-way travel – cyclists should always travel one-way in the direction of travel of adjacent traffic.

- At a minimum, bicycle lanes should be 1.5 m wide, excluding the gutter as illustrated in **Figure 7.3**. On roadways with posted speeds of 70 km/h or more, bicycle lanes should be 1.8 m wide, excluding the gutter. Bicycle lanes should not be wider than 1.8 m, as this encourages two-way bicycle travel and encourages motorists to park in the lane.

- Where bicycle lanes are provided adjacent to on-street parked vehicles, the combined width of the bicycle/parking lane should be at least 3.9 m. This provides 2.4 m for the parking lane and 1.5 m for bicycles, and provides adequate clearance for cyclists to avoid opened car doors.

- In situations where bicycle lanes are constructed as interim facilities to be replaced at a later date by an improved bicycle facility, the following minimum dimensions apply:

- Minimum 1.2 m excluding the gutter, as illustrated in **Figure 7.4**. With a typical gutter width of 300 mm, this means that an interim bicycle lane is a minimum of 1.5 m wide including the gutter.

- Minimum 1.5 m excluding the gutter on roadways with posted speeds of 70 km/h or more.

Figure 7.3: Bicycle Lane Dimensions

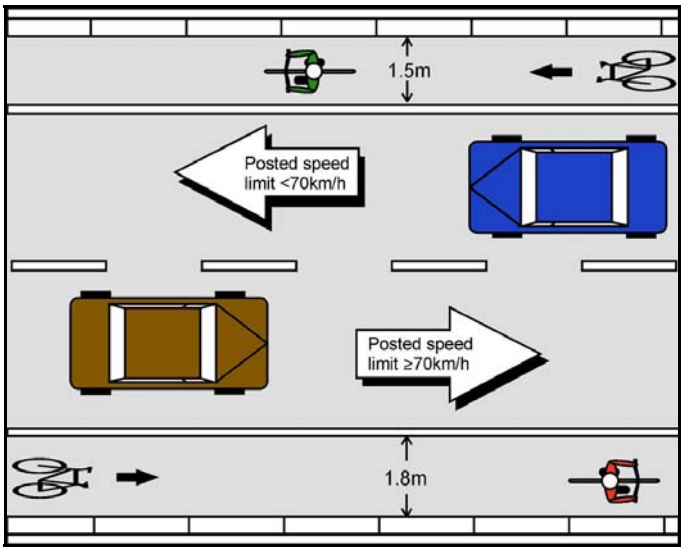
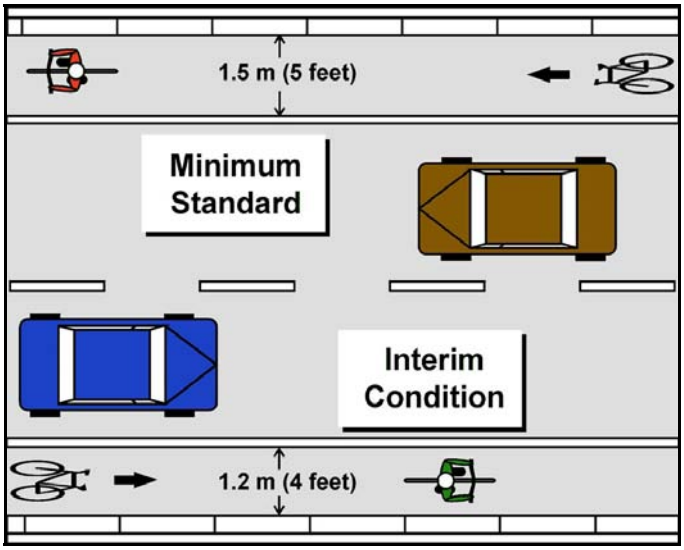


Figure 7.4: Dimensions for Interim Bicycle Lanes



- Bicycle lanes should be continuous between intersections. If a section of road between two intersections is improved to provide sufficient width for a bicycle lane without

improvements to the remaining sections of road, the lane should not be marked or otherwise identified until the remaining sections are improved to provide sufficient width for the bicycle lane.

- When a roadway which is a designated as a bicycle route is reconstructed, widened or overlaid, gravel driveways with significant traffic should be paved to a minimum of 5.0 m from the road edge, as illustrated in **Figure 7.5**, to prevent loose gravel from spilling onto the side of the roadway. It is generally not necessary to pave gravel driveways to single-family residential dwellings, as traffic on these driveways is low.

- Openings in catchbasins should be oriented at an angle to the direction of bicycle travel, so that bicycle wheels are not caught in the openings. Appropriate catchbasin designs are illustrated in **Figure 7.6**.

- Pavement overlays should taper into drainage outlets and manhole covers so they do not cause an abrupt edge. The pavement elevation should match or be within 6mm of the gutter elevation to create a smooth joint.

Figure 7.5: Paved Driveway Apron on Shared Routes

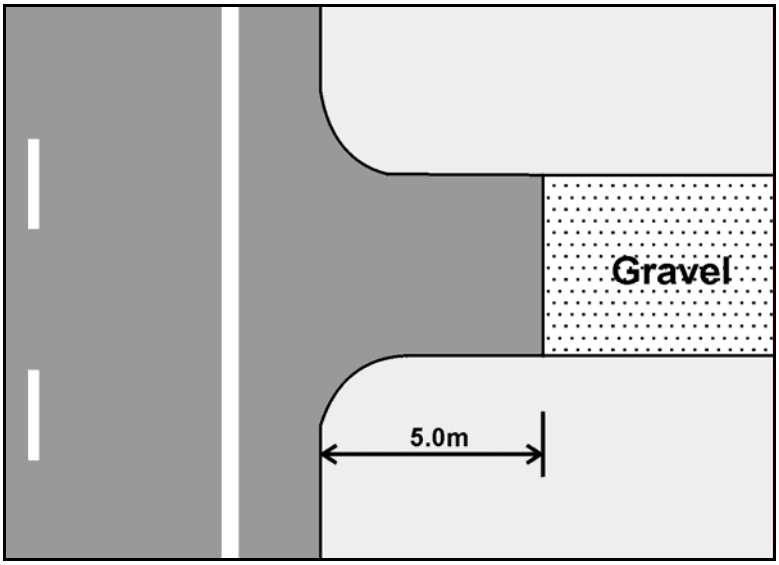
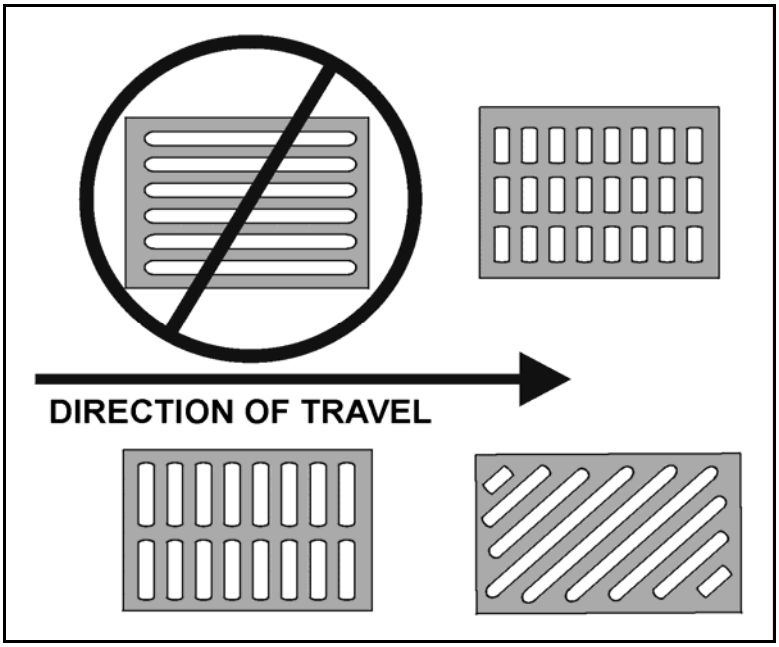


Figure 7.6: Bicycle-Friendly Catchbasins



7.2.4 Paved Shoulders

On roads with rural cross sections, where there are no curbs or gutters, cyclists and pedestrians are accommodated on paved shoulders. Specific design guidelines regarding paved shoulders include the following:

- Paved shoulders should never be planned nor designated for two-way bicycle travel – cyclists should always travel one-way in the direction of travel of adjacent traffic.

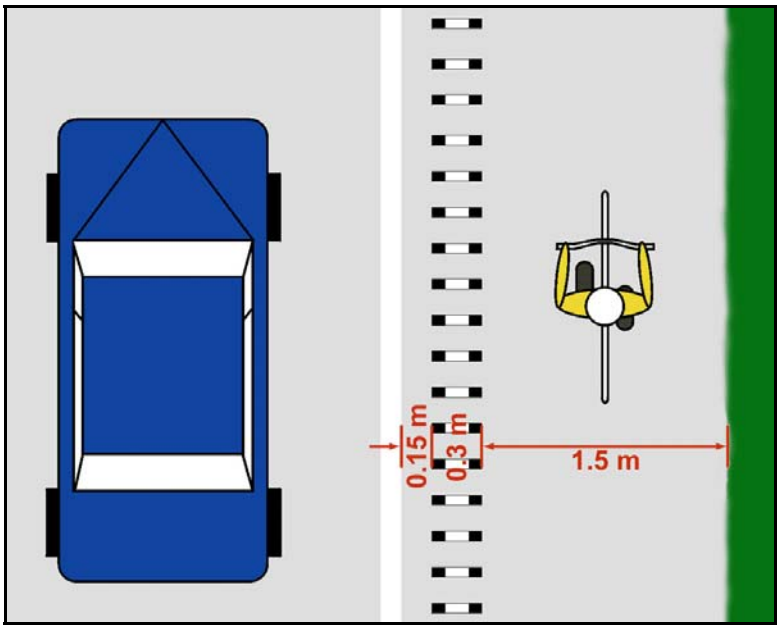
- Non-emergency parking or stopping should be prohibited on the shoulder at all times.

- Shoulders should be a minimum of 1.5 m in width. On roadways with a posted speed in excess of 70 km/h and daily traffic volumes greater than 5,000 vehicles, a paved shoulder width of 2.0 m is desirable. For roadways with posted speeds in excess of 80 km/h and daily traffic volumes greater than 10,000 vehicles, a minimum width of 2.5 m is desirable.

- Shoulders should be paved and free of obstructions, such as drainage aprons. If rumble strips are used to prevent motor vehicle drive-off accidents, they should be located on the far left of the shoulder, within 150 mm of the white fog line, and should be a maximum of 300 mm wide, as illustrated in **Figure 7.7**. The remainder of the shoulder should be a minimum of 1.5 m wide. Note that the provision of rumble strips is not ideal for cyclists and regular breaks in the rumble strip should be provided to allow safe access and egress from the paved shoulder as needed.

- Shoulders should incorporate a 2.0% crossfall to provide adequate drainage. The crossfall of the shoulders should not exceed 5%.

Figure 7.7: Paved Shoulder With Rumble Strip



7.3 Sidewalks

Sidewalks are pedestrian only facilities located adjacent to the roadway. Key considerations for the implementation of sidewalks include width, boulevards, driveway crossing and curb drops/ramps.

7.3.1 Width

Properly designed sidewalks are essential to increasing pedestrian mobility, safety and accessibility. This is especially true for persons with disabilities, the elderly and children. Recommended widths for sidewalks depend on the locations where they are installed and the anticipated usage. Recommended minimum widths typically refer to 'clear widths', the width free from all obstructions such as utility poles, fire hydrants, street signs, curbs, building walls and street furniture. Wider sidewalks not only provide a more comfortable pedestrian environment for persons of all abilities, but they also send a positive message to the community regarding the status of pedestrians within the transportation system. If sidewalk widths are reduced or not provided in residential areas, residents may not feel encouraged to walk for either transportation or recreation.

The Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads* recommends a desirable clear sidewalk width of 1.8 m, which is based on two pedestrians passing one another with a 'no-touch' zone of 0.9 m for each pedestrian. Although TAC indicates that the

typical minimum clear sidewalk width should be no less than 1.5 m, additional width should be provided in the following conditions:

- Where sidewalks are placed directly against the curb, allowing for street furniture placement, the opening of car doors and additional separation from moving traffic.
- In areas of hospitals and nursing homes, to accommodate persons in wheelchairs
- In commercial areas, to allow for higher pedestrian volumes, the opening of car doors a the curb, street furniture, lateral clearances to buildings, and storefront window shopping
- Where sidewalks abut retaining walls, fences or similar structures

7.3.2 Boulevards

Although a boulevard strip (the area between the curb and the sidewalk) within a road right-of-way is not considered a pedestrian facility, its presence significantly contributes to the enhancement of the pedestrian environment. In addition to providing a location for surface and underground utilities, street furniture, traffic signs, landscaping, and snow storage, boulevards provide an important buffer zone between pedestrians and vehicular traffic along roadways, particularly where on-street parking is not provided.

7.3.3 Driveways

Sidewalks that cross driveways are often sloped. This leads to the potential for wheelchairs to become unstable and tip over, and for other pedestrians to lose their balance. In addition to getting injured by falling, pedestrians could tumble into the roadway, exposing the pedestrian to the potential of a vehicle/pedestrian collision. Therefore, in the design and implementation of driveway crossings, it is desirable to maintain the cross-slope and introduce the driveway crossing by either dropping the driveway to street level for the full width of the sidewalk (accompanied by two ramps on the sidewalk), or maintaining the height of the sidewalk boulevards exist.

7.3.4 Curb Cuts and Ramps

Sidewalk curbs are barriers and difficult to access for some pedestrians, including:

- Persons in wheelchairs
- Persons with mobility problems
- Pedestrians using strollers, walkers, carts and bicycles and in-line skaters

However, sidewalk curb ramps eliminate this barrier by providing a transition in grade between the street and the raised sidewalk. At intersections, two curb ramps should be provided at each corner of the intersection. Single curb ramps at a corner of the intersection is not desirable, as it directs pedestrians directly into the intersection, which can be hazardous, particularly for visually and physically challenged pedestrians. In addition, if a single diagonal curb ramp is provided, turning vehicles approach pedestrians from the rear, making it difficult for pedestrians to see the vehicle.

Ideally, curb ramps should be located on the straight portion of the curb, and centred inside the crosswalk.

Figure 7.8: Curb Ramp

7.4 Multi-Use Pathways

The design guidelines in this section address off-street multi-use pathways. Generally, pathways are hard-surfaced — using concrete or asphalt — which means that all non-motorized users can be accommodated, including pedestrians, runners, in-line skaters, skateboarders, persons in wheelchairs, equestrians, persons pushing strollers, and persons walking dogs, for example. Pathways may be located within a road right-of-way, parallel to a road, or away from any roads.

These design guidelines do not address trails, which are typically narrow, winding and steep, with soft natural surfaces, and are used primarily for recreational purposes — hiking, mountain biking and horseback riding. Pathways with crushed aggregate surfaces are distinguished from trails by wider cross-sections, gentler grades and straighter alignments, and are used for commuter trips as well as recreational trips.

There are several key considerations in the design of off-road multi-use pathways, as summarized below:

- Width
- Pathway Structure
- Pathway Alignment
- Grades
- Clearances
- Illumination, Barriers, Bridges and Stairs

The most important consideration is the width of the pathway. Width is closely related to the potential for conflicts between pathway users, and as a result has a significant effect on the safety and attraction of a pathway. The second-most important (and most-overlooked) consideration is crossings where pathways intersect major roads. Crossings — or more accurately, the lack of crossings — also have a significant effect on the safety and attraction of a pathway. Crossings are discussed in detail in Section 4.0.

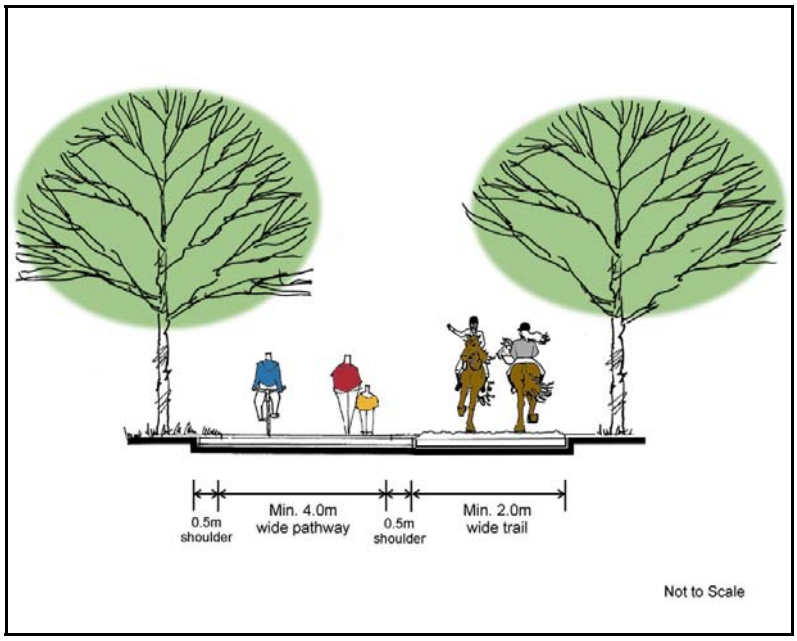
These pathway design guidelines recognize that in many cases, pathways will be retrofit within existing road right-of-ways and utility corridors, and in these locations constraints may mean that some design guidelines cannot be met. In recognition of this, these guidelines also include "interim" guidelines where applicable. The intent of these interim guidelines is to indicate minimum acceptable conditions for pathways in retrofit situations. It is expected that at some time in the future when the opportunity arises, a pathway constructed to interim guidelines would be upgraded to meet the "full" guidelines described in this section.

7.4.1 Width

Width is the most important design consideration for off-road pathways. In order to minimize the potential for conflicts between pathway users, the width of a pathway should be sufficient to accommodate the numbers and types of expected users. Applicable guidelines include:

- The minimum desired width for a multi-use pathway is 4.0 m, as illustrated in **Figure 7.9**.
- Widths of 6.0 m or more may be necessary on high-use pathways. A reduced width of 3.0 m is acceptable on low-use pathways with less than 200 persons per hour during peak periods. A constrained width of as little as 2.4 m is acceptable for short sections where there are physical constraints on the pathway width, such as trees, rocks and other objects.
- Where multi-use pathways are expected to accommodate significant numbers of in-line skaters, a minimum width of 4.0 m is required, regardless of the usage of the pathway. The width required by an in-line skater reflects the width of the skating stride as well as a manoeuvring allowance.
- As an interim condition, for pathways constructed in a retrofit situation, pathway widths of 3.0 m are acceptable. In low-use applications, widths of 2.5 m are acceptable as an interim condition.
- Shoulders a minimum of 0.5 m wide should be provided adjacent multi-use pathways, as illustrated in **Figure 7.9**.

Figure 7.9: Widths of Pathway Elements



Pathways should be designed for two-way travel, as it is difficult to ensure compliance with one-way designations. Separated pathways should be avoided. In communities which have attempted to separate users, pedestrians frequently use the pathways designated for cyclists and in-line skaters, and vice-versa, defeating the purpose of separated pathways. The preferred approach is to construct a single pathway of sufficient width to accommodate all users.

Painted centrelines should not be used to separate directions of travel on multi-use pathways. Centrelines can contribute to conflicts which arise when faster-moving pathway users cross the centreline to pass slower-moving users. Many pathway users also disregard centrelines, which also creates conflicts. The use of centrelines should be restricted to horizontal curves with limited sight distances.

An adjacent, soft-surfaced trail can be provided to accommodate runners, pedestrians, equestrians and others. For pedestrians, an aggregate or crushed bark trail a minimum of 1.0 m wide should be provided. For equestrians, a minimum 2.0 m wide dirt trail should be provided, as illustrated in **Figure 7.9**.

7.4.2 Pathway Structure

The choice of the pathway surface is important, as it determines whether or not some people will be able to use the pathway. Generally, multi-use pathways should be hard-surfaced, using asphalt or concrete, as hard surfaces accommodate all users, including persons in wheelchairs and in-line skaters. Compacted aggregates can be used where porous surfaces are necessary to address

environmental issues. It is important to recognize that aggregates prevent use by in-line skaters, cyclists with narrow tires, and some persons with disabilities.

Dimensions for pathway structures are summarized in **Table 7.1**. Indicated minimum dimensions are sufficient to accommodate occasional use by lightweight vehicles such as automobiles and pick-up trucks for which single axle loads do not exceed 1000 kg. If a pathway is to be used by heavier service vehicles, dimensions should be increased as indicated.

Shoulders should be constructed using 20 mm minus crushed stone, with a minimum 50 mm depth, as illustrated in **Figure 7.10**.

Table 7.1: Pathway Structure Guidelines

	Asphalt Pathway	Concrete Pathway
Minimum requirement	• 50 mm asphalt • 100 mm crushed stone • Compacted subgrade	• 100 mm concrete • 100 mm sand • Compacted subgrade
Medium trucks (single axle load < 3,000 kg)	• 75 mm asphalt • 150 mm crushed stone	• 125 mm concrete • 150 mm sand
Heavy trucks (single axle load < 6,000 kg)	• 100 mm asphalt • 150 mm crushed stone	• 150 mm concrete • 150 mm sand

Figure 7.10: Aggregate Pathway Shoulder

7.4.3 Pathway Alignment

The horizontal alignment of a pathway determines sight distances along the pathway, and as a result has a significant effect on the potential for conflicts between pathway users. Applicable guidelines include the following:

Design Speed

Pathway alignments should be determined based on design speeds of 35 km/h for pathways on level ground, and 50 km/h for pathways with grades of more than 4%. These speeds reflect the maximum speeds which cyclists on pathways can be expected to attain.

Sight Distance

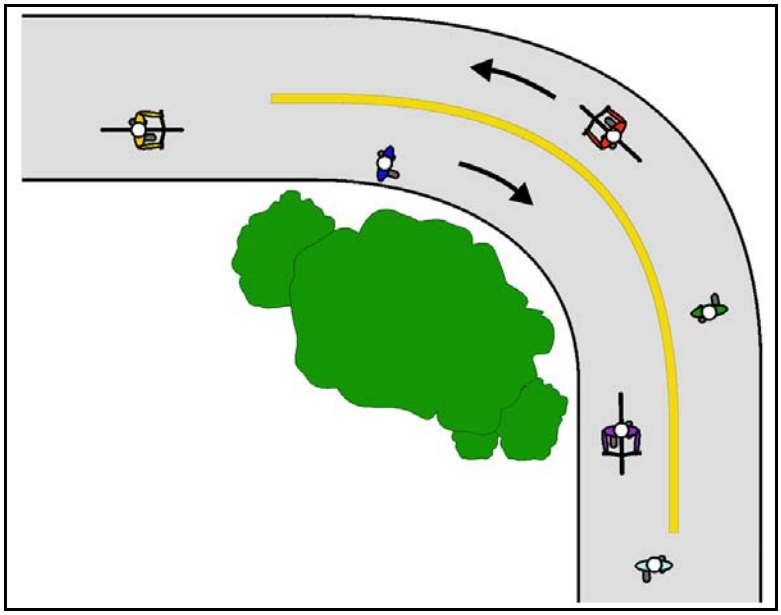
Stopping sight distances are as summarized in **Table 7.2**.

Where minimum sight distances cannot be achieved at horizontal curves, a centreline should be painted on the pathway with arrows indicating that pathway users are to stay to the right, as illustrated in **Figure 7.11**. As appropriate, "Limited Visibility" signs can also be used to alert pathway users of visibility limitations and potential hazards.

Table 7.2: Stopping Sight Distances

Design Speed	Level (no grade)	4% Downhill Grade	6% Downhill Grade	8% Downhill Grade	10% Downhill Grade
35 km/hr	44 m	47 m	50 m	53 m	56 m
40 km/hr	53 m	58 m	61 m	65 m	70 m
50 km/hr	74 m	81 m	86 m	92 m	100 m
60 km/hr	98 m	109 m	116 m	125 m	136 m

Figure 7.11: Centreline on Curve With Limited Sight Distance



Horizontal Curves

Where horizontal curves are less than the required minimum radius, the pathway should be widened by at least 1.0 m through the curve so as to provide additional room for pathways users to manoeuvre through the curve. **Table 7.3** provides a summary of minimum horizontal curve radii for various design speeds.

Table 7.3: Horizontal Curve Radii (at 2% superelevation)

Design Speed	Coefficient of Lateral Friction	Minimum Curve Radius
35 km/hr	0.27	35 m
40 km/hr	0.25	45 m
50 km/hr	0.22	80 m
60 km/hr	0.18	140 m

7.4.4 Grades

Grades on pathways create the potential for some wheeled pathway users to gain speed or lose control, and consequently pathway grades should be minimized and steep grades avoided.

Maximum uphill grades on hard-surfaced pathways should not exceed 3% for sustained sections, or 10% in any sections, as indicated in **Table 7.4**. A maximum 3% grade for aggregate surfaces helps to avoid instability for users and minimize erosion.

Table 7.4: Maximum Grades for Multi-Use Pathways

Pathway Type	Maximum Grade	Length of Segment
Hard surface	3%	For sustained sections
	5%	For sections 30m or less
	10%	For sections 15m or less
Aggregate surface	3%	For all sections

Where grades exceed the maximum grades specified in **Table 7.4**, "Steep Hill" warning signs (TAC code WA-41) should be placed at the top of a steep section to advise pathway users traveling downhill of the steep grade. No part of a pathway should exceed a 15% grade.

A minimum 0.6% grade should be incorporated in the design of a pathway if no crossfall or drainage facilities are provided.

7.4.5 Clearances

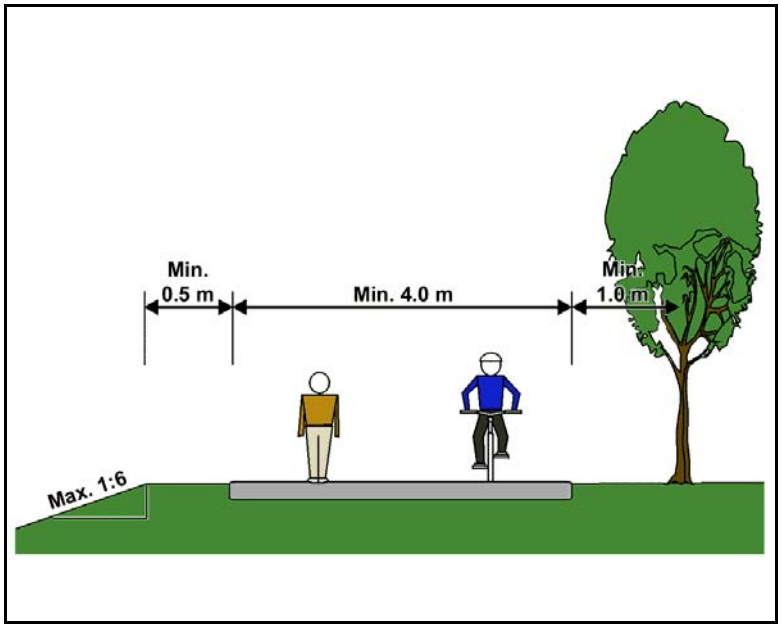
Pathways should be designed to be free of obstructions within and adjacent the pathway, both in terms of horizontal and vertical clearances.

Horizontal Clearance

The horizontal clearance from the edge of a pathway to a fixed object greater than 150 mm in height (a tree or signpost, for example) should be a minimum of 1.0 m, as illustrated in **Figure 7.12**. A minimum 0.5 m horizontal clearance is required adjacent a railing, wall or other barrier. Thus, a pathway that is 4.0 m wide with railings on both sides would have a clear width of 5.0 m from railing to railing.

As an interim condition, for pathways constructed in a retrofit situation, horizontal clearances of 0.5 m are acceptable.

Figure 7.12: Pathway Clearances



Side Slopes

Next to side slopes, a minimum of 0.5 m clearance is required from the edge of the pathway to the top of the slope, as illustrated in **Figure 7.12**. The desirable maximum slope of a side slope is 1:6. For side slopes steeper than 1:4, the pathway edge should be a minimum of 1.5 m from the top of the slope, and safety railings should be used as illustrated in **Figure 7.13**. To provide adequate horizontal clearance, safety railings should be a minimum of 0.5 m from the edge of the pathway.

The area between the pathway and the side slope should be no steeper than 1:6.

Figure 7.13: Safety Railing Adjacent Steep Side Slope

Adjacent Roads

Pathways adjacent roads with urban cross-sections (roads with curbs) should be separated from the roadway by the distances indicated in **Figure 7.14** and described below:

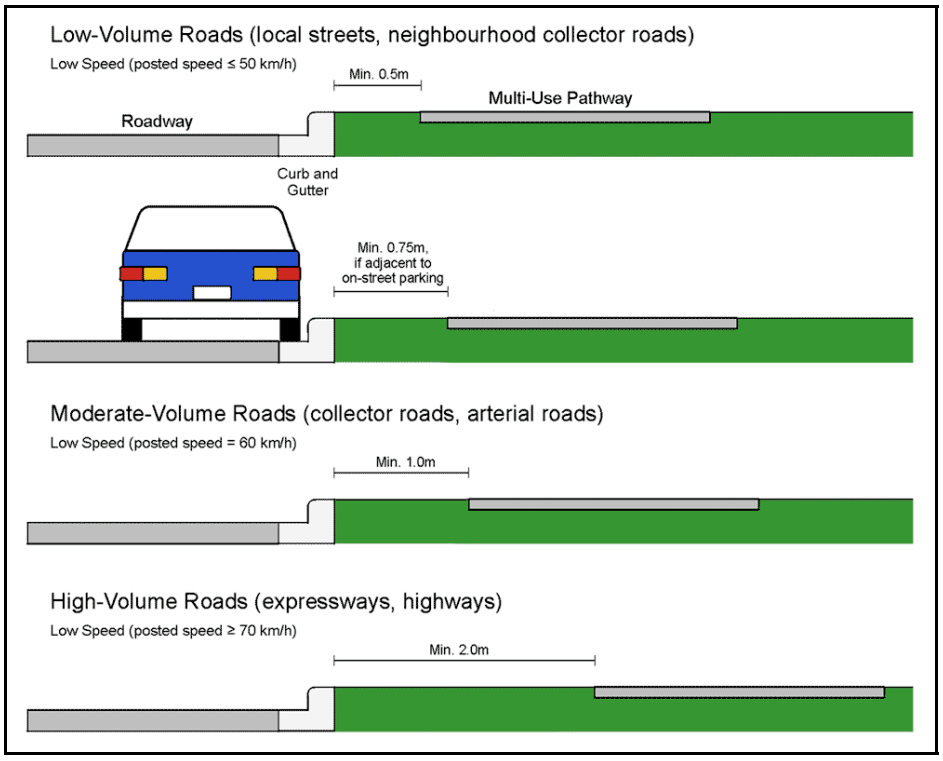
- Minimum 0.5 m separation adjacent roads with low traffic volumes and posted speeds of 50 km/h or less
- Minimum 0.75 m separation adjacent roads with parked vehicles
- Minimum 1.0 m separation adjacent roads with moderate traffic volumes and posted speeds of 60 km/h
- Minimum 2.0 m separation adjacent roads with high traffic volumes and posted speeds of 70 km/h or more

The separation area between a pathway and road may be grass, crushed stone or other aggregate, or a hard surface. If a hard surface is used, colour and texture (such as coloured, stamped asphalt) should be used to differentiate the separation area from the pathway. Signs, utility poles, trees and other objects should not be placed in the separation area between pathway and road.

Pathways adjacent roads with rural cross-sections (roads with shoulders rather than curbs) should be separated from the edge of the paved portion of the roadway by a minimum of 3.0 m, where the posted speed on the road is 60 km/h or less. A minimum 7.0 m separation should be provided where posted speeds are 70 km/h or greater. Horizontal separation requirements for rural roads

can be reduced to the dimensions for curbed roads with the addition of a concrete curb 150 mm in height, anchored to the edge of the road.

Figure 7.14: Pathway Clearances From Roadway



Vertical Clearance

The vertical clearance to tree branches and other objects should be a minimum of 2.5 m above the multi-use pathway surface. In underpasses and under structures more than 2.0 m in length, the minimum vertical clearance should be 3.0 m. A minimum 3.0 m vertical clearance is required for equestrians.

7.4.6 Other Pathway Design Considerations

Other design considerations include illumination, the use of barrier posts, special considerations for bridges, and designing stairs to accommodate bicycles, as follows:

Illumination

Generally, illumination of multi-use pathways is not necessary, and may not be considered desirable by residents adjacent to a pathway. Locations where illumination is essential include intersections with roadways, underpasses and locations where night time security is considered an issue.

The following illumination levels are recommended for multi-use pathways. Horizontal illumination is measured at pavement level, and the uniformity ratio is calculated by dividing the average illumination level by the minimum illumination level.

- Multi-use pathways should have a minimum average horizontal illumination level of 5 lux, with a minimum uniformity ratio of 6:1.
- At intersections with arterial and collector roads, illumination levels should be increased to a minimum average horizontal illumination level of 15 lux, with a minimum uniformity ratio of 4:1.
- Illumination levels in underpasses should be a minimum average horizontal illumination level of 45 lux, with a minimum uniformity ratio of 4:1.

Light standards should be located no closer than 1.0 m to the edge of the pathway, and if positioned over the pathway, should provide a minimum 2.5 m vertical clearance.

Pathways should be illuminated for a distance of 25 m on either side of intersecting roads.

Barrier Posts

Barrier posts, also known as bollards, are used to obstruct motor vehicle access to a pathway. They may be tubular or square, and should be 100 mm to 150 mm in diameter. Barrier posts should not incorporate any protrusions.

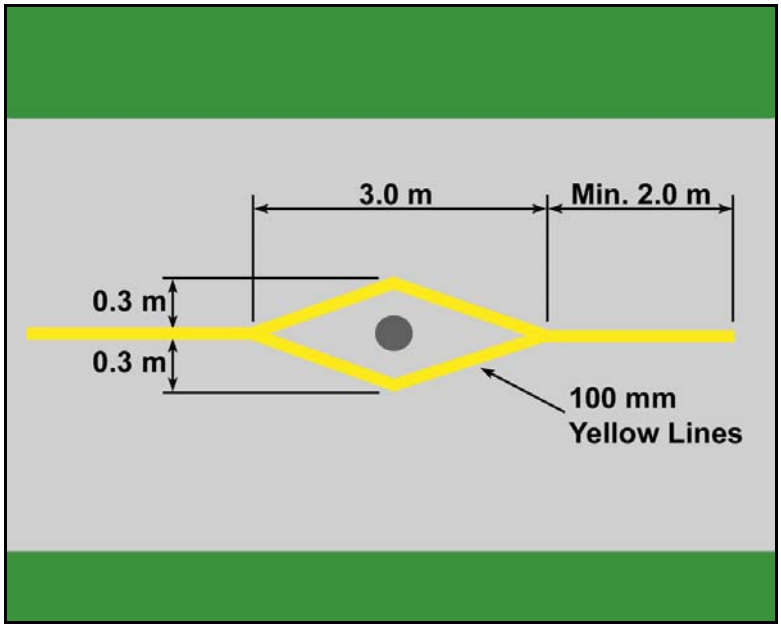
A single barrier post is preferred in the centre of a pathway. Where multiple barrier posts are used, they should be used in odd numbers and spaced far enough apart (a minimum of 1.5 m apart) to allow the passage of cyclists, bicycle trailers and wheelchair users. The use of odd-numbered posts ensures that pathway users travelling in opposite directions pass through different gaps between barrier posts, rather than attempting to pass through the same centre gap as would occur with an even number of posts.

When barrier posts are installed at locations where multi-use pathways intersect roadways, they should be set back a minimum of 7 m from the roadway to allow service vehicles to park at the entrance of the pathway to avoid removal of the bollards or encroachment onto the adjacent roadway.

Barrier posts should be painted with bright, light colours for visibility. Pavement markings should be used to divert pathway users away from barrier posts, as illustrated in **Figure 7.15**.

To accommodate service vehicles, one or more barrier post may be removable. These removable barrier posts should be padlocked or otherwise secured to prevent unauthorized access.

Figure 7.15: Pavement Markings For Barrier Post



Bridges

The same width guidelines for multi-use pathways also apply on bridges, in addition to appropriate horizontal clearance widths. This means, for example, that a bridge located on a pathway 4.0 m wide should be at least 5.0 m wide – 4.0 m to match the width of the pathway, plus 0.5 m horizontal clearance on either side of the bridge where railings are provided.

Railings on bridges should be a minimum of 1.4 m in height. For existing railings, a height of at least 1.1 m height is acceptable.

Railings on bridges should incorporate a rub rail, as illustrated in **Figure 7.16**. The purpose of a rub rail is to prevent bicycle handlebars from catching on vertical supports of railing. A rub rail should be 200 mm high, and be installed between the elevations of 0.9 m and 1.1 m. A rub rail should provide a smooth surface along the length of the railing, and should be designed to function as a handrail for pedestrians.

Railings at the end of a bridge should be continued a minimum of 2.0 m beyond the bridge end, and should be flared as illustrated in **Figure 7.17**.

Figure 7.16: Railing with Rub Rail

Figure 7.17: Railing Flared at Bridge End

Stairs

Where cyclists would be required to climb or descend stairs to reach a pathway, a ramp should be provided on both sides of the stairs to enable cyclists to roll their bicycle up or down the stairs, as illustrated in **Figure 7.18**. Handrails should be provided as specified in the BC Building Code, and should be located so as to avoid obstructing cyclists rolling their bicycles up or down the ramp.

Figure 7.18: Bicycle Ramp on Stairs

7.5 Crossings

The critical locations on bicycle or pedestrian routes are where the facilities intersect with roadways. Crossing treatments can be used to assist cyclists, pedestrians and others in crossing roadways, and to minimize potential conflicts with motor vehicles. The type of crossing treatment depends on the width of the intersecting road, the volume of motor vehicle traffic, and the number of cyclists, pedestrians and others using the crossing. This section provides an overview of crossing treatments, including marked/signed crossings, median islands, signalized crossings, grade-separated crossings and railway crossings, that can be applied throughout the bicycle and pedestrian network.

7.5.1 Marked Crossings

Where bicycle and pedestrian routes cross other roadways, marked crossings can be used. Marked bicycle and pedestrian crossings can be either mid-block or at intersecting roadways, with associated signage and pavement markings.

Marked crossings are appropriate in the following conditions:

- Relatively low volume roads, typically on local or collector roadways
- Posted speed limit of 50 km/hr or less
- Consistent gaps in traffic flow
- Low number of cyclists and pedestrians crossing the road
- Signalized intersections where pedestrian access is accommodated with pedestrian signal indications or pedestrian crossings

- Where a marked crosswalk can concentrate or channel multiple crossings into a single location
- Where confusing geometrics or traffic operations necessitate the delineation of the optimal crossing location and path
- At approved school crossings or along recommended safe school routes

Note that overuse of marked crossings can reduce motorist compliance and, hence, the effectiveness of the crosswalk. This treatment should be used sparingly and strategically.

The signage requirements for marked crossings on multi-use pathways are illustrated in **Figure 7.19.** Yield signs or stop signs should be used to control pathway traffic at marked pathway crossings. Overhead illuminated signs can be used to further enhance the visibility of crossings (**Figure 7.20**). Yield signs are generally used at low-volume intersections such as driveways and local streets with little traffic, as illustrated in **Figure 7.21**. Where a pathway parallel to a roadway crosses an intersecting road, "Crossing Ahead" signs should be used on the parallel road to alert motorists of the pathway crossing, as illustrated in **Figures 7.22** and **7.23**.

Figure 7.19: Marked Crossing Signage

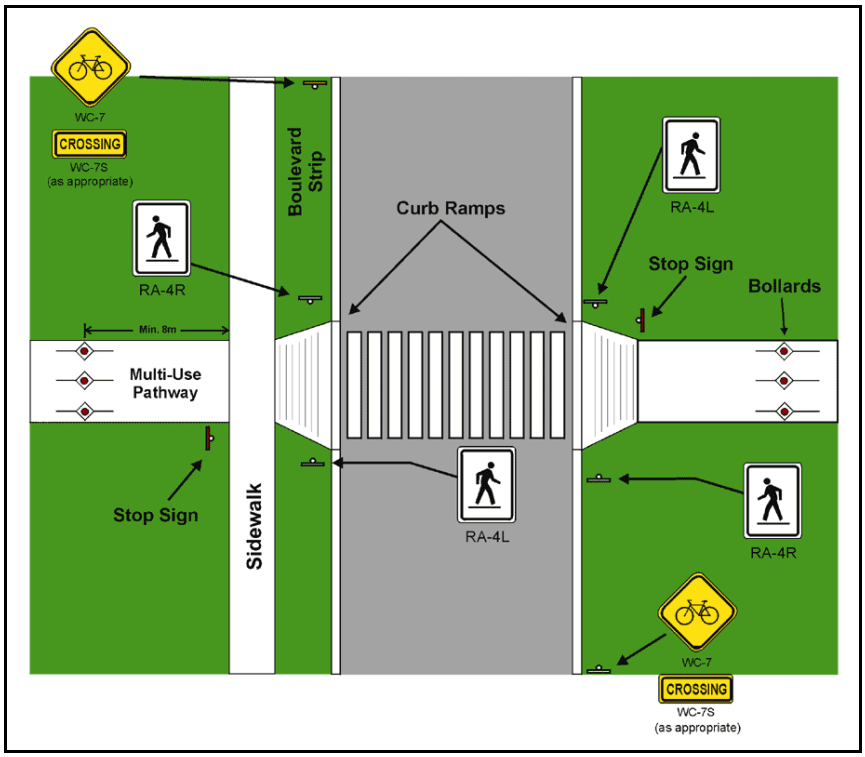
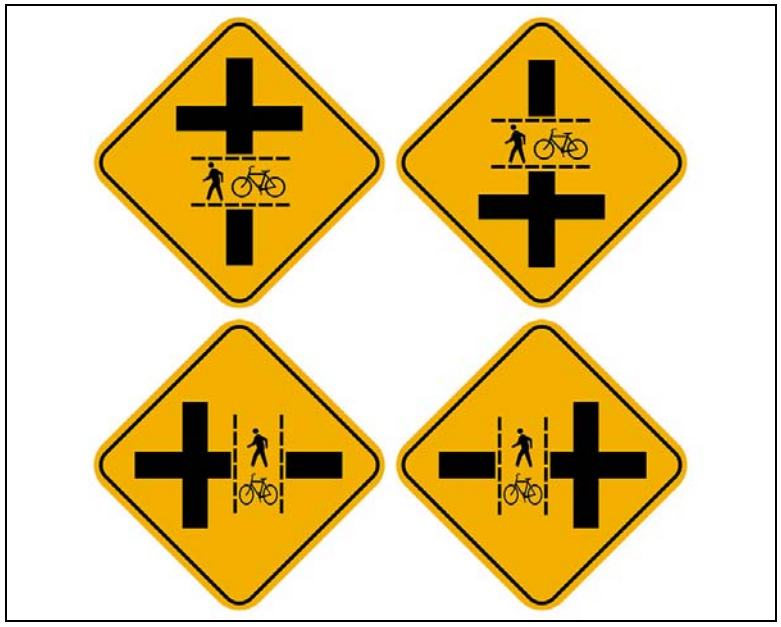


Figure 7.20: Overhead Illumination for Crossings

Figure 7.21: Yield Signs At Marked Pathway Crossing

Figure 7.22: Bicycle/Pedestrian Crossing Sign

Figure 7.23: "Crossing Ahead" Sign Configurations



Marked crossings can be supplemented with curb extensions and/or raised crosswalks as illustrated in **Figures 7.24** and **7.25**, in order to reduce the crossing distance, slow motor vehicles at the crossing, increase motorist awareness of the crossing and increase the visibility of cyclists and pedestrians.

Figure 7.24: Marked Crossing With Curb Extensions

Figure 7.25: Marked Crossing With Raised Crosswalk

Where a pathway parallel to a roadway crosses an intersecting road, the pathway should be aligned so as to direct pathway users to cross in crosswalk, as illustrated in **Figure 7.26**. This configuration maximizes the visibility of pathway users to motorists. Existing pathways which cross intersecting

roadways away from an intersection should be realigned so as to direct pathway users to cross at intersection, as illustrated in **Figure 7.27**.

Figure 7.26: Parallel Marked Pathway Crossing

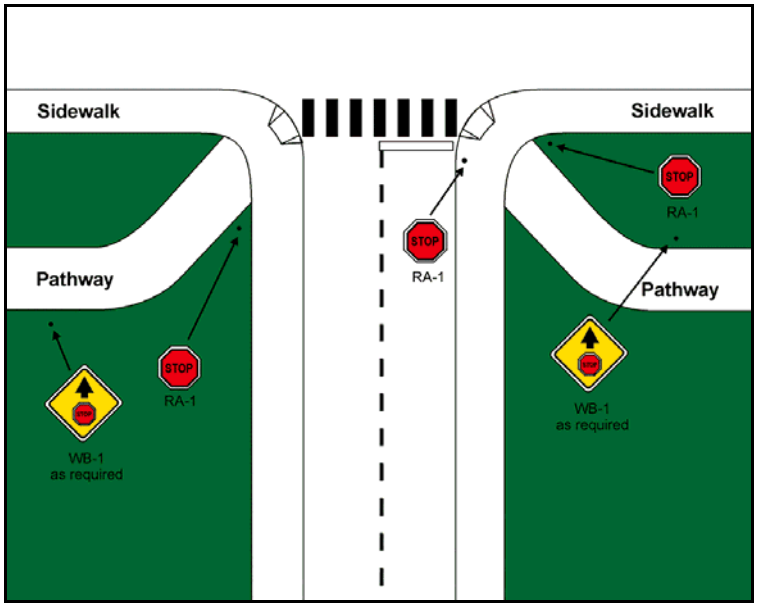


Figure 7.27: Parallel Pathway Redirected to Intersection

7.5.2 Median Islands

A median island crossing incorporates a raised island located on the centreline of the road, separating opposing directions of traffic. The median island allows cyclists and pedestrians to

cross one direction of traffic at a time, thereby reducing crossing delay. Median islands can be used at either mid-block or intersection crossings.

Median islands are appropriate in the following conditions:

- Moderate-volume roads (up to 10,000 vehicles per day), typically collector and arterial roads
- Few simultaneous gaps in both directions of traffic
- Interruption of traffic flow with signals is not desired.
- Moderate number of cyclists and pedestrians crossing road

Median islands at intersections may be located either side of the crosswalks, as illustrated in **Figure 7.28**. or through the intersection, as illustrated in **Figure 7.29**. Extending the median island through the intersection prevents left turns and through movements to and from the side street, which improves safety for cyclists and pedestrians by reducing the number of conflicting movements.

Figure 7.28: Median Island Crossing at Intersection

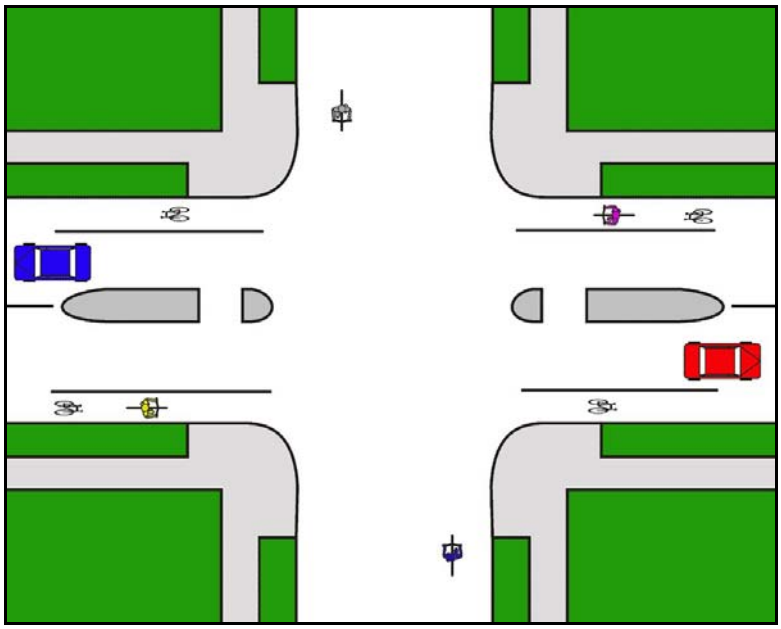
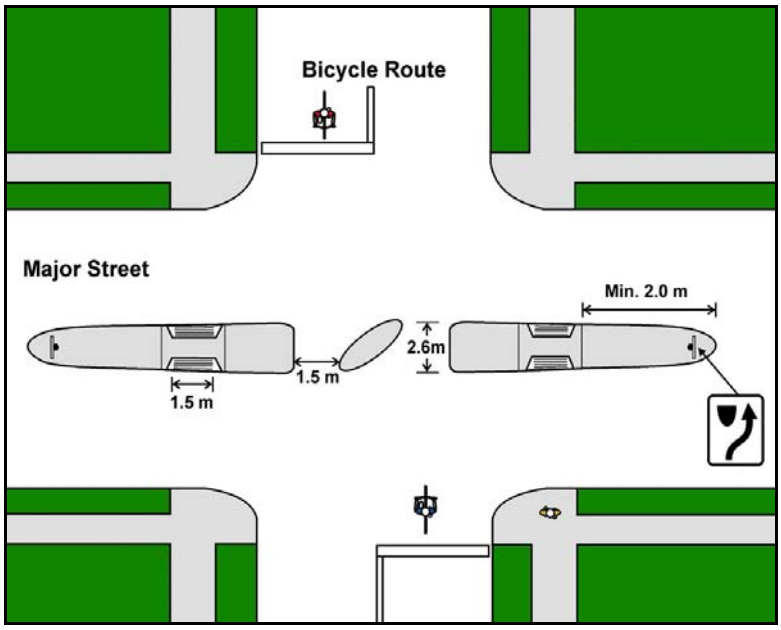


Figure 7.29: Median Island Crossing Through Intersection



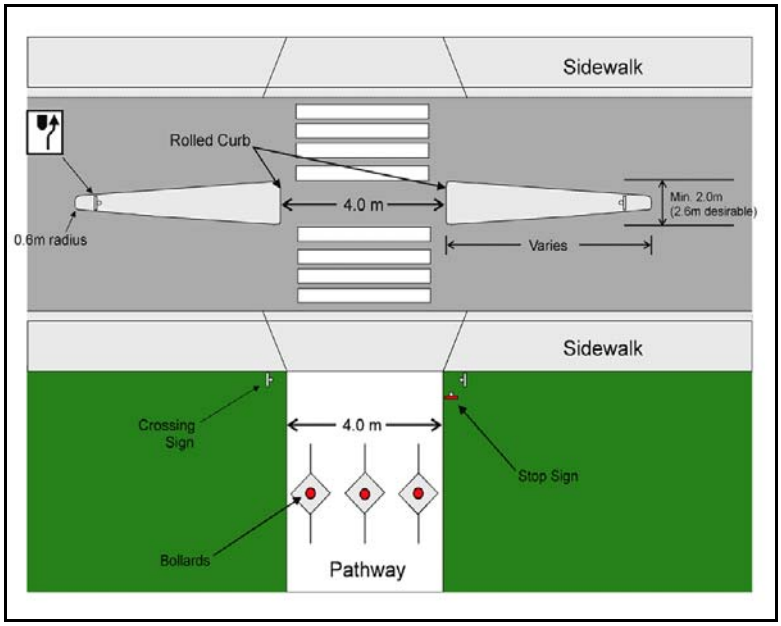
An example of a typical median refuge is provided in **Figure 7.30**. Gaps may be provided in the island to accommodate pathway users, and can be offset to discourage cyclists from riding across the crossing without checking for on-coming traffic on the far side of the island, as illustrated in **Figure 7.31**. The offset should be configured so that pathway users turn to the right on the median island to face oncoming traffic.

Figure 7.30: Crossing With Median Island

Figure 7.31: Offset Median Island Pathway Crossing

Dimensions and signage requirements for median island pathway crossings are illustrated in **Figure 7.32**. To minimize the potential for signs on the median islands to obstruct motorists' view of pathway users on the island, the length of the island indicated in **Figure 7.32** as "varies" should be at least 3.0 m.

Figure 7.32: Median Island Pathway Crossing



7.5.3 Flashing Lights

Flashing lights can be used to enhance marked crossings and median island crossings. Flashing lights are activated by cyclists and pedestrians prior to crossing the road, and provide additional indication to approaching motorists that the crossing is occupied. Flashing lights may be located in the roadway, at the side of the road or overhead. The preferred configuration is a combination of flashing lights at the side of the road and overhead flashing, to maximize visibility.

Flashing lights may be used as an alternative to signalized crossings. Advantages of flashing lights as compared with signalized crossings include the following:

- No delay for pathway users. Pathway users may cross without any significant delay once they have pressed the button and activated the flashing lights.
- Reduced delay for motorists. Once the crossing is no longer occupied by pathway users, motorists may proceed.

Flashing lights are appropriate in the following conditions:

- Moderate-volume roads (up to 10,000 vehicles per day), typically collector and arterial roads
- Two-lane and four-lane roads
- Interruption of traffic flow with signals is not desired
- Signalization requirements would result in lengthy delays to users
- Moderate number of cyclists and pedestrians crossing the road

Figures 7.33 and **7.34** show examples of flashing lights at a crossing location and appropriate warning signage.

Figure 7.33: Flashing Lights at Crossing Location

Figure 7.34: Warning Sign for Crossing with Flashing Lights

7.5.4 Signalized Crossings

Where high traffic volumes and/or traffic speeds on a major road mean that pedestrians and cyclists cannot safely cross the road, even with a median island, a traffic signal may be required.

Signalized crossings are appropriate in the following conditions:

- Higher-volume roads — arterial roads, expressways and highways
- Higher traffic speeds on major road — posted speeds of 50 km/h or more
- Consistent flow of traffic with few gaps
- High number of cyclists and others crossing road
- Greater crossing distance (four or more lanes)
- Limited visibility of crossing location for motorists

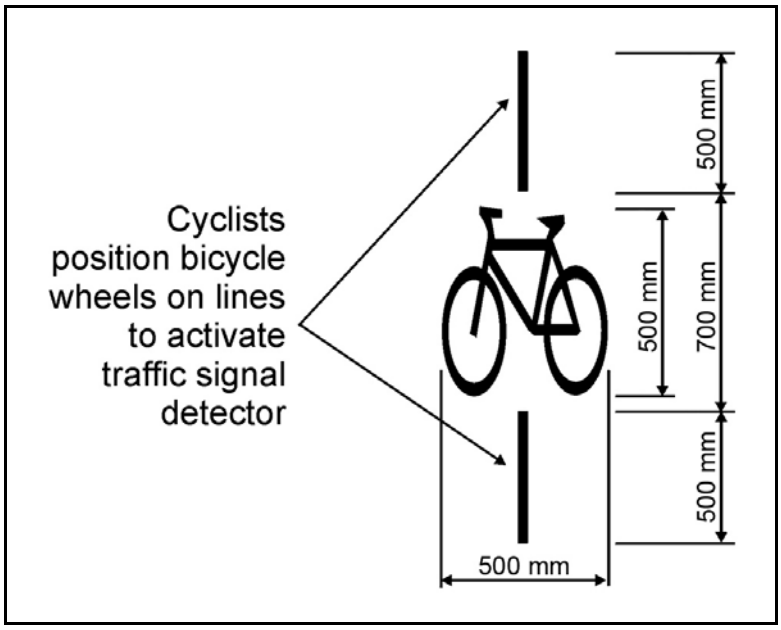
The lack of pedestrian and bicycle signals at signalized intersections can serve as a barrier to pedestrian access by forcing some individuals to take unnecessary risks to cross traffic. Pedestrian signals include the white 'walking person' and red 'stopping hand' symbols to control pedestrian movements in conjunction with traffic signals. Crossing times can be provided as shown in **Figure 7.35**.

Signals can be actuated via pushbuttons, in-ground detectors and/or video detection. Detectors should be marked as illustrated in **Figures 7.36** and **7.37** so that cyclists are better able to actuate the detectors. Pushbuttons should be provided for pedestrians. A minimal delay in signal actuation is desirable to minimize cyclists and others crossing in advance of the signals changing.

Figure 7.35: Don't walk Signal at Pedestrian Crossing

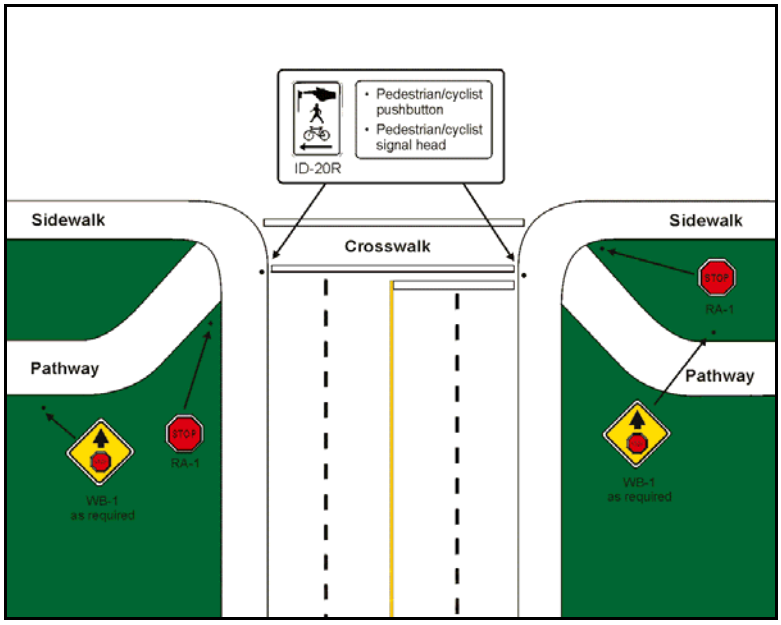
Figure 7.36: Bicycle Detector Pavement Marking

Figure 7.37: Bicycle Detector Pavement Marking



Where a pathway parallel to a roadway crosses an intersecting road at a signalized intersection, the pathway should be aligned so as to direct pathway users to cross in the crosswalk, as illustrated in **Figure 7.38.** This configuration maximizes the visibility of pathway users to motorists.

Figure 7.38: Parallel Pathway Signalized Crossing



7.5.5 Grade Separation

Grade-separated crossings are provided where it is not possible or desirable to provide an at-grade crossing. Grade-separated crossings include overpasses and underpasses. Due to the relatively high cost (often more than $1 million), grade-separated crossings are generally used only where no other crossing treatment Is possible.

Grade separated crossings are applicable in the following conditions:

- High traffic volumes on major road being crossed
- High traffic speeds on major road
- Consistent flow of traffic with few gaps
- High number of cyclists and others crossing road
- Greater crossing distance (four or more lanes)
- Limited visibility of crossing location for motorists
- Interruption of traffic flow with signals is not desired

Key design guidelines for ***overpasses*** include the following:

- Minimum 4.0 m width
- 1.4 m railings with rub rails
- Minimum 5.7 m clearance over roadway
- Minimum 7.0 m clearance over railway tracks
- Maximum 5% grade on approach ramps in order to accommodate disabled users. This requirement often means that significant amount of property are required on each side of road for access ramps.

Key design guidelines for ***underpasses*** include the following:

- Minimum 4.0 m width.
- Minimum 3.0 m vertical height.
- Maximum 5% grade on approach ramps.
- A high level of illumination to minimize personal safety concerns.

7.5.6 Railway Crossings

Special care should be taken at locations where a bicycle route crosses railroad tracks at grade. At-grade crossings of railroad tracks should be designed to allow the cyclists to cross at right angles to the rails where possible. A wide curb lane, paved shoulder or bicycle lane should be widened to permit crossings to approach the tracks at 60 to 90 degrees, as illustrated in **Figure 7.39**.

On spur tracks and other rail lines with speed limits of less than 15 km/h, compressible flangeway fillers can also be used to reduce the risk of a bicycle wheel being caught in the flangeway, as illustrated in **Figure 7.40**.

At all railway crossings, rubber or concrete track guards should be used between rails, as illustrated in **Figure 7.41**. The elevation of the track guard should be the same or within 6 mm of the elevation of the top of the rail.

Figure 7.39: Bicycle Lane Diverted at Angled Railway Crossing

Figure 7.40: Compressible Flangeway Filler

Figure 7.41: Rubber Track Guard at Railway Crossing

7.6 Signs and Pavement Markings

The application of signage and pavement markings to bicycle and pedestrian routes must be done in a uniform and consistent manner to ensure that they enhance safety and convenience for all users. Signage and pavement markings must be warranted by use and need. An over-abundance of signage and pavement markings may create a distraction and may be too confusing for motorists, cyclists and pedestrians. The application of too many signs is also unattractive when placed along roadways and pathways.

Some key guidelines for the use and installation of signage and pavement markings for bicycle facilities are provided in this section. This section is meant to correspond and supplement the following documents:

- *Bikeway Traffic Control Guidelines for Canada*, Transportation Association of Canada (December 1998)
- *Manual of Uniform Traffic Control Devices*, Transportation Association of Canada (March 2000)

7.6.1 Signs

Where applicable, the shape, colour and content of the signs should be consistent with standards specified in the Manual of Uniform Traffic Control Devices for Canada (MUTCDC). The size of signs used on multi-use pathways can be smaller than specified in the MUTCD – typically signs on pathways are 45 cm by 45 cm rather than 60 cm by 60 cm.

Type of Signs

There are three types of signs used on bicycle and pedestrian routes and multi-use pathways, as identified below. The codes used to identify these signs are from the *Bikeway Traffic Control Guidelines for Canada* (TAC, 1998).

- **Regulatory Signs** – These signs indicate traffic regulations. Examples of regulatory signs include stop signs, yield signs, 'Do Not Enter Except Bicycles' signs, and 'No Parking' signs along roads with bicycle lanes, as shown in **Figure 7.42**.

- **Warning Signs** – These signs advise cyclists and motorists of potential hazards or significant changes in conditions on roads and pathways. Warning signs are important for cyclists, as bicycles are more susceptible to poor road conditions than motor vehicles. Warning signs are also important in advising motorists of approaching bicycle and pedestrian crossings. Examples of warning signs include 'Railroad Crossing', 'Steep Grade' and construction detour signs. Examples of warning signs are provided in **Figure 7.43**.

- **Information Signs** – These signs provide direction and information for cyclists, pedestrians and others, and include:

  - **Guide Signs** – Indicate routes to major destinations, as well as parking locations, crossing locations and bicycle routes. Guide signs incorporate white text and arrows on a green background. Examples of guide signs are illustrated in **Figure 7.44**.

  - **Educational Signs** – Provide information regarding appropriate use of bicycle and multi-use facilities. Examples of educational signs are illustrated in **Figure 7.45**, and include 'Share the Road' signs and 'Yield To' signs. Although these signs are officially categorized as Warning and Regulatory signage, they also serve a purpose in educating the public as to the rules of the road.

Figure 7.42: Examples of Regulatory Signs

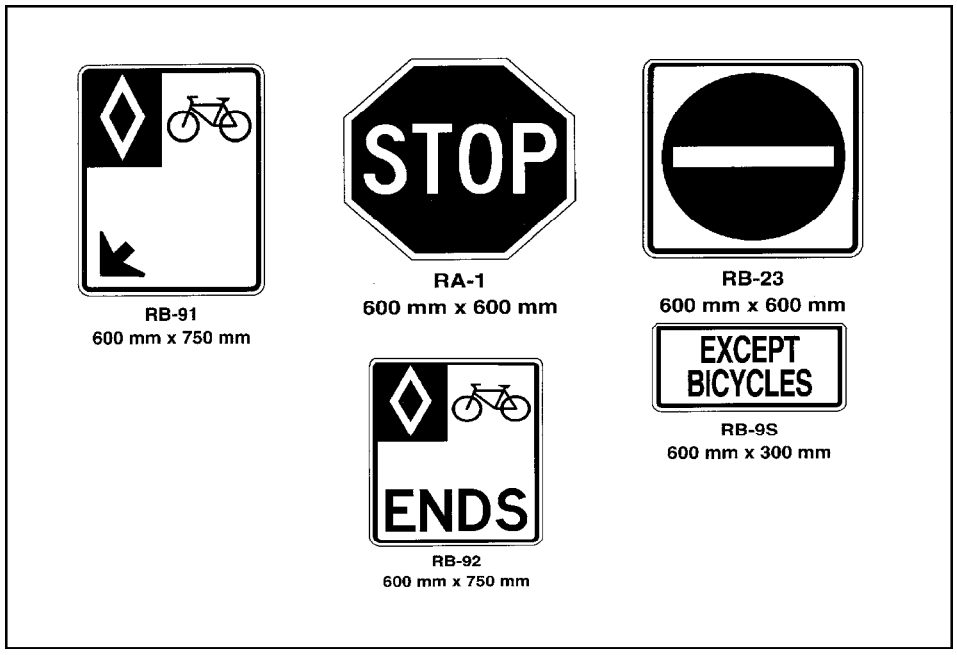


Figure 7.43: Examples of Warning Signs

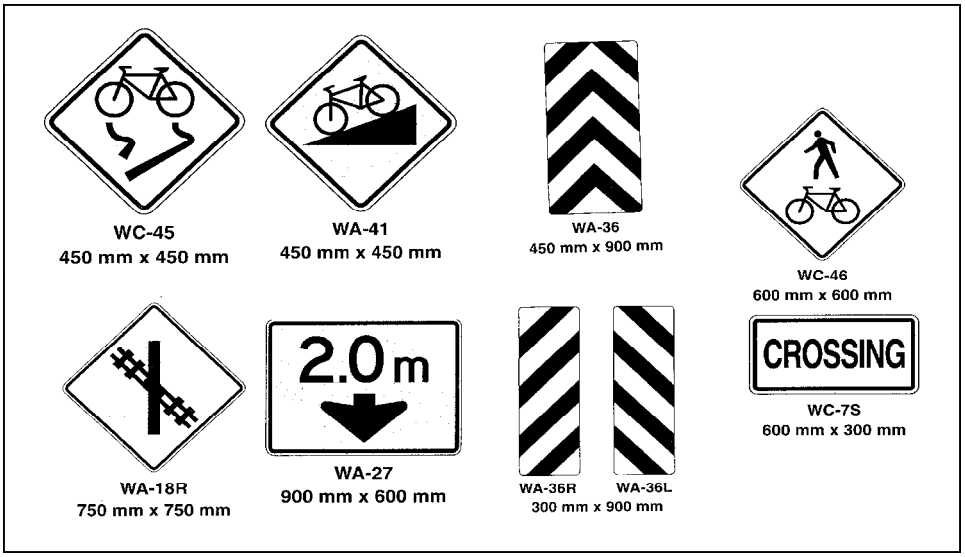


Figure 7.44: Examples of Guide Signs

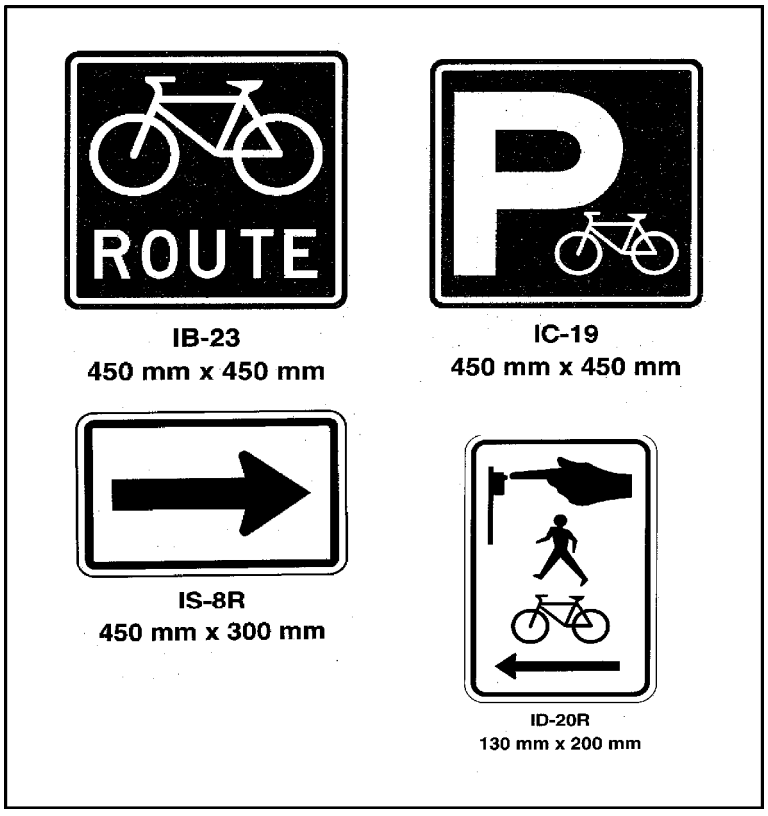
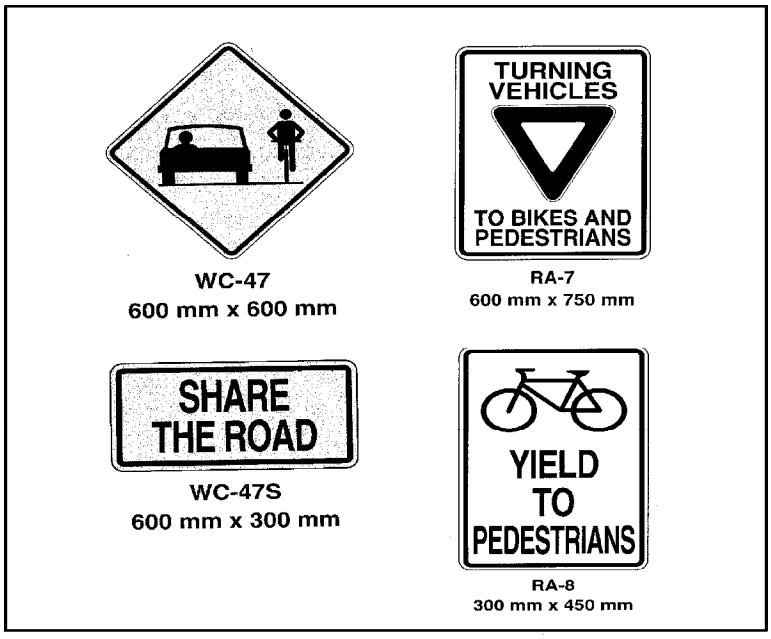


Figure 7.45: Examples of Educational Signs



Placement of Signs

Regulatory, Warning and Guide and Information Signs should be located as follows:

- **Regulatory Signs** – As close as possible to the location where the regulation is in effect. In some cases, as with stop signs that are not visible due to horizontal or vertical curves, advance notice of regulatory signs may be warranted.

- **Warning Signs** – In advance of any hazard or condition to which they apply. In some cases, it is also necessary to place a sign at the point of the condition.

- **Guide and Information Signs** – Both in advance of and at locations where conditions apply. In many cases, it may be warranted that guide and information signs are also used to re-affirm that a cyclist is on the correct route or path, particularly after a confusing intersection.

Bicycle Route signage should appear along a route at least every 100-200 metres, depending on specific circumstances. For example, an urban street with commercial uses and numerous driveways would necessitate a more frequent use of route signage than every 100 metres. However, a rural roadway with few driveways and intersections would only require a route sign every 200 metres. These intervals do not include signage placed in advance of and after intersections.

Signs should be placed near the edge of the nearest traffic lane, with the near sign edge no less than 2.0m, but no more than 4.5 m, away from the nearest traffic lane. With multi-use pathways, the minimum distance can be reduced to 1.0 m.

Figure 7.46: Bicycle Route Sign with Destination Signing

7.6.2 Pavement Markings

Pavement markings are used to delineate bicycle lanes, to identify crossings on roadway surfaces, and to complement regulatory and warning signs. Relevant guidelines regarding pavement markings are provided below.

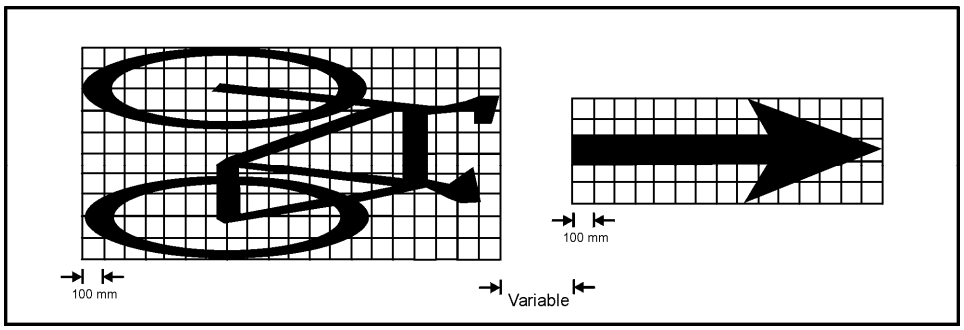
On-Road Bicycle Facilities

Pavement markings for on-road facilities can define bicycle lanes, separate opposing flows, designate lane usage, identify stop lines and supplement regulations or warnings of other devices such as traffic signals or signs. Overuse of pavement markings for on-road bicycle facilities is note recommended primarily because of the slippery conditions created from wet weather. Guidelines for on-road bicycle facility pavement markings include:

- Bicycle lanes are designated with a 10 cm white strip. Bicycle lane lines should be dashed for a distance of 15m in advance of intersections. This allows a cyclist to exit from the bicycle lane to make a left turn, and allows right-turning vehicles to merge into the bicycle lane. The bicycle lane line should be discontinued through the intersection.

- Bicycle lanes should be identified with a painted bicycle symbol and may include an arrow indicating the direction of travel (see **Figure 7.47**). Bicycle lane symbols should be spaced at approximately 350 m intervals for roadways with a posted speed limit of 50 km/h. Additional symbols should be located immediately after intersections with major roads, to alert drivers and cyclists turning onto the road of the existence of the bicycle lane.

Figure 7.47: Bicycle Lane Pavement Symbol and Arrow



- For marked wide curb lanes, bicycle symbols should be placed approximately every 200m along the road, as well as in advance of all intersections and major driveways. In cases where marked wide curb lanes are provided and on-street parking is not permitted, the bicycle stencils should be placed on the pavement next to the gutter. Where on-street parking is provided, the bicycle stencils should be placed on the right side of the travel lane, adjacent the parking lane. **Figure 7.48** illustrates the placement of bicycle symbols in marked wide curb lanes.

- The Transportation Association of Canada is proposing to introduce a new pavement marking symbol to be used for marked wide curb lanes, as illustrated in **Figure 7.49**.

Figure 7.48: Placement of Bicycle Symbols for Marked Wide Curb Lanes

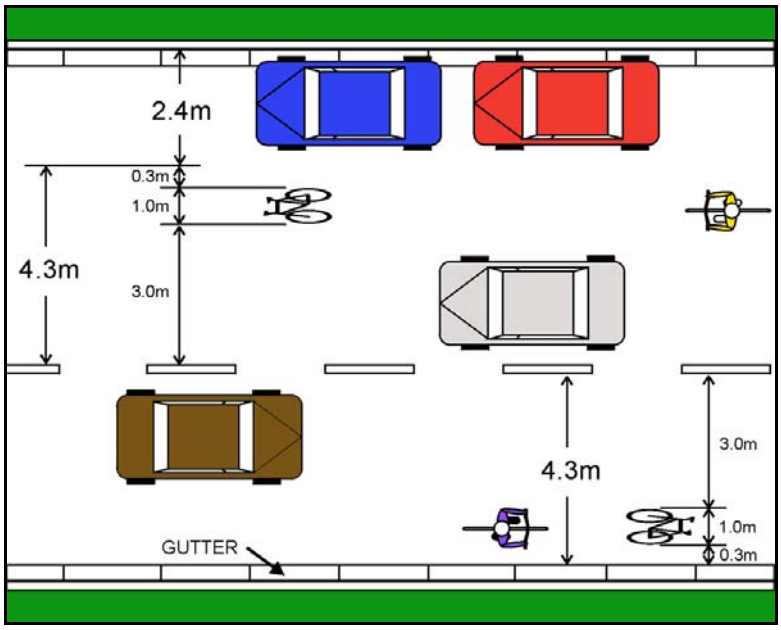
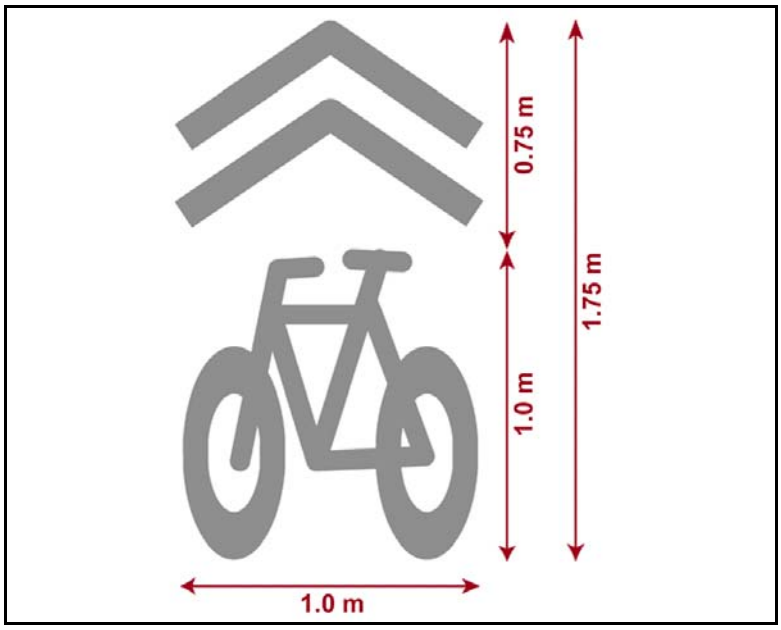


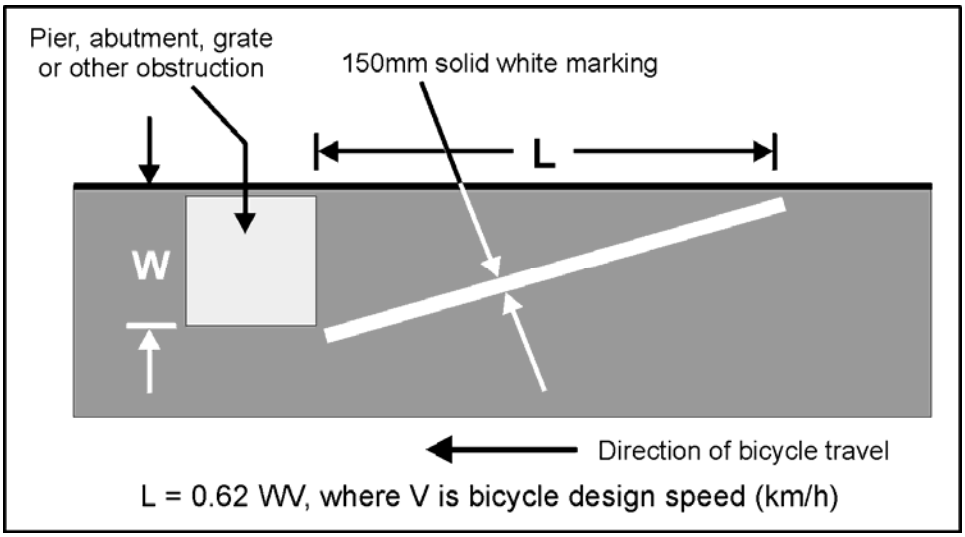
Figure 7.49: Marked Wide Curb Lane Symbol



Hazard Markings

Surface irregularities and obstructions should be clearly marked to gain the attention of approaching cyclists, as illustrated in **Figure 7.50**. Signs, reflectors, object markers (WA-36) or other treatments may be appropriate to alert cyclists to potential obstructions.

Figure 7.50: Hazard Pavement Marking



Multi-Use Pathways

Pavement markings for multi-use pathways are not as commonly used as with on-street bicycle facilities. Attempts to separate pedestrians from cyclists with a painted line have proven unsuccessful and are not recommended. Centreline stripes used to separate directional flows of traffic on multi-use pathways are only recommended where curves create poor sight distance, as discussed in Section.4.0 Pavement symbols or words may be used to alert pathway users of upcoming stop signs, railroad crossings, barrier or other potential hazards.

APPENDIX A

Pedestrian and Bicycle Route Network

APPENDIX B

Pedestrian and Bicycle Route Evaluation Criteria

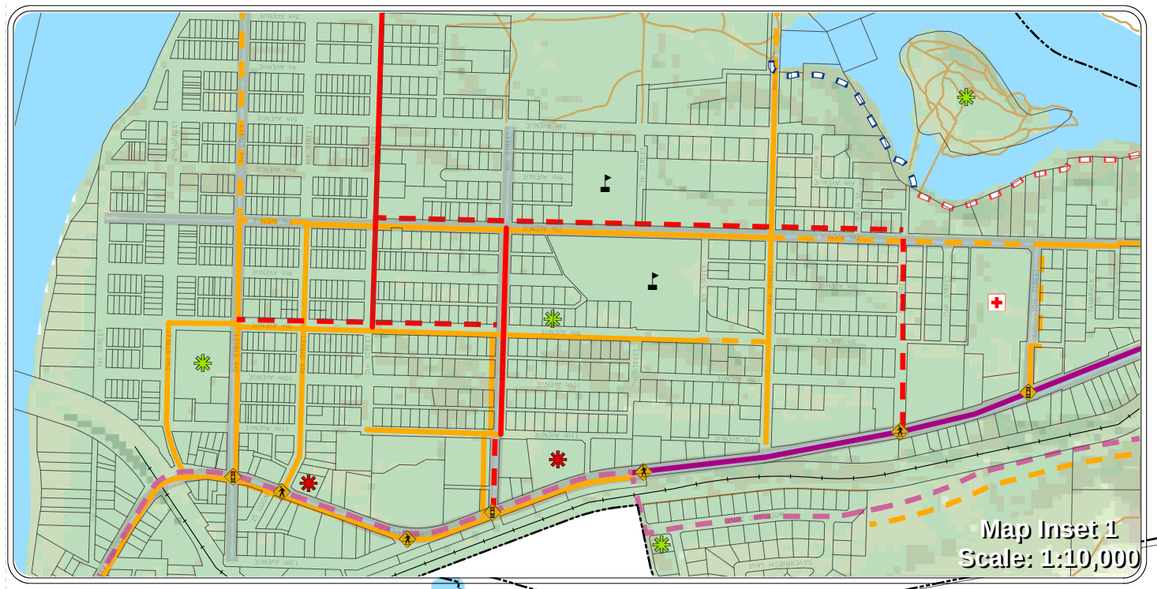
City of Castlegar

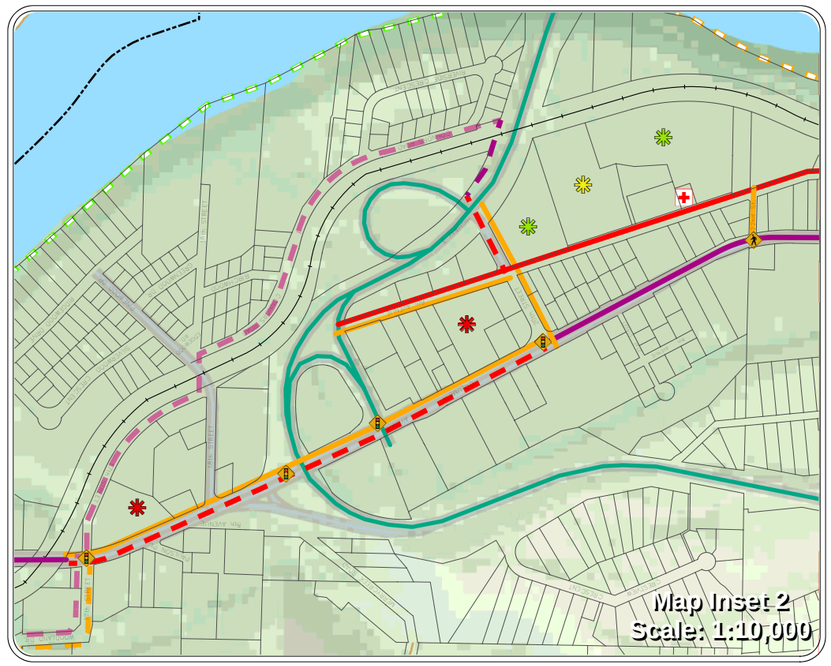
BICYCLE AND PEDESTRIAN MASTER PLAN

1:25,000

Proposed Route Network

Map A





See Map Inset 1

See Map Inset 2

Columbia Ave.

Phase 1

Phase 2

Phase 3

Phase 4

Phase 5

Phase 6

Phase 7

Legend

- City of Castlegar Municipal Boundary
- Columbia River
- Existing Roads
- CN Rail
- Airport
- Health Care
- Parks and Open Space
- Recreation Centre
- Shopping Destination
- School
- Crossing with Flasher
- Marked Crossing
- Traffic Signal Crossing
- Proposed Crossing or Signal
- Existing Bike Lane
- Proposed Bike Lane
- Proposed Shared Bike Lane
- Existing Sidewalk
- Proposed Sidewalk
- Existing Sidewalk and Bike Lane
- Proposed Multiuse Trail
- Paved Shoulder
- Existing Mapped Trail
- Proposed Network Trail
- Riverfront Trail Phase 1
- Riverfront Trail Phase 2
- Riverfront Trail Phase 3
- Riverfront Trail Phase 4
- Riverfront Trail Phase 5
- Riverfront Trail Phase 6
- Riverfront Trail Phase 7

0 250 500 750 1,000 Meters

THE ACCURACY & COMPLETENESS OF INFORMATION SHOWN ON THIS DRAWING IS NOT GUARANTEED. IT WILL BE THE RESPONSIBILITY OF THE USER OF THE INFORMATION SHOWN ON THIS DRAWING TO LOCATE & ESTABLISH THE PRECISE LOCATION OF ALL EXISTING INFORMATION WHETHER SHOWN OR NOT.

URBANSYSTEMS

SOURCES: CITY OF CASTLEGAR

File Path: U:\Projects_KEL\0841\0063\01\D-Drafting-Design-Analysis\CADD\GIS\F00-0841006301_11x17.mxd.....MXD DATE: (2007-12-14)

PEDESTRIAN and BICYCLE ROUTE
Evaluation Criteria

SAFETY
(Weighting = 3)

RATING	COMMENTS
1	Negligible safety improvement
2	Minor improvement (route is on a local or low volume collector road, negligible crossings)
3	Notable improvement (route is mostly on a low volume collector/arterial, some crossings)
4	Significant improvement (route is at least partially on high volume roadway with no existing facilities)
5	Major improvement (route is at least partially on high volume arterial with no existing facilities, and significant crossings)

DEMAND
(Weighting = 2)

RATING	COMMENTS
1	No expected usage
2	Minor demand (probably no latent demand, generators are negligible)
3	Notable demand (possibly some latent demand, links generators such as neighbourhood parks, elementary schools)
4	Significant demand (there is a latent demand, links generators such as schools, community centres, large parks)
5	Major demand (a significant latent demand exists, links large generators such as shopping centres, recreation centres, colleges and neighbourhoods)

NETWORK FUNCTION
(Weighting = 2)

RATING	COMMENTS
1	No importance in bicycle network
2	Minor network importance (no impact to overall network, a local link, small amount of time savings)
3	Notable importance (overall impact to network minimal, more localized link on a neighbourhood level, provides some travel time savings)
4	Significant importance (provides an important, but not critical link in network, some time savings, there may be an alternative route)
5	Major importance (provides a critical link in the network, provides a significant time savings, no alternative route, or alternative route is unattractive)

APPEAL:
(Weighting = 1)

RATING	COMMENTS
1	No appeal
2	Minor appeal (very challenging, skilled cyclists only, steep grades, adjacent to high volume roadway)
3	Notable appeal (appeals to mostly skilled cyclists, significant grades, aesthetics ok, adjacent to high volume roadway)
4	Significant appeal (would appeal to most cyclists, slight grades acceptable, mostly aesthetically pleasing, adjacent to lower volume roadway)
5	Major appeal (appeals to all cyclists, low grade, very aesthetically pleasing, adjacent to low volume roadway)

IMPLEMENTATION FEASIBILITY
(Weighting = 2)

RATING	COMMENTS
1	Impossible to implement
2	Somewhat feasible (there will most probably be significant issues that may hinder implementation)
3	Mostly feasible (there may be issues in implementation)
4	Fully feasible (property acquisition, phasing, environmental implications, construction implications etc. may exist but they are minor and should not hinder implementation)
5	Very feasible (there are no issues currently known that could potentially hinder implementation)

APPENDIX C

Detailed Cost Estimate Summaries

5th & 6th Avenue Shared Bike Lanes

Existing Cross-section of 5th Avenue

Road Segment:	6th Avenue (24th – 27th Street) 5th Avenue (27th Street – Schofield Creek)
Roadway Classification:	Local Road
Project Length:	2578m
Existing ROW:	15 – 22m (6th Avenue) 11 – 16.5m (5th Avenue)

Project Description

Shared bike lanes are proposed along 5th and 6th Avenue in order to provide an alternate bicycle route parallel to Columbia Avenue. These roads accommodate low traffic volumes and would be ideal for a shared bicycle route.

Notes and Assumptions

- Shared bike route signage is the only cost estimate item for this project. Signage would be placed every 200m on both sides of the roadway.
- The Shared bike route would not require any property acquisition.
- Extensive construction, hydropole relocation and property acquisition would be required should the City wish to implement Marked Wide Curb Lanes or Designated Bike Lanes. These bike route options have not been investigated.

Cost Estimate Summary

Shared Bike Lane Signage	$9,100.00
Subtotal	$9,100.00
40% Contingency	*$3,640.00*
Total	**$12,740.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
5th and 6th Avenue bike lanes
Shared bike lanes (2578 m long)

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SPECIAL CONSIDERATIONS					
.1	bike lane signage every 200 metres	each	26	$ 350.00	$ 9,100.00
	SUBTOTAL 1				$ 9,100.00
	CONTINGENCY (40%)				$ 3,640.00
	TOTAL				**$ 12,740.00**

Notes: Shared route - so signage only

no construction

Conner's Rd & 17th St Shared Bike Lanes

Existing Cross-section of 17th Street

Existing Cross-section of Conners Road

Road Segment:	17th Street (Columbia Ave – 18th Street) Conners Road (18th Street – south end)
Roadway Classification:	Local Road
Project Length:	1120m
Existing ROW:	16m (17th Street) 15 – 18m (Conners Road)

Project Description

Shared bike lanes are proposed along 17th Street and Conners Road as link within an alternate bicycle route parallel to Columbia Avenue. These roads accommodate low traffic volumes and would be ideal for a shared bicycle route.

Notes and Assumptions

- Shared bike route signage is the only cost estimate item for this project. Signage would be placed every 200m on both sides of the roadway.
- The Shared bike route would not require any property acquisition.
- Alternate bike route options such as Marked Wide Curb Lanes or Designated Bike Lanes have not been investigated.

Cost Estimate Summary

Shared Bike Lane Signage	$3,850.00
Subtotal	$3,850.00
40% Contingency	*$1,540.00*
Total	**$5,390.00**

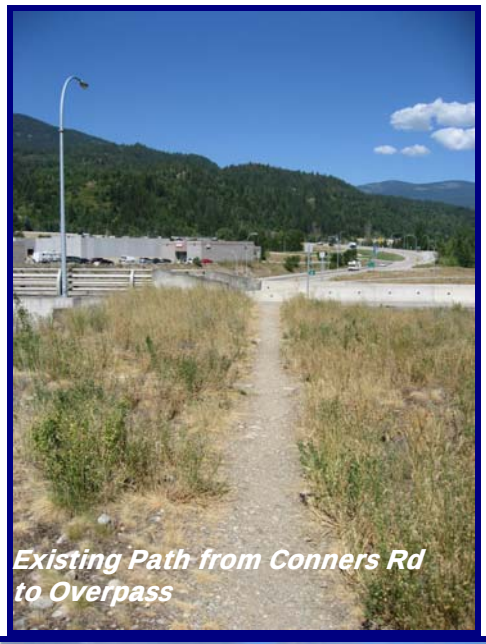
CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
Conners Rd and 17th Street Shared lanes
Shared lanes

PRELIMINARY COST ESTIMATE

SPECIAL CONSIDERATIONS					
.1	bike lane signage every 200 metres	each	11	$ 350.00	$ 3,850.00
	SUBTOTAL 1				$ 3,850.00
	CONTINGENCY (40%)				$ 1,540.00
	TOTAL				**$ 5,390.00**

Notes: signage only required for this section (shared bike lanes)

20th St – Conners Road Connection



Existing Path from Conners Rd to Overpass

Sidewalk to be widened

Pathway Segment: Multi-use pathway between 20th Street Overpass and Conners Road and sidewalk widening between the overpass and 6th Avenue

Project Length: 155m (multi-use pathway) 85m (sidewalk widening)

Project Description

A multi-use pathway is proposed between Conners Road and the 20th Street Overpass. This project would include the creation of an at-grade pedestrian/cyclist only crossing of the CPR railway.

Sidewalk currently exists on one side of the overpass and along 20th Street to Columbia Avenue. Sidewalk between the overpass and 6th Avenue is planned to be widened. Signage for cyclists to dismount while on the overpass would also be required.

Notes and Assumptions

- Multi-use pathway would be 4m wide with 0.5m granular shoulders on either side.
- At-grade CPR rail crossing improvements line item is based on 10m of improvements, does not include automatic warning signal protection and includes contingencies for civil and railway engineering and construction as well as railway approvals.
- Property acquisition is not included.
- 2m of concrete sidewalk will be added to that which is existing between the Overpass and 6th Avenue.
- 1 light standard will have to be relocated
- Traffic signs will have to be removed and relocated with new sign posts installed.
- Signage for cyclists to dismount is required at the overpass.
- Small amount of asphalt removal at the overpass and Conners Road for pathway to tie into.
- Pavement structure for multi-use path assumed to be:
  - 50mm hot mix asphalt
  - 100mm granular base
  - 100mm depth for shoulder gravel
  - Sidewalk is 100mm thick

Cost Estimate Summary

Sitework, Demolition and Removals	$7,000.00
Clearing and Grubbing	$25,000.00
Asphalt Removal	$150.00
Roadway Excavation, Embankment and Compaction	$8,750.00
Granular Base	$22,435.00
Granular Subbase	$3,400.00
Hot Mix Asphalt Concrete Paving	$37,200.00
Concrete Walks, Curbs and Gutter	$23,800.00
Topsoil and Finish Grading	$50,000.00
Shallow Utilities and Electrical Work	$25,525.00
Chicane Gates	$4000.00
At-Grade Rail Crossing Improvements	$14,400.00
Bike and Pathway Signage	$2,800.00
Subtotal	*$224,460.00*
40% Contingency	*$89,784.00*
Total	**$314,244.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
20th Street Overpass
Multi-use pathway between overpass to Conners Road (155m long)
Sidewalk between Overpass and 6th Avenue
PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02070 - Sitework, Demolition & Removals					
2070.1	Remove and relocate light standard	each	1	$ 5,000.00	$ 5,000.00
2070.2	Relocate existing traffic signs, remove and replace existing sign pos	each	5	$ 400.00	$ 2,000.00
SECTION 02111 - Clearing and Grubbing					
2111.1	Stripping of existing overburden waste material	LS	1	$ 15,000.00	$ 15,000.00
2111.2	Clearing and Grubbing (tree/shrub removal)	LS	1	$ 10,000.00	$ 10,000.00
SECTION 02550 - Asphalt Removal					
2550.1	Sawcut, remove and dispose of asphalt	sq. m.	10	$ 15.00	$ 150.00
SECTION 02224 - Roadway Excavation, Embankment and Compaction					
2224.1	Common excavation, off-site disposal	cu. m.	201	$ 20.00	$ 4,025.00
2224.2	Subgrade finishing and compaction	sq. m.	945	$ 5.00	$ 4,725.00
SECTION 02233 - Granular Base					
2233.1	Granular base - 100mm thick	sq. m.	945	$ 18.00	$ 17,010.00
2233.2	Shoulder Gravel - 100mm thick	sq. m.	155	$ 35.00	$ 5,425.00
SECTION 02234 - Granular Subbase					
2234.1	Granular subbase - 300mm thick	sq. m.	170	$ 20.00	$ 3,400.00
SECTION 02512 - Hot-Mix Asphalt Concrete Paving					
2512.1	Hot-Mix Ashphalt Paving, 50mm	sq. m.	620	$ 60.00	$ 37,200.00
SECTION 02523 - Concrete Walks, Curbs and Gutters					
2512.1	Concrete Curb (450 mm wide as per MMCD)	l.m	85	$ 80.00	$ 6,800.00
2512.2	Concrete Sidewalk (2m width) 100mm depth	sq. m.	170	$ 100.00	$ 17,000.00
SECTION 02831 - Chain Link Fences and Gates					
2921.1	Chicane Gates	each	4	$ 1,000.00	$ 4,000.00
SECTION 02921 - Topsoil and Finish Grading					
2921.1	Site restoration including topsoil and seeding/landscape	L.S	1	$ 50,000.00	$ 50,000.00
SECTION 16650 - Shallow Utilities and Electrical Work					
16650.1	Electrical conduit complete with wiring	l.m	155	$ 55.00	$ 8,525.00
16650.2	Light pole	ea	4	$ 1,800.00	$ 7,200.00
16650.3	Base for light pole	ea	4	$ 1,200.00	$ 4,800.00
16650.4	Electrical Connections	LS	1	$ 5,000.00	$ 5,000.00

SPECIAL CONSIDERATIONS					
.1	At-Grade Rail Crossing Improvements	LS	1	$ 14,400.00	$ 14,400.00
.2	Bike and pathway signage - cyclists to dismount when travelling acr	each	8	$ 350.00	$ 2,800.00
	SUBTOTAL 1				$ 224,460.00
	CONTINGENCY (40%)				$ 89,784.00
	TOTAL				**$ 314,244.00**

Notes: CP Rail crossing - see sheet from COB 1

bike signage for cyclists to dismount to cross overpass 2

bike route signage 6

multi-use pathway

assume no property acquisition

At-grade CPR rail crossing improvements line item is based on 10m of improvements, does not include automatic warning signal protection and includes contingencies for civil and railway engineering and construction as well as railway approvals.

remove and relocate light standard

assume no sawcutting of sidewalk

7th Avenue Bike Lanes and Sidewalk

7th Avenue at 4th Street

Existing Cross-section of 9th Street

Road Segment:	7th Ave (3rd – 10th St) and 9th Street (7th – Columbia Ave)
Roadway Classification:	Local Roads
Project Length:	1505m
Existing ROW:	20m on 7th Avenue 13 – 18m on 9th Street

Project Description

Sidewalks are proposed along 7th Avenue between 3rd and 4th Street and 8th and 10th Street. Bike lanes are proposed along 7th from 5th to 9th Streets and then along 9th to Columbia Avenue. These facilities would serve the schools along 7th Avenue and provide connectivity between Millennium Park and Zuckerberg Island.

Sidewalk between 3rd and 4th Street would be implemented on the east side of 7th Avenue to match up with existing sidewalk and an existing crosswalk. Sidewalk between 8th and 10th Street however is proposed on the west side of the road. This is due to a narrowed road cross-section in this area as well as for safety concerns as pedestrians on the east side would conflict with vehicles turning into the Zuckerberg Island parking lot.

Notes and Assumptions

- Sidewalk between 3rd and 4th Street would be on the east side and 1.8m wide.
- Sidewalk between 8th and 10th Street would be on the west side and 1.5m wide.
- Designated bike lanes are planned for both 7th Avenue and 9th Street, hence widening is required along 9th Street. The widening of 2.6 m would be done of the north side of the road and is assumed to be within the existing ROW.
- Some power poles along 7th Avenue between 8th and 10th will have to be moved.
- One catchbasin and drywell will be installed for each block that has proposed sidewalk.
- Any property acquisition costs are not included in this estimate.
- Bike lane signage is placed every 200m on both sides of the road.
- Pavement structure for a local road assumed to be:
  - 50mm hot mix asphalt
  - 100mm granular base
  - 300mm granular subbase
  - Sidewalks are 100mm except at driveways and lanes where it is 150mm thick.

Cost Estimate Summary

Clearing and Grubbing	$20,000.00
Asphalt Removal	$3,780.00
Roadway Excavation, Embankment and Compaction	$38,730.00
Granular Base	$57,085.00
Granular Subbase	$58,950.00
Hot Mix Asphalt Concrete Paving	$94,440.00
Concrete Walks, Curbs and Gutters	$128,620.00
Painted Pavement Markings	$9,500.00
Topsoil and Finish Grading	$80,000.00
Bike lane signage	$4,200.00
Catchbasin and drywells	$60,000.00
Hydropole Relocation	$22,500.00
Driveway restoration behind sidewalk	$24,000.00
Subtotal	*$601,805.00*
40% Contingency	*$240,722.00*
Total	**$842,527.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
7th Ave (s/w 3rd to 4th and 8th-10th, bike lanes 5th to 9th and along 9th to Columbia)

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02111 - Clearing and Grubbing					
2111.1	Stripping of existing overburden waste material	LS	1	$ 10,000.00	$ 10,000.00
2111.2	Clearing and Grubbing (tree/shrub removal)	LS	1	$ 10,000.00	$ 10,000.00
SECTION 02550 - Asphalt Removal					
2550.1	Sawcut, remove and dispose of asphalt	sq. m.	252	$ 15.00	$ 3,780.00
SECTION 02224 - Roadway Excavation, Embankment and Compaction					
2224.1	Common excavation, off-site disposal	cu. m.	1326	$ 20.00	$ 26,527.50
2224.2	Subgrade finishing and compaction	sq. m.	2441	$ 5.00	$ 12,202.50
SECTION 02233 - Granular Base					
2233.1	Granular base - 100mm thick	sq. m.	2870	$ 18.00	$ 51,660.00
2233.2	Shoulder gravel (50mm thick)	sq. m.	155	$ 35.00	$ 5,425.00
SECTION 02234 - Granular Subbase					
2234.1	Granular subbase - 300mm thick	sq. m.	2948	$ 20.00	$ 58,950.00
SECTION 02512 - Hot-Mix Asphalt Concrete Paving					
2512.1	Hot-Mix Ashphalt Paving, 50mm	sq. m.	1574	$ 60.00	$ 94,440.00
SECTION 02523 - Concrete Walks, Curbs and Gutters					
2512.1	Concrete Curb (450 mm wide as per MMCD)	l.m	530	$ 80.00	$ 42,400.00
2512.2	Concrete Sidewalk (1.8m width) 100mm depth	sq. m.	162	$ 100.00	$ 16,200.00
2512.3	Concrete Sidewalk (1.8m width) 150 mm depth for lane and driveway	sq. m.	18	$ 140.00	$ 2,520.00
2512.4	Concrete Sidewalk (1.5m width) 100mm depth	sq. m.	570	$ 100.00	$ 57,000.00
2512.5	Concrete Sidewalk (1.5m width) 150 mm depth for lane and driveway	sq. m.	75	$ 140.00	$ 10,500.00
SECTION 02580 - Painted Pavement Markings					
2580.1	Bike lane painted lines and crosswalks	LS	1	$ 9,500.00	$ 9,500.00
SECTION 02921 - Topsoil and Finish Grading					
2921.1	Site restoration including topsoil and seeding/landscape	L.S	1	$ 80,000.00	$ 80,000.00
SPECIAL CONSIDERATIONS					
.1	catch basin and drywell (one per block)	per block	6	$ 10,000.00	$ 60,000.00
.2	Driveway retoration behind sidewalk allowance	per driveway	6	$ 4,000.00	$ 24,000.00
.3	bike lane signage every 200 metres	each	12	$ 350.00	$ 4,200.00
.4	Hydropole relocation	each	3	$ 7,500.00	$ 22,500.00
	SUBTOTAL 1				$ 601,805.00
	CONTINGENCY (40%)				$ 240,722.00
	TOTAL				**$ 842,527.00**

Notes: Sidewalk between 3rd and 4th would be on east side - crosswalk markings lumped under other project

Sidewalk between 8th and 9th would be on the west side of the road

Road widening between 8th and 9th would be all on the west side of road due to entrance to Zuckerberg island

1.5m sidewalk between 8th and 10th avenue

3rd Street Sidewalk

Existing Cross-section of 3rd Street

Road Segment:	3rd Street
Project Limits:	7th – 2nd Avenue
Roadway Classification:	Local Road
Project Length:	430m
Existing ROW:	18m

Project Description

Sidewalks are proposed along 3rd Street from 7th to 2nd Avenue in order to provide a pedestrian connection from Castlegar's downtown to the recreational destination of Millennium Park.

Sidewalk west of 7th Avenue currently exists on the north side of the road, however due to constructability and implementation feasibility the proposed sidewalk will be constructed on the south side of the road.

Notes and Assumptions

- Sidewalk only installed on the south side of the roadway.
- Retaining walls will be required due to sloping front yards. The unit price for the retaining walls does not include soil investigation, engineering, density testing, surveying, bulk excavation for the geogrid area, handrails and supply of fill materials.
- Power poles will remain in place.
- Sidewalk width is 1.8m.
- Existing pavement surface is 7 m wide, to install curb, gutter and sidewalk a 0.3m wide strip of asphalt will be removed and reinstated.
- The installation of curb, gutter and sidewalk will add 2.25 m of width to the south side of the road.
- One catchbasin and drywell will be installed for each block.
- Any property acquisition costs are not included in this estimate.
- Pavement structure for a local road assumed to be:
  - 50mm hot mix asphalt
  - 100mm granular base
  - 300mm granular subbase
  - Sidewalks are 100mm except at driveways and lanes where it is 150mm thick.

Cost Estimate Summary

Clearing and Grubbing	$15,000.00
Asphalt Removal	$1,935.00
Roadway Excavation, Embankment and Compaction	$64,462.50
Granular Base	$19,737.00
Granular Subbase	$21,930.00
Hot Mix Asphalt Concrete Paving	$7,740.00
Concrete Walks, Curbs and Gutters	$119,000.00
Painted Pavement Markings	$3,000.00
Topsoil and Finish Grading	$26,000.00
Retaining Walls	$165,750.00
Catchbasin and drywells	$50,000.00
Driveway restoration behind sidewalk	$48,000.00
Subtotal	*$542,554.50*
40% Contingency	*$217,021.80*
Total	**$759,577.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
3rd Street (7th Avenue to 2nd Avenue)
Sidewalk, One Side (430m long)

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02111 - Clearing and Grubbing					
2111.1	Stripping of existing overburden waste material	LS	1	$ 10,000.00	$ 10,000.00
2111.2	Clearing and Grubbing (tree/shrub removal)	LS	1	$ 5,000.00	$ 5,000.00
SECTION 02550 - Asphalt Removal					
2550.1	Sawcut, remove and dispose of asphalt	sq. m.	129	$ 15.00	$ 1,935.00
SECTION 02224 - Roadway Excavation, Embankment and Compaction					
2224.1	Common excavation, off-site disposal	cu. m.	870	$ 20.00	$ 17,400.00
2224.2	Common excavation, on-site reuse	cu. m.	1380	$ 32.00	$ 44,160.00
2224.4	Subgrade finishing and compaction	sq. m.	581	$ 5.00	$ 2,902.50
SECTION 02233 - Granular Base					
2233.1	Granular base - 100mm thick	sq. m.	1097	$ 18.00	$ 19,737.00
SECTION 02234 - Granular Subbase					
2234.1	Granular subbase - 300mm thick	sq. m.	1097	$ 20.00	$ 21,930.00
SECTION 02512 - Hot-Mix Asphalt Concrete Paving					
2512.1	Hot-Mix Ashphalt Paving, 50mm	sq. m.	129	$ 60.00	$ 7,740.00
SECTION 02523 - Concrete Walks, Curbs and Gutters					
2512.1	Concrete Curb (450 mm wide as per MMCD)	l.m	430	$ 80.00	$ 34,400.00
2512.2	Concrete Sidewalk (1.8m width) 100mm depth	sq. m.	594	$ 100.00	$ 59,400.00
2512.3	Concrete Sidewalk (1.8m width) 150 mm depth for lane and driveways	sq. m.	180	$ 140.00	$ 25,200.00
SECTION 02580 - Painted Pavement Markings					
2580.1	Crosswalk markings (across both 3rd St and 7th Ave to join sidewalk)	LS	1	$ 3,000.00	$ 3,000.00
SECTION 02921 - Topsoil and Finish Grading					
2921.1	Site restoration including topsoil and seeding/landscape	L.S	1	$ 26,000.00	$ 26,000.00
SECTION 03300 - Precast and Cast-in-Place Concrete					
3300.1	Modular block retaining wall	v.sqm	390	$ 425.00	$ 165,750.00
SPECIAL CONSIDERATIONS					
.1	catch basin and drywell (one per block)	per block	5	$ 10,000.00	$ 50,000.00
.2	Driveway retoration behind sidewalk allowance	per driveway	12	$ 4,000.00	$ 48,000.00
	SUBTOTAL 1				$ 542,554.50
	CONTINGENCY (40%)				$ 217,021.80
	TOTAL				**$ 759,577.00**

Notes: This shows only the costs to implement portions of the bike and pedestrian plan. Should the City wish to widen the existing road network additional costs would be added

9th Avenue Designated Bike Lanes

9th Avenue at 5th Street

9th Avenue at 4th Street

Road Segment:	9th Avenue
Project Limits:	3rd to 6th Street
Roadway Classification:	Local Road
Project Length:	440m
Existing ROW:	21 - 25m

Project Description

Designated bike lanes are proposed along 9th Avenue between 3rd and 6th Street. The bike lanes would provide a link between existing bike lane links and would help to connect the public library, school and Millennium Park.

The existing pavement between 3rd and 4th Street is not wide enough to accommodate 2 bike lanes and two vehicular travel lanes. New asphalt would be added to the west between the existing sidewalk and roadway. The sidewalk would be widened with a 0.3m concrete fillet to implement appropriate curb and gutter as well.

Notes and Assumptions

- Construction will only be required between 3rd and 4th Street with the road being widened.
- Sidewalk between 3rd and 4th Street would be widened with a 0.3m concrete fillet.
- A 0.3m wide strip of existing asphalt will be removed in order to widen the roadway.
- The pavement between 4th and 6th Street is wide enough to accommodate designated bike lanes, therefore only signage and pavement paint markings are required.
- Hydropoles would not be relocated.
- The painted centreline between 3rd and 4th Street would have to be removed and repainted.
- One catchbasin and drywell will be installed between 3rd and 4th Street.
- Bike lane signage is placed every 200m on both sides of the road.
- Pavement structure for a local road assumed to be:
  - 50mm hot mix asphalt
  - 100mm granular base
  - 300mm granular subbase
  - Sidewalks are 100mm except at driveways and lanes where it is 150mm thick.

Cost Estimate Summary

Remove Pavement Centreline Paint	$20,000.00
Clearing and Grubbing	$10,000.00
Asphalt Removal	$427.50
Roadway Excavation, Embankment and Compaction	$4,800.00
Granular Base	$5,643.00
Granular Subbase	$6,270.00
Hot Mix Asphalt Concrete Paving	$14,535.00
Concrete Walks, Curbs and Gutters	$11,305.00
Painted Pavement Markings	$10,000.00
Bike lane signage	$1,400.00
Catchbasin and drywells	$10,000.00
Subtotal	*$94,380.50*
40% Contingency	*$37,752.20*
Total	**$132,133.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
9th Ave bike lanes (3rd to 6th Street)
Bike lanes both sides (440 m long)

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02070 - Sitework, Demolition & Removals					
2070.1	Remove pavement centreline paint	L.S	1	$ 20,000.00	$ 20,000.00
SECTION 02111 - Clearing and Grubbing					
2111.1	Stripping of existing overburden waste material	LS	1	$ 10,000.00	$ 10,000.00
SECTION 02550 - Asphalt Removal					
2550.1	Sawcut, remove and dispose of asphalt	sq. m.	29	$ 15.00	$ 427.50
SECTION 02224 - Roadway Excavation, Embankment and Compaction					
2224.1	Common excavation, off-site disposal	cu. m.	160	$ 20.00	$ 3,200.00
2224.2	Subgrade finishing and compaction	sq. m.	320	$ 5.00	$ 1,600.00
SECTION 02233 - Granular Base					
2233.1	Granular base - 100mm thick	sq. m.	314	$ 18.00	$ 5,643.00
SECTION 02234 - Granular Subbase					
2234.1	Granular subbase - 300mm thick	sq. m.	314	$ 20.00	$ 6,270.00
SECTION 02512 - Hot-Mix Asphalt Concrete Paving					
2512.1	Hot-Mix Ashphalt Paving, 50mm	sq. m.	242	$ 60.00	$ 14,535.00
SECTION 02523 - Concrete Walks, Curbs and Gutters					
2512.1	Concrete Curb (450 mm wide as per MMCD)	l.m	95	$ 80.00	$ 7,600.00
2512.2	Concrete Sidewalk Fillet (0.3m width) 100mm depth	sq. m.	29	$ 130.00	$ 3,705.00
SECTION 02580 - Painted Pavement Markings					
2580.1	Bike lanes and Centreline	LS	1	$ 10,000.00	$ 10,000.00
SPECIAL CONSIDERATIONS					
.1	bicycle lane signs specifying no parking	ea	4	$ 350.00	$ 1,400.00
.2	catch basin and drywell (one per block)	per block	1	$ 10,000.00	$ 10,000.00
	SUBTOTAL 1				$ 94,380.50
	CONTINGENCY (40%)				$ 37,752.20
	TOTAL				**$ 132,133.00**

Notes: Thiis cost estimate will include paving the gravel area directly up to the sidewalk and adding curb

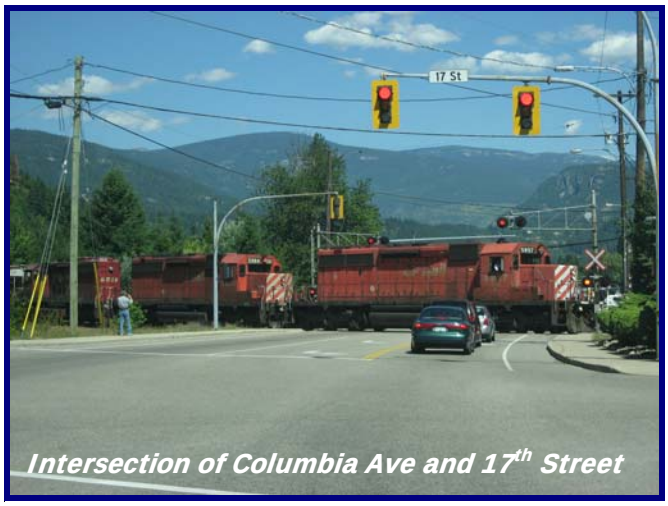
The road centrelines will no longer match up - repaint b/w 3rd and 4th

Hydropoles between 3rd and 4th will remain in place but will have to be worked around.

Parking will be eliminated along this road

Drainage - Cb's or drywells 1 per block where sidewalk widened

Columbia Avenue Bike Lanes



Intersection of Columbia Ave and 17th Street

Road Segment:	Columbia Avenue
Project Limits:	17th – 20th Street
Roadway Classification:	Arterial
Project Length:	882m
Existing ROW:	26 – 30m

Project Description

Shared bike lanes are proposed along Columbia Avenue to provide on-street cycling. As the current overpass structure for Highway 3 limits road widening options to implement designated bike lanes, shared bike lanes through painted pavement and bike signage will be used.

Notes and Assumptions

- Shared bike route signage and painted pavement markings are the only cost estimate items for this project. Signage would be placed every 200m on both sides of the roadway.
- The Shared bike route would not require any property acquisition.
- Alternate bike route options such as Marked Wide Curb Lanes or Designated Bike Lanes have not been investigated.

Cost Estimate Summary

Painted Pavement Markings	$25,000.00
Shared Bike Lane Signage	$2,800.00
Subtotal	$27,800.00
40% Contingency	*$11,120.00*
Total	**$38,920.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
Columbia Ave (17th to 20th Street)
bike lanes (882m long)

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02580 - Painted Pavement Markings					
2580.1	Bike Lane Painted Pavement Markings	LS	1	$ 25,000.00	$ 25,000.00
SPECIAL CONSIDERATIONS					
.1	bike lane signage every 200 metres	each	8	$ 350.00	$ 2,800.00
	SUBTOTAL 1				$ 27,800.00
	CONTINGENCY (40%)				$ 11,120.00
	TOTAL				**$ 38,920.00**

Notes: Assume no widening due to ROW and overpass constraints

Bike information signage placed every 200m

10th Avenue Sidewalk

Existing Cross-section of 10th Avenue

Road Segment:	10th Avenue
Project Limits:	24th Street – Cobra Climb Staircase
Roadway Classification:	Local Road
Project Length:	615m
Existing ROW:	10 - 15m

Project Description

Sidewalks are proposed along 10th Avenue from 24th Street to the Cobra Climb Staircase as a pedestrian connection to Kinnaird Elementary School.

Sidewalk on 10th Avenue between 23rd and 24th Street is located on the west side of the road therefore the proposed sidewalk will also be located on the west side.

Notes and Assumptions

- Sidewalk only installed on the west side of the roadway.
- Hydropoles exist on both sides of the road. In order to avoid the costs associated with relocating poles and property acquisition, the road would be shifted to the east to provide room to accommodate a 1.5m wide sidewalk.
- Power poles will remain in place.
- Sidewalk width is 1.5m.
- Existing pavement surface is 6.4m wide, to install curb, gutter and sidewalk to the west a 0.7m wide strip of asphalt will be added to the east side of the road.
- One catchbasin and drywell will be installed for each block.
- Property acquisition will not be required.
- The painted centreline will have to be removed and a new lane separation line painted.
- Shoulder gravel 0.5m wide on the east side of the roadway.
- Pavement structure for a local road assumed to be:
  - 50mm hot mix asphalt
  - 100mm granular base
  - 300mm granular subbase
  - Sidewalks are 100mm except at driveways and lanes where it is 150mm thick.

Cost Estimate Summary

Remove Pavement Centreline Paint	$30,000.00
Clearing and Grubbing	$26,000.00
Asphalt Removal	$14,400.00
Roadway Excavation, Embankment and Compaction	$24,926.25
Granular Base	$46,740.00
Granular Subbase	$39,975.00
Hot Mix Asphalt Concrete Paving	$48,300.00
Concrete Walks, Curbs and Gutters	$153,450.00
Painted Pavement Markings	$4,500.00
Topsoil and Finish Grading	$37,000.00
Catchbasin and drywells	$30,000.00
Driveway restoration behind sidewalk	$96,000.00
Subtotal	*$551,291.25*
40% Contingency	*$220,516.50*
Total	**$771,808.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
10th Avenue (24th Street to Cobra Climb)
Sidewalk, One Side (615m long)

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02070 - Sitework, Demolition & Removals					
2070.1	Remove pavement centreline paint	L.S	1	$ 30,000.00	$ 30,000.00
SECTION 02111 - Clearing and Grubbing					
2111.1	Stripping of existing overburden waste material	LS	1	$ 15,000.00	$ 15,000.00
2111.2	Clearing and Grubbing (tree/shrub removal)	LS	1	$ 11,000.00	$ 11,000.00
SECTION 02550 - Asphalt Removal					
2550.1	Sawcut, remove and dispose of asphalt	sq. m.	960	$ 15.00	$ 14,400.00
SECTION 02224 - Roadway Excavation, Embankment and Compaction					
2224.1	Common excavation, off-site disposal	cu. m.	885	$ 20.00	$ 17,700.00
2224.2	Subgrade finishing and compaction	sq. m.	1445	$ 5.00	$ 7,226.25
SECTION 02233 - Granular Base					
2233.1	Granular base - 100mm thick	sq. m.	1999	$ 18.00	$ 35,977.50
2233.2	Shoulder gravel (50mm thick)	sq. m.	308	$ 35.00	$ 10,762.50
SECTION 02234 - Granular Subbase					
2234.1	Granular subbase - 300mm thick	sq. m.	1999	$ 20.00	$ 39,975.00
SECTION 02512 - Hot-Mix Asphalt Concrete Paving					
2512.1	Hot-Mix Ashphalt Paving, 50mm	sq. m.	805	$ 60.00	$ 48,300.00
SECTION 02523 - Concrete Walks, Curbs and Gutters					
2512.1	Concrete Curb (450 mm wide as per MMCD)	l.m	615	$ 80.00	$ 49,200.00
2512.2	Concrete Sidewalk (1.5m width) 100mm depth	sq. m.	623	$ 100.00	$ 62,250.00
2512.3	Concrete Sidewalk (1.5m width) 150 mm depth for lane and driveways	sq. m.	300	$ 140.00	$ 42,000.00
SECTION 02580 - Painted Pavement Markings					
2580.1	Crosswalk markings and centreline re-paint	LS	1	$ 4,500.00	$ 4,500.00
SECTION 02921 - Topsoil and Finish Grading					
2921.1	Site restoration including topsoil and seeding/landscape	L.S	1	$ 37,000.00	$ 37,000.00
SPECIAL CONSIDERATIONS					
.1	catch basin and drywell (one per block)	per block	3	$ 10,000.00	$ 30,000.00
.2	Driveway retoration behind sidewalk allowance	per driveway	24	$ 4,000.00	$ 96,000.00
	SUBTOTAL 1				$ 551,291.25
	CONTINGENCY (40%)				$ 220,516.50
	TOTAL				**$ 771,808.00**

Notes: Hydro poles will remain in place and road will be shifted over
drainage
due to limited ROW, the sidewalk is minimum 1.5 m wide

17th Street Sidewalk

Existing Cross-section of 17th Street

Road Segment:	17th Street
Project Limits:	Columbia Avenue – Woodland Drive
Roadway Classification:	Collector Road
Project Length:	130m
Existing ROW:	20m

Project Description

Sidewalk is proposed along 17th Street from Columbia Avenue to Woodland Drive where sidewalk already exists on the west side of the road.

Sidewalk will be added to the north side of 17th Street and a crosswalk will be painted across Woodland Drive to connect the pedestrian crosswalks.

Notes and Assumptions

- Sidewalk only installed on the north side of the roadway.
- Existing curbing will be removed and is assumed to be concrete.
- Fire hydrant will have to be relocated.
- Sidewalk width is 1.8m.
- The roadway will remain the same width; sidewalk will be constructed beyond the existing curb. A 0.3m wide strip of asphalt will be removed to install the new concrete curb and sidewalk.
- One catchbasin and drywell will be installed for each block.
- Property acquisition has not been considered.
- Two concrete no-post barriers will have to be removed and sent to the public works yard.
- Pavement structure for a local road assumed to be:
  - 50mm hot mix asphalt
  - 100mm granular base
  - 300mm granular subbase
  - Sidewalks are 100mm except at commercial driveways where it is 200mm thick.

Cost Estimate Summary

Sitework, Demolition and Removals	$6,010.00
Clearing and Grubbing	$4,500.00
Asphalt Removal	$1,687.50
Roadway Excavation, Embankment and Compaction	$4,677.50
Granular Base	$5,967.00
Granular Subbase	$6,630.00
Hot Mix Asphalt Concrete Paving	$2,970.00
Concrete Walks, Curbs and Gutters	$41,720.00
Painted Pavement Markings	$2,000.00
Topsoil and Finish Grading	$8,000.00
Catchbasin and drywells	$10,000.00
Driveway restoration behind sidewalk	$8,000.00
Subtotal	*$102,162.00*
40% Contingency	*$40,864.80*
Total	**$143,027.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
Woodland Drive (17th)
Sidewalk, One Side (130m long)

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02070 - Sitework, Demolition & Removals					
2070.1	Remove Concrete curb	l.m	130	$ 15.00	$ 1,950.00
2070.2	Remove and relocate existing fire hydrant	each	1	$ 4,000.00	$ 4,000.00
2070.3	Remove CRB's and send to public works yard	each	2	$ 30.00	$ 60.00
SECTION 02111 - Clearing and Grubbing					
2111.1	Stripping of existing overburden waste material	LS	1	$ 3,000.00	$ 3,000.00
2111.2	Clearing and Grubbing (tree/shrub removal)	LS	1	$ 1,500.00	$ 1,500.00
SECTION 02550 - Asphalt Removal					
2550.1	Sawcut, remove and dispose of asphalt	sq. m.	113	$ 15.00	$ 1,687.50
SECTION 02224 - Roadway Excavation, Embankment and Compaction					
2224.1	Common excavation, off-site disposal	cu. m.	190	$ 20.00	$ 3,800.00
2224.2	Subgrade finishing and compaction	sq. m.	176	$ 5.00	$ 877.50
SECTION 02233 - Granular Base					
2233.1	Granular base - 150mm thick	sq. m.	332	$ 18.00	$ 5,967.00
SECTION 02234 - Granular Subbase					
2234.1	Granular subbase - 300mm thick	sq. m.	332	$ 20.00	$ 6,630.00
SECTION 02512 - Hot-Mix Asphalt Concrete Paving					
2512.1	Hot-Mix Ashphalt Paving, 50mm	sq. m.	50	$ 60.00	$ 2,970.00
SECTION 02523 - Concrete Walks, Curbs and Gutters					
2512.1	Concrete Curb (450 mm wide as per MMCD)	l.m	130	$ 80.00	$ 10,400.00
2512.2	Concrete Sidewalk (1.8m width) 100mm depth	sq. m.	36	$ 100.00	$ 3,600.00
2512.3	Concrete Sidewalk (1.8m width) 200 mm depth for commercial drivew	sq. m.	198	$ 140.00	$ 27,720.00
SECTION 02580 - Painted Pavement Markings					
2580.1	Crosswalk markings (across 17th to join sidewalk)	LS	1	$ 2,000.00	$ 2,000.00
SECTION 02921 - Topsoil and Finish Grading					
2921.1	Site restoration including topsoil and seeding/landscape	L.S	1	$ 8,000.00	$ 8,000.00
SPECIAL CONSIDERATIONS					
.1	catch basin and drywell (one per block)	per block	1	$ 10,000.00	$ 10,000.00
.2	Driveway retoration behind sidewalk allowance	per driveway	2	$ 4,000.00	$ 8,000.00
	SUBTOTAL 1				$ 102,162.00
	CONTINGENCY (40%)				$ 40,864.80
	TOTAL				**$ 143,027.00**

Notes: Does not include property aquisitionm

Assumption that existing curb is concrete

Assume this is a collector road

Assume 2 10m long driveway entrances

Fire hydrant at corner with highway

Millennium Walkway Extension


Millennium Walkway Extension location


Existing 'Unofficial' Pathway

Trail Segment: Connection between the end of the existing Millennium Walkway trail and Zuckerberg Island

Project Length: 370m

Project Description

A trail connection is proposed between Millennium Walkway and Zuckerberg Island. An unofficial trail currently exists, however the plan is to construct a 2m wide gravel pathway.

The location of the trail is on private property and adjacent to the Columbia River.

Notes and Assumptions

- The trail would be a 2m wide gravel pathway.
- The pathway structure is assumed to be 19mm minus aggregate at a depth of 50mm.
- An environmental monitoring and mitigation allowance has been included in the cost estimate. This allowance may vary substantially during the design approval process with the Ministry of Environment.
- A geogrid would be required for tree and shrub roots.
- Pathway lighting and benches have not been included within the cost estimate.
- Property acquisition costs are not included in this estimate.

Cost Estimate Summary

Clearing and Grubbing	$60,000.00
Roadway Excavation, Embankment and Compaction	$18,500.00
Granular Base	$25,900.00
Geosynthetics – Root Barrier	$37,000.00
Topsoil and Finish Grading	$50,000.00
Environmental Monitoring and Mitigation Allowance	$20,000.00
Pathway Signage	$1,400.00
Subtotal	*$212,800.00*
40% Contingency	*$85,120.00*
Total	**$297,920.00**

CASTLEGAR BICYCLE AND PEDESTRIAN PLAN
Millennium Walkway Extension
Multi-use paved pathway

PRELIMINARY COST ESTIMATE

ITEM	DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE	AMOUNT ($)
SECTION 02111 - Clearing and Grubbing					
2111.1	Stripping of existing overburden waste material	LS	1	$ 10,000.00	$ 10,000.00
2111.2	Clearing and Grubbing (tree/shrub removal)	LS	1	$ 50,000.00	$ 50,000.00
SECTION 02224 - Roadway Excavation, Embankment and Compaction					
2224.1	Common excavation, off-site disposal	cu. m.	370	$ 30.00	$ 11,100.00
2224.2	Subgrade finishing and compaction	sq. m.	740	$ 10.00	$ 7,400.00
SECTION 02233 - Granular Base					
2233.1	19mm minus aggregate 50 mm depth	sq. m.	740	$ 35.00	$ 25,900.00
SECTION 02498 - Geosynthetics					
2498.1	Geogrid - root barrier	sq. m.	740	$ 50.00	$ 37,000.00
SECTION 02921 - Topsoil and Finish Grading					
2921.1	Site restoration including topsoil and seeding/landscape	L.S	1	$ 50,000.00	$ 50,000.00
SPECIAL CONSIDERATIONS					
.1	Environmental monitoring and Mitigation Budget Allowance	L.S	1	$ 20,000.00	$ 20,000.00
.2	Pathway signage	each	4	$ 350.00	$ 1,400.00
	SUBTOTAL 1				$ 212,800.00
	CONTINGENCY (40%)				$ 85,120.00
	TOTAL				**$ 297,920.00**

Notes: Cost does not take into account property acquisition

No cost for lighting or benches

geogrid required for tree and shrub roots

environmental monitoring and mitigation allowance may vary substantially during design approval process with the Ministry of Environment