ACTIVE TRANSPORTATION NETWORK DESIGN

CITY OF NELSON

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1.0 INTRODUCTION

The City of Nelson is committed to making walking and cycling more convenient, comfortable, and practical as a transportation choice for people of all ages and abilities. Nelson is already a walkable and bicycle-friendly community, with over 30% of residents choosing to walk or bicycle for commuter trips. However, there are a number of challenges to active transportation in Nelson, including a lack of dedicated cycling infrastructure, aging sidewalks, steep topography, and constrained rights-of-way, and/or rights-of-way that contain a mix of public and private structures.

In 2010, the City developed an Active Transportation Plan (ATP). The City has recently reviewed the 2010 ATP with the goal to offer an active transportation network that provides interconnectivity between neighbourhoods, the downtown, and key amenities. This review included the development of an Active Transportation Implementation Plan Map that identifies priorities from 2020 to 2025.

The first cycling project identified on the Active Transportation Plan Implementation Plan Map focused on providing a direct cycling connection between downtown and the Nelson Bridge. In 2019, Urban Systems worked with the City of Nelson to determine preferred designs for this connection, through two projects: High Street / Nelson Avenue from Vernon Street to Anderson Street (referred to as the High Street Corridor), and Third Street / Anderson Street from Nelson Avenue to Gordon Street with a connection to the Nelson Bridge via Fell Street (referred to as the Third Street corridor). High Street runs parallel to Highway 3A (Front Street) and provides a direct connection that is relatively flat from the Fairview neighbourhood to downtown. The preferred design was a bi-directional protected bike lane on High Street, but an alternative design was also explored – a neighbourhood greenway on High Street. Third Street runs through the Fairview neighbourhood one block east of Highway 3A (Nelson Avenue) providing a connection to the Nelson Bridge, which has plans for improved active transportation facilities in the coming years, as well as to Lakeside Park. The preferred design for the Third Street Corridor was a neighbourhood greenway.

With Project 1 of the improvements of Active Transportation Plan 2020-2025 Implementation Plan completed in 2021, the City of Nelson is looking to develop conceptual designs and cost estimates in support of implementing the remaining identified projects. By advancing the remaining projects to the conceptual design level the City will be well positioned to apply for grant programs which are looking to fund "shovel-ready" active transportation projects. The City engaged Urban Systems to assist in developing the conceptual designs of Projects 2 through 5 of the Active Transportation Plan. Figure 1 shows the four corridors that were reviewed to determine recommended facility types and corridor routing. This includes:

- Project 2 – Downtown to Observatory Street Highway Overpass
- Project 3 – Rosemont Bikeway
- Project 4 – View Street
- Project 5 – Railway Street

This memorandum summarizes this study, including an overview of the existing conditions, the design criteria, and options explored and then presents the recommended conceptual design, 'Class C' cost estimate, and next steps required to implement the project.

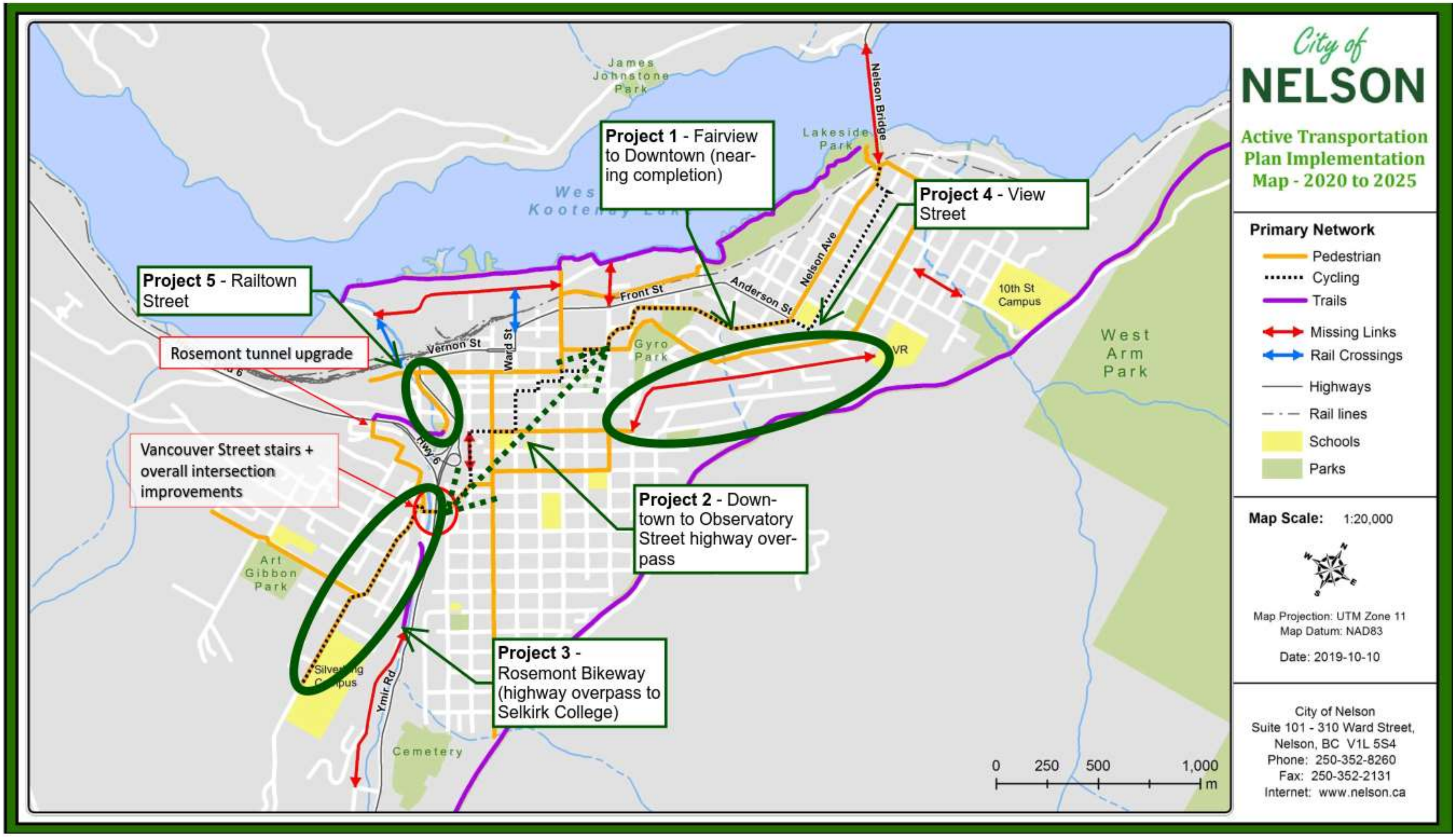


Figure 1: Nelson Active Transportation Plan Implementation Map

2.0 EXISTING CONDITIONS

The existing conditions of the corridors were established based on observations made during site visits and through a desktop review of available background information.

2.1 DOWNTOWN TO OBSERVATORY STREET HIGHWAY OVERPASS

Figure 2: Vernon Street at Hendryx Street (Top) and Ward Street at Carbonate Street (Bottom)

The Downtown to Observatory Street corridor is approximately 1.63 kilometres in length and extends from Observatory street Highway overpass in the west to Cedar Street in the east. The corridor meanders through 13 different streets, with each one having unique characteristics, to achieve the cycling path with the least grade. The corridor serves as a connection between the Rosemont neighbourhood and downtown with a variety of residential and commercial land uses along the corridor as well as Central / Wildflower School and access to Nelson Medical Clinic and Civic Centre. The corridor serves as an extension to the recent completion of the Project 1 - High Street corridor with the tie-in located at the intersection of Vernon Street and Cedar Street.

The corridor currently accommodates two-way motor vehicle traffic with parking on both sides of the street with the exception of the laneways and the Observatory Street / Highway 6 overpass. The speed limit is 40 km/h on all roadways and 20km/h along the laneways as per the Nelson Traffic Bylaw with no posted general speed limit signs. School zone signs with posted speed limits of 30km/h were observed along Carbonate Street and Ward Street adjacent to Central / Wildflower School.

The corridor varies in width from approximately 3.5 to 18.5 metres curb-to-curb width, with most sections having a continuous sidewalk on both sides with monolithic sidewalk in the Downtown area and separated with boulevard space in the residential area. Accessibility challenges exist for pedestrians, due to steep grades and many intersection crossings not having curb let-downs. Additionally, no dedicated cycling infrastructure currently exists.

Sightlines and topography create challenges along the corridor with horizontal (intersections) and vertical curves limiting the sight distance for all road users.

Traffic counts recorded on August 1, 2018 at Vernon and Hall Street, for the *205 Hall Street TIA*, estimated that the annual average daily traffic (AADT) is approximately 4,200 vehicles per day along Vernon Street and 2,200 vehicles per day along Hall Street North of Baker Street. Additional traffic counts were recorded on January 23rd 2019 at the intersection of Hall Mines Road and Observatory Street for the *Granite Point Subdivision Development Traffic Impact Study*. The study estimated that the AADT is approximately 7,200 vehicles per day along the Observatory Street Overpass and 4,900 vehicles per day on Hall Mines Road. It should be noted that the traffic data excludes pedestrian and cyclists. All traffic counts completed are included in **Appendix A**.

OPPORTUNITIES

- Connection to Downtown Commercial Area, Civic Centre, and amenities
- Wide curb to curb width along most roadways
- Tie-in with High Street corridor
- Traffic calming measures at intersections
- Corridor follows the least amount of grade

CONSTRAINTS

- Meandering corridor may be confusing or hard to follow for users
- Limited sightlines at some intersections for turning movements.
- Variety in road characteristics requires non-uniform cycling facilities along corridor
- Steep grades on street network with limited alternative low-grade routes.

2.2 ROSEMONT BIKEWAY

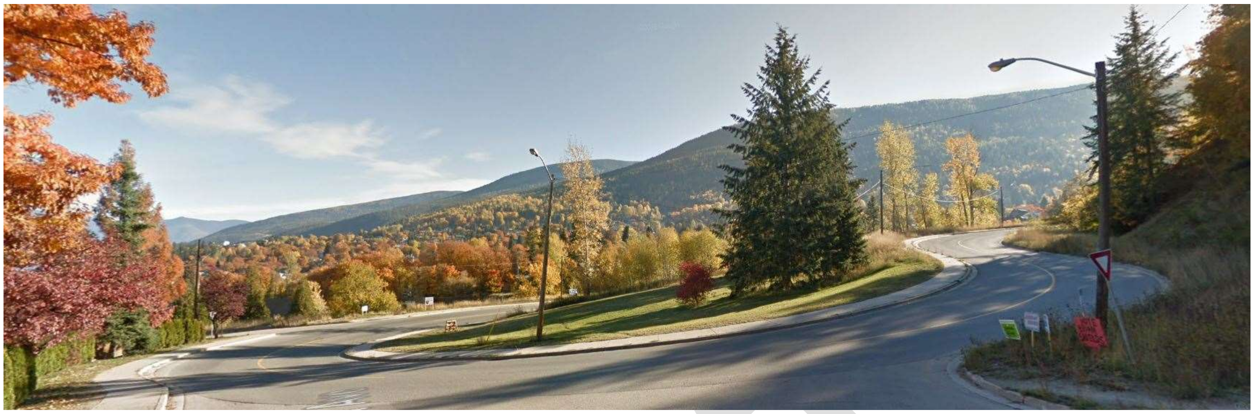


Figure 3: Vancouver Street at Robertson Avenue

The Rosemont Bikeway corridor is approximately 1.24 kilometres in length and extends from the Observatory Street / Highway 6 overpass south to Silver King Road and Tower Road. Vancouver Street and Silver King Road serve as local collectors with single and multi-family residential land uses along the corridor. Selkirk College-Silver King Campus is located at the south end of the corridor.

The corridor currently accommodates two-way north-south motor vehicle traffic with parking on one side of the street south of West Gore Street. The speed limit is 40km/h as per the Nelson Traffic Bylaw due to no posted speed limits observed.

The Rosemont corridor is typically 9.5-10.4 metres wide measured curb-to-curb, with a continuous monolithic sidewalk on both the east and west sides of the street, with the exception of the block from Robertson Avenue to West Gore Street where a sidewalk is only provided on the east side of the street. Accessibility challenges exist for pedestrians along the corridor due to the lack of curb letdowns at most intersections and steep grades between Hamilton and West Gore Street. Newly constructed stairs are proposed at the Vancouver and Observatory Street intersection to connect to uphill mid-block Vancouver Street. Additionally, no cycling infrastructure currently exists along the corridor.

The Rosemont corridor is primarily free flow with all intersecting streets stop-controlled along the corridor.

Sightlines and topography create challenges along the Observatory to West Gore Street section of the corridor with horizontal and vertical curves limiting the sight distance for all road users.

Traffic counts were recorded on January 23, 2019 at the intersection of Vancouver at Observatory Street and Vancouver at West Richards Street for the Granite Point Subdivision Development Traffic Impact Study. The estimated AADT is approximately 3,500 vehicles per day along Vancouver Street from Observatory Street to West Richards Street and 2,500 vehicles per day on Silver King Road. Additional traffic counts were completed on January 27th 2022 at Vancouver Street at Robertson Avenue and Hamilton Avenue. The estimated AADT is approximately 2,800 vehicles per day along Vancouver Street from Observatory Street to Robertson Avenue, and 1,000 vehicles per day along Vancouver Street from Robertson Avenue to West Gore Street. The traffic counts can be found in Appendix B.

OPPORTUNITIES

- Existing motor vehicle volumes are low.

- Connection to Selkirk College–Silver King Campus across the Observatory / Highway 6 overpass.
- Relatively flat longitudinal grade along Silver King Road allows cycling and walking to be comfortable for all ages and abilities.
- Few stop-controlled intersections along the corridor.

CONSTRAINTS

- Sections of sidewalk are in poor condition and lack curb letdowns at many intersections.
- Steep grades from Observatory to West Gore Street.
- Difficult sightlines due to horizontal and vertical curves.
- Constricted right of way with steep grades / challenging terrain adjacent to roadway.

2.3 VIEW STREET

Figure 4: View Street at Kootenay Lake Hospital

The View Street corridor is approximately 1.42 kilometres in length and extends from Park Street to LV Rodgers Secondary School. View Street serves as a local street with single family residential land uses along the corridor as well as Kootenay Lake Hospital. LV Rodgers Secondary School is located at the Eastern Terminus of the corridor.

The corridor currently accommodates two-way east-west motor vehicle traffic with limited parking on both sides of the street. The speed limit is 40km/h as per the Nelson Traffic Bylaw due to no posted speed limits observed. No school zone signs were observed along Sixth Street adjacent to LV Rodgers Secondary School.

The View Street corridor pavement is 5.8-6.8 metres in width. View Street includes a monolithic sidewalk on the west side with two lanes of traffic and parking on the west side (between Park Street and the Kootenay Lake Hospital). Transit currently operates on View Street from Park Street to the Hospital. View Street includes two lanes of traffic, no curbs and limited parking (between Kootenay Lake Hospital and Sixth Street). Sixth Street has two lanes of traffic with parking on both sides of the street in addition to monolithic sidewalks on both sides. Accessibility challenges exist for pedestrians with discontinuous sidewalks, and a lack of facilities along most of the corridor (View Street).

View and Sixth Street are free flow through the whole corridor with all intersecting streets being either stop or yield controlled.

Traffic observations along View Street indicate that traffic volumes are very low as this corridor primarily provides local access for residents, particularly east of the Hospital. Traffic and Speed counts for the corridor were recorded from June 25 to September 27, 2021 along View Street. The estimated AADT is approximately 500 vehicles per day. All traffic counts completed are included in **Appendix A.**

OPPORTUNITIES

- Existing motor vehicle volumes are low.
- LV Rodgers Secondary School and Kootenay Lake Hospital provide major destinations.
- Relatively flat longitudinal grade allows cycling and walking to be comfortable for all ages and abilities.

CONSTRAINTS

- Constrained right-of-way with steep grades / challenging terrain adjacent to the roadway.
- Cross streets have steep grades making sightlines challenging.
- No existing designated pedestrian/cycling facilities along the corridor.

2.4 RAILWAY STREET

Figure 5: Railway Street at Government Road

The Railway Street corridor is approximately 0.3 kilometres in length and extends from South of Carbonate Street to Baker Street. Railway Street serves as a collector street with commercial uses along the corridor. The historical Nelson Coke and Gas Works building is located at the intersection of Railway Street and Government Road.

The corridor currently accommodates two-way north-south motor vehicle traffic with parking on both sides of the street. The speed limit is 40km/h as per the Nelson Traffic Bylaw due to no posted speed limits observed. The west side of the street consists of a mountable curb with a paved boulevard that is used for perpendicular parking. On the east side of the street the commercial properties currently encroach on the right-of-way.

The Railway Street corridor is typically 9.0 metres in width, with a continuous monolithic sidewalk on the east side of the street. Accessibility challenges exist for pedestrians with low mobility along the corridor due to the lack of curb letdowns at Railway Street south of Government Road.

Railway Street is stop controlled at all intersections along the corridor.

Traffic data was not available for Railway Street, but traffic volumes are anticipated to consist of a mix of passenger vehicles and heavy trucks as Railway Street primarily provides access to local commercial/industrial properties. Government Road via Railway Street provides a secondary access to/from Nelson Nelway Highway 3A/6 for vehicles. Due to the high proportion of heavy vehicles, a separated facility for active transportation is desired in order to provide a comfortable and safe facility for all users.

OPPORTUNITIES

- Relatively flat longitudinal grade allows cycling and walking to be comfortable for all ages and abilities.
- Advances a portion of the Railtown Development Plan
- Tie-in to active transportation facilities along Hwy 3A.
- Opportunity to reclaim City right of way to introduce active transportation facility

CONSTRAINTS

- Utility poles along east side of Corridor.
- Ongoing use of the ROW by local businesses.
- Heavy vehicles accessing commercial and industrial properties.

3.0 DESIGN CRITERIA

To appropriately evaluate the constraints and opportunities within the study area, it is important to outline the necessary design criteria for the proposed facilities. The following published resources were reviewed to inform the proposed design criteria:

- Transportation Association of Canada: *Geometric Design Guide for Canadian Roads*; and
- Ministry of Transportation & Infrastructure: British Columbia Active Transportation Design Guide.

A summary of this review and the proposed project criteria are outlined in **Table 1**. Where possible, the conceptual design will strive to achieve the proposed project criteria, although these criteria may be reduced in specific circumstances to address constraints.

Table 1 – Project Design Criteria

Item	Existing Conditions	Project Design Criteria		
		Neighbourhood Bikeway	Advisory Bicycle Lanes[1]	Protected Bicycle Lane
Design Classification	Local Streets, Collector Streets	Urban Local Street	Urban Local Street	Urban Local Street Urban Collector Street
Posted Speed	30-50 km/h	30 km/h	40 km/h	50 km/h
Traffic Volume (Vehicles per Day)	~500-~7000	<1,500	<2,500	>1,500
Basic Lanes	2	2	1	2[2]
Road Width (curb to curb)	~5.8-18.5m	≤9.5m Min. 6.6m at intersections	Min. 6.6m Max. 9.7m (without parking)	≥10m
Parking	Varies	Both Sides	Varies depending on space	Varies depending on space
Bicycle Facility	None	Shared Bikeway	Minimum 1.8m Desired 2.1m	**Uni-directional** Minimum 1.8m Desired 2.2m **Bi-directional** Minimum 3.0m[3] Desired 3.6m **Buffer** Minimum 0.3m Desired 1.0m

[1]Note: *Advisory bicycle lane design guidance (TAC, BCAT) requires relatively straight and flat roads with few visual obstructions.*

[2]Note: *Where adequate space for two motor vehicle lanes does not exist one-way motor vehicle travel may be a suitable option to accommodate protected bicycle facilities.*

[3]Note: *Absolute minimum of 2.5 m for short sections where adequate space is not available to accommodate minimum width protected bike lanes and buffer.*

4.0 DESIGN OPTIONS

At the onset of the design phase, options were developed for each project based on a number of factors including, but not limited to, traffic volumes, traffic speed, longitudinal grade, and available space within the right-of-way. Generally, as traffic speeds and traffic volumes increase greater separation is needed to provide a safe and comfortable facility for all ages and abilities. **Figure 6** is the Bicycle Facility Selection Decision Support Tool from the BC Active Transportation Design Guide that supports the development of options for these projects.

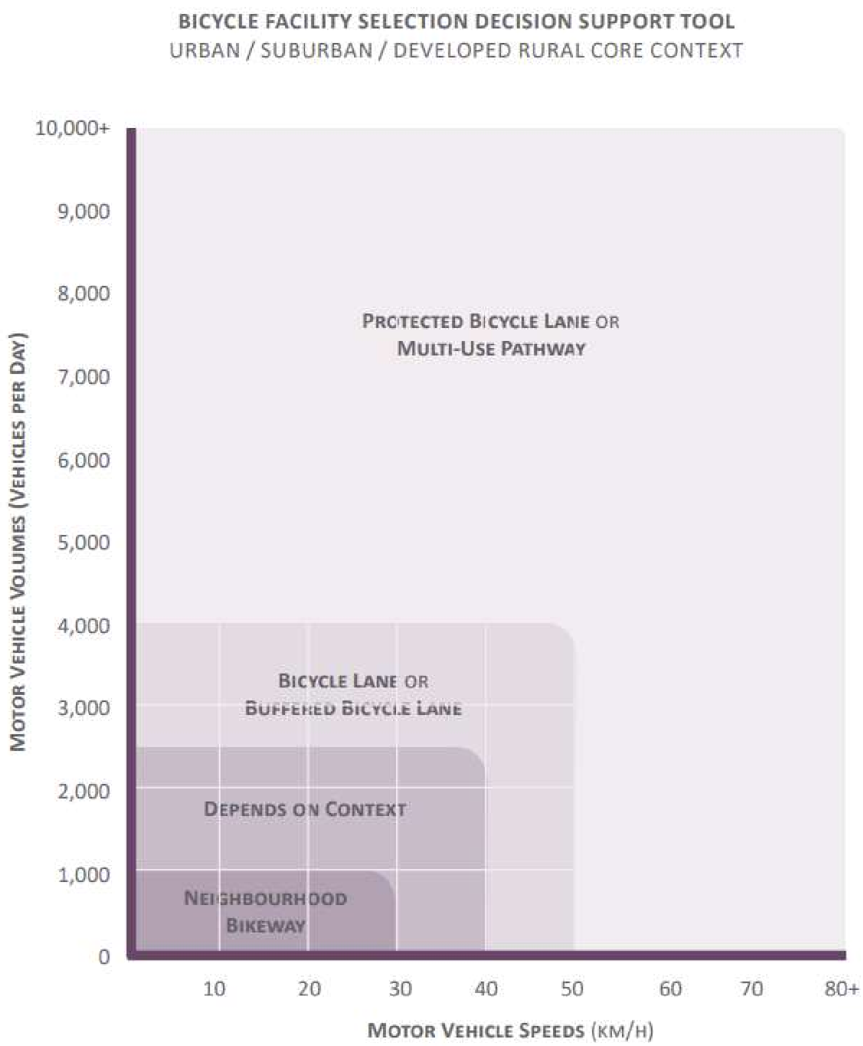


Figure 6: BCAT Design Guide – Bicycle Facility Selection Decision Support Tool

4.1 DOWNTOWN TO OBSERVATORY STREET HIGHWAY OVERPASS

The design options that were assessed for the Downtown to Observatory Street Highway Overpass corridor were based on the varied characteristics along the corridor, with the options looking at how a combination of facility types may be designed to provide safe and comfortable cycling facilities. **Figure 7** displays the segments of the corridor, grouped by street type, and the following sub-sections present the options that were considered for each corridor. The corridor was selected largely based on minimizing longitudinal grades for cyclists. **Figure 8** illustrates the approximate slopes for each street within Nelson and shows the grade issues that are present.

In general, there were two options considered: 1) bi-directional protected bike lanes and 2) neighbourhood bikeways. Bi-directional protected bike lanes are physically separated facilities typically located curbside with a physical barrier between traffic and the bike lanes. They are generally most appropriate on streets with higher traffic volumes and speeds. Bi-directional bike lanes present potential issues with contraflow bike travel as motorists may not expect cyclists travelling in both directions at intersections and driveways.

Neighbourhood bikeways are streets with low traffic volumes and slower speeds that are typically enhanced in ways to prioritize travel by bicycle. This can be done in a variety of ways, including pavement markings, traffic calming (speed management), and/or traffic diversion (volume management). Traffic calming features can include curb extensions, speed humps/tables, or chicanes and traffic diversion can include median barriers, directional diverters, or street closures. These features are not always necessary to implement a neighbourhood bikeway, however they may be added post-implementation if issues are noted along a corridor.

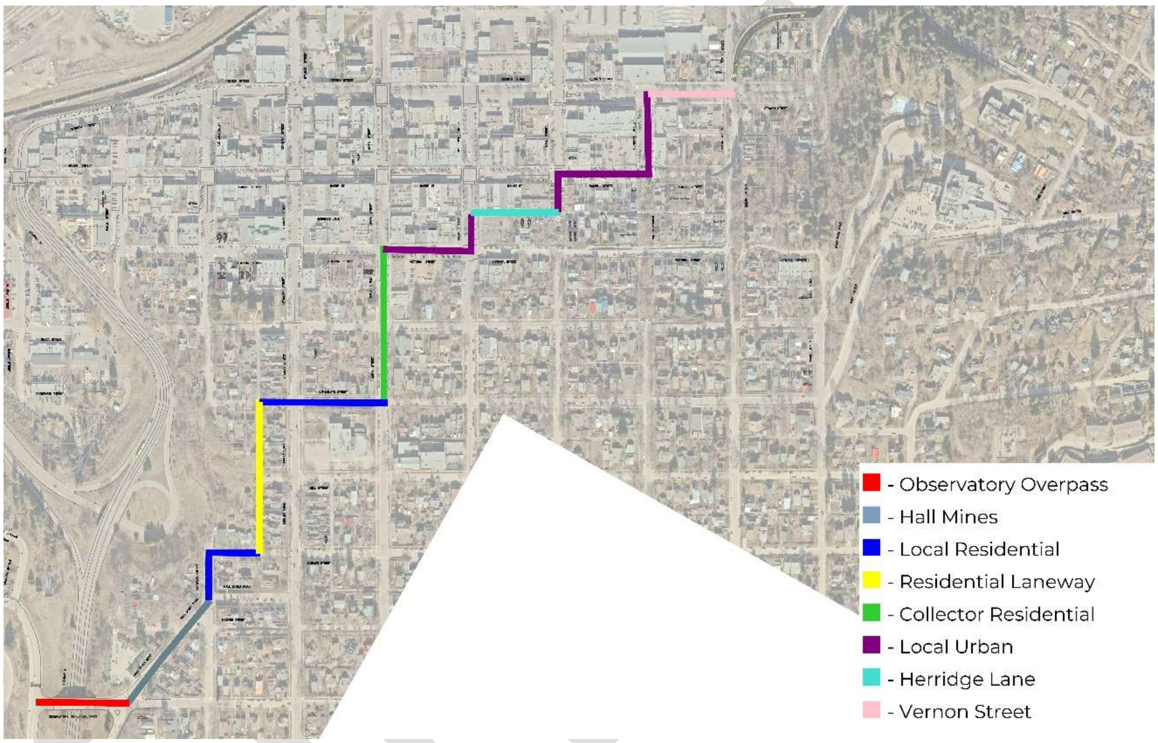


Figure 7: Downtown to Observatory Street Highway Overpass

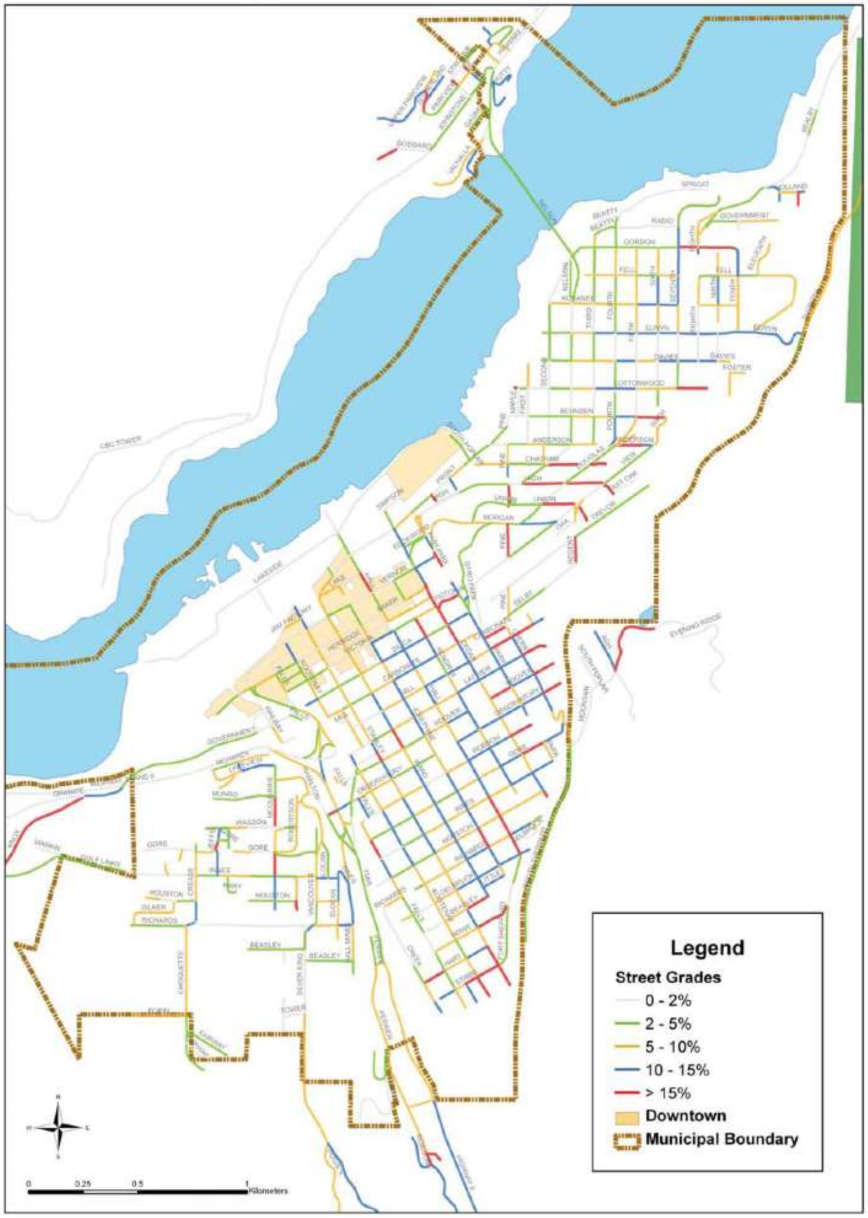


Figure 8: Nelson Street Grades

4.1.1 OBSERVATORY STREET / HIGHWAY OVERPASS

Due to the high traffic volumes and available road space on the overpass, a bi-directional protected bike lane was the only option considered for the active transportation facility. However, options for the layout of the vehicle lanes on the overpass were considered and developed in conjunction with the Ministry of Transportation and Infrastructure.

Option 1 – Bi-directional Bike Lane with Three Vehicle Lanes

The first option, shown in **Figure 9**, maintained three lanes for vehicle traffic with left turn lanes at each end of the overpass. This option has benefits to traffic capacity at the intersections, but potential issues include channelization without a median to separate the turn lanes and lack of snow storage space.

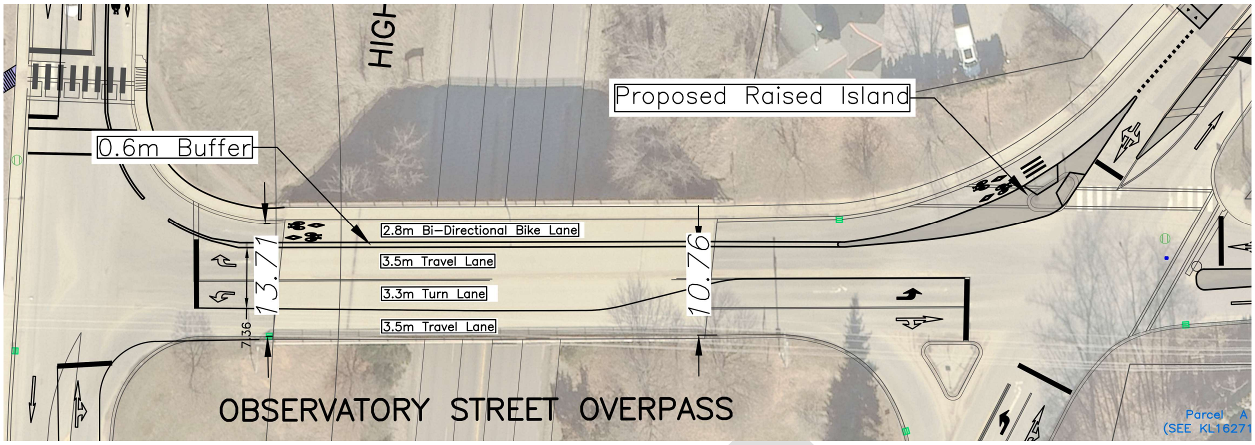


Figure 9: Option 1 – Bi-directional Bike Lane with Three Vehicle Lanes

Option 2 – Bi-directional Bike Lane with Two Vehicle Lanes and Painted Buffer

The second option, shown in Figure 10, reduces the cross-section to two lanes for vehicle traffic, providing an increased buffer to the bike lane to provide snow storage capacity during the winter months. This option improves the pedestrian crossings at the west intersection and simplifies channelization, however it does reduce vehicle capacity on the overpass.

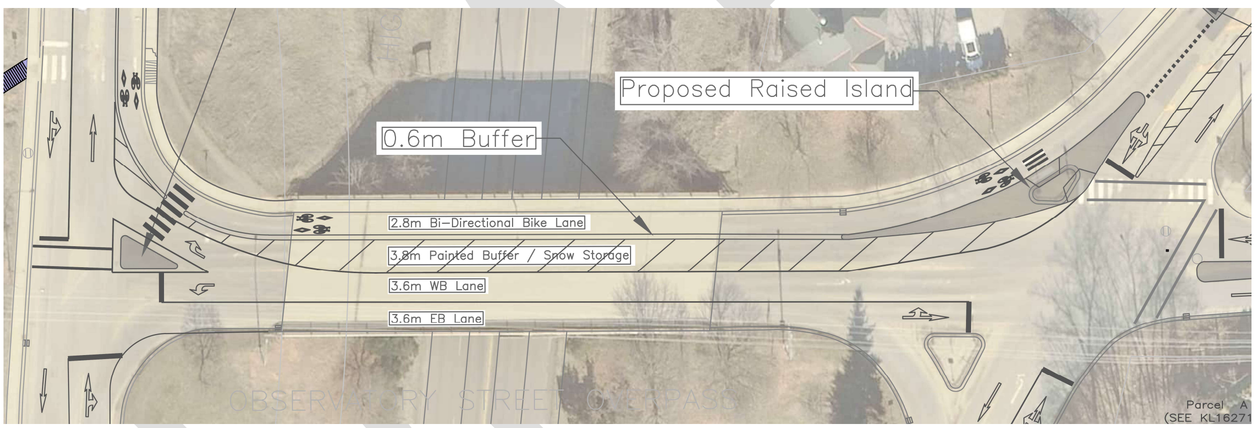


Figure 10: Option 2 – Bi-directional Bike Lane with Two Vehicles Lanes and Painted Buffer

Preferred Option: Option 2 – Bi-Directional Bike Lane with Two Vehicle Lanes and Painted Buffer

The Ministry and City's preferred option for the overpass is Option 2. It provides adequate lane designation and capacity for motorists while providing a buffered bi-directional bike lane and improved pedestrian crossings. The 3.8m painted buffer provides additional snow storage space in the winter while accommodating off-tracking movements for larger vehicles. This option includes all-way stop control for vehicles at each intersection.

4.1.2 HALL MINES ROAD

Due to high traffic volumes, available road space, and the connection to the Observatory Street Overpass, a bi-directional protected bike lane was the only option considered for Hall Mines Road. The design consists of a 3.0m bi-directional protected bike lane with two 3.5m vehicle lanes, as shown in Figure 11.

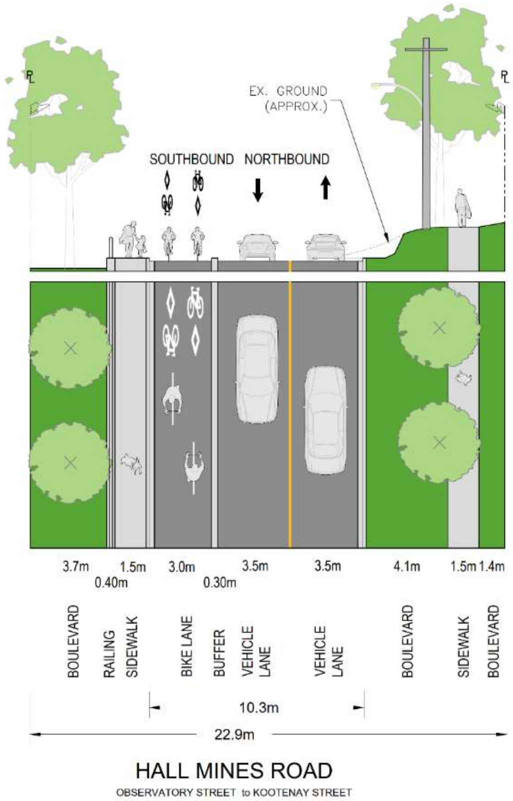


Figure 11: Proposed Cross-section for Hall Mines Road

Options were considered for the intersection of Hall Mines Road and Hoover Street in order to improve channelization and simplify vehicle movements at the intersection. Three options were considered: 1) full access closure, 2) right-in right-out intersection, and 3) channelization island.

Option 1 – Full Access Closure

The first option, shown in Figure 12, removes the connection between Hall Mines Road and Hoover Street/Kootenay Street. This would provide significant safety improvements for pedestrians and vehicles that exist due to the lack of channelization and difficult sightlines for some movements. The drawback of this option is the lack of access to/from Hall Mines Road and Hoover Street/Kootenay Street.

BENEFITS

- Opportunity for greenspace;
- Improved safety for pedestrians; and
- Eliminates sightline safety concerns.

CHALLENGES

- Motor vehicle access removed; and
- Impacts large vehicle access.

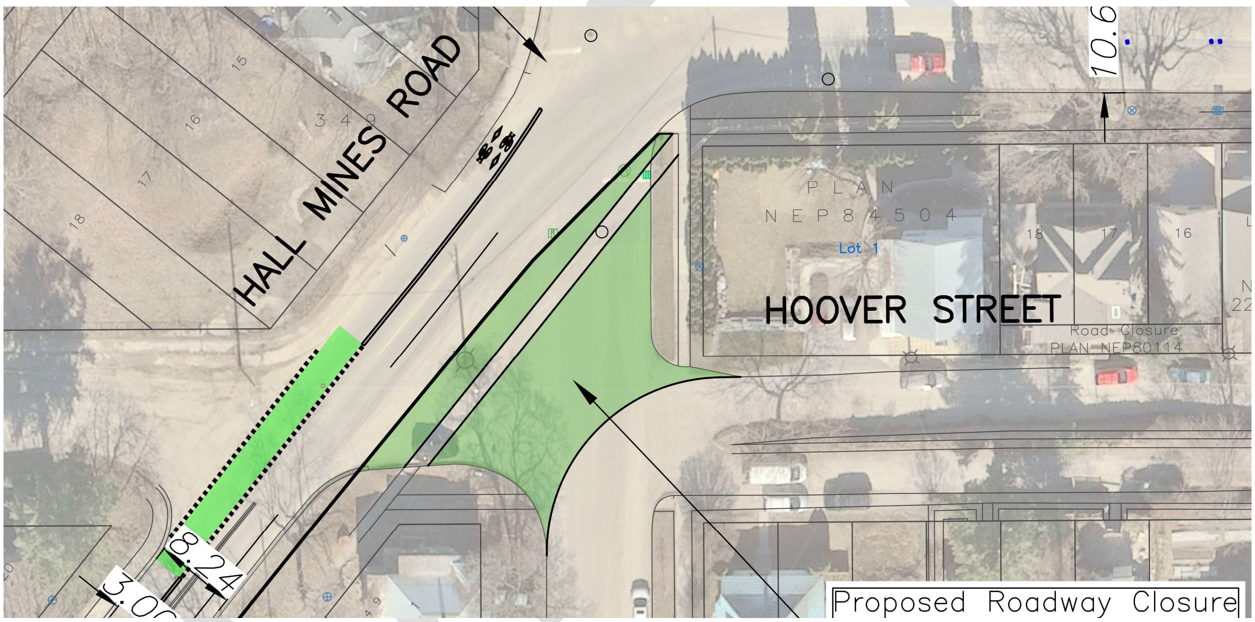


Figure 12: Option 1 – Full Access Closure

Option 2 – Right-In Right-Out Intersection

The second option, shown in Figure 13, simplifies the connection between Hall Mines Road and Hoover Street/Kootenay Street. This option has similar benefits and drawbacks as Option 1. It would provide significant safety improvements for pedestrians and vehicles that exist due to the lack of channelization and difficult sightlines for some movements. This option would also require rerouting of the existing Transit route on Kootenay Street.

BENEFITS

- Opportunity for greenspace;
- Maintains vehicle access;
- Improved safety for pedestrians; and
- Eliminates sightline safety concerns.

CHALLENGES

- Reduced motor vehicle access; and
- Impacts large vehicle access.

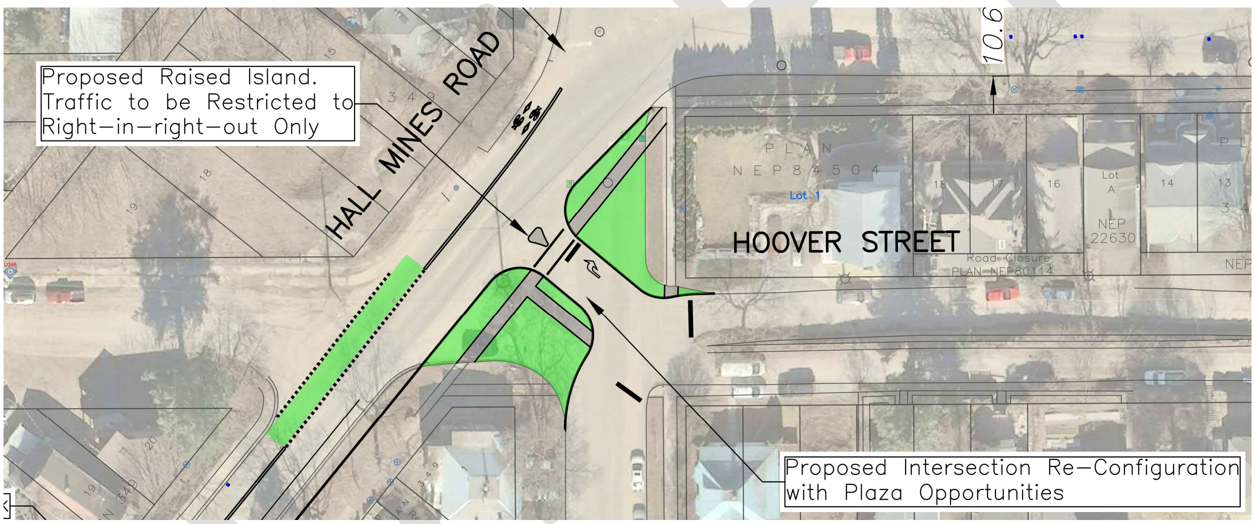


Figure 13: Option 2 – Right-in Right-out Intersection

Option 3 – Channelization Island

The third option, shown in **Figure 14**, simplifies the connection between Hall Mines Road and Hoover Street/Kootenay Street. This option provides access from Hall Mines Road to Hoover Street/Kootenay Street, but limits access onto Southbound Hall Mines Road. The introduction of the island would improve pedestrian and vehicle safety by providing pedestrian refuge, clear channelization for vehicles, and limiting vehicle movements. Transit access would remain for the existing route on Kootenay Street.

BENEFITS

- Opportunity for minor greenspace improvements;
- Maintains vehicle access and simplifies channelization;
- Improved safety for pedestrians; and
- Eliminates sightline safety concerns.

CHALLENGES

- Reduced motor vehicle access.

Figure 14: Option 3 – Channelization Island

Preferred Option: Option 2 - Right-In Right-Out Intersection

The preferred option for the intersection of Hall Mines Road and Hoover Street/Kootenay Street is Option 2. This option provides improved delineation and sightlines for motorists, improved connectivity and safety for pedestrians, added greenspace, and maintains access for residents. As part of this option we recommend restricting left turns. The raised island is recommended to deter illegal left-turns, however it's use should be reviewed further during detailed design as Kootenay Street is currently used as a detour route for larger vehicles (Transit) when Stanley Street is unavailable. A mountable island may be an option to deter passenger vehicles while accommodating larger vehicles when needed.

4.1.3 LOCAL AND COLLECTOR RESIDENTIAL STREETS

Since the streets along the corridor generally have 40km/h speed limits and lower traffic volumes, they fall within the “Depends on Context” region of the BCAT Design Guide’s Facility Selection Decision Support Tool. As such, the two options considered for the local and collector residential street portions of the corridor were bi-directional protected and/or buffered bike lanes and neighbourhood bikeways. The local and collector residential streets along the corridor include:

- Kootenay Street – Hall Mines Road to Latimer Street;
- Latimer Street – Kootenay Street to laneway west of Stanley Street;
- Carbonate Street – laneway west of Stanley Street to Ward Street; and
- Ward Street – Carbonate Street to Victoria Street.

Option 1 – Bi-directional Bike Lanes

The implementation of the bike lanes would require the removal of parking on one side of the street, which in some segments of the corridor is all the on-street parking. Removal of parking is often contentious for local residents, but consideration must be given to the trade-offs for the improvement of the regional network versus the implications at a local level. Bi-directional bike lanes also often require added considerations at intersections as the two-way cycling traffic can cause confusion for drivers. The cross-section is illustrated in **Figure 15.**

BENEFITS

- Separated facility for cyclists.

CHALLENGES

- Removal of on-street parking;
- Added maintenance requirements;
- Higher cost to implement; and
- Increased complication at intersections for interactions between cyclists and drivers.

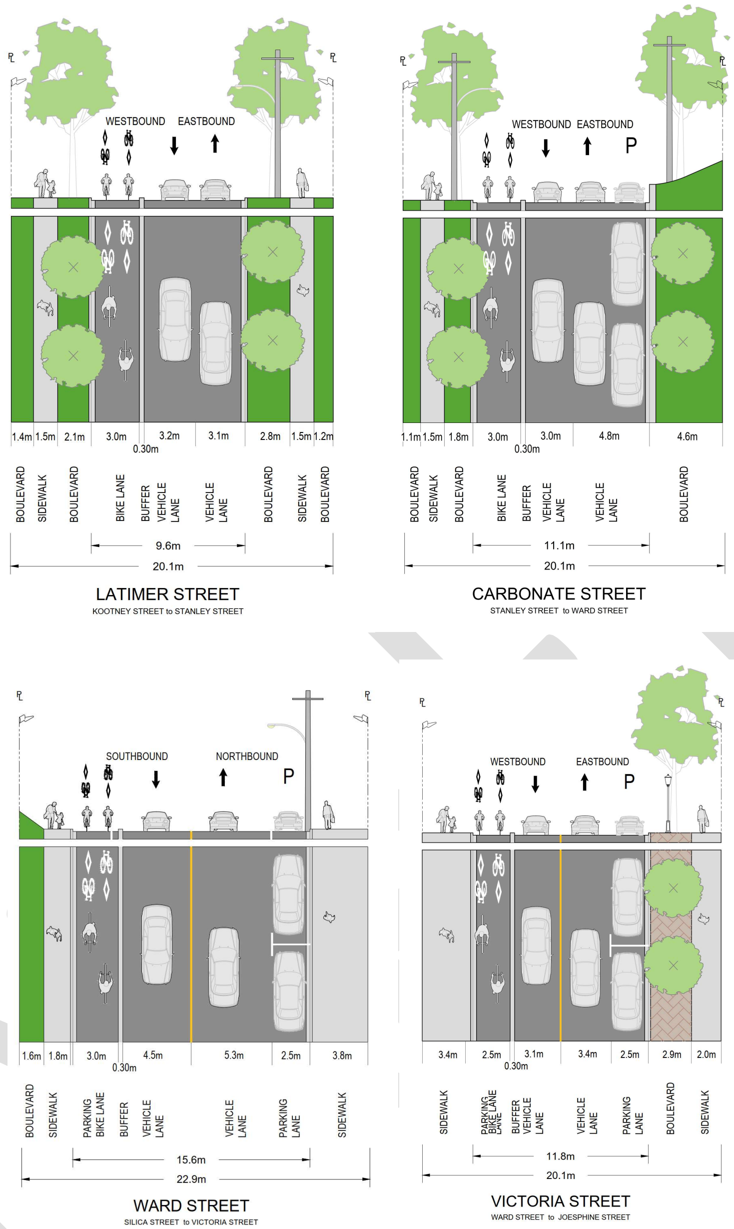


Figure 15: Option 1 – Bi-Directional Protected Bike Lanes

Option 2 – Neighbourhood Bikeways

The local and collector residential streets identified are assumed to have relatively low traffic volumes and have 40 km/h speed limits. As such, neighbourhood bikeways can be considered as a suitable option. With the provision of pavement markings and signage the streets can be highlighted as a bikeway and over time if traffic volumes or speeds are seen as an issue, traffic calming or diversion features can be implemented as needed. The cross-section is illustrated in **Figure 16.**

BENEFITS

- Low cost;
- Low maintenance;

- Traffic calming can be popular with local residents and can improve aesthetics; and
- Maintains on-street parking.

CHALLENGES

- Cyclists and motorists must share the road; and
- Can be difficult to enhance the visibility of cyclists and highlight the facility for motorists.

Preferred Option: Option 2 – Neighbourhood Bikeways

Neighbourhood bikeways are the preferred option for the local and collector residential streets because of the low cost, low maintenance, and the ability to maintain on-street parking. The traffic volumes and speeds on these streets are low enough to provide a safe and comfortable bicycle facility, however 30 km/h posted speed limits are recommended to further increase the safety of these routes. Neighbourhood bikeways provide the benefit of quickly implementing a cycling facility over a large area while also being able to add traffic calming elements at the onset or following ongoing monitoring of the facility.

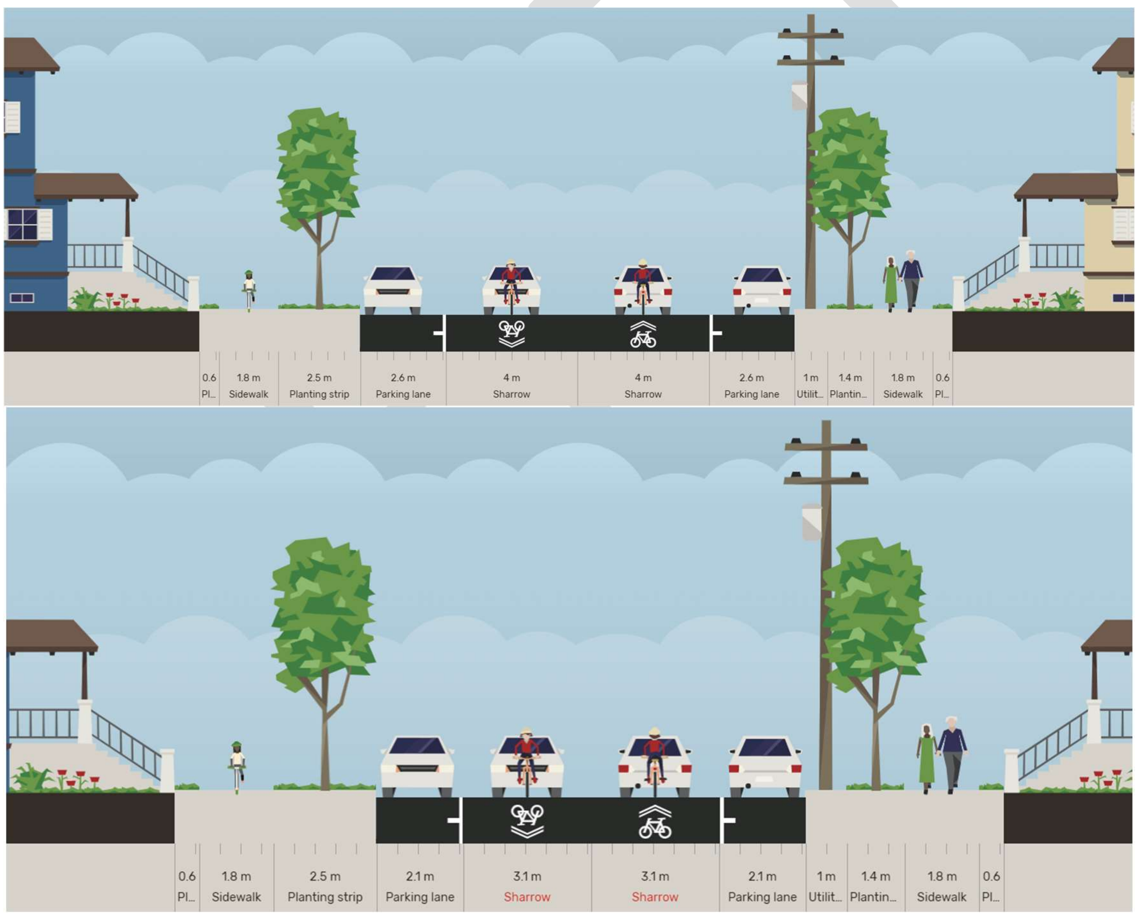


Figure 16: Option 2 – Neighbourhood Bikeways – Local and Collector Residential Streets

4.1.4 RESIDENTIAL LANEWAY

Residential laneways were considered for use where existing travel patterns indicate use by cyclists and where it is advantageous to travel via a laneway due to longitudinal grades. As part of the Downtown to Observatory Street Highway Overpass corridor the residential laneway west of Stanley Street between Latimer Street and Carbonate Street was identified as it runs parallel to Stanley Street, has very low traffic volumes, and has manageable longitudinal grade.

Due to the low volumes, low speeds, and limited right-of-way the only option considered for the laneway was a neighbourhood bikeway. The cross-section is illustrated in **Figure 17.**

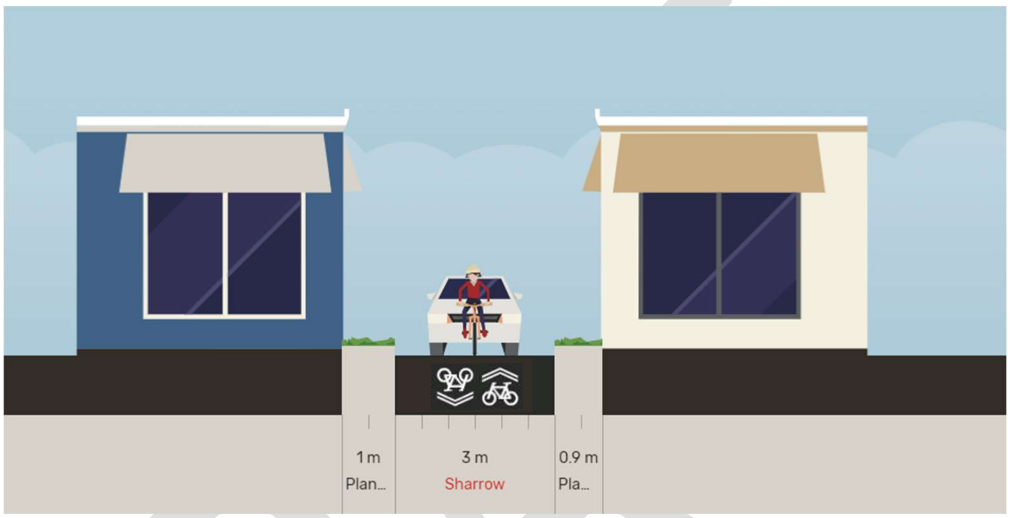


Figure 17: Neighbourhood Bikeway – Residential Laneway

4.1.5 LOCAL URBAN STREET

As the corridor transitions into the Downtown area of Nelson, the land uses along the streets changes from primarily single-family residential to multi-family residential and commercial. With the change, on-street parking takes on added importance as demand is increased in these areas, traffic volumes increase, and right-of-way space becomes more in-demand.

The local urban streets along the corridor include:

- Victoria Street – Ward Street to Josephine Street;
- Josephine Street – Victoria Street to Herridge Lane;
- Hall Street – Herridge Lane to Baker Street;
- Baker Street – Hall Street to Hendryx Street; and
- Hendryx Street – Baker Street to Vernon Street.

The streets along the identified corridor have reasonable traffic volumes and have 40 km/h speed limits and as such, the same two options are considered: 1) bi-directional protected bike lanes and 2) neighbourhood bikeways.

Option 1 – Bi-directional Protected Bike Lanes

The implementation of bi-directional bike lanes would require the reallocation of the parking lane on one side of the street to the bike lanes. Removal of parking is often contentious for local residents and businesses, but consideration must be given to the trade-offs for the improvement of the regional network versus the implications at a local level. Bi-directional bike lanes also often require added considerations at intersections as the two-way cycling traffic can cause confusion for drivers. An example of the proposed cross section is illustrated in **Figure 18.**

BENEFITS

- Separated facility for cyclists.

CHALLENGES

- Removal of on-street parking;
- Added maintenance requirements;
- Higher cost to implement; and
- Increased complication at intersections for interactions between cyclists and drivers.

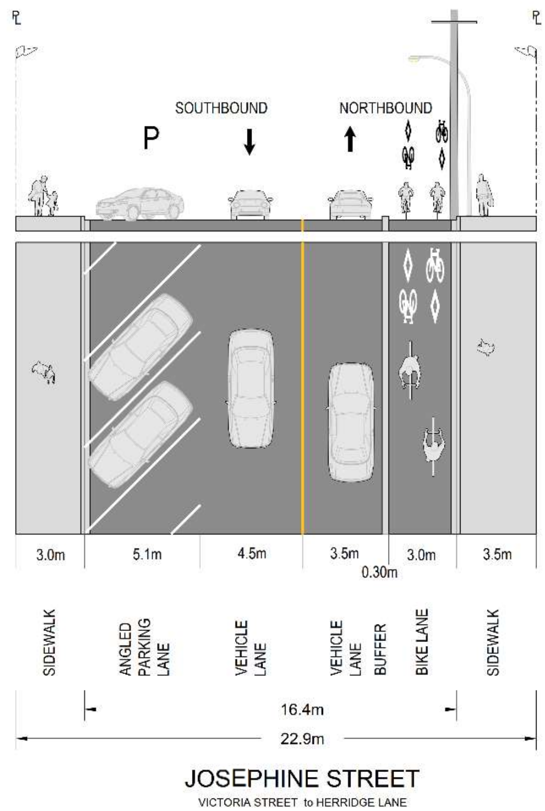


Figure 18: Bi-Directional Protected Bike Lane – Josephine Street

Option 2 – Neighbourhood Bikeways

The local urban streets identified along the corridor have low/moderate traffic volumes and 40 km/h speed limits. As such, neighbourhood bikeways can be considered as a suitable option. With the provision of pavement markings and signage the streets can be highlighted as a bikeway and over time if traffic volumes or speeds are seen as an issue, traffic calming or diversion features can be implemented as needed. An example of the proposed cross section is illustrated in **Figure 19.**

BENEFITS

- Low cost;
- Low maintenance;
- Traffic calming can be popular with local residents and can improve aesthetics; and
- Maintains on-street parking.

CHALLENGES

- Cyclists and motorists must share the road;
- Can be difficult to enhance the visibility of cyclists and highlight the facility for motorists; and
- Back-out-angled parking creates safety challenges for cyclists.

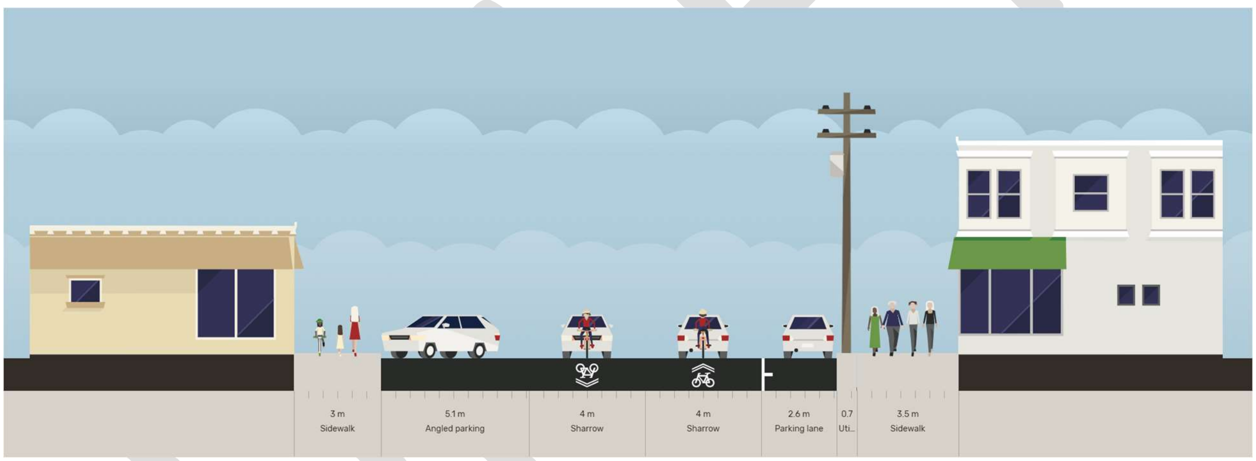


Figure 19: Neighbourhood Bikeway – Josephine Street

Preferred Option: Option 2 – Neighbourhood Bikeways

Neighbourhood bikeways are the preferred option for the local urban streets because of the low cost, low maintenance, and the ability to maintain on-street parking. The traffic volumes and speeds on these streets are low enough to provide a safe and comfortable bicycle facility, however 30 km/h posted speed limits are recommended to further increase the safety of these routes. Neighbourhood bikeways provide the benefit of quickly implementing a cycling facility over a large area while also being able to add traffic calming elements at the onset or following ongoing monitoring of the facility.

4.1.6 HERRIDGE LANE

Laneways were considered for use where existing travel patterns indicate use by cyclists and where it is advantageous to travel via a laneway that is parallel to a street with high traffic volumes. As part of the corridor Herridge Lane was identified as part of the route as it runs parallel to Baker Street, has very low traffic volumes, has manageable longitudinal grade, and provides a connection to Hendryx Street.

Due to the low volumes, low speeds, and limited right-of-way the only option considered for the laneway was a neighbourhood bikeway. The cross-section is illustrated in **Figure 20.**

Figure 20: Neighbourhood Bikeway – Herridge Lane

4.1.7 VERNON STREET

Vernon Street is a primary east-west street within Nelson's Downtown. The street is home to several restaurants, businesses, and community buildings. The existing street cross-section consists of one lane of travel in each direction, angled parking on each side of the street, and a treed median dividing the roadway.

With the goal of connecting to Edgewood Avenue (High Street Corridor), options were considered to connect from Herridge Lane to the intersection of Edgewood Avenue/Cedar Street and Vernon Street. A few routing options were considered. Herridge Lane to Cedar Street was reviewed, but ultimately removed from consideration due to the slope constraints at the east end of Herridge Lane. Routing via Baker Street to Cedar Street was also investigated, but ultimately removed from consideration due to the space constraints where Baker Street meets Cedar Street and since Baker Street/Cedar Street are one-way for vehicles. The alignment that was ultimately selected was via Hendryx Street and Vernon Street. The cross-section of Hendryx Street is included in the discussion of local urban streets.

Several options were developed for Vernon Street to provide a safe and comfortable connection to Edgewood Avenue while limiting the impacts to on-street parking and traffic operations. All options include dedicated bike lanes due to the high traffic volumes anticipated on Vernon Street.

Option 1 – Uni-Directional Protected Bike Lanes

Uni-directional bike lanes were considered adjacent to the curb on each side of the street. By narrowing the vehicle lane, the angled parking is able to be maintained. Uni-directional bike lanes follow the flow of traffic and are generally less confusing for users and motorists. Difficulty remains at each intersection with Vernon Street for cyclists making left-turns off Vernon Street to access the side streets. The plan view of this option is shown in **Figure 21.**

BENEFITS

- Separated facility for cyclists; and
- Minimal impact to on-street parking and traffic operations.

CHALLENGES

- Increased maintenance required;
- Sightline issues for motorists and cyclists with parked vehicles; and
- Left-turn movements for cyclists may be challenging.

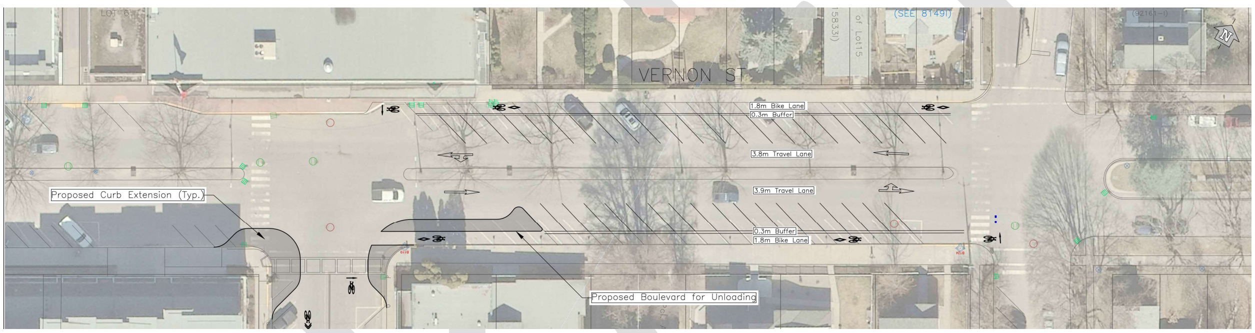


Figure 21: Option 1 – Uni-Directional Protected Bike Lanes

Option 2 – Uni-Directional Painted Bike Lanes

Uni-directional bike lanes were considered between Cedar Street and Hendryx Street. By narrowing the vehicle lane, angled parking is maintained. Uni-directional bike lanes follow the flow of traffic and are generally less confusing for users and motorists. Difficulty remains at each intersection with Vernon Street for cyclists making left-turns off Vernon Street to access the side streets. As part of this option, changing the front-in-angled parking to back-in-angled parking is recommended to improve the visibility of cyclists for vehicles exiting parking stalls. With front-in-angled parking, sightlines are impeded by adjacent parked vehicles, and it can be difficult to see cyclists and vehicles upstream on the street without partially backing out of the stall. The plan view of this option is shown in **Figure 22.**

BENEFITS

- Simplified maintenance;
- Minimal impact to on-street parking and traffic operations.

CHALLENGES

- Conflicts between parked vehicles and cyclists;
- Left-turn movements for cyclists may be challenging.

Figure 22: Option 2 – Uni-Directional Painted Bike Lanes

Option 3 – Bi-Directional Protected Bike Lanes

Bi-directional bike lanes were considered along the eastbound lanes of Vernon Street between Cedar Street and Hendryx Street. By narrowing eastbound vehicle lanes, parallel parking replaces the angled parking removing 9 parking spaces to accommodate the bi-directional facility. Bi-directional bike lanes follow the flow of traffic and are generally less confusing for users and motorists. Difficulty remains at each intersection with Vernon Street for cyclists making left-turns off Vernon Street to access the side streets. This design was chosen as the preferred option. The plan view of this option is shown in **Figure 23.**

BENEFITS

- Separated facility for cyclists; and
- No change to on-street parking and traffic operations on Westbound Lanes .

CHALLENGES

- Increased maintenance required;
- Left-turn movements for cyclists may be challenging; and
- Conversion to parallel parking lanes on Eastbound Lanes results in loss in on-street parking spaces.

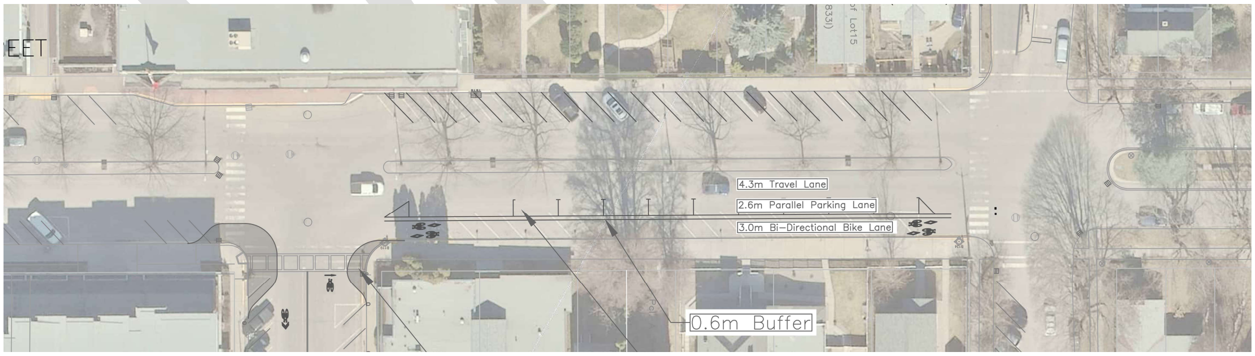


Figure 23: Option 3 – Bi-Directional Protected Bike Lanes

Preferred Option: Option 2 – Uni-Directional Painted Bike Lanes

Uni-directional painted bike lanes are the preferred option for Vernon Street. The implementation provides a cycling facility that requires minimal geometric changes to the street and maintains the on-street parking on both sides of Vernon Street. The implementation of bike boxes at each intersection is recommended to provide the option of a two-stage left-turn for cyclists. It is also recommended that the angled parking be changed to back-in-angled parking as this provides increased visibility for drivers as they exit the parking stall.

4.1.8 VERNON AT CEDAR STREET/EDGEWOOD AVENUE INTERSECTION

Options were considered for the intersection of Vernon and Cedar Street to improve channelization and the tie-ins for cyclists into the existing High Street Corridor on Edgewood Avenue. The existing configuration of the intersection involves five legs, with the three legs of Cedar Street and Edgewood Avenue stop controlled. Both legs of Cedar Street are one-ways with directions towards the intersection. The section of Cedar Street north of the intersection is designated as right-turn only to remove conflicts with right turn movement from Edgewood Avenue on to Vernon Street. Two options were considered: 1) curb bump-outs with a bike box and 2) right turn Channelization from Cedar Street.

Option 1 – Curb Bump-outs with Bike Channelization

The first option, shown in **Figure 24**, extends the median along Vernon Street to provide safe refuge for pedestrian and cyclist crossings on Vernon Street. The addition of the left turn bike boxes at each intersection provides an alternative crossing option for left turning cyclists. Cyclists will have the option to take the vehicle lane to make the left turn or to use the bike boxes and wait for a gap in traffic. The curb bump-outs at each corner would shorten crossing distances for pedestrians and cyclists significantly. This would provide significant safety improvements for pedestrians, cyclist and vehicles.

Included in this option is the conversion of the angled parking to back-in-angled parking in order to increase visibility of cyclists for drivers entering/exiting the parking spaces.

BENEFITS

- Improved crossings for cyclists;
- Median refuge for southbound to westbound cyclists;
- Shortened pedestrian crossings; and
- Minimal change to intersection operations.

CHALLENGES

- Left-turn movements for cyclists may be challenging.

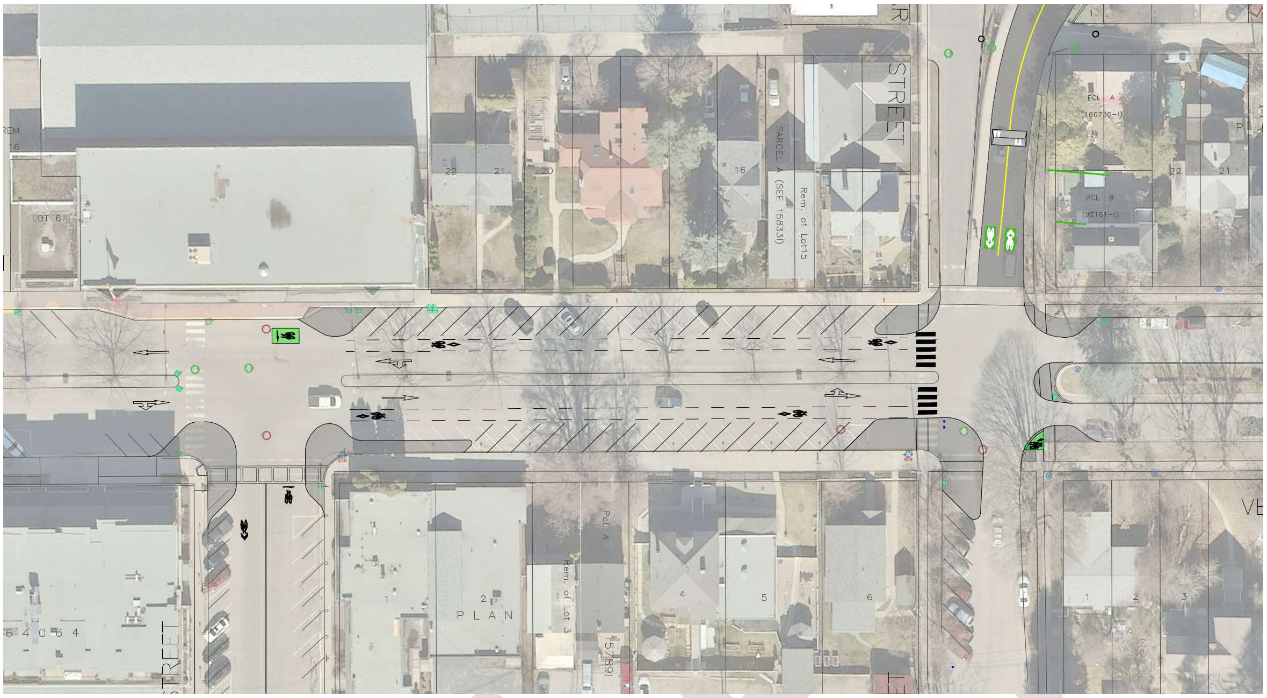


Figure 24: Option 1 – Curb Bump-outs with Bike Channelization

Option 2 – Right turn Channelization from Cedar Street

The second option, shown in **Figure 25**, follows a similar design as Option 1, but includes channelization of the right turn vehicle movement from north leg of Cedar Street. The addition of a roll-over curb enforces right turn only movements from Cedar Street into Vernon Street and include space for vehicles to merge with westbound traffic on Vernon Street.

BENEFITS

- Improved crossings for cyclists;
- Median refuge for southbound to westbound cyclists;
- Shortened pedestrian crossings; and
- Minimal change to intersection operations.

CHALLENGES

- Increased maintenance requirements;
- Loss in on-street parking spaces;
- Short merge lane; and
- Left-turn movements for cyclists may be challenging.

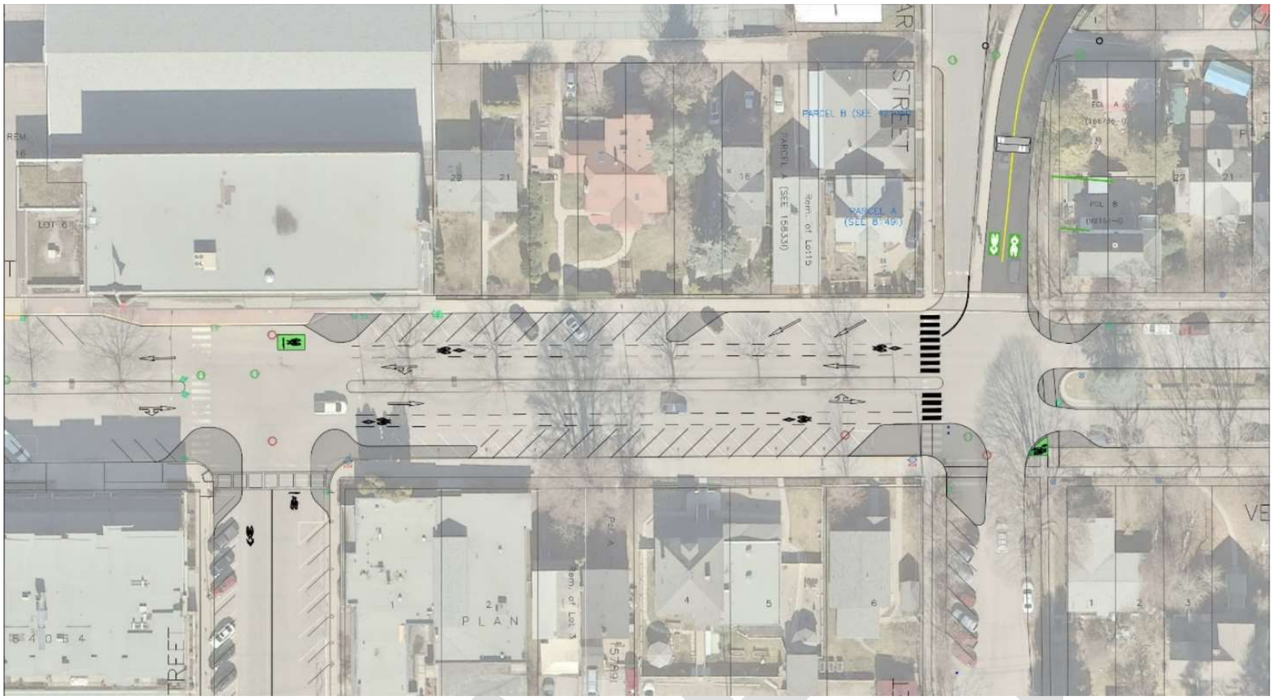


Figure 25: Option 2 – Right Turn Channelization from Cedar Street

Option 3 – Mini-Roundabout with Right turn Channelization from Cedar Street

The third option, shown in **Figure 26**, is a mini roundabout with channelization of the right turn vehicle movement from the north leg of Cedar Street. The central island of the roundabout would be required to be traversable to allow for turning movements of large single unit trucks and emergency vehicles, as specified in TAC's Geometric Design Guide. The addition of splitter islands channelizes vehicle movements approaching and exiting the roundabout and provides refuge for pedestrians. A channelization island enforces right turn only movements from Cedar Street into Vernon Street and includes space for vehicles to merge with westbound traffic on Vernon Street. The challenge of a roundabout is the accommodation of cyclists. Cyclists would be required to merge with traffic in advance of the roundabout so as to avoid conflicts and confusion between cyclists and vehicles as they traverse the roundabout.

BENEFITS

- Channelized traffic flow;
- Reduced vehicle speeds through intersection; and
- Shortened pedestrian crossings.

CHALLENGES

- Increased maintenance requirements;
- Loss in on-street parking spaces;
- Short merge lane;
- Cyclists must merge with traffic in advance of the roundabout; and
- Significant change to intersection operations.

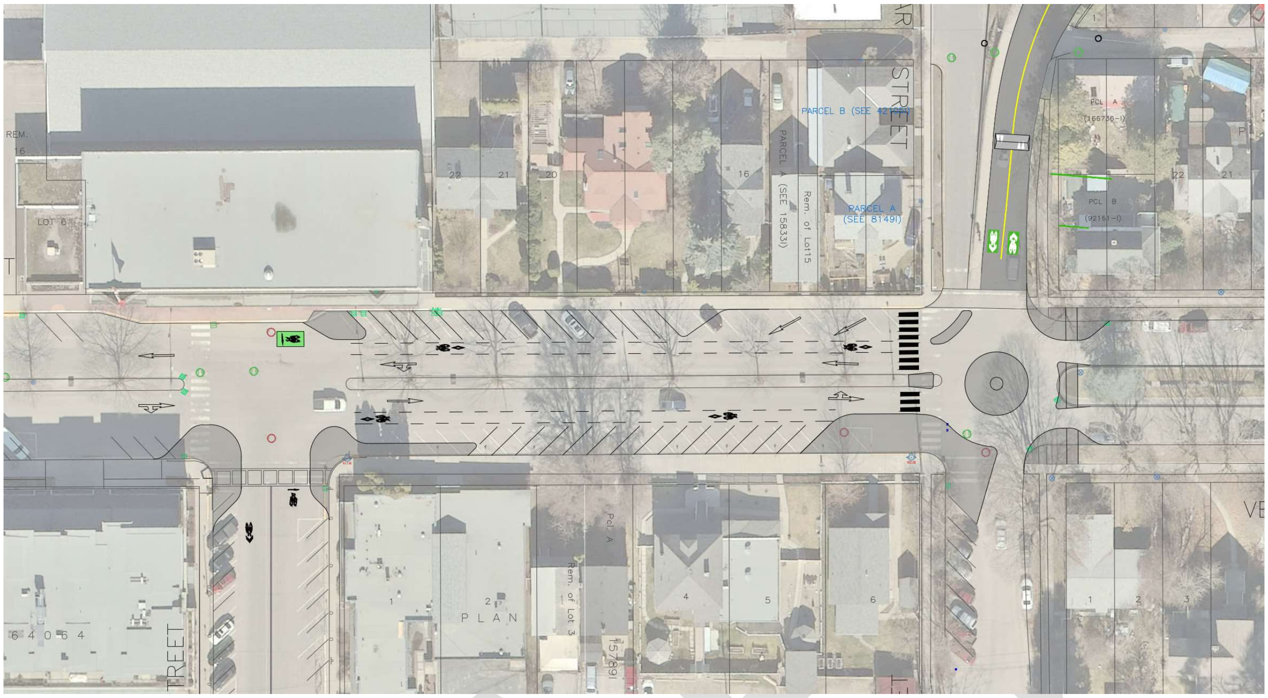


Figure 26: Option 3 – Mini Roundabout with Right turn Channelization from Cedar Street

Preferred Option: Option 1 – Existing Conditions with Bike Channelization

The first option provides the best balance between all users. Maximizing available on-street parking while providing improved pedestrian and cyclist accommodation. Consideration should be given in the future for signalization of the Vernon Street and Cedar Street intersection to further improve the crossing opportunities for all users.

4.2 ROSEMONT BIKEWAY

The design options that were assessed for the Rosemont corridor were based on the varied characteristics of the corridor with the options looking at how a combination of facility types may be designed to provide safe and comfortable cycling facilities. **Figure 27** displays the segments of the corridor, grouped by street type, and the following sub-sections present the options that were considered for each corridor.

Bi-directional protected bike lanes are physically separated facilities typically located curbside with a physical barrier between traffic and the bike lanes. They are generally most appropriate on streets with higher traffic volumes and speeds. Bi-directional bike lanes present potential issues with contraflow bike travel as motorists may not expect cyclists travelling in both directions at intersections and driveways.

Multi-use pathways (MUPs) are pathways that are separated from the road and are shared between pedestrians and cyclists. They are generally most appropriate along roadways with higher traffic volumes and speeds. MUPs also present potential issues with contraflow bike travel as motorists may not expect cyclists travelling in both directions at intersections and driveways. The interactions between cyclists and pedestrians can also be of concern, particularly in areas with high volumes of each.

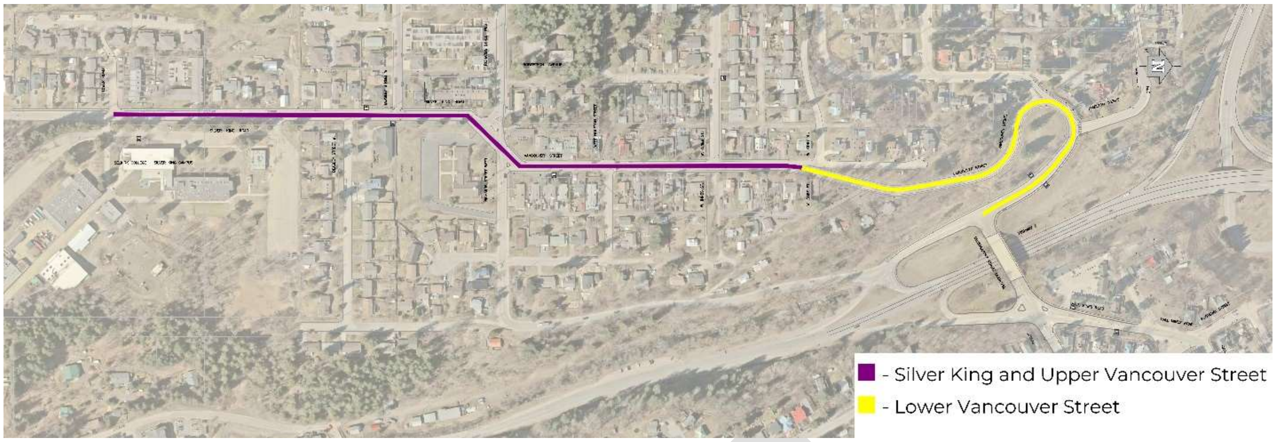


Figure 27: Rosemont Bikeway

4.2.1 LOWER VANCOUVER STREET

Lower Vancouver Street has a steep gradient to connect to the upper elevations of the Rosemont neighbourhood. This section serves as a collector and is the main access point to the Rosemont neighbourhood. The surrounding zoning is single family residential with road and laneway access only. Vancouver Street follows a hairpin turn with steep grades. Due to high traffic volumes, available road space, and the connection to the Observatory Street Overpass, a multi-use path option was considered for Vancouver Street as well as an option via Robertson Avenue, Gore Street West, McQuarrie Avenue, and Richards Street. A multiple account evaluation was completed for the two alignments, as shown in **Table 2.**

The multi-use path option along Vancouver Street consists of a 3.5m path along the outer section of the hairpin turn with two 3.5m vehicle lanes, as shown in **Figure 28**.

Table 2 – Multiple Account Evaluation

CRITERIA	OPTION 1 – Via Vancouver Street	OPTION 2 – Via Robertson Avenue, Gore Street, McQuarrie Avenue, and Richard Street
Available Space	+ Option consists of protected bike lanes and MUPs – space available with parking removal	+ Option consists mostly local street bikeway – no dedicated space required
Cycling Network Connectivity	+ Direct connection to/from Downtown-Observatory bikeway and Silver King Road bikeway	- Indirect connection to/from Downtown-Observatory bikeway and Silver King Road bikeway (~150m longer)
Cycling Safety and Comfort	+ Protected bicycle lanes and MUPs provide physical separation between active transportation users and motor vehicles + Cyclists will travel more comfortably than the current configuration with all on-street parking removed on Vancouver Street + Route avoids steep hills (>10% grade) , more accessible	- Cyclists must share the road with vehicles, which still creates potential for conflict and a less comfortable environment for both. - Route requires people to climb grades over 15% - Off-road section along McQuarrie Avenue is relatively steep, creating challenges for some users
Pedestrian Safety and Comfort	+ New MUP on the west side of Vancouver Street from W Gore Street to Robertson Avenue to provide an additional option	Improvements for bicycles only – pedestrians to use Vancouver Street
Access to Destinations	+ Both options provide access to the residential area in Rosemont + More direct route to/from Selkirk College	+ Both options provide access to the residential area in Rosemont - Indirect route to/from Selkirk College
Winter Maintenance	- Protected bicycle lanes require additional snow removal and street sweeping	+ Easiest maintenance and operations without protected bicycle lanes
Transit Operations	- Travel lane to be narrowed between Robertson Avenue and W Gore Street	+ There are no transit operations on this corridor.
Motor Vehicle Traffic Operations	+ There are no changes to motor vehicle access and circulation. Travel lanes to be narrowed between Robertson Avenue and W Gore Street acting as traffic calming	No changes to motor vehicle operations
Intersection and Conflict Zones	+ Intersection improvements at Silver King / Richards / Vancouver minimize conflict points for all users	- Transitions between dedicated facility and local street bikeway will require additional intersection crossings
Parking/Loading/Access	- Parking on west side to be removed along Vancouver Street from W Gore Street to Richard Street W - Potential impacts to garbage/recycling pick up	+ No impacts to on-street parking
Utility Impacts	- MUP between Robertson Avenue and W Gore Street may require relocation of hydro poles and drainage infrastructure	+ No utility impacts
Property Impacts	+ There are no property impacts	+ No property impacts
Relative Cost	- Higher cost option with proposed intersection improvements at Richards Street W, Silver King Road and Vancouver Street intersection, in addition to new MUP between Robertson Avenue and W Gore Street	+ Lower cost option with mostly local street bikeways

The alignment that was ultimately selected was to continue via Vancouver Street following the existing roadway alignment. This would eliminate the need for costly rock-blasting, retaining walls, etc. that would likely be associated with the alternative alignments and provide a more direct facility.

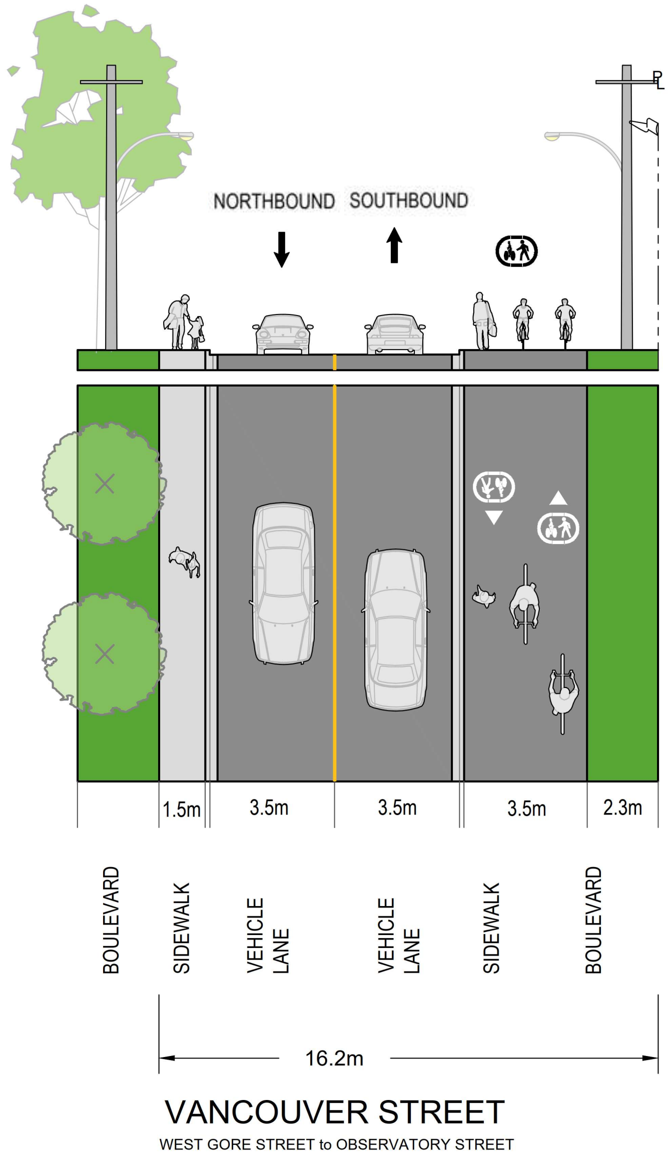


Figure 28: Vancouver Street Multi-Use Path

A particular constraint of the Vancouver Street alignment is at the intersection of Vancouver Street and West Gore Street. The property line of 1401 Vancouver Street on the east side and the retaining wall on the west side constrict the available right of way and create a pinch-point for the roadway and pathway. Options were considered to accommodate both vehicle travel and the multi-use pathway in this area. Using the existing roadway, narrowing the travel lanes to 3.5m would accommodate a multi-use path of 2.6m with the existing sidewalk on the east side. This configuration is shown in **Figure 29**.

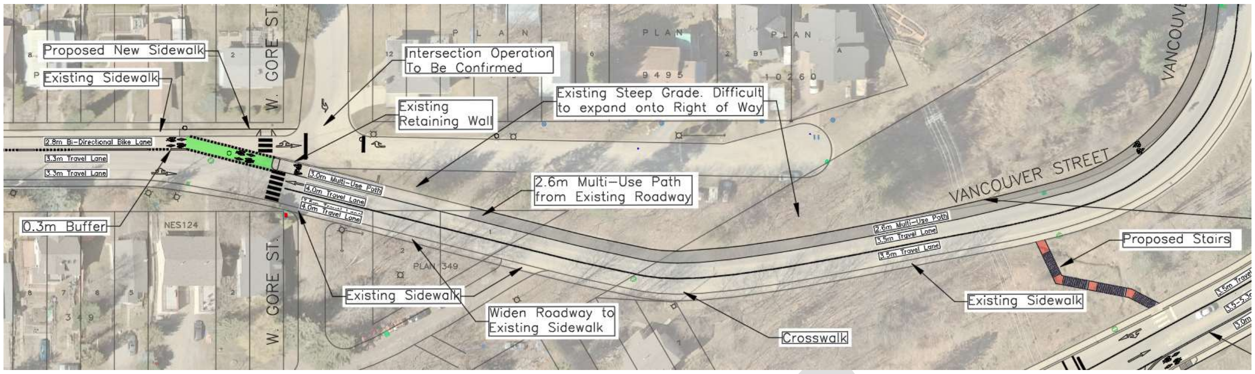


Figure 29: MUP Design - Existing Roadway

Another option is to reallocate the existing sidewalk on the east side to expand the roadway to the east to achieve 4.0m wide travel lanes and a 3.0m wide multi-use path. This option would feature a mid-block crosswalk to shift pedestrians to the multi-use path for the removal of the existing sidewalk on the east side. The existing sidewalk north of the proposed crosswalk would provide a connection to the proposed staircase that would provide a connection to the intersection of Vancouver Street and Observatory Street. This configuration is shown in **Figure 30**.

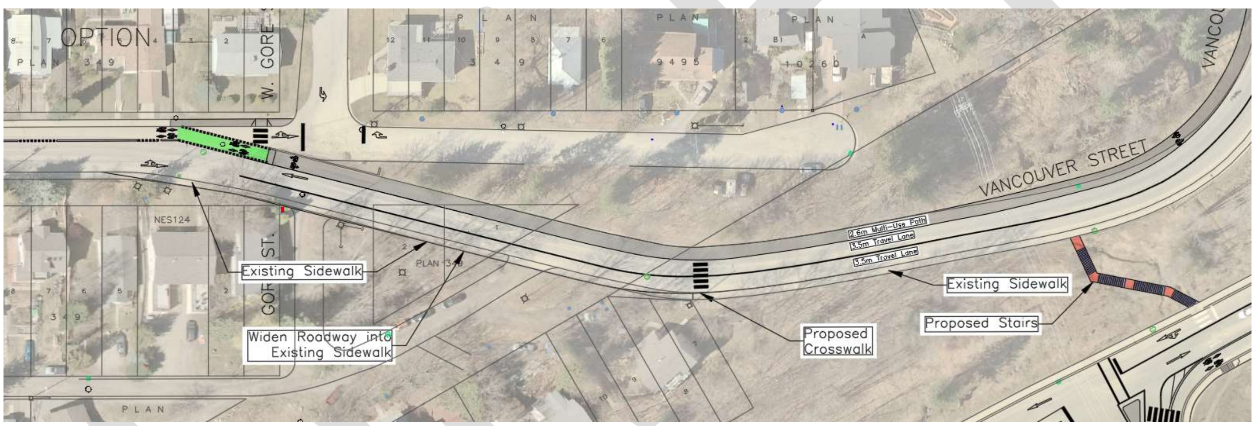


Figure 30: Alternative Design Option – Removal of Sidewalk

4.2.2 SILVER KING ROAD AND UPPER VANCOUVER STREET

Silver King Road and Vancouver Street are a primary north-south street within Nelson's Rosemont neighbourhood. The streets serve single-family and multi-family residential properties, churches, and the Selkirk College – Silver King Campus. The existing street cross-section for both roadways consists of one lane of travel in each direction, with parking only on the west side.

The existing corridor has a right of way of 20.1m with a low vertical and horizontal gradient. The proposed corridor follows a straight alignment with few obstructions, such as utility poles.

Several options were developed for Silver King and Vancouver Street to provide a safe and comfortable connection to Selkirk College while limiting the impacts to on-street parking and traffic operations. All options include dedicated bike lanes due to the high traffic volumes anticipated on Silver King Road and Vancouver Street.

Option 1 – Uni-Directional Protected Bike Lanes

Uni-directional protected bike lanes were considered located adjacent to the curb on each side of the street. This option is created from narrowing the existing vehicle lane, and removal of the parking lane. Uni-directional bike lanes follow the flow of traffic and are generally less confusing for users and motorists. Difficulty remains at each intersection with making left-turns off Vancouver Street to access the side streets, but the implementation of bike boxes for two-stage left turns can help to alleviate the concern. The cross-section of this option is shown in **Figure 31.**

BENEFITS

- Separated protected facility for cyclists; and
- Minimal changes in traffic operations.

CHALLENGES

- Narrow vehicle lanes;
- Difficult connection to proposed Lower Vancouver Street pathway;
- Increased maintenance required; and
- Removal of on-street parking

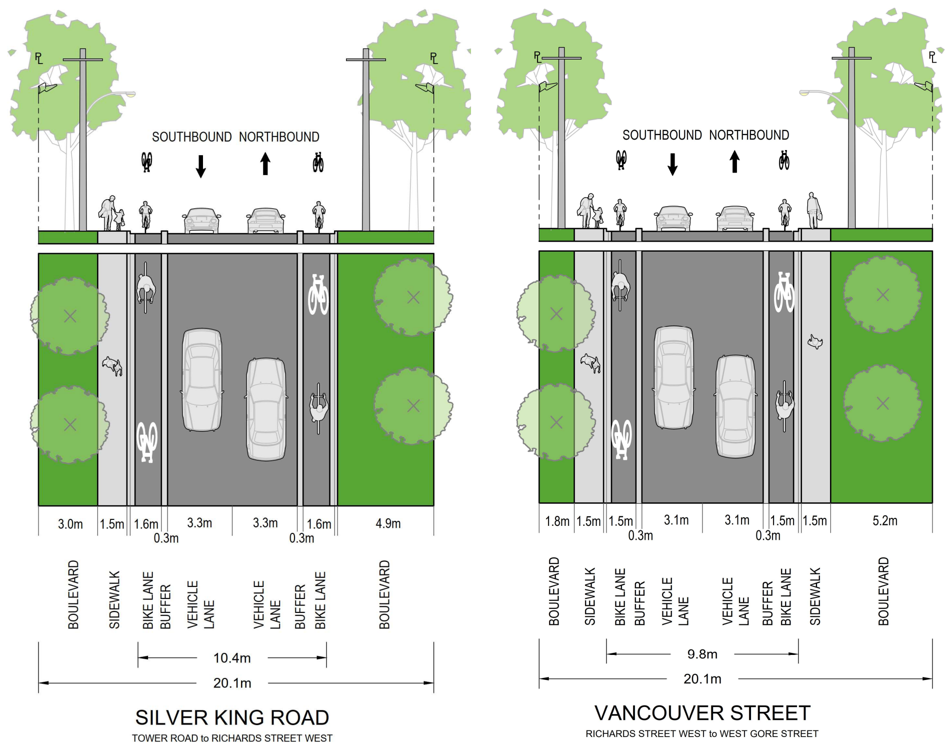


Figure 31: Option 1 – Uni-Directional Protected Bike Lanes

Option 2 – Uni-Directional Painted Bike Lanes

Uni-directional painted bike lanes were also considered adjacent to the curb on each side of the street. This option is similar to Option 1, however there is no physical protection from traffic. Painted bicycle lanes can alleviate concerns with road space, off-tracking, and snow removal, but at the cost of the safety and comfort of the facility. The cross-section of this option is shown in **Figure 32.**

BENEFITS

- Dedicated facility for cyclists;
- Lowest maintenance; and
- Minimal changes in traffic operations.

CHALLENGES

- Limited protection for cyclists with painted lines;
- Difficult connection to proposed Lower Vancouver Street pathway;
- Narrow vehicle lanes;
- Left-turn movements for cyclists may be challenging; and
- Removal of on-street parking.

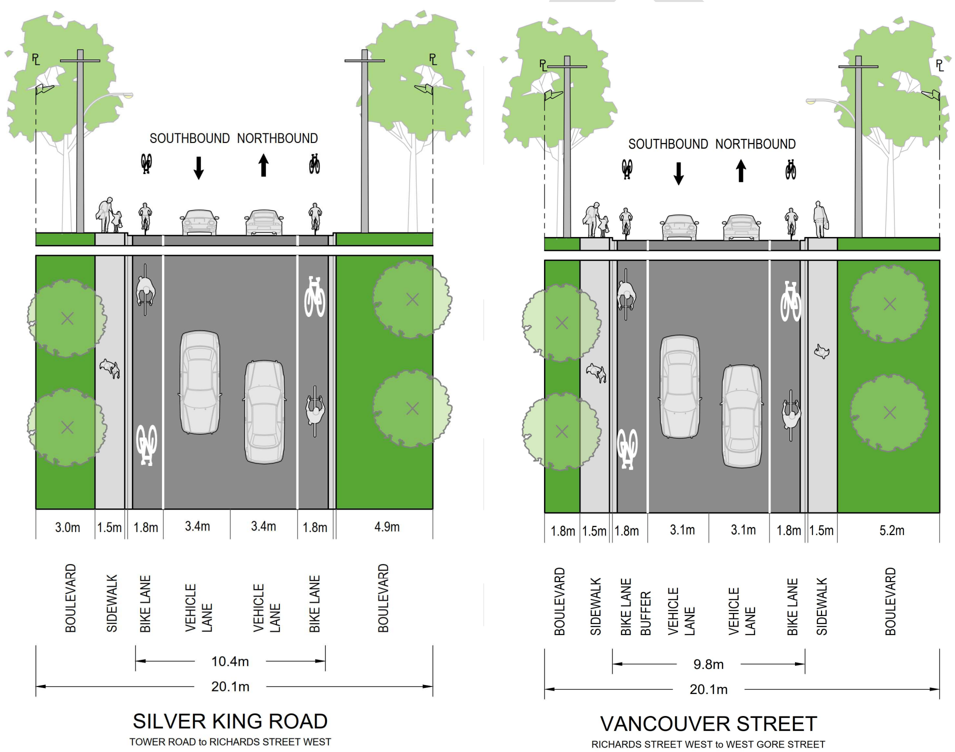


Figure 32: Option 2 – Uni-Directional Painted Bike Lanes

Option 3 – Bi-Directional Protected Bike Lanes – West Side

Bi-directional protected bike lanes were considered adjacent to the curb on the west side of the street. This option is created from narrowing the existing vehicle lanes and reallocating the parking lane to the bi-directional bike facility. Bi-directional bike lanes require added considerations at intersections as the two-way cycling traffic can cause confusion for drivers, but have the benefit reduced maintenance and cost when compared to uni-directional protected bike lanes. A common complaint of uni-directional bike lanes is that some cyclists use the nearest bike lane to travel in either direction, bi-directional facilities remove this issue. The cross-section of this option is shown in **Figure 33.**

BENEFITS

- Separated protected facility for cyclists;
- Less maintenance than Option 1;
- Minimal change to traffic operations; and
- Simple tie-in with proposed Lower Vancouver Street section.

CHALLENGES

- Increased complication at intersections for interactions between cyclists and motorists; and
- Removal of on-street parking.

Figure 33: Option 3 – Bi-Directional Protected Bike Lanes – West Side

Option 4 – Bi-Directional Protected Bike Lanes – East Side of Silver King Road

A multi-use pathway was also considered for the segment of Silver King Road between Tower Road and Richards Street West as it was identified that there is available boulevard space on the east side of the roadway. The east boulevard along Silver King Road contains mature trees, utility poles, driveways, and a bus stop. In order to more accurately determine the viability and impacts of this proposed option, the design was developed in plan view with consideration given to maintaining on-street parking where possible. The design widens the existing pavement to the east providing two travel lanes, a parking lane, and a bi-directional bike lane. In the area between the northernmost approach to the College's parking lot and Beasley Street West, the existing east curb line is maintained, and on-street parking is removed in order to accommodate the bi-directional bike lane. This is due to the presence of the private driveways, their slopes, and the associated retaining wall.

Topographic survey would be necessary to determine the exact impact to the existing trees and utility poles and to identify whether retaining walls are needed.

In order to provide a crossing to the west side of Vancouver Street it is recommended as part of this option that a three-way stop be implemented at the northern intersection of Richards Street West and Vancouver Street to allow for safe crossing of cyclsts and pedestrians.

The cross-section of this option is shown in **Figure 34** and the plan view drawings are shown in **Figures 35** and **36**.

BENEFITS

- Separated protected facility for cyclists;
- Maintains approximately 18 on-street parking spaces;

CHALLENGES

- Increased complication at intersection for interactions between cyclists and drivers;
- Impacts to mature street trees; and
- Requires relocation of utility poles.

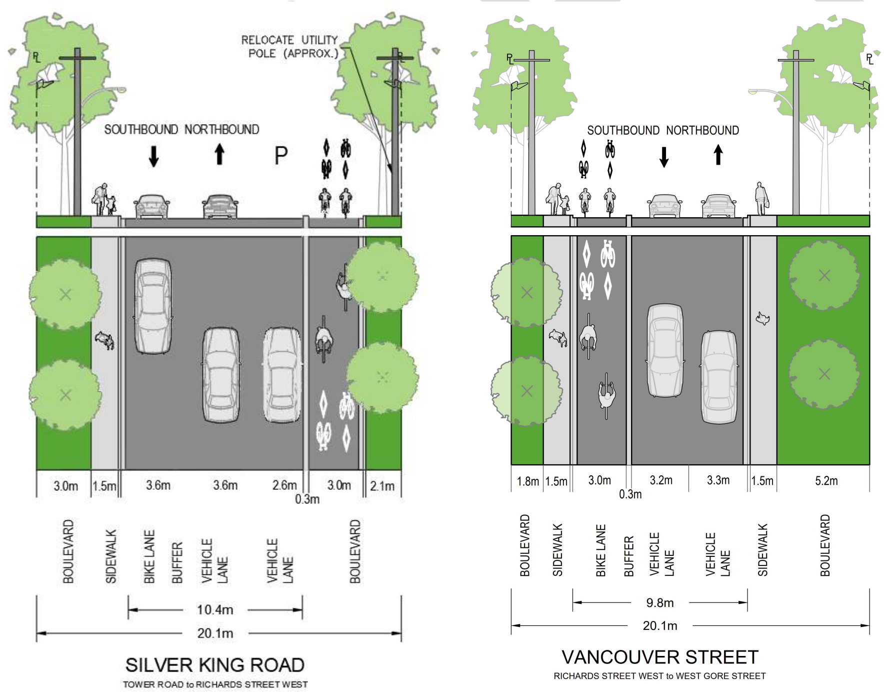


Figure 34: Option 4 – Bi-Directional Protected Bike Lanes – East Side

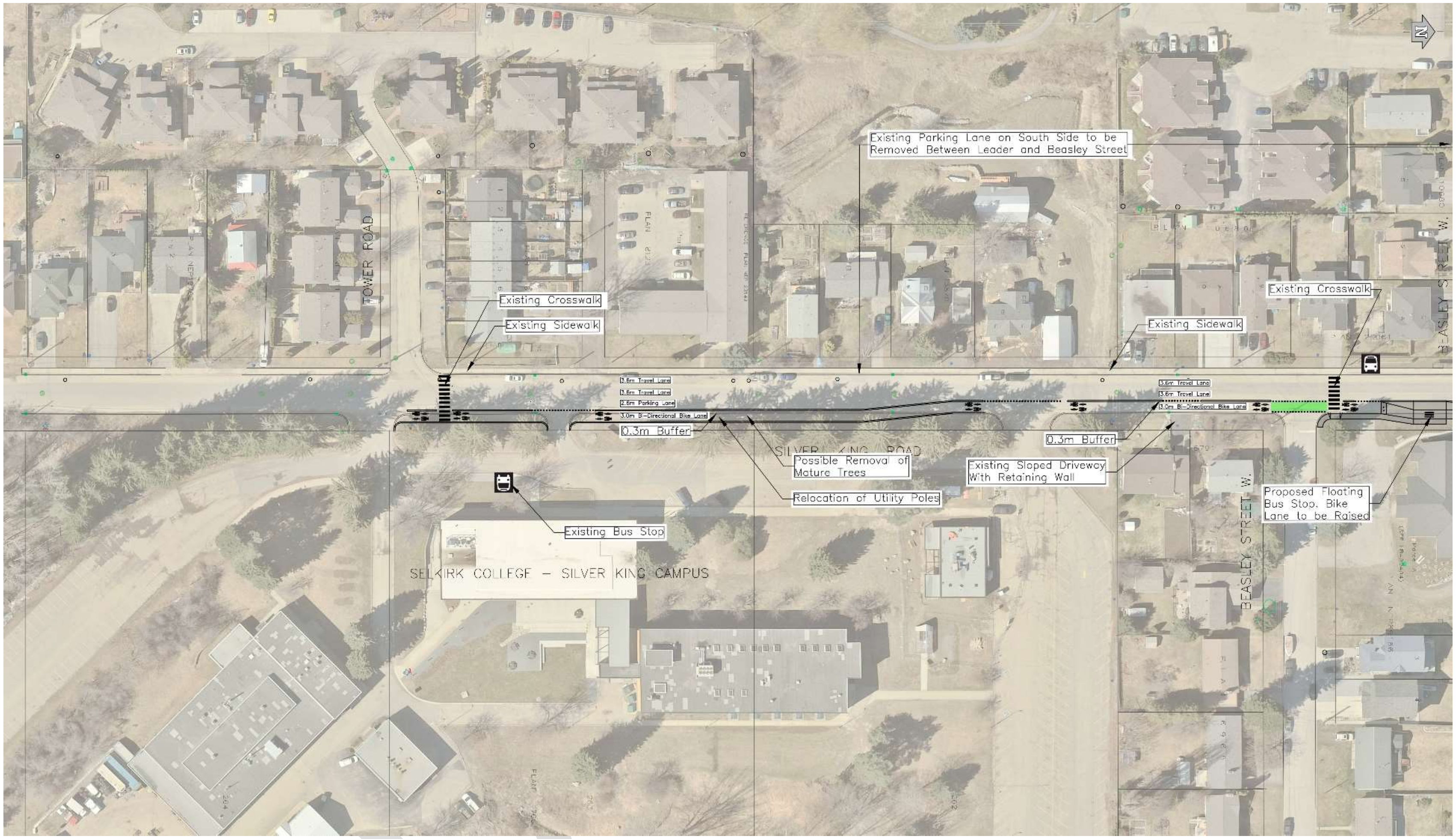


Figure 35: Option 4 – Bi-Directional Protected Bike Lanes – East Side (Plan View 1)

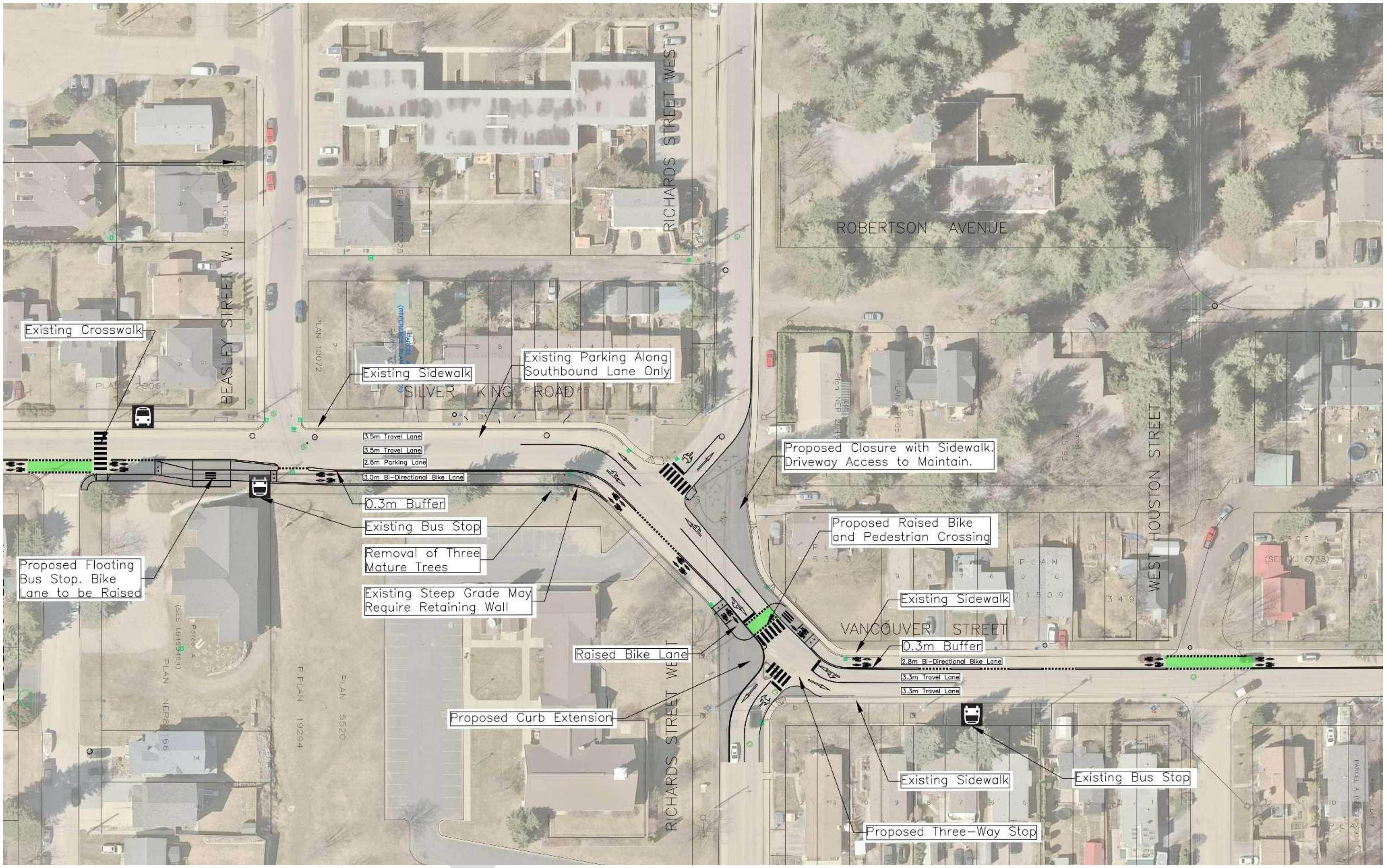


Figure 36: Option 4 – Bi-Directional Protected Bike Lanes – East Side (Plan View 2)

Preferred Option: Option 3 – Bi-Directional Protected Bike Lanes – West Side

Bi-directional protected bike lanes are the preferred option due to the traffic volumes and speeds present on Silver King Road and Vancouver Street and because they provide a protected cycling facility that is a continuation of the facility along Lower Vancouver Street at a lower capital cost than uni-directional protected bike lanes and the bi-directional option with parking, with simplified snow-clearing and wider vehicle travel lanes compared to the uni-directional protected facility. If parking removal is highly contentious, Option 4 may be considered to offset a portion of the lost on-street parking.

4.3 VIEW STREET

The design options that were assessed for the View Street corridor were based on the varied characteristics along the corridor, with the options looking at how a combination of facility types may be designed to provide safe and comfortable pedestrian facilities. **Figure 37** displays the two segments of the corridor and the following sub-sections present the options that were considered for each segment.

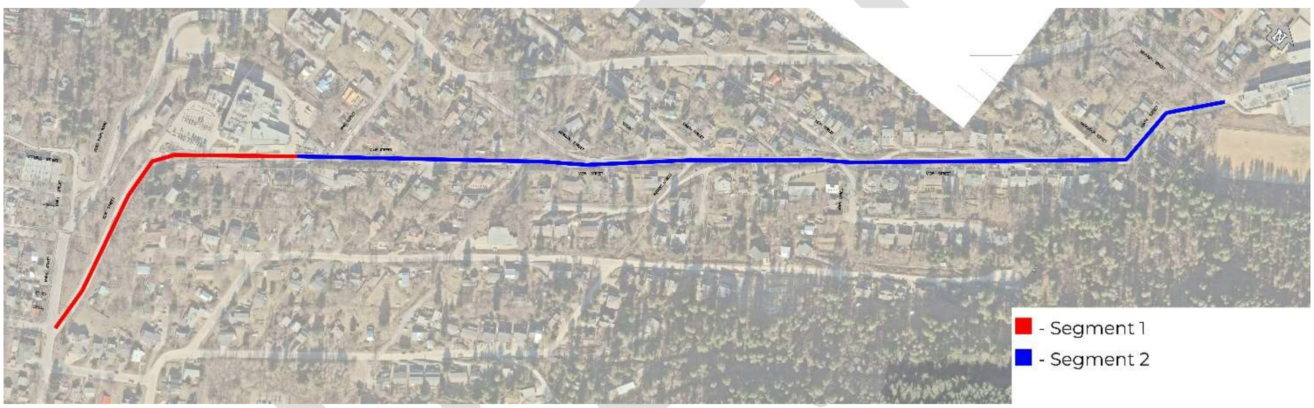


Figure 37: View Street

4.3.1 SEGMENT 1

Segment 1 of the corridor connects the intersection of Pine Street and View Street to the Kootenay Lake Hospital. This section serves single family houses with private driveway accesses and the main access to the hospital. There is an existing sidewalk on the west side of the roadway connecting to Kootenay Lake Hospital. This section has a constrained right-of-way with steep side slopes on each side of the roadway but a relatively gentle longitudinal grade. The parking lane on the west side is highly utilized as it serves as overflow parking for the hospital.

With the perceived speed and volume of the corridor already appearing to meet the design criteria for a shared street concept additional design measures beyond changing the speed limit to 30km/h, adding new signage, and pavement markings may not be needed to implement the facility, although additional features would further enhance the street for all users. Providing a sidewalk extension from the west driveway of the Hospital to the east side of the Hospital was considered a key element for this segment of View Street.

Options were presented to provide dedicated cycling facilities in this section of the corridor. **Figure 38** shows a cross section of uni-directional protected bike path. **Figure 39** shows a cross section of a constricted uni-directional painted bike path. Due to the constrained roadway width, presence of existing parking, and low traffic volumes these options were removed from consideration.

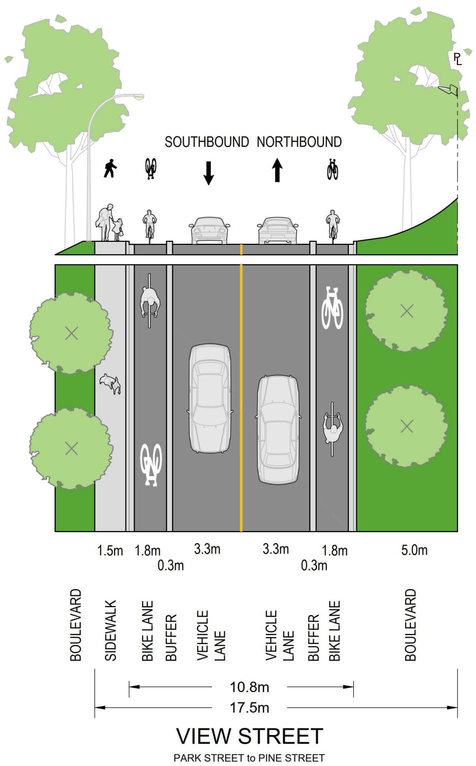


Figure 38: Option 1 - Protected Uni-directional Bike Lanes

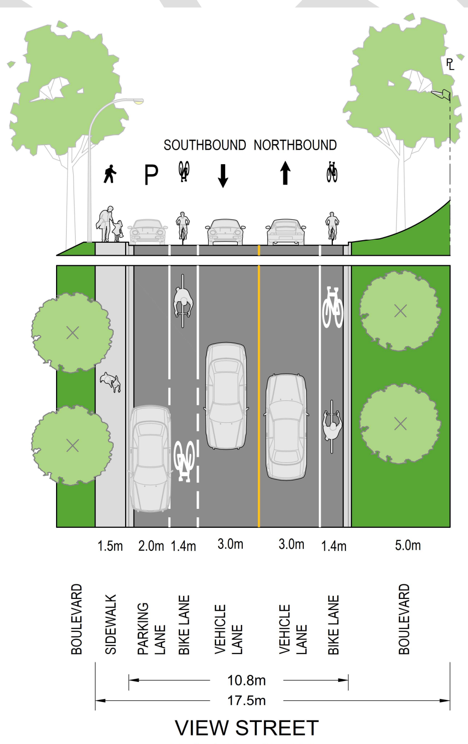


Figure 39: Option 2 - Constrained Uni-directional Painted Bike Lanes

4.3.2 SEGMENT 2

Segment 2 of the corridor outlines the section connecting from Kootenay Lake Hospital to LV Rogers Secondary School. This section serves single family with many private driveway accesses and serves as a neighbourhood link to LV Rodgers Secondary School. This section has steep side slopes with a narrow roadway and limited potential to widen but also has a gentle longitudinal grade providing a comfortable experience for pedestrians and cyclists. Parking along this corridor is located off-street in limited sections.

Option 1 – Advisory Bike Lanes

Advisory painted bike lanes were considered due to low traffic counts and are located adjacent to the roadway edges of the street. This option is created from narrowing the existing vehicle lanes, and reallocating space to uni-directional cycling and walking lanes on each side of the road. Advisory bike lanes also often require added considerations as the single travel lane can cause confusion for drivers. The cross-section of this option is shown in **Figure 40.**

BENEFITS

- Facility for cyclists and pedestrians; and
- Low maintenance.

CHALLENGES

- Impact to traffic operations; and
- Potential for conflicts between all users.

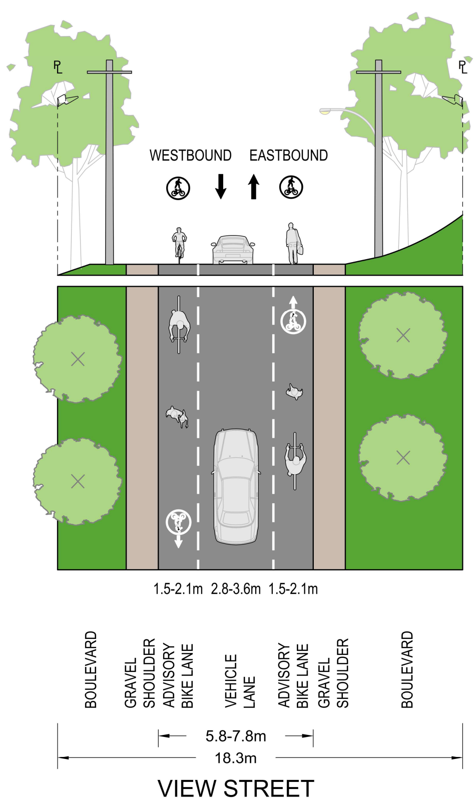


Figure 40: Option 1 - Advisory Painted Bike Lanes

Option 2 – On-Street Walkway

An on-street walkway was considered to provide a dedicated space for pedestrians located along the north roadway edge to tie-in with the proposed sidewalk expansion in Segment 1. This option is created from narrowing the existing vehicle lanes to provide space for the dedication of an on-street walkway. In this option, cyclists would be expected to share the travel lane with vehicles. The cross-section of this option is shown in **Figure 41.**

BENEFITS

- Facility for pedestrians;
- Low maintenance required;
- Minimal changes to traffic operations; and
- Simple tie-in with proposed sidewalk expansion in Segment 1.

CHALLENGES

- Cyclists and motorists must share the road;
- No physical protection for pedestrians; and
- Can be difficult to enhance the visibility of pedestrians and highlight the facility for motorists.

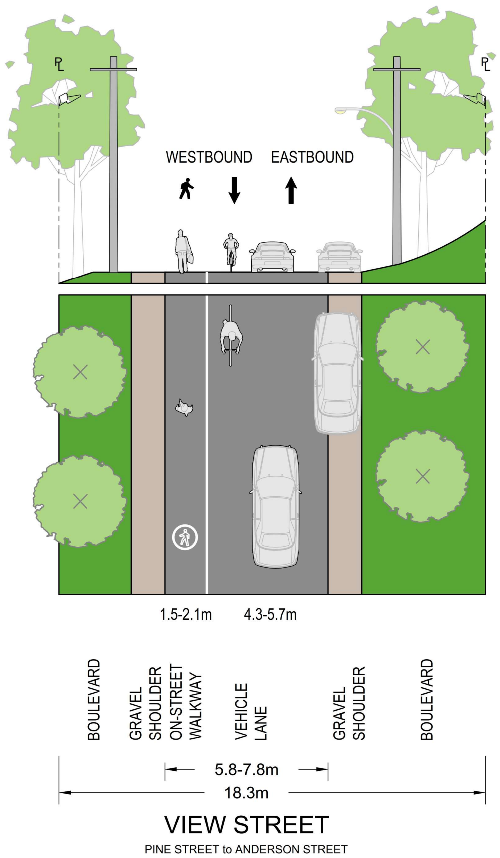


Figure 41: Option 2 – On-Street Walkway

Preferred Option: Sidewalk Extension and On-Street Walkway

The preferred option for View Street includes an extension of the existing sidewalk to the east side of the Kootenay Lake Hospital and an on-street painted walkway from that point to the east limit of the study area at LV Rogers Secondary School. No dedicated cycling facilities are recommended due to limited road space, low traffic volumes, and low traffic speeds.

4.4 RAILWAY STREET

The design options that were assessed for the Railway Street corridor were based on the varied characteristics along the corridor, with the options looking at how a combination of facility types may be designed to provide safe and comfortable pedestrian facilities. **Figure 42** displays the segments of the corridor, grouped by street type, and the following sub-sections present the options that were considered for each corridor. In general the Multi-use Path was option that was considered in this corridor

Multi-Use Paths (MUP) are pathways are separated pathways from roadways with shared spaces for pedestrians and cyclists. They are generally most appropriate along roadways with higher traffic volumes and speeds. MUP present potential issues with contraflow bike travel as motorists may not expect cyclists travelling in both directions at intersections and driveways, and potential conflict interactions with cyclists and pedestrians.

Figure 42: Railway Street Corridor

4.4.1 SEGMENT 1

Segment 1 follows the section of Railway Street between Baker Street and Silica/Government Road. This section services mainly commercial buildings and the Nelson Coke and Gasworks historical building. Utility poles run along the east side of the corridor. Existing pedestrian and cycling bridge over Cottonwood Creek will be used to tie-in the proposed facility. Existing perpendicular parking on the west side is observed along commercial businesses. Along the east side of the segment, City owned right-of-way is currently being encroached upon by the existing car dealership. Reclaiming this land for the redevelopment of this corridor provides an opportunity to enhance the space.

Option 1 – Angled Parking with Separated Facilities

Angled parking lanes are considered due to the available roadway space and the desire to maximize available parking for the surrounding commercial businesses. Narrowing of the roadway will allow space to accommodate angled parking and bi-directional bike lanes. Separation of facilities is ideal to reduce potential conflicts between pedestrians and cyclists. Bi-directional bike lanes often require added considerations at intersections as the two-way cycling traffic can cause confusion for drivers, but only one intersection is present within the study area. The cross-section of this option is shown in **Figure 43.**

BENEFITS

- Separated facilities for cyclists and pedestrians; and
- Low impact to on-street parking and traffic operations.

CHALLENGES

- Increased maintenance required;
- Increased complication cyclists and drivers at intersection; and
- Reclaiming of City right-of-way may be contentious.

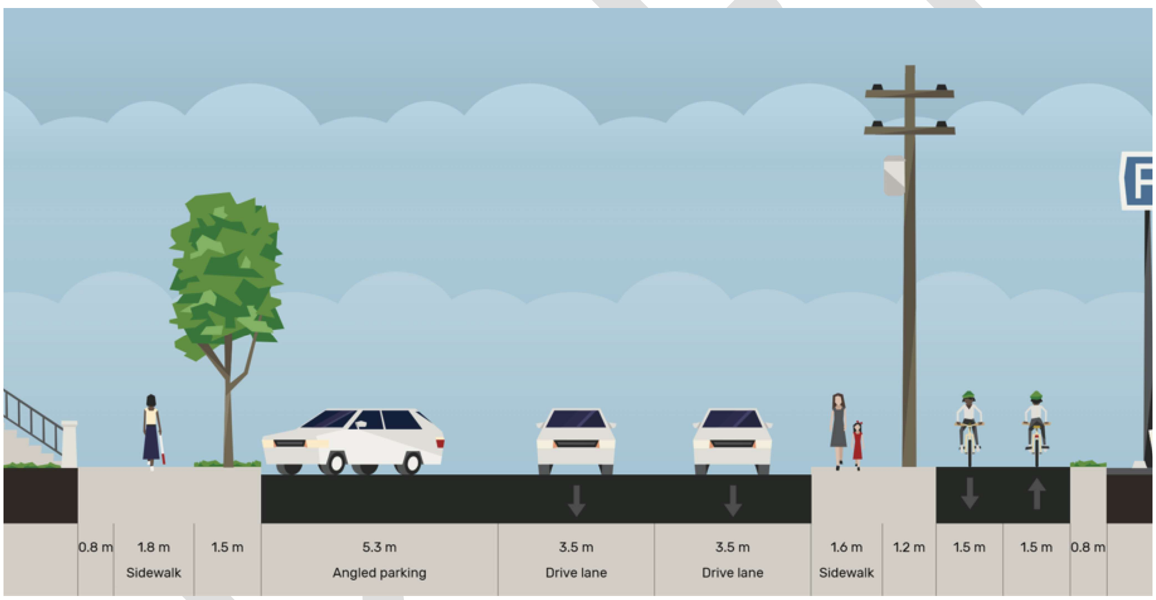


Figure 43: Option 1 – Angle Parking with Separated Facilities

Option 2 – Parallel Parking with Separated Facilities

Parallel parking lane are considered due to the available roadway space and the desire from surrounding commercial businesses. Narrowing of the roadway will allow space to accommodate parallel parking with extended sidewalk and boulevard space on the west side and bi-directional bike lanes on east side without relocation of the existing utility poles. The cross-section of this option is shown in **Figure 44.**

BENEFITS

- Separated facilities for cyclists and pedestrians;
- Accommodates some of the existing encroachment on the east side; and
- Low impact to traffic operations.

CHALLENGES

- Increased maintenance required;
- Reduced volume of on-street parking; and
- Increased complication cyclists and drivers at intersection.

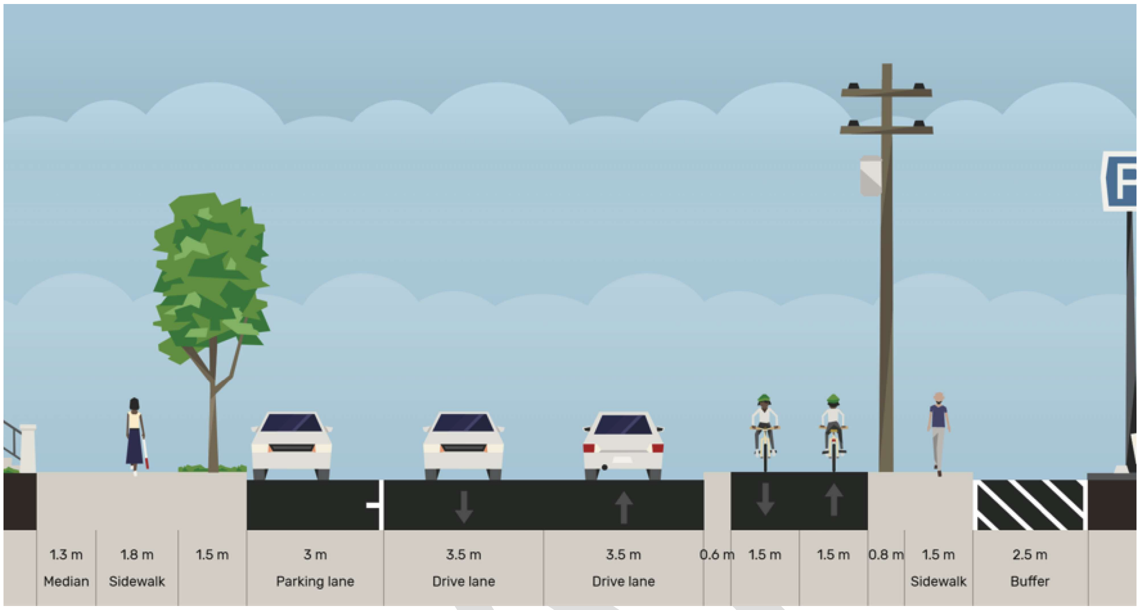


Figure 44: Option 2 – Parallel Parking with Separated Facilities

Preferred Option – Hybrid with Multi-Use Path

A hybrid option was identified while evaluating Options 1 and 2 that combines elements of both. The option is formed with the narrowing of the existing travel lanes and features angled parking on the west side and adds additional parallel parking on the east side. A 3.5m multi-use path will be located to the east of the existing utility poles. Muti-use paths may induce potential conflicts between pedestrians and cyclists as the volume of users increases. The cross-section of this option is shown in **Figure 45.**

BENEFITS

- Facilities for cyclists and pedestrians;
- Fronting sidewalk on the west side for commercial properties; and
- Provides additional on-street parking.

CHALLENGES

- Increased maintenance required;
- Reclaiming of City right-of-way may be contentious; and
- Increased complication cyclists and drivers at intersection.

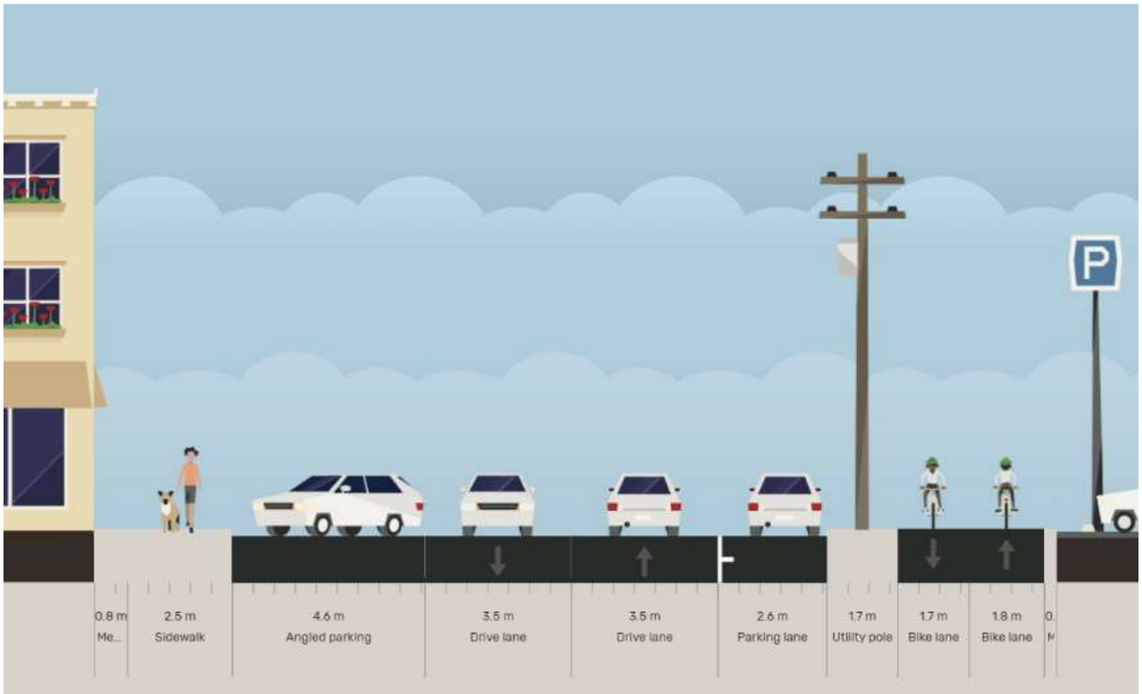


Figure 45: Option 3 – Hybrid with Multi-Use Path

4.4.2 SEGMENT 2

Segment 2 follows the section of Railway Street between Sillica/Government Road and south of Carbonate Street. This section services commercial buildings with monolithic sidewalk on west side. Utility poles run along the both sides of the corridor and pose as an obstacle for the design. The existing trail along Highway 3A will tie-in the proposed facility. Existing parallel parking is observed on both sides of roadway.

Due to available road space, and the connection to Segment 1 and the existing trail, a multi-use pathway was the only option considered for Segment 2. The design consists of a 3.0m multi-use pathway on the east side of the roadway with two 3.5m vehicle lanes, with sidewalk and boulevard space as shown in **Figure 46**. The design maintains the parallel parking access on the east side of the roadway by shifting the roadway to the west. A new sidewalk is recommended along the property on the west side.

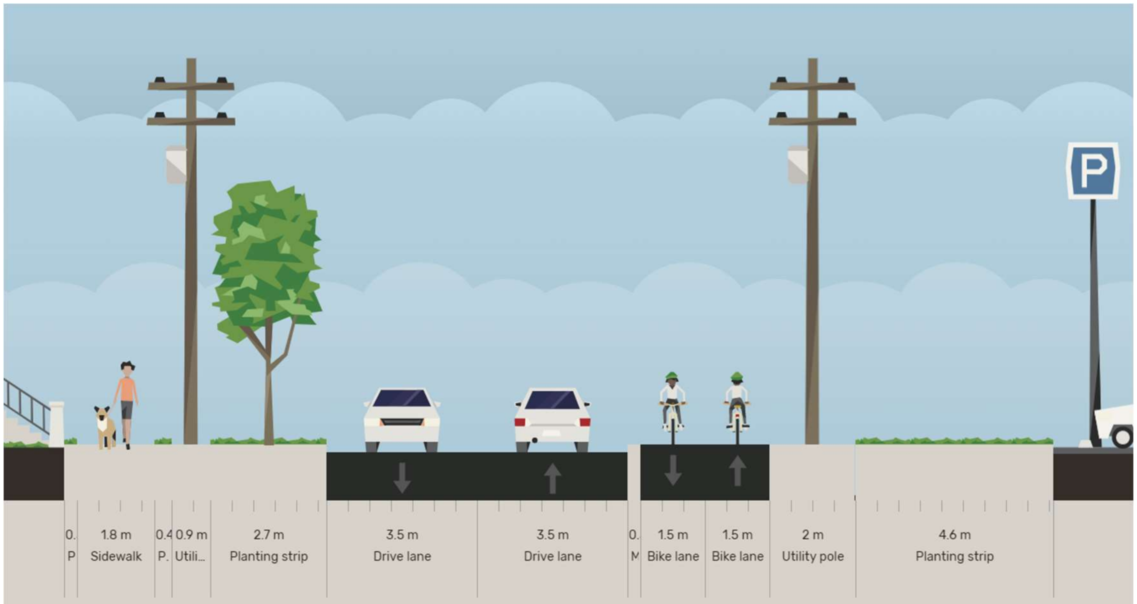


Figure 46: Segment 2 Design

5.0 PREFERRED DESIGN

5.1 DOWNTOWN TO OBSERVATORY STREET

To summarize the preferred design of the corridor, the segments and treatments are outlined in **Table 3** and the preferred options are identified by bolded text.

Table 3 - Downtown to Observatory Street Highway Overpass Preferred Design

Location	Design Options		
	Option 1	Option 2	Option 3
Hall Mines Road	**Bi-directional Bike Lanes**	-	-
Hall Mines Road at Kootenay[1]	Full Access Closure	**Right-In Right-Out Intersection**	Channelization Island
Local Residential and Collector Roads	Bi-directional Bike Lanes	**Neighbourhood Bikeway**	-
Residential Laneway	**Neighbourhood Bikeway**	-	-
Local Urban Street	Bi-directional Bike Lanes	**Neighbourhood Bikeway**	-
Herridge Lane	**Neighbourhood Bikeway**	-	-
Vernon Street	Uni-directional Protected Bike Lane	**Uni-directional Painted Bike Lane**	Bi-directional Protected Bike Lane
Vernon Street at Cedar/Edgewood Avenue[1]	**Curb Bump-outs with Bike Channelization**	Right Turn Channelization from Cedar Street	-

<u>Bi-directional Bike Lanes</u>

This option is preferred from both a pedestrian and cyclist perspective due to the physical separation provided between motor vehicle traffic and people walking and cycling. The design provides this separation using a painted buffer, flexible bollards, and precast concrete curbs located at key locations such as Observatory Street Overpass, intersections, and around vertical and horizontal curves. Physical protection is recommended to ensure that motor vehicles are not able to inadvertently cross over the barrier into the bike lane.

<u>Neighbourhood Bikeways</u>

The recommended design for the remainder of the corridor is a network of neighbourhood bikeways. These are streets with low traffic volumes and low traffic speeds that are comfortable for cyclists to travel on.

Neighbourhood bikeways typically rely on traffic calming from treatments such as speed humps, a traffic speed reader board, and strategically placed gateway treatments along the corridor that communicate to all road users that they are entering a shared environment where people cycling are encouraged to ride in the middle of the travel lane.

Possible treatments could include the use of any or all of the treatments shown in **Table 4**.

Table 4 – Traffic Calming Features

Treatment Type	Example Photo
Vertical Centerline Treatment	
Raised Crosswalk or Speed Table	
Coloured or Textured Pavement or Pavers	
Curb Extensions	

Treatment Type	Example Photo
Traffic Diverter	

Preferred Design Class D Cost Estimate

The Class D cost estimate of the bi-directional protected bicycle lane and neighbourhood bikeway facility on the Downtown to Observatory Street is **$1,792,000**. This design includes curb extensions, a painted buffer, and intermittent barrier curbs as separation between people cycling and driving along the corridor. This cost estimate neglects the options at Hall Mines Road and Hoover Street and at Vernon and Cedar/Edgewood Avenue. See **Appendix C** for a cost break-down.

5.2 ROSEMONT BIKEWAY

To summarize the preferred design of the corridor, the segments and treatments are outlined in **Table 5** and the preferred options are identified by bolded text.

Table 5 – Rosemont Bikeway Preferred Design

Location	Design Options			
	Option 1	Option 2	Option 3	Option 4
Observatory Street Highway Overpass	Bi-directional Bike Lane with 3 vehicle lanes	**Bi-directional Bike Lane with 2 vehicle lanes and painted buffer**	-	-
Lower Vancouver Street	**Multi-Use Pathway**	-	-	-
Silver King Road and Upper Vancouver Street	Uni-Directional Protected Bike Lanes	Uni-Directional Painted Bike Lanes	**Bi-Directional Protected Bike Lanes – West Side**	Bi-Directional Protected Bike Lanes – East Side of Silver King Road

Multi-Use Pathway

This design separates the existing motor vehicle and pedestrians and cyclists along the steep and constrained section of the corridor, and was the only option considered for the safety and ease for pedestrians and cyclists travelling this corridor. The conceptual design for the section relies on ties-in with the bi-directional facility from the Observatory Street Overpass and the connection with the rest of the corridor.

Bi-Directional Bike Lanes

This option is preferred from both a pedestrian and cyclist perspective due to the physical separation provided between motor vehicle traffic and people walking and cycling. The design provides this separation using a precast concrete curb located along the corridor. The physical protection is recommended to ensure that motor vehicles are not able to inadvertently cross over the barrier into the bike lanes. This option is preferred with the simple tie-in with the proposed multi-use path design for Lower Vancouver Street at West Gore and Vancouver Street.

Preferred Design Class D Cost Estimate

The Class D cost estimate of the bi-directional protected bicycle lane facility on the Rosemont Bikeway is **$1,050,000**. See **Appendix C** for a cost break-down.

5.3 VIEW STREET

To summarize the preferred design of the corridor, the segments and treatments are outlined in **Table 6** and the preferred options are identified by bolded text.

Table 6 – View Street Preferred Design

Location	Design Options		
	Option 1	Option 2	Option 3
Segment 1	Uni-Directional Bike lanes	Uni-directional Painted Bike Lanes	**Sidewalk Extension**
Segment 2	Advisory Bike Lanes	**On-Street Walkway**	

Sidewalk Extension and On-Street Walkway

The preferred option for View Street includes an extension of the existing sidewalk at the west side of the Kootenay Lake Hospital to the east side of the Kootenay Lake Hospital and an on-street painted walkway from that point to the east limit of the study area at LV Rogers Secondary School. No dedicated cycling facilities are recommended due to limited road space, low traffic volumes, and low traffic speeds. Cyclists would be encouraged to share the road with motorists through this segment.

Preferred Design Class D Cost Estimate

The Class D cost estimate of the View Street corridor is projected at **$211,000**. This design includes the sidewalk expansion and the pavement markings for the on-street walkway. See **Appendix C** for a cost break-down.

5.4 RAILWAY STREET

To summarize the preferred design of the corridor, the segments and treatments are outlined in **Table 7** and the preferred options are identified by bolded text.

Table 7 – Railway Street Preferred Design

Location	Design Options		
	Option 1	Option 2	Option 3
Segment 1	Angle Parking with Separated Facilities	Parallel Parking with Separated Facilities	**Hybrid with Multi-use Path**
Segment 2	**Multi-Use Path**	-	-

Hybrid with Multi-Use Path

A hybrid option was identified while evaluating Options 1 and 2 that combines elements of both. The option is formed with the narrowing of the existing travel lanes and features angled parking on the west side and adds additional parallel parking on the east side. A 3.5m multi-use path will be located to the east of the existing utility poles.

Preferred Design Class D Cost Estimate

The Class D cost estimate of the View Street corridor is projected at **$521,000**. See **Appendix C** for a cost break-down.

6.0 CONCLUSION AND NEXT STEPS

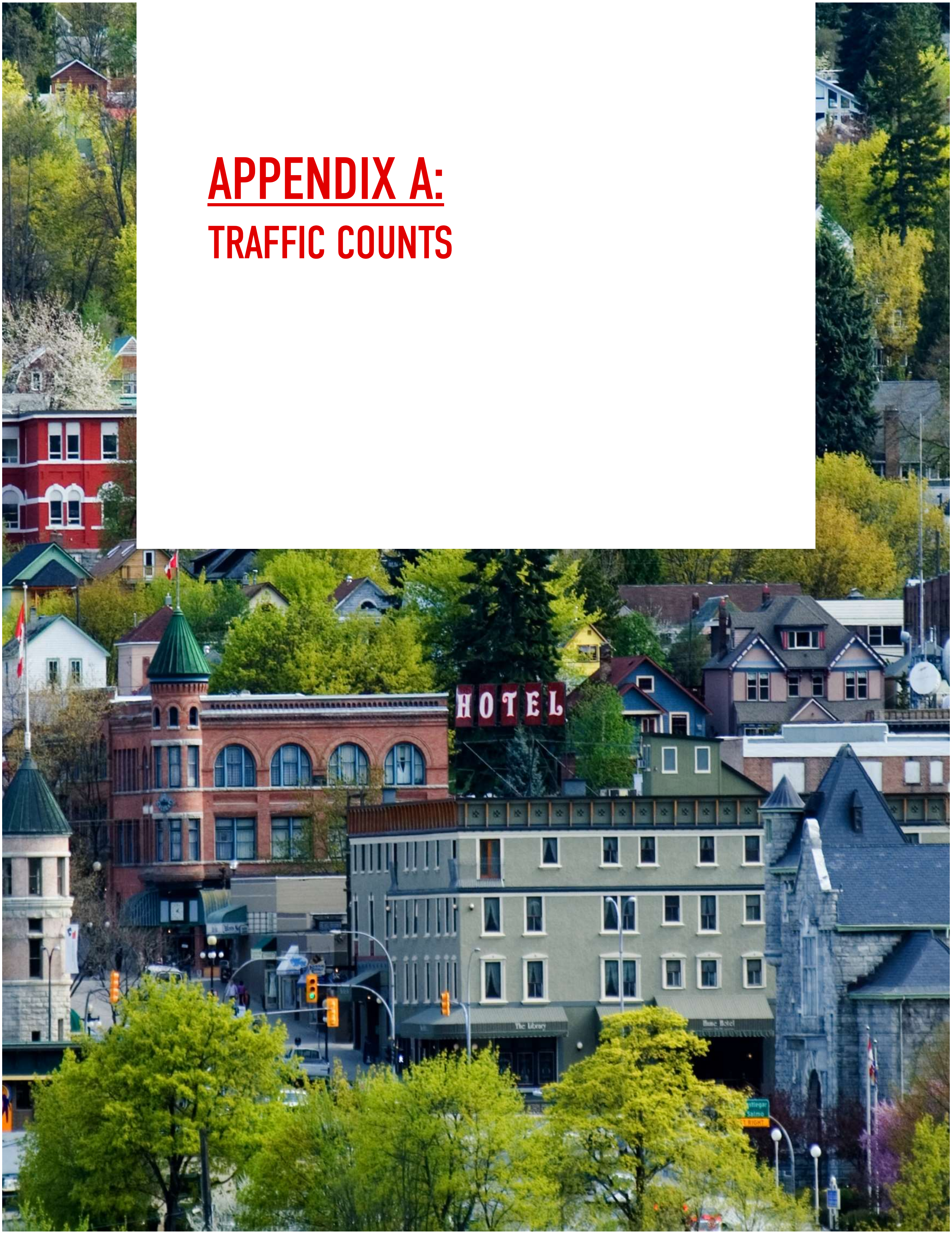
The preferred designs presented in **Section 5** will improve the safety and comfort for people walking and cycling and will encourage residents to travel by sustainable modes within the City of Nelson. The preferred design for all the corridors aims to reduce motor vehicle travel speeds and volumes and may cause additional traffic on parallel routes along the outlined corridors.

Next steps in the implementation of these projects include reaching out to residents and stakeholders surrounding all four corridors and finalizing the grant application for the BC Active Transportation Grant.

If the concept designs are to be implemented, Urban Systems can support the City of Nelson to advance the conceptual design work through to the detailed design level required for construction of the facilities.

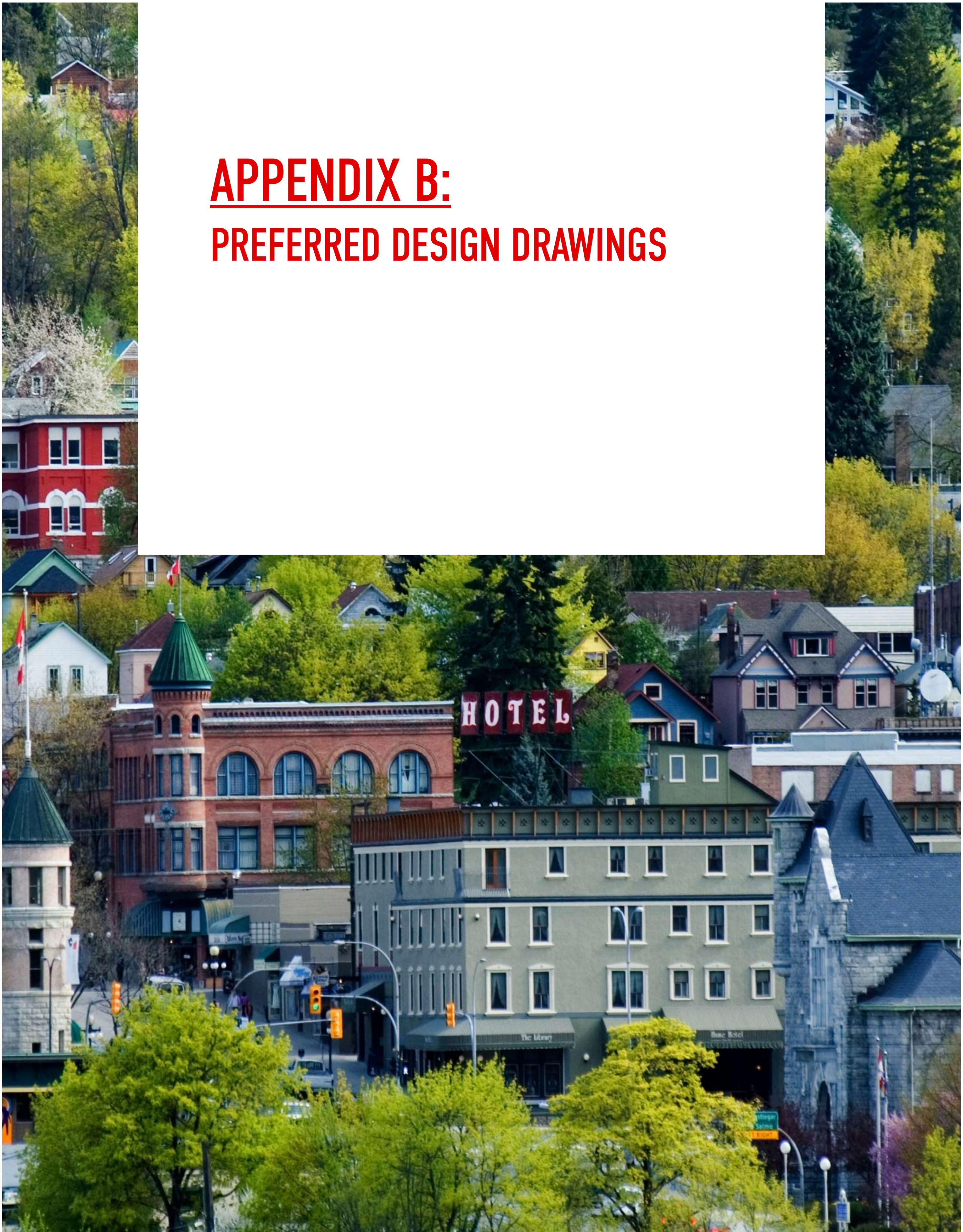
APPENDIX A:

TRAFFIC COUNTS

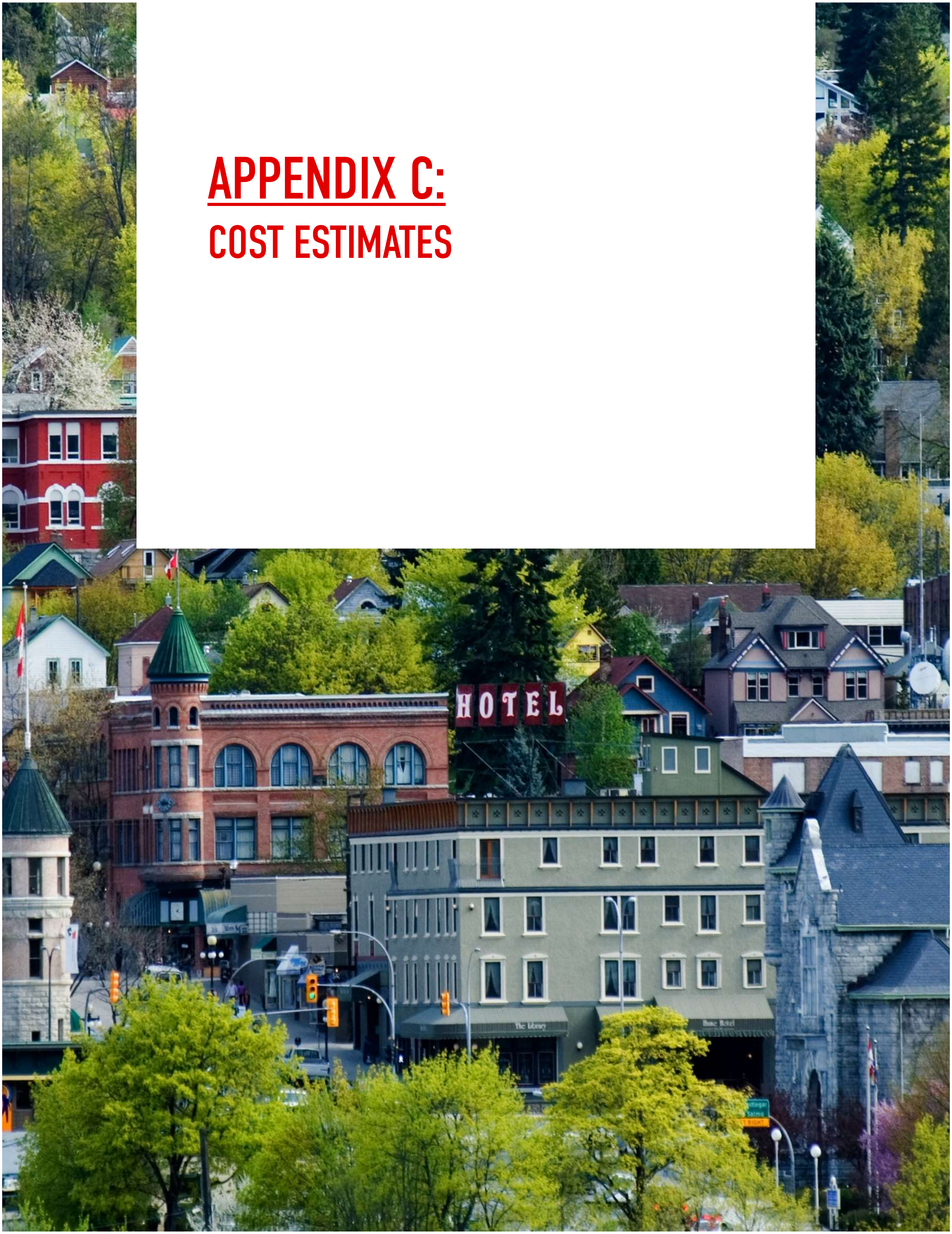


APPENDIX B:

PREFERRED DESIGN DRAWINGS



APPENDIX C:
COST ESTIMATES



ASSUMPTIONS

Item	Unit	Unit Price	Comment
Ex Curb Removal	m	$ 35.00	Abbotsford
Subgrade Preparation	m^2	$ 5.00	Boundary St tender
Mill and Overlay	m^2	$ 50.00	Previous cost estimates
Raised Concrete Pathway/Median Island	m^2	$ 150.00	Abbotsford
Raised Asphalt Pathway	m^2	$ 100.00	Abbotsford. (Boundary St Tender and 4th Ave Tender ~$50, to account for the cost of raising)
Pavement Markings Allowance	m	$ 60.00	Same as Langley / Agnes
Drainage Allowance	l.s.		3k per CB, extra 2 CB per corridor +existing
Signage Allowance	m	$ 50.00	Same as Langley / Agnes
Flexible Delineator Posts	ea.	$ 150.00	
Utilities Relocation Allowance	l.s.		5k each if not many; 10k if more
Ex Asphalt Removal	m^2	$ 40.00	4th Ave Tender - ranging from $14 to $74, taking $40 in between
Ex Concrete (Sidewalk/Median Island) Removal	m^2	$ 40.00	5th Ave Tender - ranging from $14 to $74, taking $40 in between
Curb and Gutter	m	$ 220.00	Boundary St Tender
Sod	m^2	$ 20.00	Abbotsford
Excavation and Disposal Allowance	l.s.		$30/m3 assume 0.2m thick -> $6/m2
Concrete Roadside Barriers	m	$ 200.00	Boundary St Tender (drainage type)
Concrete Transition Barriers	ea.	$ 500.00	Tender package Naughton
Bullnose Barriers	ea.	$ 400.00	Tender package Naughton
Green Paint	m^2	$ 80.00	Powell river cost estimation
Painted Gore	m^2	$ 40.00	Powell river cost estimation
Street light	l.s.	$ 10,000.00	Powell river cost estimation

DOWNTOWN TO OBSERVATORY STREET

Improvement	Hall Mines Road - Observatory Street to Kootenay Street			
Roadway Length (m)	175			
Description of Work	**Unit of Measure**	**Unit Price**	**Quantity**	**Extended Amount**
Ex Concrete (Sidewalk/Median Island) Removal	m2	40	16	640
Ex Curb Removal	m	35	150	5250
Ex Asphalt Removal	m2	40	790	31600
Subgrade Preparation	m2	5	785	3925
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	295	44250
Full Pavement Structure	m2	125	95	11875
Raised Asphalt Pathway	m2	100	45	4500
Sod	m2	20	445	8900
Curb and Gutter	m	220	315	69300
Pavement Markings Allowance	m	60	175	10500
Signage Allowance	m	50	175	8750
Flexible Delineator Posts	ea.	150	30	4500
Green Paint	m2	80	100	8000
Drainage Allowance	l.s.	3000	1	3000
SUBTOTAL COST ESTIMATE				219990
Contingency and Design Engineering Costs	45%			98995.5
TOTAL CONSTRUCTION COST ESTIMATE				**318986**

Improvement	Kootenay and Latimer Street - Hall Mines to Stanley Street Laneway			
Roadway Length (m)	70			
Description of Work	**Unit of Measure**	**Unit Price**	**Quantity**	**Extended Amount**
Pavement Markings Allowance	m	60	70	4200
Signage Allowance	m	50	70	3500
SUBTOTAL COST ESTIMATE				7700
Contingency and Design Engineering Costs	45%			3465
TOTAL CONSTRUCTION COST ESTIMATE				**11165**

Improvement **Stanley Laneway - Latimer to Carbonate**
Roadway Length (m) **200**

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Pavement Markings Allowance	m	60	200	12000
Signage Allowance	m	50	200	10000
Street lights	l.s.	10000	3	30000
SUBTOTAL COST ESTIMATE				52000
Contingency and Design Engineering Costs	45%			23400
TOTAL CONSTRUCTION COST ESTIMATE				**75400**

Improvement **Carbonate Street - Laneway to Ward Street**
Roadway Length (m) **170**

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	170	6800
Ex Curb Removal	m	35	80	2800
Subgrade Preparation	m2	5	170	850
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	170	25500
Sod	m2	20	0	0
Curb and Gutter	m	220	100	22000
Drainage Allowance	l.s.	3000	4	12000
Pavement Markings Allowance	m	60	170	10200
Signage Allowance	m	50	170	8500
SUBTOTAL COST ESTIMATE				93650
Contingency and Design Engineering Costs	45%			42142.5
TOTAL CONSTRUCTION COST ESTIMATE				**135793**

Improvement **Ward Street - Carbonate to Silica Street**
Roadway Length (m) **200**

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	450	18000
Ex Curb Removal	m	35	380	13300
Subgrade Preparation	m2	5	450	2250
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	450	67500
Sod	m2	20	0	0
Curb and Gutter	m	220	220	48400
Drainage Allowance	l.s.	3000	8	24000
Pavement Markings Allowance	m	60	170	10200
Signage Allowance	m	50	170	8500
SUBTOTAL COST ESTIMATE				197150
Contingency and Design Engineering Costs	45%			88717.5
TOTAL CONSTRUCTION COST ESTIMATE				**285868**

Improvement **Ward Street - Silica Street to Victoria Street**
Roadway Length (m) **50**

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	355	14200
Ex Curb Removal	m	35	160	5600
Subgrade Preparation	m2	5	300	1500
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	355	53250
Sod	m2	20	0	0
Curb and Gutter	m	220	220	48400
Drainage Allowance	l.s.	3000	4	12000
Pavement Markings Allowance	m	60	50	3000
Signage Allowance	m	50	50	2500
SUBTOTAL COST ESTIMATE				145450
Contingency and Design Engineering Costs	45%			65452.5
TOTAL CONSTRUCTION COST ESTIMATE				**210903**

Improvement	Victoria Street			
Roadway Length (m)	**110**			

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Pavement Markings Allowance	m	60	110	6600
Signage Allowance	m	50	110	5500
SUBTOTAL COST ESTIMATE				12100
Contingency and Design Engineering Costs	45%			5445
TOTAL CONSTRUCTION COST ESTIMATE				**17545**

Improvement	Josephine Street			
Roadway Length (m)	**50**			

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	355	14200
Ex Curb Removal	m	35	160	5600
Subgrade Preparation	m2	5	300	1500
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	355	53250
Sod	m2	20	0	0
Curb and Gutter	m	220	220	48400
Drainage Allowance	l.s.	3000	4	12000
Pavement Markings Allowance	m	60	50	3000
Signage Allowance	m	50	50	2500
SUBTOTAL COST ESTIMATE				145450
Contingency and Design Engineering Costs	45%			65452.5
TOTAL CONSTRUCTION COST ESTIMATE				**210903**

Improvement **Herridge Lane**
Roadway Length (m) **120**

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	230	9200
Ex Curb Removal	m	35	90	3150
Subgrade Preparation	m2	5	230	1150
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	230	34500
Sod	m2	20	0	0
Curb and Gutter	m	220	100	22000
Drainage Allowance	l.s.	3000	4	12000
Pavement Markings Allowance	m	60	50	3000
Signage Allowance	m	50	50	2500
SUBTOTAL COST ESTIMATE				92500
Contingency and Design Engineering Costs	45%			41625
TOTAL CONSTRUCTION COST ESTIMATE				**134125**

Improvement **Baker Street**
Roadway Length (m) **120**

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	230	9200
Ex Curb Removal	m	35	160	5600
Subgrade Preparation	m2	5	300	1500
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	355	53250
Sod	m2	20	0	0
Curb and Gutter	m	220	220	48400
Drainage Allowance	l.s.	3000	4	12000
Pavement Markings Allowance	m	60	120	7200
Signage Allowance	m	50	120	6000
SUBTOTAL COST ESTIMATE				148150
Contingency and Design Engineering Costs	45%			66667.5
TOTAL CONSTRUCTION COST ESTIMATE				**214818**

Improvement	Vernon Street
Roadway Length (m)	110

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	110	4400
Ex Curb Removal	m	35	100	3500
Subgrade Preparation	m2	5	110	550
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	300	45000
Sod	m2	20	0	0
Curb and Gutter	m	220	210	46200
Drainage Allowance	l.s.	3000	2	6000
Pavement Markings Allowance	m	60	100	6000
Signage Allowance	m	50	100	5000
SUBTOTAL COST ESTIMATE				121650
Contingency and Design Engineering Costs	45%			54745
TOTAL CONSTRUCTION COST ESTIMATE				**176395**

TOTAL CONSTRUCTION COST ESTIMATE	1791900

ROSEMONT BIKEWAY

Improvement	Observatory Street - Vancouver Street to Hall Mines Road
Roadway Length (m)	100

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Pavement Markings Allowance	m	60	100	6000
Signage Allowance	m	50	100	5000
Bullnose Barriers	ea.	400	2	800
Concrete Transition Barriers	ea.	500	2	1000
Concrete Roadside Barriers	m	200	67	13400
SUBTOTAL COST ESTIMATE				26200
Contingency and Design Engineering Costs	0.45			11790
TOTAL CONSTRUCTION COST ESTIMATE				**40000**

Improvement	Rosemont Bikeway - Tower Road to Observatory Street			
Roadway Length (m)	1200			
Description of Work	**Unit of Measure**	**Unit Price**	**Quantity**	**Extended Amount**
Ex Concrete (Sidewalk/Median Island) Removal	m2	40	280	11200
Ex Asphalt Removal	m2	40	1730	69200
Ex Curb Removal	m	35	680	23800
Subgrade Preparation	m2	5	2275	11375
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	590	88500
Raised Asphalt Pathway	m2	100	1685	168500
Curb and Gutter	m	220	765	168300
Pavement Markings Allowance	m	60	1200	72000
Signage Allowance	m	50	1200	60000
Flexible Delineator Posts	ea.	150	250	37500
Utilities Relocation Allowance	l.s.	50000	1	50000
Drainage Allowance	l.s.	45000	1	45000
SUBTOTAL COST ESTIMATE				689800
Contingency and Design Engineering Costs	0.45			310410
TOTAL CONSTRUCTION COST ESTIMATE				**1010000**

VIEW STREET

Improvement	View Street			
Roadway Length (m)	1040			
Description of Work	**Unit of Measure**	**Unit Price**	**Quantity**	**Extended Amount**
Ex Asphalt Removal	m2	40	110	4400
Ex Curb Removal	m	35	50	1750
Subgrade Preparation	m2	5	110	550
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	45	6750
Curb and Gutter	m	220	30	6600
Drainage Allowance	l.s.	3000	2	6000
Pavement Markings Allowance	m	60	1040	62400
Signage Allowance	m	50	1040	52000
SUBTOTAL COST ESTIMATE				145450
Contingency and Design Engineering Costs	45%			65452.5
TOTAL CONSTRUCTION COST ESTIMATE				**210903**

RAILWAY STREET

Description of Work	Unit of Measure	Unit Price	Quantity	Extended Amount
Ex Asphalt Removal	m2	40	170	6800
Raised Asphalt Pathway	m2	100	580	58000
Ex Curb Removal	m	35	335	11725
Subgrade Preparation	m2	5	110	550
Excavation and Disposal Allowance	l.s.	5000	1	5000
Raised Concrete Pathway/Median Island	m2	150	465	69750
Sod	m2	20	300	6000
Curb and Gutter	m	220	660	145200
Drainage Allowance	l.s.	3000	4	12000
Pavement Markings Allowance	m	60	400	24000
Signage Allowance	m	50	400	20000
SUBTOTAL COST ESTIMATE				359025
Contingency and Design Engineering Costs	45%			161561.25
TOTAL CONSTRUCTION COST ESTIMATE				**520586**