MUNICIPALITY OF
JASPER

PROMOTING ACTIVE TRANSPORTATION IN JASPER FEASIBILITY STUDY

Prepared by:
Associated Engineering

September, 2023

EXECUTIVE SUMMARY

The Municipality of Jasper (MoJ/ The Municipality) retained Associated Engineering Alberta Ltd. (Associated) to investigate the feasibility of an on-street active transportation network. The study aims to explore the viability of implementing designated bike lanes to connect residential areas within the Town of Jasper to commercial districts, schools, and parks. By adopting a complete streets approach and reconfiguring the current rights-of-way, the existing space can accommodate various mobility needs including pedestrians, cyclists, transit, or automobile users. The existing roadways are spaceous, and the Study did not find any issues with accommodating active transportation facilities within the right-of-way of the corridors identified. This Feasibility Study directly addresses the priorities of the community by proposing an active transportation network that is easy to navigate and separate from vehicles. The proposed reconfiguration will increase overall safety limiting conflicts between automobile users and active modes.

The Town of Jasper, situated in the picturesque Jasper National Park in the Rocky Mountains, boasts a compact and easily navigable community that is highly conducive to walking and cycling. Residents already rely on cycling as a year-round mode of transportation, especially those without vehicles. While Parks Canada manages extensive mountain biking trails in the park, formal bike facilities within the townsite are limited, with the Discovery Trail being the only existing dedicated bike path. The Municipality has been striving to support active transportation in the community however, investments have been limited. The 2018 Transportation Master Plan identified the need for improved active transportation infrastructure, and suggests residents are in favour of targeted investments to improve opportunities for more sustainable modes of travel.

The Study provides an opportunity to reimage existing roadways into mobility cooridors supporting a year-round , connected and continuous active transportation network. The study also reviewed maintenance needs, safety considerations at crossing locations, examined existing bylaws impacting cycling on sidewalks, conducted benchmarking for active transportation facilities in other municipalities and providing guidance for inclusive wayfinding strategies.

Two network loop options were developed and supplemented with roadway cross-sections and key intersection improvements. Modifications to the existing roadway corridors and intersections improvements are needed in both network options to accommodate bike lanes effectively. Using a Triple Bottom Line (TBL) approach, the bike network options were reviewed against economic, social, and environmental criteria. Between the two concepts the overall scores vary minimally. However, relative to the total score for the “Existing Condition” the criteria and scores clearly indicate that providing the active modes facilities is beneficial to the community even when considering capital construction and annual maintenance costs. Aspects such as community cohesiveness, promoting an active lifestyle and providing sustainable transportation options were also weighed and scored.

Figure E-1 shows the Loop Option 1, and **FigureE-2** shows Loop Option 2. Each route includes a primary ‘loop’ (shown in dark blue), to facilitate efficient and safe travel for cyclists throughout Jasper and a secondary route (light blue) to provide greater connectivity for residents and can be implemented through a series of project phases. Formalized infrastructure on the secondary route will provide cyclists with better access to the primary loop.

Figure 1-1 Loop Option 1

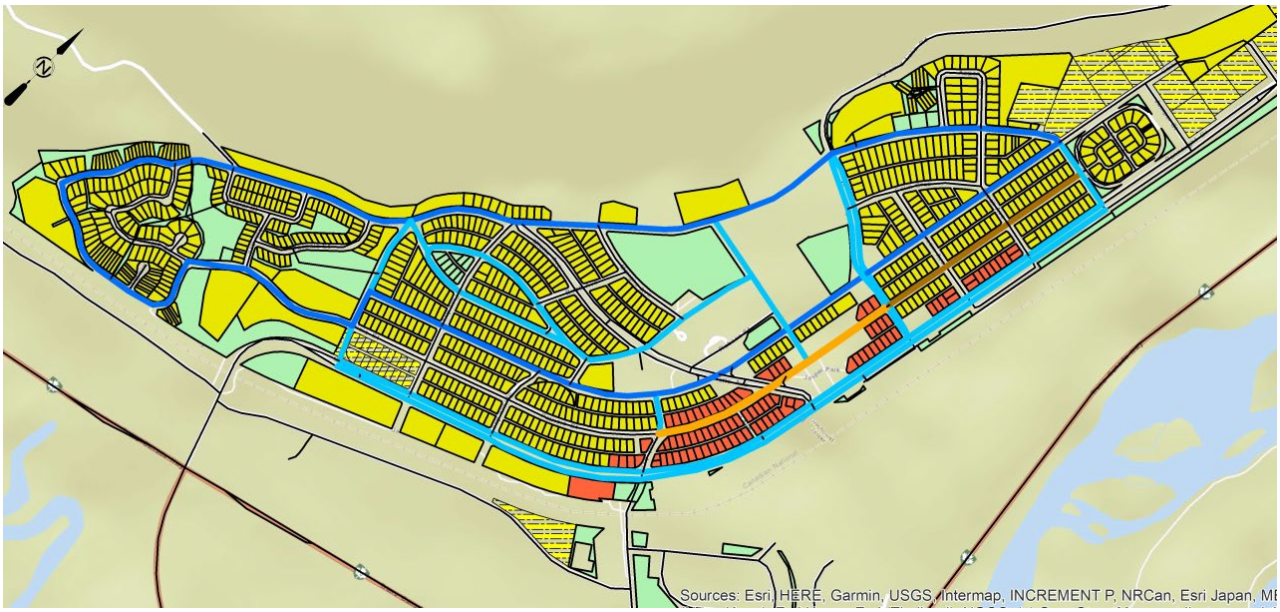
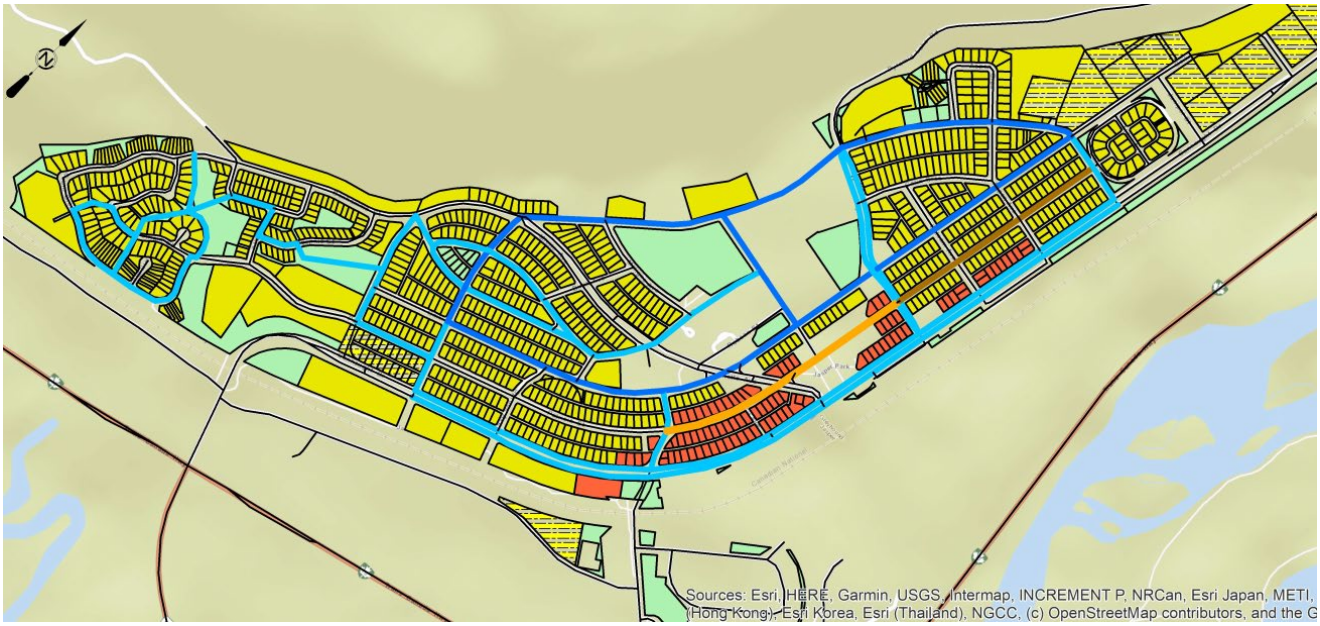


Figure 1-2 Loop Option 2



While most of the network is proposed to run along Bonhomme Street, Cabin Creek Drive, and Geikie Street, the study also looked at the feasibility of configuring Patricia Street into a pedestrian/bike priority roadway, similar to what Banff has created along Bear Street. The configuration would allow continued vehicle access, some parking, but prioritize pedestrians and cyclists within the space. The feasibility of converting Connaught Drive into a more pedestrian and bike-friendly space was also reviewed to identify opportunities to maintain parking supply and traffic movement but provide more space adjacent to the businesses along Connaught Drive for pedestrians and cyclists.

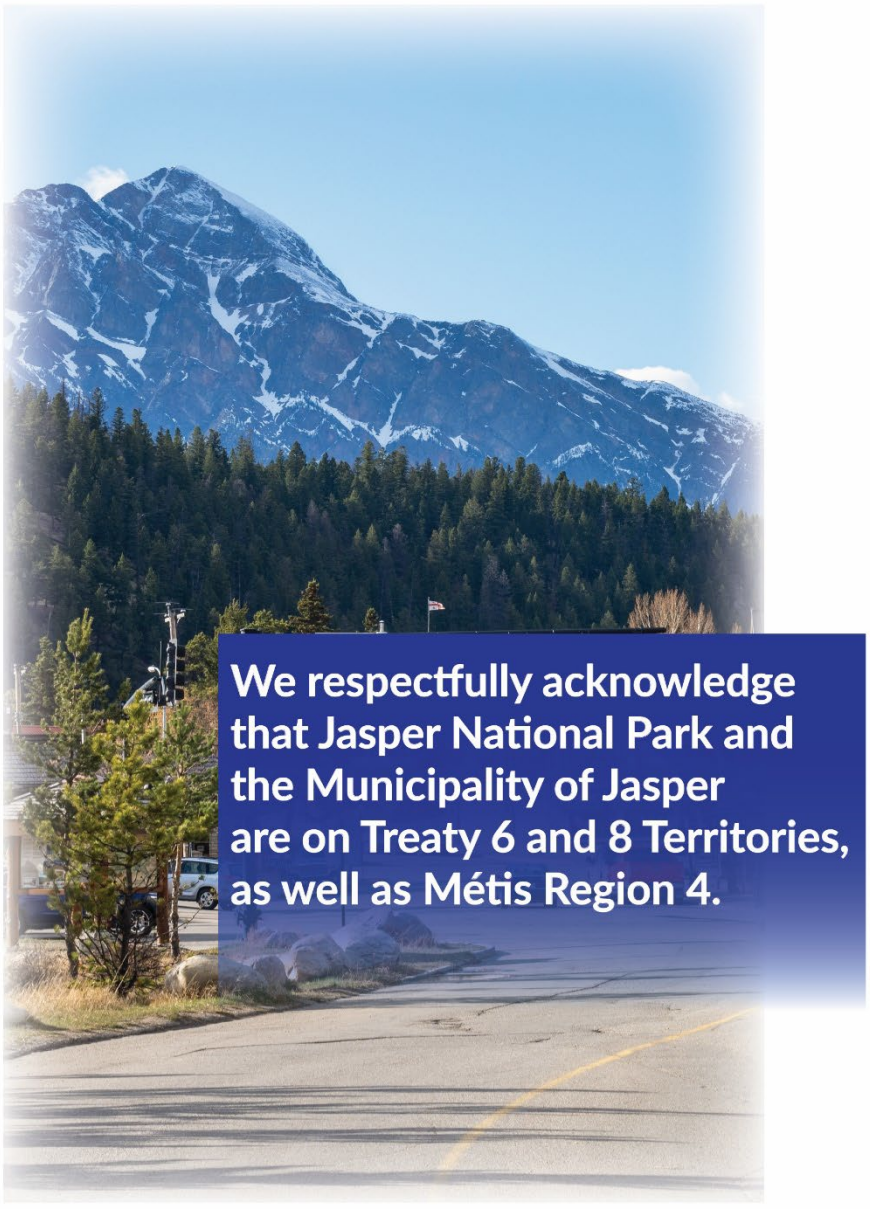

https://www.rmoutlook.com/banff/bear-street-ready-to-welcome-back-the-world-3970053

The concepts presented in this Feasibility Study provide a foundation for further discussion, refinement, and public feedback through planned engagement with residents of the Town, including families with young children, those with limited mobility options, and vulnerable groups. The options presented in the study can be altered as feedback is gathered and eventually a preferred single network can be brought to Council for approval. Downstream activities should also include a phased approach to constructing the various kilometres of the network considered within the context of other needs, available funding, and resources to manage the execution of projects. Collaboration amongst stakeholders such as Parks Canada, special interest groups, senior administration, and Council will be beneficial to inform next steps. Grant funding opportunities for active transportation infrastructure has increased in recent years and is likely to continue. Having a line of sight to these opportunities and the approval process will provide options for cost sharing with other levels of government. Section 6 of the study provides more detailed findings and outlines the proposed next steps including the option to implement pilot projects through rapid deployment techniques that can help Municipal staff gather feedback from users. These low-cost strategies along with other improvements such as reconsidering the possibility of altering current 4-way stop conditions into yield conditions that prioritizes the street with an active transportation facility can be combined to clearly demonstrate a desire to shift towards sustainable mobility options and inclusiveness.

ACKNOWLEDGEMENTS

Associated Engineering would like to thank the Municipal staff who participated in meetings, engagement sessions and guided tours, providing us with the necessary context, data, and information to support the Feasibility Study.

We acknowledge that this project is located on the traditional Treaty 6 and 8 Territories. We honour and extend our gratitude to all First Nations, Metis and Inuit peoples for the opportunity to gather, work and live on these lands.



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LIST OF ABBREVIATIONS

AADT	Average Annual Daily Traffic
CN	Canadian National Rail
MADT	Monthly Average Daily Traffic
MoJ	Municipality of Jasper
NACTO	National Association of City Transportation Officials
MUP	Muli-Use Path
RCMP	Royal Canadian Mounted Police
ROW	Right-of-Way
TAC	Transportation Association of Canada
TBL	Triple Bottom Line
TMP	Transportation Master Plan

1 INTRODUCTION

The Municipality of Jasper (MoJ) retained Associated Engineering Alberta Ltd. (Associated) to investigate the feasibility of an on-street bike network using designated bike lanes to connect residential areas of the Town of Jasper (the Town) to commercial districts, schools, and parks. Reconfiguring the current Municipality owned rights-of-ways with a complete streets approach will provide a more balanced accommodation for a wider range of mobility needs including pedestrian, cyclist, transit user, or automobile user. This Feasibility Study directly addresses the priorities of the community by proposing a cycling network that is easy to navigate and separate from vehicles. The proposed reconfiguration will increase the overall safety of cyclists limiting conflicts between automobile users and active modes.

The Town of Jasper is located within the world-renowned destination of Jasper National Park, at the heart of the Rocky Mountains. The limited geographic footprint of the Town and its location at the bottom of a wide valley between mountain ranges means the community itself is quite contained, making it very walkable and bike friendly. Residents already bike, walk, or scooter for at least six months of the year, and residents who do not own a vehicle rely on cycling as a year-round mode of transportation.

Parks Canada owns hundreds of kilometres of trails for mountain biking in the Park, but within the townsite there are no formalized bike facilities except for the Discovery Trail which runs adjacent to Connaught Drive and connects the Town with adjacent park trails. Although Municipal Council endorsed the 2018 Transportation Master Plan (TMP) outlining the need for better active transportations facilities for residents, there has been limited investment for infrastructure to date.

Currently residents (including children) and visitors on bicycles navigate roadways without proper markings, signage, or separation from roadway traffic. By addressing these risks in providing safer, dedicated facilities for cyclists, the modal shift to active transportation is expected to increase substantially.

The focus of this study is centred on the development of a safe and functional cycling facility network within the Town, to provide connections to the existing trails and to popular destinations.

1.1 Study Objectives

- Develop two concepts that identify the most suitable roadways for a connected and continuous active transportation network considering the needs of the community, location of services, and integration with future transit stops.
- Develop a reasonable maintenance strategy for all-season access to the On-Street Bicycle Network and increase the use window from six months to 12 months.
- Conduct a TBL assessment of a continuous On-Street Bicycle Network against economic, social, and environmental criteria.
- Review up to four crossing locations along Connaught Drive that are suitable points of entry from the On-Street Bicycle Network to the existing Discovery Trail south segment.
- Conduct a TBL assessment of a continuous On-Street Bicycle Network against economic, social, and environmental criteria.
- Review challenges and opportunities for existing bylaws impacting the use of sidewalks for children cycling.
- Recommend alternatives for wayfinding that are sensitive to the needs of residents including vulnerable populations and linguistic minorities, visitors/ tourists, and non-English speaking users of the active transportation network.

1.2 Study Area

The study area is defined as the roadway network area encompassed within the Jasper's jurisdiction and municipal boundary (**Figure 1-1**). Within the Town, all roads have a maximum posted speed of 30km/hr.

Figure 1-1 also shows the existing land uses within the Municipality. Adjacent to Connaught Drive is the main business district and tourism zone, while most of the remaining land use in town is primarily residential development.

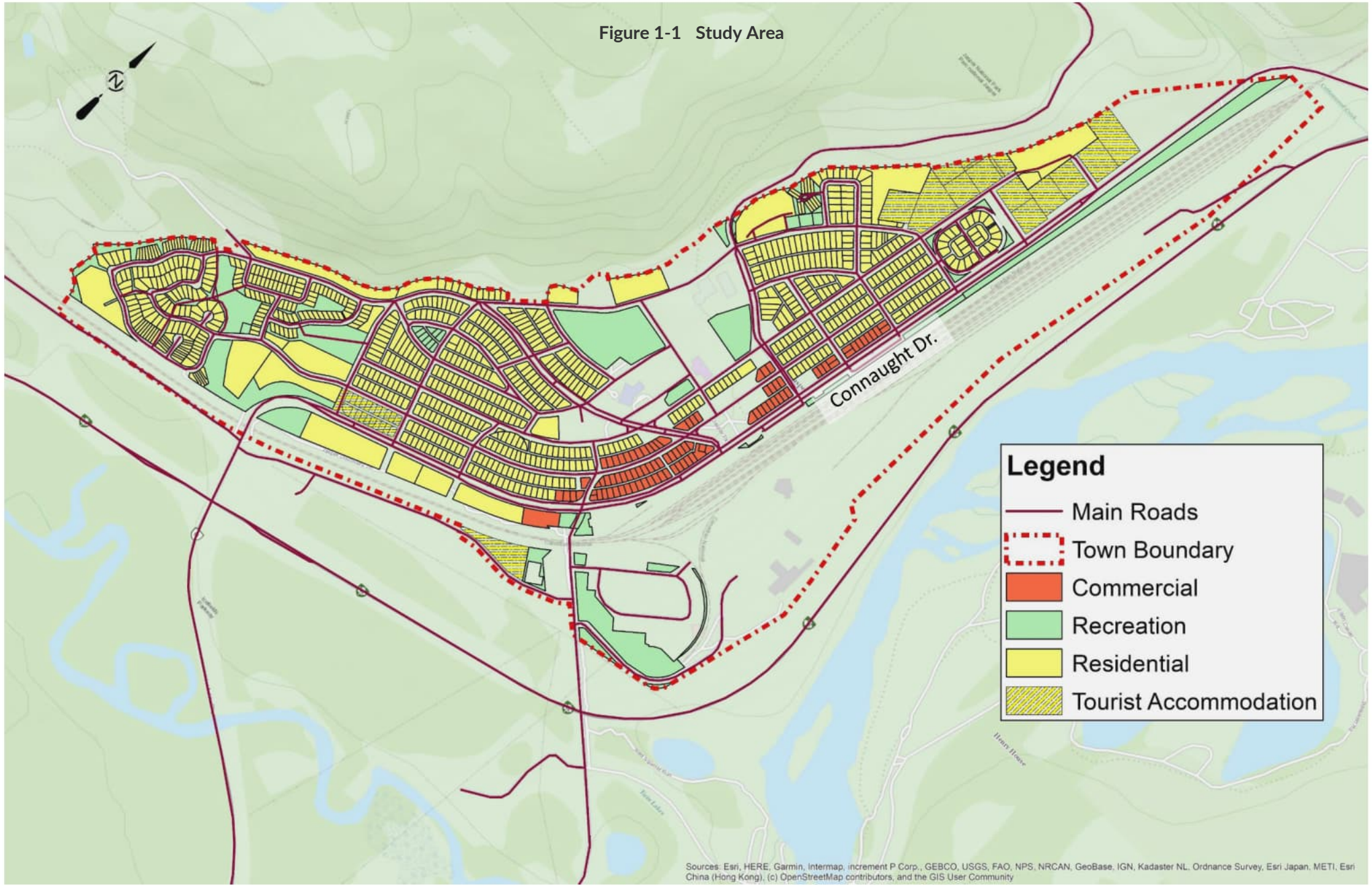
1.3 Resident and Community Needs vs. Tourism Needs

Designing for the right audience is important so the network will be well utilized and continue to grow as needed. The Town of Jasper has two main demographics that have vastly different needs within the townsite: community members and visitors. An active transportation network that meets the goal and objectives of community members will also provide inviting features for visitors to use while in the Town as well.

Residents are the target audience for the proposed active transportation network as they live within the community all-year round and many already cycle around town for most of the year. While residences are spread throughout the Town, most of the community features, such as schools, recreational areas, and shops are in the centre of the townsite. The residents will benefit from a network that connects to these important community features.

Tourists primarily visit Jasper during the summer months. Over 2.1 million visitors came to Jasper National Park in 2021, and visitors to the area are expected to grow annually based on reports published by Parks Canada. They tend to spend most of their time in the hotel area toward the north end of town on Connaught Drive and Geikie Street, and travel to Patricia Street and Connaught Drive as the commercial district is located within this area.

Figure 1-1 Study Area



2 EXISTING CONDITIONS

2.1 Background and Information Review:

Several documents were reviewed as part of this study. Key information used to inform the proposed active network concepts are summarized in this section.

2.1.1 The Municipality of Jasper Transportation Master Plan, Municipality of Jasper, July 2018

The TMP calls for an improved active transportation infrastructure based on stakeholder engagement. Overall, 46% of residents were comfortable cycling, 41% were somewhat comfortable and 13% were not comfortable. Stakeholders' suggested improvements to the level of comfort in cycling included **designated bike lanes, wider sidewalks, more multi-use trails, and secure bike parking**.

A traffic review completed as part of the TMP noted higher traffic during the summer months due to tourism. The highest monthly average daily traffic (MADT)in 2016 was 8,078 (July, east boundary) compared to the lowest of 1,616 (January, west boundary). Of the other traffic counts assessed in the TMP, **Miette Avenue at Patricia Street and Miette Avenue at Connaught Drive had some movements with a failing level of service during a typical summer weekday due to high pedestrian activity**.

2.1.2 The Municipality of Jasper Bylaw #224 Traffic Safety, Municipality of Jasper[1]

Bylaws relevant to this functional study are noted below:

- Section 12 Bicycles: "Cyclists should ride as close as possible to the right edge of the road or curb."
- Section 13 Use of Sidewalks: "Bikes can only be operated on the sidewalk for users 10 years old and under. If a person older than 10 is accompanying a cyclist 10 and under they are able to ride on the sidewalk."
- Schedule "B": Unless otherwise marked all areas of the community are 30km/h.

2.1.3 Jasper: Connaught Drive and Patricia Street Closures

In 2020, the Municipality permitted Connaught Drive and Patricia Street to use parking spaces in front of their businesses. This allowed a temporary closure of the southbound parking lane along Connaught Drive to promote social distancing and allow businesses to extend operations onto the street[2]. All businesses were permitted to expand beyond their storefront if desired.

A survey was conducted by the Jasper Park Chamber of Commerce with businesses/organizations along Patricia Street and Connaught Drive to engage interest from the community for the proposed road closures. The survey received a mixed response as 55 votes were in favour, 27 votes not in favour and 27 votes with yes or no values. 22 business or organizations did not respond to the survey.

The main concerns raised by the businesses/organizations was the accessibility issues and parking. As Connaught Drive and Patricia Street have grocery stores and hotels, there was concern about the accessibility issues for those carrying groceries further distances to cars or for tourists carrying luggage. Other comments identified hindering retail businesses

[1] Municipality of Jasper, Traffic Safety Bylaw #244: https://Jasper-alberta.ca/Home/DownloadDocument?docId=f63562f1-2e68-4a00-ac15-b009c04bd4c8

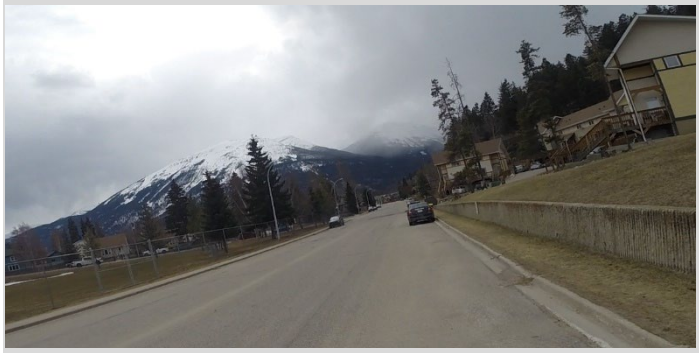
[2] Municipality of Jasper, Regular Council Meeting Minutes, Public Spacing in Public Places, June 2, 2020

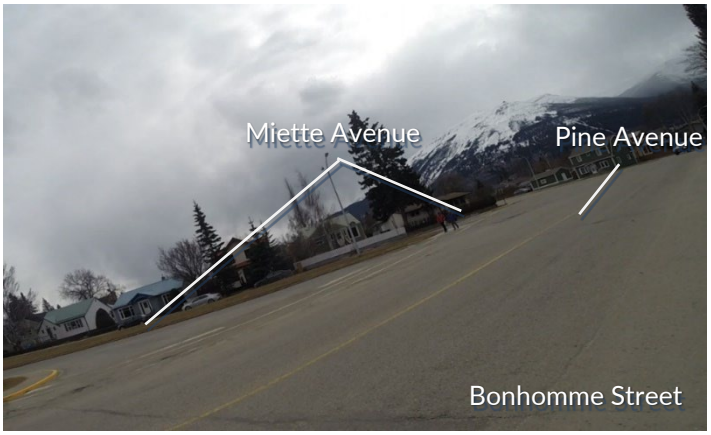
due to reduction in parking and potentially commercial parking overflow into residential areas. The yes or no values largely were focused on the aesthetics of the pedestrian environment and adding separation for bikes to protect pedestrians with options to keep short term parking for grocery stores or hotels. Those in favour of the closure supported a trial period in 2020 for possible further implementation. The likelihood of reducing congestion and improving mobility for disabled individuals or strollers also appealed to supporters.

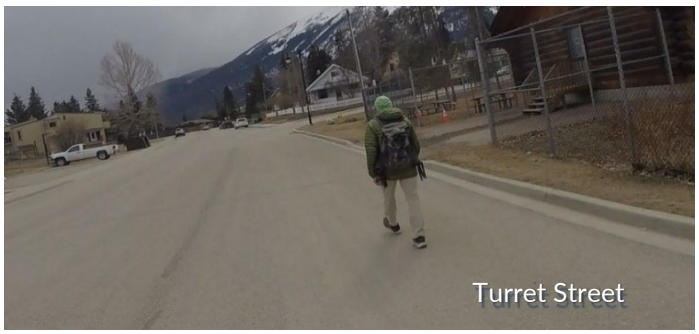
2.2 Site Visit

A site visit to the Town was completed from April 13-15, 2023, to understand travel patterns, demand and how users currently navigate the road network on bicycle. MoJ representatives Christopher Read (Director of Community Development), Lisa Riddel (Community Development Manager), John Greathead (Director, Operations and Utilities), and Sheila Hampel (Program Coordinator, Operations Department) assisted in this information gathering exercise.

Associated staff biked and mapped Jasper's road network to understand the existing conditions and made the following key observations. Additional site visit notes are included in **Appendix A**.

Existing Road Geometry Observations	
	Wide cross-section along Connaught Drive (median separated, two through lanes with left turn lanes and parking in each direction). This results in long crossing distances for pedestrians and cyclists. Connaught Drive has no flashers for pedestrians to signal crossing the four lanes
	Excessively wide cross-section along Bonhomme Street with sidewalk missing in some locations.

Existing Road Geometry Observations	
	Wide cross-section along Geikie St – parking on both sides and two lanes of traffic – primarily residential street (mostly used by residents as a through road as well)
	Wide cross-section along Pyramid Lake Avenue with median and parking on both sides of street
	Bonhomme Street and Miette Avenue / Pine Avenue intersections are confusing to navigate and very wide. Miette Avenue has a wide centre median, however it does not provide good refuge for pedestrians crossing.

Existing Road Geometry Observations	
	Bonhomme Street and Miette Avenue / Pine leads to poor sightlines and a very long exposure time for pedestrians and cyclists.
	Bonhomme Street at Elm Avenue has narrow sidewalks (90cm in width), too narrow for passing pedestrians or pedestrians with strollers or children on bikes.
	Pedestrians and cyclists use a shortcut at the southern tip of Tonquin and Turret Street (cuts through driveway access to back lanes) and connects to the intersection of Bonhomme Street and Willow Ave.
	Some sections of road, adjacent to parks do not have sidewalks

Existing Road Geometry Observations	
	Discovery Trail along Connaught Drive is narrow for shared-use (both sidewalk version and trail version). Only demarked using small multi-use stencil on the concrete

Other Observations

Patricia Street is one-way from Cedar Avenue to Bonhomme Street. Municipal representatives do not know the history behind this configuration.

Existing pathways in between residences are too narrow for passing pedestrians or cyclists (approx. 1.5m).

In general, most streets have wide right-of-way with large carriageway and narrow sidewalks.

There is a multi-use path (MUP) from CN underpass to Municipality Operations and Parks offices – Located on Parks land, but Town maintains the path.

2.3 Roadway Characteristics and Geometry

2.3.1 Bonhomme Road

Bonhomme Street is the main north-south road on the west side of the townsite and is currently well-used by cyclists and vehicles in Jasper. It has a wide right-of-way with parking in most areas. A large portion of the road either has no sidewalk or very narrow sidewalks with no buffer space from parked vehicles.

2.3.2 Cabin Creek Drive

South of Bonhomme Street, this roadway is the main connection through the south part of Jasper. This roadway contains closely spaced residences and there are numerous driveways fronting the road. The road is narrow and winding with vehicles parked on both sides of the road.

2.3.3 Geikie Street

Geikie Street is one of the main north-south connections through the townsite. It has a very wide right-of-way with residences fronting most of the road. There are some driveways, but more houses have rear laneway access to garages. From Miette Avenue to Pyramid Avenue, Geikie provides access to church institutions, firehall, school, and connections to the central businesses. North of Pyramid Avenue, there is a narrow sidewalk with a grass buffer between parking on each side of the road.

2.3.4 Patricia Street

Currently, Patricia Street is one-way traffic south to north from Hazel Avenue to Bonhomme Street. The block from Hazel Avenue to Miette Avenue contains a large portion of the restaurants and stores within the Town. There is parking on both sides of the road, and some accesses to side-building access and back lanes. From Miette Avenue to Pyramid Lake Road, there is commercial infrastructure and multiple parking lots. North of Pyramid Lake Road is residential housing with parking both sides of the road.

2.3.5 Connaught Drive

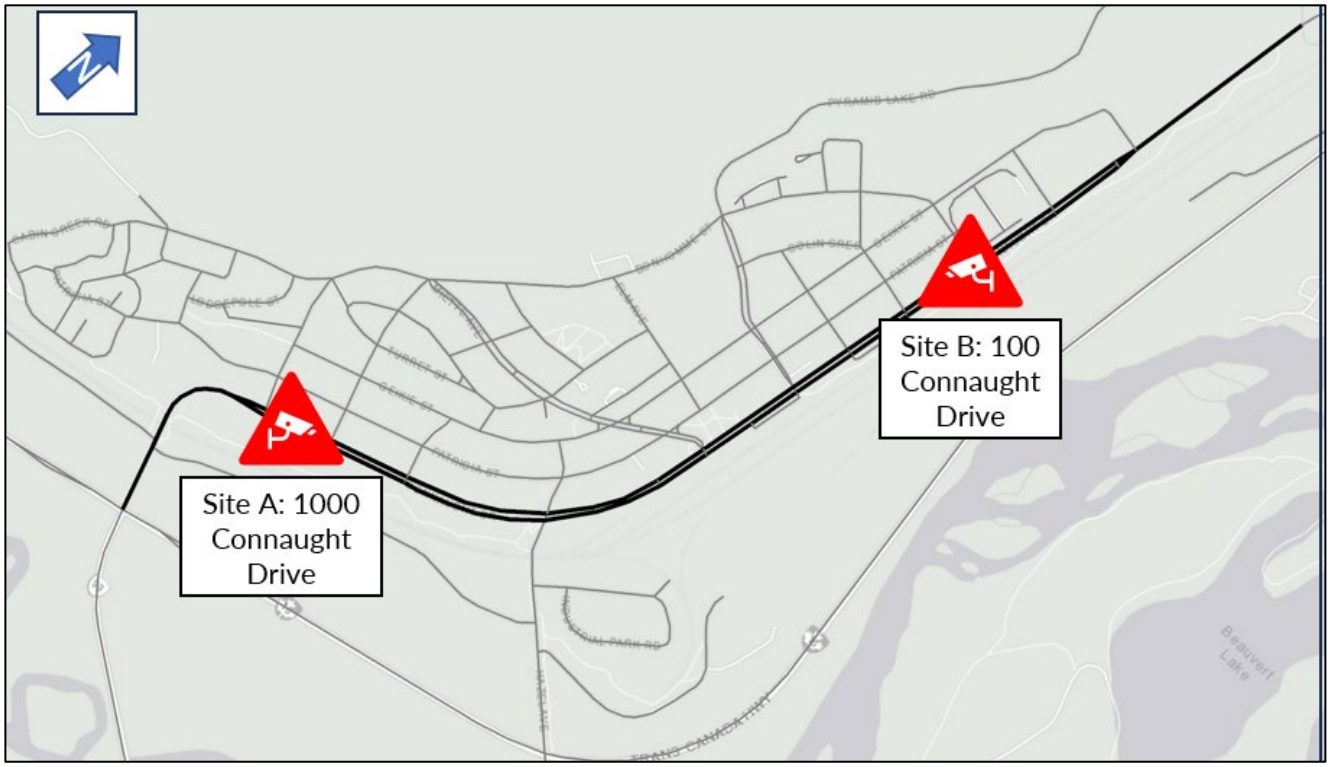
Connaught Drive is the main north-south road through the townsite. It connects Jasper to Highway 16 north to Edmonton, and The Icefields Parkway (Highway 93) to the south. Connaught Drive is located along the east boundary of the Town, and it serves a portion of the commercial district made up of retail, tourism services and restaurants. Toward the north end of Jasper, many hotels are located along Connaught; supporting the influx of seasonal tourists to the area. Connaught Drive is very wide with a 33.5 metre right-of-way. It has two travel lanes in each direction with left turn bays at every intersection and parking on both sides of the street. The road has 14 pedestrian crossings between Hazel Avenue and Bonhomme Street, where pedestrians need to traverse over 25m. These pedestrian crossings each have curb cuts and wheelchair ramps for accessibility, but do not have flashers for crossing.

In addition to the on-street parking, there are numerous parking lots adjacent to the east side of the road. The Canadian National Railway (CN) Jasper Station, the eastern terminus for The Rocky Mountaineer, and Discovery Trail are located on the east side of Connaught Drive.

Although the speed along Connaught Drive is posted 30km/h, it was observed that there is very low compliance from drivers. The MoJ collected traffic data at two points along Connaught, see **Figure 2-1**. Site A, 1000 Connaught Dr, captures traffic heading northeast and Site B, 100 Connaught Drive, captures traffic heading southwest along Connaught Drive[3].

[3] The Municipality of Jasper provided traffic data collected from March 9-30, 2023 using Safe pace radar signs and the SafePace Pro software application to compile and analyze data.

Figure 2-1 Connaught Traffic Count Data Points



Site A sees on average 4,750 vehicles per day and Site B see on average 1,750 vehicles per day.

These counts have also been taken during the shoulder season of March. It would be expected that in high tourism seasons (i.e. summer) the volume of traffic on the road would increase substantially.
Speed data collected with the same traffic study found at Site A ~97% of vehicles speeding, while Site B measured~82% of vehicles speeding. The average 85th percentile for Site A and Site B is 50.7 km/hr and 48.9 km/hr, respectively.

Due to the locations of the traffic counts, it is unclear whether vehicles continue to speed through the Townsite and if the 30km/hr speed limit compliance improves through the commercial district.

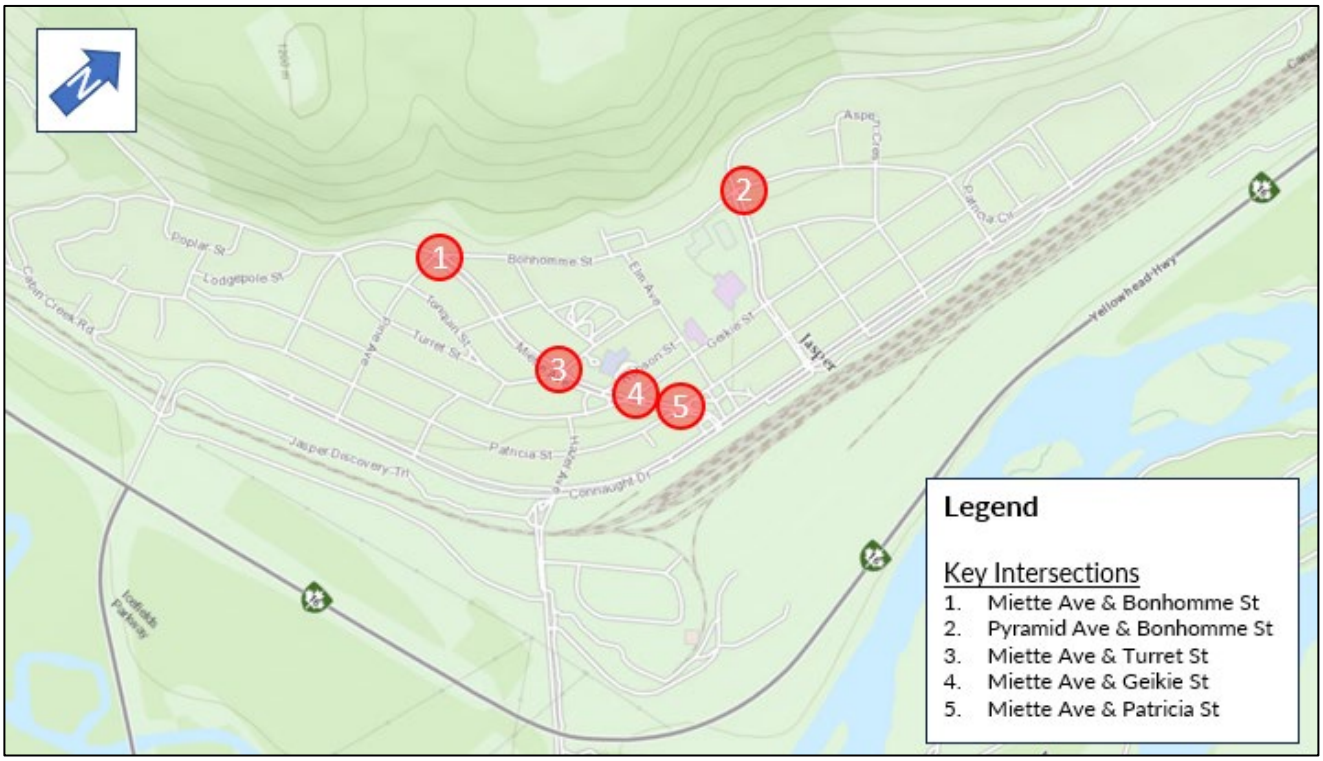
2.3.6 Elm Avenue

Elm Avenue connects Bonhomme Street and Geikie Street, providing access to Jasper Elementary School, Ecole Desrochers, and Jasper Junior and Senior High School. Currently there is parking permitted on both sides of the road. There is no sidewalk on the south side, and staff and teachers park along the south curb. The north curb is utilized for student drop-off and pick-up by parents and buses. This configuration is conducive to undesirable operations including jaywalking by students.

2.4 Notable Intersections

During the site visit and observations made of Jasper's road network, the following five intersections with operational concerns were noted, see **Figure 2-2**.

Figure 2-2 Intersections of Notable Operations



1. Miette Avenue and Bonhomme Steet is non-standard intersection configurated with stop-controlled condition on Miette Avenue. The overall intersection is skewed with Pine Ave also entering the intersection at an acute angle to Miette Ave. Due to the width of Miette Ave, with wide lanes and median width, pedestrians and cyclists have a high exposure time when crossing.

2. Pyramid Avenue and Bonhomme Street is a controlled 4-way stop intersection with overall poor sightlines for all roadway users. Traffic from Pyramid Lake Road has a designated right-turn lane with a combined through and left turn lane heading east along Pyramid Lake Road, all other directions offer one lane for traffic.

3. Miette Avenue and Turret Street is a stop-controlled intersection, with stop condition on Turret Street, and with a wide footprint and channelized right turns. The overall intersection is wide including large lane widths and centre median with no refuge areas, which creates high exposure time for pedestrians and cyclists. The intersection also has a parking lot entrance and exit driveway location within the intersection limits that operates with full turns conditions.

4. Miette Avenue and Geikie Street is a 4-way stop-controlled intersection with channelized right turns and large centre median along Miette Ave. The size of the intersection increases the overall exposure time for cyclists through the intersection. Within the median configuration there are large trees that can impact the sightline of the intersection, especially for cyclists given the canopy size of the mature trees.

5. Miette Avenue and Patricia Street is a 3-way stop-controlled intersection with a westbound channelized right-turn lane and large centre median along Miette Ave. Patricia Street runs one-way from south to north. When crossing Miette Avenue, the crossing distances for pedestrians are long and the skew contributes to poor visibility.

Further diagrams and images for each intersection is included in **Appendix D**.

2.5 Active Transportation – Observations

Factors that have an impact on active transportation in the community were noted during the site visit. Overall, most of the townsite has narrow sidewalks and there is no existing cycling infrastructure.

Missing Sidewalks:
West side of Bonhomme Street, adjacent to the RCMP station, there is a no sidewalk for approximately 300 m with no pedestrian crossing to facilitate crossing to the other side of the road.

Centennial Park, located in the centre of town adjacent to the schools, has no sidewalks located on the north, east, or south sides of the park.

Geikie Street at the north end of the Town, across from the hotels, has no sidewalk on the east side of the road.

Bike Parking:
In the central business area of Patricia Street and Connaught Drive, there are bike racks present, and they were noted to be well utilized. The type and placement of racks appear disorganized.

There are numerous bike racks being used to capacity at both school sites. At the elementary school, in addition to the bike racks, there is also a fenced bike parking area. The community centres also have several well-utilized bike racks at each facility. Bike racks were observed to be missing from most parks within the townsite.

Pedestrian Crossings
The Central Business District and many hotels are located on the west side of Connaught Drive. On-street parking is currently provided on both the east and west side of Connaught Drive. Pedestrian crossings along Connaught Drive do not have flashers that can be activated for pedestrians crossing the 4-lane divided road. Heading north on Connaught, the last crosswalk is at Connaught and Aspen Ave, pedestrians at this location have a choice of connecting to the Discovery Trail or crossing to the west side of the road. The next crossing along Connaught for users of the Discovery Trail is located ~1 km north down the road. The north end of Connaught hosts the largest number of tourist accommodations, with a small percentage of higher-density residential housing.

Around the townsite the are crosswalks ais limited lighting near intersections and pedestrian crossings.

3 BENCHMARK FINDINGS

A review of standards, guidelines, and best practices were reviewed to inform the options development. The following sections provide a summary of insights and observations that the Town can consider to support active mode use.

3.1 Bylaw Review

A review of similar towns in terms of similar geography and lifestyle was conducted to understand the bylaws and existing active modes infrastructure present. The towns chosen for benchmarking were Canmore and Banff due to National Parks context, climate, location and similar local population demographics. Both towns have a large summer tourism industry.

Upon the review of the bylaws it was revealed that Jasper has the lowest age restriction of 10 years old maximum age that can cycle on the sidewalk. Both Canmore and Banff have set a bylaw age for cycling on the sidewalk at age 12 as the maximum.

3.2 Road Closures

Canmore and Banff have both adopted the ongoing practice of closing main roads to vehicular traffic such as Main Street and Banff Avenue, first introduced because of the Covid-19 pandemic. These road closures to vehicles provide more room for social distancing and favour active modes on the street.[4]

In 2021, Banff chose to extend the pedestrian zone for 2 years and will be seeking input in fall 2023 about the concept of creating a recurring annual summer pedestrian zone[5]. The pedestrian zone in Banff is closed from approximately mid-May until mid-October. Within the pedestrian zone, bicycles and skateboards are to yield to and travel almost as slowly as pedestrians.

After the initial success in 2020 of the Main Street closure, Canmore has also extended the closure of Main Street into 2023. The “pedestrian and cyclist only” condition on Main Street exists from beginning of May until mid-October.

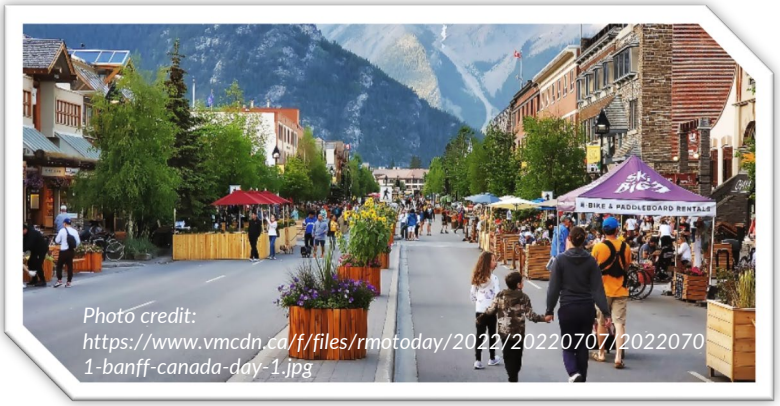


Photo credit: https://www.vmcdn.ca/f/files/rmotoday/2022/20220707/20220701-banff-canada-day-1.jpg

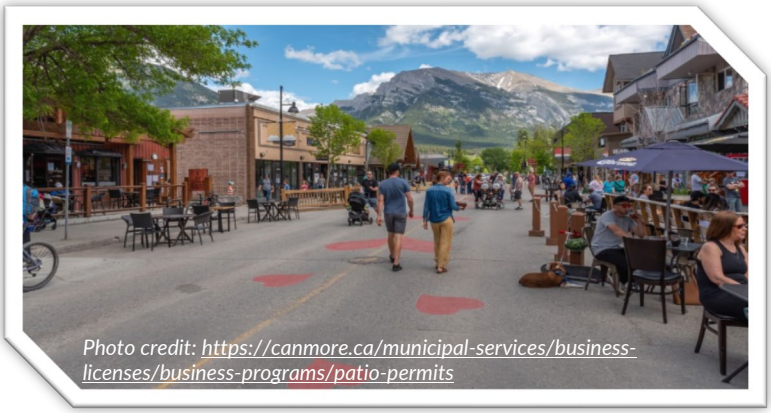


Photo credit: https://canmore.ca/municipal-services/business-licenses/business-programs/patio-permits

[4] Town of Banff, Banff Avenue Pedestrian Zone: https://banff.ca/1146/Banff-Avenue-Pedestrian-Zone
[5] Town of Banff, Downtown Pedestrian Zone; 2022 year in review and 2023 year ahead: https://banff.ca/DocumentCenter/View/15430/Downtown-Pedestrian-Zone-2022-Year-in-Review-and-2023-year-ahead
[3] Town of Banff, Bear Street Shared Street: https://banff.ca/969/Bear-Street-Shared-Street
[4] Town of Banff, Bear Street Reconstruction Review: https://banff.ca/DocumentCenter/View/12002/March-8-2021-Banff-Town-Council-Briefing---Bear-Street-Reconstruction

In 2020 MoJ chose to close the southbound parking lane of Connaught Drive to traffic to improve the ability for social distancing and allowing businesses to expand seating onto the sidewalk and parking lane. MoJ has not brought back the closure since its original implementation in 2020 for social distancing.

3.3 Pedestrian Priority Street

A pedestrian priority street (also known as a 'Woonerf') is a street where the space is reallocated to provide priority to active transportation users like pedestrian and cyclists. Motor vehicles are still permitted, but the travel speed is low. The objective is to create a public space that can be enjoyed by all users.


Photo credit: https://banff.ca/969/Bear-Street-Shared-Street

There are several jurisdictions where pedestrian-only streets or pedestrian priority streets have been implemented

Winnipeg

In Winnipeg, John Hirsch Place was transformed into a pedestrian priority street based on objectives from their 2011 Transportation Master Plan. Curbs were removed to create a seamless pedestrian environment, while street furniture and lighting enhances the space for pedestrians. Parking is available sparingly and traffic calming measures were used to reduce vehicle speeds[6].

Banff

The Town of Banff recently created a permanent pedestrian priority corridor on Bear Street. In the 2013 TMP, Bear Street was a recommended candidate for a shared street design[7]. Banff's goals for the Shared Street concept was to create a pedestrian and cycling priority environment that would become a destination unto itself within the downtown area[4]. Bear Street was recommended as the adjacent street, even though Banff Avenue, had six times the number of pedestrians. The use of Bear Street away from vehicles would encourage more visitors to the area and promote longer stays. Bear Street is also home to many residential services such as doctors and dentist offices, with the creation of a pedestrian and cycle priority space, it will encourage more residents to use active modes of transportation over personal vehicles to this area. The main feature of Bear Street is a completely shared space with no separation between pedestrians, cyclists, and cars. The entire road has no curb and is covered in interlocking pavers with a crossed pattern to encourage crossing in multiple directions. The interlocking pavers create the feel of an old European main

6 John Hirsch Place- Winnipeg's First Woonerf, https://citygreen.com/case-studies/john-hirsch-place-winnipegs-first-woonerf/
7 Town of Banff, Request for Direction Bear Street Shared Street Concept: https://banff.ca/DocumentCenter/View/6301/Bear-Street-Shared-Street-Concept-Report-January-28-2019?bidId=

street, which encourages people to remain on the street for longer periods of time. Traffic calming features, such as planters and landscaping, were installed to narrow the right-of-way for cars naturally slowing traffic down.

Banff conducted a pilot project testing Bear Street as a shared space. The pilot ran from 2015-2018 during the summer months and lead to a permanent redesign of the right-of-way. Construction of Bear Street started in 2020, sped up due to the pandemic, and was completed in 2021. The $9.5 million project included upgrades to all underground water and sewer mains, addition of soil cells, additional landscaping, upgrades to street lighting and resurfacing of the road[4].

Kelowna

Kelowna has created a temporary pedestrian corridor during the summer months. The project transforms Bernard Street into a pedestrian corridor with patios, parklets, and art. Vehicle access is restricted, and pedestrians and cyclists are permitted to walk along the sidewalks or in the street[8]. The program provides greater space for locals and tourists to spend time within the community

https://infotel.ca/inwine/you-can-drink-on-the-street-in-downtown-kelowna-by-thursday-afternoon/it98389

3.4 Cycling Amenities

A comparison of the cycling amenities and infrastructure that are provided within the Town of Canmore and Banff to encourage active modes include a range of amenities offered cover (e.g. canopies, shelters), trip-end facilities, repair stations, safe access areas and recreational areas.

The Town of Canmore investments into active modes infrastructure include[9]:

- Bike Maintenance Stands (Dero Fixit Stands with multi-tools for basic repairs and maintenance)
- Bicycle Corrals and Street Patios
- Covered Bike Parking
- Bike Lockers
- Trans-Canada Highway Underpass
- Rocky Mountain Legacy Trail
- Mountain Bike Skills Parks

There are currently 10 locations of the bike stands throughout the Town. The bicycle corrals, street patios, covered bike parking and bike lockers are all end-trip facilities that provide safe and secure options for cyclists to park bikes at when at their destination.

[8] Meet me on Bernard, https://meetmeonbernard.com
[9] Town of Canmore, Cyclist Amenities: https://canmore.ca/residents/getting-around/cyclist-amenities

The Town of Banff has also been implementing more cycling infrastructure that support active modes and emerging micro mobility needs. The current amenities offered are:

- Free bike valet
- E-bike charging
- Bike repair stations

The bike valet is a staffed bike lock up service that is offered during the months of pedestrian zone[10] (May -October) providing a safe lock up location for cyclists to leave bikes. The E-bike charging station is also located at the bike valet. Bike repair stations are located at various spots within the Town core with the necessary tools for basic repairs and maintenance.

3.5 Parking Restrictions

The Town of Banff implemented paid parking in all downtown lots and streets with free parking in certain areas to encourage transit use[11]. The Bear Street parkade and the train station, offer free 9-hour parking for visitors with access Roam Transit service that runs within the Town and greater Bow Valley area. Downtown lots are paid parking from 8 am to 8 pm daily, with free parking the remaining hours. Typically, downtown paid lots are full by 11 am in the summer and with the creation of the free parking lots has reduced the number of vehicles in the downtown core.

The Town of Canmore implemented paid parking in all downtown areas with free 9-hour parking located in areas outside of the downtown core. Paid parking was also implemented at Quarry Lake, a popular location for recreation for both the community and tourists. Paid parking within the downtown core has reduced the number of vehicles in the area. The paid parking is in effect from 8 am to 8 pm daily. Canmore Residents Parking Permit holders are provided with up to 3 hours free in all paid parking zones per day. [12]

[10] Town of Banff, Banff Avenue Pedestrian Zone: https://banff.ca/1146/Banff-Avenue-Pedestrian-Zone
[11] Town of Banff, Parking: https://banff.ca/93/Parking
[12] Town of Canmore, Paid Parking Program: https://canmore.ca/municipal-services/pay-for-parking

4 CONCEPTUAL OPTIONS DEVELOPMENT

Based on the study objectives, existing conditions, and benchmark findings, high-level concepts have been developed for a continuous bike network within Jasper. There are two components to the concepts:

ROUTE – Overall bike network planning, including accessibility and connectivity.
FACILITY – cross-section incorporation of the bike facilities with other improvements to the cross-section to support multi-modal infrastructure.

Several additional principles were considered when developing the network routing options. The Federal Highway Administration[13] identifies seven principles of bicycle network design:

The network should provide necessary and desired connections. It should be safe and comfortable for users of all ages and abilities and provide priority and efficient travel through the network. Finally, it should help the Municipality be strategic in investing and implementing the network.

The roadways best suited for a connected and continuous on-street bicycle network were selected for overall routes. Typical cross-sections along the route have been developed to identify how the bike infrastructure can be incorporated. For the routes and facilities, the key considerations included the needs of the community, location of services, and integration with future transit stops.

4.1 Conceptual Network Options

Two high-level network routes were created to identify ideal options for network circulation through the Municipality. Each route includes a primary 'loop,' to facilitate efficient and safe travel for cyclists throughout Jasper.

The secondary (neighbourhood) route connections are intended to provide greater access points for residents and can be implemented following the implementation of the primary loop. Formalized infrastructure on the secondary route connections will provide cyclists with better access to the primary loop.

Option 1 is shown in **Figure 4-1** and Option 2 is shown in **Figure 4-2**. The figures indicate how these network options service the land uses of Jasper. Key intersections for each network are described below and shown in the figures.

[13] FHWA, Bikeway Selection Guide, pg 10: https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf

Bonhomme Street – This is the main north-south road on the west side of the townsite. It has a wide right-of-way which facilitates utilizing the space to accommodate north-south vehicle traffic and bike traffic. It is proposed as part of the primary loop in Option 1 and Option 2.

Cedar Creek Drive – South of Bonhomme Street, this roadway is the main connection through the south part of Jasper. Option 1 has a longer primary network that extends to include Cabin Creek Road. Option 2 has a shorter primary network and connects to the Cabin Creek Road area via secondary paths in the existing green space to not impact vehicle operations along Cedar Creek Drive.

Geikie Street – One of three main north-south connections on the east side of the townsite. Due to the very wide right-of-way, it provides the best space for providing infrastructure for multiple modes. Due to its current use as a main connection for resident trips Associated observed on the site visit that Geikie Street was used more frequently by the residents compared to the tourism/commercial focused Patricia Street and Connaught Drive). Geikie Street connects back into Bonhomme Street at the north end of the townsite.

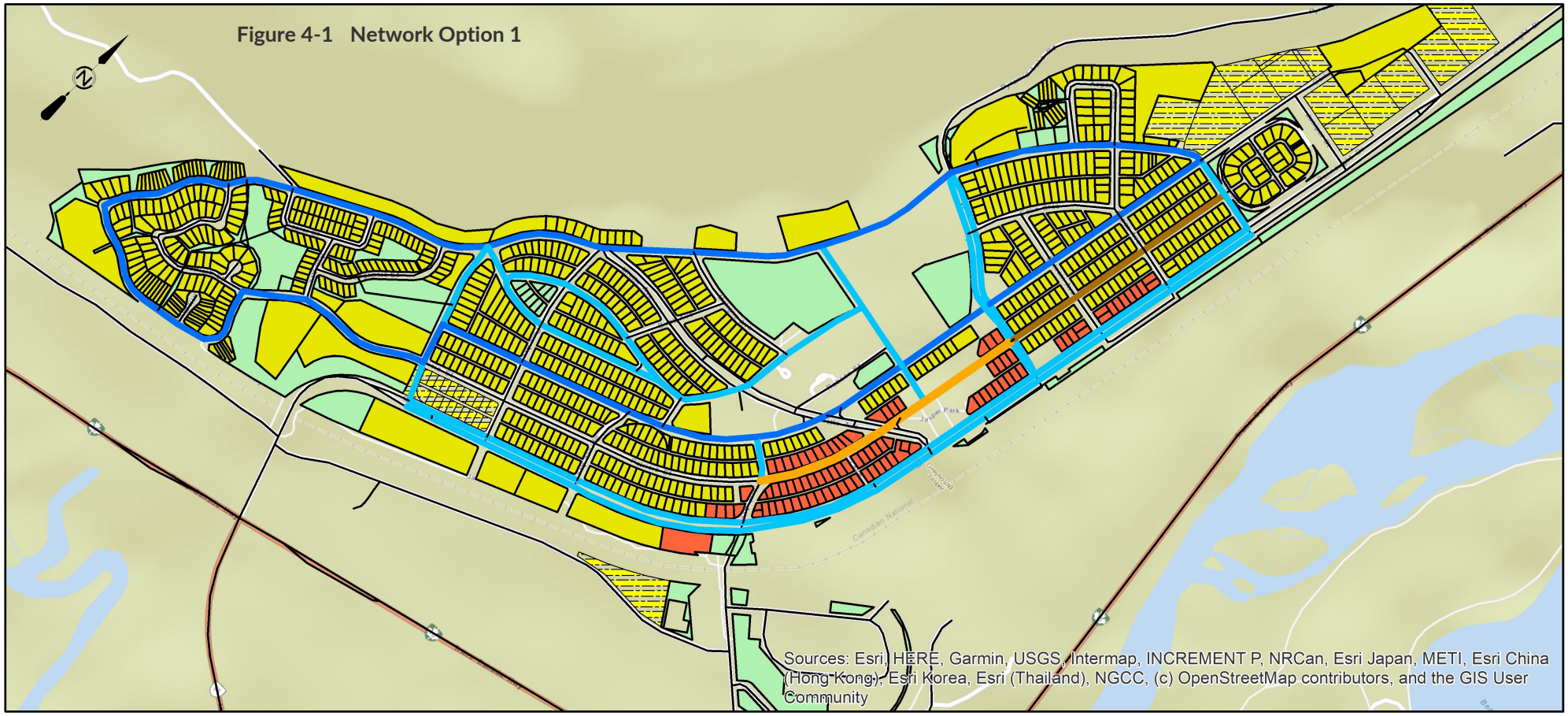
Patricia Street – Both options recommend converting Patricia Street to a shared street (similar to Banff's Bear Street) from Hazel Avenue to Pyramid Avenue. Configuring Patricia Street to a one-way shared street will maintain vehicle access and parking to the businesses along Patricia Street and promote active transportation to the businesses in Jasper. Patricia Street was not selected as a route for the primary bike network due to the importance of the area as a destination for shoppers, rather than a traveller thoroughfare.

Connaught Drive – Reconfigure Connaught Drive to become a secondary connection to the bike network. This will reduce traffic speeds along the road and at the same time, it will create a more pedestrian and bike-friendly business area. While this roadway is an important location for residents of the Town, improving Connaught Drive will also greatly improve mobility and accessibility for tourism.

Elm Avenue – Elm Avenue is the main road to access the schools in Jasper. Because of this it is critical for the bike network to seamlessly connect students travelling to and from the school to the proposed cycling facilitiesl. Option 1 identifies Elm Street as secondary connection to prioritize the primary network first. Option 2, however, identifies Elm Street as a primary connection due to its greater focus on east-west connectivity.

Pyramid Avenue – The width of Pyramid Avenue allows for flexibility in the type of facility to be installed. It is an important east-west connection and can provide formal bike access out of the townsite to Pyramid Lake.

Figure 4-1 Network Option 1



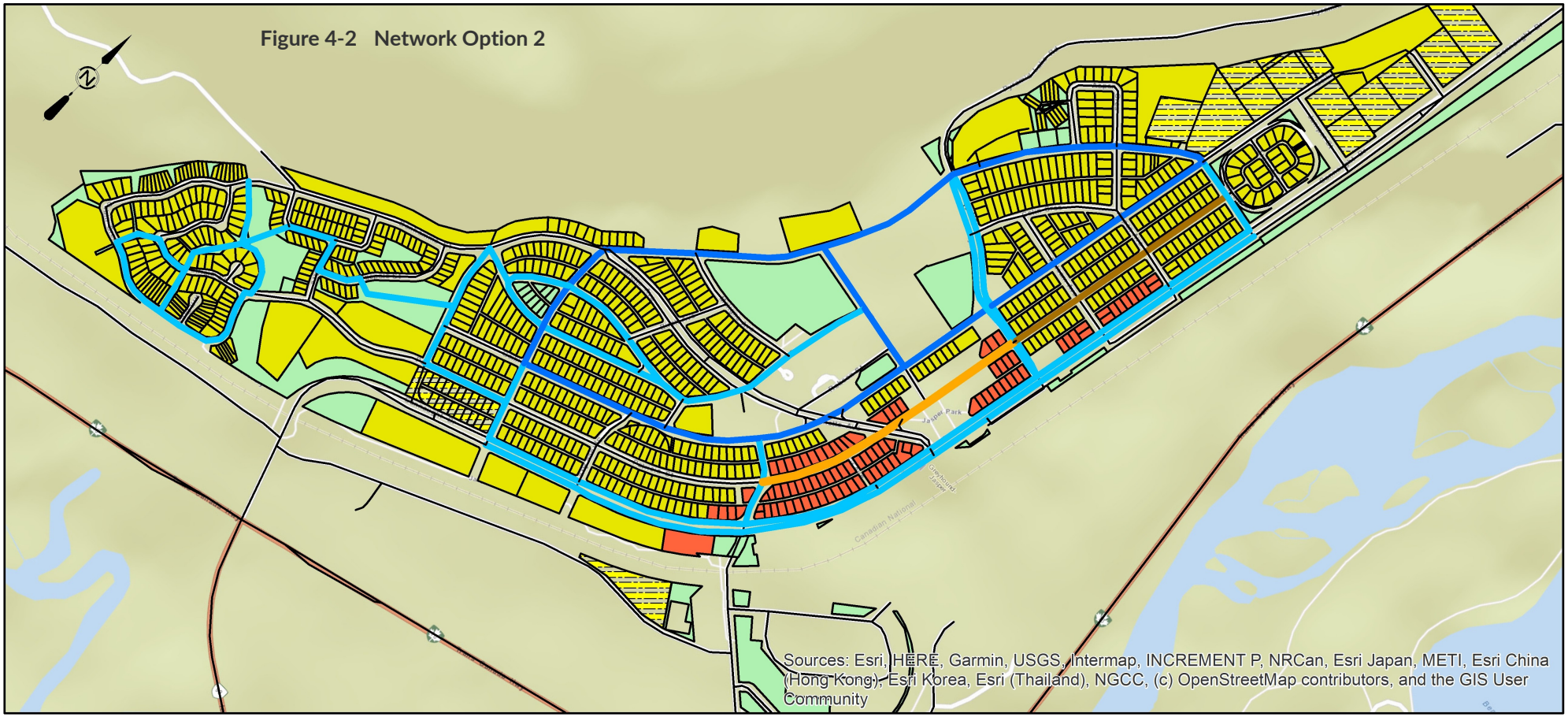
Associated Engineering

AE PROJECT NO.	2023-3605
DATE	2023-06-23
COORD. SYSTEM	NAD 1983 CSRS UTM ZONE 11N
DRAWN BY	JSL

Legend

- Primary Cycling Network
- Secondary Cycling Network, Instate Pedestrian Priority Street
- Secondary Cycling Network
- Re-instate Two-way Motor Vehicle Traffic
- Other Roads
- Commercial
- Recreation
- Residential
- Tourist Accommodation

Figure 4-2 Network Option 2



Associated Engineering

AE PROJECT NO.	2023-3605
DATE	2023-06-23
COORD. SYSTEM	NAD 1983 CSRS UTM ZONE 11N
DRAWN BY	JSL

Legend

- Primary Cycling Network
- Secondary Cycling Network, Instate Pedestrian Priority Street
- Secondary Cycling Network
- Re-instate Two-way Motor Vehicle Traffic
- Other Roads

- Commercial
- Recreation
- Residential
- Tourist Accommodation

In Network Option 2, the existing formal and informal walking path network is proposed as being integrated into the bike network. Currently the pathways are narrow walking paths with a width of approximately 1.5m. These pathways should be widened to provide space for cyclists to pass. A typical multi-use path (MUP) should be 3.0m-4.0m wide. The off-line pathway system would require a new crossing over Cabin Creek. **Figure 4-3** shows the pathway system.

Figure 4-3 Proposed Network Option 2 Pathway System

4.2 Key Street Cross-Section Options

In addition to the two network options, several cross-sections have been developed for the key roads within the networks. Important considerations for the cross-section development were as follows:

- Provide separate bike facilities.
- Consider connectivity for bikes through the network.
- Improve existing pedestrian facilities.
- Maintain parking supply.

The following guidelines and resources were used to inform the development of the active transportation design facilities and cross-section options:

- The BC Active Transportation Design Guide[14]
- NACTO Urban Bikeway Design Guide[15]
- TAC Design Manual[16]
- Complete Streets Design and Construction Standards, City of Edmonton[17]

Protected Bike Lane[18]

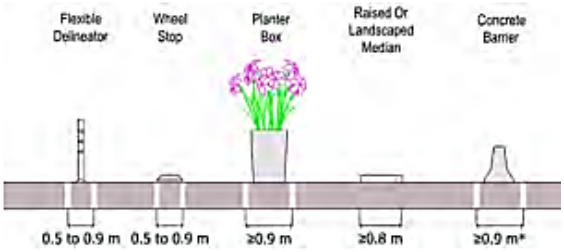
- Can be unidirectional or bidirectional depending on right-of-way space and route requirements of users.
- Commonly used in retrofit and rapid implementation scenarios.
- Provides the most separation between all modes of travel.
- Protected separation elements should be added depending on.
- Ideally contains a buffer space between the pedestrian space and the bike space.
- Maintenance equipment (including snow removal) needs to be tailored to fit the width of the lane.

Sidewalk Level Protected Bike Lane[19]

- Often located alongside a parallel pedestrian facility
- Similar to a multi-use path segregated by user type
- Offers maintenance benefits for pathway and sidewalk snow clearing
- Ideally contains a buffer space between the pedestrian space and the bike space and parking lane and bike space
- For accessibility of visually impaired people, utilize a tactile strip between the two facilities or consider an intermediate elevation for the bike lanes.

  As an example, 106 Street in Edmonton, AB has a sidewalk level protected bike lane that has no raised buffer space between the sidewalk and bike lane. This

[14] BC Active Transportation Design Guide, 2019: https://www2.gov.bc.ca/assets/gov/driving-and-transportation/funding-engagement-permits/grants-funding/cycling-infrastructure-funding/active-transportation-guide/2019-06-14_bcatdg_compiled_digital.pdf
[15] National Association of City Transportation Officials, Urban Bikeway Design Guide: https://nacto.org/publication/urban-bikeway-design-guide/
[16] Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, 2017
[17] City of Edmonton, Complete Streets Design Standards, 2018: https://www.edmonton.ca/public-files/assets/document?path=PDF/CompleteStreets_DesignStandards_Sept2018.pdf
[18] BC Active Transportation Design Guide, Protected Bicycle Lanes: Figure D-46
[19] BC Active Transportation Design Guide, Protected Bicycle Lanes: Figure D-44



allows for flexibility within the space for users to pass, and allows for simplified snow clearing.

Preferred Separation Elements in the Street Buffer Zone[20]

- Less physical protection (delineator or wheel stops) can be utilized since the speed limit through the Town is 30km/h
- Ideally the buffer space should be 0.5m – 0.9m
- The type of buffer selected will depend on maintenance requirements and street scaping preferences.

Design Domain Ranges

Facility	Minimum Width	Maximum Width	Notes
Sidewalk	1.8	2.4	*Can be wider in pedestrian priority context*
Unidirectional bike lane	1.8	2.5	
Bidirectional bike lane	3.0	4.0	*Includes multi-use paths*
Buffer	0.5	0.9	
Driving Lane	3.0	3.6	*3.3 m minimum if transit route*
Parking Lane	2.35	2.65	*Based on City of Edmonton*

Due to the snow removal during the winter months in Jasper, it is noted that pavement markings alone are not an effective tool in delineating cycling facilities within the townsite. Bike facility signage is an important feature and wayfinding details are included in **Section 4-6**.

A one-size-fits-all cross-section may not make sense for an entire roadway. A protected bike lane may make more sense in some locations instead of a sidewalk level bike lane. The details of the cross-section would be further developed in later stages of design for the bike lanes.

Typical recommended cross-sections are shown using Streetmix online. Limiting impacts to current parking supply is an important consideration for the Municipality. The cross-sections presented below balances the space to maintain parking while still providing cycling facilities and improving pedestrian facilities. A per metre cost estimate is also provided for each option for the Municipality to apply to future funding and planning assignments. Material thickness is informed by Associated's past experience of pathway design and comparison to available design standards cross-sections.

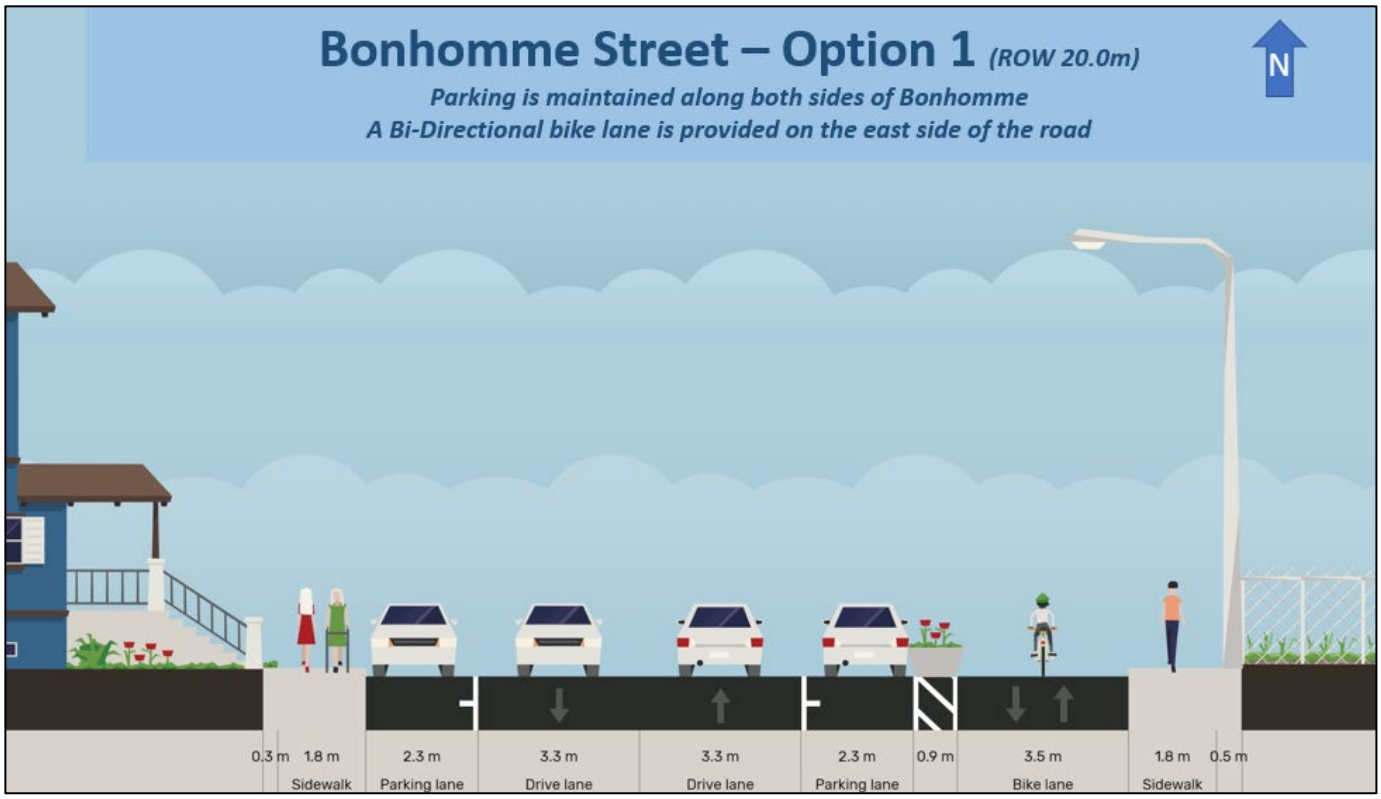
Appendix D includes cross-section options with removal of some parking supply should the Municipality want to look at reducing parking in the future.

4.2.1 Bonhomme Street

Bonhomme Street is currently well-used by cyclists in Jasper and is a major road for resident's vehicle travel. To maintain parking on both sides of the road, a single bidirectional bike lane on the east side of Bonhomme Street is recommended. Due to the alignment of the road, the bidirectional bike lane will provide access to most connections along the proposed networks.

[20] BC Active Transportation Design Guide, Protected Bicycle Lanes: Figure D-42

Figure 4-4 Typical Section Bonhomme Street Option 1



This cross-section is used to estimate the quantities of materials required for the cycling network.

Table 4-1 Bonhomme Street Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost (/m)	If Utilities Work is Needed (/m)
Bonhomme – 1	3.5	3.6	$1,300.00	$13,900

4.2.2 Cabin Creek Drive

Due to the narrow, restricted right-of-way along Cabin Creek Drive, it is not possible to fit cycling facilities within the right-of-way while maintaining full vehicle operations.

To maintain the street parking, converting the road to a one-way loop is proposed. Vehicles will only be able to travel one-way along Cabin Creek Drive from south of Poplar Avenue to Patricia Street. There is a minimal increase in travel time for vehicles, and this change allows for improvements to the sidewalks and provides sidewalk level bike lanes on each side of the roadway. **Figure 4-5** shows the proposed one-way loop for traffic.

Figure 4-5 Proposed One-Way Vehicle Traffic Along Cabin Creek Drive (Network Option 1 Only)

Figure 4-6 Typical Section Cabin Creek Drive Option 1

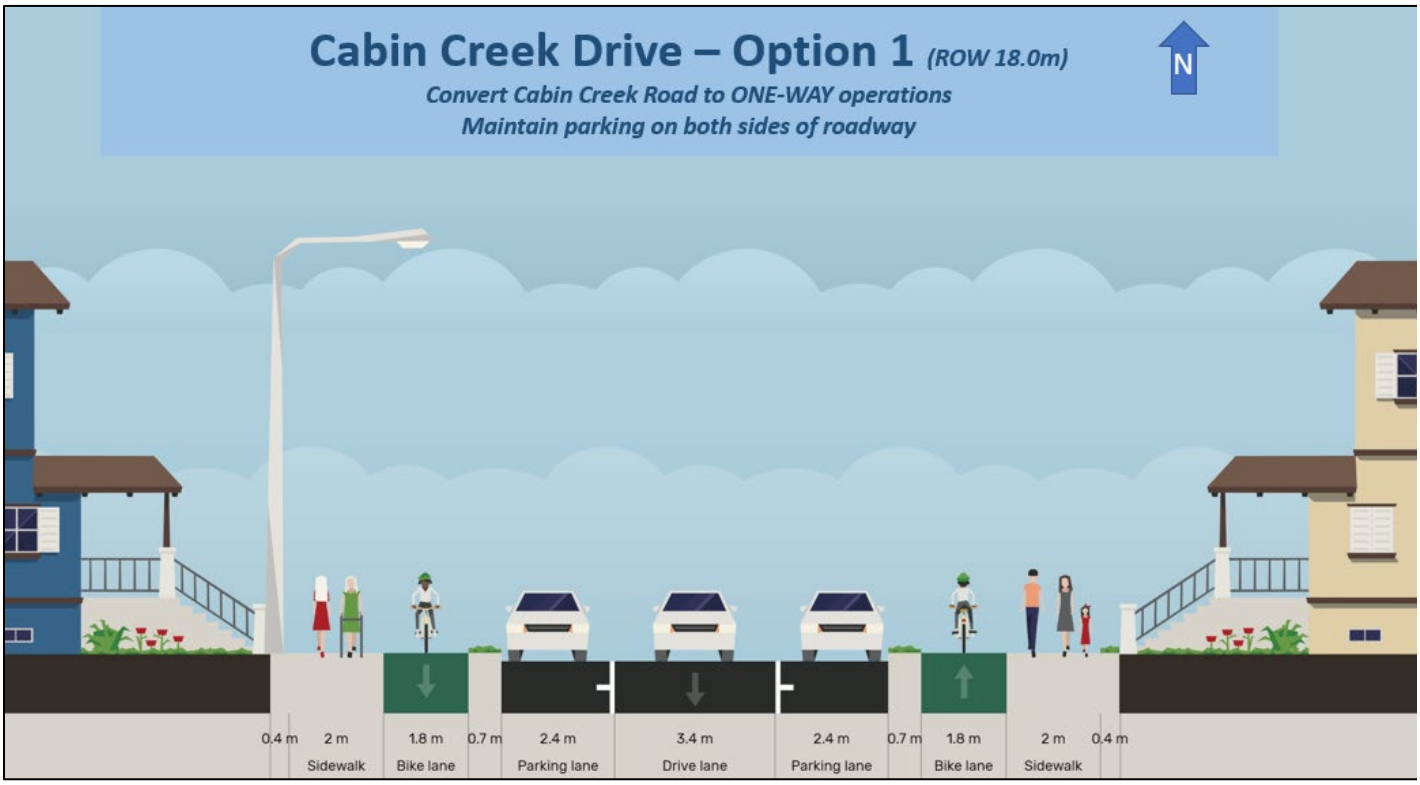


Table 4-2 Cabin Creek Drive Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost (/m)	If Utilities work is needed (/m)
Cabin Creek Drive – 1	3.6	4	$1,500.00	$9,800

This one-way approach applies to network Option 1 only. Network Option 2 recommends leaving Cabin Creek Drive in its current configuration and utilizing the MUPs between the developments to provide an 'off-line' bike network for residents accessing the south part of Jasper.

4.2.3 Geikie Street

Geikie Street has a very wide right-of-way, and there is flexibility to provide cycling facilities without compromising pedestrian or vehicle space. Because of the houses fronting both sides of the roadway, it is more beneficial to have facilities on each side of Geikie Street as well. The sidewalk level bike lanes provide this access to residential properties, provide flexibility for the users, and can be maintained easier than separate bike lanes.

Figure 4-7 Typical Section Geikie Street Option 1

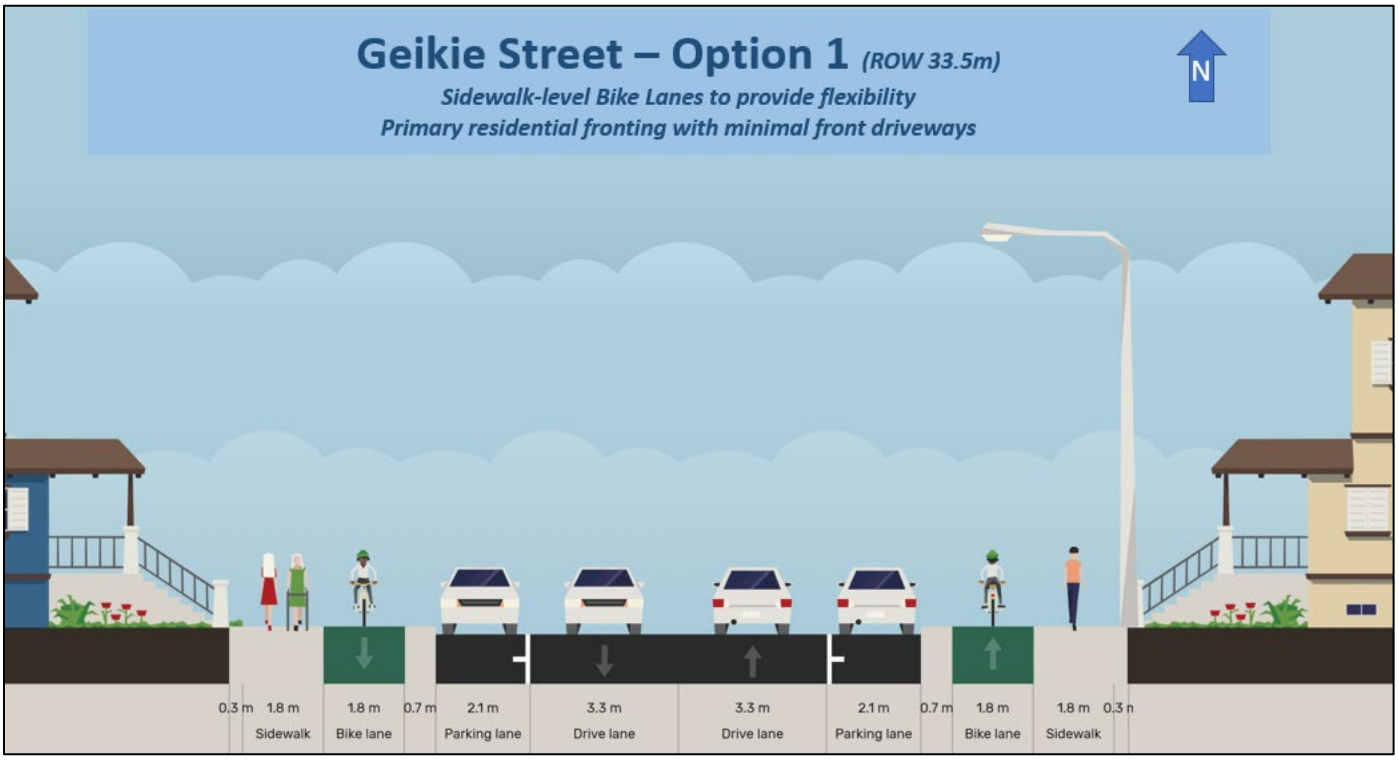


Table 4-3 Giekie Street Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost (/m)	If Utilities work is needed (/m)
Geikie Street – 1	3.6	3.6	$1,400.00	$9,600

Geikie Street has been identified as a future transit route. The lane widths in the proposed cross-section will accommodate transit vehicles, and bus stops can be planned to fit within the parking lane with access for pedestrians and cyclists.

4.2.4 Connaught Drive

The cross-section option proposed for Connaught Drive maintains the current location of the centre median. The west side of the road is proposed to be reconfigured to become a pedestrian realm, and the Discovery Trail would be routed along this side of Connaught instead of the existing share sidewalk on the east side.

The east side of Connaught will maintain parking on either side of the roadway and north-south traffic will have one lane each. During the summer months in peak tourist season, some delays along Connaught Drive can be expected. However, the reconfiguration of the roadway provides a better utilized and more inviting space for residents and tourists to experience the businesses located on the west side of Connaught Drive.

The pedestrian realm could include elements such as:

- Outdoor restaurant patios
- Urban parklets, gardens, and street scaping
- Bike parking facilities and/or bike valet to encourage biking to and from the area.

Figure 4-8 Typical Section Connaught Drive Option 1

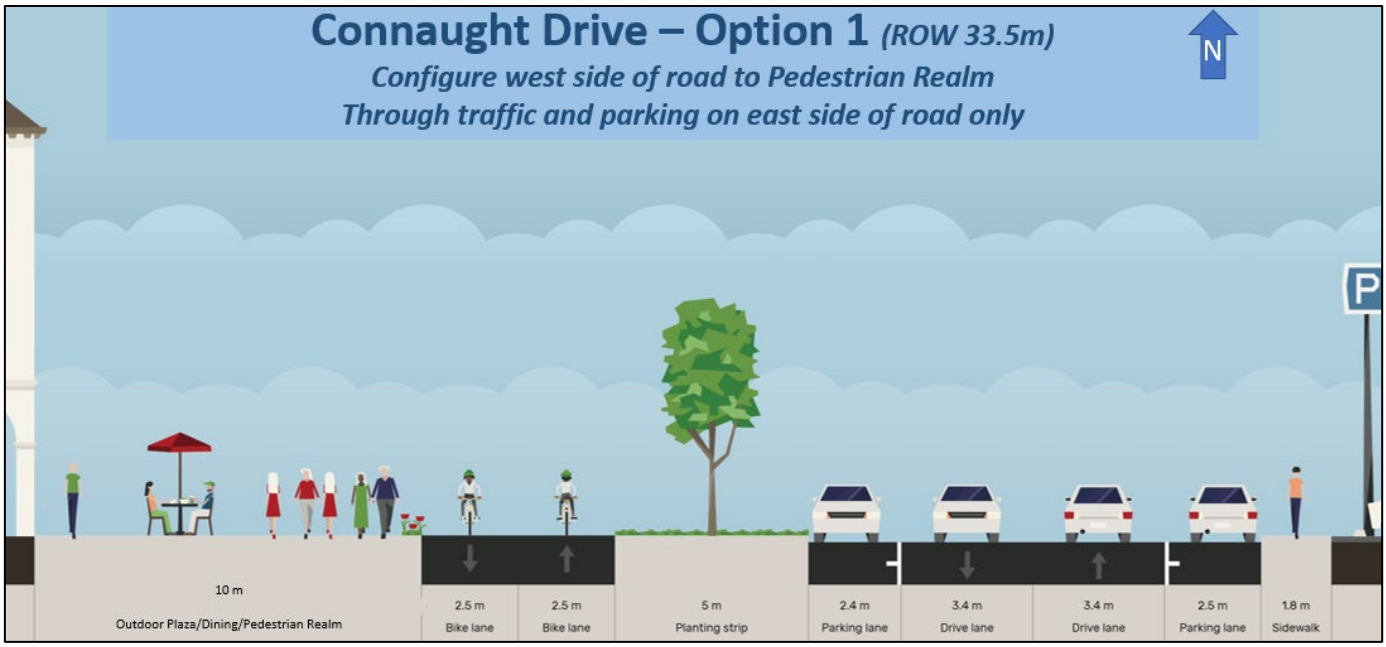


Table 4-4 Connaught Drive Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost (/m)	If Utilities work is needed (/m)
Connaught Drive – 1	5	11.3	$3,700.00	not assessed

Maintaining the centre median provides adequate separation between the vehicle traffic and the pedestrian realm and simplifies construction/ implementation of the improvements. The crossing distances for pedestrians parked east of Connaught or walking to/from the townsite are minimized with the reduced cross-section.

4.2.5 Elm Avenue

Elm Avenue is the main street that provides access to the schools. Many students bike to and from school and currently utilize the road and/or the sidewalks for transportation. The schools currently have a large number of bike racks and bike parking areas.

Utilizing a bidirectional bike lane along the north side of the road will facilitate students accessing the school site from either Bonhomme Street or Geikie Street. We also recommend converting this road to a one-way, single travel lane with parking on both sides, to provide the space needed for the bidirectional bike lane. Orienting vehicles to one-way travel reduces conflicts for drivers and pedestrians/cyclists. **Figure 4-10** shows the proposed one-way travel direction for vehicles.

Figure 4-9 Typical Section Elm Street Option 1

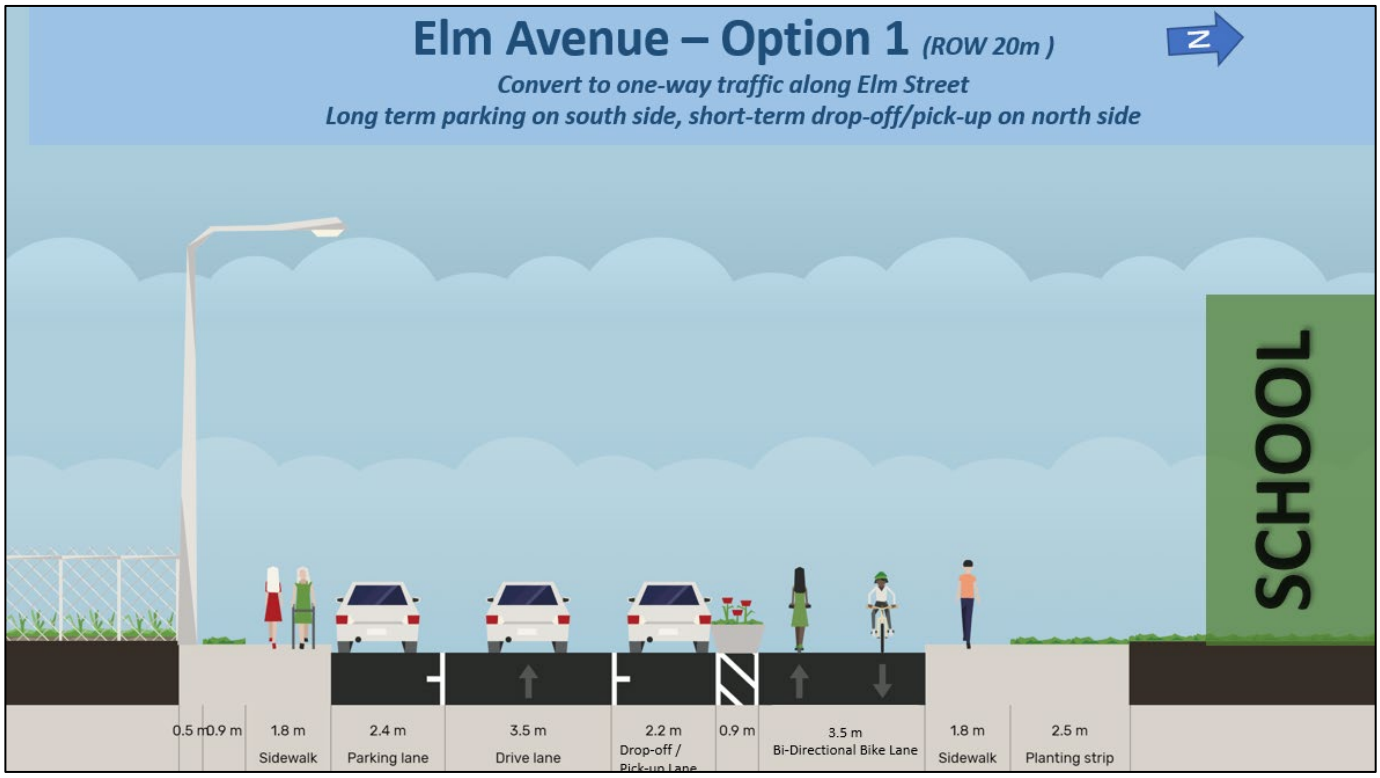


Table 4-5 Elm Avenue Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost (/m)	If Utilities work is needed (/m)
Elm Avenue – 1	3	3.6	$1,300.00	$5,900

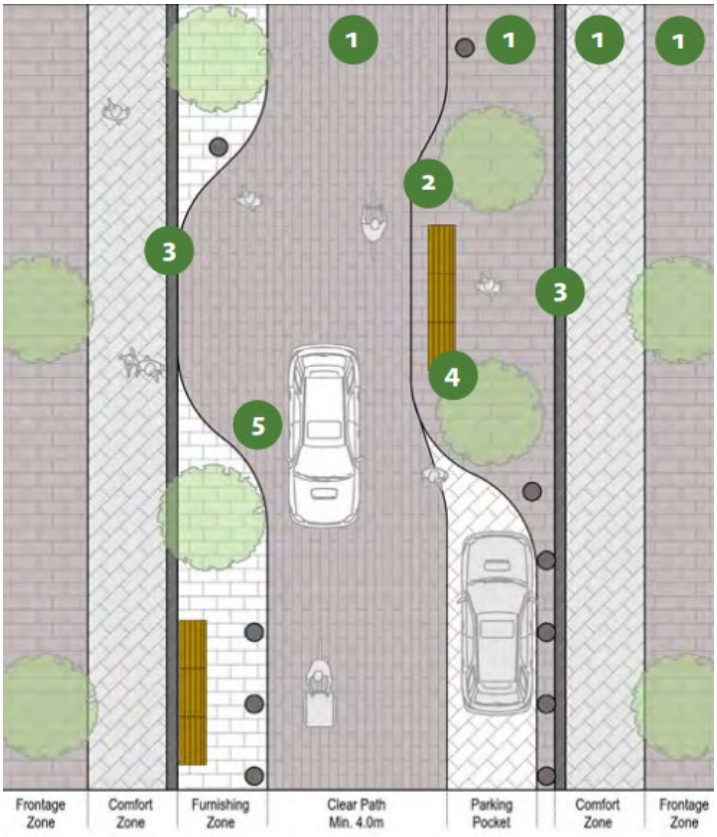
Figure 4-10 Proposed One-Way Vehicle Traffic Along Elm Avenue with Proposed Bike Lanes

4.2.6 Patricia Street

A pedestrian/bike priority roadway is proposed along Patricia Street between Hazel Avenue and Pyramid Lake Avenue. The cross-section is based on the Bear Street project recently implemented in Banff, AB. The roadway features wide pedestrian spaces with patios, seating, streetscaping and other elements. The following are some key features to consider when developing a plan for Patricia Street. **Figure 4-11** shows a typical guide to follow on the features to include in a shared pedestrian/bike priority space.

- Changes vehicle space to a shared space that prioritizes pedestrians and cyclists.
- Utilizes roadway/pavement materials to promote slow traffic speed.
- Removes curbs and elevation differentials and keeps the sidewalk and street at the same grade.
- Adds zones for patio seating for public and restaurant use.
- Provides thoughtful, integrated bicycle parking design to promote cycling to and from the area.
- Utilizes curbside landscaping and design to promote slow traffic speed.
- Promotes safe crossing environments for pedestrians.
- Integrates trees and other green landscaping to the streetscape.
- Considers additional street lighting to enhance the space for pedestrians during all hours.
- Integrates street furnishings including benches, waste bins, landscaping, etc. to unify the design through the space.

Figure 4-11 Shared Space Features and Layout



1) Distinct surface materials and patterns for each zone
2) Lack of curb between vehicle path and other zones
3) Optional detectable edge
4) Public space amenities to define spaces.
5) Flexible and meandering road to reduce vehicle speeds

Figure 4-12 shows a typical cross-section, and **Figure 4-13** shows a concept view of the proposed Patricia Street traffic flow.

Figure 4-12 Typical Section Patricia Street

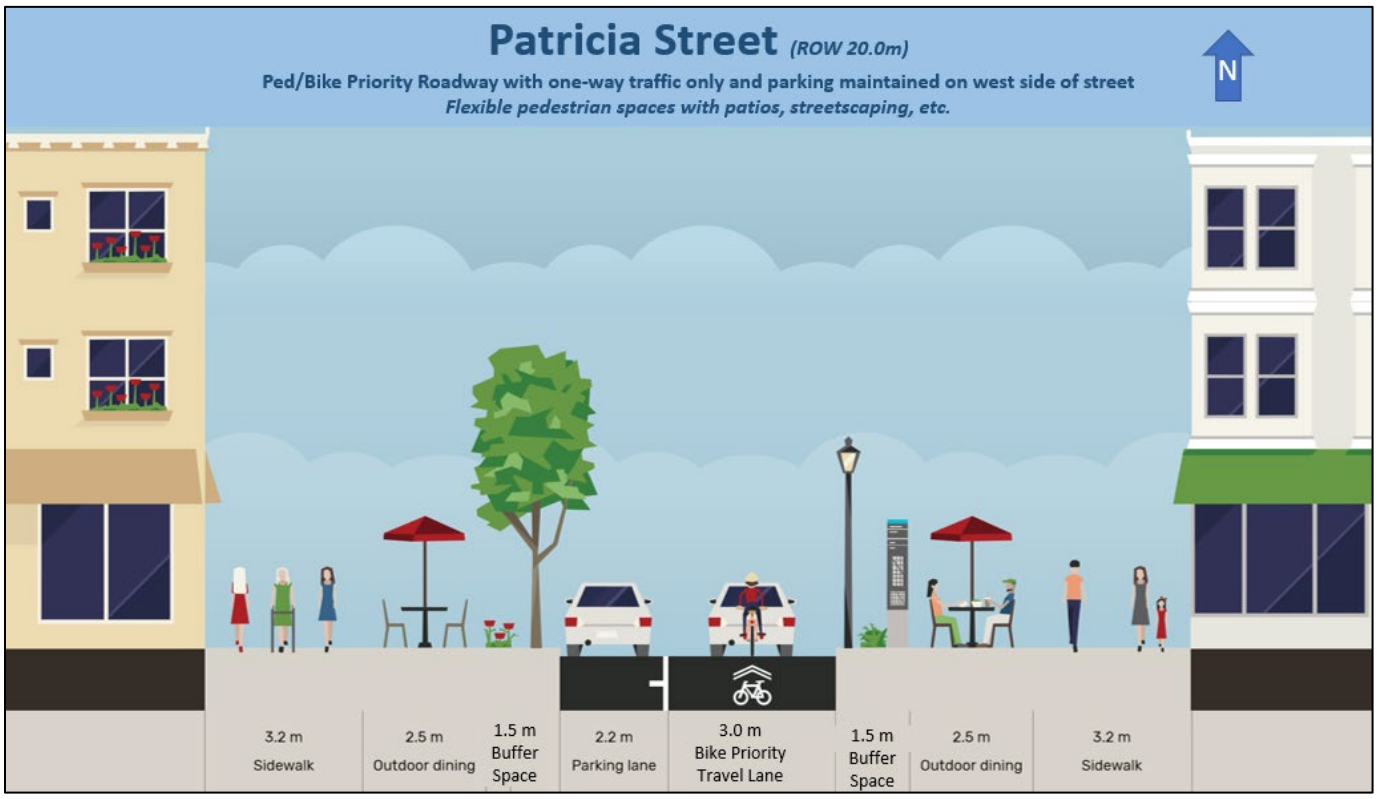


Figure 4-13 Patricia Street Circulation

4.3 Intersection Improvements for Active Transportation

With both network options, intersections will require upgrading to incorporate the bike lane infrastructure. Intersections are critical locations where most conflict points are located, and most barriers experienced by pedestrians and cyclists occur. At intersections located within the bike network, the treatments should:

- Minimize conflicts between users
- Reduce the speed of vehicles
- Increase visibility of pedestrians and cyclists
- Communicate a clear right-of-way

At some intersections, signage and pavement markings may be sufficient to direct different modes of traffic. Currently, there is only one signalized intersection at Connaught Drive and Hazel Avenue. The 2018 TMP indicated that traffic does not warrant additional signalized intersections. Intersections should prioritize the movement of bikes along the network and aim to stop vehicles moving in the opposite directions. While full protected intersections are likely not needed since signalization is not required, some protected elements should be included in intersection improvements to provide mode separation for bikes, pedestrians, and vehicles at intersections, key components are:

- Corner refuge islands and/or raised corner curb with small radii to reduce vehicle speeds
- Pedestrian crosswalks over bike facilities
- Bike cross-rides (elephant's feet) with conflict zone pavement markings
- Yield to bike signage

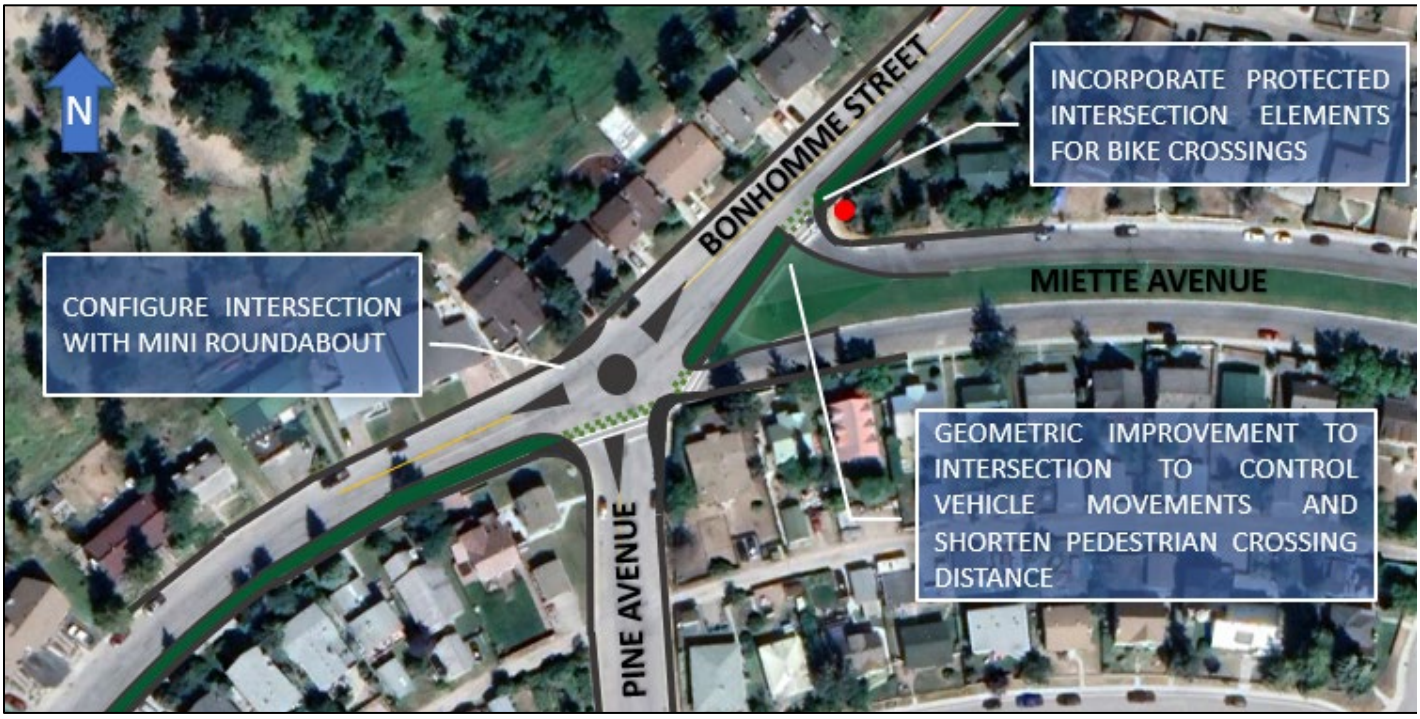
Specific considerations for bidirectional bike facilities including signage to alert drivers of bikes moving in the opposite direction and signage for cyclists to understand how to move through the intersection.

There are key intersections with challenging geometry that will require improvements. The intersections identified that should be considered for improvements are:

1. Miette Avenue and Bonhomme Street
2. Pyramid Avenue and Bonhomme Street
3. Miette Avenue and Turret Street
4. Miette Avenue and Geikie Street
5. Miette Avenue and Patricia Street

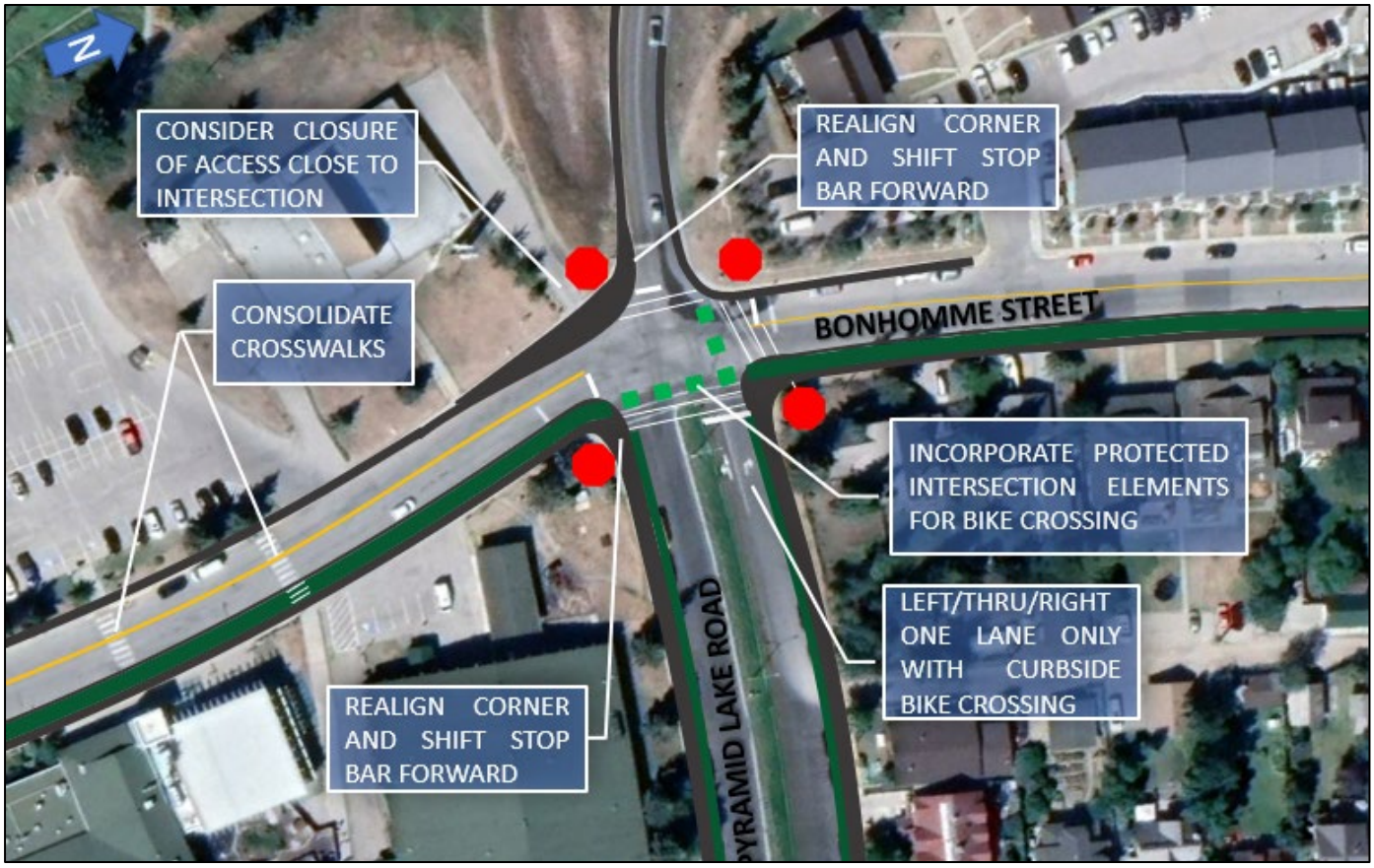
Miette Avenue and Bonhomme Street – Due to the layout of the intersection and the proximity to the intersection of Pine Avenue, there are numerous concerns with the intersection(s) existing geometric layout and operations. Adjustments to the geometry will be beneficial for providing space for the bike lane.

Figure 4-14 Intersection Improvements - Miette Avenue and Bonhomme Street with Bidirectional Bike Lane



Pyramid Avenue and Bonhomme Street – Currently the configuration of the intersection has poor sightlines for vehicles approaching eastbound and northbound. Incorporating bike lanes with protected crossing elements, narrowing the intersection, and pushing in the stop bars can help improve the sightlines.

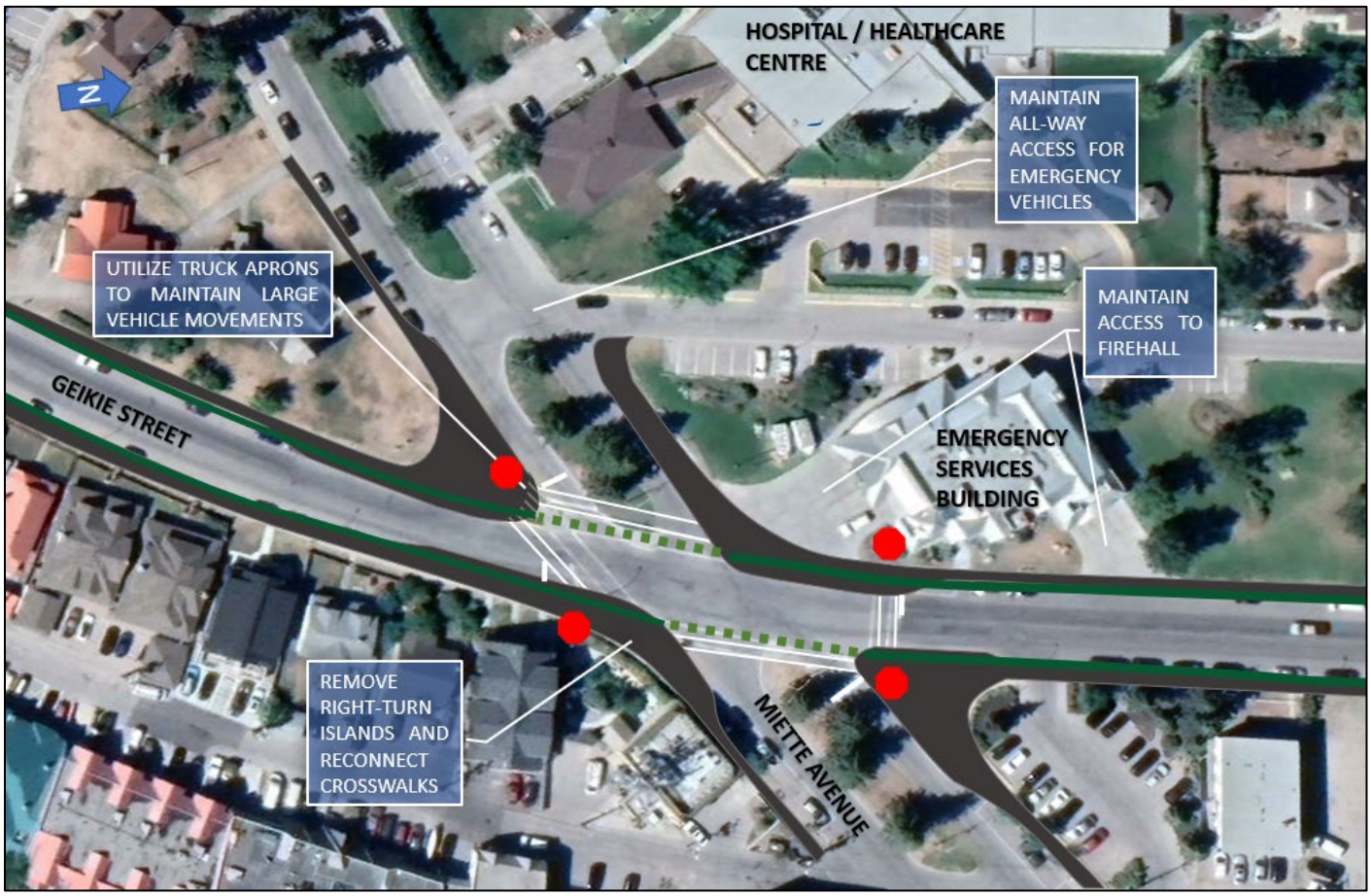
Figure 4-15 Intersection Improvements - Bonhomme Street at Pyramid Lake Road



Miette Avenue and Geikie Street – Currently the intersection has an undesirable configuration due to the wide right-of-way and skewed orientation of Miette Avenue. To improve the intersection and provide crossing facilities for bikes and pedestrian, it is recommended to tighten up the intersection geometry. Removing right-turn islands and providing curb extensions at the intersection will help reduce the speed for vehicles and simplify crossing for bikes and pedestrians.

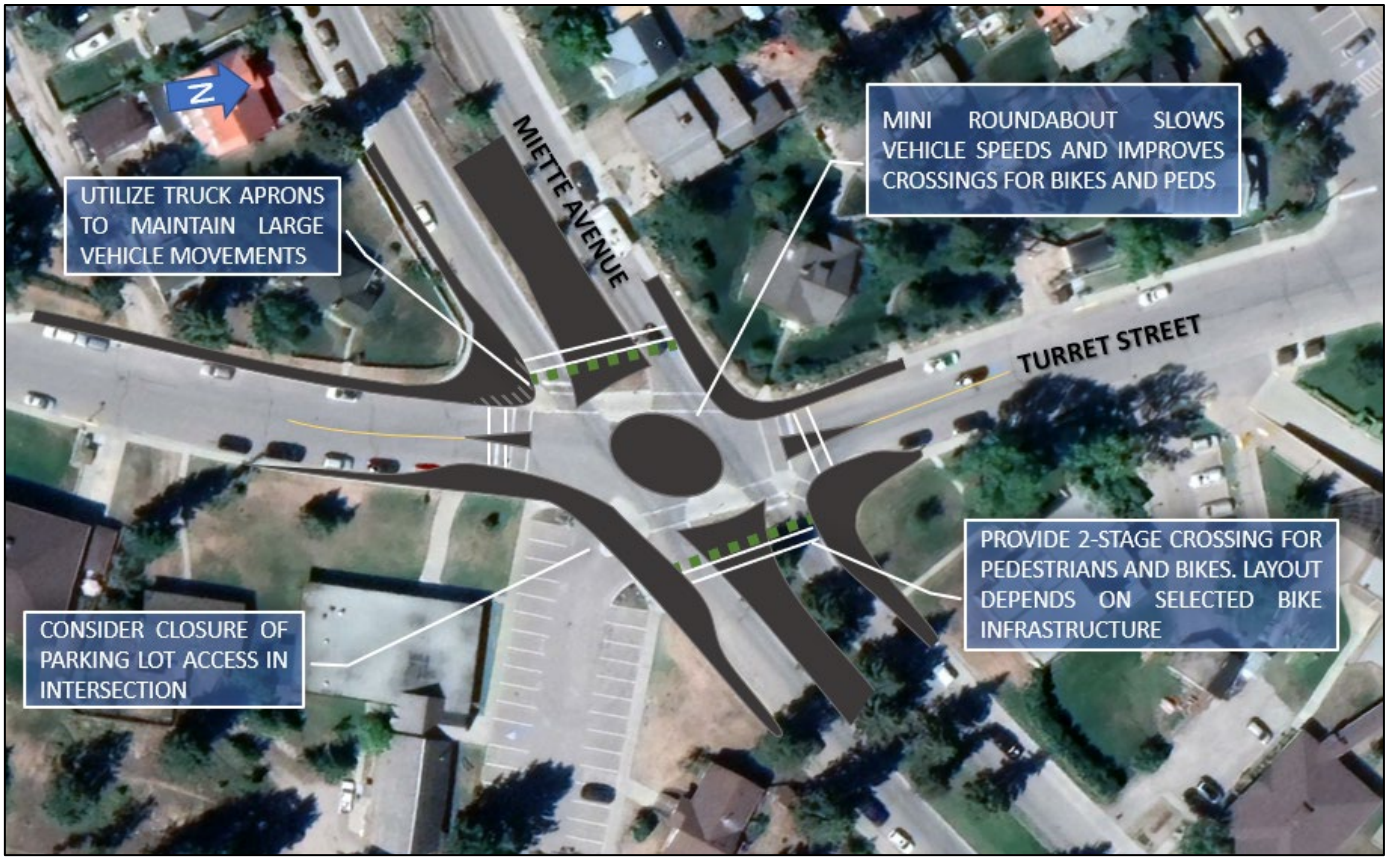
Due to the proximity of the fire hall and the hospital, the intersection and adjacent accesses are maintained for full access. Utilizing truck aprons in the intersection and adjacent accesses will maintain access for emergency vehicles but help control passenger vehicle driving paths.

Figure 4-16 Intersection Improvements - Miette Avenue – Geikie Street



Miette Avenue and Turret Avenue has similar configuration to Miette Avenue and Geikie Street. Turret Avenue is proposed to be a secondary connection in both networks, providing access to the schools in Jasper. The geometrics at Miette Avenue and Turret Avenue can be improved by removing right-turn islands, closing the parking lot access at the southeast corner of the intersection, and utilizing truck aprons where critical turning movements are required to be met. At a future design stage, a mini-roundabout could be explored as an option to improve intersection geometry and operations of all travel modes.

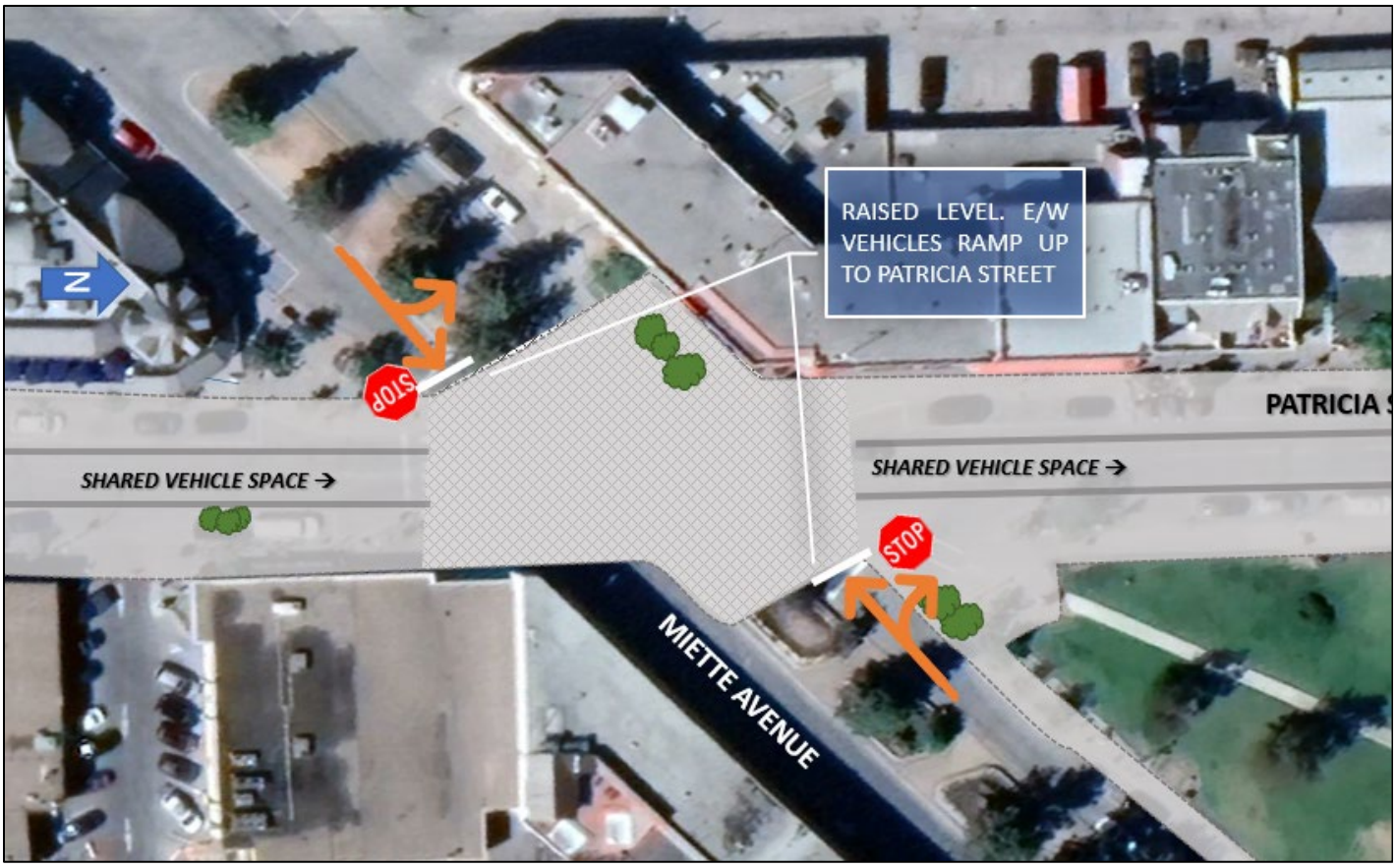
Figure 4-17 Intersection Improvements - Bonhomme Street at Pyramid Lake Road



Miette Avenue and Patricia Street improvements would need to fit the context of Patricia Street becoming a pedestrian priority street. Vehicles travelling south to north will be slow moving and will not have right-of-way to pedestrians and bikes. Vehicles travelling east/west along Miette Avenue will Stop and wait for active transportation users to pass the intersection before preceding.

- To maintain the connectivity of the pedestrian corridor, the intersection can maintain the shared vehicle space, and east/west vehicles stopped on Miette Avenue will ramp up and over the intersection on either side.
- Intersection vehicle space is shared with pedestrians and cyclists.

Figure 4-18 Intersection Improvements - Bonhomme Street at Pyramid Lake Road



4.4 Capital Costs

The capital costs for infrastructure projects can vary considerably depending on a number of variables including inflation, availability of labour and other higher value projects competing for the same services. The opinion of probably costs developed for this section are an initial estimate of the major project related costs. These include primary materials, concrete, asphalt, and ground coarse base material, and intersection bollards. Other materials not costed include but are, not limited to, signs and poles, street furniture, painting, and landscaping. The detailed cost breakdown is shown in **Appendix E**, and per linear metre summaries were included in **Section 3.2** for key cross-sections.

Typical uplift factors are then applied to account for project design costs, mobilization, construction, and inspection, close out, and contingency costs. These costs are estimated from the lump sum of the primary and secondary quantities of materials whereas a phasing of construction is more likely.

Phasing decisions should be made after selection of the network route and cross-section design, and this phasing error for cost equally applies to both networks and cross-sections, so this error does not make an impact in the comparison of the network or cross-section options.

4.5 Maintenance Considerations

Adequate maintenance is crucial for ensuring safety, accessibility, and enjoyment of the cycle path network for all seasons. Many of the below aspects are seasonal activities and are maintenance functions the Town already conducts for the sidewalk and roadway networks, such as street cleaning, snow plowing, and garbage collection. This section highlights activities that may be novel maintenance activities for the active modes network. Costs of these activities will highly depend on the level of service the Town decides to provide and upon the existing capacity of Town maintenance resources to perform these activities or the cost to add additional resources.

A critical aspect of an all-season active modes network is snow and ice control. During winter months, pathways can become hazardous due to snow accumulation and icy surfaces. Proper snow and ice control measures, such as plowing, salting, or sanding, are essential to keep the pathways clear and safe for cyclists. Prompt and effective snow and ice control not only minimizes the risk of accidents and injuries but also promotes continuous usage of the pathways throughout the year, increasing public support for the project. For on-road cycle paths without bollards, on the secondary network, existing snowplowing equipment will likely suffice. For separated bicycle pathways, especially single wide track as narrow as 1.8 metres, a smaller maintenance vehicle will be required.

In the summer months, grass maintenance is an important aspect of pathway maintenance. Clearing vegetation growth along the edges of the pathway, ensures that the full width of the pathway is available for use; this allows for safe overtaking by increasing sight lines and increasing available room to manoeuvre. Regular grass maintenance, including mowing and trimming, enhances the aesthetic appeal of the pathway and contributes to a pleasant user experience. Well-maintained shoulders and grass areas create a visually pleasing environment and encourage people to utilize the pathway for recreational activities as well as commuting.

Watering in dry spells of the summer is crucial for the health and longevity of vegetation along the pathway. Regular watering ensures that trees, plants, and flowers planted alongside the pathway thrive, providing shade, beauty, and a sense of natural ambience. Watering is particular importance if planters are used as separators for on-road cycle lanes. In other areas, adequate watering also helps prevent soil erosion and promotes a sustainable and green environment along the pathway.

Pathway sweeping is another crucial aspect of multi-use pathway maintenance. Regular cleaning removes debris, leaves, litter, and other obstructions from the pathway, enhancing its cleanliness and appearance. Clean pathways not only create a more pleasant environment for users but also reduce the risk of slipping or tripping on debris, especially for users with narrower or smooth bicycle tires and vulnerable populations. With an increase in traffic along the cycling routes to be expected, proper waste management and garbage removal are equally important to maintain cleanliness and prevent the accumulation of trash along the pathway.

Damage to cycle path furniture, such as bollards and signs, is important to identify and address regularly. Vandalism may also be a concern in some areas. Damage caused either by vandalism or by natural events can not only diminish the aesthetic appeal of the pathway but also create a sense of insecurity for users. Swift removal of graffiti and prompt repair of any damaged infrastructure is essential to maintain the pathway's integrity and public support.

Furniture, such as benches, bike racks, and picnic tables, enhances the usability and comfort of multi-use pathway sections of the cycle network. Regular maintenance of these amenities, including repair and cleaning, ensures that they remain in good condition and functional for users to rest, socialize, or enjoy the surrounding environment. These items encourage local residents to use the cycle network for recreational and social activities, which in turn builds familiarity of the network and increases the likelihood that residents will use the pathway for commuting and other trips.

Crack sealing and pothole filling is an essential maintenance task for pathways with paved surfaces. Regular inspection and repair of defects in the pavement prevent further deterioration, ensuring a smooth and safe surface for users. By addressing defects early on, expensive and extensive repairs can be avoided in the future.

In summary, comprehensive maintenance, which includes snow and ice control, shoulder cuts/grass maintenance, line painting, signage, cleaning, damage repair, watering, furniture upkeep, crack sealing, and garbage removal, is as important as the installation of the network in the first place. These maintenance activities collectively contribute to the safety, accessibility, aesthetics, and overall quality of the cycle path network, creating enjoyable spaces that cater to the diverse needs of pedestrians, cyclists, and other users of all ages an abilities. Regular and proactive maintenance practices not only extend the lifespan of the pathways but also promote their continuous use, ultimately fostering healthy, active, and vibrant communities.

4.6 Wayfinding Considerations

Jasper is fortunate to have a diverse mix of newcomers to Canada who settle in the Municipality and contribute to the vibrant cultural mix. There are a high number of residents whose language of choice is neither English nor French and addressing wayfinding accessibility and language barriers in conjunction with providing improved biking infrastructure can result in improved comfort and safety of those who use active modes as a primary form of transportation. Jasper also experiences many tourists in the summer months; many of whom English is not their first language. Wayfinding is critical in helping visitors navigate the area effectively, and there is currently minimal wayfinding within the Town for all transportation modes.

Wayfinding encompasses tools and techniques to help people navigate and orient themselves within spaces and places they are not familiar with. It includes signage, pavement markings, visible cues, and tactile cues. The wayfinding program should use a standards-based approach to integrate information for all modes of transportation, including walking and biking.

The following are key objectives when designing wayfinding for the Jasper Bike Network:

- **Connect Places** – Provide information to help riders travel between destinations.
- **Keep Information Simple** – Information should be presented in a logical way with minimal text.
- **Maintain Movement** – Wayfinding should be given in advance and simple enough, so cyclists do not need to stop to read or understand.
- **Be Predictable** – uniform design and cohesive wayfinding plan will aid users in understanding the information at a glance.
- **Disclose Information Progressively** – Provide enough information to keep users moving without overwhelming.
- **Help users Learn** – Complement the wayfinding with online resources and maps.

Wayfinding that is implemented for the bike network can also be complemented with increased wayfinding for pedestrians at key locations (near Patricia Street and Connaught) where walking may be prioritized over cycling. Consider also utilizing wayfinding for vehicles to promote vehicle traffic along certain routes and reduce conflicts with pedestrians and cyclists.

Example of themed pedestrian wayfinding in downtown Banff. *Photo credit: https://3dservices.com/portfolio/town-of-banff-signage-program/*

There is potential to incorporate merging technologies such as smart phone applications to curate information to users regardless of language or accessibility challenges.

Line painting and signage play vital roles in guiding and informing pathway users. Clear and visible line markings on the pathway help delineate different lanes, such as pedestrian and cyclist lanes, ensuring proper usage and minimizing conflicts. Signage, including directional signs and safety instructions, provides essential information about rules, regulations, and potential hazards. Signage is particularly useful in the winter months where lines on pavement may be obscured by ice or snow, even with clearing activities. Regular maintenance of line painting and signage ensures that users can navigate the pathways safely and efficiently, promoting a smooth flow of traffic and reducing the risk of accidents. Using a pictogram approach recommended by the Manual of Uniform Traffic Control Devices and Accessible Signage Guidelines for Canadians along with consideration for the variety of languages would improve wayfinding for the active transportation modes within the Municipality. Integrate regional wayfinding signage at the edges of the townsite to direct riders to/from Jasper and surrounding attractions and the Jasper Discovery Trail.

4.7 Additional Active Transportation Implementation Considerations

If the MoJ proceeds with implementation of the concepts provided, phasing sections over several years and implementing holistic improvements is desirable. The following are additional considerations to include as part of the active transportation facility development.

Sidewalk Improvements
On routes where on-street bike improvements are not recommended, providing sidewalks that meet minimum width of 1.8m would be beneficial for pedestrians. In some locations where sidewalk is missing, it is recommended that the sidewalks be constructed to provide a connected network for pedestrians.

Connaught Drive Pedestrian Crossings
Utilizing rectangular rapid flashing beacons (RRFBs) for use at pedestrian crossings along Connaught and/or Miette Avenue to improve safety of pedestrians and cyclists.

Lighting
During improvements, consider improving the lighting along the bike routes to provide more direct lighting for active transportation. Improved illumination increases the safety and comfortability of active transportation users.

Bike Racks and Street Furniture
Bike racks are in demand, and the Municipality can expect to see increasing demand for more bike racks as the cycling network and facilities are expanded. Along with these proposed improvements, adding bike racks at destination locations, playgrounds, parks, and other locations would be beneficial so that users may dismount and can lock up their bikes.

Street furniture like benches, trash receptacles, bike racks, and information signages, in conjunction with a pedestrian priority corridor is beneficial in creating a pedestrian and cyclist friendly environment.

The Municipality may want to consider the following opportunities to enhance the experience of active transportation users.

Rapid Implementation
Rapid implementation techniques can be utilized to install infrastructure for a trial setup, interim facility setup, or to help reduce costs with permanent implementation. Rapid implementation does not sacrifice safety or comfortability of active transportation users but can be a flexible and accessible option for implementation. It is typically placed between the existing road curbs while including placemaking elements and streetscaping components. The systems can be installed and removed quickly and can be easily modified. TransLink created an overarching design guide to help organizations beyond Metro Vancouver with rapid implementation projects[21].

Shared Micro Mobility
Shared micro mobility like bike-share and scooter sharing programs are becoming more common in Canada. Implementing a shared micro mobility network comes with cost of implementation, maintenance, and operations. Often a third-party provider partners with a Municipality to oversee the operations. Most residents have access to their own bikes (or other mobility devices). This would mainly provide tourists with opportunities to access micro mobility devices.

[22] NACTO, Urban Bikeway Design Guide WORKING PAPER, Shared Micromobility permitting, Process, and Participation, December 2022: https://nacto.org/wp-content/uploads/2022/12/2022_NACTO_UBDG_Regulating-Micromobility.pdf

NACTO released a working paper in 2022 to outline emerging trends for municipalities managing micro mobility networks and providers[22]. The BC Active Transportation Guide also has information to help understand the different models of micro mobility[23].

Alternate Parking Opportunities

Using wayfinding, visitor can be encouraged to park in specific locations around the townsite, specifically parking lots and spaces along Connaught Drive.

Opportunities to park and bring bicycles to tour around the Town can be a great way to introduce visitors to the biking network. The parking lot at Hazel Avenue and Sleepy Hollow Road, east of the CN Rail pathway underpass could be utilized as an entry point for cyclists and pedestrians to access the townsite by foot.

Other off-street parking improvements as discussed in the 2018 TMP would be beneficial in providing space for visitors to park their vehicle and enjoy Jasper on foot or by bike.

[22] NACTO, Urban Bikeway Design Guide WORKING PAPER, Shared Micromobility permitting, Process, and Participation, December 2022: https://nacto.org/wp-content/uploads/2022/12/2022_NACTO_UBDG_Regulating-Micromobility.pdf

[23] BC Active Transportation Design Guide, Section H.5, New Mobility Integration

5 TRIPLE BOTTOM LINE ASSESSMENT

Where the provision of services to the public and a "greater good" objective is concerned, a Triple Bottom Line (TBL) assessment driven by environmental, social, and economic criteria is a method that considers each category equally important. More than just "the bottom line" of profit-driven decisions are evaluated in this approach. Decision-making includes impacts on people and the planet; therefore, TBL assessment is often known as the 3 P's.

5.1 Assessment Criteria

For ease of discussion, flexibility to highlight similarities and differences between the two network concepts the TBL assessment uses a scoring scale ranging from 1 to 5 (1 being worst and 5 being best). When criteria such as the number of road crossings are evaluated, the option with more crossings receives a lower score (e.g. 2) and the option with fewer crossings receives a higher score depending on the extent of the difference, it maybe represented by a score of 3 or 4. If options are relatively close in characteristics, then the same score can be used, but where possible, the scale is applied. Notes beside to document the rationale for scores is recommended. These notes can be updated as new information becomes available but provides a reference to the considerations made during the Feasibility Study.

Weights for the criterion within each category was also included to provide additional means of indicating importance such as sightlines (weighted more heavily) verses proximity to obstructions/utilities/ barriers (weighted less heavily). Weights ranging from 1 to 3 were applied to each criterion but can be adjusted based on public engagement outcomes or further detailed consideration by the Town.

Each criterion was assessed by the project team, including environmental and geometric design professionals from Associated Engineering, while criterion in the Social category aimed at quality of life, inclusion and reputation were led by the Municipal representatives.

The total score of each concept is made up of the number of criteria in each category, its weight, and the weight of the category. In this case, the three categories are weighted equally. The calculations ensure that categories with more criteria do not bias the total score.

The following tables describe each criterion considered under the environmental, social, and economic categories.

5.2 Environmental Criteria

Category	Criterion	Descriptions	Poor (1)	(2)	Moderate (3)	(4)	Positive (5)
ENVIRONMENTAL	Loss of natural areas or environmentally sensitive features	Disturbance or removal of environmentally sensitive areas resulting in loss of wildlife habitat, birds nests, den sites, rare and native vegetation species, wetlands and overall general biodiversity.	Permanent or significant loss of natural areas or environmentally sensitive features.	↔	Temporary disturbance that can be minimized through planning and mitigation strategies (i.e., restoration, compensation, etc.).	↔	No disturbance to natural areas or environmentally sensitive areas.
	Aquatic Habitat	Impacts to important fish habitat and other aquatic species (i.e., invertebrates, amphibians, waterfowl, aquatic vegetation).	Significant impacts expected that would result in permanent loss of aquatic habitat.	↔	Temporary impacts that can be minimized with environmental mitigation measures.	↔	No instream or riparian area impacts.
	Wildlife Passage	Changes to wildlife movement and/or habitat connectivity (fragmentation).	Significant barriers that result in wildlife being fragmented from important habitats and / or increase potential for vehicle – wildlife collisions.	↔	Temporary impacts that can be minimized with mitigation measures.	↔	No barrier to wildlife movement through the area.
	Regulatory Approvals	The ability to obtain regulatory approvals for each mitigation measure.	Non-standard application(s) requiring significant stakeholder engagement, separate studies following non-standard processes, and risk of project not receiving approval from the provincial and federal agencies.	↔	Standard application(s) following a routine process with significant back-and-forth.	↔	Standard application(s) following a routine process.
	Contamination Risk	Soils in the project area may be impacted by contamination which may increase construction costs and create long term liability.	High probability of encountering contamination.	↔	Moderate probability of encountering contamination.	↔	Low probability of encountering contamination.
	Historical Resources	Impacts to objects, sites, practices, or resources of cultural or historical importance due to a climate hazard.	High damage, full recovery may not be possible or could take years.	↔	Moderate damage, with full recovery taking months.	↔	Minimal or no impact, recovering full functionality within days.

5.3 Social Criteria

Category	Criterion	Descriptions	Poor (1)	(2)	Moderate (3)	(4)	Positive (5)
SOCIAL	Reputation of the Town/ Municipality	Public perception of the Municipality and its commitment to sustainability (mobility options away from vehicles).	Public reaction is significant negative view of Council & Administration. Network does not show a commitment to active modes.	↔	Public reaction is moderate. This pathway connection will not impact significantly on public perception. Active modes are encouraged	↔	Public perception is positive. Viewed as a step toward sustainable transportation with a clear priority for active modes over vehicles
	Aesthetics/user experience/points of interest opportunities	Improved appearance, including opportunities for rest areas, points of interest, and improving user experience	Low opportunities along the alignment for improvements or points of interest	↔	Moderate opportunities along the alignment for improvements or points of interest	↔	Active modes facilities improve roadway aesthetics and has many opportunities for future improvements or points of interest
	Equity and Inclusion (mobility for broader demographics)	Impacts that the network may have on the options and access to mobility by a broader demographic	No impacts expected to mobility for residents of all incomes, ages and abilities.	↔	Limited improvement to mobility for residents of all incomes, ages and abilities.	↔	Mobility for residents will significantly improve to access services, jobs and education.
	Quality of Life/Active Lifestyle	Quality of life/Active Lifestyle is impacted by having a connection between Airdrie Rocky View County and Calgary.	Minimal improvement to the quality of life and active lifestyle needs of residents.	↔	Some improvement to the quality of life and aligns generally with active lifestyle needs.	↔	Fulfills a need within the community that has been expressed by residents and will greatly improve opportunities for active living.
	Roadway Crossings	The number of level road crossings.	Highest number of road crossings with limited opportunities to avoid.	↔	Moderate level of crossings with some opportunities to avoid.	↔	minimal or limited roadway crossings with many opportunities to improve.
	Proximity to barriers/ obstructions / poles	The presence of barriers/ obstructions & utilities conflicts present/future on the proposed alignment.	Highest number of barriers/obstructions/utilities along the alignment.	↔	Moderate number of barriers/obstructions/utilities along the alignment.	↔	Lowest number of barriers/obstructions/utilities along the alignment.
	Adjacent Road Speed (observed and posted)	The speed of the surrounding roads.	High speed roadways (60-80km/hr).	↔	Moderate speed roadways (40-60 km/hr).	↔	Low speed roadways <40 km/hr.

Category	Criterion	Descriptions	Poor (1)	(2)	Moderate (3)	(4)	Positive (5)
	Traffic Control	Traffic control devices/markings/signage near or at crossings to provide safety.	Little or no traffic control at crossings.	↔	Some controls in place at some crossings.	↔	All necessary controls are existing and crossings meet current standards for safety.
	Traffic mix and volumes (existing and forecasted including tourists)	Estimated based on future roadway classification and current traffic volumes & traffic mix (passenger vehicles, transit, commercial)	High traffic volume with high mix and more opportunities for conflict.	↔	Moderate traffic volume and some limited locations of concern for conflicts due to traffic mix.	↔	low traffic volumes and little or no concerns with conflicts or traffic mix
	Vertical Profile	The elevation profile of the road and its accessibility to all users.	Many steep segments with significant regrading required.	↔	Some steep segments but regrading requirements are reasonable.	↔	No concerns with grades and minimal regrading is needed.
	Sightlines	Sight lines in advance of stops, grade changes or turns.	A number of locations with poor sightlines.	↔	Some concerns about sightlines where mitigation might be required.	↔	Good, clear sightlines in both directions.
	Curves and tight Turns	The number of curves and tight turns on the path	Highest number of tight turns that cannot be designed out of the alignment.	↔	Some tight turns that have to be designed out and may impact costs.	↔	No tight turns expected or necessary mitigations.
	Connectivity (considering future secondary connections)	Where and how the pathway alignment connects with existing or approved local/regional pathways.	Connectivity is poor and segments to connect to the pathway are undesirable, or cannot be constructed	↔	Connectivity is mostly good with some missing segments to connect to the pathway from a few locations	↔	Connectivity is very good from all directions to destinations, services, points of interest
	Access to future transit stops	The level of accessibility to public transit from the active transportation network	Poor/ limited access to future transit stations	↔	Good/ reasonable access to future transit stations	↔	Excellent access to future transit stations
	Parking at intercept points	The amount of parking accessible near the trail heads and primary stops along the network	Little or no opportunities to park a vehicle near the pathway without impacting residences or roadway operations.	↔	Some limitations on parking that will require monitoring but likely sufficient.	↔	Ample parking without impacts to adjacent residences or roadways.

5.4 Economic Criteria

Category	Criterion	Descriptions	Poor (1)	(2)	Moderate (3)	(4)	Positive (5)
ECONOMIC	Capital Construction	The cost to construct the proposed alignment.	Highest capital cost.	↔	Mid-price capital cost.	↔	Low to no capital cost needs. Delivered through agreements, partnerships, etc.
	Annual Maintenance Costs (NPV)	The cost to operate the asset over one year, including labour and operations management.	Highest annual O&M. Inaccessible for maintenance (people, machines, etc.). Not in keeping with expectations.	↔	Mid-price annual O&M. Typical of what is currently maintained in the pathways inventory. Is consistent with expectations.	↔	Lower than expected annual O&M (e.g. opportunity to share costs with commercial, industrial or private residential communities).
	Hidden Costs (Costs for pedestrian crossing signals, traffic signals, advanced warning)	Likelihood of costly capital upgrades to improve safety for active network users.	Potentially high capital cost upgrades for safety measures and impacts to annual maintenance costs	↔	Moderate capital cost improvements expected.	↔	Negligible to none. Initial construction costs will include safety measures
	Tourism	The impact of the proposed pathway alignment on tourism	Network is not appealing for tourism and low opportunity to improve user experience.	↔	Network may not be appealing initially but has good potential for improving user experience and positively impacting tourism.	↔	The Network will serve tourists well and likely to increase tourism for the Town
	Partnering with Private Industry	Potential for partnerships with business and private industry to enhance the pathway and user experience.	Low or no potential for private partnerships.	↔	Some potential for private partnerships but unsure of the likelihood. More details to sort out.	↔	Likelihood of private partnership is high.
	Changes Required to roadway direction or number of lanes	Considers the extent of changes to current operations of the roadway	Significant changes to geometry or direction of traffic flow	↔	Some changes to geometry and no changes to traffic flow		No changes required to geometry or traffic flow
	Changes Required to on-street parking	Considers the magnitude of changes to the existing parking provided on-street	Significant reduction or changes to on-street parking	↔	Some reduction or changes to on-street parking		No changes required on-street parking
	Changes Required to Policy	Changes to already approved policy that will require additional time and resources.	Significant changes to standing or approved policy.	↔	Minimal changes to standing or approved policy.	↔	No changes required to standing or approved policy.

5.5 Concept Scores

The total score for each option is made up of the number of criteria in each category, its weight, and the weight of the category. In this case, the three categories are weighted equally. The calculations ensure that categories with more criteria do not bias the total score. The concept score calculation details are included in **Appendix G**.

The total score is calculated out of a maximum of 100. The results are as follows:

TBL Categories	Loop Option 1 Primary Loop	Loop Option 2 Primary Loop	Existing
Environmental	96.7	90.0	100.0
Social	87.4	85.2	54.8
Economic	80.0	81.8	80.0
Total Score	88.0	**85.7**	78.3

**Total Scores are out of a possible 100 points*

There is clearly room for interpretation and continued refinement of the scores, including ways to mitigate financial or timelines risks through more detailed studies. This does not preclude future blending of the proposed concepts to accommodate further feedback from the public, valued stakeholders such as Parks Canada, special interest groups, senior administration, or Council. Section 5 provides more detailed findings and recommended next steps that can further build on the outcomes of this Feasibility Study.

Between the two concepts the overall scores vary minimally. Relative to the total score for the "Existing Condition" the criteria and scores indicate that providing the active modes facilities is beneficial from an environmental, social and economic perspective even when considering capital construction and annual maintenance costs.

6 FINDINGS AND RECOMMENDED NEXT STEPS

The following flow charts of recommended next steps identifies the key activities that the Town will have to undertake in order to make the active transportation network a reality for residents.

PROMOTING ACTIVE MODES IN JASPER FEASIBILITY STUDY

Strategic Alignment

Active Transportation Network planning aligns with endorsed transportation and community strategies, and Council direction,

Residents identified as the primary audience and users of the network. By developing a network tailored to meet the needs of residents, the network will also serve visitors.

Gather Data/Information to Support Decision Making

Data and information gathered and confirmed includes:

- Cycling patterns (peak and off-peak) in the townsite (road, pathway, goat trials).
- Existing road rights-of-way.
- On-street parking situation.
- Traffic volumes, posted speed, travel speed.
- Existing wayfinding support for active transportation users.
- Existing safety concerns at intersections and other road crossing locations.
- Sentiment of residents and Town Administration regarding active modes infrastructure (challenges and opportunities).
- Existing Town bylaws and policies.
- Existing maintenance practices.

Benchmarking

Contrast and compare the bylaws, policies and active modes infrastructure investment in similar municipalities to help inform Jasper on potential approaches outcomes.

Identify Applicable Standards and Best Practices

Review industry standards, best practices and design guidelines:

- BC Active Transportation Design Guide
- NACTO Urban Bikeway Design Guide
- TAC Geometric Guide for Canadian Roads
- City of Edmonton Complete Streets Standards

Consider the best approach for Jasper to meet the objectives and consider the need for the bike network to provide safe and comfortable connections throughout the town for users of all ages and abilities.

Develop Feasible Concepts

Provide a primary loop option.

Develop potential secondary connection options.

Develop potential cross sections for each roadway that includes new active modes infrastructure.

Provide an opinion of probable costs for capital investment.

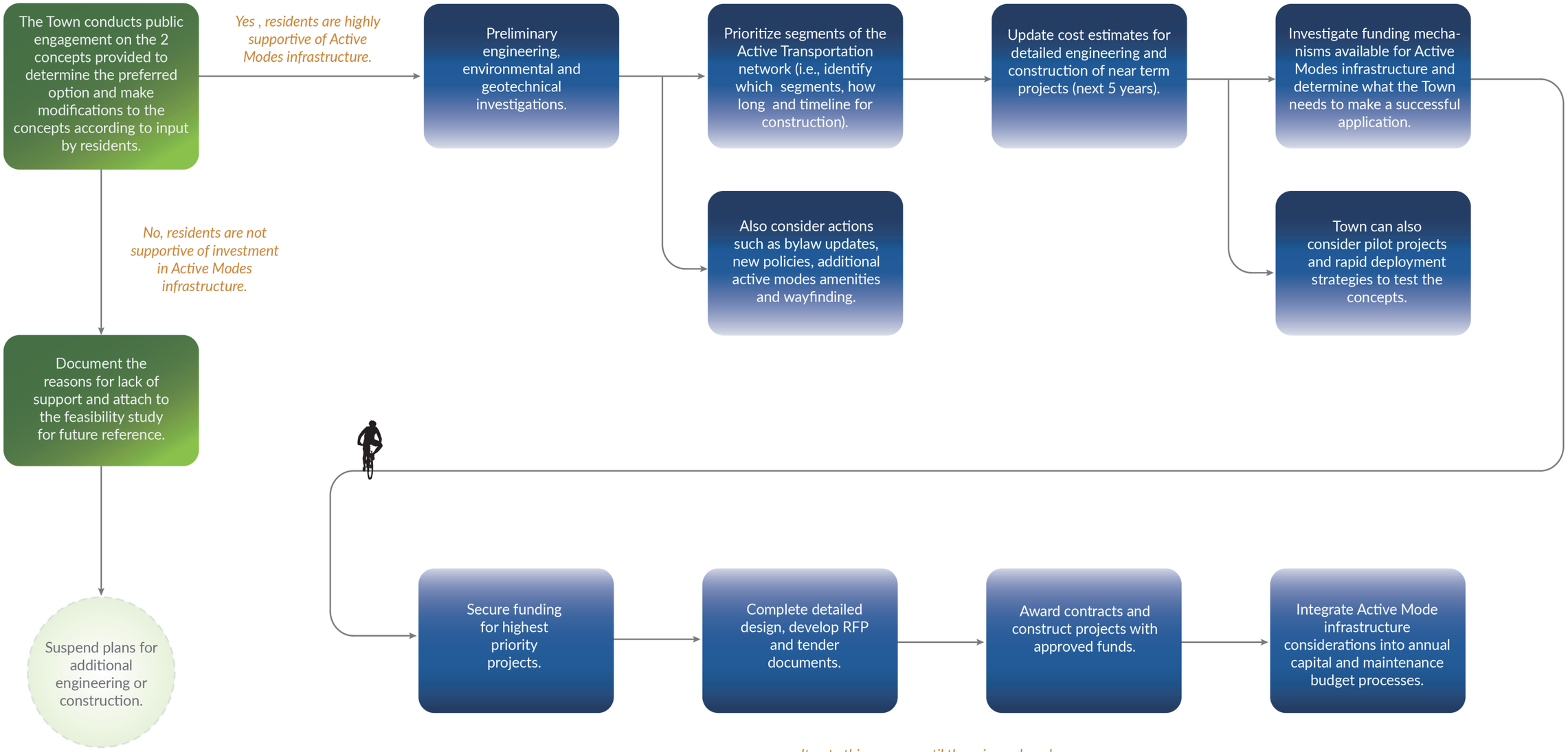
Provide considerations for annual maintenance and what are the activities and costs associated.

Assess both concepts and the existing condition using a Triple Bottom Line approach including environmental, social and economic criteria.

STUDY COMPLETE

Continue to Figure 6-2
Recommended Next Steps for the Municipality

RECOMMENDED NEXT STEPS FOR THE MUNICIPALITY



Iterate this process until the primary loop has been fully constructed.

Consider next steps for secondary connections if desired.

CERTIFICATION PAGE

This report presents our findings regarding the Municipality of Jasper Promoting Active Transportation in Jasper Feasibility Study. The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,
Associated Engineering Alberta Ltd.

Breanna Jackson, P.Eng.
Transportation Planning Engineer

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
Signature _____
M69180 Shane Thompson 2023-09-21
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta

Appendix A

SITE VISIT NOTES

Associated Engineering

Intersection Notes

Figure A-1: Overview of Miette Ave and Bonhomme St

Figure A-2: Sightline from Miette towards Bonhomme St

Figure A-3: Sightline from Miette facing North down Bonhomme

Figure A-4: Sightline from Miette approaching intersection with Bonhomme St

Figure A-5: Sightline from Bonhomme facing south

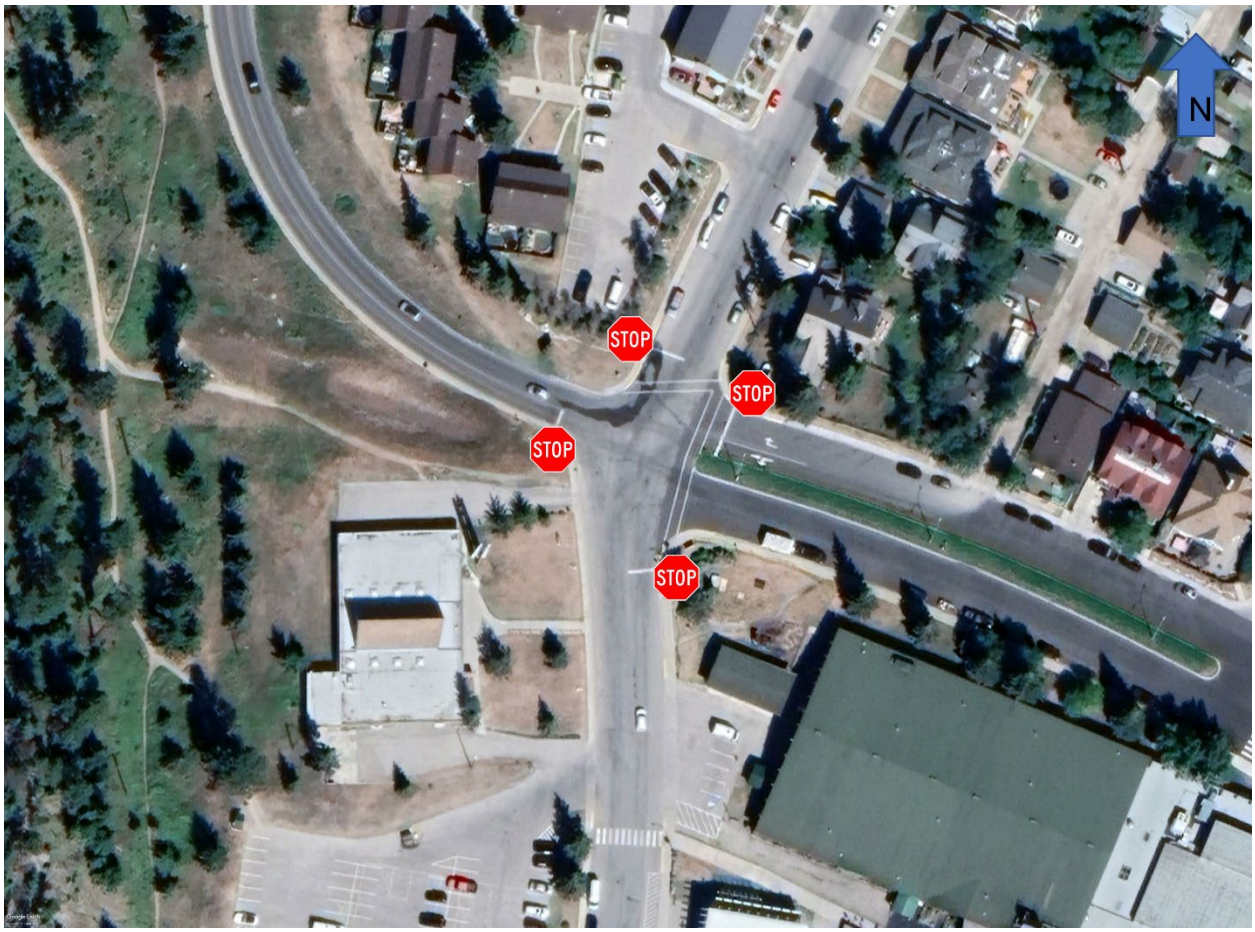


Figure A-6: Overview of Pyramid Ave and Bonhomme St

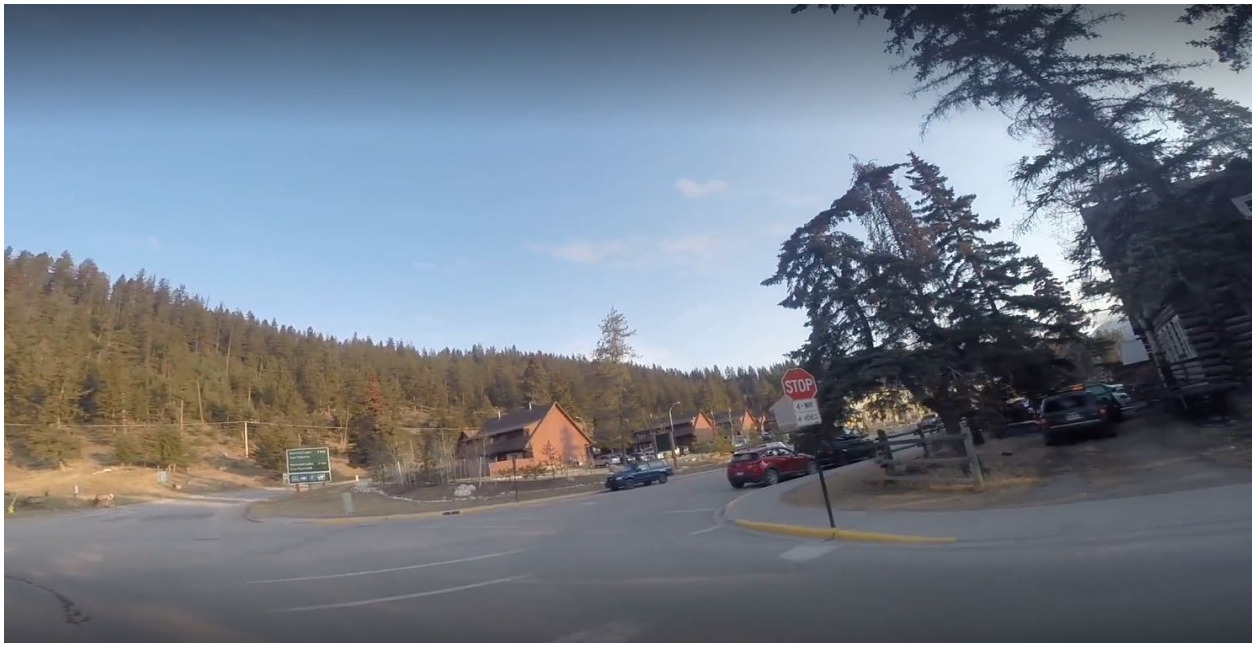


Figure A-7: Sightline from Pyramid Ave facing north towards Bonhomme Street

Figure A-8: Sightline from Pyramid Ave facing east towards Bonhomme

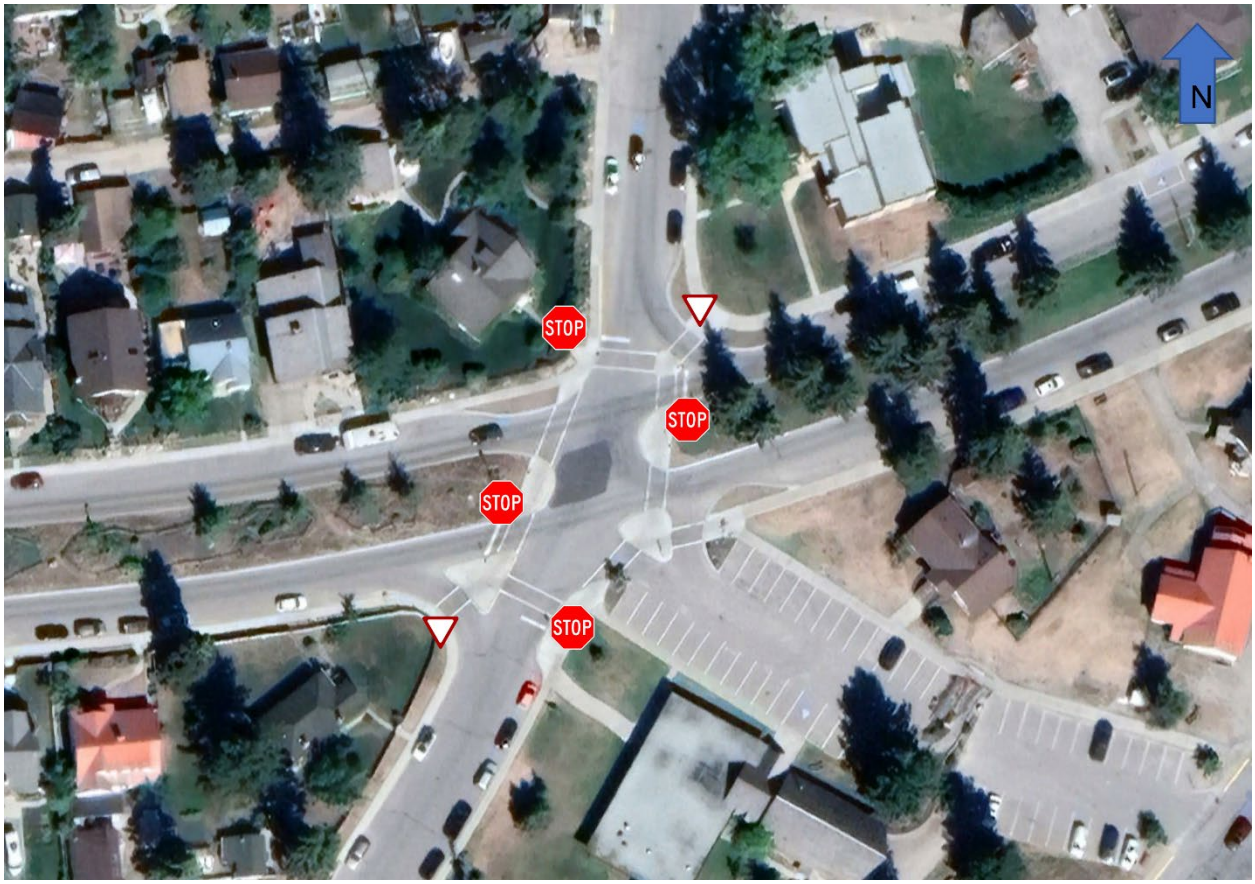


Figure A-9: Overview of Miette Ave and Turret St

Figure A-10: Sightline from Turret St facing north towards Miette Ave

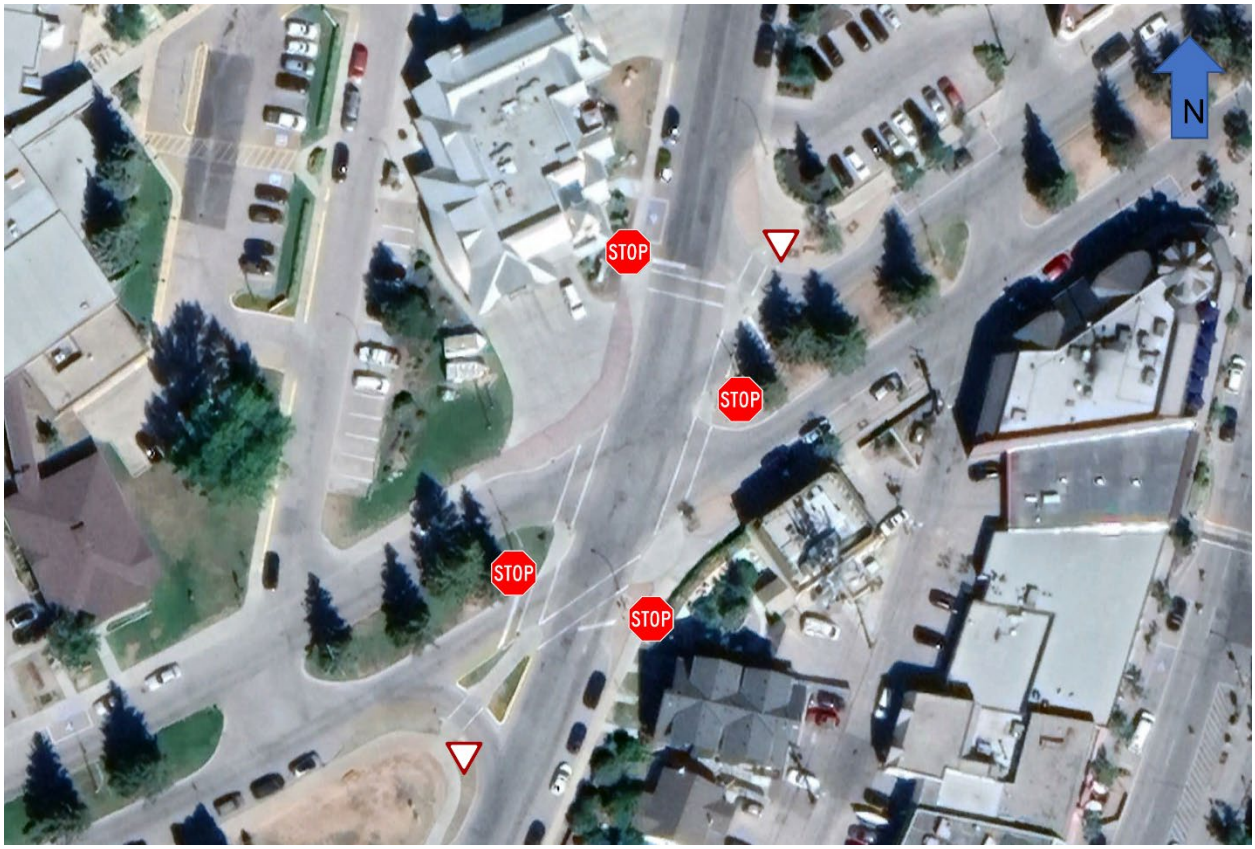


Figure A-11: Overview of Miette Ave and Geikie St

Figure A-12: Sightline from Miette Ave facing west towards Geikie St

Figure A-13: Sightline approaching Geikie St from Miette Ave

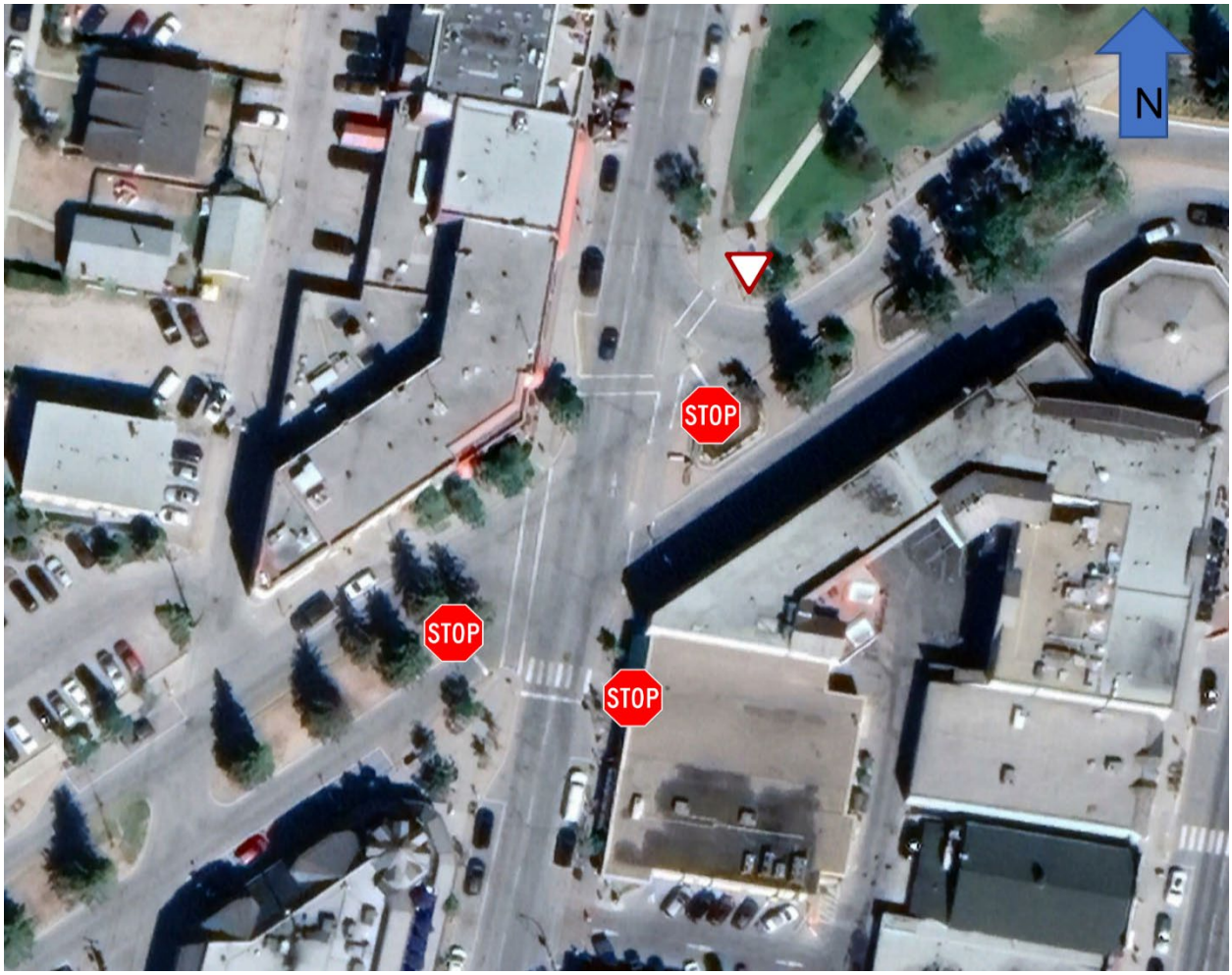


Figure A-14: Overview of Miette Ave and Patricia St

Figure A-15: Sightline from Miette facing east towards Patricia St

Figure A-16: Sightline Patricia St approaching intersection with Miette

Appendix B

TRAFFIC COUNT DATA

Associated Engineering

APPENDIX B – TRAFFIC COUNT DATA

Table B-1: Site A – Total Daily Traffic (March 2023)

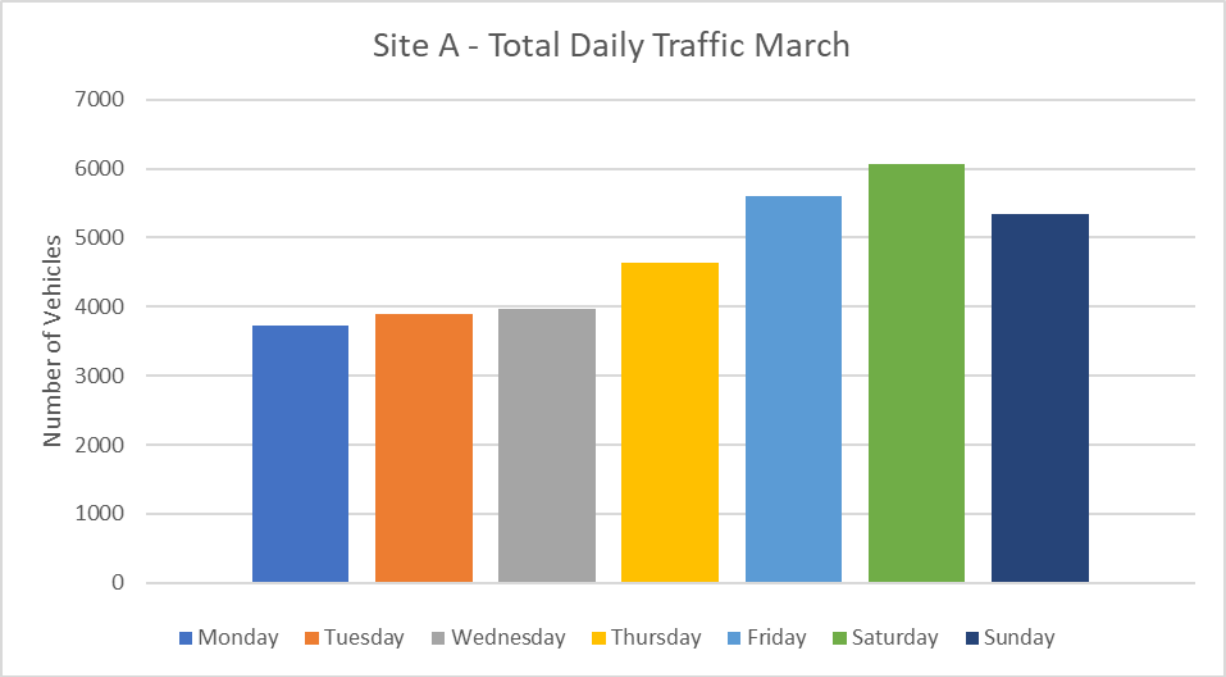
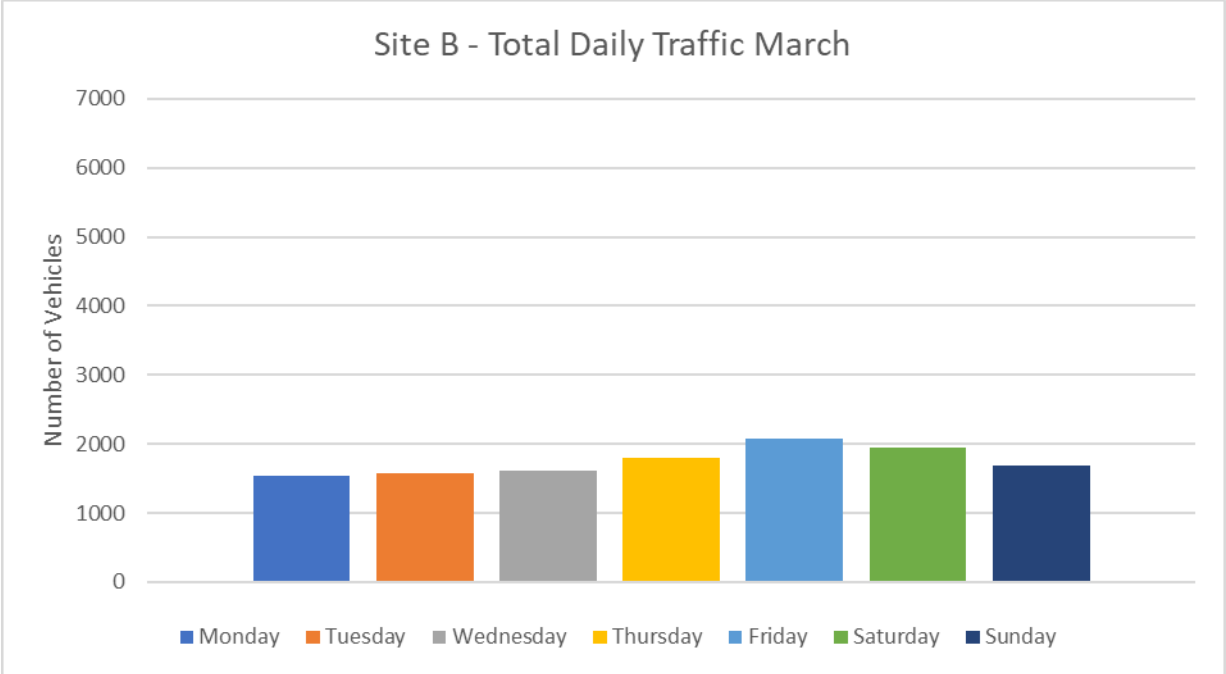


Table B-2: Site B – Total Daily Traffic (March 2023)



The Town of Jasper also sees a directional traffic flow with Site A seeing ~250% more traffic than Site B, as seen below.

Table B-3: Average Weekly Traffic (March 2023) – Site A vs Site B

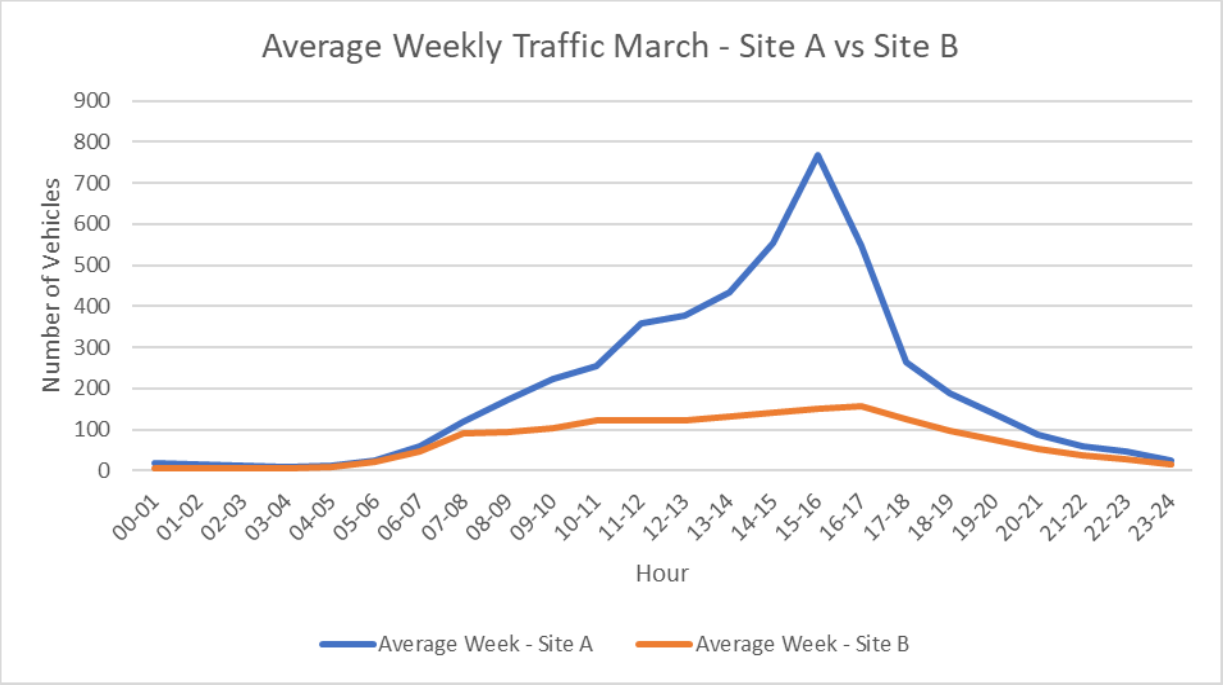


Table B-4: Site A – Average Hourly Traffic Volumes (March 2023)

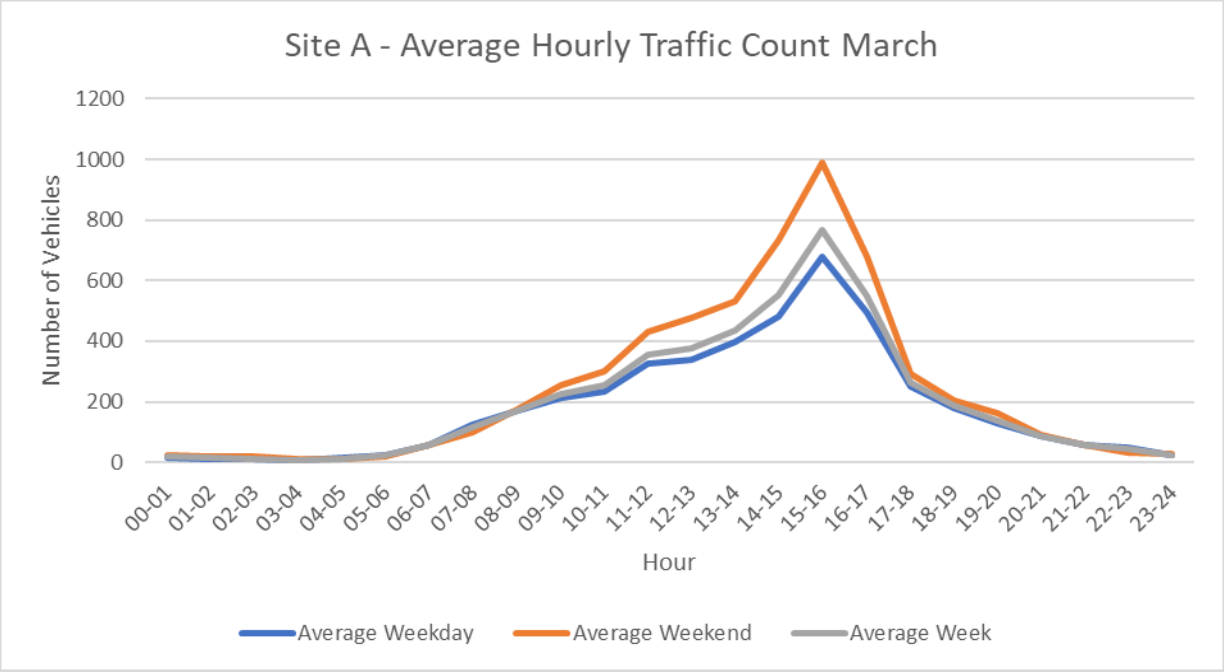
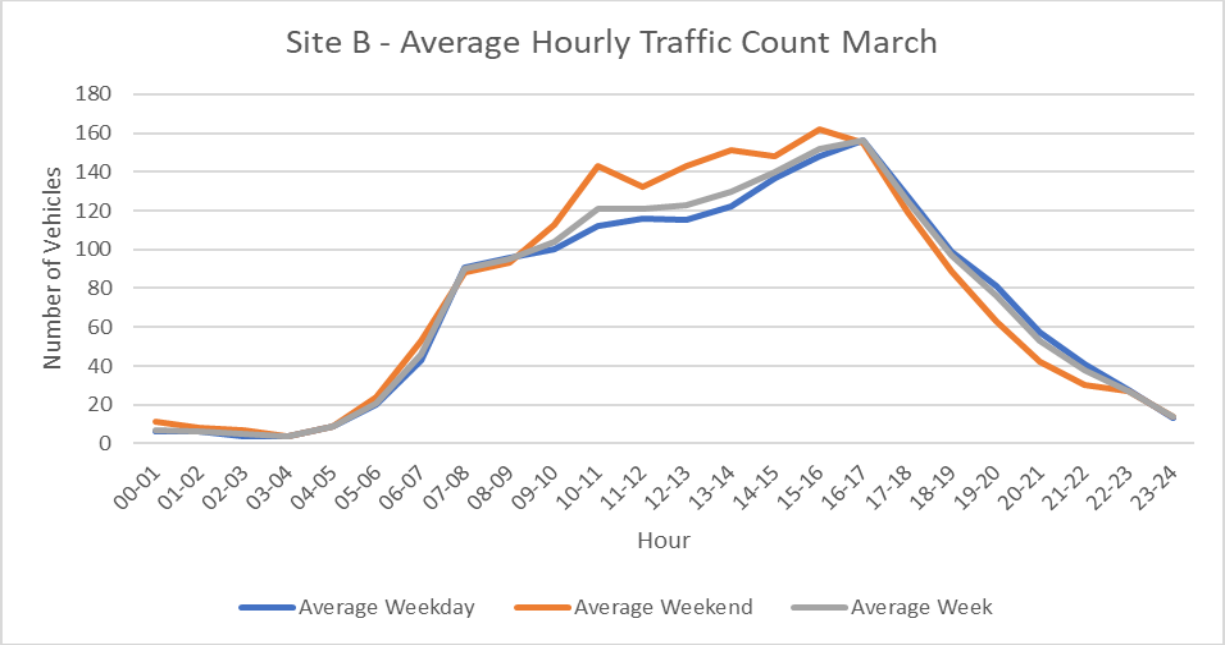
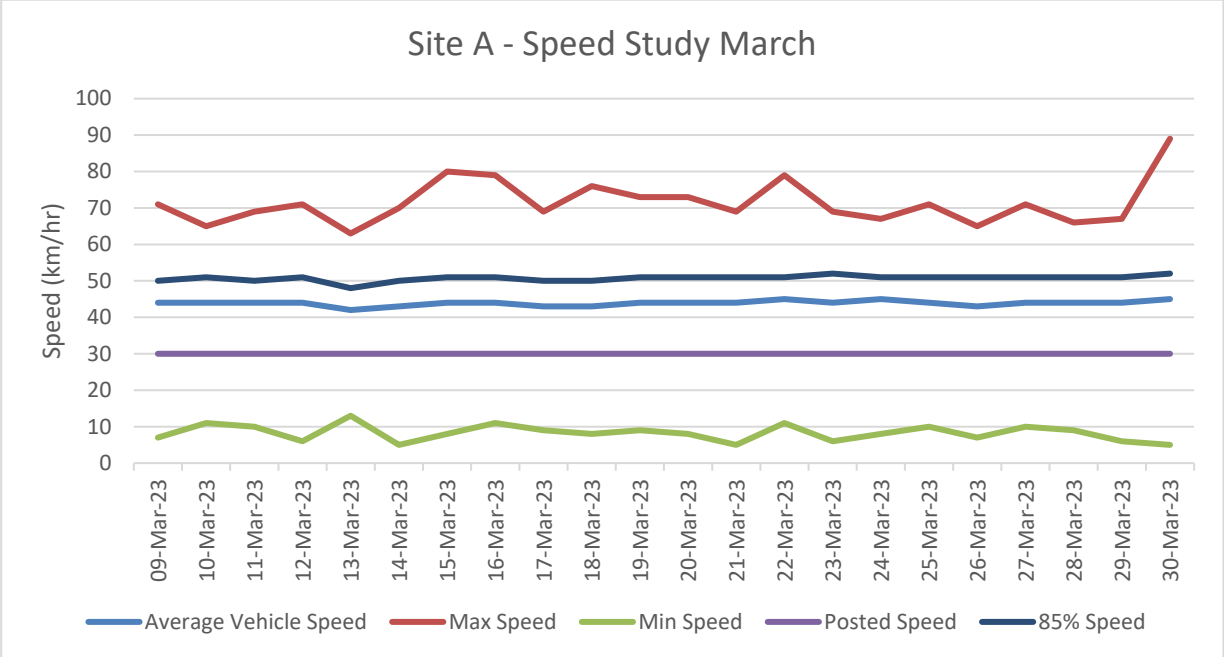


Table B-5: Site B – Average Hourly Traffic Volumes (March 2023)



A speed study was completed for both Site A and B from March 9, 2023 – March 30, 2023. This speed study collected the travelling speed of the vehicles as they passed the radar signs at the Site A and Site B locations. A summary of the results for Site A is detailed below.

Table B-6: Site A – Recorded Vehicle Speeds (March 2023)



While Connaught Drive is posted at 30km/hr, the 85-percentile speed was observed to be 50.7km/hr and the average vehicle speed was observed to be 43.9km/hr. The average maximum speed was found to be 71.5km/hr. On average, 97% of the vehicles driving northbound along Connaught are speeding, as seen in the following figures.

Table B-7: Site A – Speed Limit Violations (March 2023)

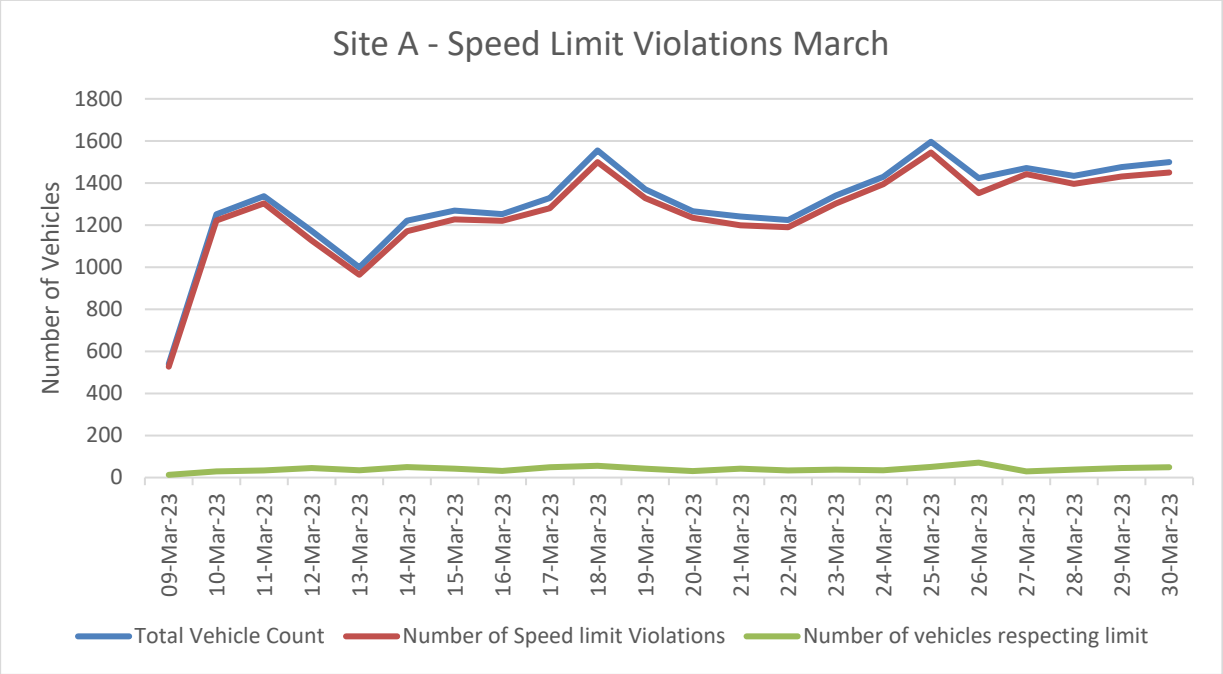
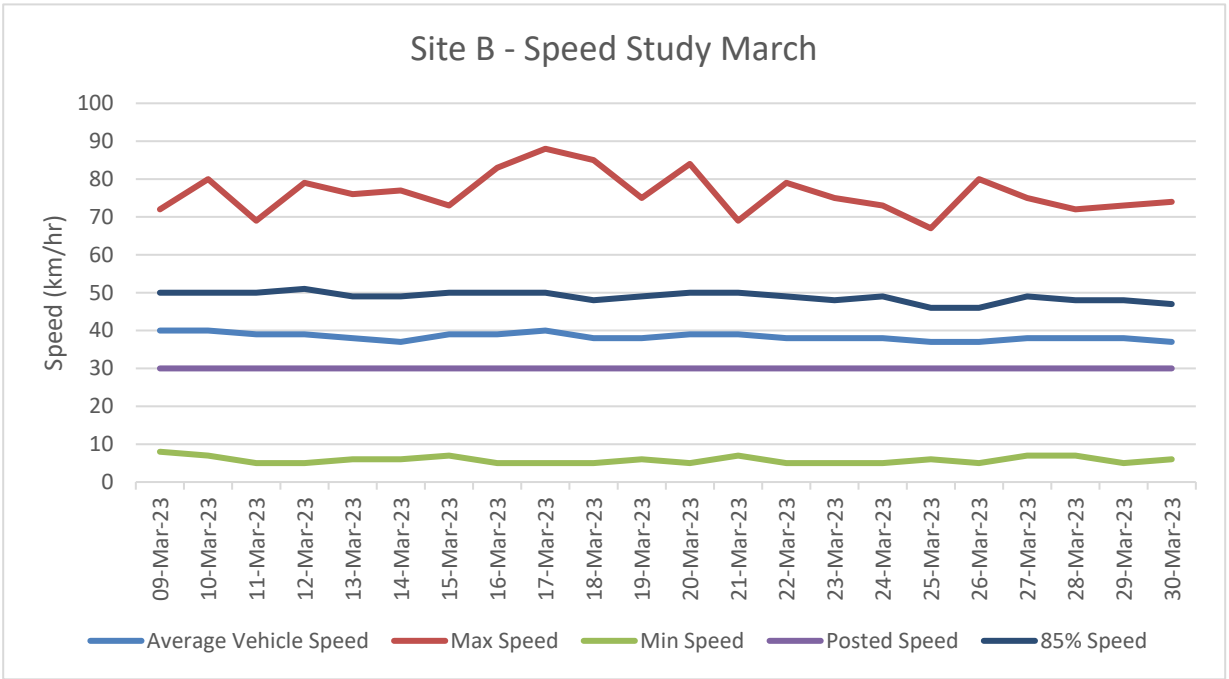


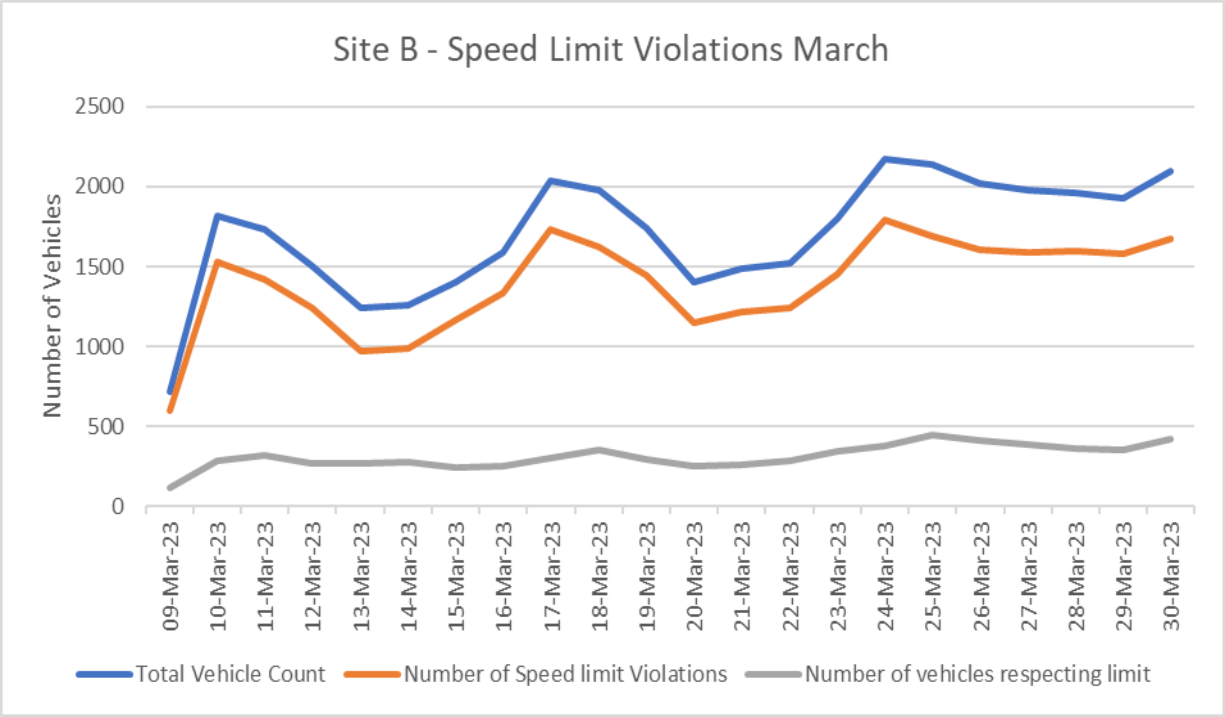
Table B-8: Site B – Recorded Vehicle Speeds (March 2023)



For Site B the 85-percentile speed was observed to be 38.4/hr and the average vehicle speed was observed to be 48.9km/hr. The average maximum speed was found to be 76.2km/hr.

On average 82% of vehicles travelling southbound are speeding, as seen below.

Table B-9: Site B – Speed Limit Violations (March 2023)



As none of the crosswalks along Connaught have any flashers to identify to crossing pedestrians and is reliant on drivers seeing pedestrians. With parking located on both sides of Connaught Drive, the sightlines that vehicles for pedestrians wanting to cross can be obstructed, decreasing the safety of pedestrians crossing Connaught.

The speeding on Connaught also suggests that there is a higher perceived safety for cars, resulting in a faster rate of travel down the road.

Appendix C

CYCLING NETWORK DETAILS

Associated Engineering

APPENDIX C – CYCLING NETWORK DETAILS

For analysis and discussion, Figure C-1 presents the network diagram for the Jasper road network. An abstract network diagram (not to physical scale) such as this allows for network analysis to be conducted. The following tables, Table C and Table, detail the network options by road with reference to the above network diagram node.

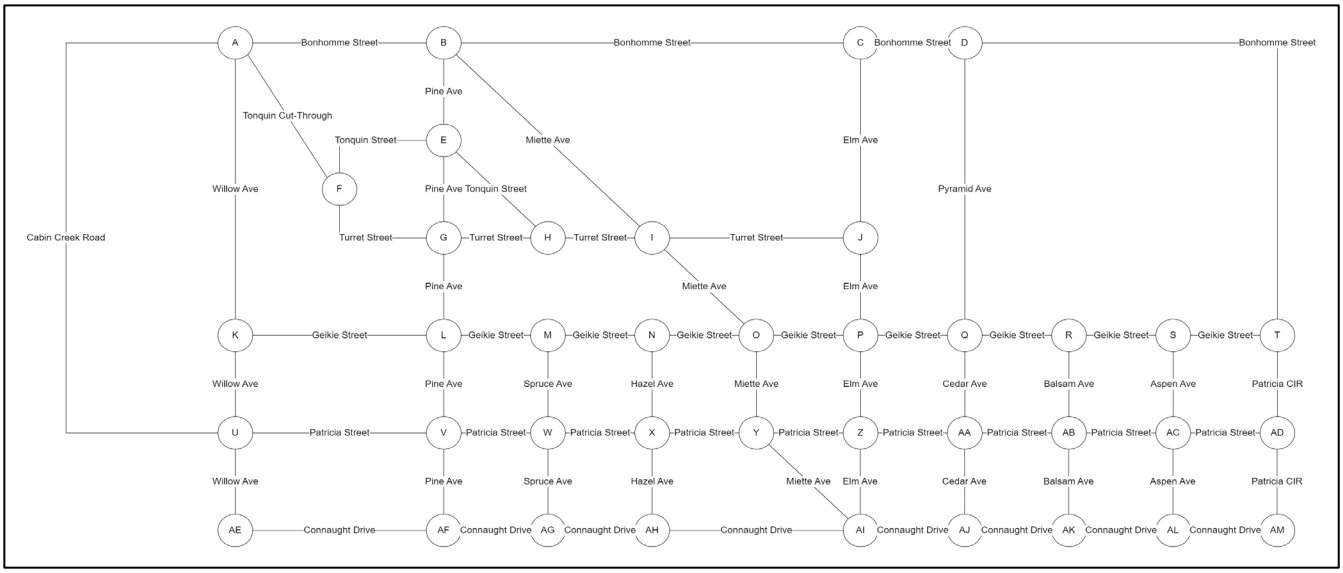


Figure C-1: Network Diagram of Road Network

Table C-1: Network Option 1 Road List

Road	Category	From	To	Length (km)
Bonhomme	Primary	A	T	1.56
Geikie	Primary	T	K	1.81
Willow Ave	Primary	K	U	0.09
Cabin Creek Road	Primary	U	A	1.75
Total Primary				**5.21**
Connaught Drive	Secondary	AE	AM	1.81

Road	Category	From	To	Length (km)
Tonquin Cut-through	Secondary	A	F	0.07
Tonquin	Secondary	F	H	0.40
Turret	Secondary	F	J	0.89
Pine Ave	Secondary	AF	L	0.46
Pyramid Ave	Secondary	Q	D	0.30
Patricia CIR	Secondary	AM	T	0.17
Cedar Ave	Secondary	AJ	Q	0.18
Willow Ave	Secondary	A	K	0.18
Willow Ave	Secondary	U	AE	0.08
Total Secondary				4.54

Table C-2: Network Option 2 Road List

Road	Category	From	To	Length (km)
Bonhomme	Primary	B	T	1.30
Geikie	Primary	T	L	1.63
Pine Ave	Primary	L	B	0.29
Elm Ave	Primary	C	P	0.30
Tonquin Cut-through	Primary	A	F	0.07
Tonquin	Primary	F	E	0.12
Turret	Primary	F	G	0.12
Total Primary				3.83

Road	Category	From	To	Length (km)
Tonquin	Secondary	E	H	0.28
Turret	Secondary	G	J	0.77
Cabin Creek Road	Secondary	Off-network	Off-network	0.84
Cabin Creek Road	Secondary	Part-network	Part-network	0.50
Connaught Drive	Secondary	AE	AM	1.81
Willow Ave	Secondary	A	K	0.28
Total Secondary				4.48

Appendix D

ROAD FACILITY CROSS SECTIONS THAT FAVOUR ACTIVE TRANSPORTATION

Associated Engineering

APPENDIX D – ROAD FACILITY CROSS-SECTIONS

Alternate cross-sections have been developed for some of the roads within the proposed bike network. The cross-sections reduce the amount of parking space available or compromise on facility component widths.

Bonhomme Street:

Figure D-4 Typical Section Bonhomme Street Option 2

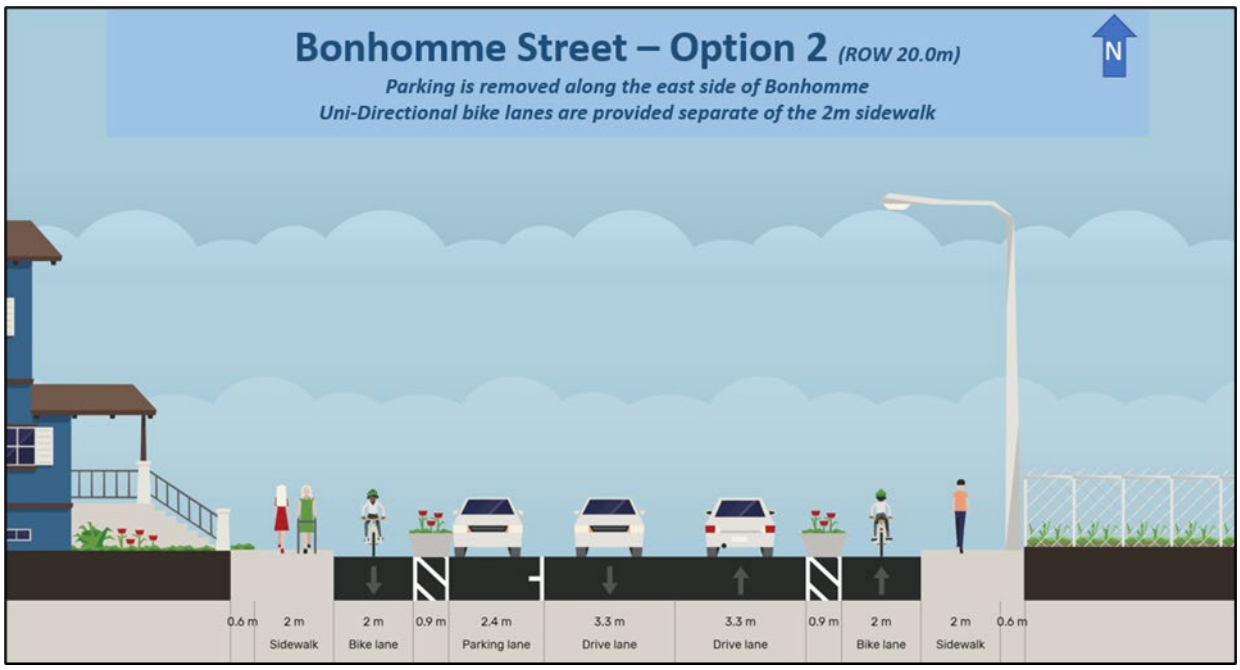


Table D-1: Bonhomme Street Option 2 Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost Per Metre	If Utilities Work is Needed
Bonhomme – 2	4	4	$1,700.00	$13,900

The following option comparison table weighs the pros and cons of a unidirectional bike lane with a bidirectional bike lane.

Table D-2: Bonhomme Street Options 1 and 2 Comparison

Type	Pros	Cons
One-Way	Standard directional layout is intuitive for all users and simplifies movements at intersections. Generally the preferred option to integrate bike facilities into existing road operations.*	Depending on location of origins/destinations, may require more crossing of main road to access the appropriate lane direction. If underutilized or low volume users may disregard travel direction*
Two-Way	More space for cyclists to use full lane width and pass lower users when low volume / no bikes in opposing direction**. Less space needed (fewer buffer zones)* Depending on land use (if most/all are on one side of the road, the lane may be more accessible when roads are wide, and blocks are long).****	Bikes travelling "counter-flow" of vehicle traffic may be unexpected for drivers to check for at intersections (less appropriate when high number of crossings***)

** BC Active Transportation Guide D43 – D44*

***BC Active Transportation Guide Pg D33*

****BC Active Transportation Guide Pg B29*

***** TAC Geometric Design Guide for Canadian Roads Section 5.3.1.2*

Cabin Creek Drive:

In order to maintain travel in both directions while also including bike lanes and sidewalks, the drive lane are selected to be 3 m wide. This is not wide enough for transit or other wider vehicles to pass without encroaching into the oncoming lane and vehicles may need to give-way when passing. The bike lane and sidewalks are minimum widths and do not have any buffer spaces.

If two-way traffic is desired along Cabin Creek Drive, it may be better to keep bike infrastructure off the roadway and utilize the pathway system between the houses, as outlined in Network Option 2.

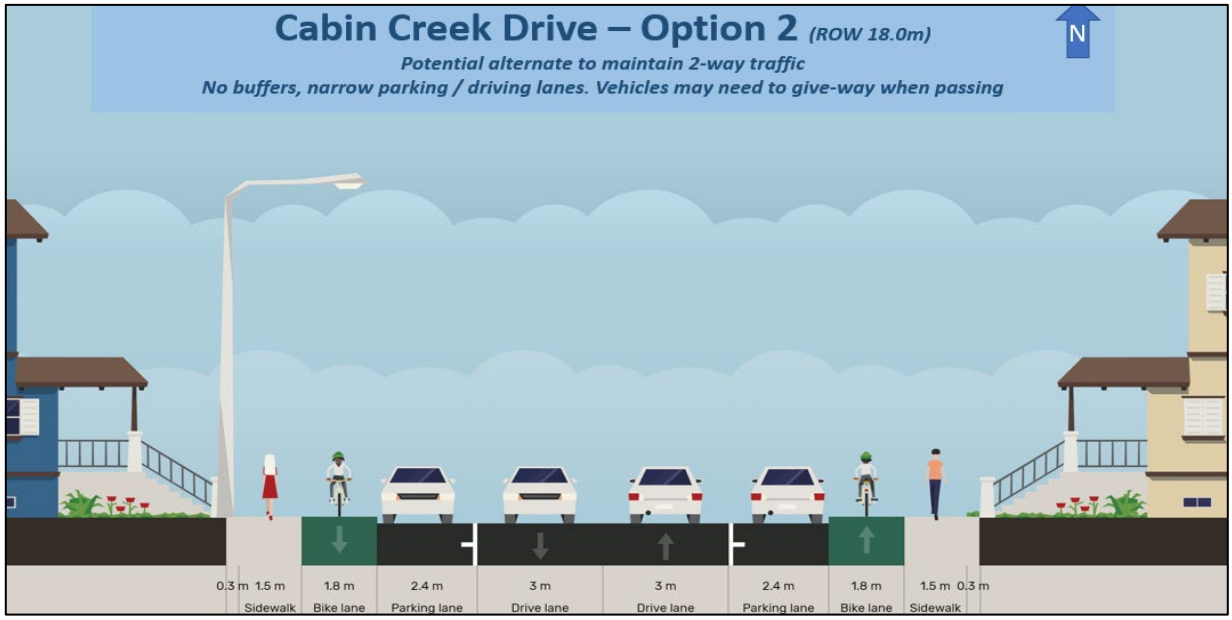


Figure C-2: Typical Section Cabin Creek Drive Option 2

Table D-3: Cabin Creek Drive Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost Per Metre	If Utilities Work is Needed
Cabin Creek Road – 2	3.6	3.6	$1,400.00	$9,800

Connaught Drive:

Option 2 for Connaught Drive decreases the width of the existing centre median and maintains the Discovery Trail on the wide shared-use sidewalk on the east side of Connaught Drive.

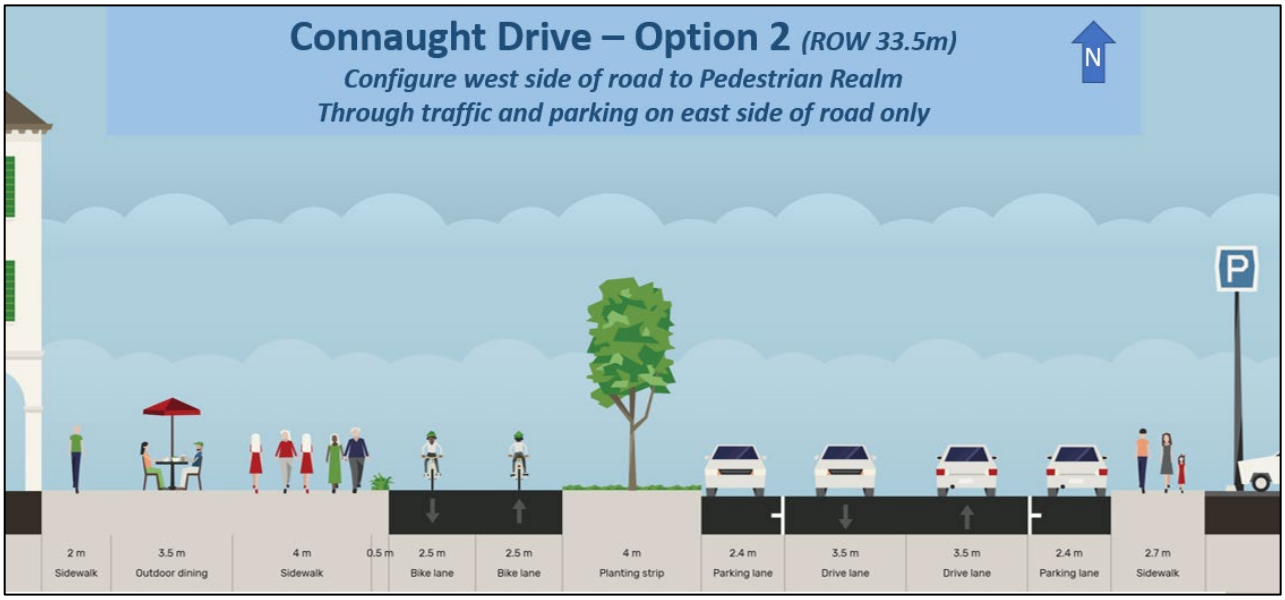


Figure C-3: Typical Section Connaught Drive Option 2

Table D-4: Connaught Drive Option 2 Cross Section per Meter Cost Estimate

Cross-section Option	Bicycle Lane Width (m)	Sidewalk Width (m)	Total Estimated Cost Per Metre	If Utilities Work is Needed
Connaught Drive – 2	5	12.2	$4,000.00	not assessed

Appendix E

DETAILED COST ESTIMATES

Associated Engineering

APPENDIX E – DETAILED COST ESTIMATES

The following cost estimate is an opinion of probable costs using the information available at this conceptual option development stage. These costs do not account for inflation or contract delivery type, both of which are major factors in future project costs.

Materials Considered

After investigating the cross-section designs and past projects, Associated determined that the majority of material costs derive from:

- Asphalt
- Granular Base Course
- Sidewalk Concrete

Utility relocation is also identified as a major cost component to street redesign projects. The length of parallel utilities is identified and the number of crossings the utility makes with the road right-of-way.

Cross-Sections of Materials

Table E-1: Cost per Cross-Section of Materials

		Cycle Track			Sidewalk
		Asphalt H2 (Base)	Asphalt S1 (Surface)	Granular Coarse Base (25mm)	Granular Coarse Base (25mm) and Concrete Surface
		Square Metres	Square Metres	Square Metres	Metres Width
Road	Section Option	(50mm thickness)	(50mm thickness)	(250mm thickness)	
Bonhomme	1a	0.200	0.200	1.000	4
Bonhomme	1b	0.100	0.100	1.000	4
Bonhomme	2	0.088	0.088	0.875	3.6
Cabin Creek Road	1	0.090	0.090	1.620	4
Cabin Creek Road	1a	0.090	0.090	1.620	3.6

		Cycle Track			Sidewalk
		Asphalt H2 (Base)	Asphalt S1 (Surface)	Granular Coarse Base (25mm)	Granular Coarse Base (25mm) and Concrete Surface
		Square Metres	Square Metres	Square Metres	Metres Width
Cabin Creek Road	2	0.000	0.000	0.000	3
Geikie Street	1	0.090	0.090	1.620	3.6
Geikie Street	2	0.090	0.090	1.620	3.6
Connaught Drive	1	0.125	0.125	2.250	12.2
Connaught Drive	2	0.125	0.125	2.250	11.3
Elm Street	1	0.075	0.075	0.750	3.6
Elm Street	2	0.075	0.075	0.750	3.6

Assumed Unit Costs

Unit costs were initially taken from the latest Alberta Transportation Unit Price Averages (UPA) report, updated April 30, 2023. Values are taken for the "Central" region of Alberta and are considered representative of the costs for materials Jasper would likely incur. These values were compared with projects Associated is involved in the Bow Valley and nearby areas and found to be underestimating recently experienced rates. The more conservative rates were therefore selected and applied. Inflation should be applied to any forecasts and these data are taken from a limited sampling so additional local knowledge should be applied wherever possible.

Table E-2: Assumed Unit Costs

Construction	Assumed Unit Rate	Units	Assumed Density (t/m°)	UPA Code
Sidewalk Concrete	$120	per square metre	N/A	N/A
Granular Base Course	$24	per tonne	1.52	B282
Asphalt Concrete Pavement – EPS Mix Type H2	$140	per tonne	2.323	N/A
Asphalt Concrete Pavement – EPS Mix Type S1	$160	per tonne	2.323	N/A

Estimated Utilities Conflicts

Utility conflicts were investigated by overlaying the projected primary network over the known sewer, stormwater, and water utility networks. Data on electricity distribution networks were not available. The number of crossings (where the utility intersects with the centre line of the roadway) and the length of parallel running (where the utility runs within the road right-of-way), are both noted.

Table E-3: Estimated Length and Crossings for Utilities

		Sewer		Stormwater		Mains Water	
Network Option	Road	Length	Crossings	Length	Crossings	Length	Crossings
1	Bonhomme	1.56	7	1.56	1	1.56	3
	Geikie	0.7	4	0.31	5	0.32	7
	Willow Ave	0	0	0	0	0.09	2
	Cabin Creek Road	1.75	4	0.59	4	1.75	11
2	Bonhomme	1.3	7	1.3	1	1.3	3
	Geikie	0.7	4	0.31	5	0.27	6
	Pine Ave	0.15	4	0.2	1	0.29	4
	Elm Ave	0	2	0.14	1	0.3	2
	Tonquin Cut-through	0	1	0	1	0	2
	Tonquin	0	0	0	0	0	1
	Turret	0	0	0	0	0	0

Assumed Unit Rates for Utility Management

Utility relocation will not always be required and will depend on the site conditions and final detailed design. The following unit rates are indicative of costs that would likely be incurred if such work is required.

Table E-4: Unit Rates for Utility Management

Diameter	Material	Utility Type	Unit Rate Estimate to Adjust/Relocate
203mm	Vitrified Clay Pipe	Sewer	$3,900
200mm	Polyvinyl Chloride – PVC	Sewer	$3,900
1075mm	Concrete (Non-Reinforced) – CP	Storm	$6,800
450mm	Concrete (Non-Reinforced) – CP	Storm	$3,000
375mm	Concrete (Non-Reinforced) – CP	Storm	$2,900
300mm	Polyvinyl Chloride – PVC	Water	$3,200
150mm	Cast Iron – CAS	Water	$2,700
200mm	Cast Iron – CAS	Water	$3,000
200mm	Polyvinyl Chloride – PVC	Water	$3,000

Cross-Section Costs

Table E-5: Material Cost Estimates per Metre

	Cycle Track			Sidewalk	
	Asphalt H2	Asphalt S1	Granular Coarse Base (25mm)	Sidewalk (GBC + Concrete)	
Unit Price	$336.00	$384.00	$36.48	$120.00	
Bonhomme – 1a	$67	$77	$29	$480	$653.18
Bonhomme – 1b	$34	$38	$29	$480	$581.18
Bonhomme – 2	$29	$34	$26	$432	$520.54
Cabin Creek Road – 1	$30	$35	$53	$480	$597.33
Cabin Creek Road – 1a	$30	$35	$53	$432	$549.33
Cabin Creek Road – 2	$0	$0	$0	$360	$360.00
Geikie Street – 1	$30	$35	$53	$432	$549.33
Geikie Street – 2	$30	$35	$53	$432	$549.33
Connaught Drive – 1	$42	$48	$73	$1,464	$1,626.96
Connaught Drive – 2	$42	$48	$73	$1,356	$1,518.96
Elm Street – 1	$25	$29	$22	$432	$507.89
Elm Street – 2	$25	$29	$22	$432	$507.89

Capital Cost per Metre

Capital cost consists of materials plus labour and equipment. At this stage, the assumed escalation factor for labour and equipment is 60%.

Table E-6: Capital Cost per Metre

Cross-section Option	Labour & Equipment (60%)	Capital Costs
Bonhomme – 1a	$396	$1,056
Bonhomme – 1b	$354	$944
Bonhomme – 2	$318	$848
Cabin Creek Road – 1	$360	$960
Cabin Creek Road – 1a	$330	$880
Cabin Creek Road – 2	$216	$576

Cross-section Option	Labour & Equipment (60%)	Capital Costs
Geikie Street – 1	$330	$880
Geikie Street – 2	$330	$880
Connaught Drive – 1	$978	$2,608
Connaught Drive – 2	$912	$2,432
Elm Street – 1	$306	$816
Elm Street – 2	$306	$816

Escalation Costs per Metre

The following escalation factors are necessary to account for the costs above materials incurred in a construction project. Associated Engineering provides the following percentage escalation factors based on past project experience and expertise. These rates and resulting cost estimates are to be used as a guide for comparing the network and cross-section options, and as an opinion of probable cost for budgeting purposes. Inflation and project delivery mode are not considered as they depend upon the decision of the Town of Jasper as to when and how they wish to deliver these projects.

Table E-7: Escalation Costs per Metre

Escalation Factor	Rate Applied to Capital Cost
Mobilization	20%
Contingency	10%
Design Costs	12%
Construction/Inspection	10%

Opinion of Probable Total Cost per Metre

Table E-8: Opinion of Probable Cost per Metre

Cross-section Option	Design	Mobilization	Construction/Inspection	Contingency	Total Cost per Metre
Bonhomme – 1a	$126.72	$211.20	$126.72	$105.60	$549.12
Bonhomme – 1b	$113.28	$188.80	$113.28	$94.40	$490.88
Bonhomme – 2	$101.76	$169.60	$101.76	$84.80	$440.96
Cabin Creek Road – 1	$115.20	$192.00	$115.20	$96.00	$499.20
Cabin Creek Road – 1a	$105.60	$176.00	$105.60	$88.00	$457.60
Cabin Creek Road – 2	$69.12	$115.20	$69.12	$57.60	$299.52

Cross-section Option	Design	Mobilization	Construction/Inspection	Contingency	Total Cost per Metre
Geikie Street – 1	$105.60	$176.00	$105.60	$88.00	$457.60
Geikie Street – 2	$105.60	$176.00	$105.60	$88.00	$457.60
Connaught Drive – 1	$312.96	$521.60	$312.96	$260.80	$1,356.16
Connaught Drive – 2	$291.84	$486.40	$291.84	$243.20	$1,264.64
Elm Street – 1	$97.92	$163.20	$97.92	$81.60	$424.32
Elm Street – 2	$97.92	$163.20	$97.92	$81.60	$424.32

Appendix F

CONTAMINATED SITES CONSIDERATIONS

Associated Engineering

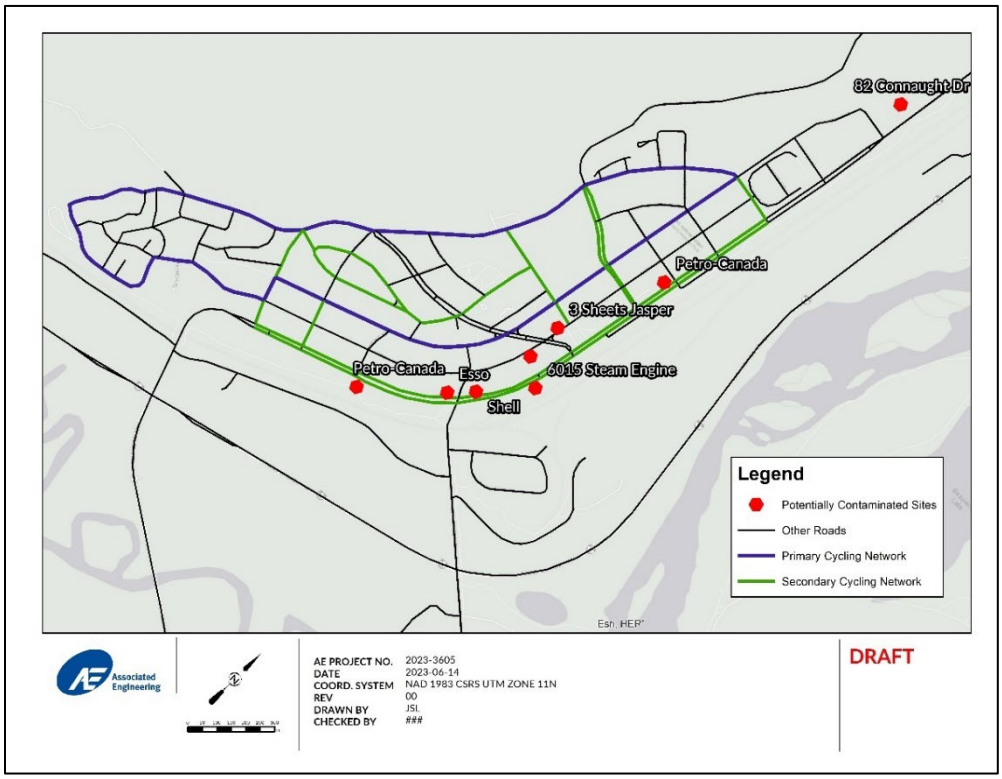
APPENDIX F – CONTAMINATED SITES CONSIDERATIONS

To identify potential of an uncontrolled contaminated site. Especially if it can lead to contaminated soil and groundwater that has a plume moving off the originating source or site. Contamination liability unfortunately sits in part on the shoulders of the party who exposes it. So if the Town does earthworks to construct active transportation facilities that run beside a former or old or current gas station, for example, then the Town will be responsible for any pathways of exposure that results from any earthworks, and also may need to cost for backfilling with clean material, etc.

There are no active Federal Contaminated Sites within the likely construction areas of either cycling network. There is one closed site at the location of the previous Royal Canadian Mounted Police station, on the corner of Elm Avenue and Turret Street. The contaminants at this site were remediated in 2010-2011.

A good rule of thumb at the feasibility stage is to identify any high- risk land uses including gas stations and dry cleaner businesses. A search of the Federal Contaminated Sites database also helps identify any logged areas of concern (below). This section details the findings of the contaminated site search. Overall, there is a moderate risk to discover contamination along Connaught Drive. As Connaught Drive is a key corridor for both network options, this does not influence the decision-making between the two network options.

Fuel stations, vehicle mechanic shops, and laundromats are businesses that may cause contamination. The only known vehicle mechanic shops are on the east side of the Town's railway tracks and thus not near the cycling network construction areas. Three current laundromats are along the proposed cycling network: Coin Clean Laundry at 607 A Patricia Street; 3 Sheet Jasper at 604 Patricia Street; and 6015 Steam Engine at 6090 Connaught Drive. Four current gas stations and one past gas station have been identified in the Town. The past gas station is outside of the proposed cycle network construction areas. The current four gas stations are all located along Connaught Drive, three on the west/township side and one on the east/railway side of the drive.


82 Connaught Dr
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3 Sheets Jasper
Petro-Canada
Esso
6015 Steam Engine
Shell
Legend
Potentially Contaminated Sites
Other Roads
Primary Cycling Network
Secondary Cycling Network
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Associated Engineering
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DATE 2023-06-14
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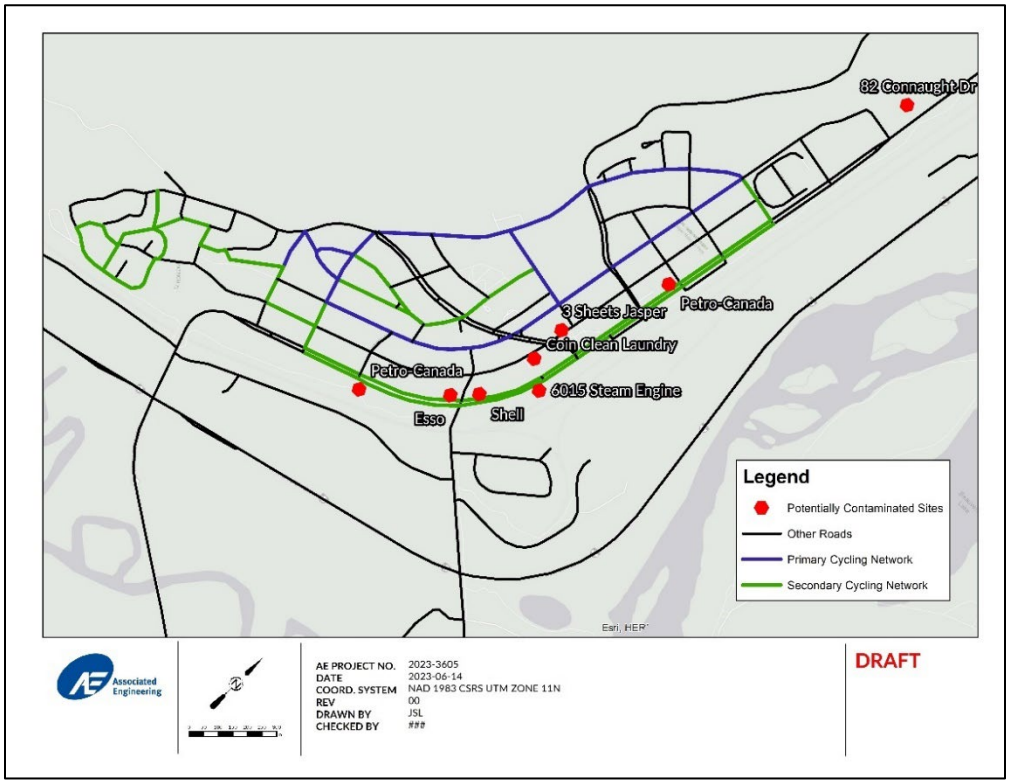
82 Connaught Dr
Petro-Canada
3 Sheets Jasper
Coin Clean Laundry
Petro-Canada
6015 Steam Engine
Esso
Shell
Legend
Potentially Contaminated Sites
Other Roads
Primary Cycling Network
Secondary Cycling Network
Esri, HERE
Associated Engineering
AE PROJECT NO. 2023-3605
DATE 2023-06-14
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REV 00
DRAWN BY JSL
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DRAFT

Appendix G

CONCEPT SCORE CALCULATIONS

Associated Engineering

	Option 1	Option 2	Existing Condition
Section Score - Environmental	60.0	60.0	60.0
Section Score - Social	85.2	87.8	62.9
Section Score - Economic	75.0	80.0	75.0
Total Option Score	**73.4**	**75.9**	**66.0**

* All Scores are out of a possible 100 max.

Weight	Category and Criteria	Option 1 Primary Loop		Option 2 Primary Loop		Existing condition	
		Av. Score	Weight	Av. Score	Weight	Av. Score	Weight
1	**Environmental**	3.0	3.0	3.0	3.0	3.0	3.0
1	Loss of natural areas or environmentally sensitive features						
1	Aquatic Habitat						
1	Wildlife passage	3	3	3	3	3	3
1	Regulatory Approvals (basic environmental reviews)	3	3	3	3		
1	Contamination risk (reclamation needs)						
1	Sensitive Receptors						
1	Historical Resources						
1	**Social**	4.3	8.2	4.4	8.4	3.3	6.0
1	Reputation						
1	Aesthetics/user experience/points of interest opportunities						
1	Equity and Inclusion (mobility for broader demographics)						
1	Improving Quality of Life/Active Lifestyle						
	Safety						
2	Roadway crossings	3	6	4	8	3	6
1	Proximity to barriers/ obstructions/ poles	4	4	4	4	4	4
2	Adjacent road speed (observed and posted)	5	10	5	10	5	10
3	Traffic control	4	12	4	12	3	9
2	Traffic mix and volumes (existing and forecasted)	5	10	5	10	3	6
	Geometry						
2	Vertical profile	4	8	5	10		
3	Sightlines	4	12	4	12	3	9
2	Curves and Tight Turns	4	8	5	10	3	6
	Access						
3	Connectivity (considering future secondary connections)	5	15	4	12	2	6
1	Access to future transit stops	4	4	4	4	2	2
1	Flood risk	5	5	5	5	5	5
1	Parking at intercept points	4	4	4	4	3	3
1	**Economic**	3.8	3.8	4.0	8.0	3.8	5.3
1	Capital Construction Costs (NPV)						
3	Annual Maintenance Costs (NPV)						
2	Hidden Costs (future pedestrian crossing signals, traffic signals, advanced warning)						
1	Tourism	5	5	4	20	2	8
1	Partnering with private industry						
	Policy Alignment						
1	Changes to road way direction or number of lanes	4	4	5	5	5	5
1	Changes to on street parking	4	4	5	5	5	5
1	Changes required to other policy	2	2	2	2	3	3

Weight of categories is expected to stay equivalent to each other (i.e. Environmental, Social, Ecnomic share the same importance in the decision making process) and but each criteria can range from 1-3 using a relative to a benchmark of:

1: is a criteria that should be evaluated but doesn't have serious impacts to how the network will function

2: is a criteria that is clearly important to user safety, access and impacts connectivity/effectiveness of the Network

3: is critical to user safety or financial sustainability of the Network and service level expectations

Critera should not be assess across categories e.g Economic criteria should not be compared to Social criteria specifically.