Highway 97 – Lake Country (Glenmore/Beaver Lake Road) Planning Study

FINAL REPORT

Prepared For:

The Ministry of Transportation & Infrastructure

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Highway 97 – Lake Country (Glenmore/Beaver Lake Road) Planning Study

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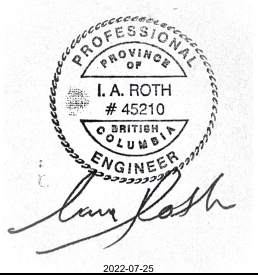

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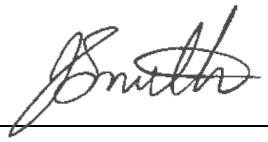

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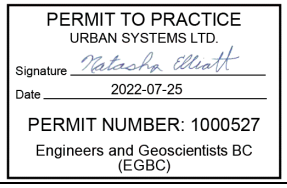

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EXECUTIVE SUMMARY

The BC Ministry of Transportation and Infrastructure (MoTI) retained Urban Systems Ltd. to undertake a Transportation Planning Study for the segment of Highway 97 between Duck Lake and Lodge Road through the District of Lake Country (Segment 1221 km 17.56 – 13.18). This study builds upon the work completed previously in the Central Okanagan Planning Study - Phase 1 (COPS), and supports broader integrated land use and transportation planning in the Central Okanagan region. Furthermore, this study has informed the regional transportation planning work underway through the Province's *Central Okanagan – Integrated Transportation System Strategy*.

While the Lake Country Planning Study builds upon the completed COPS planning work, it goes further to involve an integrated planning approach to better align transportation and land use planning within the study area. This study focused on generating sustainable infrastructure solutions to advance improvements to implementation for active transportation and transit in addition to goods movement and vehicles. Furthermore, existing community plans were studied including the District of Lake Country's Official Community Plan and Transportation for Tomorrow Plan to identify opportunities in the project to enhance the livability of the commercial and residential neighbourhoods that are situated along the study corridor. The study objectives were to:

- Identify an access strategy, intersection upgrades, access modifications and supporting frontage / municipal road requirements for future land development and diversification.
- Investigate options for the Glenmore / Beaver Lake Road intersection including a conceptual level evaluation of the feasibility of each option to explore a preferred solution.
- Verify the role and function guidelines developed through COPS for this segment of Highway 97.
- Determine short-, medium-, and long-term timeframes for improvements as part of an overall infrastructure strategy.
- Engage the Project Team, MoTI Business Groups, affected Local Governments and Indigenous Communities, affected stakeholders and community organizations, and the public to learn about and incorporate the input of diverse perspectives into the recommended options.

EXISTING CONDITIONS

Highway 97 is the Okanagan Valley's key north-south connector and plays a significant role in the provincial transportation network, connecting highways including the Trans-Canada Highway, Highway 3 (Crowsnest), and Highways 97A, 97B, and 97C to the US border. Highway 97 is a critical commercial vehicle route and provides access to the consumer and industrial centres integral to the region's economy. Highway 97 is also key to supporting tourism in the Okanagan Valley.

Through the study area, Highway 97 also functions as an urban commuter route to the Central Okanagan regional centres of Kelowna to the south and Vernon to the north. Highway 97 through Lake Country and many other communities also serves as a continuous link between neighbourhoods as part of the local road network where internal parallel connections are limited or do not exist.

As Highway 97 enters the study area from the north, it transitions from a high-speed rural section with agricultural and natural land uses and well-spaced intersections into a low-speed urban

condition with commercial, industrial and residential land uses and closely spaced intersections used by pedestrians and cyclists.

South of the Glenmore / Beaver Lake Road intersection, the highway transitions back to a rural cross-section with agriculture and residential land uses. A concrete median barrier begins at the location of the south study boundary.

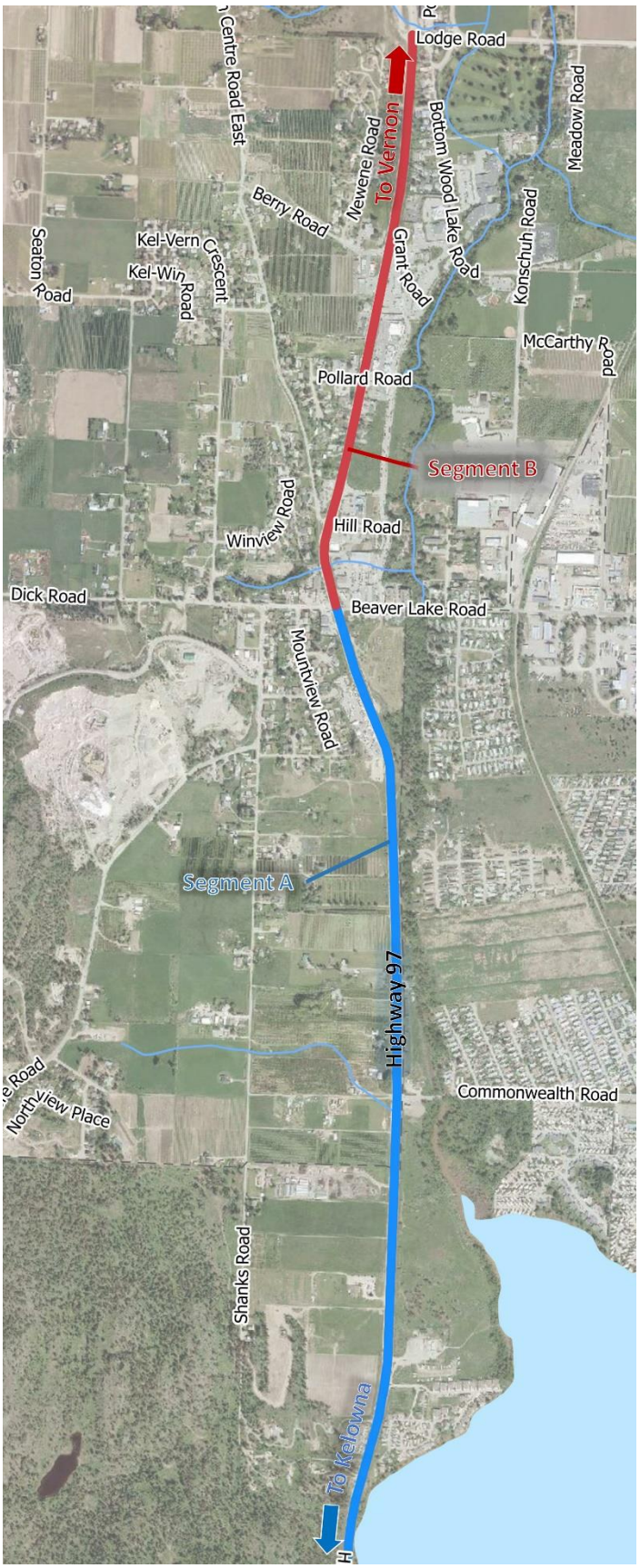
The study corridor was split into two segments (as shown at right) to focus on specific existing highway and land use characteristics in each area and to help define improvement options specific to the unique sections of the study area. The two segments meet approximately in the middle of the study area on the north side of the Glenmore / Beaver Lake Road intersection and are as follows:

Segment A: South study boundary at the Duck Lake Pullout up to and including the Glenmore / Beaver Lake Road intersection.

Segment B: North of Glenmore / Beaver Lake Road intersection to the north study boundary at Lodge Road.

The existing and future conditions along the corridor were investigated and assessed in terms of the following characteristics:

- Network Accesses and connections
- Land use
- Gender-Based Analysis Plus
- Multi-modal facilities
- Traffic characteristics and patterns
- Existing and future mobility performance
- Safety and reliability
- Environmental & archaeological
- Geometric, asset, and geotechnical conditions



The existing and future conditions assessment culminated with an overall study area problem definition statement, as follows:

> Highway 97 in Lake Country, including the Glenmore / Beaver Lake Road intersection, experiences above average collision rates and has limited pedestrian or cycling facilities. Further, side-street approaches have steep grades, intersections experience traffic congestion and highway movements conflict with several private driveways and accesses.

OPTION DEVELOPMENT

The Option Development phase of the study included defining the desired role and function of the highway, identifying a set of guiding principles to evaluate the concepts, and developing design criteria to guide the conceptual layouts of access concepts. The Highway 97 mainline, access points and local road connections were studied as one overall segment to ensure access spacing requirements are thoroughly considered, and to maintain a consistent corridor role and function.

HIGHWAY ROLE & FUNCTION

The COPS *Project Planning and Design Guidelines* recognizes that Highway 97 in this project's study area consists of urban and rural environments. Improvement solutions should focus on maintaining mobility and improving local road network connectivity to the highway. Direct access to the highway, such as private accesses and driveways, should be limited to support Lake Country's vision to create a multi-modal local road network of complete streets.

Based on the previous work undertaken in the COPS, the role and function of Highway 97 within Segment A (from the south study boundary at the Duck Lake Pullout up to and including the Glenmore / Beaver Lake Road intersection) was identified to fit a Rural Arterial Divided highway standard. The COPS identified the role and function of Segment B on Highway 97 (from north of the Glenmore / Beaver Lake Road intersection to the north study boundary at Lodge Road) to fit an Urban Expressway Divided highway standard.

GUIDING PRINCIPLES

Guiding principles were identified to initially evaluate each option and determine which option(s) should be studied further in the Multiple Account Evaluation (MAE). The guiding principles are also used to ensure each option addresses the identified problems and supports the values and integrated infrastructure outcomes of the project.

1. **Develop the highway to align with the desired role and function for Highway 97**
2. **Integrate the highway with the vision for a better local community**
3. **Support economic development and land use plans**
4. **Consider a diverse range of transportation modes and users in the highway design**
5. **Develop solutions that are feasible given the identified constraints**

DESIGN CRITERIA

Two sets of design criteria were identified, one for each Highway 97 Segment, which are based on the following existing guidelines:

- *TAC Geometric Design Guide for Canadian Roads* (2017 Ed., TAC Guide)
- MoTI *Supplement to TAC Geometric Design Guide for Canadian Roads*
- *COPS Project Planning and Design Guidelines*.

It is important to note that the design criteria used in the development and evaluation of options may not always be achievable due to other project constraints and limitations, but is intended to provide specific direction and vision in the design development process. Road grades, access and interchange spacing, and local road design criteria were also established with reference to the above documents as well as the District of Lake Country's Subdivision and Development Servicing Bylaw 98.

OPTION GENERATION

The concept generation for the study area of Highway 97 through Lake Country was completed in stages to determine potential access and network solutions. First, feasible highway crossing opportunities were identified within the study area for at-grade and grade-separated locations. Additional network improvements were considered in the option development process including other highway accesses, backage and frontage roads, active transportation facilities, and local road connections to homes, businesses and community activity areas.

Local stakeholder feedback was collected and used to refine the improvement options. The final iteration of potential improvement options for each segment of the study area resulted in three options for Segment A and one for Segment B. These options consist of long-term improvements that accommodate forecasted traffic demands to the 25-year horizon and achieve the project objectives and guiding principles. Additionally, corresponding interim phase options were developed (where feasible) that could be staged with the long-term horizon options.

The four refined improvement options were further evaluated using a Multiple Account Evaluation framework, and are listed below:

- Option A-1: Glenmore Rd to Commonwealth Rd
- Option A-2: Glenmore Rd to Jim Bailey Rd (North Alignment)
- Option A-3: Glenmore Rd to Main Street
- Option B-1: Winfield Town Centre

MAE SUMMARY & KEY FINDINGS

The improvement options for the Highway 97 Lake Country study area were evaluated considering both the technical assessment through the multiple account evaluation (MAE) and community engagement, as discussed below.

Segment A

All proposed transportation network options for Segment A provide safety, mobility and environmental (GHG reduction) benefits and all are considered viable options at this time. These options also enhance network connectivity and present an opportunity to improve the active

transportation network and frequent transit facilities. All options have high construction and property costs; however, the benefits of each option are expected to outweigh the costs.

Each option impacts properties, businesses, and ALR land in some capacity and has other differing considerations, which are summarized below:

- Option A-1 does not negatively impact residential properties or businesses. However, the proposed design does impact ALR land west of Highway 97 and may lead to increased traffic noise with additional commercial vehicle traffic on Commonwealth Road and the adjacent neighbourhood.
- Option A-2 impacts residential properties, business, and ALR lands, and has environmental risks given the proximity to Vernon Creek and the requirement of an additional creek crossing.
- Option A-3 provides a direct connection between Highway 97 and the Winfield Town Centre via Main Street. However, the proposed design impacts residential properties, businesses, and ALR lands, and poses environmental risks given the proximity to Vernon Creek.

The community engagement feedback and public opinion identified specific items for consideration and concerns related to each option in Segment A, including, but not limited to, network connectivity, land impacts, and community atmosphere and vision.

Segment B

For Segment B of the study area, Option B-1 has been identified as an improvement opportunity to improve safety and mobility on Highway 97 through Lake Country. The long-term concept for Option B-1 enhances highway mobility and local road network connectivity within Lake Country with grade-separated infrastructure, and facilitates safe and smooth access for pedestrians, cyclists, transit vehicles and regular vehicle traffic across Highway 97. However, the long-term infrastructure phase, if pursued, would have a negative impact on some residential and business properties, and ALR lands. Thus, a short to medium-term infrastructure solution was developed that poses minimal impacts to adjacent land uses and maintains infrastructure at-grade.

Community engagement feedback noted support for the short to medium-term improvements in Option B-1 for improved safety, local road network connections, and enhanced connectivity and active transportation accommodations. Some concerns were also raised by the community regarding the long-term improvements in Option B-1, which included increased speeds along Highway 97 and increased traffic demand near Lodge Road. The community also stressed the desire to maintain the local and urban community environment through the Winfield town centre.

CURRENT STATUS & NEXT STEPS

In February 2022, the Okanagan Indian Band, District of Lake Country, and City of Kelowna signed a memorandum of understanding to see several infrastructure projects completed in the Lake Country area. This includes opening Commonwealth Road to Jim Bailey Road, which is identified as an interim step to Option A-1. The MoTI will continue to engage with these three jurisdictions to implement both interim and long-term improvements in the study area. However, there is no funding currently committed for further design or construction for these projects and all those identified in this plan.

In addition, the MoTI will Incorporate the findings from this Highway 97 Lake Country Planning Study into the *Central Okanagan - Integrated Transportation Strategy* (CO-ITS).

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1.0 INTRODUCTION

The BC Ministry of Transportation and Infrastructure (MoTI) retained Urban Systems Ltd. to undertake a Transportation Planning Study for the segment of Highway 97 between Duck Lake and Lodge Road through the District of Lake Country (Segment 1221 km 17.56 – 13.18). This study builds upon the work completed previously in the Central Okanagan Planning Study - Phase 1 (COPS), and supports broader integrated land use and transportation planning in the Central Okanagan region. Furthermore, this study has informed the regional transportation planning work underway through the Province's *Central Okanagan – Integrated Transportation System Strategy*.

While the Lake Country Planning Study builds upon the completed COPS planning work, it goes further to involve an integrated planning approach to better align transportation and land use planning within the study area. This study focused on generating sustainable infrastructure solutions to advance improvements to implementation for active transportation and transit in addition to goods movement and vehicles. Furthermore, existing community plans were studied including the District of Lake Country's Official Community Plan and Transportation for Tomorrow Plan to identify opportunities in the project to enhance the livability of the commercial and residential neighbourhoods that are situated along the study corridor. The study objectives were to:

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- Engage the Project Team, MoTI Business Groups, affected Local Governments and Indigenous Communities, affected stakeholders and community organizations, and the public to learn about and incorporate the input of diverse perspectives into the recommended options.

This report documents the Highway 97 Lake Country Planning Study including assessment of existing and future transportation conditions, development of guiding principles and improvement options, option screening, and a Multiple Account Evaluation (MAE) of the short-listed options. This report also summarizes the study outcomes and recommendations, and the community engagement undertaken over the course of the study.

1.1 INTEGRATED PLANNING APPROACH

This study involved an integrated planning approach to better align transportation and land use planning along Highway 97. The provincial *Integrated Transportation Development Strategy* aligns transportation and land use planning for smart and coordinated growth. This is a modern, collaborative approach to planning that supports B.C.'s goals around shaping development patterns; achieving climate change objectives; strengthening community affordability, health and resiliency; improving transportation networks; and driving economic growth and innovation.

Decisions about transportation investments and land-use have implications on the establishment of livable communities including cost of living, local congestion and greenhouse gas emissions, sprawl and density, and access to jobs and services, as well as for the efficient movement of goods.

As a result, this study was developed to support and integrate with other land use and transportation planning in the Central Okanagan region including the District of Lake Country's Official Community Plan and Transportation for Tomorrow Plan.

1.2 CONTEXT

Highway 97 is the Okanagan Valley's key north-south connector and plays a significant role in the provincial transportation network, connecting highways including the Trans-Canada Highway, Highway 3 (Crowsnest), and Highways 97A, 97B, and 97C to the US border. Highway 97 is a critical commercial vehicle route and provides access to the consumer and industrial centres integral to the region's economy. Highway 97 is also key to supporting tourism in the Okanagan Valley.

Through the study area, Highway 97 also functions as an urban commuter route to the Central Okanagan regional centres of Kelowna to the south and Vernon to the north. Communities in the surrounding region are listed below in **Table 1.1** with their corresponding populations (Census 2016). Highway 97 through Lake Country and many other communities may also serve as a continuous link between neighbourhoods as part of the local road network where internal parallel connections are deficient or do not exist.

Table 1.1: Adjacent Community Population Summary

Community	Population (2016)	% Annual Change (2016-2011)
Central Okanagan Region	194,882	1.7
Lake Country	12,922	2.1
Kelowna	127,380	1.7
Vernon	40,116	1.0

1.3 PREVIOUS STUDIES

Previously completed studies and reports relevant to this study were reviewed to provide additional context and support the existing conditions assessment and problem definition. All previous work in and near the Lake Country study area were considered in future phases of this project, specifically in the option development and evaluation phases. The relevant studies are summarized below.

1.3.1 Lake Country Transportation Planning Update Phase 1 – OCP Update (WATT Consulting Group, April 2018)

As part of the Lake Country Official Community Plan (OCP) update, the District of Lake Country updated Section 8 (Transportation) which included the road classifications and network strategy. The report identified the need to have multiple east-west connections across Highway 97 with the logical areas being near Beaver Lake Road, Hill Road, Lodge Road / Pretty Road, Berry Road, and Oceola Road / Woodsdale Road. The recommended road network strategy addresses challenges by identifying additional elements and consideration for future study, including potential grade-separated crossings.

1.3.2 Official Community Plan 2018-2038 (District of Lake Country, 2018)

The District of Lake Country's Official Community Plan (OCP) identified guiding principles that helped form key goals and objectives for the community. The OCP goals, objectives, and policies related to transportation on Highway 97 and in the community are as follows:

- Reduce green house gas (GHG) emissions and be a leader in sustainable municipal practices.
- Safe and convenient pedestrian and bicycle connections should be made from the highway and local streets to amenity areas such as parks and trails.
- Create a multi-modal transportation network to provide a range of transportation options and provide a safe and efficient transportation network.
- Change Highway 97 crossings from a barrier to pedestrian and bicycle trips by improving facilities to/from highway crossings and coordinating with the Provincial Government to enhance accessibility and safety of crossings.
- Improve traffic flow and safety along the Highway 97 corridor and at highway crossing locations.
- Work with the Provincial Government to alleviate congestion of Glenmore Road.
- Enhance the aesthetic quality of the Highway 97 corridor.

1.3.3 Central Okanagan Planning Study Phase 1 – Current and Future Corridor Conditions (Parsons, June 2015 and December 2016)

The BC Ministry of Transportation and Infrastructure (BC MoTI) initiated the Central Okanagan Planning Study (COPS) as the first phase of the Okanagan Lake Second Crossing Project. The COPS is an evaluation of long-term transportation corridor requirements for Highway 97 through the Central Okanagan to ultimately define short-term and long-term highway infrastructure improvements through the study area (Highway 97 from College Way / Clerke Road to Greata Ranch Winery). The problem statement for the Lake Country area identified safety concerns, highlighting Lake Country's rural context with high speeds and complex geometry contributing to collision risk and severity. Congestion on Highway 97 is limited to the Beaver Lake Road intersection near the Town Centre.

1.3.4 District of Lake Country – Transportation for Tomorrow (Strategic Infrastructure Management Inc., December 2014)

The goal of the Transportation for Tomorrow report is to support and plan for "the implementation and sustainability of the District's transportation vision, with a focus on roadway infrastructure and its importance for vehicles, cyclists, and pedestrians." The initiative developed nine roadway cross-sections for the district to maintain consistent and affordable transportation design. Many roadway infrastructure improvements are identified and included in a three-phase timing and implementation plan for 1-5 years, 6-10 years, and 11-20 years. Public outreach and engagement were also included in this initiative and helped produce key recommendations which supported the District in financing, prioritizing, and implementing infrastructure renewals and improvements.

1.3.5 Okanagan Valley Transportation Symposium (MoTI, December 2011)

The objective of the Okanagan Valley Transportation Symposium (OVTS) was to develop a shared vision for transportation between First Nations and local governments in the Okanagan Valley, and highlight and better understand key transportation issues and priorities in the Okanagan Valley. The result of the OVTS identified a long-range vision for the Okanagan Valley transportation system. District of Lake Country Transportation Plan – Phase 2: Updated Transportation Plan (CTS Ltd., March 2007)

Phase 2 of the District of Lake Country's Transportation Plan consisted of planning the District's street network to accommodate projected populations and traffic demand. The transportation plan modifications were developed based on technical work and public input and included various road network connections and modifications. Specifically, realignment of Beaver Lake Road and Glenmore Road with Highway 97. Final recommendations emphasize that the District of Lake Country develop and improve multi-modal transportation choices within the District.

1.3.6 MoTI Lake Country Access Management Benefit-Cost Assessment (Urban Systems Ltd., July 2006)

The benefit-cost assessment completed by Urban Systems in 2006 built off the plans developed in the 2003 access management plan by Earth Tech in 2003. This option, with some minor modifications, was also recommended in the District of Lake Country's Transportation Plan prepared in 2005. Discussions between MoTI and the District of Lake Country resulted in defining a reduced scope of improvements that was recommended for short-term implementation including a new Main Street connection between Beaver Lake Road and Berry Road, east of Highway 97. This design was constructed and is in service today.

1.3.7 Highway 97 – Lake Country Town Centre Draft Access Management Plan Functional Design (Earth Tech (Canada) Inc., May 2003)

This assignment focused on developing a functional level highway and road design, including cost estimates, multiple accounts evaluation, and phasing strategy to meet the future needs of the community. Based on analysis and technical considerations, three options were developed, one of which was further evaluated in the *MoTI Lake Country Access Management Benefit-Cost Assessment (Urban Systems Ltd., July 2006)*.

2.0 EXISTING AND FUTURE CONDITIONS

The existing and future conditions along the corridor were investigated and assessed. This section of the report summarizes the key findings from the existing and future conditions assessment while the complete analysis is provided in **Appendix A.**

2.1 NETWORK DESCRIPTION

As Highway 97 enters the study area from the north, it transitions from a high-speed rural section with agricultural and natural land uses and well-spaced intersections into a low-speed urban condition with commercial, industrial and residential land uses and closely spaced intersections. South of the Glenmore / Beaver Lake Road intersection, the highway transitions back to a rural cross-section with agriculture and residential land uses. A centre median barrier begins at the location of the south study boundary.

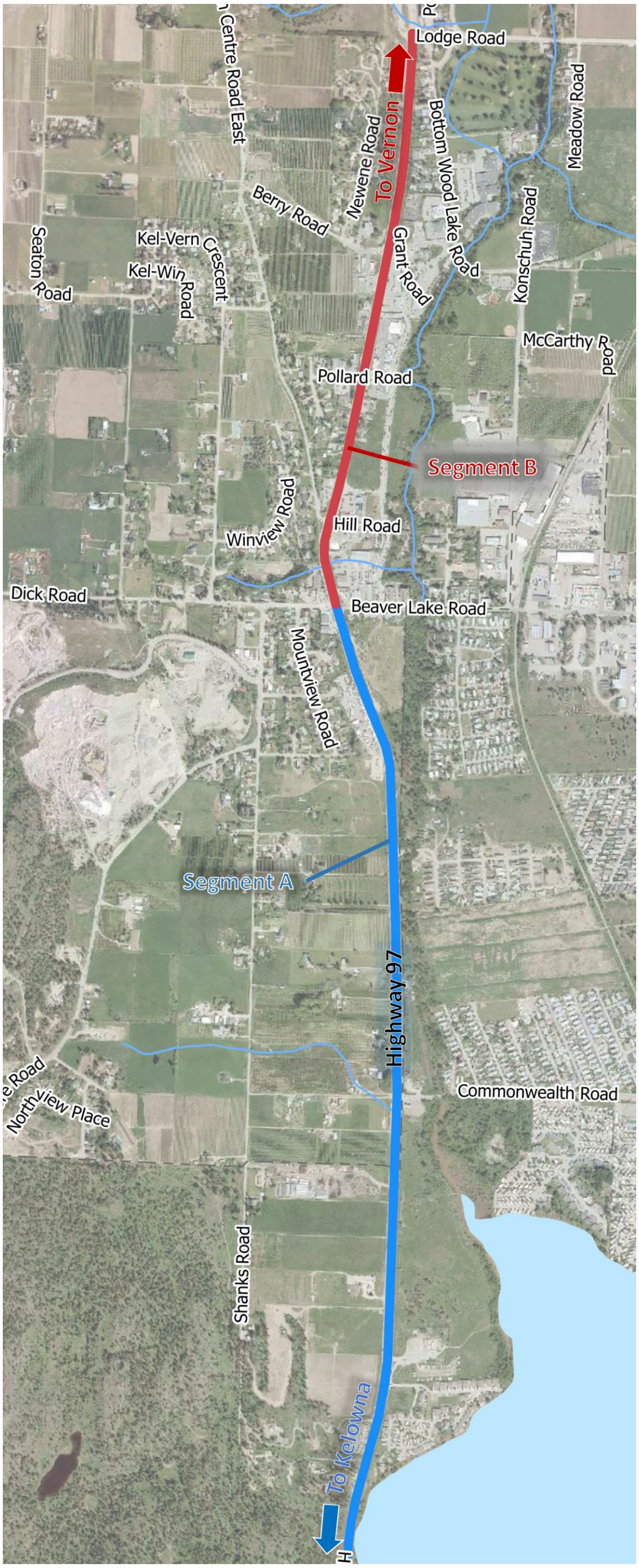
The study corridor was split into two segments to focus on specific existing highway and land use characteristics in each area and to help define improvement options specific to the unique sections of the study area. The two segments meet approximately in the middle of the study area on the north side of the Glenmore / Beaver Lake Road intersection and are as follows:

Segment A: South study boundary at the Duck Lake Pullout up to and including the Glenmore / Beaver Lake Road intersection.

Segment B: North of Glenmore / Beaver Lake Road intersection to the north study boundary at Lodge Road.

The entire study area, and the two defined segments, are illustrated on the following page in **Figure 2.1**.

Figure 2.1: Highway 97 Lake Country Study Area



2.2 NETWORK ACCESSES & CONNECTIONS

Over this 4.4 km segment, a total of 47 driveways (private and business driveways) and 10 local road intersections directly access Highway 97, as summarized below in **Table 2.1**. Most of the driveways are on the west side of Highway 97 (72% of the total 47 driveways).

Table 2.1: Highway 97 Lake Country Access Summary

	Side of Highway 97			
	Both	East Only	West Only	**Total**
Business	0	5	9	14
Private Access	0	8	25	33
Intersection	4	5	1	10
Total	**4**	**18**	**35**	**57**

The key local road intersections on Highway 97 within the study area are listed below in **Table 2.2** from south to north. Commonwealth Road and Glenmore / Beaver Lake Road are spaced approximately 1,440 km apart. In Segment B, intersection spacing ranges from 120 m between Hill Road and Winfield Road to 590 m between Berry Road and Lodge Road.

Table 2.2: Highway 97 - Major Network Connections

LKI Segment 1221 (km)	Intersection		Traffic Control
14.5	Commonwealth Road	3-Leg[1]	Signalized
15.9	Glenmore / Beaver Lake Road	4-Leg	Signalized
16.2	Okanagan Centre Road E / Hill Road	3-Leg	Stop-controlled
16.3	Winfield Road	3-Leg	Stop-controlled
16.6	Pollard Road	4-Leg	Signalized
17.0	Berry Road	4-Leg	Signalized
17.6	Lodge Road	3-Leg	Stop-controlled

Currently, MoTI only permits new accesses on Segment A of Highway 97 as right-in right-out configuration. All existing accesses on the highway in Segment A that are not right-in right-out have permits that have expired, likely due to ownership changes.

2.3 EXISTING LAND USE

The District of Lake Country's Official Community Plan (OCP) was reviewed to understand land uses and anticipated developments along the highway study segments. The lands to the east of the highway between the southern boundary of the District and the Voyager RV Centre (just south of Glenmore / Beaver Lake Road) are within Okanagan Indian Band Reserve #7 (Duck Lake IR#7). The remainder of the study area is within the District of Lake Country's municipal boundaries.

[1] *A driveway to the west of Highway 97 creates an undesignated fourth leg at Commonwealth Road.*

This section summarizes the land use conditions along study segments with further details in **Appendix A.**

Segment A (South) – Duck Lake Pullout to Glenmore / Beaver Lake Rd

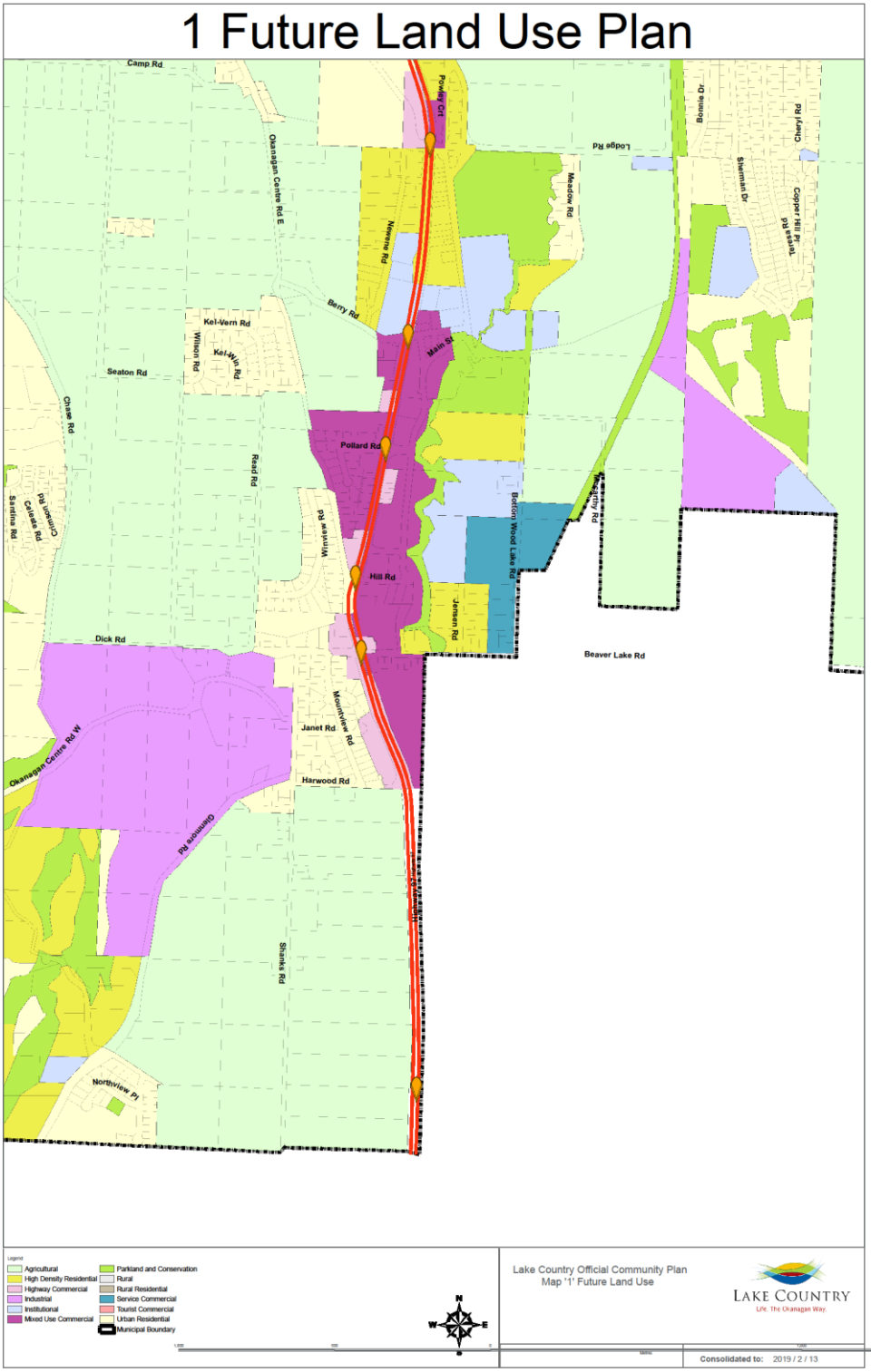
Through Segment A, Highway 97 is flanked by land parcels designated in the OCP as Commercial, Mixed Use Commercial, and Agricultural. Lands designated as Commercial are situated on the west side of the highway closer to the Glenmore / Beaver Lake Road intersection. South of these commercial lands on the west side of the highway is Agricultural-designated land that is also within the Agricultural Land Reserve (ALR). Eight parcels immediately south of Beaver Lake Road (on the east side of Highway 97) adjacent to the highway are designated as Mixed-Use Commercial.

Segment B (North) – Glenmore / Beaver Lake Rd Intersection to Lodge Rd

Segment B land use adjacent to Highway 97 is a mixture of commercial, residential, and institutional land uses. Between Berry Road and Lodge Road, most of this land has an OCP designation of High-Density Residential. Parcels situated closer to Berry Road on both sides of Highway 97 have an OCP designation of Institutional. A few parcels at the corner of Bottom Wood Lake Road and Highway 97 on the west side are currently used for low density residential purposes but are designated as Mixed-Use Commercial. The parcels located within the rest of this segment are designated as Mixed-Use Commercial and Highway Commercial.

The area between Beaver Lake Road and Berry Road to the east of the highway is classified as Lake Country's Town Centre. Further east of the highway and north of Beaver Lake Road between Bottom Wood Lake Road and McCarthy Road, several parcels are within the City of Kelowna boundary.

Figure 2.2: Highway 97 Lake Country - Future Land Use Plan



2.4 GENDER-BASED ANALYSIS PLUS

Gender-based analysis (GBA+) was also completed as part of the existing conditions assessment to ensure all gender and diversity issues are identified, considered, and addressed throughout the study. Detailed findings from the GBA+ are included in **Appendix A**.

2.5 MULTI-MODAL REVIEW

The District of Lake Country has been making strides in improving their active transportation network, as outlined in the District of Lake Country Official Community Plan (2018). The District has highlighted the importance of safe and efficient networks and reducing the greenhouse gas emissions by providing a broader range of transportation options.

The nearby Rail Trail was constructed in 2017 and is a key active transportation facility within the region. The Rail Trail aims to provide a connection between Kelowna and Vernon; However, the section of the Rail Trail through the Duck Lake IR#7 is yet to be formalized and completed. This facility acts as an important commuter route for residents and a recreational trail for locals and tourists.

A review of existing pedestrian, bicycle and transit facilities along the highway segments is summarized below with further details in **Appendix A.**

Pedestrian

No concrete sidewalks are provided on Highway 97 from the southern study area boundary until the approaches to the Glenmore / Beaver Lake Road intersection. Sidewalks are provided on both sides of Highway 97 from Glenmore / Beaver Lake Road to Berry Road, and on the west side between Berry Road and Lodge Road (the northern study boundary). No sidewalks are provided north of the study area.

In general, pedestrian facilities along the highway are in good condition; however, some of the crosswalk lines have faded and need repainting. The COPS identified that pedestrian facilities through the study area generally do not meet desired performance criteria, due to the sidewalks being directly adjacent to the highway and narrow in some areas.

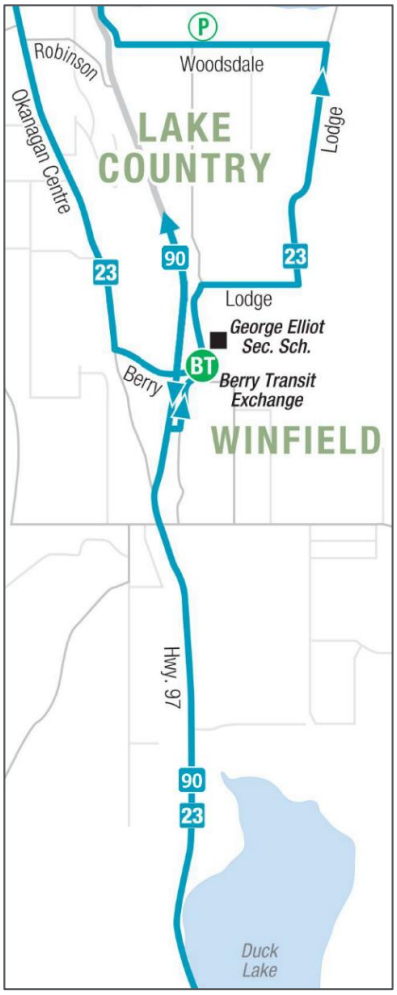
Bicycle

No bike lanes are provided along Highway 97. Cyclists may ride along the narrow shoulders; however, they are not consistently wide enough, nor do they meet minimum design requirements to accommodate cyclists. These findings are consistent with COPS existing condition assessment. The alternative north-south bicycle route is provided via bicycle lanes on Bottom Lake Road and Main Street, which run parallel to and east of the highway.

Transit

BC Transit operates two routes on the Highway 97 corridor from Kelowna to Vernon: Route 23 and Route 90, as illustrated on the right in **Figure 2.3.**

Figure 2.3: Highway 97 - Lake Country Transit Routes



BC Transit has outlined five transit priorities for the District of Lake Country in the *Central Okanagan Transit Future Plan* (2012):

1. Increase service between Lake Country and Kelowna by improving connections and frequency. The Highway 97 RapidBus system should be timed to minimize transfer times to improve the connection between the two municipalities.
2. Create multi-modal transportation system by introducing a Park & Ride in Lake Country's Town Centre. This will enable more residents to access the transit system.
3. Reconfiguring the bus stops along Route 90 but to continue to provide Oyama Resident services by either:
    - Operating local service between Oyama and Lake Country Town Centre and exchange
    - Operating local service between Oyama and the nearest and safest stop on the highway connecting to Route 90 North Okanagan Connector
    - Providing a Park & Ride to enable Oyama residents an option to connect into the system
4. Strengthen connections between Kelowna and Vernon through Route 90 North Okanagan Connector.
5. Providing transit to areas with lower densities such as the Lakes Neighbourhood. This can be difficult without decreasing efficiency but may be a priority to provide access to these areas.

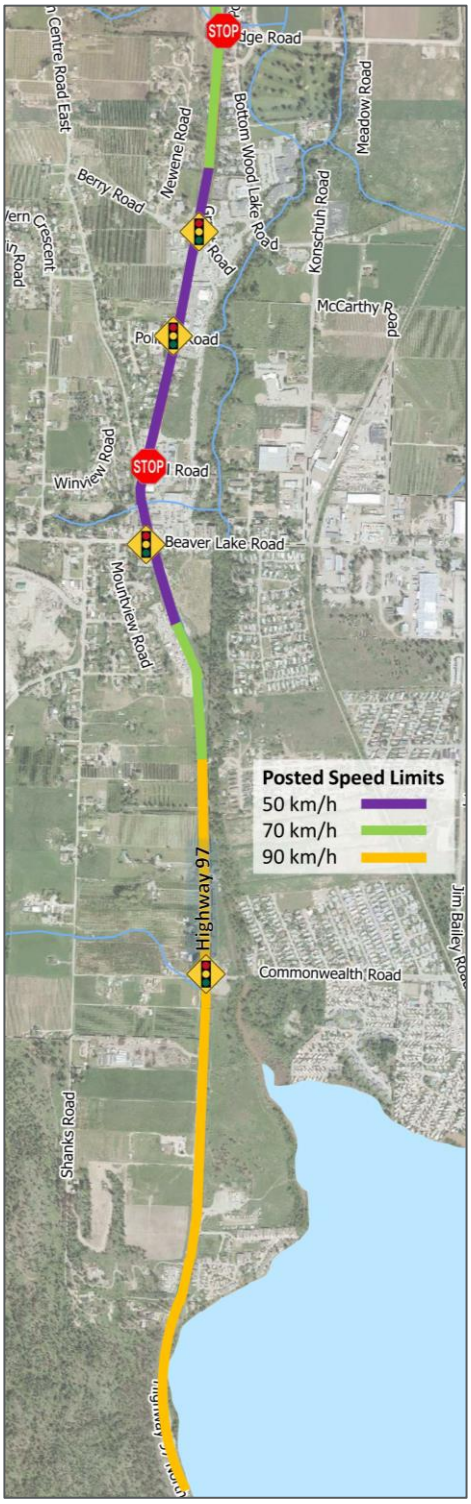
Building off the *Central Okanagan Transit Future Plan* (2012), BC Transit prepared the *Transit Future Action Plan* (2018) which provided an update on transit service and infrastructure recommendations for the entire region.

2.6 TRAFFIC CHARACTERISTICS

Traffic data and was obtained and analyzed to better understand the existing traffic characteristics in the study area. The current transportation conditions in terms of traffic patterns and composition are described below.

The current posted speed limit on Highway 97 within the study area is illustrated on the right in **Figure 2.4**. At the south end of the study area, Highway 97 has a posted speed limit of 90 km/h which transitions to 70 km/h north of Commonwealth Road, and then 50 km/h south of the Glenmore / Beaver Lake Road intersection. The highway maintains 50 km/h through the urban Towne Centre before transitioning back to 70 km/h north of Berry Road, and then 90 km/h north of Lodge Road (the north study area boundary).

Figure 2.4: Highway 97 - Posted Speed Limits



2.6.1 Traffic Data

The MoTI has a permanent count station located just north of the study area on Highway 97 (P-25-2NS), which collected data beginning in 2017. MoTI also has a temporary counts station located just north of Lodge Road (25-032NS) that collected traffic data in August 2016 and 2012.

As part of this study, turning movement counts[2] (TMC) were collected on January 30, 2019 at the five key intersections within the study area. The TMCs captured the AM, Mid-Day and PM peak hour periods, for a total of eight hours of data. Additional traffic count data was obtained in the form of traffic signal volume downloads from January 2019 and September 2018, which were used to verify the TMC data for accuracy and seasonal variations. The available TMC traffic data for each intersection within the study area is summarized below in **Table 2.3.**

[2] *MioVision Scout cameras were used to collect data at four of the study intersections and the fifth intersection was counted manually.*

Table 2.3: Available Traffic Data

Intersection	TMC	Signal Volume Download
Commonwealth Road	✓	✓
Glenmore / Beaver Lake Road	✓	✓
Okanagan Centre Road E		
Winfield Road		
Pollard Road	✓	✓
Berry Road	✓	✓
Lodge Road	✓	

2.6.2 Annual Average Daily Traffic

Annual average daily traffic (AADT) and summer average daily traffic (SADT) volumes were derived from the TMC data. The total eight hours of TMC data was factored up to represent total daily traffic (24-hours) using a factor calculated using the signal volume downloads by comparing the same TMC hours and 24-hours on the same day. The resulting 24-hour volumes were then factored to represent AADT and SADT volumes using MoTI provincial average seasonal factors for 2018. Based on MoTI traffic count stations in the area and corridor traffic characteristics, traffic patterns are classified as seasonally consistent giving AADT and SADT factors of 1.128 and 1.214, respectively.

The estimated AADT and SADT on Highway 97 and the five study intersecting roads are illustrated below on **Figure 2.5** and **Figure 2.6**. The key findings from the review of traffic volumes are described as follows:

- AADT and SADT volumes along Highway 97 within the study area are highest north of the Glenmore / Beaver Lake Road intersection with about 35,800 vehicles per day (vpd) and 38,600 vpd, respectively.
- The key side-streets in the study area exhibit higher traffic demand to the east of Highway 97, which is expected as more development exists east of Highway 97 through Lake Country.
- Of the side-street traffic demand, the west leg of the Glenmore / Beaver Lake Road exhibits the highest traffic volumes with an estimated AADT and SADT of approximately 11,300 vpd and 12,200 vpd, respectively.
- The east leg of the Glenmore / Beaver Lake Road intersection also exhibits relatively high traffic demand with an estimated AADT and SADT of approximately 9,100 vpd and 9,800 vpd, respectively.

Figure 2.5: Highway 97 Estimated AADT & SADT (2019)

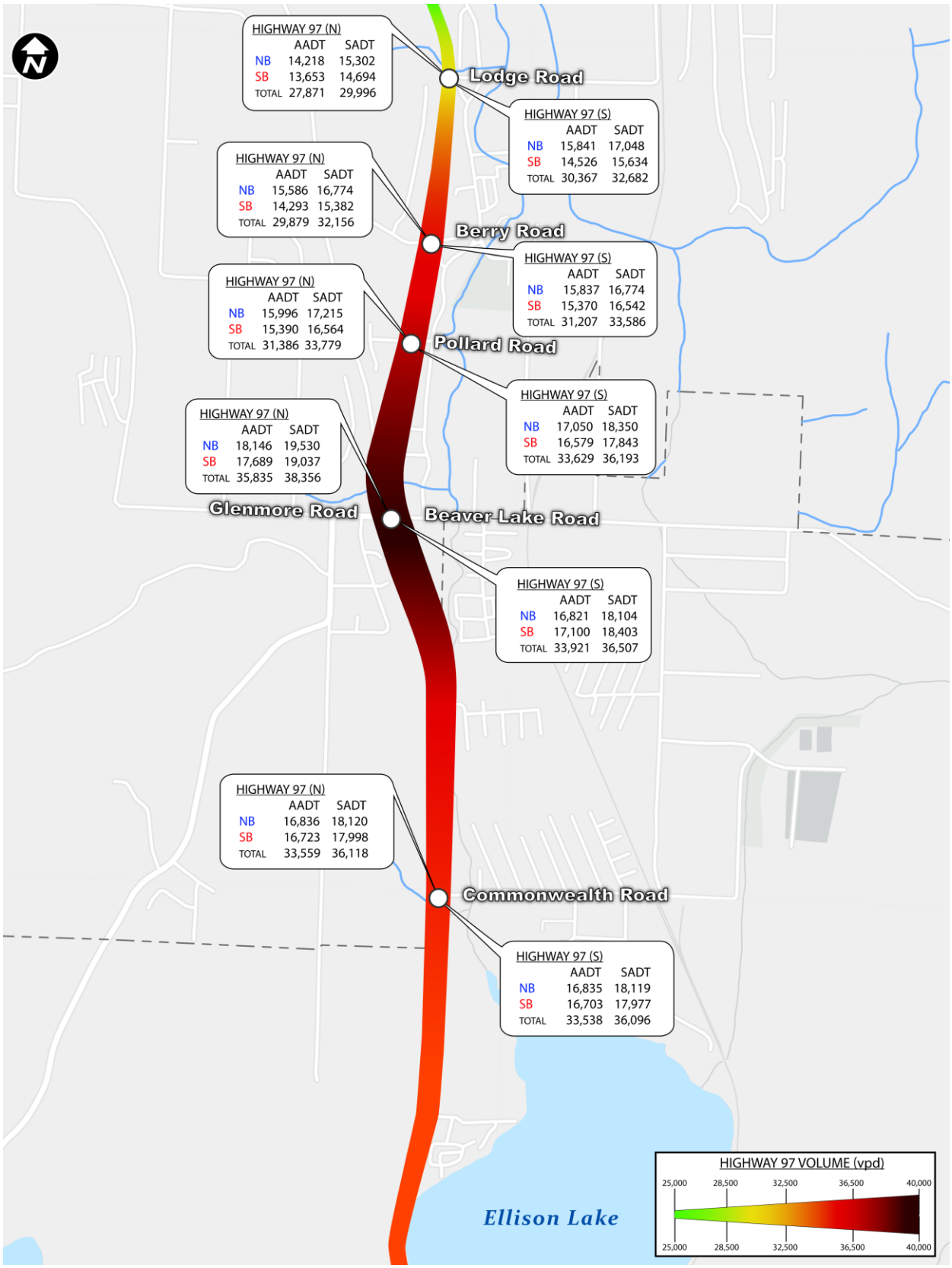
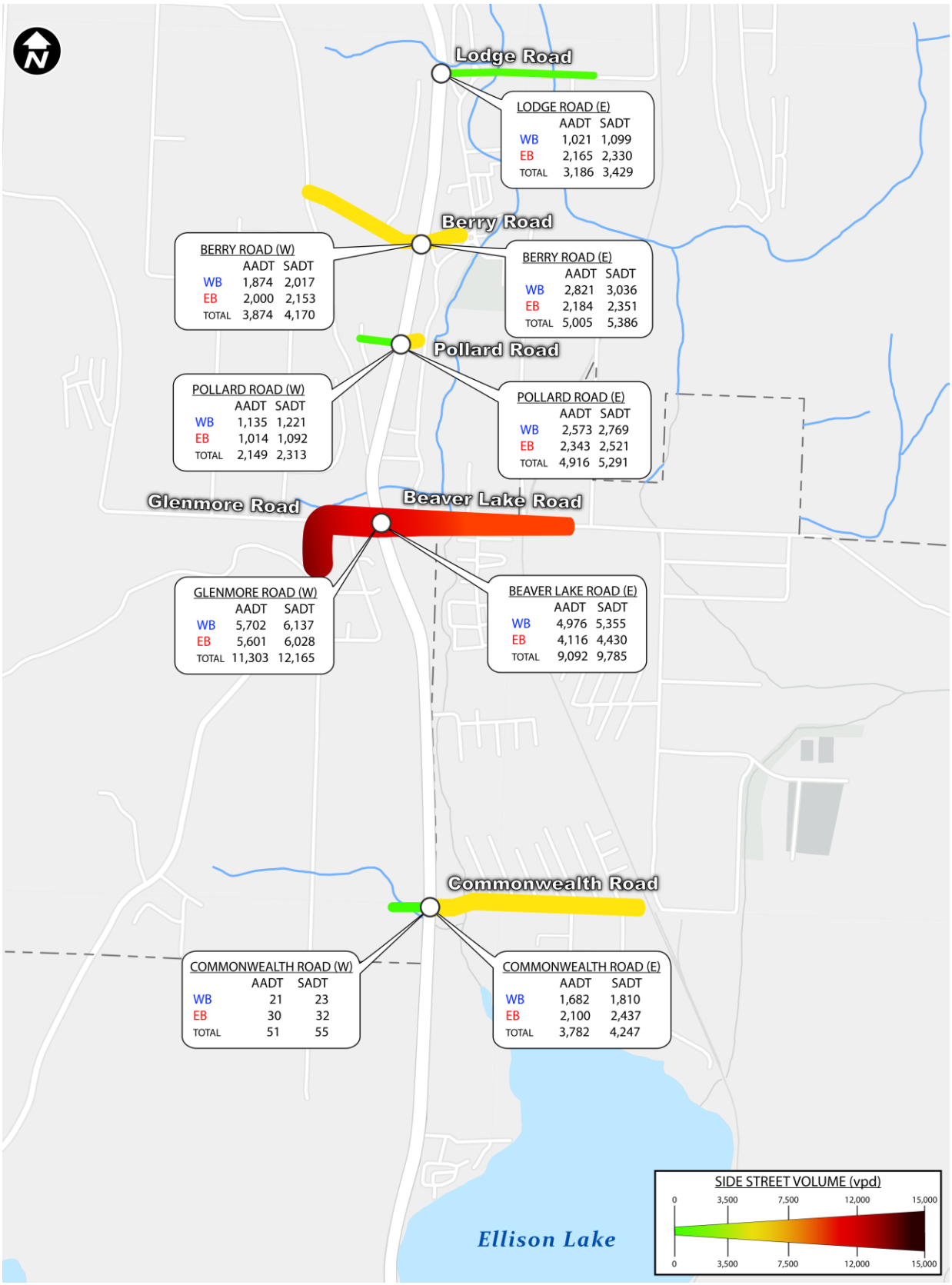


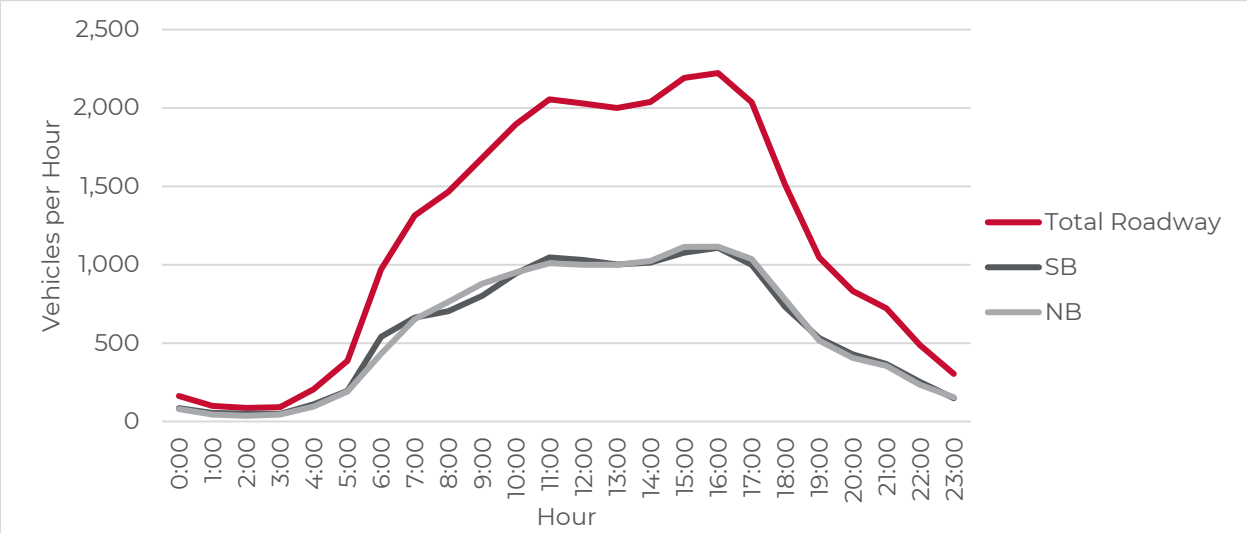
Figure 2.6: Side-Street AADT & SADT (2019)



2.6.3 Highway Traffic Profile

The traffic profile on Highway 97 north of the study area is illustrated below in **Figure 2.7**, showing a typical regional traffic demand trend with an overall midday peak; However, commuter type trip patterns are also apparent with smaller but distinct spikes in the AM and PM. The daily peak occurs at approximately 3:00 – 4:00 PM, with a total of 2,200 vehicles per hour. Directionally, traffic patterns exhibit an even split, with the peak hour reaching 1,100 vehicles per hour, per direction.

Figure 2.7: Highway 97 Daily Traffic Profile - August 2018 (P-25-2NS)



2.6.4 Peak Hour Traffic Volumes

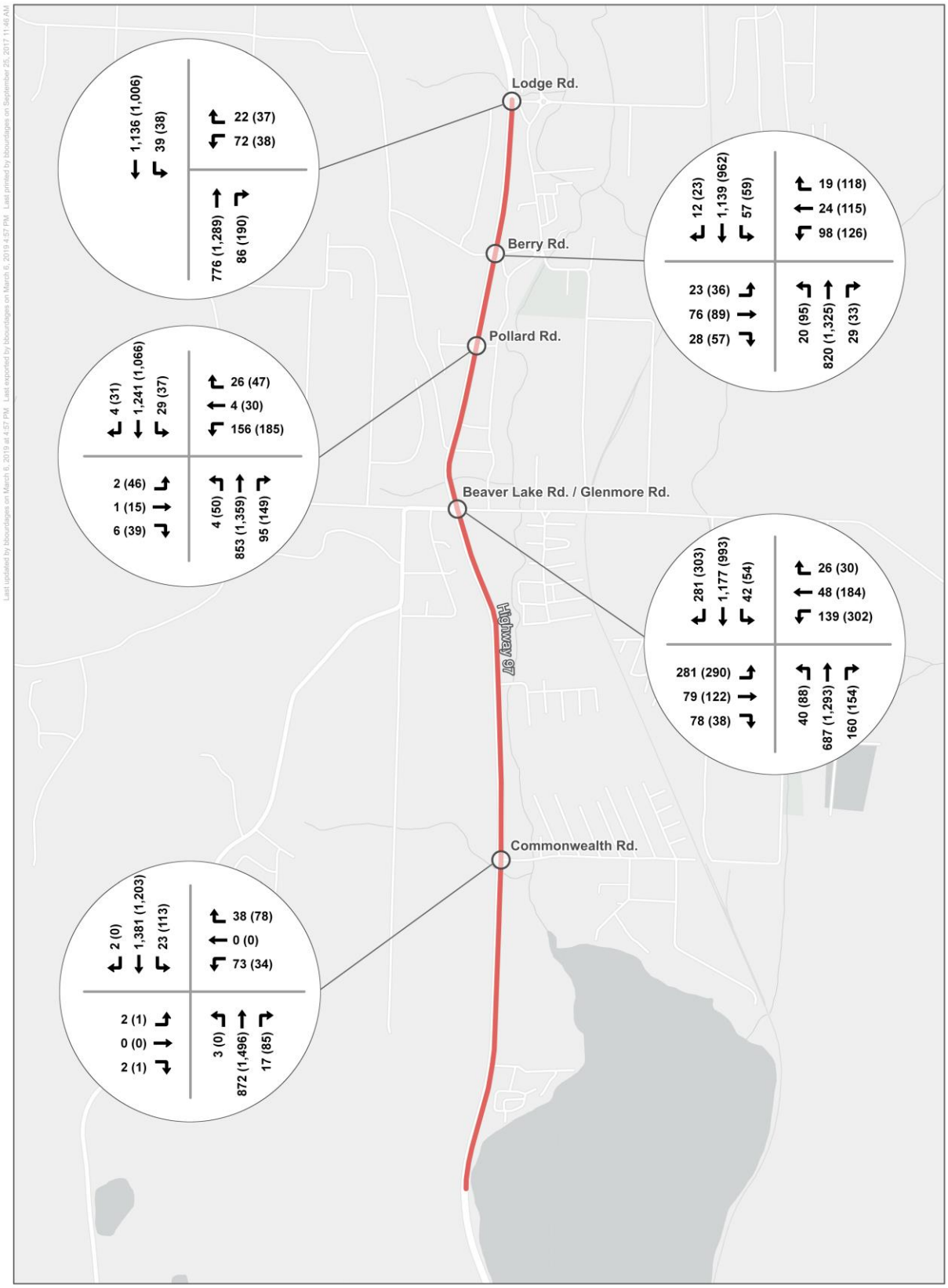
Based on the TMCs collected for this study in January 2019, peak hours of the day were found to be as follows:

- AM Peak: 7:15 AM - 8:15 AM
- Mid-Day Peak: 12:00 PM – 1:00 PM
- PM Peak: 3:30 PM – 4:30 PM

The peak hours occur at the same hour for each intersection except for Pollard Road during the PM peak (3:45 PM – 4:45 PM)[3]. The original peak hour volumes from the TMC data are shown below in **Figure 2.8**. It is noted that through volumes on Highway 97 at Lodge Road were not recorded during the manual traffic count. The highway through volumes at Lodge Road were assumed to be consistent with the volumes leaving (northbound) and arriving at (southbound) the adjacent intersection at Berry Road as no significant accesses exist between the two intersections.

[3] *For consistency, the traffic volumes between 3:30 – 4:30 PM at Pollard Road were assumed as the PM peak volumes in the mobility analysis and as shown on Figure 3.4.*

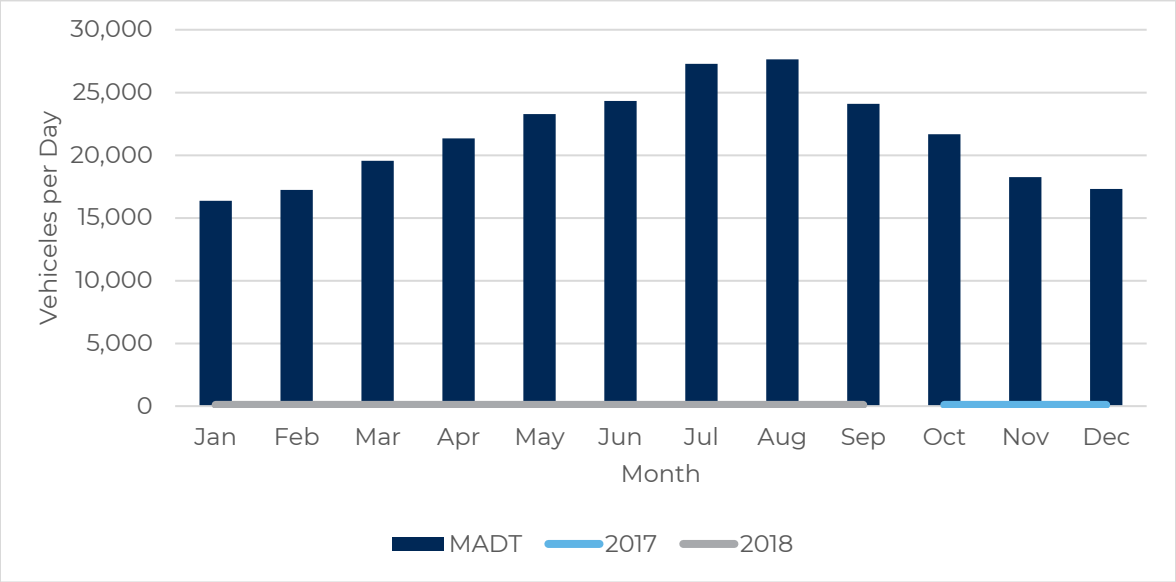
Figure 2.8: Peak Hour Traffic Volumes: January 2019 – AM (PM)



2.6.5 Traffic Seasonality

Highway 97 through Lake Country is classified as having 'Consistent' traffic variations. The monthly average daily traffic (MADT) is depicted below in **Figure 2.9**, based on the available data from the permanent count station north of the study area on Highway 97. These monthly traffic trends support the classification of consistent variations with August traffic volumes approximately 1.7 times that of January traffic volumes. While this is considered the lowest classification of seasonal traffic variations compared to all highways in BC, summer traffic is still considerably higher than in winter in part due to regional tourist traffic. Anecdotally, this concern has been noted by the local community and drivers.

Figure 2.9: Highway 97 Traffic Seasonality (2017-2018)

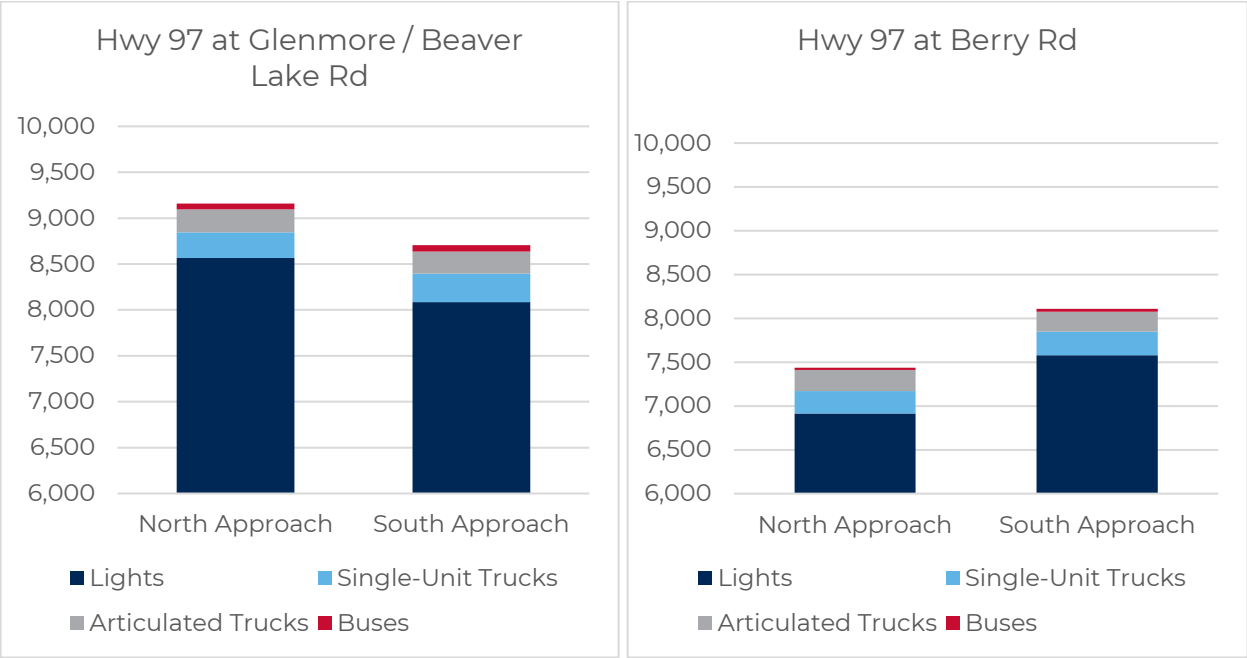


2.6.6 Vehicle Classification

Vehicle length data was obtained from the MoTI Traffic Data Program station north of Oceola Road from June 2017 to December 2018. Based on average traffic volumes in 2018, 15% of all vehicles on Highway 97 were over 6 m long. This data includes buses and class 5 pick-up trucks (two-axle, six-tire), therefore, this may be an over-representation of the total heavy vehicle volumes. The total volume of long vehicles (longer than 6 m) on Highway 97 north of the study area was approximately 3,270 vpd, based on the annual average volumes for 2018.

Vehicle classification data was also obtained from the TMCs collected in January 2019. The TMC data indicates that the proportion of heavy vehicles (including single-unit trucks, articulated trucks, and buses) on Highway 97 over the eight-hour TMC period ranges from approximately 6% to 7% of the total roadway traffic. This corresponds to the total volume of heavy vehicles on Highway 97 ranging from approximately 930 to 1,220 vehicles over the total eight-hour TMC period. **Figure 2.10** illustrates the classification of vehicles on Highway 97 at the Glenmore / Beaver Lake Road and Berry Road intersections.

Figure 2.10: Vehicle Classification on Highway 97 (8-Hour Total on January 30th, 2019)



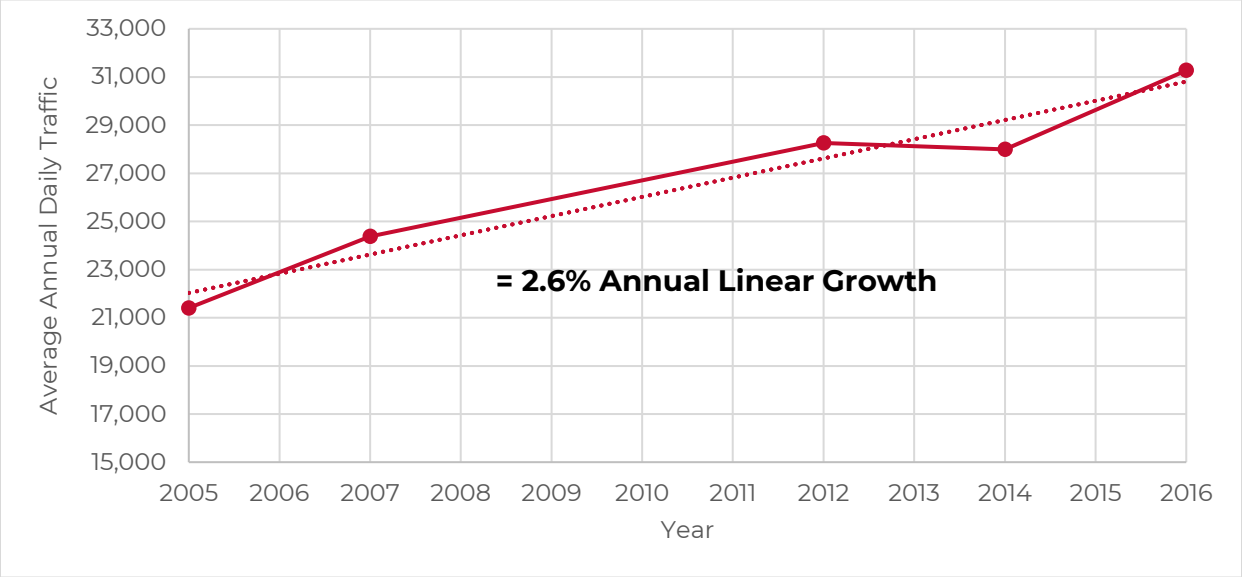
During the peak hour, heavy vehicle volumes on Highway 97 were found to range between approximately 90 and 130 vehicles per hour. These values are consistent directionally on Highway 97 and throughout the study area.

It should be noted that these volumes and proportions represent January traffic characteristics and may likely observe slight seasonal variations.

2.6.7 Historic Traffic Growth

An approximate growth rate was calculated using the historical data available from the MoTI short count station at Lodge Road (25-032NS). This short count station provides AADT data from 2005 to 2016 as shown in **Figure 2.10**. Trends in the data over the 12-year period indicate an annual linear growth rate of 2.6%. The permanent count station north of Oceola Road indicates an annual growth rate between 2017 and 2018 of approximately 3.2%. This rate was calculated using the average of the monthly average daily traffic (MADT) volumes from June to August.

Figure 2.11: Calculated Annual Linear Growth Rate - Lodge Road (25-032NS)



2.7 MOBILITY PERFORMANCE

This section provides a summary of the existing and future conditions analysis with further details and analysis findings provided in **Appendix A.**

The traffic model area encompasses five intersections along Highway 97 between the Duck Lake Pullout and Lodge Road through Lake Country. The mobility performance of the study network was assessed using PTV Vision's microscopic traffic simulation software VISSIM 10. The key performance measures include the 95th percentile queue length, delay in seconds, and the level of service (LOS) measure. The model was also used for the development of improvement options at the study intersections with a focus on safety, mobility, and access design.

The VISSIM model was calibrated to the existing traffic conditions based on the process, criteria, and acceptance thresholds provided by MoTI. The detailed calibration report for the VISSIM model is provided in **Appendix B**. MoTI provided signal timing sheets (STS) for the four signalized study intersections which were included in the existing conditions models.

2.7.1 Network Assessment Parameters

Traffic LOS was used to evaluate the performance parameters. The LOS indicator ranges from the ideal LOS A condition to the failing LOS F condition and is directly related to the average delay experienced by drivers for turning movements and overall intersection. LOS A is described as free flow operations. LOS A thru D is considered to have acceptable performances. LOS E operates at capacity and is described as unstable operations. LOS F is described as operating conditions with significant delay, longer queues and poor performance.

The critical movement at each intersection is identified as the approach lane with the LOS E or LOS F at the intersection of interest. The mobility analysis of the study intersections was undertaken in accordance with MoTI's general mobility performance criteria and thresholds. The six levels of service and the corresponding delay thresholds are illustrated in **Table 2.4** for signalized and stop control intersections. As shown in **Table 2.4**, the control delay for signalized intersections is comparatively higher than for the same level of service at stop-controlled intersections. This implies

that motorists are more tolerant of the delay at signalized intersections compared to stop-controlled intersections.

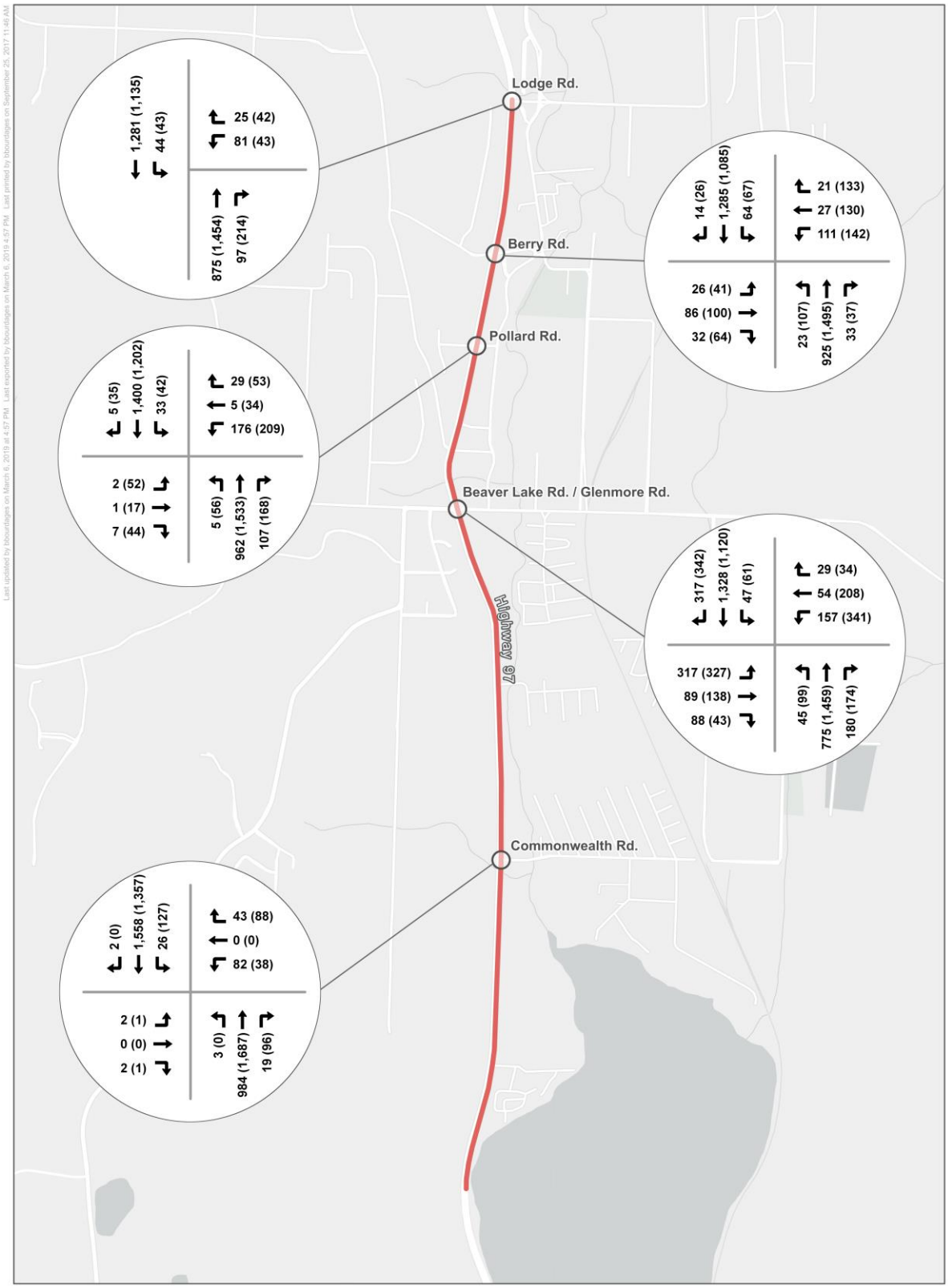
Table 2.4: Mobility Level of Service Parameters

LEVEL OF SERVICE (LOS)	CONTROL DELAY (S)	
	STOP CONTROL	SIGNAL
A	0 - 10	0-10
B	> 10 - 15	>10-20
C	> 15 - 25	>20-35
D	> 25 - 35	>35-55
E	> 35 - 50	>55-80
F	> 50	>80

2.7.2 Traffic Volume Assumptions and Factors

The 2019 existing mobility performance was analysed based on normalized AM and PM peak hour volumes shown in **Figure 2.11**. The AM and PM peak hour volumes were normalized to obtain typical day traffic conditions by applying MoTI seasonal factor (1.128) to the winter traffic volumes collected in January 2019.

Figure 2.12: Design Hour Traffic Volumes: Annual Average – 2019 AM (PM)



2.7.3 Existing Conditions Performance SUMMARY

The key findings from the existing conditions mobility analysis results are summarized as follows and the complete model output results are included with **Appendix A**:

- The study intersections operate at satisfactory LOS D or better during the AM and PM peak periods.
- The side street movements at Pollard Road are currently operating at acceptable levels of service (LOS C) or better during the morning and evening peak hours.
- Similarly, the side street movements at Commonwealth Road are currently operating at acceptable levels of service (LOS D) or better during the morning and evening peak hours.
- Several movements at the side street approaches along Lodge Road, Berry Road, Glenmore / Beaver Lake Road operate at LOS E or LOS F for accompanying peak hour traffic demand as described below.
    - The westbound left approach at Lodge road performs at LOS E and LOS F during AM and PM peak periods respectively as heavy traffic volumes waiting at stop signs on Lodge Road to turn left on Highway 97.
    - The performance of side street approaches at the Berry Road intersection deteriorates from LOS C in the AM peak period to LOS D due to heavy traffic volumes in the PM peak period.
    - The side street approaches at Glenmore Road are currently operating at LOS E and LOS F during AM peak and PM peak periods, respectively.
    - The performance of side street approaches at Beaver Lake Road deteriorate from LOS D in the AM peak period to LOS F in the PM peak period.
- The approaches along Highway 97 at all intersections operate at LOS D or better in the peak periods.

2.8 FUTURE CONDITIONS ASSESSMENT SUMMARY

This section provides summarizes the future conditions mobility performance of the study area based on forecasted traffic demand within the study area. The impact of estimated growth on the corridor in terms of capacity and intersection levels of service was analyzed for the 5-, 10-, and 25-year horizons.

To estimate future traffic volumes, existing traffic was factored using an appropriate background growth rate. The growth rate was determined based on a combination of information sources including historical traffic growth rate, land use plans, and future population projections in the surrounding area of the study network. To assess future conditions in the road network, the following sources were referenced with further detail and discussion included in **Appendix A**.

- Regional Emme Model for the Central Okanagan (March 2019, City of Kelowna)
- Historical Traffic Volumes, and
- Population Forecasts (Based on Regional Emme Model)

A growth rate of 1.75% per annum was determined to best predict background growth in the region along Highway 97. This growth rate was applied to 2019 traffic volumes on Highway 97 to grow them to 2025, 2030 and 2045 horizon traffic volumes. Side street traffic was factored using a growth rate of 2% per annum, based on the population growth and Emme model data. The future traffic volumes at the study intersections at 5-, 10-, and 25-year horizon are also shown in **Appendix A.**

2.8.1 Future Mobility Performance

The key findings from the mobility performance results for the 2025, 2030 and 2045 future horizons are summarized as follows and the complete model output results are included in **Appendix A.**

- The study intersections operate at satisfactory LOS D or better during the AM and PM peak periods for all three future horizons.
- The westbound left approach at Lodge Road was found to perform at LOS F during AM and PM peak periods for all future horizons as heavy traffic volumes waiting at stop signs on Lodge Road to turn left on Highway 97.
- The side street approaches at the Berry Road intersection operate at undesirable LOS E and LOS F during 2025 and 2030 PM peak periods respectively, and LOS F during both 2045 AM and PM peak periods.
- The side street movements at Pollard Road operate at undesirable LOS E and LOS F in 2045 AM and PM peak period, respectively.
- The side street approaches at Glenmore Road operate at LOS F during AM peak and PM peak periods for all three future horizons.
- The side street approaches at Beaver Lake Road operate at LOS F in the AM and PM peak periods for all three future horizons.
- The side street movements at Commonwealth Road operate at undesirable LOS F during 2030 and 2045 AM peak and PM peak periods.
- The approaches along Highway 97 at all intersections operate at LOS D or better in the AM peak period. In the PM peak period, the Highway approaches operate at LOS E or better.

2.9 SAFETY PERFORMANCE

The safety performance of Highway 97 was assessed based on the most recent available collision data for the five-year period (2012-2016). The analysis was completed using collision data from MoTI's Collision Information System (CIS)[4]. This data was filtered to include only collisions that occurred on segments of Highway 97 or at intersections within the study area. Based on the filtered collision data, a total of 109 collisions occurred within the study area between 2012 and 2016, which are summarized below in **Table 2.5**.

[4] *Collision data was also obtained from ICBC claim reports. However, the ICBC data generally corresponds with trends in the CIS Data and no additional findings were identified.*

Table 2.5: Historic Collision Frequency (2012-2016)

Year	Fatal	Injury	PDO	Total
2012	0	16	6	22
2013	0	7	9	16
2014	2	11	10	23
2015	0	7	14	21
2016	0	12	15	27
Total	**2**	**53**	**54**	**109**

Two fatal collisions occurred over the five-year period, both in 2014 at the southern end of the study area near the Duck Lake Pullout. Both fatal collisions were head on configuration and occurred in daylight. One collision occurred in December and involved a sport utility vehicle and a combination unit tractor / trailer. The other collision occurred in July and involved two passenger cars. The reported incident locations indicate that the primary vehicle involved in each collision was entering the slight curve in the Highway 97 alignment (just north of the Duck Lake Pullout).

A median barrier was installed in May 2015 south of the study area up to the southern study area boundary. Both fatal collisions occurred in 2014 before the median barrier was installed, however, both collisions occurred north of the existing barrier location. Currently, no median barrier exists on the highway within the study area. This may be a safety concern, specifically in Segment A which has higher travel speeds and limited highway lighting, and may contribute to increased head-on collisions, which tend to result in more severe collisions.

2.9.1 Collision Trends

The collision data was analyzed to determine any apparent trends in historic collisions within the study area. The analysis found that collisions which occurred between 2012 and 2016 tend to correspond with the traffic demand profiles, in terms of months of the year and hours of the day. These trends are illustrated below in **Figure 2.13** and **Figure 2.14** showing the months of the year and hours of the day with the highest traffic demand also tend to exhibit higher collision frequency.

Figure 2.13: Collision Frequency by Month vs MADT (2012-2016)

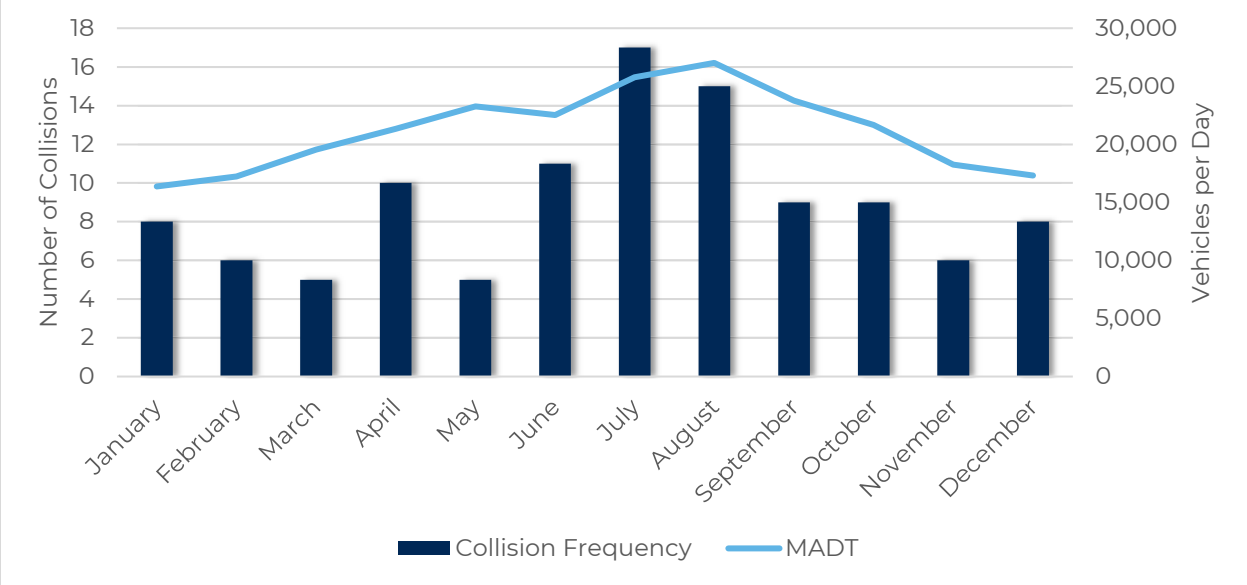
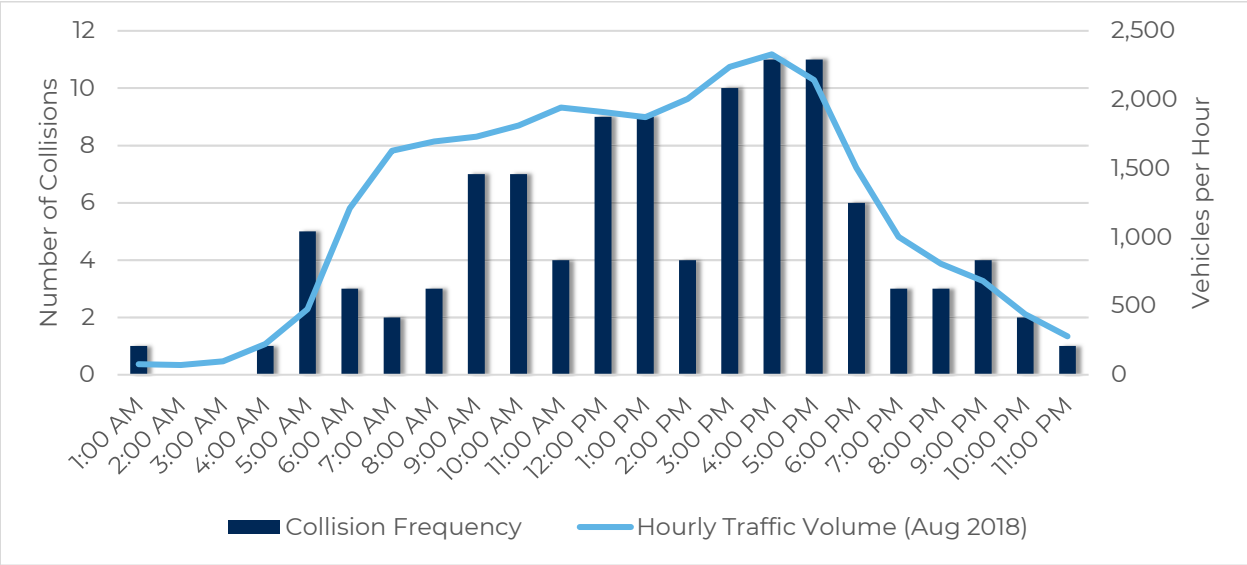


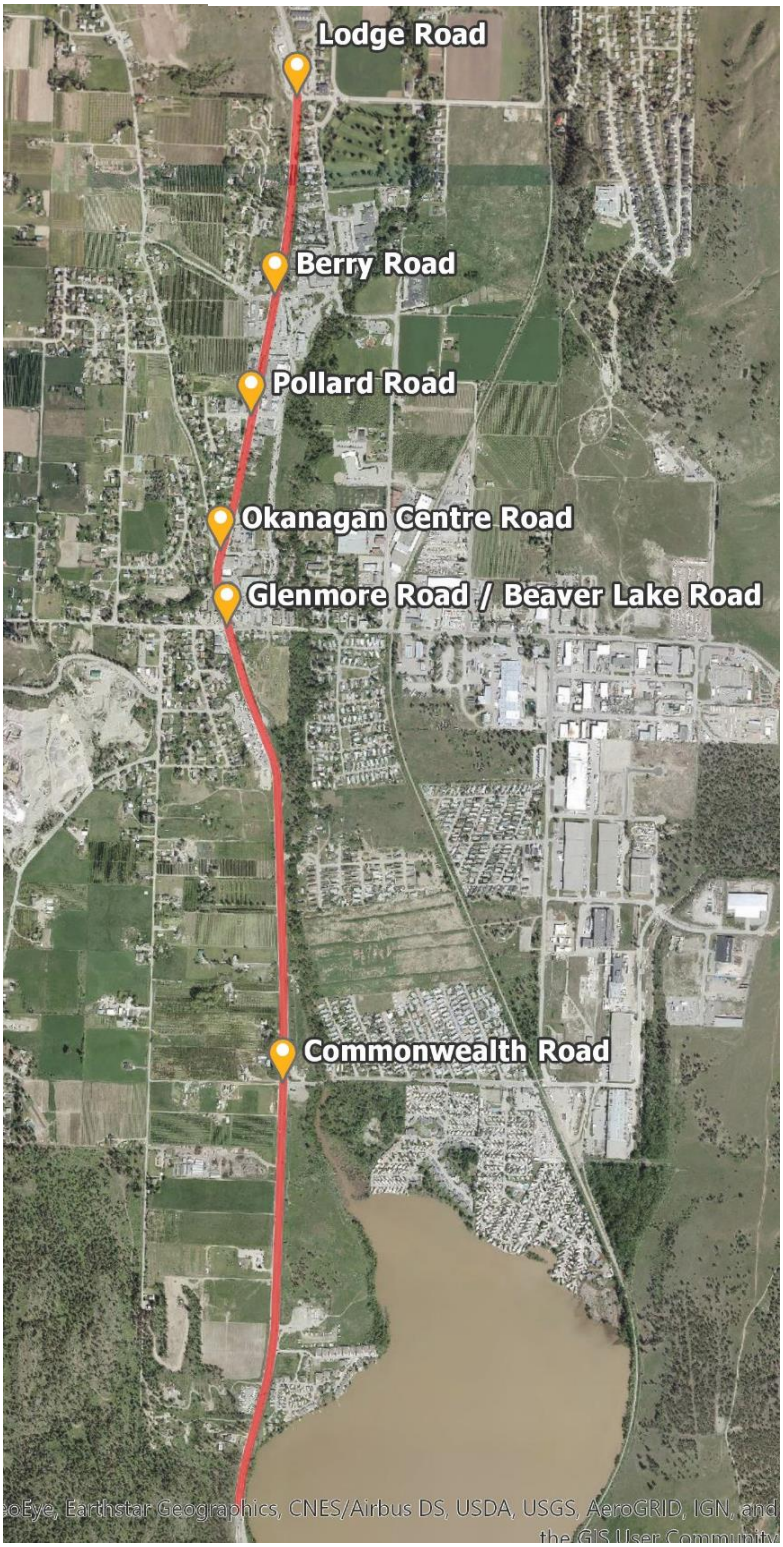
Figure 2.14: Collision Frequency by Hour vs Hourly Traffic Volume (2012-2016)

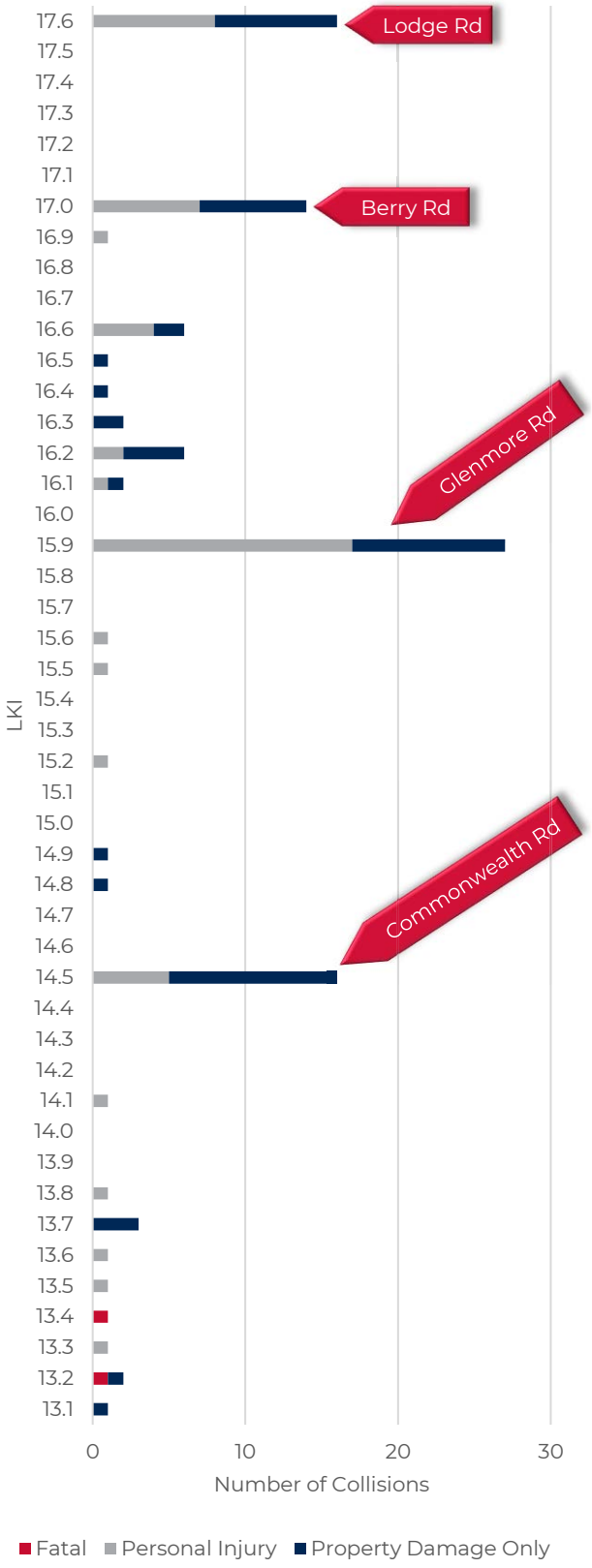


The most common collision configuration was found to be rear ends, which is typical of intersection collision types. The second most common was found to be off-road right, which is typical of segment and non-intersection collisions. The most common reported contributing factor, after "Not Applicable", was "Driver Inattentive."

Spatial collision trends are illustrated below in **Figure 2.15**, showing that most collisions between 2012 and 2016 on Highway 97 within the study area occurred at intersections (over 82%). Mid-block collisions were observed at the south end of the study area where the highway corridor is more rural, and near Pollard Road in the more urban area of the corridor.

Figure 2.15: Spatial Collision Trends (2012-2016)





The intersections within the study area with the highest collision frequency between 2012 and 2016 were found to be Lodge Road, Berry Road, Glenmore / Beaver Lake Road, and Commonwealth Road. These locations are discussed in further detail in **Appendix A**.

2.9.2 Collision Rate Analysis

The collision data was used to calculate collision rates and collision severity indices (CSI) for the intersections on Highway 97 and the two corridor segments through the Lake Country study area. The following equations were used to calculate the CSI, collision rate, and critical collision rate.

$$CSI = \frac{((100 \times \#\ Fatal\ Collisions) + (10 \times \#\ Injury\ Collisions) + (\#\ PDO\ Collisions))}{Total\ \#\ Collisions}$$

$$Collision\ Rate = \frac{Total\ \#\ Collisions}{MEV}$$

$$Critical\ Collision\ Rate = ProvAvg + 1.645 \times SQRT\left(\frac{ProvAvg}{MEV}\right) + \frac{1}{(2 \times MEV)}$$

The "ProvAvg" is the MoTI average collision rate for intersections on similar highway facilities to Highway 97 (based on collisions from 2012 to 2016). The province of BC average collisions and collision rate data is based on the type of highway classification and intersection control (signalized or unsignalized).

The critical collision rate equation uses million entering vehicles (MEV) and corresponds to the total volume of vehicles entering the intersection over the analysis period (five years in this case), in units of million vehicles. The corridor segment collision rates were calculated using the same equations, above, but instead, using million vehicle kilometers (MVK), which is the volume of vehicles traveling the segment over the analysis period (five years).

The CSI provides a clear indicator of the types of collisions that occur along the study corridor. The index applies higher emphasis on personal injury and fatal collisions.

To establish the safety performance indicators, collision rates and CSIs were determined and compared to provincial benchmarks for similar facilities. The summary of the key safety performance indicators and corresponding provincial averages is presented on the following page in **Table 2.6**.

The key findings of the collision rate analysis are as follows:

- Lodge Road is the only intersection within the study area that has a collision rate above the calculated critical collision rate.
- Glenmore / Beaver Lake Road has a collision rate above the provincial average for similar intersections.
- Glenmore / Beaver Lake Road, Pollard Road, and Lodge Road have CSIs slightly above the provincial average CSI for similar intersections.
- These results differ from the safety assessment reported in the COPS, which identified Commonwealth Road as having a CSI greater than the provincial average. Based on historic collision data from 2012 to 2016, the Commonwealth Road intersection does not appear to be a safety concern.

- Segment A was found to have a collision rate of 0.09 collisions/MVK, which is below the calculated critical collision rate of 0.12 col/MVK but above the provincial average of 0.08 col/MVK for comparable roads. This indicates collisions are more frequent within the southern segment of the study area than on other comparable highway facilities in BC.
- The CSI for Segment A is 20.29 which is significantly higher than the provincial average of 10.16. This is because the CSI calculation puts higher weight on fatal collisions, and 2 of the 14 collisions that occurred on this segment between 2012 and 2016 resulted in fatality.
- Segment B has a collision rate of 0.06 col/MVK which is below the critical rate of 0.16 col/MVK and the provincial average. The CSI for Segment B was calculated to be 4.60 which is below the provincial average of 8.64.

Table 2.6: Highway 97 - Collision Rate Summary

Intersection Collision Rates[5]									MoTI Provincial Average	
LKI	**Road Name**	**Int. Type**	**# of Col's**	**Col. Freq. (per 5 yrs)**	**Volume (MEV)**	**Collision Rate (col/MEV)**	**Critical Col. Rate (col/MEV)**	**Collision Severity Index (CSI)**	**Col. Rate (col/MEV)**	**CSI**
13.7	Parkinson Drive	A2	3	0.6	55.09	**0.05**	0.23	**1.00**	0.14	7.24
14.5	Commonwealth Road	A5	16	3.2	57.93	**0.28**	0.53	**3.81**	0.39	6.49
15.9	Glenmore / Beaver Lake Road	A5	27	5.4	74.06	**0.36**	0.45	**6.67**	0.33	5.95
16.2	Okanagan Centre Road / Hill Road	A2	6	1.2	58.86	**0.10**	0.23	**4.00**	0.14	5.39
16.3	Winfield Road	A2	2	0.4	58.86	**0.03**	0.23	**1.00**	0.14	5.39
16.6	Pollard Road	A5	6	1.2	59.18	**0.10**	0.46	**7.00**	0.33	5.95
17.0	Berry Road	A5	14	2.8	57.41	**0.24**	0.46	**5.50**	0.33	5.95
17.6	Lodge Road	A2	16	3.2	50.12	**0.32**	0.24	**5.50**	0.14	5.39
Segment Collision Rate[6]									**MoTI Provincial Average**	
LKI	**Highway 97 Segment**	**Road Class**	**# of Col's**	**Col. Freq. (per 5 yrs)**	**Volume (MVK)**	**Collision Rate (col/MVK)**	**Critical Col. Rate (col/MVK)**	**Collision Severity Index (CSI)**	**Col. Rate (col/MVK)**	**CSI**
13.1 to 15.8	Segment A	RAU4	14	2.8	148.73	**0.09**	0.12	**20.29**	0.08	10.16
15.9 to 17.6	Segment B	UAU4	5	1.0	90.75	**0.06**	0.16	**4.60**	0.10	8.64

[5] *Including all collisions that were reported to occur at the intersection LKI location*

[6] *Not including collisions occurring at intersection LKI locations.*

2.10 RELIABILITY PERFORMANCE

Highway reliability describes a highway's capability to maintain safe and drivable conditions between major access points under all types of weather, emergency, and related conditions that it may be subjected to. One of the key measures for assessing highway reliability is analyzing the duration and frequency of when a highway is closed. Closures may occur for a number of reasons, most often due to vehicle collisions and incidents, poor weather conditions, and avalanche control.

Closures and delays on a highway can have a significant economic impact on communities, especially those with limited travel route options. Highway closures increase travel times, resulting in higher transportation and operating costs. Closures may also result in increased volumes on local roads and through communities due to rerouting of highway traffic. Travel delays impact the delivery of goods and services that support these communities and can be a significant concern with respect to the timely delivery of emergency services. Both regional and local travellers are impacted by road closures with travel delays, which can increase driver frustration and lead to more risk-taking behaviours. For these reasons, mitigating the frequency and duration of closures is important to supporting safe and thriving communities.

The local road network within the study area provides limited alternate routes to the highway, specifically in Segment A. No parallel or alternate routes to Highway 97 exist south of Glenmore / Beaver Lake Road, which is a reliability concern when the highway and/or intersections are closed due to an incident. North of Glenmore / Beaver Lake Road, local roads exist on both sides of the highway which can be used as alternative routes and can minimize the impact of incidents on the travelling public.

It should also be noted that the Jim Bailey Industrial Park, east of Highway 97, only has one highway connection via Beaver Lake Road. This stresses the importance of this intersection and the significant impacts to truck traffic when it is closed due to an incident.

2.10.1 DriveBC Data

To better understand reliability along this corridor, DriveBC data was provided by MoTI for a twelve-year period between 2006 and 2017 for analysis. DriveBC is a web-based messaging system operated by MoTI to provide the public with up-to-date information on roadway driving conditions. The data package is comprehensive where every message provided through the DriveBC website is recorded along with many attributes. Key attributes used in this reliability review include the type and frequency, date and time, and cause of the traffic pattern change, and the duration of the closures.

Before analyzing the reliability data, the data was screened to remove multiple messages recorded for single events, events that did not result in delays or closures to the highway, and events which occurred outside of the study area. After screening, there were a total of 12 reliability events recorded between January 11th, 2006 and July 2nd, 2017 included in the analysis. Given the recorded data ends mid-year, the results presented below and in **Appendix A** for 2017 are skewed representing only the first half of the year.

2.10.2 Reliability Summary

DriveBC incident data from 2006 to 2017 shows that 12 incidents have occurred along Highway 97 in the study area, as summarized in **Table 2.7** below. It should be noted that the exact location of these

closures is unknown, and they may not all be within the study area. The majority of incidents were caused by vehicle incidents and collisions and the average closure duration was 2 hours and 49 minutes. The longest closure lasted 6 hours and 33 minutes due to a collision, and the second longest closure lasted 6 hours and 24 minutes, due to downed hydro lines.

Table 2.7: Highway 97 Reliability (2006-2017)

ID	Start: Date - Time	Duration (h:mm)	Cause
10318	Jan 11, 2006 - 19:11	1:51	Rock Slide
22964	Jun 22, 2006 - 15:17	4:09	Collision
32727	Dec 21, 2006 - 22:29	2:36	Collision
38560	Jan 25, 2007 - 01:41	6:33	Collision
38693	Jan 25, 2007 - 13:56	0:36	Vehicle Recovery
47629	Sep 03, 2007 - 10:14	2:30	Collision
66237	Aug 29, 2008 - 08:06	6:24	Hydro Lines Down
116444	Sep 01, 2011 - 10:05	1:09	Collision
141811	Dec 19, 2012 - 14:02	1:17	Vehicle Incident
171333	Aug 05, 2014 - 00:18	5:30	Vehicle Incident
191649	May 08, 2015 - 11:06	0:58	Vehicle Incident
249591	Jul 02, 2017 - 04:28	0:16	Debris on Road

2.11 ENVIRONMENTAL & ARCHAEOLOGICAL SCAN

An Environmental Scan was completed as part of the study and the complete report is included in **Appendix C**. This task involved conducting a field reconnaissance overview of the study area and a desktop review of relevant environmental and archaeological information from available reports, literature, maps, photos and databases for the project area. Biophysical components evaluated include topography, surficial geology, hydrogeology, surface water, fish and fish habitat, flora and fauna, species of management concern, and sensitive ecosystems. Based on this review, environmental constraints were identified within the study corridor and are described further in **Appendix C**.

2.12 GEOMETRIC & ASSET CONDITION REVIEW

A review of the current highway geometry was completed in accordance with the Transportation Association of Canada's (TAC) *Geometric Design Guidelines for Canadian Roads* (1999) and the MoTI's *BC Supplement to TAC Geometric Design Guide* (2007). Using information and data provided by MoTI, including LiDAR, a desktop review was completed to assess the existing geometry of the corridor including highway alignment, major access locations, drainage and lighting. Details of the review are provided in **Appendix A.**

Further, a review of asset conditions was completed, including major utilities, pavement conditions and other constraints. This review identified key pieces of infrastructure that would influence the development of improvement options. The complete review is also provided in **Appendix A.**

2.13 PRELIMINARY GEOTECHNICAL ASSESSMENT

Westrek Geotechnical Services Ltd. was retained to complete a preliminary assessment of the geotechnical conditions within the Highway 97 study area in Lake Country. The assessment did not identify any major existing geotechnical concerns within the study area. The complete report is included in **Appendix D** and the key findings are summarized below:

- Historic slope failures were noted north of the study area, which may have been caused by seepage issues. The north end of this study area may have similar seepage issues and/or perched aquifers.
- Lower lying areas have potential for soft soil conditions and could also be subject to flooding from Vernon Creek and Ellison Lake (notably in Segment B of the study area).
- Steep slopes are present throughout the study area which have potential for slumping, especially if disturbed or modified. Landslide hazards were also noted Parkinson Drive in the south end of the study area.
- Existing, man-made fills are likely present throughout the study area and may be prone to settlement if insufficient compaction or materials were initially used in construction.
- Soil condition in the study area likely has a relatively high silt and fine sand content, which has potential to be highly erodible and pose concerns for any road cuts and fills. Silty and fine soils are not suitable for fills and hence reduce the ability to re-use the material for construction.

3.0 PROBLEM DEFINITION STATEMENT

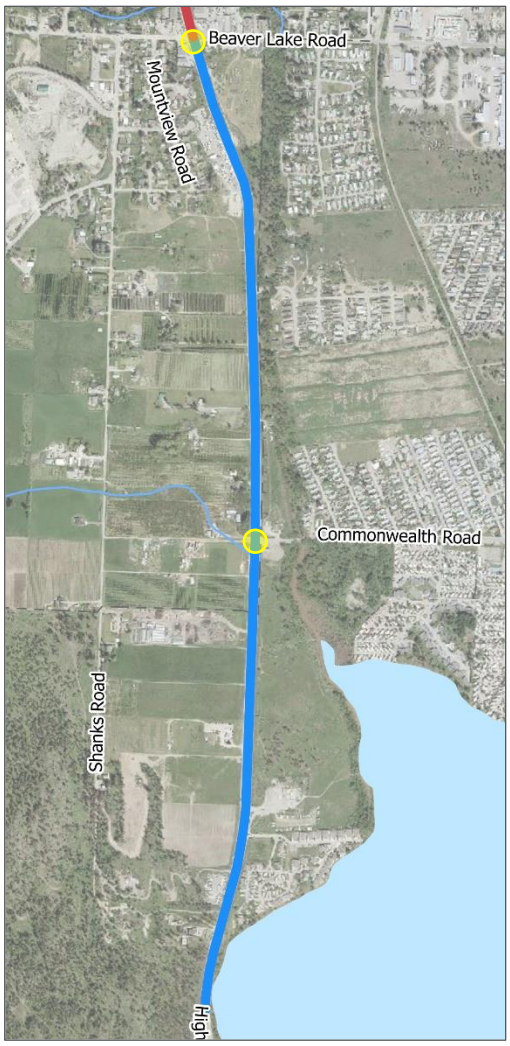
The existing conditions assessment and analysis highlighted key issues along the Highway 97 corridor through Lake Country. These key issues are described below by each study segment and culminate in an overall study area problem definition statement.

Segment A Summary of Issues: Segment A has a collision rate above critical, and does not provide adequate, or any, pedestrian or cycling facilities. The Glenmore / Beaver Lake Road intersection experiences poor mobility performance and exhibits collision severity rates above the provincial average.

Further description of the identified problems in Segment A are summarized as follows:

- **Mobility:** The Highway 97 / Glenmore - Beaver Lake Road intersection experiences increasing congestion and vehicle delays due to the high volume of turning traffic on all approaches. The westbound side-street approach at the Highway 97 / Commonwealth Road intersection experiences some moderate vehicle delays.
- **Safety:** The Highway 97 / Glenmore - Beaver Lake Road intersection observed above average rates for collision severity compared to provincial averages. Segment A of Highway 97 from the Duck Lake Pullout to Glenmore – Beaver Lake Road observed above average rates for collision severity compared to provincial averages.
- **Access Management:** Several private and commercial driveways, and local roads have direct access to Highway 97 through the study area. Access density contributes to safety and mobility concerns on the corridor.
- **Multi-Modal**: No pedestrian and cyclist facilities exist in Segment A of Highway 97 south of the Glenmore / Beaver Lake Road intersection. The lack of facilities in this segment presents a concern for pedestrian safety and accessibility at the Highway 97 / Commonwealth Road intersection where pedestrians share the highway shoulder to access and wait at BC Transit bus stops.
- **Geometry:** At most of the study intersections, approach grades on side-streets to Highway 97 exceed the maximum standard criteria. This can be challenging specifically for trucks to stop and start at intersections. Geometric deficiencies were also identified at Commonwealth Road regarding truck turning movements.

Figure 3.1: Segment A Study Area

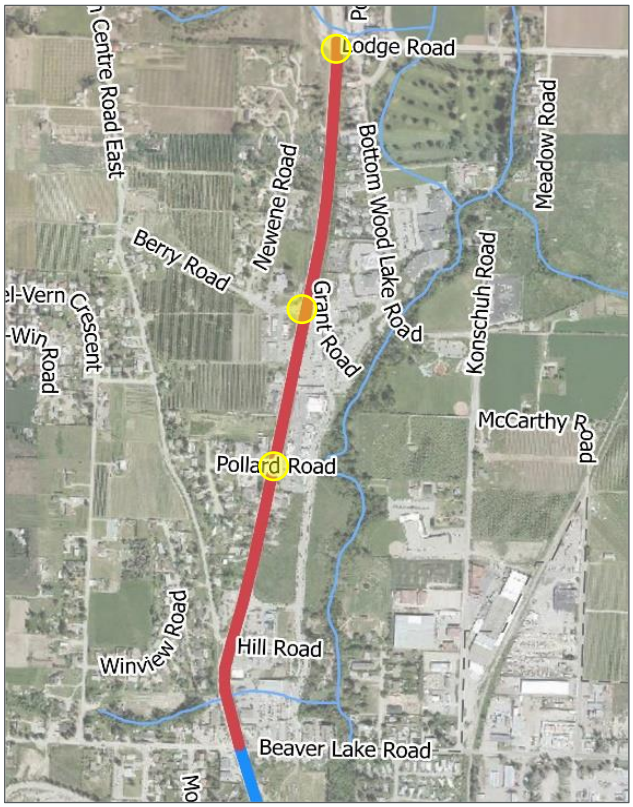


Segment B Summary of Issues: Within Segment B, the intersections of Lodge Road and Berry Road experience poor mobility performance, which worsen under forecasted future conditions. Additionally, safety concerns are identified at the intersections of Lodge Road and Pollard Road.

Further description of the identified problems in Segment B are summarized as follows:

- **Mobility:** Side-street approaches to Highway 97 at Lodge Road and Berry Road observed increasing vehicle delays. Fewer gaps are available for traffic turning left off Lodge Road onto Highway 97.
- **Safety:** The Highway 97 / Lodge Road intersection observed above average rates for collision frequency compared to provincial averages. The Highway 97 / Pollard Road intersection observed above average rates for collision severity compared to the provincial average.
- **Access Management:** Access density contributes to safety and mobility issues on the corridor. While many of the accesses onto Highway 97 on this segment are private and commercial driveways, this segment is mainly zoned for commercial, with high-density residential and institutional parcels near Lodge Road.
- **Multi-modal:** Pedestrian facilities are provided in most places; however, they are located directly adjacent to highway travel lanes, which impacts pedestrian comfort and safety perceptions. Pavement markings for crosswalks and other treatments have faded.
- **Geometry:** Approach grades on some side-streets to Highway 97 exceed the maximum standard criteria. This can be challenging specifically for trucks to stop and start at intersections.

Figure 3.2: Segment B Study Area



Overall Highway 97 Lake Country Planning Study

Problem Definition Statement:

Highway 97 in Lake Country, including the Glenmore / Beaver Lake Road intersection, experiences above average collision rates and has limited pedestrian or cycling facilities. Further, side-street approaches have steep grades, intersections experience traffic congestion and highway movements conflict with several private driveways and accesses.

4.0 OPTION DEVELOPMENT

Prior to identifying access concepts for the study area of Highway 97 through Lake Country, the desired role and function of the highway was defined, along with guiding principles to evaluate the concepts and design criteria and to guide the conceptual layouts of access concepts. For the concept generation phase of this project, the Highway 97 mainline, access points and local road connections were studied as one overall segment to ensure access spacing requirements are thoroughly considered, and to maintain a consistent corridor role, function, and environment.

4.1 HIGHWAY ROLE & FUNCTION

The study segment of Highway 97 between the Duck Lake Pullout and Lodge Road forms the northern part of the larger planning work that the ministry has undertaken in the Central Okanagan Planning Study Phase 1 (COPS). The COPS looked at both short- and long-term transportation needs and solutions for this study area.

The role and function of Highway 97, which is documented in the COPS *Interim Options Generation Report* (March, 2017). was defined as follows:

"The primary role of Highway 97 in the Central Okanagan is to connect Central Okanagan communities, regional/ provincial activity centres and other provincial highways."

The COPS *Project Planning and Design Guidelines* recognizes that Highway 97 in this project's study area is a mix of urban and rural environments. Improvement solutions should focus on maintaining mobility and improving local road network connectivity to the highway. Direct access to the highway, such as private accesses and driveways, should be limited to support Lake Country's vision to create a multi-modal local road network of complete streets.

Based on the previous work undertaken in the COPS, the role and function of Highway 97 within Segment A (from the south study boundary at the Duck Lake Pullout up to and including the Glenmore / Beaver Lake Road intersection) was identified to fit a Rural Arterial Divided (RAD) highway standard. The COPS identified the role and function of Segment B on Highway 97 (from north of the Glenmore / Beaver Lake Road intersection to the north study boundary at Lodge Road) to fit an Urban Expressway Divided (UED) highway standard.

4.2 PREVIOUS COPS CONCEPTS

The *COPS Interim Options Generation Report – Working Draft* (2017) identified three potential long-term options along Highway 97 through Lake Country from Ellison Lake to Lodge Road, named Lake Country Options (LCO). These options were developed to address the existing issues and projected concerns to the 2040 horizon. The three options developed through the COPS are summarized below. These were also presented at a public open house in March 2017.

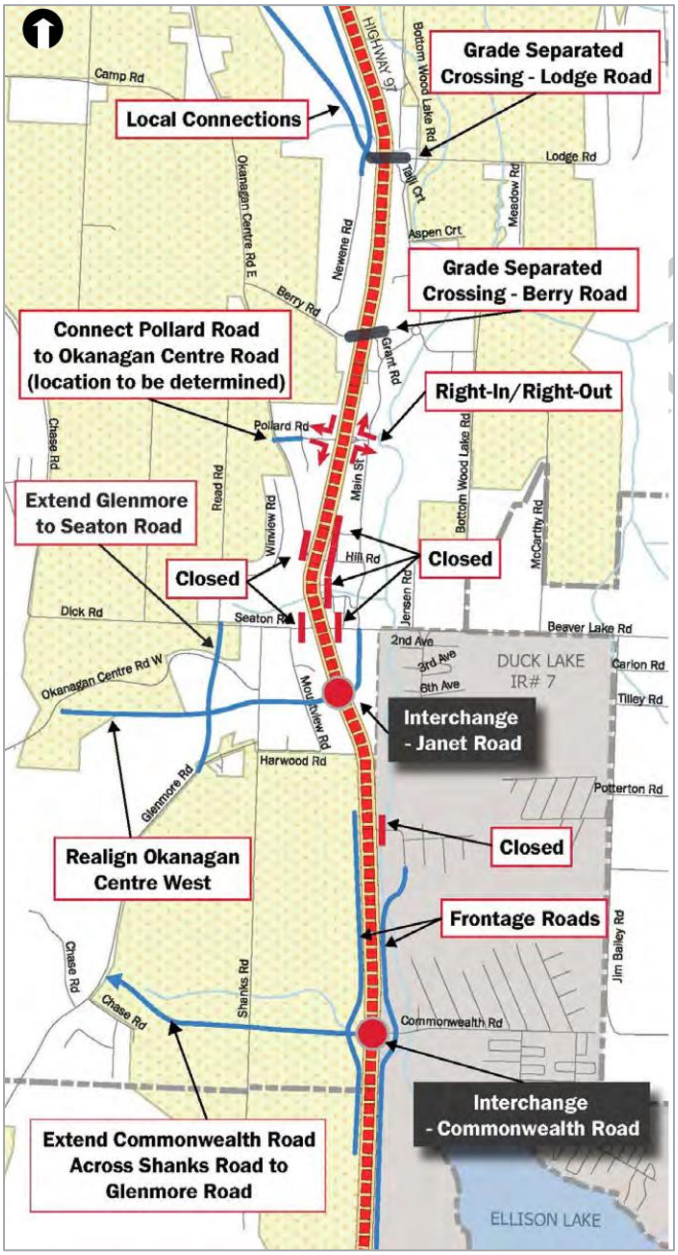
The options identified in COPS were assessed further in this study for design and construction feasibility.

4.2.1 LCO-1A: Interchanges at Commonwealth Road and Janet Road

This option included two interchanges, at Commonwealth Road and Janet Road, which would provide ramps for all traffic movements at those locations (i.e. full-movement interchanges). Commonwealth Road would be extended west to Glenmore Road, and east to Jim Bailey Road. The Janet Road interchange would connect with Glenmore Road to the west of Highway 97 and Main Street to the east of Highway 97. All accesses onto the highway would be closed and accommodated with frontage roads.

Grade-separated crossings are provided at Berry Road and Lodge Road, and right-in-right-out access was proposed at Pollard Road. The existing intersections at Glenmore / Beaver Lake Road, Okanagan Centre Road E, and Winfield Road would be closed.

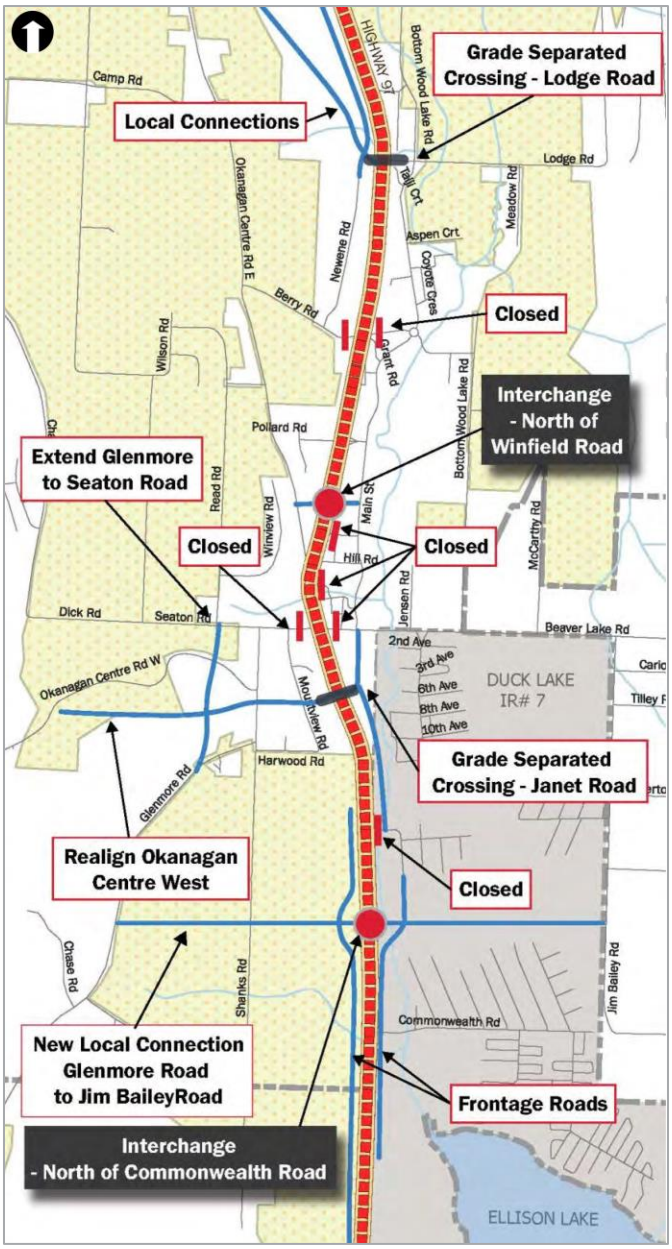
Figure 4.1: COPS Option 1A



4.2.2 LCO-1B: Interchanges N of Commonwealth Rd & N of Okanagan Centre Rd E

This option consisted of two full-movement interchanges, one located north of Commonwealth Road and one north of Winfield Road. Like the first option, the interchange north of Commonwealth Road would connect to Glenmore Road west of the highway and Jim Bailey Road east of the highway. All accesses onto the highway would be closed and accommodated with frontage roads. Grade-separated crossings would be provided at Janet Road and Lodge Road, and the intersections of Berry Road, Winfield Road, and Glenmore / Beaver Lake Road, Commonwealth Road would be closed.

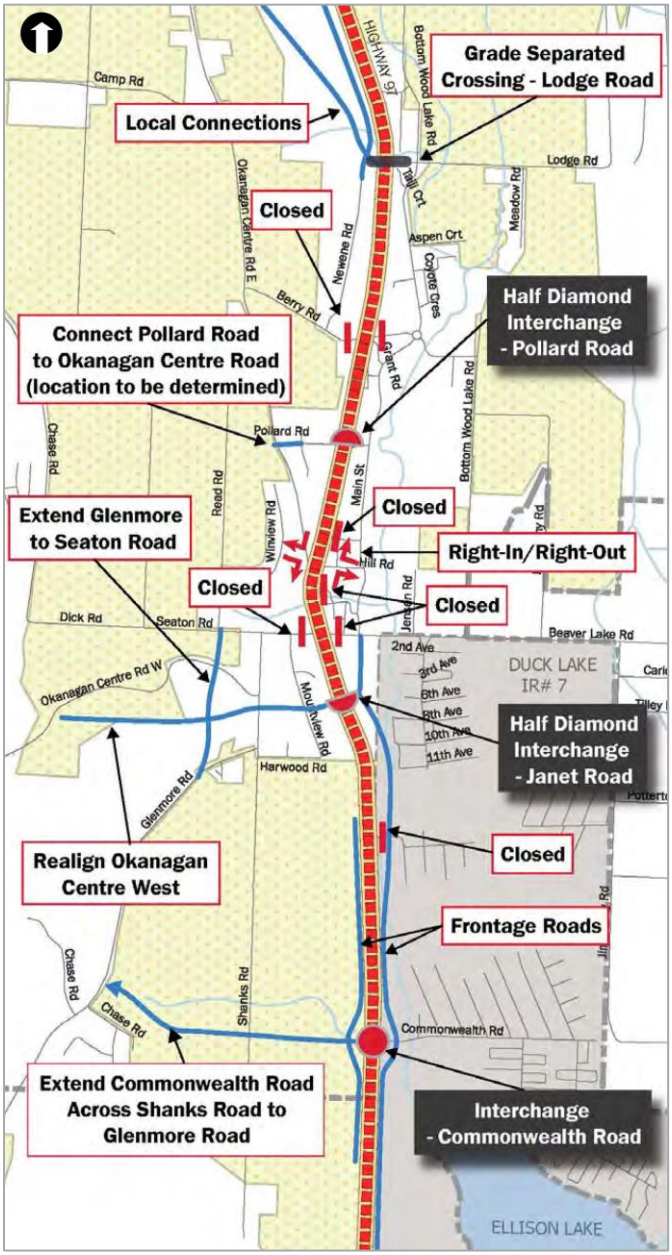
Figure 4.2: COPS Option 1B



4.2.3 LCO-1C: Interchanges at Commonwealth Rd & Split Diamonds at Janet Rd & Pollard Rd

The Commonwealth Road interchange and supporting frontage and local road network are the same as shown in Option LCO-1A. A half interchange at Janet Road would provide south-facing ramps, while a half interchange at Pollard Road would provide north-facing ramps. One grade-separated crossing was proposed at Lodge Road and right-in-right-out access would be maintained at Okanagan Centre Road E / Hill Road. The intersections of Glenmore / Beaver Lake Road, Winfield Road, Berry Road, and Lodge Road would be closed.

Figure 4.3: COPS Option 1C



4.3 GUIDING PRINCIPLES

As described in the problem definition statement, the Highway 97 study area experiences safety issues, geometric constraints, and is expected to observe decreasing mobility performance on intersection side-street approaches.

The development of improvement options on the Highway 97 corridor and at study intersections is intended to provide solutions to address these problems. Before identifying and developing improvement options, a set of guiding principles was identified in consultation with the project team and key stakeholders in the Technical Advisory Committee (TAC), and Community Liaison Committee (CLC). The purpose of creating the guiding principles is to obtain a common understanding and alignment of the core values and vision among each of these represented groups within the context and scope of the Highway 97 Lake Country Planning Study.

Guiding principles were identified to initially evaluate each option. The initial evaluation determines whether each option should be studied further in the Multiple Account Evaluation (MAE), considered for the implementation strategy, or screened out. The guiding principles are also used to ensure each option addresses the identified problems and support the values and desired outcomes of the project.

What are Guiding Principles?

- Guiding Principles reflect the vision, mission, promise, and core values, along with the project's scope.
- Guiding Principles offer direction and add clarity for large projects.
- Guiding principles are simple rules or value statements that help project teams make decisions when they are faced with a choice or when disagreements arise.

4.3.1 Guiding Principles for the Highway 97 Lake Country Planning Study

1. **Develop the highway to align with the desired role and function for Highway 97**
    - Improve mobility by reducing congestion, vehicle delays and queueing along the highway and side-street roadway approaches.
    - Reduce collision frequency on the highway, at intersections and at access points by considering modifications to highway geometry, traffic control, traffic operations, and access to improve road safety.
    - Identify/apply appropriate design criteria for the development of improvement options to achieve desired role and function of Highway 97.
    - Provide access management solutions along Highway 97.
    - Prioritize active transportation modes and transit considerations in the highway design.
2. **Integrate the highway with the vision for a better local community**
    - Promote energy efficient alternative modes of transportation, such as car sharing and carpooling.
    - Reduce greenhouse gas emissions to improve air quality.
    - Improve public health and quality of life.
    - Connect people, places, services, and employment opportunities.

- Incorporate community feedback and input to achieve a corridor that aligns with the community's vision, goals, and principles.
- Build a walkable, cyclable, and public transit-friendly community to support a sustainable transportation system.

3. Support economic development and land use plans

- Minimize land impacts and potential disruption and impacts on the community, including Agricultural Land Reserve (ALR), existing businesses, and residents.
- Consider long-term solution(s) to provide safe and efficient access between the highway and adjacent lands up to the 25-year planning horizon.
- Consider local community and regional planning objectives.
- Consider future active transportation and transit corridors to support network connectivity.

4. Consider a diverse range of transportation modes and users in the highway design

- Take a Gender-Based Analysis Plus (GBA+) approach for planning and designing to accommodate a diverse group of transportation user needs.
- Prioritize the development of a sustainable multi-modal transportation system.
- Provide convenient, safe, and affordable transportation options for all ages, abilities, backgrounds and identify factors.

5. Develop solutions that are feasible given the identified constraints

- Avoid environmentally and culturally sensitive areas.
- Consider geometric, utilities, geotechnical, and environmental constraints.
- Provide solution(s) that may be implemented in phases and that include short-, medium-, and long-term initiatives.

4.4 HIGHWAY DESIGN CRITERIA

Two sets of design criteria were identified for Highway 97, as summarized in **Table 4.1,** which are based on the existing guidelines specified by the *TAC Geometric Design Guide for Canadian Roads* (2017 Ed., TAC Guide) and the MoTI *Supplement to TAC Geometric Design Guide for Canadian Roads*. The proposed design criteria is also based on the *COPS Project Planning and Design Guidelines*. It is important to note that the design criteria used in the development and evaluation of options may not always be achievable due to other project constraints and limitations, but is intended to provide specific direction and vision in the design development process.

The proposed design criteria for Urban Expressway Divided – 80 km/h (UED-80) corresponds to the COPS reference guidelines for UED-80 and was used to develop and evaluate options for Segment B of the study area. A design speed of 80 km/h is used for this study as a conservative assumption and for consistency with the COPS. However, the existing posted speed of 50 km/h through Segment B may be maintained with any improvements to align with the District of Lake Country's desires and vision for the community.

The proposed design criteria for Rural Arterial Divided – 90 km/h (RAD-90) reflects a new project design criterion that fits between the COPS reference guidelines for RAD-80 and RAD-100. This new RAD-90 project design criteria was used for Segment A of the study area, where the existing posted and design speed is 90 km/h.

The complete design criteria proposed for this study is included in **Appendix E**.

Table 4.1: Proposed Project Design Criteria – Highway 97

Function	MoTI / TAC Guidelines	Proposed Project Design Criteria	
	UED-80 (COPS Reference Guideline)	UED–80 (Segment B)	RAU–90 (Segment A)
Posted / Design Speed	80 km/h posted & design	80 km/h posted & design	90 km/h posted & design
Minimum Intersection Spacing	0.8 – 2.0 km	0.8 – 2.0 km	0.8 – 2.0 km
Maximum Grade	5 – 7%	5 – 6%	5 – 6%
Minimum Horizontal Radius	250 m	250 m	340 m
Lane Width	3.7 m	3.7 m	3.7 m
Shoulder Width Outside	3.0 m	3.0 m	3.0 m
Shoulder Width Inside	1.0 m	1.0 m	1.0 m
Median Width	2.6 m	2.6 m	2.6 m
Design Vehicle	WB-20	WB-20	WB-20
Minimum Stopping Sight Distance (SSD)	113 – 140 m	140 m	170 m

4.4.1 Highway Grades

As stated above in **Table 4.1**, the TAC and MoTI guidelines recommend maximum road grades of 5 to 7% on highways such as Highway 97. The COPS proposed a desirable maximum highway grade of 5% but noted that 6% is more realistic due to topographical constraints in the area.

4.4.2 Access Management and Spacing

The TAC Guide was reviewed to determine present day best practices for the spacing of interchanges and intersections and the findings are summarized below.

Interchange Spacing – The TAC guidelines for minimum interchange spacing is summarized below in **Table 4.2**. Section 10.3 of the TAC Guide recommends that interchanges should be spaced 3 to 8 km apart in rural areas, and 2 to 3 km apart in urban areas. However, on freeways in urban areas, Section 2.6.4 of the TAC Guide recommends minimum interchange spacing of 1.6 km.

Table 4.2: TAC Guidelines – Minimum Interchange Spacing

Rural Roads	Urban Roads	Urban Freeways
3.0 – 8.0 km	2.0 – 3.0 km	1.6 km

Typically, interchanges should be located at major roads (i.e. arterial roads) or to provide a connection to an important community area. While the general interchange spacing rules should be considered in the planning of highway corridors, the TAC Guide recommends that closer spacing of interchanges may be appropriate where weaving analysis is undertaken to confirm the volume of traffic merging on and off the highway, and where traffic weaving does not result in undesirable traffic performance conditions. Vehicle weaving analysis helps to confirm the capacity, performance, and safety of closely spaced interchange ramps. Thus, weaving analysis has been undertaken in HCS software for the interchange configurations where recommended minimum spacing cannot be achieved.

This study will aim for a minimum interchange spacing of 1.6 km and preferably 2.0 km, which aligns with the TAC Guide for Urban Freeways and the COPS Project Planning and Design Guidelines.

Intersection Spacing – Section 2.6.4 of the TAC Guide recommends minimum spacing between intersections in urban areas of 400 m and 800 m for major arterials and expressways, respectively, as summarized below in **Table 4.3**. The BC MoTI Electrical & Traffic Engineering Manual states that signalized intersections spaced less than one kilometer apart should be assessed to confirm if signal coordination is required. Signal coordination should be implemented on corridors where the resulting vehicle platooning, and progression maintains acceptable mobility performance.

Table 4.3: TAC Guidelines – Minimum Intersection Spacing

URBAN ROADS		
Minor Arterials	**Major Arterials**	**Expressways**
200 m	400 m	800 m

This study will aim for a minimum intersection spacing of 800 m, which aligns with the TAC guidelines for expressways and COPS Project Planning and Design Guidelines.

4.5 LOCAL ROAD DESIGN CRITERIA

The proposed design criteria used for arterial, collector and local roads corresponds to the District of Lake Country's (DoLC) Subdivision and Development Servicing Bylaw 985. The design criteria for the District of Lake Country's roads are summarized in **Table 4.4.** The complete design criteria sheets for local roads are also included in **Appendix E**.

Table 4.4: Project Design Criteria – Local Roads

Function	DoLC Subdivision and Development Servicing Bylaw 985, 2016 Standards		
	Arterial Road	Collector Road	Local Road
Posted / Design Speed	50 km/h posted / 70 km/h design	50 km/h posted / 70 km/h design	50 km/h posted / 50 km/h design
Maximum Grade	9%	9%, up to 11%	8%, up to 12%
Minimum Horizontal Radius	190 m	130 m	95 m
Lane Width	3.5 m	3.5 m	3.5 m
Shoulder Width Outside	2.0 m	1.5 m bike lane	1.5 m bike lane
Shoulder Width Inside	1.8 m	-	

For local roadways, this study has applied the local standards for road grades where possible, as stated above in **Table 4.4**. As a range is stated in the District of Lake Country's bylaw, this study has assumed the maximum allowable road grades of 10% and 12% for local and collector roads, respectively, as summarized below in **Table 4.5**.

Table 4.5: Proposed Design Criteria – Road Grades

Road Classification	Proposed Maximum Road Grade
Arterial Road	9%
Collector Roads	10%
Local Roads	12%

5.0 CONCEPT OPTION GENERATION & SCREENING

The concept generation for the study area of Highway 97 through Lake Country was completed in stages to determine potential access and network solutions. First, feasible highway crossing opportunities were identified within the study area. The feasible locations were then investigated further where concepts were developed that focused on the long-term goal of grade-separated highway accesses. Additional network improvements were considered in the option development process including other highway accesses, backage and frontage roads, and local road connections. The option development process and identified improvement concepts for the Highway 97 Lake Country study area are described below.

5.1 HIGHWAY CROSSING OPPORTUNITIES

The first step in the option development process was to identify the potential highway crossing opportunities. The design criteria, discussed in **Section 4.4**, was used to assess the feasibility of crossing locations. The high-level screening exercise considered all locations on Highway 97 within the study area for a potential highway crossing, under and/or over the highway. The factors that were assessed included roadway grades on the local roads crossing the highway, grades on Highway 97 itself, and potential land impacts and constraints.

The locations that were reviewed in this highway crossing opportunity assessment are illustrated and described on the following page in **Figure 5.1** and **Table 5.1**. **Table 5.1** summarizes the following characteristics for each location:

- The type of crossing that was studied for the location (under or overpass).
- If the crossing was included in the COPS Option Generation.
- The crossing road design classification and corresponding maximum road grade from the proposed design criteria.
- The critical (or maximum) grade experienced with an overpass option and if it meets the proposed design criteria.
- The critical (or maximum) grade experienced with an underpass option and if it meets the proposed design criteria.

The feasible crossing locations identified through this exercise were then used as a basis to develop network access and connectivity solutions.

It should be noted that an active transportation crossing may be feasible at many more locations than interchanges and highway crossings as design criteria for grades are less strict and the required footprint may be significantly smaller.

Table 5.1: Highway Crossing Screening Summary

Drawing Reference	Potential Crossing Location	Type of Crossing Available	COPS Option	*Design Criteria*		Overpass		Underpass[4]	
				Design Classification	*Max Grade (%)*	Critical Grade (%)	Feasibility	Critical Grade (%)	Feasibility
1	**Turtle Lodges Resort**	Crossing Only	N	*Collector*[1]	*10.0*	9.0	X[3]	8.5	■ [3]
2	**West of The Jammery**	Mini-Interchange	N	*Future Collector*	*10.0*	9.0	✓	N/A	
3	**Commonwealth Rd**	Interchange	Y	*Future Collector*	*10.0*	7.8	✓	7.8	■
4	**OKIB (North of Commonwealth)**	Interchange	Y	*Future Collector*	*10.0*	8.2	✓	10.6	X
5	**Harwood Rd**	Interchange	N	*Future Arterial*	*9.0*	8.0	✓	9.0	■
6	**Janet Rd**	Interchange	Y	*Local*[2]	*12.0*	12.3	X	15.6	X
7	**Okanagan Centre Rd E**	Mini-Interchange	N	*Local*	*12.0*	12.0	✓	10.0	■
8	**Winfield Rd #1**	Crossing Only	N	*Local*	*12.0*	20.5	X	17.8	X
9	**Winfield Rd #2**	Mini-Interchange	N	*Local*	*12.0*	12.0	✓	N/A	
10	**Winfield Rd #3**	Crossing Only	N	*Local*	*12.0*	22.4	X	10.0	■
11	**Pollard Rd**	Crossing Only	Y	*Local*	*12.0*	24.8	X	19.2	X
12	**Between Pollard Rd & Berry Rd**	Crossing Only	Y	*Local*	*12.0*	41.3	X	18.0	X
13	**Berry Rd**	Crossing Only	Y	*Local*	*12.0*	20.4	X	15.3	X
14	**Lodge Rd #1**	Interchange	Y	*Collector*	*10.0*	9.0	✓	>12.0	X
15	**Lodge Rd #2**	Crossing Only	N	*Collector*	*10.0*	9.0	✓	N/A	

Table Legend

✓ **Feasible**

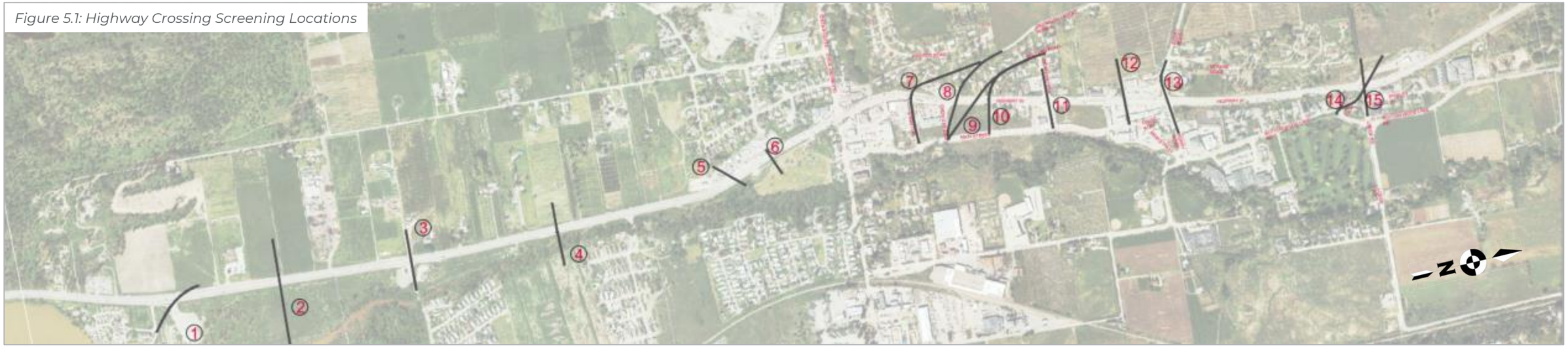
■ **Potentially Feasible**

X **Not Feasible**

Table Notes:

1. Maximum grade for collector roads for limited adverse topographic conditions is 11% upon DoLC Engineer approval.
2. Maximum grade for local roads for limited adverse topographic conditions is 12% upon DoLC Engineer approval.
3. While maximum grade can be met for Turtle Bay Resort crossing, the sag curves do not meet design criteria. Further, an underpass in this location would be challenging due existing highway grades and adjacent groundwater sources.
4. Many constraints exist for the underpass options that meet design grades, but require further feasibility review based on geotechnical review, utilities and hydrology.

Figure 5.1: Highway Crossing Screening Locations



5.2 LOCAL ROAD NETWORK CONNECTIVITY OPPORTUNITIES

In addition to the local road connections identified in the District of Lake Country's plans, other local, frontage, and backage road options were considered to support local road network connectivity within Lake Country and in conjunction with Highway 97. These sub-options were also proposed to support the long-term goal of consolidating direct access to the highway.

The following local road connections were considered with all of the future highway access options to further optimize the local road network connectivity:

- A local road connection between Newene Road and north to Pretty Road (identified as a future road in the District of Lake Country's Transportation for Tomorrow Road Improvement Plan as the "Lodge Road Extension").
- Extension of Read Road east to connect with Pollard Road (a similar connection is identified as a future road in the District of Lake Country's Transportation for Tomorrow Road Improvement Plan as the "Pollard Road Extension").

5.3 INITIAL CONCEPT OPTION DEVELOPMENT

Based on the previous highway crossing review, many improvement options were initially developed for the study area of Highway 97 through Lake Country to address the identified issues. These improvement options considered major and minor highway accesses, backage and frontage roads, and local road connections. The identified concepts were developed by segment to optimize the overall network and to meet the existing and future interim and long-term transportation needs of the corridor.

The first iteration of concept options for the study area involved combining the segment options into three overall Transportation Network Packages (TNP). Each TNP consisted of a combination of potential access and interchange improvements, intersection / access restrictions, and a variety of sub-options for local road connections. The TNPs are described and shown in **Appendix F**.

5.4 OTHER CONCEPT OPTIONS CONSIDERED & SCREENED-OUT

Two additional concepts were developed and presented to MoTI project team members and the TAC and CLC groups.

5.4.1 Option A-2: Glenmore Rd to Jim Bailey Rd (South Alignment)

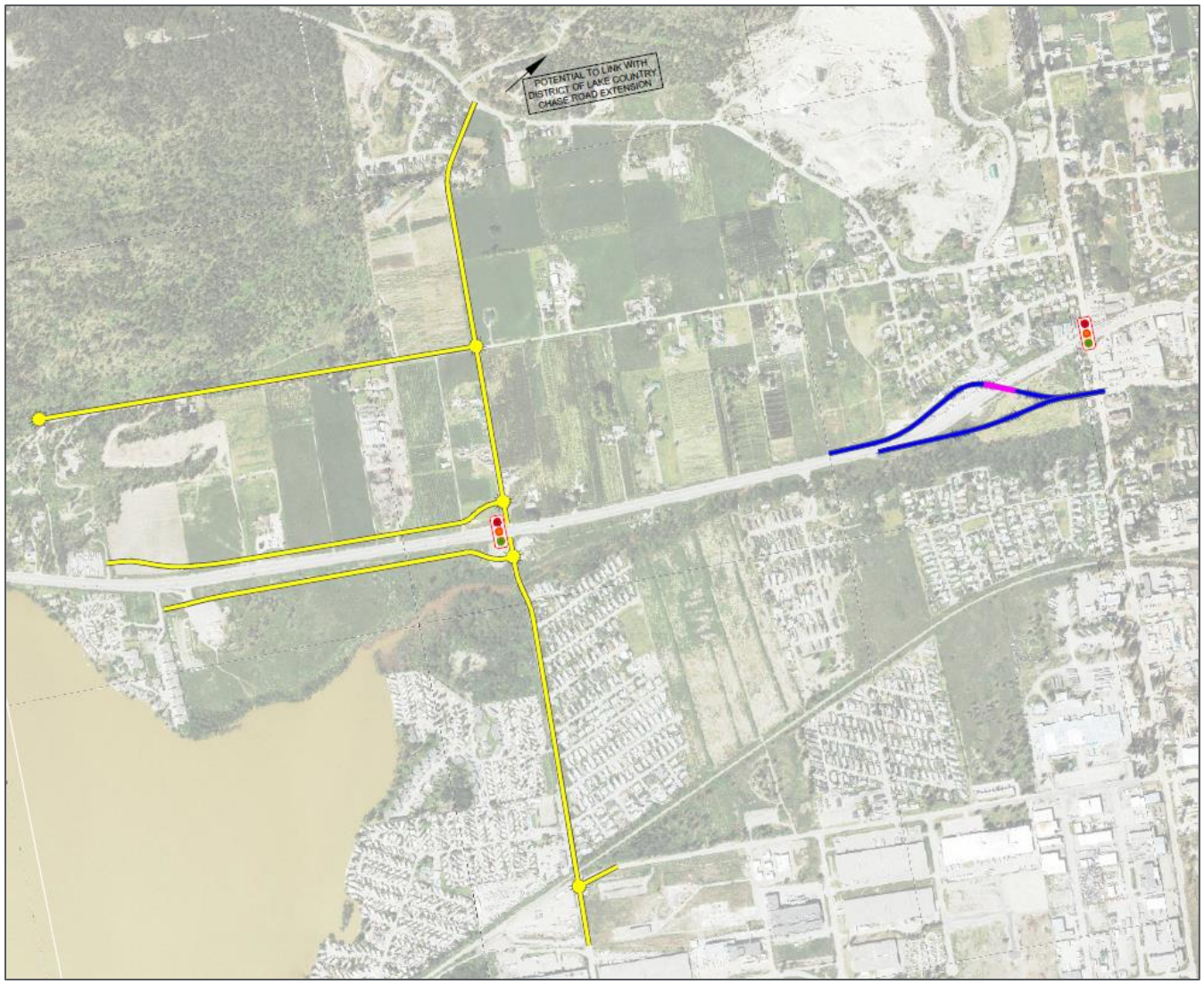
The original alignment of Option A-2 (as shown in TNP-2) created a key highway access approximately mid-way between the existing Commonwealth Road and Glenmore / Beaver Lake Road intersections. The new road alignment connected west to Glenmore Road and east through the OKIB to Jim Bailey Road.

Based on discussions with stakeholders, this alignment was shifted further north closer to Voyager RV as it was determined to be more desirable for access to the east side of Highway 97 and OKIB. Additionally, the initial alignment further south was screened-out as it has more land and environmental impacts and would be more challenging to construct.

5.4.2 Option A-4: Main Street Connection with Commonwealth Intersection Upgrade

Option A-4 consists of a highway fly-under just south of the existing Glenmore / Beaver Lake Road intersection to provide direct connection for southbound traffic on Main Street to Highway 97. A highway off-ramp accommodates northbound traffic from Highway 97 to Main Street. This connection supports traffic between the Winfield Town Centre and heading southbound towards Kelowna and could be considered as a "gateway" into Winfield. Further, Option A-4 includes a new road from Glenmore Road to the Highway 97 / Commonwealth Road intersection, as illustrated below in **Figure 5.2**.

Figure 5.2: Option A4 – Main Street Connection Concept



This concept was screened-out since it does not achieve the project objectives and does not meet the forecasted long-term needs of the corridor. However, the Main Street connection piece of this concept may be considered in the future if a direct connection between the Winfield Town Centre and Highway 97 is desired, and if it is geometrically and operationally feasible with a future preferred option.

5.5 REFINED CONCEPT OPTIONS

Based on stakeholder feedback and further assessment, the improvement options were modified and refined further. The final iteration of potential improvement options for the study area are described below by segment, consisting of three options for Segment A and one for Segment B:

- Option A-1: Glenmore Rd to Commonwealth Rd
- Option A-2: Glenmore Rd to Jim Bailey Rd (North Alignment)
- Option A-3: Glenmore Rd to Main Street
- Option B-1: Winfield Town Centre

The developed improvement options aim to accommodate forecasted traffic demands to the 25-year horizon; However, they require significant modifications to the Highway 97 corridor with grade-separated interchanges due to increasing traffic volumes. While these improvements achieve the project objectives and guiding principles, the construction timeline may be lengthy. Existing issues within the study area support the desire for a solution in the short-term; therefore, interim phase options were also developed (where feasible) that may have a shorter implementation schedule and could be staged with the ultimate horizon options.

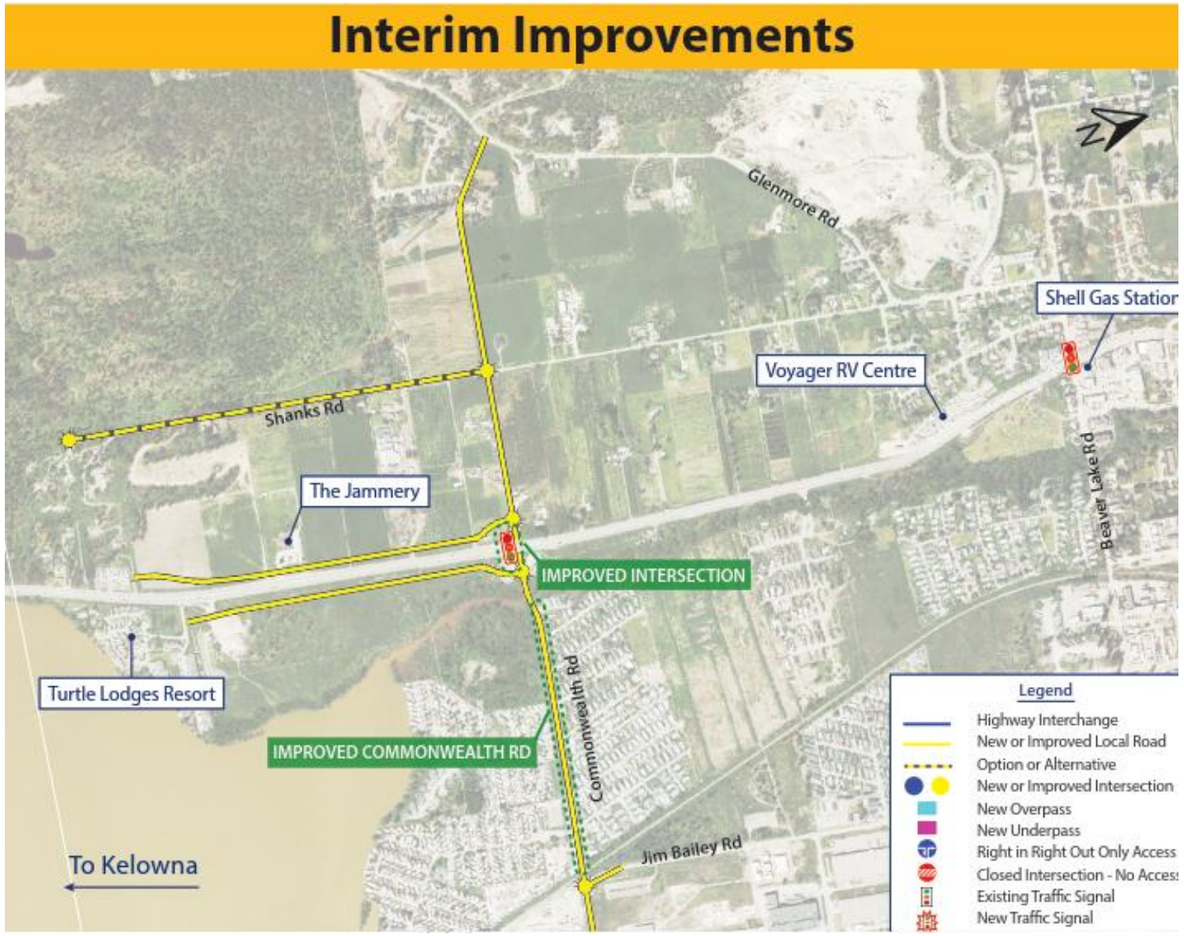
5.5.1 Option A-1: Glenmore Rd to Commonwealth Rd

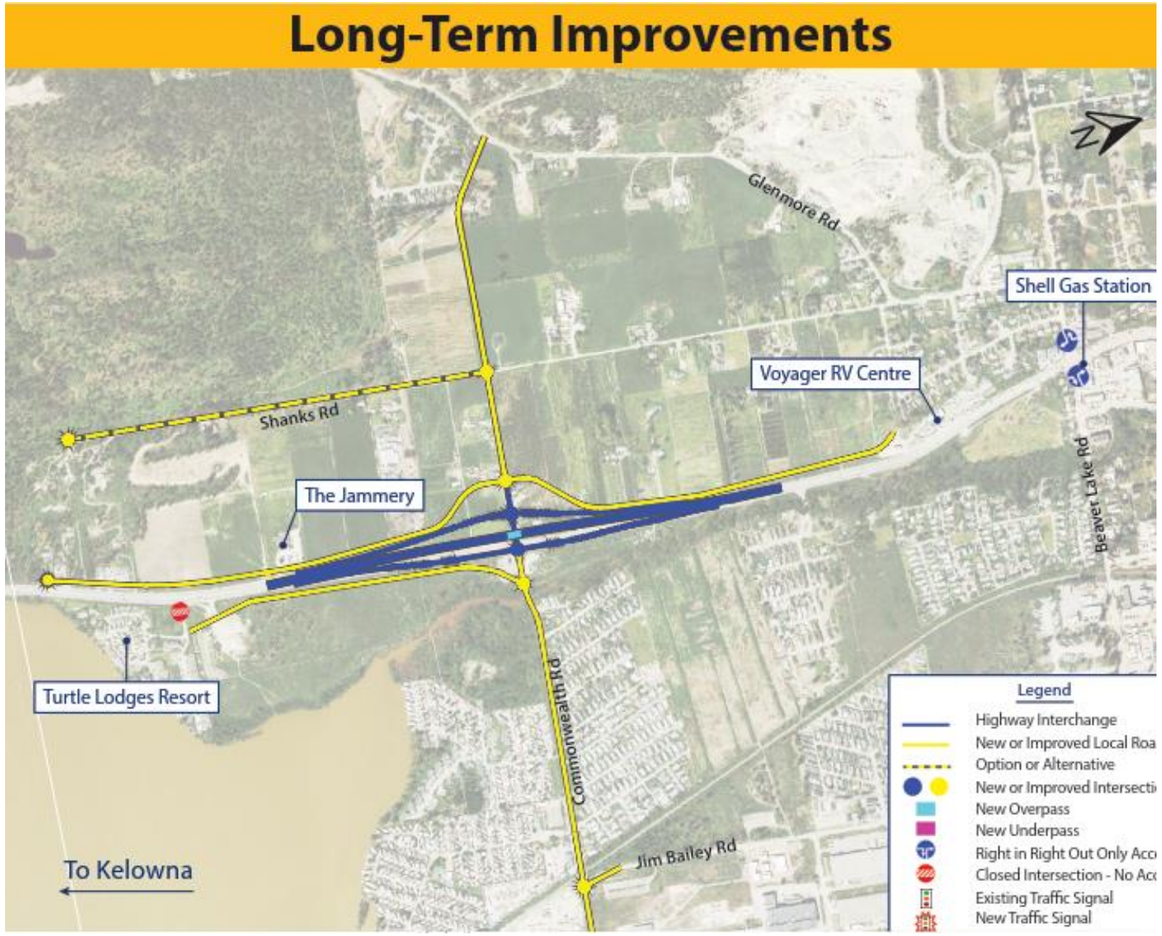
Interim Improvements Description: Option A-1 includes an upgraded highway access at Commonwealth Road with a new road connection from Glenmore Road to the existing Commonwealth Road intersection. In the interim, this intersection would remain signalized and the new road alignment would be constructed and create a fourth east leg at the Commonwealth intersection. Commonwealth Road is connected east to Jim Bailey Road to facilitate traffic between the Industrial Park on Jim Bailey Road and the highway.

To support closure of all private driveway accesses on the highway while minimizing land impacts, a frontage road network is constructed on the west side of the highway connecting with the new road alignment between the highway and Glenmore Road. Additionally, Shanks Road may be upgraded to provide backage road access to the properties in this segment along Highway 97. Commonwealth Road would be upgraded to accommodate the increase in traffic demand with the new connection to Jim Bailey Road and the industrial park. Upgrades may include active transportation facilities, intersection and crossing treatments, noise mitigation, connection to the Rail Trail, etc.

Long-Term Improvements Description: Option A-1 consists of replacing the signalized intersection at Commonwealth Road with a grade-separated interchange providing full movement access for all directions of traffic. The interchange requires realigning the highway to achieve acceptable road grades and provide sufficient space for constructing the interchange ramps while maintaining traffic movements during construction. The frontage road network is expanded to the north on the west side of Highway 97. The existing Glenmore / Beaver Lake Road intersection may remain open for right-in and right-out traffic since minimum intersection spacing requirements are met between it and Commonwealth Road.

The flyover between Main Street and Highway 97 (Option A-4) was considered in combination with this option to further support connectivity from the Winfield Town Centre. The distance between the ramps (approximately 550m) meets the minimum spacing requirements as per the TAC Guide, and a high-level traffic analysis indicates that the highway weaving movement between the ramps is expected to operate at LOS D at the 2045 horizon. Therefore, this additional access may be considered by the District of Lake Country in the future to provide direct access between the highway and Main Street.





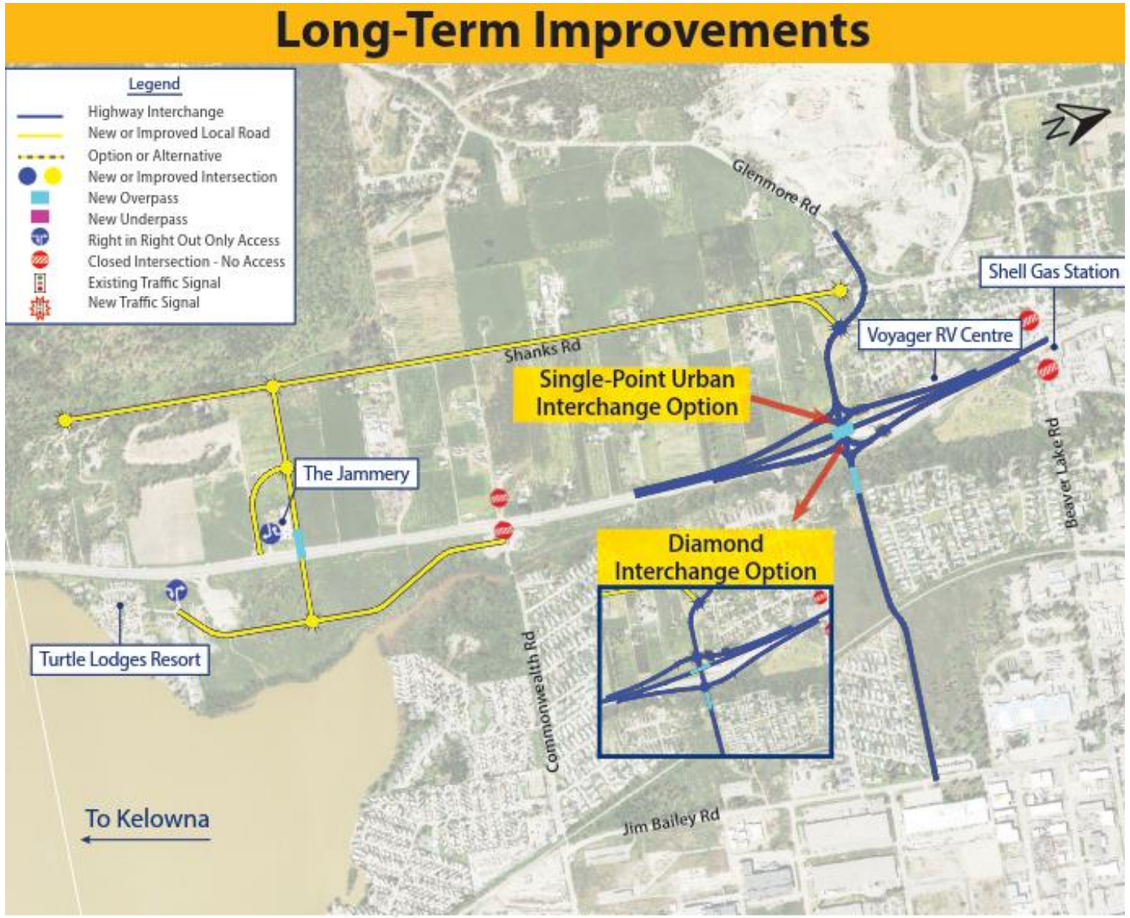
5.5.2 Option A-2: Glenmore Rd to Jim Bailey Rd (North Alignment)

The original alignment of Option A-2 (as shown in TNP-2) was moved further north during the option refinement stage, based on discussions with stakeholders. The ultimate alignment of Option A-2 is illustrated below.

Interim Improvements Description: Option A-2 proposes a new intersection on Highway 97 and new road alignments connecting Highway 97 west to Glenmore Road and east to Jim Bailey Road. The interim improvements consist of a traffic signal at the new intersection with Highway 97. The existing Commonwealth Road intersection would be closed and replaced with a mini-interchange access with overpass and supporting road connections near the Jammery at the south end of the study area. In conjunction with the mini-interchange, Shanks Road is upgraded as a backage road on the west side of Highway 97 to support closure of all private driveway accesses on the highway.

Long-Term Improvements Description: The long-term improvements for Option A-2 consist of replacing the new signalized intersection with a grade-separated interchange at the same location. Due to intersection spacing requirements and ramp construction, the existing Glenmore / Beaver Lake Road intersection would need to be closed. The interchange also likely requires realigning the highway to achieve acceptable road grades and provide sufficient space for constructing the interchange ramps while maintaining traffic movements during construction.

Three interchange design configurations were explored for this location: Single-point Urban Interchange (SPUI), traditional Diamond Interchange, and Half-Parclo (with loop ramps on the west side of the highway). The Half-Parclo interchange design was screened out due to the wide extent of land impacts and significant number of new creek crossings and riparian impacts that would be required. The SPUI and Diamond Interchange designs were included for further evaluation and are illustrated below.

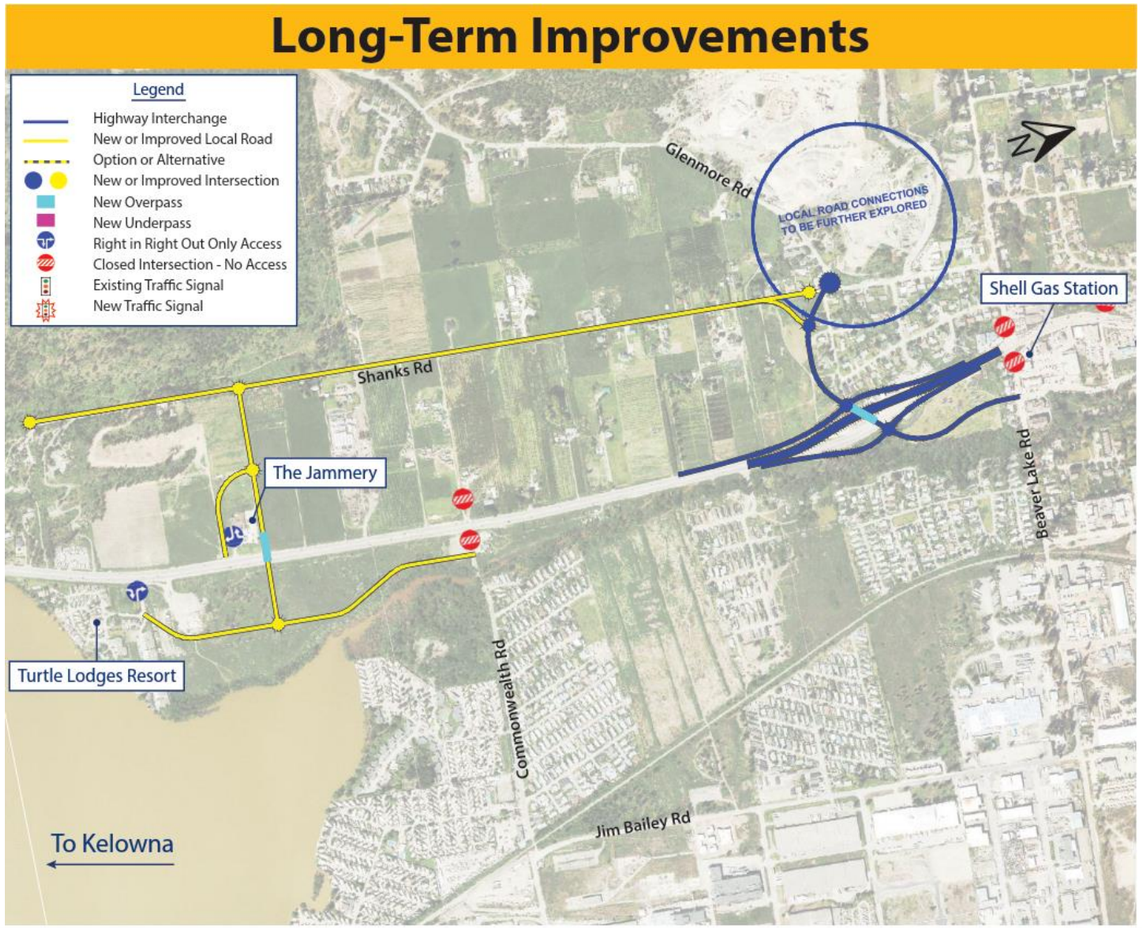


5.5.3 Option A-3: Glenmore Rd to Main Street

No feasible interim solution was determined for Option A-3, as no at-grade alignments were identified that could be reasonably staged with the grade-separated option at the same location.

Long-Term Improvements Description: The proposed interchange for Option A-3 is located just south of the existing Glenmore / Beaver Lake Road intersection, close to Harwood Road. This interchange option also requires realigning the highway to achieve acceptable road grades, positioning for the interchange ramps, and to maintain traffic flow during construction. Due to intersection spacing requirements and ramp construction, the existing Glenmore / Beaver Lake Road intersection would need to be closed.

The existing Commonwealth Road intersection would be closed and replaced with a mini-interchange access with overpass and supporting road connections near the Jammery at the south end of the study area. In conjunction with the mini-interchange, Shanks Road is upgraded as a backage road for the west side of Highway 97 to support closure of all private driveway accesses on the highway.

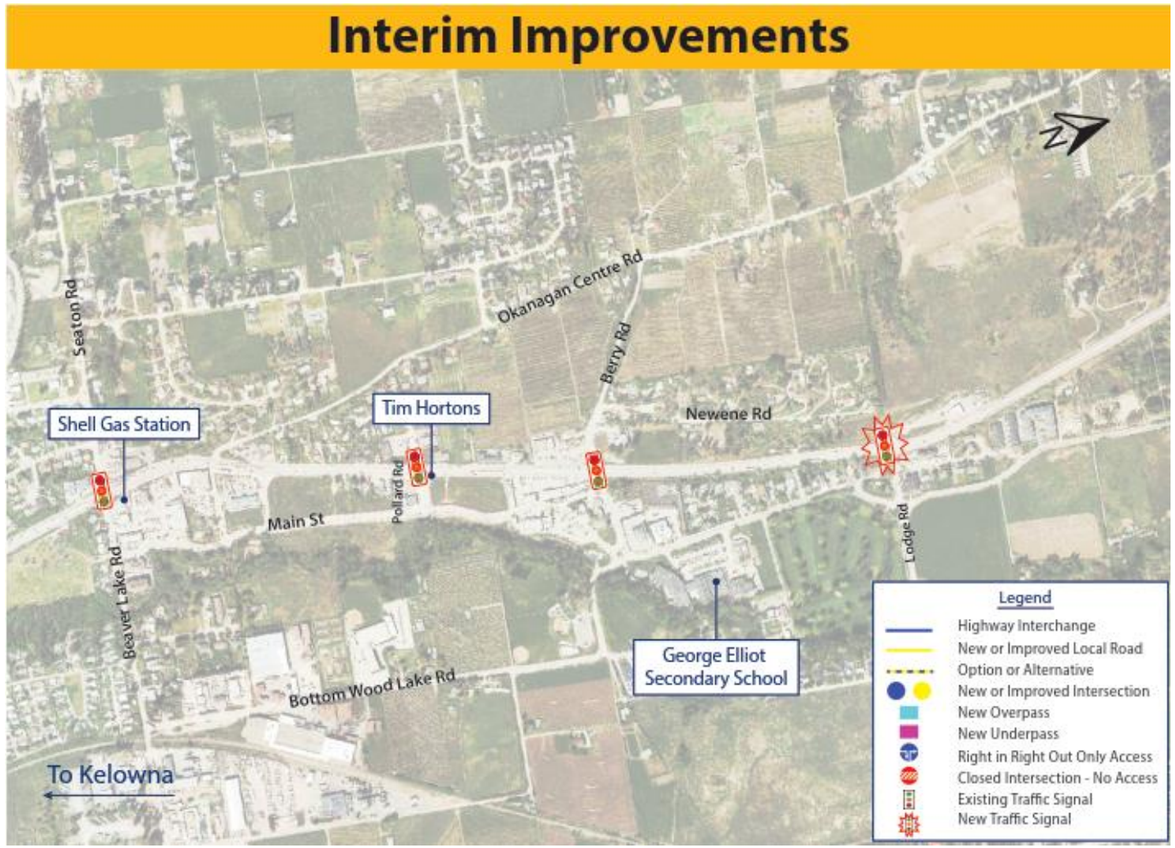


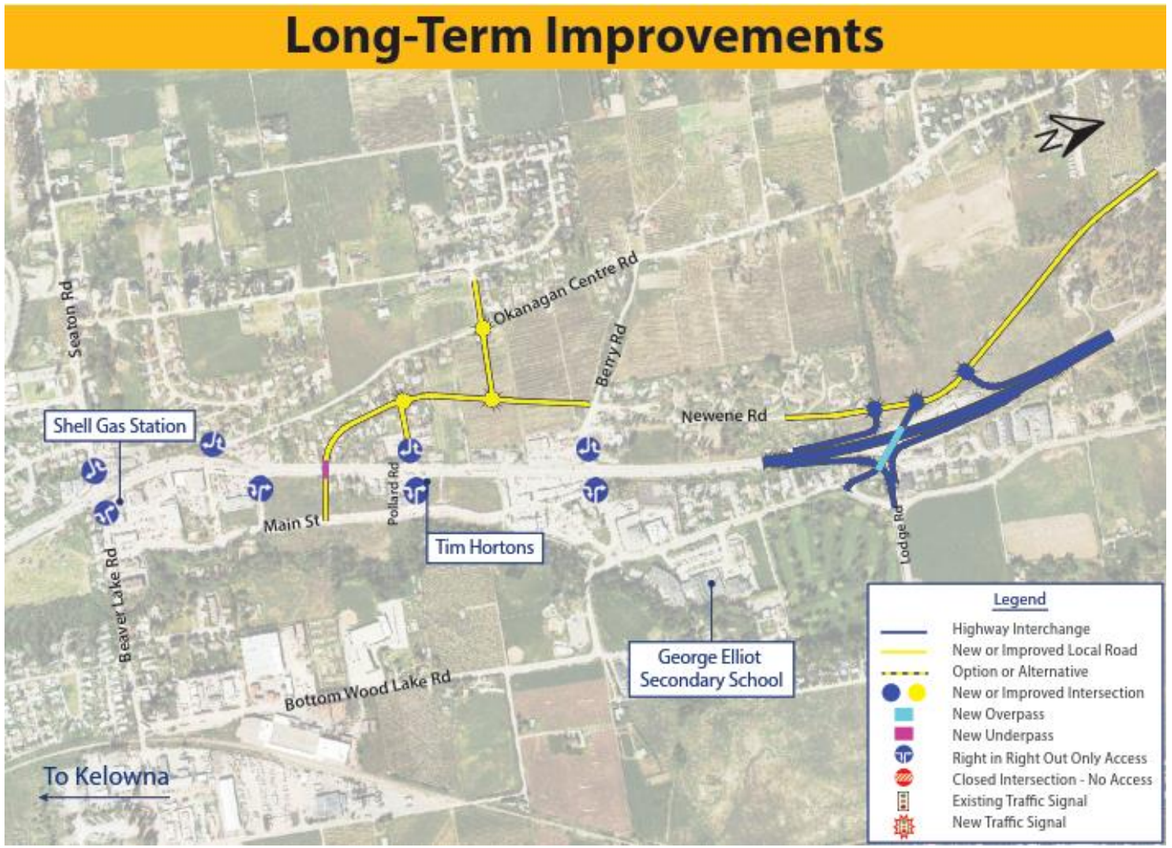
5.5.4 Option B-1: Winfield Town Centre

Interim Improvements Description: The proposed interim improvements for Option B-1 consist of installing a traffic signal at Lodge Road to improve safety and mobility at that intersection. No further improvements were identified for the interim phase of Option B-1.

Long-Term Improvements Description: In the long-term, a grade-separated diamond interchange is proposed at Lodge Road to support local road network connectivity and to eliminate the four at-grade signalized intersections and turning movement conflicts through study Segment B. This highway interchange is supplemented with a grade-separated highway crossing between the existing intersections of Winfield Road and Pollard Road that would serve as a multi-modal crossing for pedestrians, cyclists and transit vehicles. Right-in / right-out access is maintained at the existing road connections between Winfield Road and Berry Road with the potential to allow left-in access from the highway.

Additional local roads are constructed at Newene Road, and between Berry Road and Okanagan Centre Road East to further support local road network connectivity. The extension of Newene Road to Pretty Road is identified in and builds upon the District of Lake Country's plans.





5.6 CONCEPT SCREENING & ADVANCEMENT

The complete list of options that were developed for Highway 97 through Lake Country for this study are summarized below in **Table 5.2**, along with the potential option timing, and the recommended action. The recommendation action was based on a high-level option evaluation, discussions with the project team, public and stakeholder feedback, and identified design constraints, as previously documented. A total of four long-term improvement options were advanced to the Multiple Account Evaluation (MAE). Three of the corresponding interim options were also short-listed to be considered with each of the long-term counterparts.

Table 5.2: Improvement Option Development Summary

	Option	Timing & Description		Action
Segment A	Option A-1: Glenmore Rd to Commonwealth Rd	Short-Term		*Consider with Long-Term in the MAE*
		Long-Term		Advance to MAE
	Option A-2: Glenmore Rd to Jim Bailey Rd	Long-Term (South Alignment)		Screen-Out
		Short-Term (North Alignment)		*Consider with Long-Term in the MAE*
		Long-Term (North Alignment)	Diamond Interchange	Advance to MAE
			Half-Parclo	Screen-Out
			Single-Point Urban Interchange	Screen-Out
	Option A-3: Glenmore Rd to Main St	Long-Term		Advance to MAE
	Option A-4: Main St Connection	Mid-Term		Screen-Out
Segment B	Option B-1: Winfield Town Centre	Short-Term		*Consider with Long-Term in the MAE*
		Long-Term		Advance to MAE

6.0 MULTIPLE ACCOUNT EVALUATION

Four long-term options were advanced to and assessed in the MAE as listed below:

1. Option A-1: Glenmore Rd to Commonwealth Rd
2. Option A-2: Glenmore Rd to Jim Bailey Rd
3. Option A-3: Glenmore Rd to Main St
4. Option B-1: Winfield Town Centre

The criteria included in the MAE and results of the four long-term options are summarized in the following section, with further details attached in **Appendix G**.

6.1 CONCEPT DESIGNS AND COST ESTIMATES

The conceptual design drawings and class D planning-level construction cost estimates for each of the four options listed above are included in **Appendix H** and **Appendix I**, respectively. These cost estimates include the capital investment costs for planning, project management, design and engineering, environmental, construction, and regional recoveries and a contingency of 40% has been applied to each of these cost elements. These construction cost estimates do not represent total project costs and do not include First Nations consultation and accommodation. archaeological assumptions, or property acquisition costs (addressed separately in Property Impact Assessment provided in **Appendix J**). Quantities for the cost estimates have been developed from the conceptual designs and items, and unit rates are based on the MoTI's Historical Construction Cost Data website

6.2 MAE CRITERIA

The criteria assessed in the MAE aimed to capture all key considerations and differences between competing improvement options. Some of the criteria could be quantified and others were assessed qualitatively. All criteria included in the MAE of the options for this study are summarized below in **Table 6.1**. Details on the methodology and assumptions used in the MAE can be found in **Appendix G**.

Table 6.1: MAE Criteria

Account	Criteria	Measure	
		Quantitative	Qualitative
Financial	Construction Cost	✓	
	Maintenance	✓	
	Salvage Value	✓	
	Phasing Potential		✓
	Constructability		✓
Customer Service	Safety Benefits	✓	
	Reliability Benefits	✓	
	Travel Time Savings	✓	
	Vehicle Operating Costs	✓	
	Network Connectivity		✓
	Active Transportation Integration		✓
	Transit Integration		✓
Social / Community	Residential Impacts		✓
	Business Impacts		✓
	ALR Impacts		✓
	Noise Impacts		✓
	Visual Impacts		✓
	Future Growth & Development		✓
	Consistency with Land Use & Community Plans		✓
Environmental	Greenhouse Gas Emissions	✓	
	Wetlands & Riparian Impacts		✓
	Wildlife & Habitat		✓
Economic Potential	Benefit Cost Comparison		✓

6.3 SEGMENT A OPTIONS MAE SUMMARY

The results of the MAE for each of the Segment A Options are summarized below and in **Table 6.2**.

Financial Account

Option A-1 has the highest expected lifecycle costs, and Option A-2 has the lowest. Options A-2 and A-3 scored negative for constructability and phasing potential, respectively: Option A-2 may have constructability challenges due to the local topography and environmental constraints. No feasible interim option was identified for Option A-3, unlike the other options. Option A-1 scored positively for both the constructability and phasing potential criteria.

Customer Service Account

All three options in Segment A are expected to provide significant customer service benefits regarding safety, reliability, travel time, and vehicle operating costs. Option A-3 results in marginally higher benefits compared to the other two options. All three options enhance network connectivity. Active transportation integration was scored neutral for all three options since active transportation facilities will be provided or improved where possible in all concepts and provide similar connectivity. The transportation network proposed in Option A-3 has the highest potential to integrate with transit with the proposed Main Street Connection link to the Winfield Town Centre.

Social / Community Account

All three options are expected to impact ALR lands, while Option A-1 is expected to least impact business and residential properties. Compared to the other options, Option A-1 is considered to have highest impact on noise and aesthetics, mostly due to the increased traffic on Commonwealth Road.

The alignments proposed in Options A-2 and A-3 have higher potential to encourage future growth and development, compared to Option A-1, since these two alignments bring traffic closer to the town centre and developable lands. Compared to the other options, Option A-3 most closely aligns with community plans in the area, again, since it provides a direct connection from the highway to the Winfield Town Centre, for transit and economic considerations.

Environmental Account

Greenhouse gas emissions are reduced under all three option scenarios. Wildlife and habitats are not expected to be impacted by any of the options, however, Options A-2 and A-3 are more likely to impact wetlands and riparian areas, relative to Option A-1, since they require more new creek crossings, and the proposed alignments are through or near wetland areas.

Economic Potential Account

The results of this technical analysis found that all three options in Segment A have a positive benefit-cost ratio, indicating that all options provide high lifecycle benefits that outweigh the total costs. Therefore, based on this evaluation, all Segment A concepts are considered viable options for implementation.

Table 6.2: Multiple Account Evaluation Summary of Segment A Options

ACCOUNT	25-Year		
FINANCIAL	**Option A-1**	**Option A-2**	**Option A-3**
Construction Cost	$66.6M	$50.9M	$62.4M
Maintenance	$1.2M	$1.1M	$1.1M
Salvage Value	($8.0)M	($6.9)M	($8.7)M
LIFECYCLE COSTS	**$ 59.8M**	**$ 45.0M**	**$ 54.9M**
Phasing Potential	Positive ↑	Positive ↑	Negative ↓
Constructability	Positive ↑	Negative ↓	Positive ↑
CUSTOMER SERVICE			
Safety	$19.2M	$15.4M	$15.5M
Reliability	$1.2M	($0.6)M	($0.5)M
Travel Time	$606.8M	$615.5M	$644.8M
Vehicle Operating Costs	$44.8M	$36.8M	$36.9M
LIFECYCLE BENEFITS	**$ 671.9M**	**$ 667.2M**	**$ 696.8M**
Network Connectivity	Positive ↑	Positive ↑	Positive ↑
Active Transportation Integration	Neutral —	Neutral —	Neutral —
Transit Integration	Neutral —	Neutral —	Positive ↑
SOCIAL / COMMUNITY			
Residential Impacts	Neutral —	Negative ↓	Negative ↓
Business Impacts	Neutral —	Negative ↓	Negative ↓
ALR Impacts	Negative ↓	Negative ↓	Negative ↓
Noise Impacts	Negative ↓	Neutral —	Neutral —
Visual Impacts	Negative ↓	Neutral —	Neutral —
Future Growth & Development	Neutral —	Positive ↑	Positive ↑
Consistency with Land Use & Community Plans	Neutral —	Neutral —	Positive ↑
ENVIRONMENTAL			
Nitrogen Oxide (NO) (Tonnes/yr)	331	348	342
Hydrocarbon (HC) (Tonnes/yr)	161	169	166
Carbon Dioxide (CO_2) (Tonnes/yr)	2,993	3,144	3,090
Wetlands & Riparian Impacts	Neutral —	Negative ↓	Negative ↓
Wildlife & Habitat	Neutral —	Neutral —	Neutral —
ECONOMIC POTENTIAL			
Benefit-Cost Comparison	Positive ↑	Positive ↑	Positive ↑

6.4 SEGMENT B OPTION MAE SUMMARY

The proposed transportation network in Option B-1 provides safety, reliability, and mobility benefits which are expected to outweigh the total costs for the project. Option B-1 also enhances the local road network connectivity and benefits active transportation users with grade-separated highway crossings to the Winfield Town Centre. However, the proposed design impacts residential properties, businesses, and ALR lands.

Table 6.3: Multiple Account Evaluation Summary of Option B-1

ACCOUNT	25-Year
FINANCIAL	**Option B-1**
Construction Cost	$45.0M
Maintenance	$0.6M
Salvage Value	($5.7)M
TOTAL	**$ 37.6M**
Phasing Potential	Positive
Constructability	Negative
CUSTOMER SERVICE	
Safety	$27.7M
Reliability	$6.6M
Travel Time	$104.0M
Vehicle Operating Costs	($22.3)M
TOTAL	**$103.9M**
Network Connectivity	Positive
Active Transportation Integration	Positive
Transit Integration	Neutral
SOCIAL / COMMUNITY	
Residential Impacts	Negative
Business Impacts	Negative
ALR Impacts	Negative
Noise Impacts	Positive
Visual Impacts	Neutral
Future Growth & Development	Positive
Consistency with Land Use & Community Plans	Positive
ENVIRONMENTAL	
Nitrogen Oxide (NO) (Tonnes/yr)	-144
Hydrocarbon (HC) (Tonnes/yr)	-70
Carbon Dioxide (CO_2) (Tonnes/yr)	-1,306
Wetlands & Riparian Impacts	Neutral
Wildlife & Habitat	Neutral
ECONOMIC INDICATORS	
Benefit-Cost Comparison	Positive

7.0 COMMUNITY ENGAGEMENT

This study involved significant engagement with stakeholders, including the project team, municipal staff and Elected Officials, First Nations, and the public. The input received throughout the project helped the technical team to develop community-minded solutions to address the transportation and infrastructure concerns within the study area. The meetings and engagement events that were facilitated throughout the study are listed below:

- 4 x Technical Advisory Committee (TAC) Meetings
- 3 X Community Liaison Committee (CLC) Meetings
- 3 X Elected Official Updates
- 4 x Okanagan Indian Band (OKIB) Staff Meetings
- 2 X CP Holder Meeting
- 1 X Public Workshop
- 1 X Public Open House

The involvement of these various groups and the input received is described in the following sections.

7.1 TECHNICAL ADVISORY COMMITTEE

The purpose of the Technical Advisory Committee (TAC) was to be a forum for technical-level dialogue between MoTI, local governments, and First Nations to inform and be informed by this study. The goal of the TAC was to consult with and involve technical representatives from these local groups in the infrastructure planning process. Members of the TAC were responsible for providing their input, sharing local knowledge, and reporting back to their respective organizations at the various phases of the study.

By consulting with these key representatives, the ministry obtained meaningful feedback on technical analysis and infrastructure options. Working directly with the local governments and First Nations throughout the highway planning process ensured that their concerns and aspirations were consistently understood and considered and directly reflected in the proposed infrastructure options.

Chaired by the project manager from MoTI, the TAC consisted of transportation, planning, and/or engineering staff from:

- MoTI,
- District of Lake Country,
- Okanagan Indian Band,
- City of Kelowna, and
- Regional District of Central Okanagan.

The TAC met on four separate occasions over the duration of the project, as summarized below in **Table 7.1**.

Table 7.1: Technical Advisory Committee Meetings Summary

MEETING DATE	MEETING OBJECTIVES
April 17, 2019	▸ Confirm existing and future conditions ▸ Provide input on the draft problem definition statement ▸ Provide input on the draft guiding principles
October 28, 2019	▸ Present Community Engagement #1 Summary ▸ Present highway role and function, guiding principles, and design criteria ▸ Review and discuss Transportation Network Packages
November 27, 2019	▸ Review and discuss short- and medium-term options ▸ Review traffic growth forecasts and long-term options ▸ Gather feedback on options and staging to determine a preferred option
May 21, 2020	▸ Review conceptual design options and community engagement feedback ▸ Present technical option evaluation results ▸ Discuss results and next steps

7.2 COMMUNITY LIAISON COMMITTEE

The purpose of the Community Liaison Committee (CLC) was to be a forum for community-level dialogue between MoTI and related community organizations in Lake Country to inform and be informed by this study. The goal of the CLC was to consult with and involve representatives from local groups who have a high stake in the infrastructure planning process. Members of the CLC were responsible for representing their respective organizations and reporting back to their respective organization's members.

By consulting with these key community groups, the ministry obtained meaningful feedback on current and future highway transportation conditions, and infrastructure options. Throughout the study, the ministry kept CLC members informed, listened to and acknowledged community concerns and aspirations, and provided feedback on how public input influenced the Province's decisions. This ensured that the concerns and hopes of these community organizations were directly reflected in the proposed infrastructure solutions.

Chaired by the project manager from MoTI, the CLC included representatives from local industries and community organizations who have a high stake in this planning project, including:

Fortis BC
BC Hydro
Lake Country Fire Department
RCMP
BC Ambulance Service - Station 343
Lake Country Chamber of Commerce
BC Transit
Agricultural Land Commission
Okanagan Collaborative Conservation Program
Local Gravel Pit
OK Builders Supplies
Peter's Bros Construction
A G Appel Holdings Ltd
Kon Kast Products Ltd
Okanagan Boys and Girls Club
Walk Around Lake Country
Walking Club
Lake Country Running Club
Lake Country Health Planning Society
Access and Age Friendly Committee
Industrial Representative
Communications Officer (DLC)
Youth Representative
School District 23 Transportation
Okanagan Indian Band
Okanagan Rail Trail Committee
Interior Health Authority
Rotary Club of Lake Country

Three meetings were held with the CLC over the duration of the study, as summarized below in **Table 7.2**. The first meeting was concluded with a summary report, which can be found in **Appendix K**.

Table 7.2: Community Liaison Committee Meetings Summary

MEETING DATE	MEETING OBJECTIVES
June 10, 2019	▸ Present summary of technical findings from the existing and future conditions assessment ▸ Gather CLC input on existing highway and transportation conditions ▸ Gather CLC input on ideas and areas of opportunity to improve highway and transportation conditions in the future ▸ Understand what is most important to CLC
October 28, 2019	▸ Present Community Engagement #1 Summary ▸ Present highway roles & function, guiding principles, and design criteria ▸ Review and discuss Transportation Network Packages
May 19, 2020	▸ Review conceptual design options and community engagement feedback ▸ Present technical option evaluation results ▸ Discuss results and next steps

7.3 ELECTED OFFICIALS

Elected Officials from the District of Lake Country were updated on the project progress at three key milestones throughout the study, as summarized below in **Table 7.3**. The project was also presented to City of Kelowna Elected Officials at the close of the study to present the project outcomes and recommendations.

Table 7.3: Elected Officials Updates Summary

MUNICIPALITY	MEETING DATE	MEETING OBJECTIVES
District of Lake Country	March 26, 2019	▸ Present planning study process, project overview and previous work, and community engagement plan
District of Lake Country	November 19, 2019	▸ Review project and community engagement update ▸ Present the Problem Definition Statement and Guiding Principles ▸ Discuss potential interim and long-term solutions
District of Lake Country	July 7, 2020	▸ Present the study outcomes and next steps
City of Kelowna	July 13, 2020	▸ Present the study outcomes and next steps

7.4 OKANAGAN INDIAN BAND

Okanagan Indian Band (OKIB) was engaged throughout the study process over a variety of communication meetings and forums. Correspondence via email and phone was conducted regularly, and more formal meetings were held with OKIB staff and Council.

The project team attended and presented at an OKIB Community Meeting on June 10, 2019, where they introduced the planning study process and objectives. The objective of the engagement was to gather input on existing transportation conditions and ideas and opportunities to improve the highway and study area. Another key objective of the meeting was to understand what is most important to the OKIB community.

CP Holders near Indian Reserve #7 (Duck Lake Indian Reserve) were also consulted with individually to inform them of the project progress and to gather input and feedback critical to the project's development.

In addition to specific engagement with the OKIB community and Council, staff from OKIB were represented as members on the TAC and CLC.

7.5 PUBLIC WORKSHOP

The first public engagement event was a workshop held on June 19th, 2019 between 7:00 pm and 9:00 pm at the District of Lake Country Senior's Activity Centre. The purpose of the workshop was to review and verify the findings of the existing and future conditions assessment. Over 70 people attended and participated in the first public engagement event.

The workshop was facilitated using a "World Café" format to gather input on the existing conditions of the study area and help form the guiding principles that were the basis for option development. The workshop portion of the event focused on three main topics:

- Traffic, Mobility and Safety
- Walking, Cycling and Transit
- Land Use and Environment

The workshop concluded with a discussion on the potential Guiding Principles and then an overview of the next steps for the project. The feedback obtained at the workshop is summarized in the Public Engagement #1 Summary Report included in **Appendix K**.

7.6 PUBLIC OPEN HOUSE

The second public engagement event was an open house held on February 5th, 2020 between 3:00 pm and 7:00 pm at Winfield Memorial Hall. The purpose of the public engagement event was to present the project to the public, summarize previous stakeholder feedback, and gather public input on the four potential improvement options:

- Option A-1: Glenmore Road to Commonwealth Road
- Option A-2: Glenmore Road to Jim Bailey Road
- Option A-3: Glenmore Road to Main Street
- Option B-1: Winfield Town Centre

A total of 136 participants attended the public open house. Twelve members of the project team (seven ministry staff and five Urban Systems employees) were present at the event to engage in discussion with the public attendees and to provide clarification and answer any questions that arose during the event.

The ministry also utilized PlaceSpeak, an online location-based citizen engagement platform, to supplement the in-person engagement. On PlaceSpeak, participants could access the project information and details, and provide feedback in the form of a feedback survey and open discussion (utilizing PlaceIt and the Discussion Board tools). In addition to the online feedback opportunities through PlaceSpeak, participants could submit the feedback form in-person at the open house or via mail or email to the project manager. Community members also submitted emails to the project manager containing further comments, ideas and concerns related to the information presented at the public open house.

The second public engagement event and feedback results are described in the Public Engagement #2 Summary Report included in **Appendix K**. The feedback results for each specific option are summarized below:

Option A-1

Concern was noted about increasing truck traffic on Commonwealth Road and how that would impact the residents and community in the area.

Support for this option related to improving access between Highway 97 and the Jim Bailey industrial area and utilizing the existing road network.

Option A-2

Overall feedback for Option A-2 was evenly split between positive and negative comments. Concerns focussed primarily on providing local road network connectivity and maintaining highway access.

Option A-3

Respondents who preferred Option A-3 over the other options liked that it appears to have fewer land impacts and provides direct connectivity with Main Street.

Participants were concerned with the impacts that Option A-3 will have on businesses along Highway 97. Community members also noted the lack of a viable interim solution, which is greatly desired.

Option B-1

Support for Option B-1 highlighted short to medium-term improvements to safety and mobility. Participants also noted that the local road network connections would enhance connectivity and active transportation.

Opposition for Option B-1 raised concerns regarding the long-term grade-separated improvements that would result in increased speeds along Highway 97 and increased traffic demand near Lodge Road.

8.0 CONCLUSION

The improvement options for the Highway 97 Lake Country study area were evaluated considering both the technical assessment and findings of the multiple account evaluation, summarized above in **Section 6.0**, and the feedback provided through community engagement, summarized in **Section 7.0**. Additional details on a potential implementation strategy, property impacts, and risk registers are included in **Appendix J**. It is noted that not all components of this potential implementation strategy are accepted or endorsed by the community representatives that have been consulted

8.1 NEXT STEPS

In February 2022, the Okanagan Indian Band, District of Lake Country, and City of Kelowna signed a memorandum of understanding to see several infrastructure projects completed in the Lake Country area. This includes opening Commonwealth Road to Jim Bailey Road, which is identified as an interim step to Option A-1. The MoTI will continue to engage with these three jurisdictions to implement both interim and long-term improvements in the study area. However, there is no funding currently committed for further design or construction for these projects and all those identified in this plan.

In addition, the MoTI will Incorporate the findings from this Highway 97 Lake Country Planning Study into the *Central Okanagan Integrated Transportation Strategy* (CO-ITS).