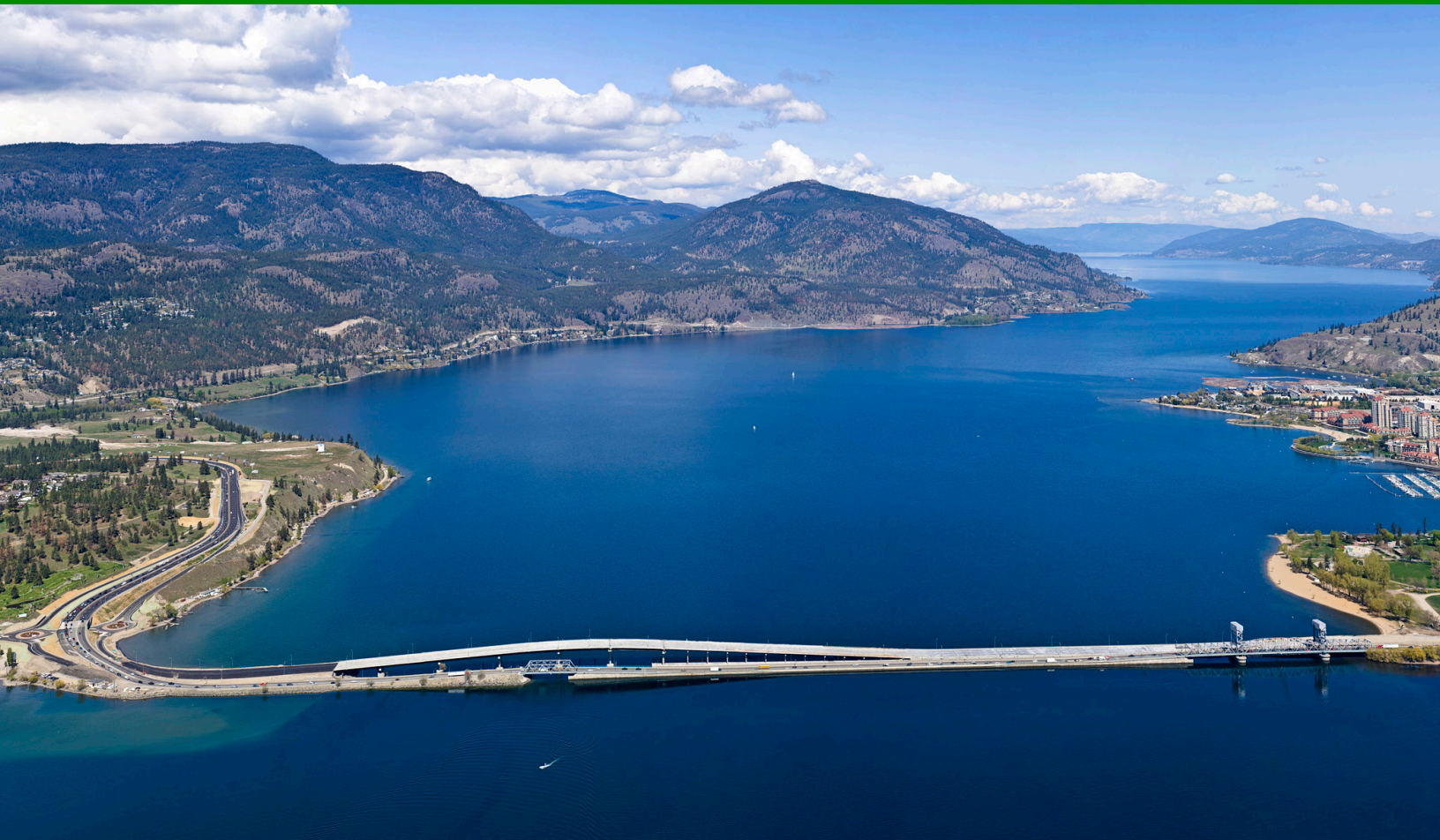


CENTRAL OKANAGAN PLANNING STUDY

Future Corridor Conditions

FINAL REPORT - DECEMBER 2016



Ministry of
Transportation
and Infrastructure

PARSONS

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1.0 INTRODUCTION

The BC Ministry of Transportation and Infrastructure (BC MoTI) has 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, including the need for a possible second crossing of Okanagan Lake.

The overall study objective is to conduct the necessary planning to define short term and long term highway infrastructure improvements through the study area. This will include:

- Assessment of current conditions on the existing Highway 97 corridor;
- Assessment and identification of future improvements for the existing corridor at 10, 25, and 40 years including supporting infrastructure such as local road and highway improvements or realignments, intersection and access road improvements;
- Identification of alternate corridors; and
- Identification of near term (0-5 years) improvements to the existing highway infrastructure in the existing corridor.

The intended result is a series of reports identifying:

- Current Corridor Conditions report including problem definition;
- Future Corridor Conditions report for the 2040 planning horizon (25 years);
- Future Corridor Performance Assessment including concept enhancements to meet 10, 25, and 40 year requirements along the existing corridor;
- Corridor Alternatives and Assessment including a comparison and assessment of the existing corridor with possible alternatives; and
- Near Term Options including concept enhancements for the near term (0-5 years).

This report presents the findings of the Future Corridor Conditions of the Highway 97 corridor for the 2040 (25 years) planning horizon. The 2040 planning horizon represents the future base scenario.

Analysis for the 40 year (or Long Range) requirements will be treated as sensitivity analysis in the Future Corridor Performance Assessment report and the Corridor Alternatives and Assessment report. Similarly, analysis for the 10 year time frame will be conducted to support the Near Term Options assessment.

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1.1 Report Purpose

The purpose of this report is to document the future corridor assumptions, the performance along the corridor in the future base planning horizon (2040), and to identify any future network and operational deficiencies. To facilitate comparisons and to identify changes, the analysis and presentation of the future performance analysis results closely follow the format and content of the results presented in the Current Conditions Report.

1.2 Study Area

The COPS study area includes the Highway 97 corridor within the Regional District of the Central Okanagan (RDCO), plus a short section from the RDCO north boundary to the College Way / Clerke Road intersection. The general study area is shown as the shaded area in **Figure 1.1** below.

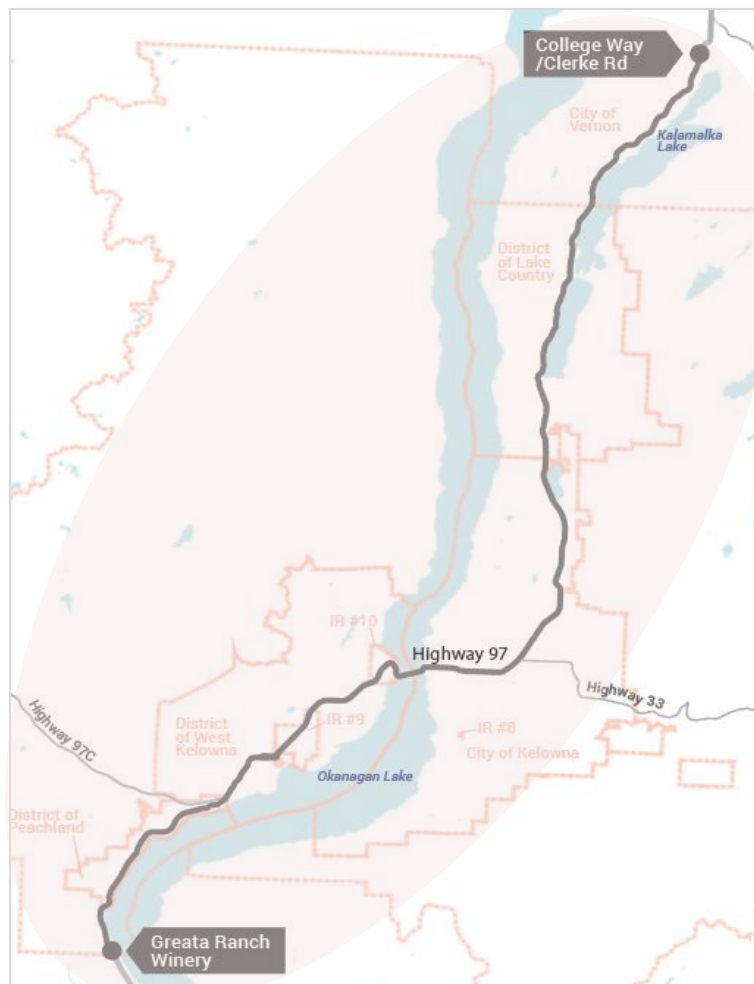


Figure 1.1: Study Area

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2.0 FUTURE TRAVEL DEMAND

This section provides a brief description of the traffic forecasting process which is based on the application of the Regional District of the Central Okanagan Transportation Model and the key inputs to generate future 2040 traffic volumes including estimated future population and employment statistics.

2.1 Future Growth and Development

Demand for transportation is influenced by land use and the activities associated with those uses. Land use is therefore a fundamental component in any traffic forecast. Forecasting future regional land uses, represented in terms of population and employment statistics, is a challenging task, particularly in the Central Okanagan region. This forecasting challenge is due to the fact that the region is comprised of several communities, each with its own Official Community Plan, growth forecasts and economic development ambitions. At the same time, regional growth and development is affected by provincial, national, and to a lesser extent, international economic influences.

For the purpose of forecasting future transportation demand in the region, and most importantly, traffic demand that will impact the provincial highway system in the region, three base land use scenarios have been developed:

- Near Term Trend – approximately 10-year horizon that assumes future growth will occur in approximately the same manner as it has in the past;
- Future Base Trend (2040) – the future base against which alternative land use and transportation scenarios will be compared, representing approximately a 25-year horizon and an assumption that growth will continue generally according to historical trends; and
- Long-Range – assumes approximately full development of lands designated within current Official Community Plans, representing a time horizon of 40 to 50 years.

The Future Base Trend represents the basis for generating the future traffic demand to be utilized in the detailed analysis of the Highway 97 corridor. The development of the Future Base Trend land use scenario, along with the other two base land use scenarios are described in the following sections.

2.1.1 Future Base Trend (2040)

The primary base forecast is the Future Base Trend. Development of this forecast was based on population and employment forecasts as described below in this section. The other base land use scenarios have been derived from this forecast.

For the purpose of populating the regional transportation model, the Future Base Trend was developed in cooperation with the Sustainable Transportation Partnership of the Central Okanagan (STPCO), a partnership of the City of Kelowna, City of West Kelowna, Districts of Lake Country and Peachland, Westbank First Nation, and the RDCO. As noted above, this scenario represents a base against which land use and transportation alternatives can be assessed.

The key growth assumption of the Future Base Trend is that past trends will continue into the future. While allocation of growth within each jurisdiction respects the land use designations within individual OCPs and other growth plans (i.e., growth only placed in areas appropriately designated), no consensus has been reached among the STPCO members regarding the rate, sequencing, and allocation of growth among the communities.

While the Future Base Trend land use scenario is the primary forecast representing the base case, it is important to note that other alternate land use scenarios can and will be tested, including some that will specifically test the sensitivity of localized alternate growth options. These sensitivity tests will be conducted through the option generation and evaluation stage of the COPS, and also through the regional transportation planning process to be completed by STPCO.

Population Growth

The BC Stats population forecast for the Central Okanagan regional district was used as the regional control population. This forecast has a regional population of 273,845 in 2040, an increase of 43% from the 2014 regional population. It should be noted that summing individual OCPs and other growth management documents for the individual communities would result in a 2040 population of 306,895.

The allocation of population growth between 2014 and 2040 to the municipalities, Westbank First Nation (WFN) and RDCO was estimated by considering past trends in the share of total population for each community, as shown in **Figure 2.1** overleaf.

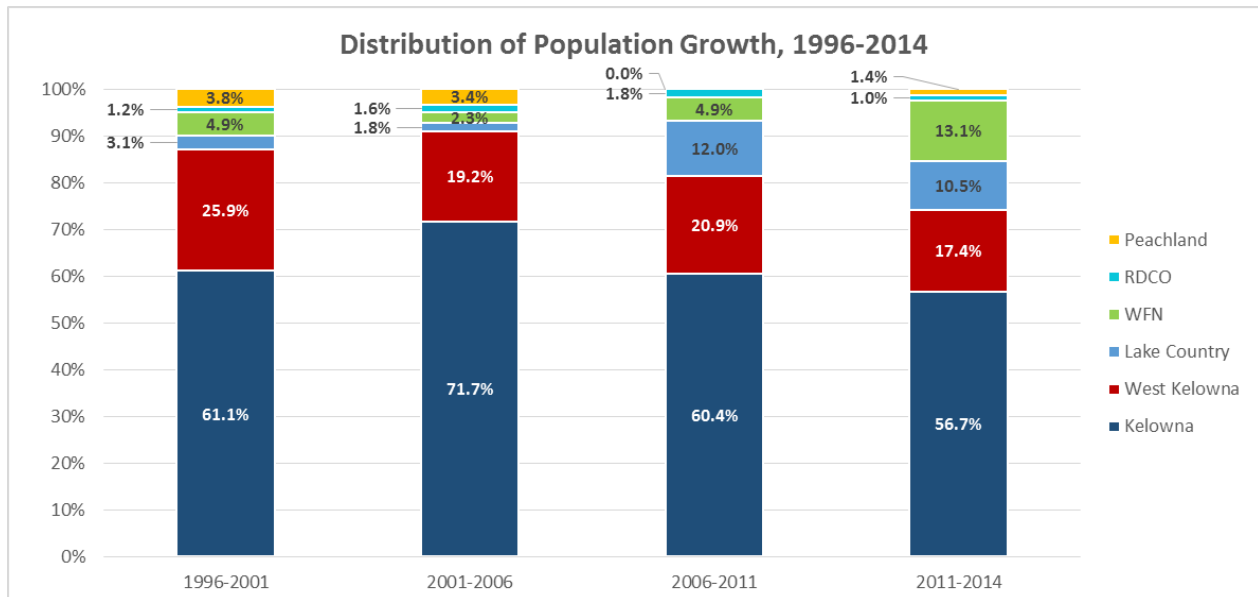


Figure 2.1: Distribution of Population Growth, 1996 to 2011 (Source: STPCO, BC Stats)

Using the regional population forecast for 2040 as produced by BC Stats, assuming the trend in historical population distribution continues among the communities, the population growth by municipality is summarized in **Table 2.1**. The municipal totals presented in **Table 2.1** are somewhat different than those presented in the STPCO technical memorandum (see Future Land Use Technical Memorandum in **Appendix A**) as the allocation presented in the table was completed later than the original STPCO analysis and reflects minor changes that were made to assist in the traffic forecasting process. The values presented in **Table 2.1** reflect the values ultimately included in the regional traffic forecasting model.

Table 2.1: Existing and Future Base Trend Scenario Population by Community

Community	2014 Population	2014 Share of Regional Population	Base Trend (2040) Forecast Population	Base Trend (2040) Forecast Share of Regional Population
Kelowna	124,000	64.7%	179,300	65.4%
West Kelowna	32,900	17.2%	47,400	17.3%
Lake Country	12,900	6.7%	18,600	6.8%
WFN	8,600	4.5%	13,600	5.0%
RDCO	5,900	3.1%	7,000	2.6%
Peachland	5,400	2.8%	6,100	2.2%
Other Rural	2,100	1.1%	2,000	0.7%
TOTAL	191,800	100.0%	274,000	100.0%

For the purpose of updating the regional traffic forecasting model, population was further allocated to smaller neighbourhoods or zones within each community. This task was completed with the assistance of planning staff in each community, using existing OCPs for guidance.

Employment Growth

The regional employment forecast incorporates two interrelated components:

- Bottom up forecast of employment for key industrial sectors utilizing population and other industrial drivers; and
- Development of a forecast of the size of the Kelowna Census Metropolitan Area (CMA) labour force as a means to validate forecasts derived from the bottom up approach.

A full description of the methodology and employment forecast results is also provided in the Future Land Use Technical Memorandum attached in **Appendix A**. Employment forecasts by industry and other economic performance metrics for 2020 and 2040 are summarized in **Table 2.2**.

**Table 2.2: Employment Forecasts and Other Economic Performance Metrics
Central Okanagan (2020 and 2040)**

Industry (with NAICS Codes)	2020	2040
Agriculture (111-112, 1100, 1151-1152)	1,800	2,000
Forestry, Fishing, Mining (21, 113-114, 1153, 2100)	1,000	1,200
Utilities (22)	639	844
Construction (23)	10,404	11,775
Manufacturing (31-33)	8,300	9,572
Trade (41, 44-45)	15,003	19,542
Transportation and Warehousing (48-49)	4,019	5,596
Finance, Insurance, Real Estate (52-3)	4,155	5,594
Professional and Scientific Services (54)	8,085	11,454
Business Building and Other Support Services [55-56]	4,449	7,146
Educational Services (61)	5,340	6,959
Health Care Services (62)	15,240	21,749
Information, Culture and Recreation [51, 71]	5,294	6,994
Accommodation and Food Services (72)	9,872	12,046
Other Services (81)	4,400	5,812
Public Administration (91)	2,911	3,846
TOTAL EMPLOYMENT	100,911	132,128

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Economic Performance Metrics	2020	2040
Implied average annual rate of employment growth from 2014	1.87%	1.47%
Total Population	207,295	273,845
Population growth, average annual from 2014	1.53%	1.43%
Estimated Labour Force	106,212	139,126
Labour Force Growth, average annual from 2014	1.98%	1.50%
Implied Unemployment Rate	5.0%	5.0%
Population Age 15+ not in Labour Force	72,197	97,222

As indicated in **Table 2.2**, employment is estimated to reach 100,911 in 2020. By 2040, employment is expected to increase to 132,128. Compared with the estimated labour force of 106,212 and 139,126 in 2020 and 2040, respectively, an unemployment rate of approximately 5% in each of these years is implied. This forecast unemployment rate can be considered realistic, although somewhat conservative, when compared to historical average provincial unemployment rates. Recent commercial bank short-term provincial employment forecasts to 2016 anticipate an unemployment rate of about 5.5% to 5.8% under a relatively positive GDP growth.

The 2040 forecast is used as the regional total for the Future Base Trend forecast.

The expected trends by sector are:

- Agriculture – future employment is likely to increase slightly;
- Forestry, Fishing, Mining – a constant level of employment with very limited growth;
- Utilities – future employment is expected to correlate directly with population increases;
- Construction – the ratio of jobs to population is likely to decline in the long-run, as major projects are completed;
- Manufacturing – the long-run rate of growth to 2040 is expected at an average annual rate of growth equivalent to one-half of the population growth;
- Trade – the ratio of jobs to population is expected to be lower than the last 10 year average;
- Transportation and Warehousing – continued overall long-term growth;
- Finance, Insurance and Real Estate – the 1.5% average annual rate of growth between 2001 and 2012 is expected to continue in the future;
- Professional and Scientific Services – generally expected to grow at historical rates but drop by 10% for the longer term;

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- Business, building and other support services – in general, employment is expected to increase over time, with some reduction in the growth rate in the long term;
- Educational Services – the ratio of employment to population over 2012-2014 is expected to be representative of future conditions;
- Health Care Services – analyses frequently point out population aging and in particular the share of population 65+ as a significant driver of health care expenditures. The ratio of employment to 100,000 population 65+ from 2012-2014 was used for forecasting purposes;
- Information, Culture and Recreation – the industry displays a somewhat increasing employment trend, which is expected to continue into the future;
- Accommodation and Food Services – based on historical employment values, a modest annual rate of growth of 1% is assumed;
- Other Services – the future ratio of employment to population assumption is based on the average calculated from 2010-2014; and
- Public Administration – in 2014 employment was at the same level as the beginning of 2000; the forecast is based on an employment to population ratio equal to an average of 2010 – 2014.

When allocated to municipalities and ultimately to the smaller neighbourhoods or zones, minor adjustments and rounding result in a slightly lower regional employment total being used for Future Base Trend. **Table 2.3** compares the total regional employment and population for 2014 and 2040.

**Table 2.3: Regional Population and Employment
Existing (2014) and Base Trend Forecast (2040)**

	Existing (2014)	Base Trend Forecast (2040)
Population	191,800	274,000
Employment	86,100	131,900
Ratio of Jobs per 1,000 Population	449 jobs/1,000 population	481 jobs/1,000 population

The allocation of employment to the municipalities was completed by assuming proportional growth in the existing locations. The resultant allocation of employment by municipality for the Future Base Trend scenario, along with the population allocation is presented in **Table 2.4**.

**Table 2.4: Allocation of Population and Employment
Existing (2014) and Base Trend Scenario (2040)**

Community	2014 Jobs	2014 Jobs / 1,000 Population	Base Trend (2040) Jobs	Base Trend (2040) Jobs / 1,000 Population
Kelowna	67300	543	103100	575
West Kelowna	7800	237	12000	253
Lake Country	4300	332	6400	344
WFN	4300	505	6600	485
RDCO	700	127	1100	157
Peachland	1500	279	2300	377
Other Rural	200	79	300	150
TOTAL	86100	449	131900	481

2.1.2 Near Term Trend

The Near Term Trend is based on an approximate 10 to 11 year horizon and is intended to be used to evaluate potential staging of projects. As a secondary forecast scenario, the Near Term Trend has been estimated by simply adding 44% of the growth (11 years of 25) between the 2014 value and the Future Base Trend value. The same procedure was used for estimating population and employment growth trends. While this approach does not consider sequencing of growth over the next decade, it provides a reasonable estimate of travel demand in order to evaluate staging of transportation options. More detailed reviews that consider localized sequencing of development may be necessary for some of these transportation options.

2.1.3 Long Range Trend

The Long Range Trend will be used as a sensitivity test and represents fully developed conditions within the provision of existing planning documents such as the current regional growth strategy. For residential growth, this scenario reflects full development of the residential components of traffic analysis zones in current Official Community Plans. The exception is Kelowna, where the designated residential land within the current urban containment boundary is expected to be fully developed by 2040. However, it is unrealistic and impractical to assume no long range growth in Kelowna beyond 2040. Therefore, for the purposes of developing a long range test scenario, the total City of Kelowna population share of the regional total was assumed to remain the same as in the Future Base Trend scenario, with the additional population growth distributed proportionally within the smaller neighbourhoods of Kelowna. This assumption represents infill and intensification through redevelopment within the urban containment boundary.

Employment was assumed to grow proportionally with population in existing locations. In specific locations where new employment lands are located away from existing areas, some transfer of jobs to new areas was assumed. However, in most cases, new employment growth will likely be in similar locations as existing employment or adjacent to existing employment.

The Long Range Trend is not a primary forecast scenario, and there is no formal land use planning beyond the 2040 horizon. Broad assumptions such as those described above allow the regional transportation model to be populated so that potential long term land use growth options can be tested to assess their general ability to support very long term growth in the region. It is not practical to use this type of long range scenario to compare options or forecast detailed traffic conditions.

The population and employment by municipality for the long range scenario is summarized in **Table 2.5**.

Table 2.5: Allocation of Population and Employment for the Long Range Scenario

Community	Population	Employment
Kelowna	194900	112100
West Kelowna	52100	13200
Lake Country	26800	9200
WFN	20200	9800
RDCO	8400	1300
Peachland	18100	6800
Other Rural	1900	300
TOTAL	322400	152700

2.2 Regional Transportation Model Overview

The Central Okanagan Planning Study (COPS) depends on analyzing current and future usage and performance of the highway, the effects of potential new corridors, as well as the potential changes in the surrounding areas that may influence travel behaviour or demand. This analysis will be conducted using the regional transportation model.

The Regional District of the Central Okanagan Transportation Model (RDCO Model) was recently updated and improved to meet the requirements of the Central Okanagan Planning Study. The RDCO Model is a comprehensive travel demand forecasting tool that estimates AM and PM peak hour traffic demand for various modes using EMME software version 4.

The extents of the model cover the Regional District of the Central Okanagan as shown in **Figure 2.2**. The model includes the road networks within the municipalities of Kelowna, West Kelowna, Westbank First Nations, Lake Country, and Peachland.

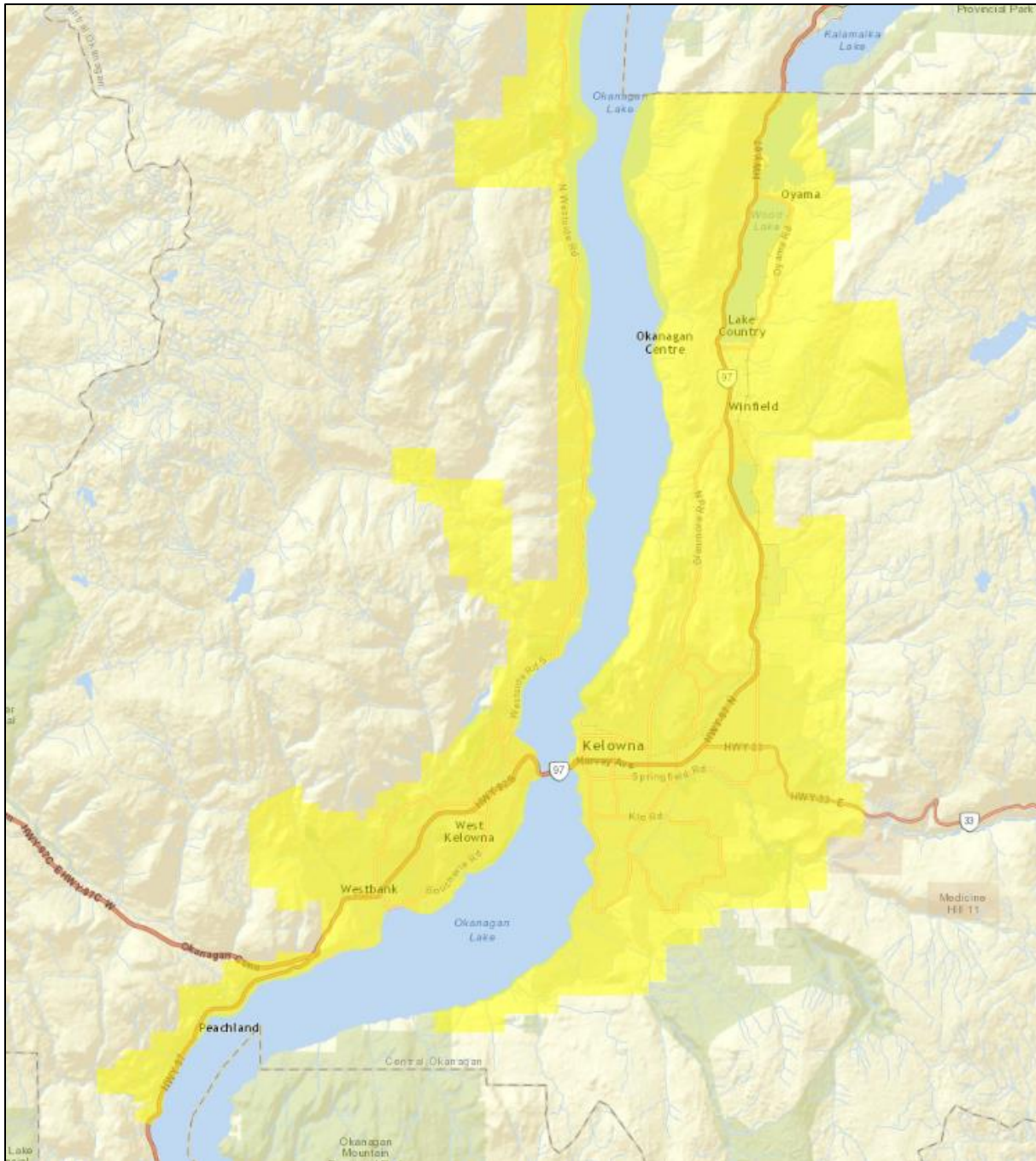


Figure 2.2: Model Coverage

The RDCO model coverage shown in **Figure 2.2** does not match perfectly with the study area as shown previously in **Figure 1.1** with the upper limits of the study area omitted. For the portions of Highway 97 beyond the model limits, manual forecasts were generated based on background growth trends on Highway 97 north of Lake Country.

The RDCO Model replicates traffic conditions during a typical weekday AM peak hour (7:30 - 8:30 AM) and PM peak hour (4:30 – 5:30 PM), and represents typical fall (October) traffic conditions.

The recent model update involved significant restructuring to rectify issues identified in the previous version of the model, mostly related to the lack of consistency and cohesion. As part of the update, enhancements were made to all four sub-models – trip generation, trip distribution, mode choice, and trip assignment. A new model component was also introduced to model light and heavy truck traffic and their corresponding growth.

For the base model, all road network, land use and demographic data, and economic parameters were updated to represent 2014 conditions. As a result, all model parameters and coefficients were re-estimated.

2.2.1 Regional Model Components

For the purposes of providing context in forecasting future traffic demand, the key components of the Regional Transportation Model include:

- Traffic Zone System;
- Land Use and Demographics; and
- Network Elements.

The following subsections provide a brief overview of the key model components.

Traffic Zone System

The region was subdivided into a number of Traffic Analysis Zones (TAZ). These zones are geographic areas dividing the planning region into homogenous areas of land use and activity, such as smaller residential neighbourhoods or commercial blocks. The zones capture origins and destinations of travel activity within an area. The boundary of the zones was determined based on physical constraints, while the size of the zones was determined based on population and / or employment density and travel activity.

In addition to the internal zones which involve the demographic information, the model also incorporates six external zones at the six entry / exit points of the region. These external zones represent vehicle trips that have an origin, destination or both trip ends outside the region. External trips cover only vehicle traffic and are independent of land use data. The current RDCO model employs a total of 288 traffic analysis zones with the actual traffic zone system illustrated below in **Figure 2.3**.

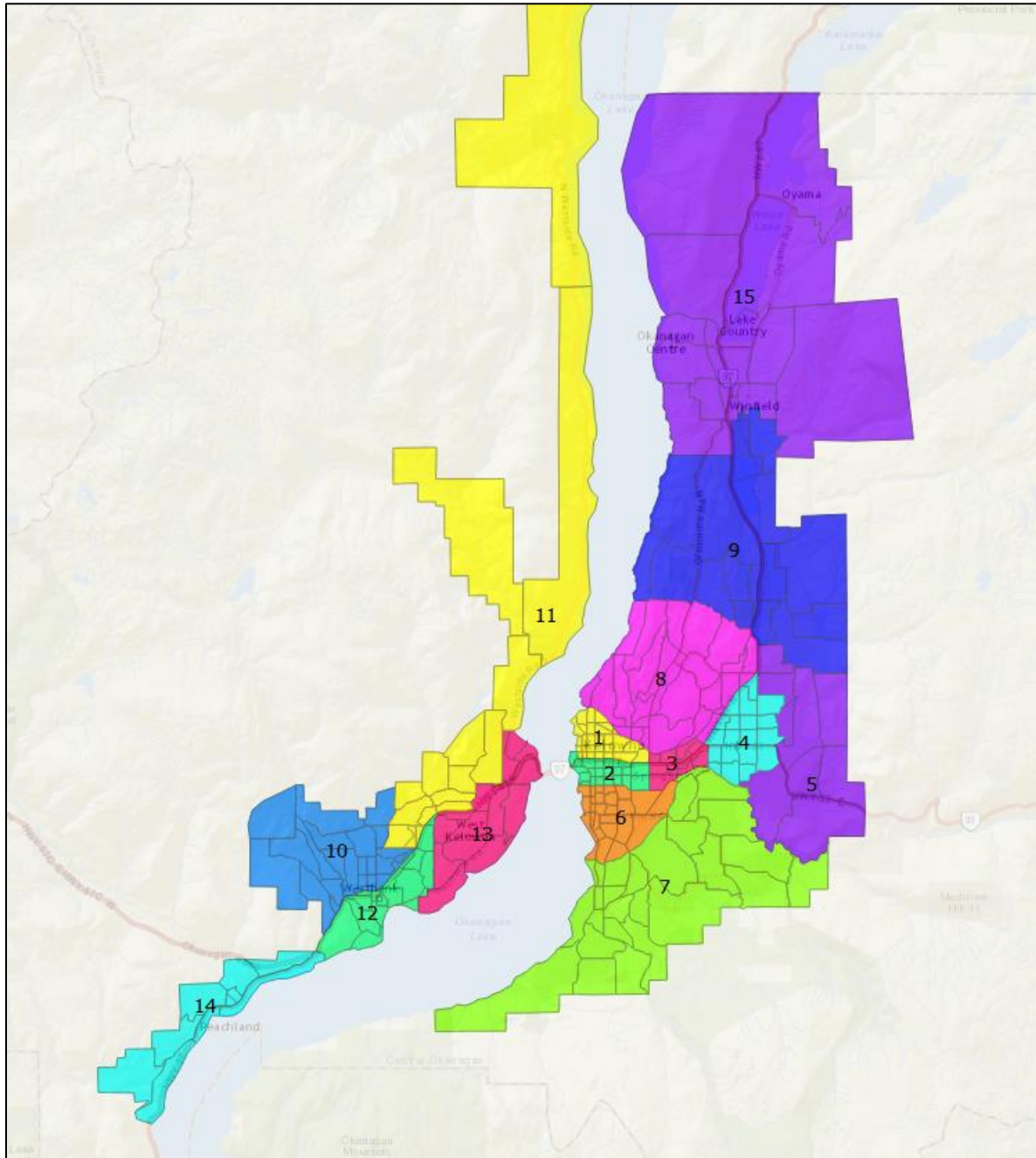


Figure 2.3: Zone Structure including Super Zones (numbered)

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As noted in **Figure 2.3**, the individual zones are also assigned to one of 15 superzones within the region which are used to assist in model calibration, especially with respect to trip distribution which was calibrated at this superzone level.

Land Use and Demographics

Land use information is one of the primary inputs in any travel demand model. The number of trips generated within an urban area is highly dependent on demographic data. For the RDCO Model, land use data are defined by population, employment, and school enrolment. The population data is stratified into various age groups, the employment data is stratified into various categories, and school enrolment data is stratified into various types. The land use variables used in the model are shown in **Table 2.6**.

Table 2.6: Land Use Variables

Population (Age)	Employment	School Enrolment
0-4 years	Retail	Elementary
5-12 years	Service/Office	Secondary
13-17 years	Manufacturing	Post-Secondary
18-24 years	Transportation/Utility	
24-45 years	School	
45-64 years	Institution/Cultural	
64-74 years	Agricultural	
75 years +		

In addition to the land use and demographic data listed above, the input data also comprises estimates of the number of employed and non-employed residents in each zone, as well as zone area, parking cost, median income level, as additional factors that could potentially influence trip making and therefore travel demand.

Network Elements

The network elements are divided into road network, transit network; and walk / bike network. These three elements of the network are summarized as follows:

Road Network

One of the most important components of the model is the road network system. An accurate representation of the road network system serving the region is required to properly estimate travel demand. The road network in the model is captured by nodes, links, and turns.

There are two types of links in the model – Regular Links which represent the actual network link, and Centroid Connectors which represent access and egress between zone centroids (notional geographic centre of the zone) and the network. All zone centroids must have at least one centroid connector in and out. Zone connectors can represent local roads, or they can be abstract links to simply provide access and egress between the traffic zone centroid and the road network. Depending on the zone size and density of the adjacent road network, each zone may have more than one centroid connector.

The specific classifications of roads represented in the model include all provincial highways, arterial roads, collectors, and a few local roads that are signal controlled or served by transit. Local roads are usually not included because of the regional model's emphasis on regional trips and higher order roads. Combined with the coarseness of the zone structure, the model is not configured to accurately report traffic on local roads in any case.

The base road network in the RDCO model is illustrated in **Figure 2.4**.

Transit Network

The transit network in the model is captured by nodes, links, transit vehicles, transit lines, and transit segments. Transit lines are identified in EMME by a unique transit line number and transit line description. The itinerary of individual transit routes is coded into the transit line.

Transit line routes incorporated into the regional transportation model are based on the transit route map and data obtained from BC Transit's website. All transit routes that operate wholly within the region by BC Transit are captured in the model. Intercity bus services are not included.

Currently there are 28 transit routes in the region, of which 17 run wholly within the City of Kelowna, eight west of Okanagan Lake, two routes to / from Lake Country, and one route connecting West Kelowna / Westbank and UBCO.

The model transit network, updated to represent the 2014 base conditions, is illustrated in **Figure 2.5**.

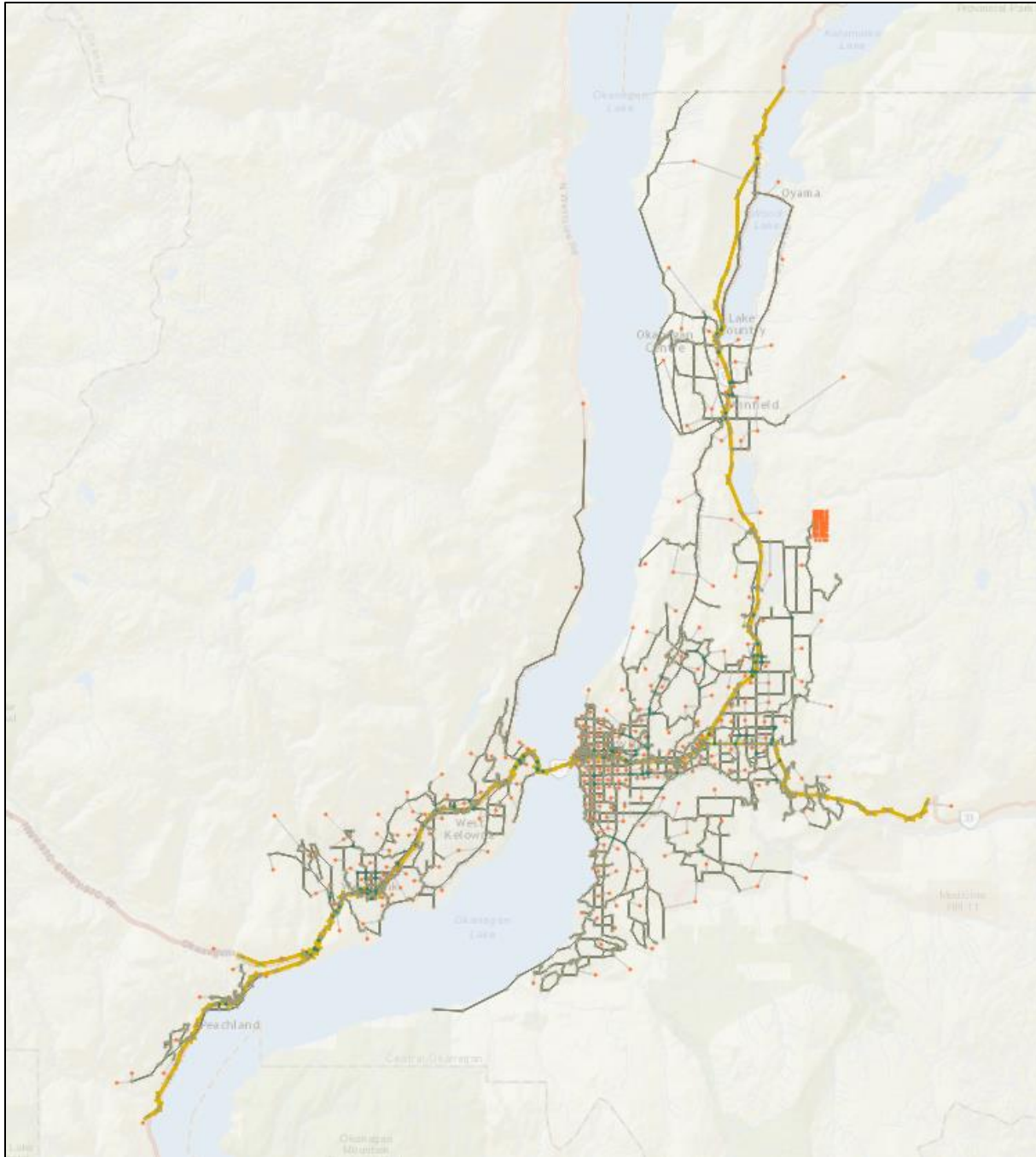


Figure 2.4: Base Road Network

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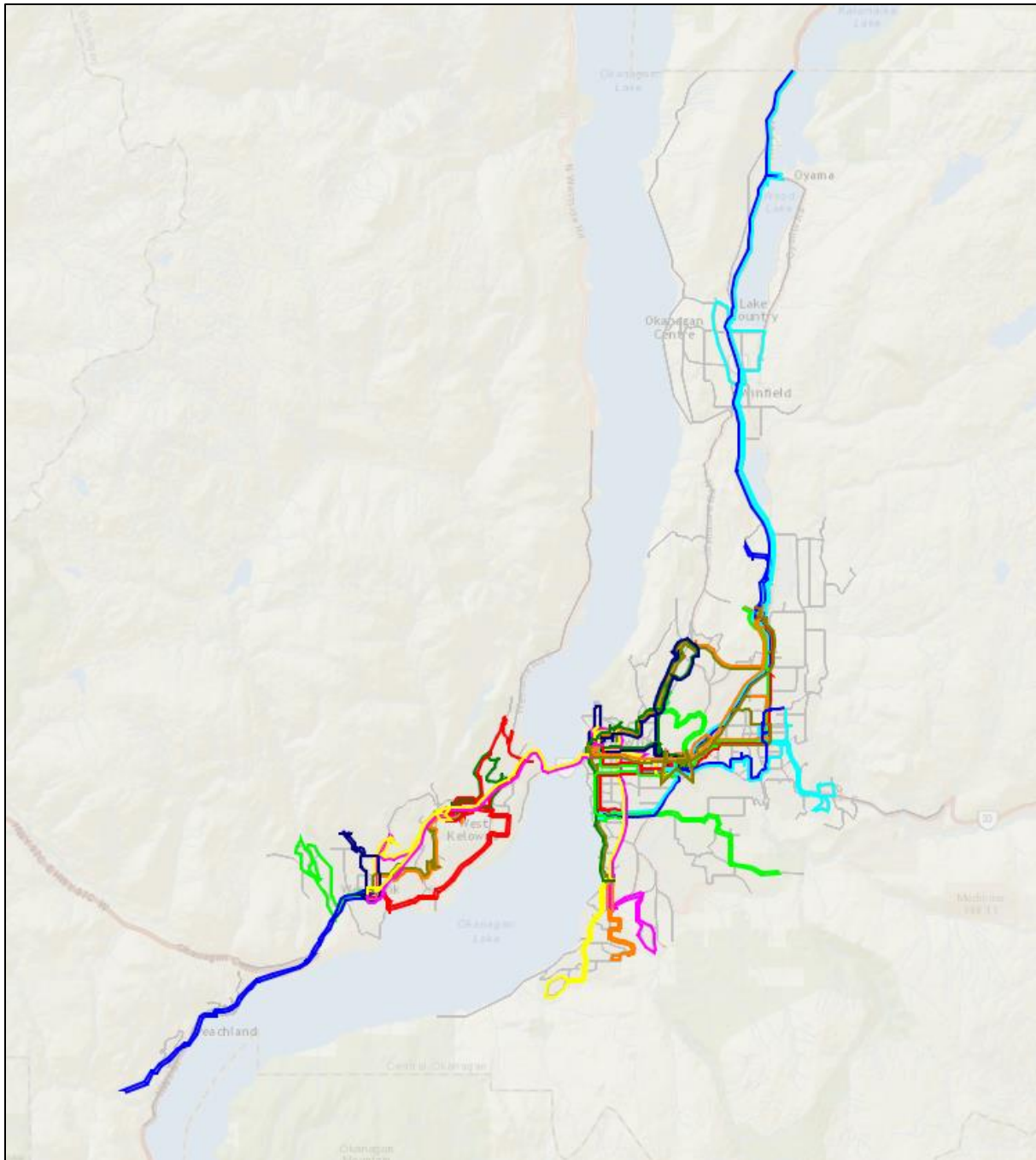


Figure 2.5: Base Transit Network

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Walk / Bike Network

The RDCO model generates walk and bike trips in addition to auto and transit trips. Walk and bike trips are allowed to use any link in the road network, hence, the walk / bike network is the same as the road network. However, the walk / bike travel times are calculated for trip distribution and mode split only. As such, walk and bike trips are not specifically assigned to the road network.

The walk and bike trips are not assigned to the network because with the makeup of the regional model, the zone system is much too coarse to handle short trips such as walk and bike trips. In addition, the network was not constructed to include all walk paths and cycling routes that may not follow the road network. Furthermore, the EMMIE software, as a regional transportation model platform, is not the right tool to account for factors that influence cycling route choices and walking path choices.

2.2.2 Model Outputs

The above components are tied together through a series of model procedures which include various equations and data manipulation processes. As mentioned earlier, the RDCO Model uses a standard “four-step” procedure to predict future travel demands by mode and link.

- Trip Generation – based on land use data to compute the number of person trips to be made.
- Trip Distribution – based on travel impedances to compute where trips go.
- Mode Choice – based on travel impedances to compute the mode used.
- Trip Assignment – based on route costs to compute which routes are used.

The mode choice sub-model estimates the share of the trips to each available mode based on the time and cost characteristics of the various modes of travel. Three modes are considered in forecasting person trips in the model:

- Auto
 - SOV,
 - HOV (2+ Occupant Carpools);
- Transit; and
- Walk/Bike.

Note: The walk/bike mode is estimated, but the trips are not assigned to the network.

Up to the trip assignment stage, two separate and parallel procedures were developed to forecast the underlying origin-destination trip tables to be assigned to the respective road and transit networks described previously. The standard four-stage modelling procedure was retained and updated for forecasting non-truck trips. A three-stage model was developed for forecasting truck trips. The final trip assignment stage executes the forecast of the non-truck and truck trip tables simultaneously upon the road network.

The final trip assignment on the road network therefore includes SOV, HOV, Light Trucks, and Heavy Trucks, as well as transit. The RDCO Model assigns these four vehicle classes and transit to the road network for the AM peak hour (7:30 - 8:30 AM) and the PM peak hour (4:30 – 5:30 PM).

2.3 Base Model Calibration

Prior to applying the regional transportation model in forecasting future traffic volumes, the base 2014 model was calibrated to current conditions. To establish the base model, 2014 land use and demographic data, existing road information, and transit network data was used as input. The model was calibrated based on the 2013 trip diary survey. The general model calibration process in terms of its data sources and methodology, is described below.

2.3.1 Data Sources

Numerous data sources were used to assist in the model calibration, which are described as follows:

Trip Diary Survey

The 2013 Trip Diary Survey was conducted in fall 2013 covering the RDCO as well as the City of Vernon. However, data related to the City of Vernon were not used since the City is outside the RDCO Model boundary. The survey was the source of person trip data to obtain the following information for the calibration of the trip generation, trip distribution, and model choice sub-models:

- Person age group;
- Trip rate (productions and attractions);
- Trip purpose;
- Trip origin and destination;
- Mode; and
- Time period.

Origin-Destination Survey Data

Results from an origin-destination survey conducted by the BC MoTI in the summer of 2014 were used to provide external trip totals and their distribution at the six entry / exit points of the region.

Traffic Count Data

Traffic count data were obtained by the BC MoTI, City of Kelowna, and District of West Kelowna. However, the traffic counts collected by various agencies used different methods of collection and the collection occurred over many different years and months. For consistency and accuracy, only those traffic counts collected in 2012 or later were used. For calibration of the trip assignment sub-model, the following information was required from the respective count data:

- Count method;
- Days of counts collected;
- Time period; and
- Total vehicle traffic on link (by vehicle class if available).

Travel Time Data

Although travel time data were collected in 2014 as part of the COPS, both the origin-destination survey and the travel time surveys along the Highway 97 corridor were completed during the summer of 2014. Therefore, with only summer time measurements available from these two sources, this travel time data was not considered useful in validating the model.

2.3.2 Methodology

The purpose of model calibration is to ensure the current base 2014 model scenario matches that of current traffic patterns and conditions, which would be the best technical foundation from which to forecast future traffic patterns and conditions through the use of scenarios representing future land use, transportation system, and behaviour assumptions.

Model calibration involves the adjustment of model parameters and coefficients in the sub-models in an iterative fashion until modelled travel patterns and conditions reasonably match observed travel patterns and conditions represented by survey data. In each iteration, model parameters and coefficients may be estimated based on state-of-the-art techniques documented in recent research papers, various regression analyses, or just plain trial-and-error, depending which method would be the most accurate and efficient way to calibrate the sub-models.

2.4 Future 2040 Travel Demand Forecasting

With the base 2014 model calibrated, two key variables used to forecast future traffic volumes were updated to represent 2040 conditions. These variables include the future land use information which will predict overall travel demand and the future road network which will predict how the future travel demand is assigned to the road network.

2.4.1 Future Land Use Demographics

As discussed in Section 2.1, the future land use for the 2040 regional travel demand model was derived through an extensive process involving the Sustainable Transportation Partnership of the Central Okanagan (STPCO) and each municipality in the region. The STPCO team worked with each municipality to allocate residential units and commercial square footage of new development, and then applied factors by type of residential unit and employment for type of development. The employment was intensified in some areas where no new development will occur but higher employment or population density is expected. The resultant population and employment distribution, by traffic analysis zones, represents the key inputs in generating traffic demand to be subsequently assigned to the road network.

2.4.2 2040 Road Network Assumptions

Through discussions with BC MoTI and municipal representatives within the Central Okanagan Region, and extensive review of past reports, transportation and official community plans, the 2040 future base road network assumptions were established and grouped into two categories: Base Committed Projects and Candidate Projects. A detailed description of all known base committed and candidate projects is included in a technical memorandum titled Central Okanagan Planning Study – Future Base Transportation Networks (August 2015), included in **Appendix B**.

The base committed scenario was developed for the regional model for the 2040 planning horizon. The discussion overleaf provides an overview of the individual projects included in the base committed road network category. However, it should be noted that this is a list of known projects and not all can be coded into the coarse regional model.

BC MoTI

- Highway 97 between Greata Ranch and Antlers Beach Park – widening to rural four lanes divided highway.
- Highway 97 at Daimler Drive – signal phasing and channelization improvement.

- Highway 97 at Sneena Road Overpass – New 2-lane Sneena Road overpass linking Westside Road and Campbell Road.
- Highway 97 between Highway 33 and Edwards Road – widening to six lanes including HOV extension; upgrades to major intersections at Enterprise / Leathhead Road, McCurdy Road, Findley/Hollywood Road and Sexsmith Road; Rutland Road realignment; and turning movement restriction at Stremel Road.
- Highway 97 at Birnie Road / Vista Road – turning movement restriction; provide acceleration and deceleration lane between Highway 97 and Birnie Road; southbound left turn lane extension and provide acceleration lane at Kalamalka Lakeview Drive intersection to the south.
- Highway 97 at Pollard Road – signal phasing improvement.
- Highway 97 at Berry Road – signal phasing improvement.
- Highway 97 at Gordon Road – turn lane storage extension.
- Highway 97 at Airport Way – signal phasing improvement and turn lane storage extension.
- Highway 97 at Lodge Road – new signal.
- Highway 97 between University Way and Commonwealth Road – provide median barrier and access improvements.
- Highway 97 at Beaver Lake Road – turn lane storage improvement and construction.
- Highway 97 at Oceola Road – raised median extension; provide intersection channelization and acceleration lane.
- Highway 97 at University Way – Removal of signalized intersection upon connection of John Hindle Drive.

City of Kelowna

- Clifton Road between Clement Avenue and Lambert Avenue – Four lane arterial widening plus protected cycle tracks.
- Dilworth Drive Active Transportation Corridor – New Active Transportation Facilities between Rails with Trails and Mission Creek Greenway.
- John Hindle Drive Extension between Glenmore Road and UBCO Campus – Two lane east-west connection with multi-use pathway.
- Lakeshore Road between Dehart Road and McClure Road – Urban cross section with sidewalk, bike paths, curb and gutter, street lighting and other features.

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- South Perimeter Road between Gordon Drive and Stewart Road West – Two lane extension of Gordon Drive, two lane connection from Gordon Drive to Stewart Road West. On street bike paths and multi-use trail connections to be provided.
- Hollywood Road Extension between John Hindle Drive and Findley Drive/Hollywood Road South - Two lane extension from John Hindle Drive through Sexsmith Road and across Highway 97 to Findley Drive and Hollywood Road South.
- McCurdy Road Extension between McCurdy Road and Rifle Road – A two lane westerly arterial extension to Rifle Road.
- Burtch Road connection between Byrns Road and KLO Road – A two lane arterial connection of Burtch Road north and south from Byrns Road to KLO Road.
- Stewart Road realignment between Crawford Road and Dehart Road – A two lane arterial realignment of Stewart Road between Crawford Road and Dehart Road.
- Water Street at Leon Ave – Modify current traffic signal timings for the Leon/Water
- Water Street at Bernard Ave – signal timings modification for the Bernard/Water Separate left turn lanes on Water St at Bernard Ave.
- Water Street at Queensway – Roundabout installation.
- Doyle Avenue at Water St / Ellis St / Richter St – New roundabout at Doyle/Water, separate left turn lanes at Doyle/Ellis, and signals at Doyle/Richter.
- Highway 97 at Gordon Drive – Extension of turn lane storage.
- Queensway at Ellis Street – New signal.
- Rose Avenue at Richter Street – New signal.

District of West Kelowna

- Tallus Ridge Drive between Cobblestone Road and Smith Creek Road – 2-lane arterial extension from Cobblestone Road to Smith Creek Road.
- Asquith Road between Iron Ridge Road and Tallus Ridge Drive – 2-lane collector connection from Iron Ridge Road to Tallus Ridge Drive.
- Westbank Centre Network between Ingram Road and Gellatly Road East – 2-lane new collector road from Ingram Road to Gellatly Road East.

Westbank First Nation

- Carrington Road extension between Carrington Road and Cougar Road – A 2-lane extension of Carrington Road / Ironwood Drive northerly parallel to Highway 97 with a connection to the east leg of Grizzly Road.

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District of Peachland

- Somerset Avenue / Ponderosa Drive connector – New major east-west 2-lane connection and secondary emergency route.

District of Lake Country

- Tyndall Road at Okanagan Centre Road West – Road and intersection realignment with turn lanes, sidewalk and multi-use pathway.

2.5 Future Traffic Volumes

The travel demand outputs from the 2040 regional model were not directly used to analyze future traffic operations and corridor performance due to the coarseness of the regional model in terms of road network and traffic analysis zone size. The assumptions and methodology used to convert the 2040 regional model travel demand outputs to 2040 forecasted link volumes and turning movements at the various signalized intersections along Highway 97 is described here.

2.5.1 Future Link Volumes

The 2040 forecasted link volumes between each signalized intersection along Highway 97 were calculated by multiplying the 2014 observed link volumes by the factored growth between the 2040 and 2014 regional model travel demand, as shown in the formula below.

$$2040 \text{ Link Vol} = 2014 \text{ Observed Link Vol} * \frac{2040 \text{ EMME Link Vol}}{2014 \text{ EMME Link Vol}}$$

Where:

2040 Link Vol = Future 2040 forecasted link volumes

2014 Observed Link Vol = Observed link volumes based on 2014 traffic data

2014 EMME Link Vol = 2014 EMME link volumes (regional model)

2040 EMME Link Vol = 2040 EMME link volumes (regional model)

A summary of the 2014 AM and PM peak hour observed link volumes versus 2040 forecasted link volumes at several representative locations along the Highway 97 corridor is presented in **Figure 2.6**. Each chart also provides the relative growth between the 2014 and 2040 link volumes in each direction of travel and for each peak period.

As can be seen in the figure, growth rates vary significantly along the corridor. For example:

- North of the CBD, growth rates ranged from 18% to 105%;
- Within the CBD, growth rates ranged from 6% to 74%; and,
- South of the CBD growth rates ranged from 6% to 53%.

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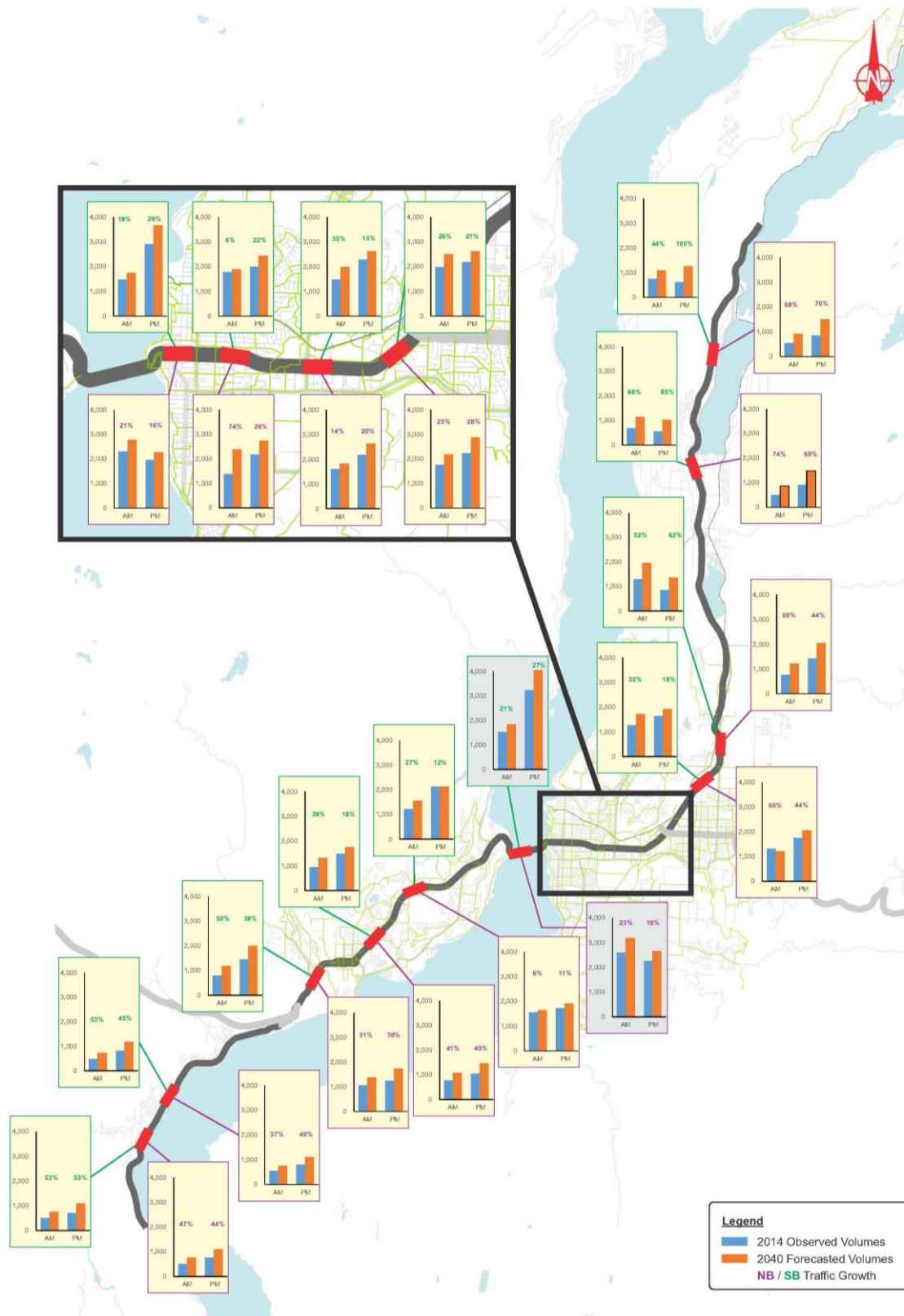


Figure 2.6: 2014 Observed versus 2040 Forecasted Link Traffic Volumes

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2.5.2 Future Turn Volumes

In order to forecast future turn volumes at the various signalized intersections along Highway 97, the document National Cooperative Highway Research Program (NCHRP) Report 765, Analytical Travel Forecasting Approaches for Project-Level Planning and Design was utilized.

The current capacity analysis indicates not all vehicles can be processed at all signalized intersections, resulting in movements that are over-capacity and metering traffic to downstream intersections. As a result, certain movements can be under-represented in current traffic counts, as counts reflect only the processed volume and not the true traffic demand that could be metered at an upstream intersection.

When existing traffic volumes are factored up to the future 2040 horizon year, this traffic metering was not accounted for due to the complex and unproven method of manually metering traffic and reassigning volumes. As a result, the forecasted traffic volumes represent a worst-case scenario where vehicles are not metered by upstream intersections, which is an unrealistic scenario in both the existing and future 2040 scenarios. Using these higher, unmetered traffic volumes will result in worse than expected traffic operations.

To fully account for traffic metering, a traffic micro-simulation model is currently being developed that will more accurately model expected future 2040 traffic operations. The results presented in this report therefore represent a worst-case scenario, where traffic demands equal traffic processed.

Link Volumes

Forecasting and refining the 2040 link volumes was accomplished by using one of four different techniques that were selected based on a “goodness-of-fit” test between the 2014 regional model and 2040 growth estimates. The rationale for choosing the appropriate forecasting method is shown in **Figure 2.7**, which utilizes equations (1) and (2). In addition, the outputs from the regional model need to be checked and further refined before they could be used for highway project planning and design. This process of model checking, refining, and adjusting is an important part of traffic forecasting. These procedures were also needed to adjust the travel demand model to ground counts before using them for project-level traffic forecasts. The 2040 link volumes were adjusted across a screenline based on relationships among base year traffic counts, base year assignments, and future year link capacities.

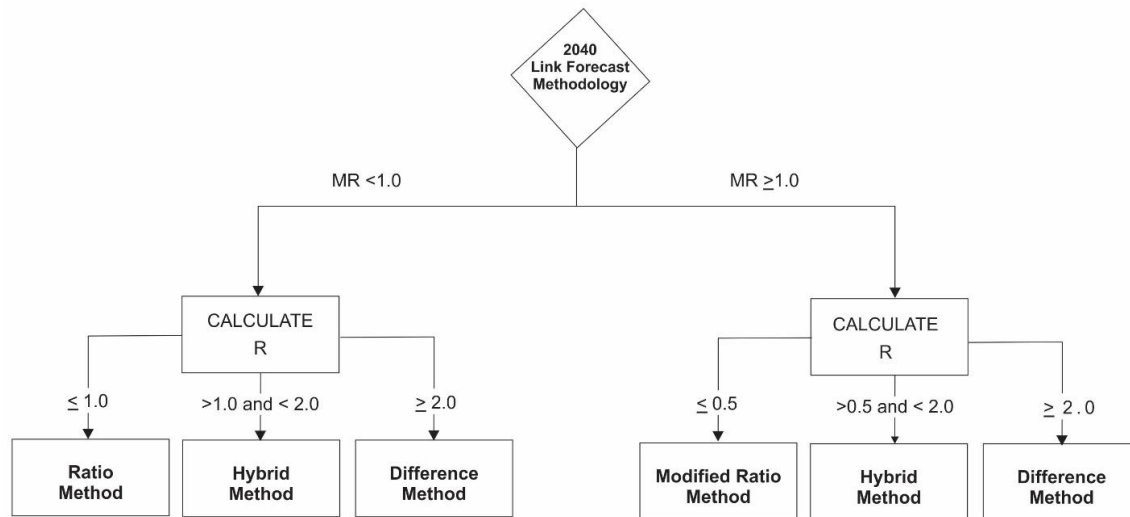


Figure 2.7: Link Forecast Methodology Decision Tree

The formulae for model ratio (MR) and calculated ratio (R) are provided as follows.

$$MR = \left(\frac{Afi - (COUNT - Abi)}{Abi} \right)$$

Where:

MR = model ratio,

Abi = base year traffic assignment,

Afi= future year traffic forecast, and

COUNT = actual base year traffic count.

$$R = \left(\frac{COUNT}{Abi} \right)$$

Where:

R = calculated ratio,

COUNT = actual base year traffic count, and

Abi = base year traffic assignment.

Once the appropriate forecasting method was determined using the logic outlined in **Figure 2.7**, a calculation to determine the refined future year forecast volume was made. Each forecasting method is detailed as follows.

- **Difference Method**

The difference method generates a future year forecast by applying the difference between the base year link count and the base year model assignment to the future year model

assignment. The 2040 forecast volume using the difference method is calculated using the following formula:

$$FFri(\text{Difference}) = FAi + (BCi - BAi)$$

Where:

$FFri(\text{Difference})$ = 2040 forecast volume (Difference Method),

BCi = base year count,

FAi = future year model assignment, and

BAi = base year model assignment.

- **Ratio Method**

The ratio method creates a future year forecast by applying the ratio of the future year assignment to the base year assignment and multiplying that by the base year count. The 2040 forecast volume using the ratio method is calculated using the following formula:

$$FFri(\text{Ratio}) = BCi * \left(\frac{FAi}{BAi} \right)$$

Where:

$FFri(\text{Ratio})$ = 2040 forecast volume (Ratio Method),

BCi = base year count,

FAi = future year model assignment, and

BAi = base year model assignment.

- **Modified Ratio Method**

The modified ratio method incorporates the Ratio Method and aspects of the Difference Method. This method weighs towards the Difference Method for models where there are large increases in forecasted traffic.

The 2040 forecast volume using the Modified Ratio method is calculated using the following formula:

$$FFri(\text{Modified Ratio}) = \left(\frac{(MR - 1) * Diff + RATIO}{MR} \right)$$

Where:

$FFri(\text{Modified Ratio})$ = 2040 forecast volume (Modified Ratio Method),

$RATIO$ = ratio adjusted future year link forecast,

$DIFF$ = difference adjusted future year link forecast, and

MR = Model Ratio.

- **Hybrid Method**

The hybrid method is calculated by taking the average of the Modified Ratio Method and the Difference Method. The 2040 forecast volume using the Hybrid Method is calculated using the following formula:

$$FFri(\text{Hybrid}) = \left(\frac{FFri(\text{Difference}) + FFri(\text{Modified Ratio})}{2} \right)$$

Where:

$FFri(\text{Hybrid})$ = 2040 forecast volume (Hybrid Method),

$FFri(\text{Modified Ratio})$ = 2040 forecast volume (Ratio Method), and

$FFri(\text{Difference})$ = 2040 forecast volume (Difference method).

Turn Volumes

In order to forecast future turning movement volumes at the various signalized intersections along Highway 97, existing turning movement counts at these intersections were grown iteratively by balancing the turning movements until the sum of all inbound turning movement volumes at each intersection reached the estimated 2040 inbound link volumes. This process was repeated for all outbound link volumes as well. This iterative procedure can be applied to produce either directional or non-directional turning volumes. The method requires an initial estimate of turning percentages at an intersection. Estimated turning percentages can be based on existing turning movement counts, turning movement patterns at similar intersections, or professional judgment associated with knowledge of nearby land use or travel patterns.

The number of required iterations depends on the desired level of convergence. Where large differences between base year conditions and future year forecasts are expected to occur, several iterations may be required. Normally, the volumes converge in six to ten total iterations.

A summary of the resulting future 2040 forecasted turn volumes at all of the key intersections along Highway 97 are provided in **Figures 2.8 to 2.14**.

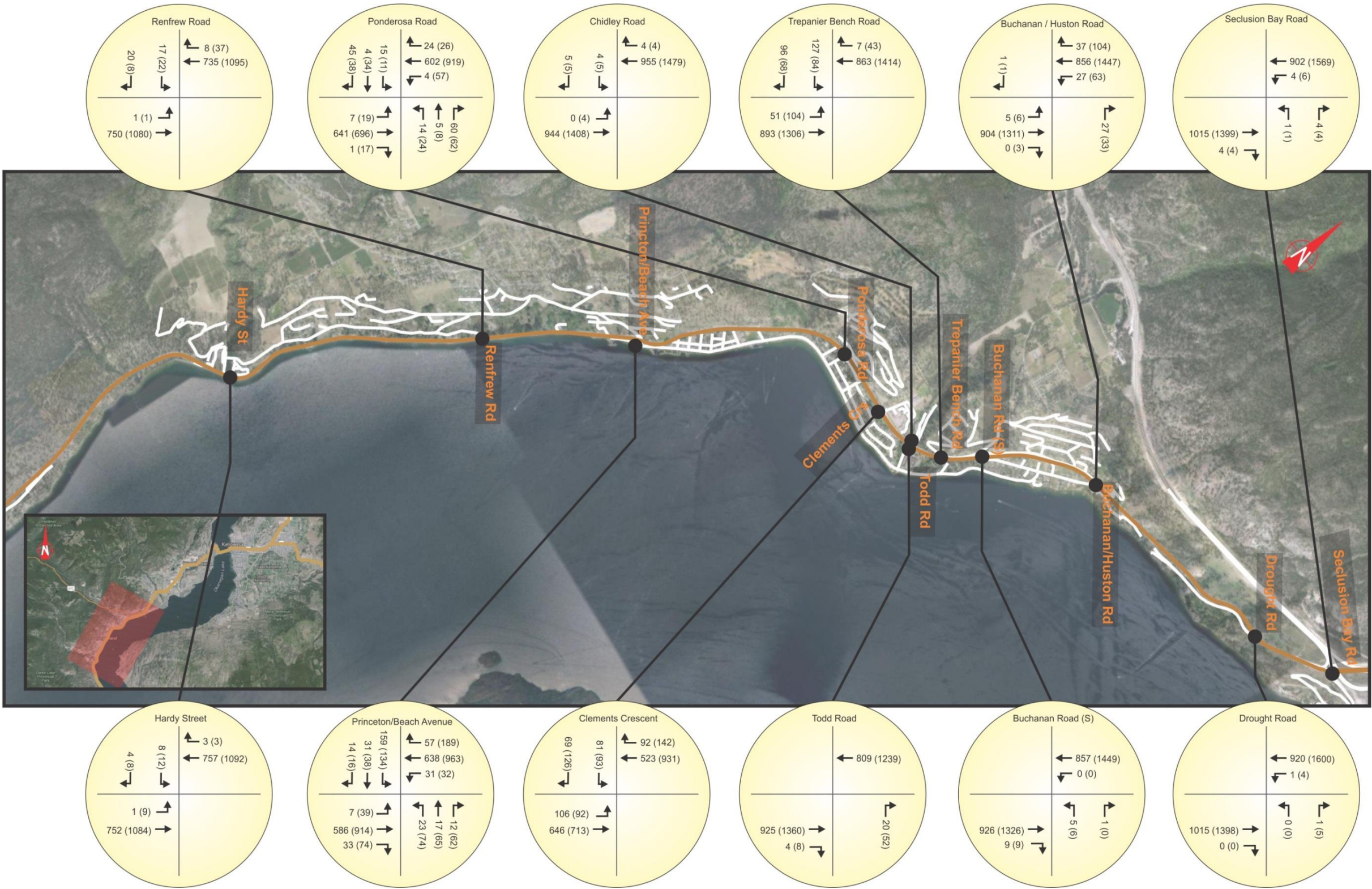


Figure 2.8: 2040 Forecasted Turn Volumes



Figure 2.9: 2040 Forecasted Turn Volumes

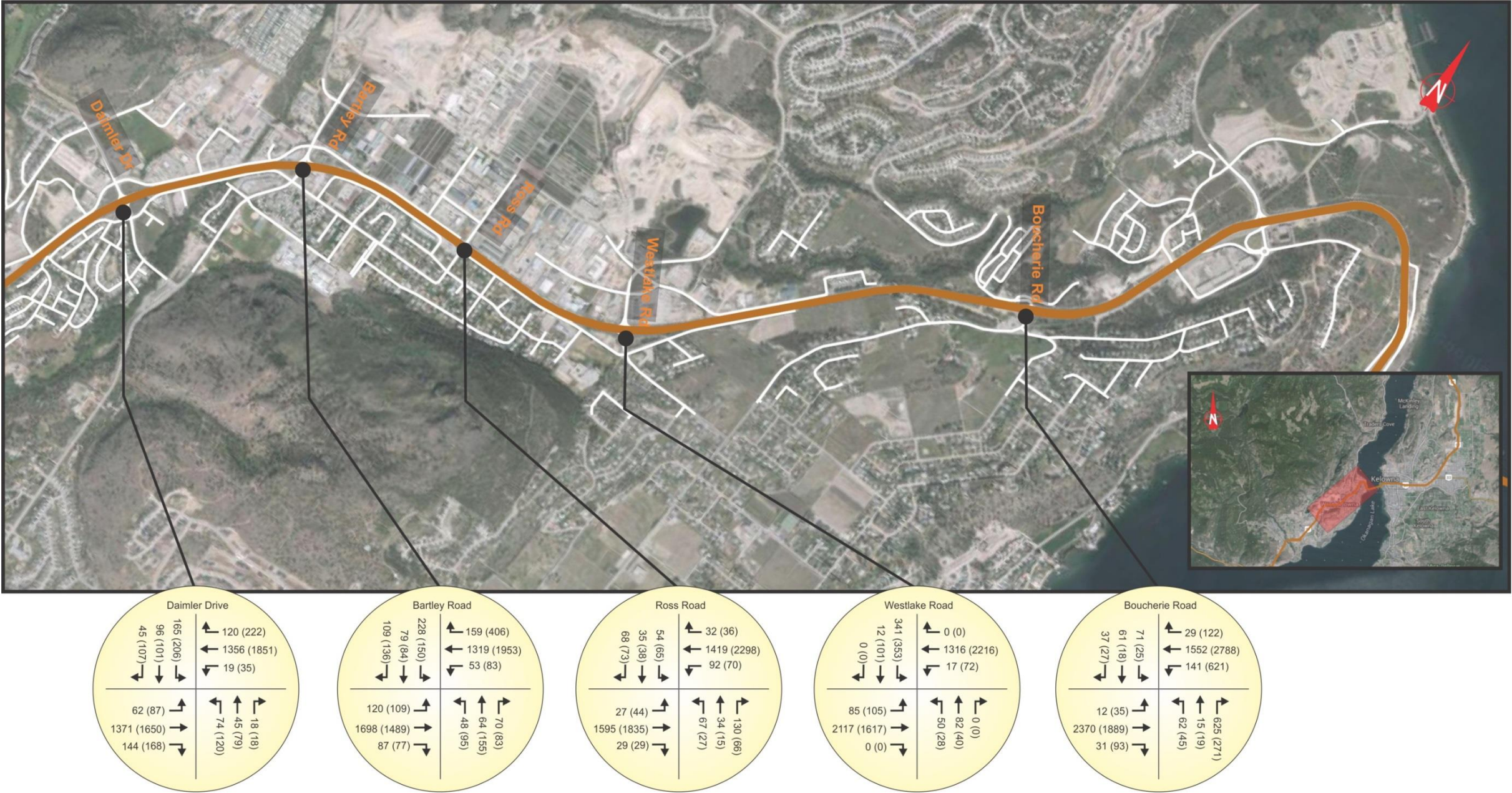


Figure 2.10: 2040 Forecasted Turn Volumes

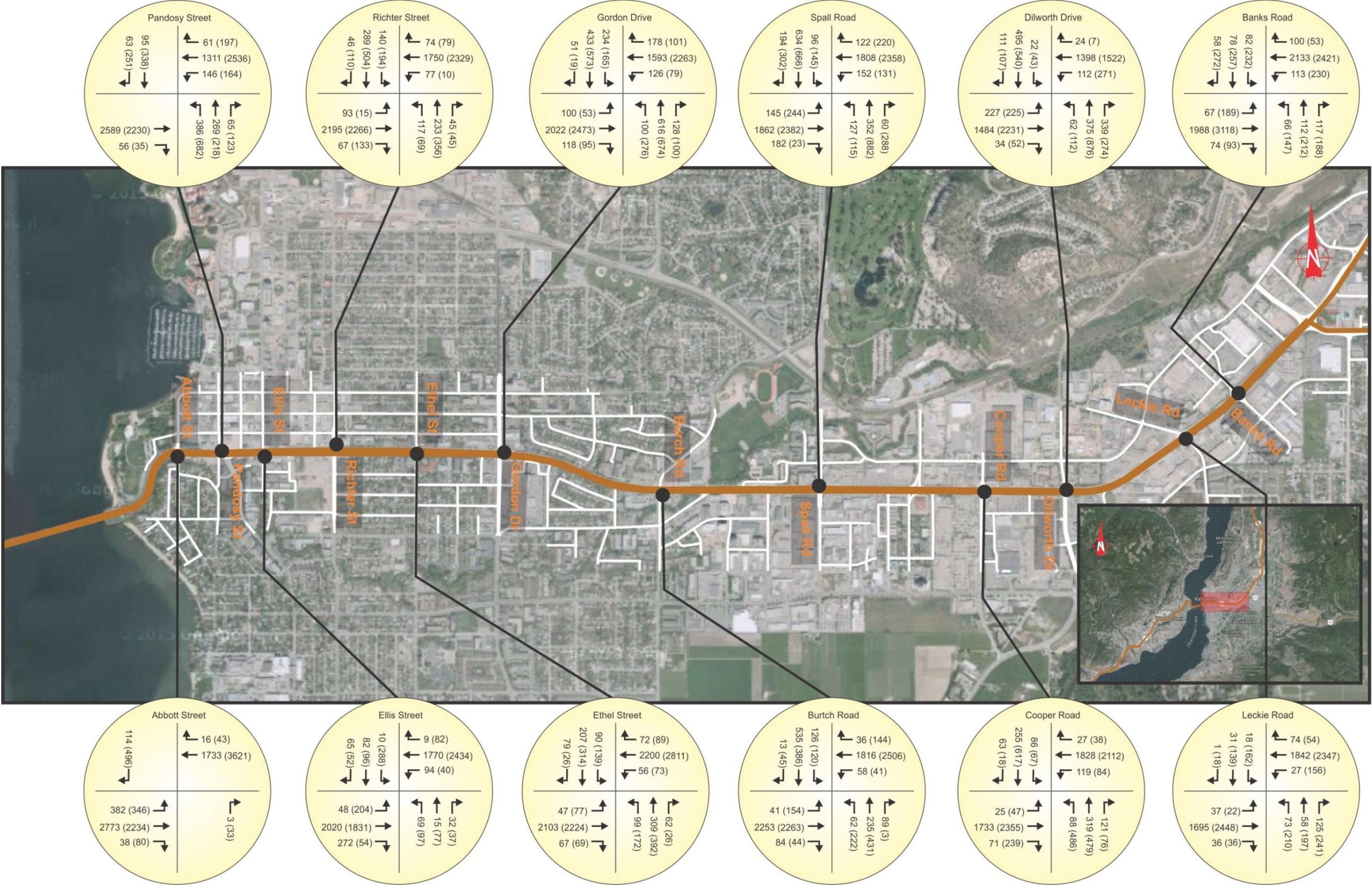


Figure 2.11: 2040 Forecasted Turn Volumes

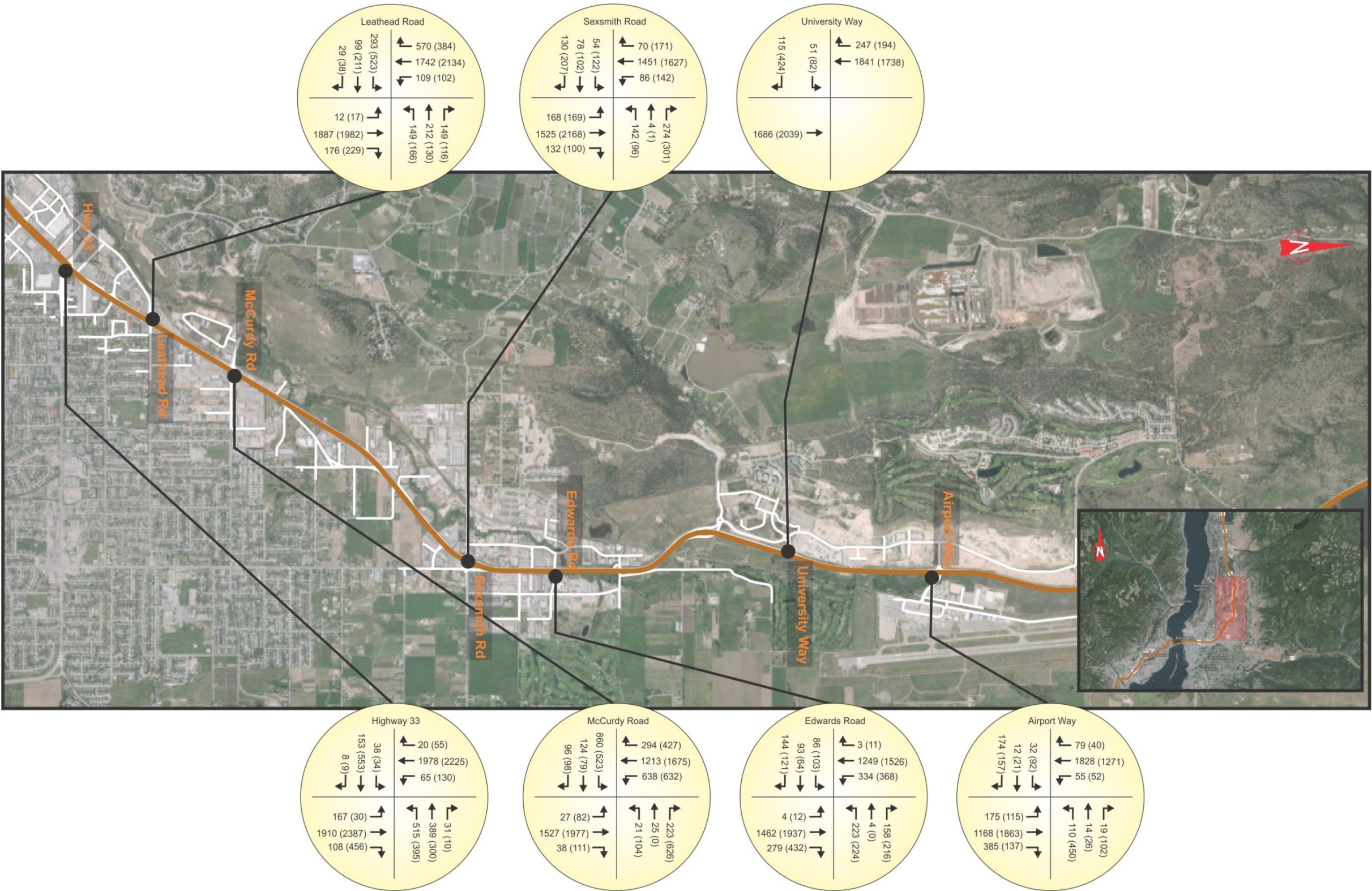


Figure 2.12: 2040 Forecasted Turn Volumes

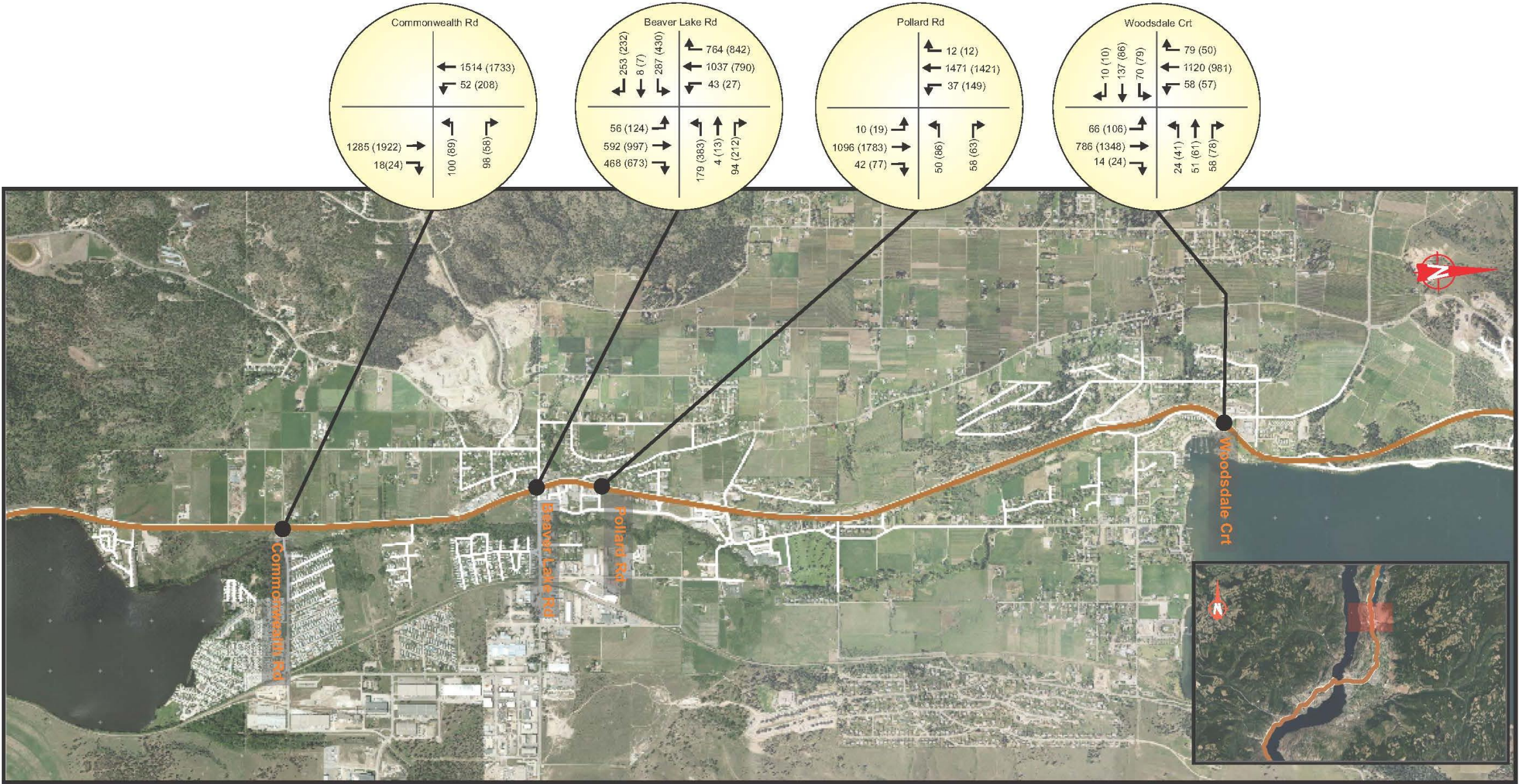


Figure 2.13: 2040 Forecasted Turn Volumes

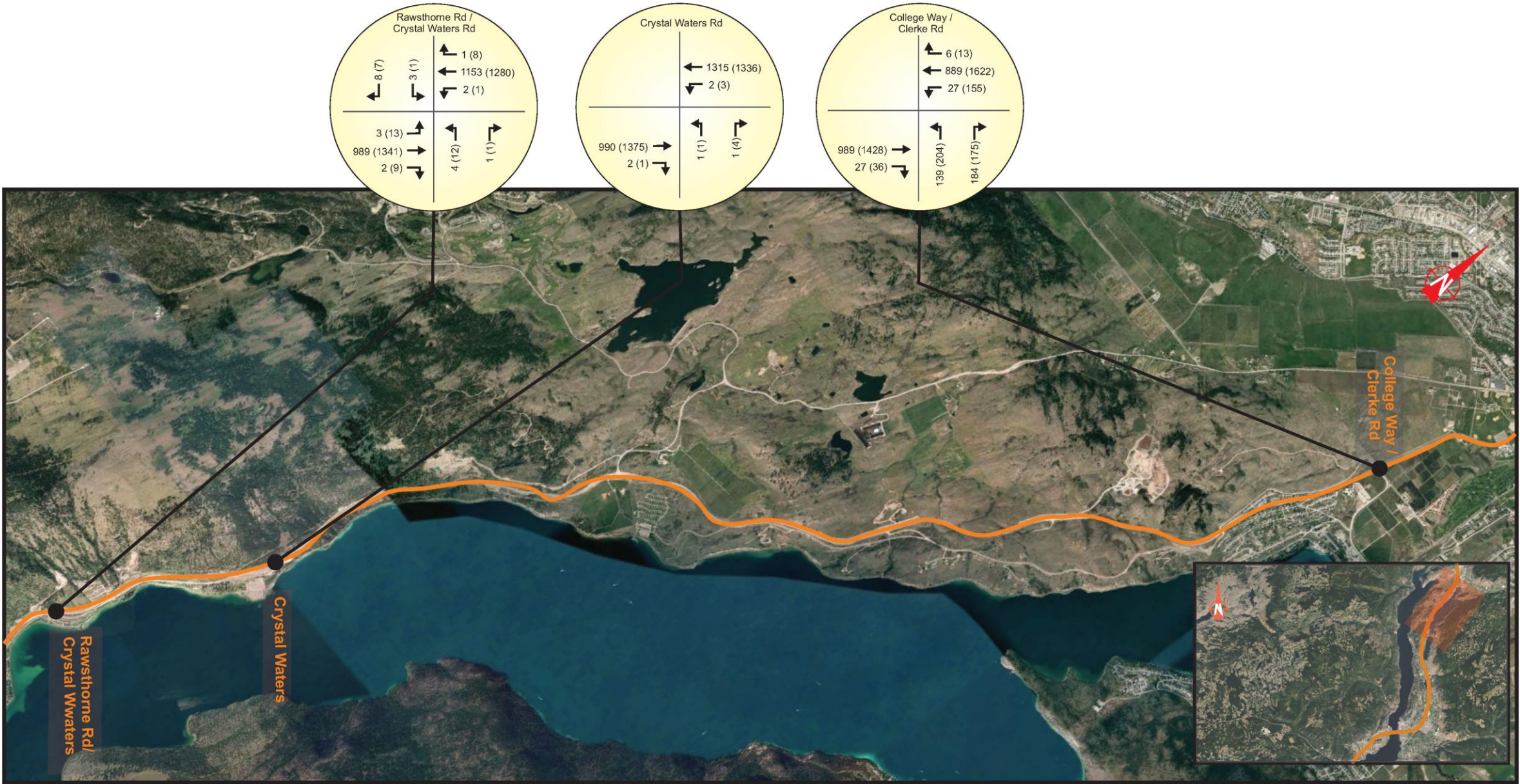


Figure 2.14: 2040 Forecasted Turn Volumes

3.0 PERFORMANCE ASSESSMENT

This section presents future 2040 performance assessments of the Highway 97 corridor using applicable performance metrics as applied previously in the Current Corridor Conditions report.

3.1 Performance Criteria

The selected criteria associated with intersection, interchange, and travel time performance are described in **Table 3.1**. These same criteria were applied in the Current Corridor Conditions report in assessing the current highway performance.

Table 3.1: Traffic Operations Performance Criteria

Measure	Threshold	Threshold Reference
Mainline		Performance targets adapted from the Ministry's Business Case Guidelines Appendix 1: Rural Passing Mobility: "A deficiency is considered to occur when the "percent following" exceeds 60% as measured in the field or as calculated by TRARR or an equivalent tool. This figure equates to the LOS C/D interface." Note that according to the Highway Capacity Manual Exhibit 15-3, 65% represents the threshold for LOS D, whereas 60% is between LOS C/D.
Multi-lane Highway	LoS D or better based on calculated density and speed	
Two-lane Highway	LoS C or better based on Time Spent Following ($\leq 60\%$ as per Highway Capacity Manual) for Class I Highways	
Intersections		Performance targets are adapted from the MoTI Southern Interior Region General Mobility Performance Criteria, February 2014. These targets are also consistent with guidelines contained within the MoTI Planning and Designing Access to Developments (PDAD) public document.
Signalized Intersection		
<ul style="list-style-type: none">Mainline Through Movements	LoS D or better v/c ratio < 0.85	
<ul style="list-style-type: none">Mainline Turning Movements	LoS D or better v/c ratio < 0.90	
<ul style="list-style-type: none">Side Street Approaches	LoS E or better v/c ratio < 0.90	
Unsignalized Intersection		
<ul style="list-style-type: none">Mainline Through / Turning Movements	LoS C or better v/c ratio < 0.85	
<ul style="list-style-type: none">Side Street Approaches	LoS D or better v/c ratio < 0.90	
Storage bay lengths	Sufficient length to contain 95 th percentile queue lengths	
Travel Time		Although specific TTI performance thresholds are not well defined, the Texas Transportation Institute and other groups tend to look at relative global rankings or changes from year to year rather than specific thresholds. A review of indices for other major North American centres indicate TTI > 1.20 are common where peak hour type conditions prevail and 1.50 would likely represent the acceptable threshold to define a problem area.
Travel Time Index	1.50 < TTI defines significant congestion	

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Mainline Analysis

Analysis of the mainline has been undertaken using the latest version of the Highway Capacity Software (HCS 2010), forecasted AM and PM peak hour volumes for a typical fall weekday in 2040, and segment geometric / operational characteristics.

Intersection Performance Analysis

To be consistent with the analysis conducted on the highway corridor under existing conditions, the intersection analysis was undertaken using similar techniques described in the Current Corridor Conditions report. Synchro Version 8.0 capacity analysis software and methodology were again applied, this time using the forecasted 2040 traffic volumes. The software uses forecasted intersection turning movements, heavy vehicle composition, peak hour factors, lane geometry and signal timing parameters as its key inputs, and produces estimates of delay per vehicle, LoS, and volume to capacity ratios as its key outputs. Queuing at signalized intersections was assessed using SimTraffic with a 10 minute seeding interval, 60 minute recording interval, and three runs for statistical randomness. The analysis was done in accordance with Ministry of Transportation and Infrastructure issued guidelines.

Interchange Operations

Interchange analysis was conducted using Highway Capacity Software (HCS) Version 2010 Ramps. Merge and diverge analysis was performed for the future 2040 horizon year assuming the existing road geometry and forecasted 2040 traffic volumes. The analysis considered traffic volumes and compositions, free flow speeds, merge and diverge lane lengths, and terrain to determine the level of service (LoS) of the merge / diverge area, which is a function of density. A LoS F indicates that the travel demand at the ramp junction exceeds the available capacity. Operations at ramp terminals were analyzed using Synchro Version 8.0, as per the intersection performance analysis.

Corridor Travel Time Performance

Travel time performance was again evaluated using travel times and Travel Time Indices (TTI) which compares the travel time required for a median (50th percentile) peak period trip versus a median off-peak period reference trip. The index is calculated using point to point travel time data collected during Summer 2014 as the base, and forecasted travel times using AM and PM peak hour output from the regional transportation model compared against the base reference trip travel time. The base reference trip is defined as occurring between 5:00 AM to 6:00 AM (outside of the signal coordination period). The peak periods used in the evaluation are AM peak (7:00 AM to 9:00 AM) and PM peak (3:00 PM to 6:00 PM).

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3.2 Mainline Operations

Figures 3.1 and **3.2** show the results of the mainline operation assessment for the future 2040 AM and PM peak periods respectively. Note that the HCS mainline analysis is not applicable in urban areas such as the Westbank couplet, and downtown Kelowna. As such, these urban segments of the highway have been left blank in the figures.

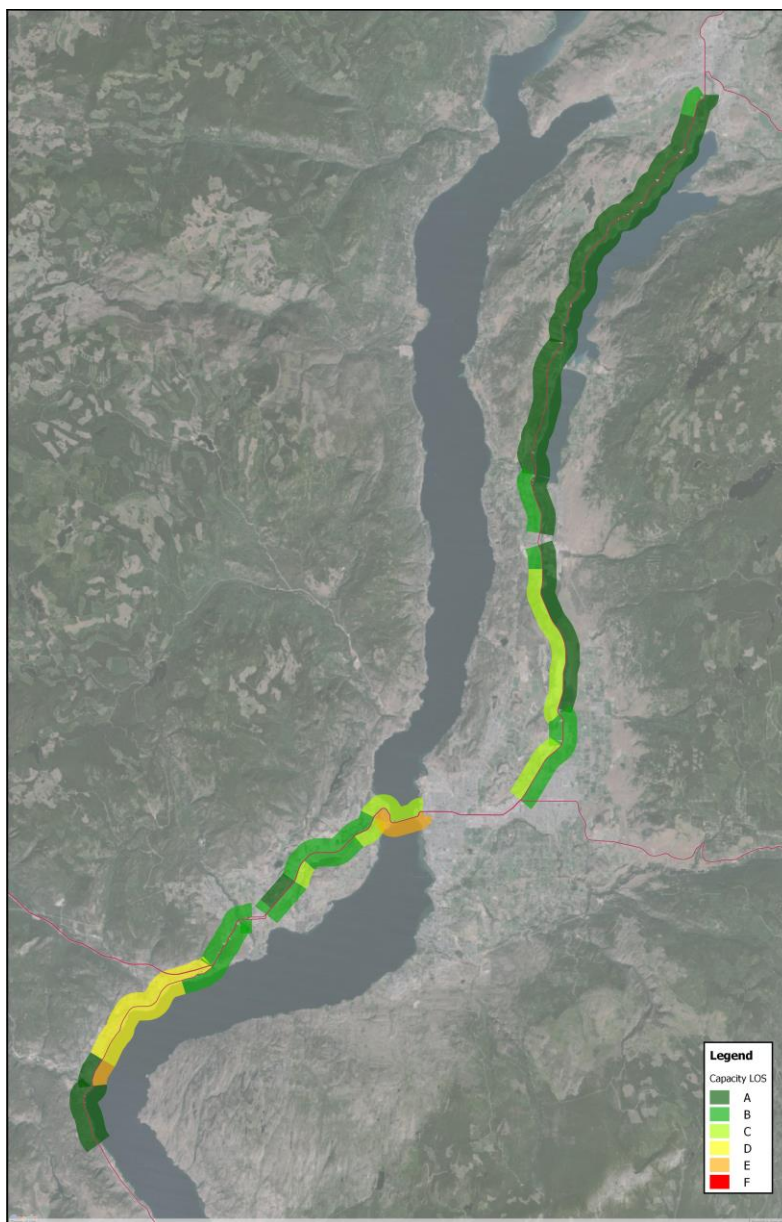


Figure 3.1: Future 2040 AM Peak Mainline Operations

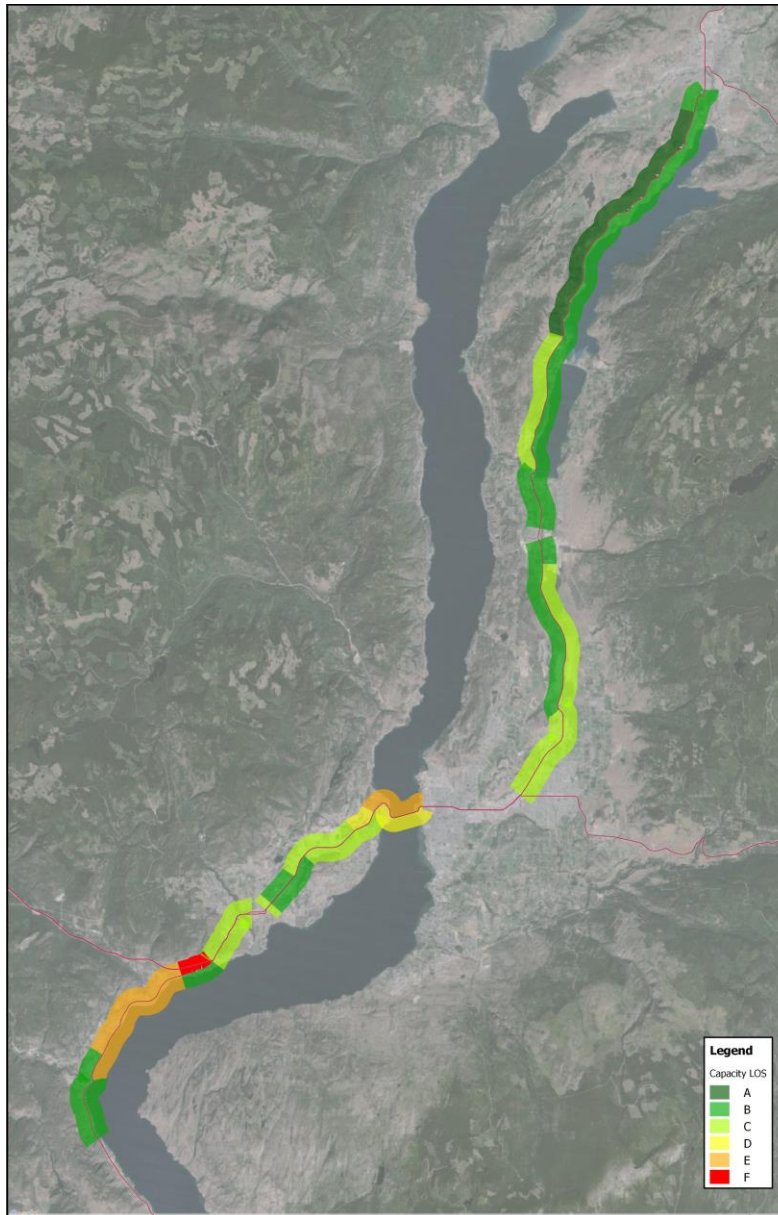


Figure 3.2: Future 2040 PM Peak Mainline Operations

Based on the above analysis, several segments perform below the critical threshold for the AM and / or PM peak hours. These results are summarized in **Table 3.2**.

Table 3.2: Future 2040 Mainline Operations Critical Level of Service Summary

Community	Peak	Direction	From	To	Link Capacity LoS
West Kelowna	AM	N	Westside Road	Abbott Street	E
West Kelowna	PM	S	Westside Road	Abbott Street	E
Peachland	AM	N	1 KM North of Hardy Road	Renfrew Road	E
Peachland	AM	N	Renfrew Road	700m south of Ponderosa Dr	D
Peachland	AM	N	700m south of Ponderosa Dr	900m north of Huston Road	D
Peachland	AM	S	South end of Peachland	1 KM North of Hardy Road	D
Peachland	AM	S	Renfrew Road	700m south of Ponderosa Dr	D
Peachland	AM	S	700m south of Ponderosa Dr	900m north of Huston Road	D
Peachland	AM	S	900m north of Huston Road	Highway 97C (Okanagan Connector)	D
Peachland	PM	N	1 KM North of Hardy Road	Renfrew Road	E
Peachland	PM	N	Renfrew Road	700m south of Ponderosa Dr	E
Peachland	PM	N	700m south of Ponderosa Dr	900m north of Huston Road	E
Peachland	PM	S	South end of Peachland	1 KM North of Hardy Road	D
Peachland	PM	S	Renfrew Road	700m south of Ponderosa Dr	E
Peachland	PM	S	700m south of Ponderosa Dr	900m north of Huston Road	E
Peachland	PM	S	900m north of Huston Road	Highway 97C (Okanagan Connector)	F

3.3 Intersection Performance

A total of 53 intersections were analyzed throughout the study corridor to determine future 2040 traffic performance characteristics and to identify any deficiencies. These same intersections were analyzed as part of the Current Corridor Conditions report (Section 5 - Existing Corridor Performance Analysis). As mentioned, the performance metrics used in this previous report were also retained for this analysis to maintain consistency between the existing and future analysis.

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The future 2040 network was modified in the Synchro model to reflect relevant committed projects along the study corridor, as summarized in **Table 3.3**.

Table 3.3: Network Modifications from Committed Projects

Agency	Corridor or Intersection	Corridor From or At Intersection	Corridor To	Project Description
BC MoTI	Highway 97	Greata Ranch	Antlers Beach Park	Widening from rural 2-lane undivided highway (RAU) to rural 4-lane divided highway (RAD)
	Highway 97	Daimler Drive		Advance left turn phasing provided from Highway 97
	Highway 97	Highway 33	Edwards Road	Widening from 4 to 6 lanes. (HOV extension)
	Highway 97	McCurdy Road		Provide dual EB left turn and revise signal phasing.
	Highway 97	Pollard Road		SBL advance phasing
	Highway 97	Gordon Drive		NBL storage extension
	Highway 97	Cooper Road		Advance left turn phasing, capacity improvements (e.g., dual lefts off the cross street)
	Highway 97	Dilworth Drive		Advance left turn phasing, capacity improvements (e.g., dual lefts off the cross street)
	Highway 97	Airport Way		EBL and WBL advance phasing
	Highway 97	Oceola Road		Provide intersection channelization and NB acceleration lane
City of Kelowna	Highway 97	Abbott Street		Provide grade separation of pedestrian movements
	Highway 97	Pandosy Street		NB channelized right turn lane
	Highway 97	Gordon Drive		Extension of NBL storage from 65 to 120 metres

Traffic signal timings were then re-optimized for the corridor before performing the analysis and extracting results. This exercise was conducted to provide a reasonable estimate of traffic operations with the forecasted 2040 turning movements, as existing signal timings would likely not be suitable to accommodate the forecasted volumes and therefore result in unrealistic operations. As a result of the optimization, some future 2040 results may be better than those results reported for 2014 conditions.

The future 2040 volume to capacity ratios at the corridor intersections are summarized in **Table 3.4**. Volume to capacity ratios greater than 0.90 for highway turning movements and side street approaches are highlighted in orange. Volume to capacity ratios greater than 0.85 for the highway through movements have also been highlighted. For consistency purposes, the individual movement results are reported assuming Highway 97 movements are oriented northbound / southbound.

The intersection Level of Service (LoS) ratings for each movement at the various corridor intersections are summarized in **Table 3.5**. These ratings are based on average delay per vehicle in seconds and the LoS categories ranging from A to F. LoS ratings of highway movements falling below D are highlighted in orange as they exceed the defined performance thresholds, while ratings of side street approaches falling below E are similarly highlighted in orange.

Table 3.6 summarizes the simulated 95th percentile queue lengths in metres at the corridor intersections. As mentioned previously, the queue lengths are calculated using SimTraffic and are based on the average of three runs where random seeds were applied. The 95th percentile queue lengths that exceed the existing storage bay lengths are highlighted in orange and indicate the potential for turn bay blockage and more extensive combined queuing and delays.

Table 3.4: Future 2040 Synchro Results (Volume to Capacity Ratios)

Community	Intersection (Hwy 97 &)	Control Type	V/C																							
			AM												PM											
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Peachland	Hardy Street	Stop Controlled	0.09		0.09				0.00	0.00			0.49	0.49	0.39		0.39				0.02	0.02			0.70	0.70
	Renfrew Road	Stop Controlled	0.22		0.22				0.00	0.00			0.47	0.01	0.65		0.65				0.00	0.00			0.70	0.02
	Princeton/Beach Avenue	Signalized	0.48	0.07	0.04	0.15	0.08	0.07	0.05	0.60	0.04	0.14	0.70	0.70	0.56	0.11	0.05	0.64	0.41	0.33	0.49	0.78	0.07	0.19	1.01	1.01
	Ponderosa Road	Signalized	0.17	0.31	0.31	0.14	0.34	0.34	0.01	0.49	0.00	0.01	0.46	0.02	0.11	0.44	0.44	0.26	0.36	0.36	0.10	0.61	0.02	0.16	0.69	0.02
	Clements Crescent	Signalized	0.49		0.34				0.25	0.52			0.50	0.10	0.50		0.45				0.42	0.55			0.81	0.13
	Todd Road	Stop Controlled						0.09		0.59	0.59		0.52							0.54		0.87	0.87		0.79	
	Chidley Road	Stop Controlled	0.09		0.09				0.00	0.60			0.61	0.00	0.49		0.49				0.01	0.01			0.95	0.00
	Trepanier Bench Road	Stop Controlled	2.30		0.32				0.08	0.57			0.55	0.00	10.73		0.51				0.27	0.84			0.90	0.03
	Buchanan Road (S)	Stop Controlled						0.00		0.60	0.60	0.00	0.55						0.04		0.85	0.85	0.93	0.93		
	Buchanan / Huston Road	Stop Controlled			0.00			0.10	0.01	0.58	0.58	0.04	0.55	0.02			0.01			0.21	0.02	0.84	0.84	0.14	0.93	0.07
	Drought Road	Stop Controlled				0.00		0.00		0.43	0.43	0.00	0.00				0.02		0.02		0.60	0.60	0.01	0.01		
	Seclusion Bay Road	Stop Controlled				0.04		0.04		0.65	0.65	0.01	0.58				0.01		0.01		0.43	0.22	0.01	0.58		
West Kelowna	Dobbin/ Herbert Road	Signalized	0.01	0.04			0.02	0.14	0.67	0.67	0.67				0.26	0.23			0.10	0.25	0.78	0.78	0.78			
	Dobbin/ Elliott Road	Signalized	0.65	0.38			0.53	0.44	0.65	0.65	0.65				0.93	0.38			0.69	0.24	0.67	0.67	0.67			
	Dobbin/ Brown Road	Signalized	0.18	0.54			0.17	0.53	0.59	0.59	0.59				0.18	0.48			0.23	0.41	0.78	0.78	0.78			
	Dobbin/ Old Okanagan Hwy	Signalized	0.45	0.19			0.04	0.45	0.60	0.60	0.60				0.01	0.20			0.12	0.02	0.77	0.77	0.77			
	Herbert Road	Signalized		0.00	0.04	0.18	0.18					0.65	0.65	0.65		0.02	0.42	0.60	0.60					0.82	0.82	0.82
	Elliott Road	Signalized		0.27	0.31	0.45	0.39					0.68	0.68	0.68		0.38	0.48	0.99	0.67					0.98	0.98	0.98
	Brown Road	Signalized		0.28	0.28	0.26	0.12					0.62	0.62	0.62		0.66	0.66	0.60	0.19					0.84	0.84	0.84
	Old Okanagan Hwy	Signalized		0.06	0.12	0.51	0.09					0.53	0.53	0.53		0.06	0.11	0.49	0.11					0.75	0.75	0.75
	Gosset Road	Signalized	0.46	0.27	0.27	0.54	0.79	0.79	0.29	0.91	0.16	0.34	0.74	0.06	0.81	0.54	0.54	0.66	0.91	0.91	0.34	0.86	0.21	0.76	0.80	0.08
	Butt Road	Signalized	0.75	0.34	0.11	0.43	0.35	0.23	0.09	0.49	0.04	0.10	0.81	0.09	0.83	0.76	0.52	0.82	0.87	0.37	0.32	0.63	0.08	0.36	0.94	0.17
	Daimler Drive	Signalized	0.70	0.43	0.43	0.44	0.16	0.08	0.26	0.64	0.14	0.09	0.74	0.13	0.86	0.58	0.58	0.92	0.24	0.07	0.57	0.77	0.16	0.22	0.92	0.23
	Bartley Road	Signalized	0.77	0.48	0.48	0.19	0.38	0.38	0.73	0.96	0.10	0.52	0.85	0.20	0.72	0.61	0.61	0.43	0.69	0.69	1.00	0.89	0.10	0.67	1.15	0.46
	Ross Road	Signalized	0.44	0.20	0.33	0.54	0.21	0.56	0.13	0.69	0.03	0.47	0.62	0.03	0.52	0.24	0.37	0.25	0.09	0.35	0.26	0.77	0.03	0.41	1.01	0.03
	Westlake Road	Signalized	1.12	0.03	0.03	0.15	0.19	0.19	0.39	1.05	1.05	0.10	0.75	0.75	1.13	0.24	0.24	0.10	0.09	0.09	0.62	0.84	0.84	0.42	1.19	1.19
	Boucherie Road	Signalized	2.21	2.21	2.21	0.24	1.05	1.05	0.10	2.00	0.06	0.57	1.15	0.04	1.14	1.14	1.14	0.34	0.88	0.88	0.35	1.02	0.11	1.07	1.22	0.11

Community	Intersection (Hwy 97 &)	Control Type	V/C																							
			AM												PM											
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Kelowna	Abbott Street	Signalized			0.32			0.00	0.81	0.91	0.03		0.55	0.55			1.02			0.03	0.19	1.00	1.00		0.74	0.74
	Pandosy Street	Signalized		0.56	0.60	1.26	0.85	0.58		0.81	0.81	3.43	0.44	0.44		0.86	1.57	1.60	0.30	0.30		0.63	0.63	0.62	0.62	0.62
	Ellis Street	Signalized	0.09	0.63	0.63	0.59	0.30	0.30	0.37	0.68	0.68	1.78	0.57	0.57	1.03	0.35	0.35	0.78	0.62	0.62	0.76	0.62	0.62	0.66	1.05	1.05
	Richter Street	Signalized	0.99	0.60	0.60	0.98	0.47	0.47	1.00	0.83	0.83	0.61	0.54	0.54	0.96	0.68	0.68	0.59	0.43	0.43	0.29	0.87	0.87	0.08	0.80	0.80
	Ethel Street	Signalized	0.77	0.66	0.27	0.53	0.92	0.21	0.64	0.63	0.63	0.64	0.63	0.63	1.32	1.01	0.10	1.40	1.09	0.09	1.65	0.79	0.79	1.80	1.12	1.12
	Gordon Drive	Signalized	1.00	0.50	0.50	0.38	1.01	1.01	0.71	1.01	0.18	0.94	0.83	0.28	1.03	1.05	1.05	1.04	1.02	1.02	0.45	1.07	0.13	0.69	0.92	0.13
	Burtch Road	Signalized	0.74	0.95	0.95	1.21	0.62	0.62	0.29	0.85	0.10	0.98	0.76	0.05	0.80	0.70	0.70	1.60	0.65	0.65	1.12	0.83	0.06	0.86	1.08	0.21
	Spall Road	Signalized	0.38	0.88	0.54	0.71	0.48	0.19	0.70	0.87	0.26	0.71	0.83	0.17	1.01	0.82	0.76	0.72	1.07	0.76	1.04	0.96	0.03	0.90	1.05	0.31
	Cooper Road	Signalized	0.55	0.54	0.54	0.69	0.85	0.36	0.08	0.78	0.11	0.61	0.75	0.04	0.49	1.02	1.02	1.01	0.86	0.18	0.39	1.03	0.34	0.70	0.88	0.05
	Dilworth Drive	Signalized	0.12	0.81	0.81	0.35	0.79	0.79	0.74	0.65	0.65	0.51	0.69	0.04	0.28	0.71	0.71	0.56	1.09	1.09	0.82	1.13	1.13	1.11	0.79	0.01
	Leckie Road	Signalized	0.13	0.20	0.20	0.79	0.24	0.60	0.61	0.59	0.59	0.42	0.60	0.08	0.90	0.55	0.55	1.47	0.55	0.93	0.47	0.84	0.84	3.25	0.78	0.06
	Banks Road	Signalized	0.62	0.33	0.23	0.45	0.48	0.46	0.35	0.64	0.08	0.53	0.67	0.10	1.18	0.55	0.58	0.91	0.43	0.38	0.98	1.22	0.12	1.15	0.94	0.07
	Highway 33	Signalized	0.34	0.44	0.06	0.96	0.50	0.09	0.72	0.94	0.17	0.42	1.19	0.04	0.37	1.00	0.04	1.00	0.35	0.03	0.25	1.01	0.59	0.95	0.89	0.07
	Leathead Road	Signalized	0.67	0.27	0.02	0.72	1.09	1.09	0.23	0.72	0.21	2.23	0.67	0.57	1.48	0.68	0.03	1.36	1.08	1.08	0.38	0.64	0.24	1.88	0.69	0.37
	McCurdy Road	Signalized	7.83	0.54	0.43	0.09	0.32	0.84	0.38	0.88	0.07	2.72	0.54	0.40	1.52	0.25	0.31	0.34		1.26	0.72	1.35	0.25	1.69	0.75	0.66
	Sexsmith Road	Signalized	0.34	0.28	0.37	0.44	0.61	0.61	0.71	0.75	0.19	0.54	0.81	0.12	0.58	0.29	0.45	0.29	0.74	0.74	0.73	0.97	0.14	0.89	0.81	0.24
	Edwards Road	Signalized	0.80	0.80	0.80	1.53	1.53	1.53	0.02	0.63	0.63	4.46	0.45	0.45	0.85	0.85	0.85	1.50	1.50	1.50	0.12	0.86	0.86	6.49	0.55	0.55
	University Way	Signalized	0.10		0.45					0.71			0.77	0.21	0.10		1.07					0.99			0.85	0.19
	Airport Way	Signalized	0.14	0.64	0.64	0.80	0.14	0.14	0.94	0.57	0.36	0.48	0.98	0.09	0.41	0.64	0.64	1.16	0.26	0.26	0.76	1.11	0.17	0.63	0.86	0.06
Lake Country	Commonwealth Road	Signalized				0.60		0.60		0.70	0.02	0.23	0.72					0.64		0.64		0.97	0.03	0.93	0.73	
	Beaver Lake Road	Signalized	0.96	0.80	0.80	0.89	0.34	0.34	0.40	0.57	0.57	0.17	0.97	0.97	1.12	0.77	0.77	1.07	0.86	0.86	0.94	1.04	1.04	0.22	1.09	1.09
	Pollard Road	Signalized				0.22		0.15	0.08	0.54	0.05	0.14	0.66	0.66				0.40		0.19	0.14	0.90	0.08	0.69	0.61	
	Woodsdale Road	Signalized	0.26	0.35	0.35	0.10	0.27	0.27	0.26	0.37	0.01	0.17	0.59	0.09	0.34	0.23	0.23	0.16	0.36	0.36	0.37	0.60	0.02	0.34	0.57	0.06
	Crystal Waters / Rawsthorne*	Stop Controlled	0.06		0.06	0.07		0.07	0.01	0.32	0.00	0.00	0.37	0.00	0.04		0.04	0.53		0.53	0.03	0.43	0.01	0.00	0.41	0.01
	Crystal Waters*	Stop Controlled				0.01		0.01		0.32	0.00	0.00	0.42					0.03		0.03		0.44	0.00	0.01	0.43	
	Clerke Road / College Way*	Signalized				0.50	0.30	0.30		0.63	0.03	0.08	0.44	0.01				0.76	0.44	0.44		0.94	0.04	0.68	0.74	0.01

* Forecasts based on representative growth rates from adjacent intersections, as model did not extend to this intersection

Thresholds for Signalized Intersections:

NBT, SBT ≥ 0.85

All other movements ≥ 0.90

Thresholds for Unsignalized Intersections:

NBL, NBT, NBR, SBL, SBT, SBR ≥ 0.85

All other movements ≥ 0.90

Table 3.5: Future 2040 Synchro Results (Levels of Service)

Community	Intersection (Hwy 97 &)	Control Type	LoS																							
			AM												PM											
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Peachland	Hardy Street	Stop Controlled	D		D				A	A			A	A	F		F				A	A			A	A
	Renfrew Road	Stop Controlled	D		D				A	A			A	A	F		F				A	A			A	A
	Princeton/Beach Avenue	Signalized	B	B	A	C	C	B	A	B	A	B	B	B	D	C	B	E	D	B	C	B	A	A	D	D
	Ponderosa Road	Signalized	D	B	B	D	B	B	A	A	A	A	A	A	D	C	C	D	B	B	A	B	A	A	A	A
	Clements Crescent	Signalized	D		B				A	A			B	A	D		B				B	A			B	A
	Todd Road	Stop Controlled						C		A	A		A							F		A	A		A	
	Chidley Road	Stop Controlled	E		E				A	A			A	A	F		F				A	A			A	A
	Trepanier Bench Road	Stop Controlled	F		C				B	A			A	A	F		F				C	A			A	A
	Buchanan Road (S)	Stop Controlled						C		A	A	A	A							D		A	A	A	A	
	Buchanan / Huston Road	Stop Controlled			C			C	B	A	A	B	A	A			D			D	B	A	A	B	A	A
	Drought Road	Stop Controlled				B		B		A	A	A	A					C		C		A	A	A	A	
	Seclusion Bay Road	Stop Controlled				D		D		A	A	A	A					B		B		A	A	B	A	
West Kelowna	Dobbin/ Herbert Road	Signalized	C	C			C	A	B	B	B				D	D			C	C	B	B	B			
	Dobbin/ Elliott Road	Signalized	D	C			C	B	A	A	A				E	C			D	C	B	B	B			
	Dobbin/ Brown Road	Signalized	C	C			C	C	A	A	A				D	D			D	C	A	A	A			
	Dobbin/ Old Okanagan Hwy	Signalized	D	D			C	C	A	A	A				D	D			D	C	A	A	A			
	Herbert Road	Signalized		C	B	C	C					A	A	A		C	C	D	D					A	A	A
	Elliott Road	Signalized		C	A	B	B					A	A	A		C	C	E	C					C	C	C
	Brown Road	Signalized		A	A	C	C					A	A	A		D	D	D	C					B	B	B
	Old Okanagan Hwy	Signalized		D	B	D	D					A	A	A		C	B	D	C					A	A	A
	Gosset Road	Signalized	C	C	C	C	D	D	D	C	B	D	C	A	D	D	D	C	E	E	E	D	B	F	C	B
	Butt Road	Signalized	D	C	B	C	C	A	C	B	A	A	C	A	E	E	C	E	E	C	D	C	A	D	D	A
	Daimler Drive	Signalized	D	C	C	D	C	A	A	B	A	A	B	A	E	D	D	F	D	B	C	B	A	A	A	A
	Bartley Road	Signalized	D	D	D	C	C	C	E	D	A	F	C	A	D	D	D	D	D	D	F	C	A	E	F	A
	Ross Road	Signalized	E	D	B	E	D	C	A	A	A	C	A	A	E	D	B	D	D	B	B	A	A	C	B	A
	Westlake Road	Signalized	F	C	C	D	D	D	B	D	D	A	C	C	F	D	D	D	D	D	C	C	C	B	F	F
	Boucherie Road	Signalized	F	F	F	C	E	E	D	F	B	E	F	B	F	F	F	E	D	D	E	E	A	F	F	A

Community	Intersection (Hwy 97 &)	Control Type	LoS																							
			AM												PM											
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Kelowna	Abbott Street	Signalized			E			A	E	A	A		A	A			F			A	E	A	A		D	D
	Pandosy Street	Signalized		F	D	F	E	E		B	B	F	A	A		F	F	F	D	D		C	C	F	B	B
	Ellis Street	Signalized	E	E	E	E	D	D	C	A	A	F	A	A	F	D	D	F	E	E	E	B	B	E	E	E
	Richter Street	Signalized	F	E	E	F	D	D	F	A	A	C	B	B	F	D	D	E	D	D	C	C	C	B	C	C
	Ethel Street	Signalized	E	E	D	D	F	D	F	A	A	F	B	B	F	F	D	F	F	D	F	A	A	F	E	E
	Gordon Drive	Signalized	F	D	D	C	F	F	E	D	A	F	D	B	F	F	F	F	F	F	C	E	A	D	C	A
	Burtch Road	Signalized	E	E	E	F	D	D	B	C	A	F	B	A	E	D	D	F	D	D	F	B	A	F	E	B
	Spall Road	Signalized	C	E	C	D	D	B	D	C	A	D	C	A	F	E	D	E	F	D	F	C	A	E	E	A
	Cooper Road	Signalized	E	D	D	E	E	B	A	B	A	C	C	A	F	F	F	F	E	B	C	D	A	D	D	B
	Dilworth Drive	Signalized	E	D	D	E	D	D	C	C	C	C	C	A	E	D	D	E	F	F	E	F	F	F	D	C
	Leckie Road	Signalized	D	D	D	F	D	D	D	A	A	C	A	A	F	E	E	F	E	F	D	C	C	F	A	A
	Banks Road	Signalized	E	D	B	D	D	B	C	A	A	C	B	A	F	D	C	F	D	B	F	F	B	F	D	B
	Highway 33	Signalized	E	D	C	E	D	B	D	D	A	C	F	B	E	F	D	F	D	C	B	C	A	F	C	A
	Leathead Road	Signalized	E	D	A	E	F	F	C	C	A	F	B	A	F	E	A	F	F	F	C	B	A	F	B	A
	McCurdy Road	Signalized	F	E	B	D	D	D	E	D	A	F	B	A	F	D	A	E		F	F	F	C	F	C	B
	Sexsmith Road	Signalized	D	D	B	D	B	B	E	C	A	E	C	B	D	D	A	C	C	C	E	D	A	F	C	A
	Edwards Road	Signalized	E	E	E	F	F	F	B	B	B	F	B	B	D	D	D	F	F	F	B	C	C	F	B	B
	University Way	Signalized	C		C					A			B	A	C		F					C			B	A
	Airport Way	Signalized	D	C	C	F	C	C	F	B	A	E	D	A	D	D	D	F	B	B	F	F	A	F	D	A
Lake Country	Commonwealth Road	Signalized				C		C		B	A	A	B					D		D		C	A	E	A	
	Beaver Lake Road	Signalized	F	D	D	F	B	B	C	B	B	A	D	D	F	D	D	F	E	E	F	E	E	B	F	F
	Pollard Road	Signalized				C		A	B	B	A	A	A	A				C		A	B	C	A	C	A	A
	Woodsdale Road	Signalized	C	C	C	C	B	B	A	A	A	B	B	A	C	C	C	C	B	B	A	A	A	C	B	A
	Crystal Waters / Rawsthorne*	Stop Controlled	D		D	F		F	B	A	A	B	A	A	D		D	F		F	B	A	A	B	A	A
	Crystal Waters*	Stop Controlled				D		D		A	A	B	A					D		D		A	A	B	A	
	Clerke Road / College Way*	Signalized				C	A	A		B	A	A	A	A				D	B	B		C	A	C	B	A

* Forecasts based on representative growth rates from adjacent intersections, as model did not extend to this intersection

Thresholds for Signalized Intersections:

NBL, NBT, NBR, SBL, SBT, SBR = E, F

All other movements = F

Thresholds for Unsignalized Intersections:

NBL, NBT, NBR, SBL, SBT, SBR = D, E, F

All other movements = E, F

Table 3.6: Future 2040 Synchro Results (95th Percentile Queue Lengths)

Community	Intersection (Hwy 97 &)	Control Type	95 th Percentile Queue Length (m)																							
			AM												PM											
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Peachland	Hardy Street	Stop Controlled	10		10				6	6			0	0	16		16				79	79			0	0
	Renfrew Road	Stop Controlled	15		15				1	1			0	0	14		14				0	0			0	0
	Princeton/Beach Avenue	Signalized	34	27	0	10	11	15	10	89	19	18	147	147	36	38	0	30	44	17	27	173	30	17	212	212
	Ponderosa Road	Signalized	12	13	13	16	12	12	5	54	0	5	25	0	10	24	24	16	12	12	10	67	0	14	54	0
	Clements Crescent	Signalized	34		8				21	49			64	0	35		21				24	16			65	0
	Todd Road	Stop Controlled						3		0	0		0							123		45	45		0	
	Chidley Road	Stop Controlled	11		11				0	0			0	0	11		11				58	58			0	0
	Trepanier Bench Road	Stop Controlled	39		24				16	0			0	2	34		22				30	102			0	6
	Buchanan Road (S)	Stop Controlled						3		0	0	0	0							7		0	0	0	0	
	Buchanan / Huston Road	Stop Controlled			3			13	3	0	0	11	0	0	0	0	3			14	5	0	0	16	0	0
	Drought Road	Stop Controlled				3		3		0	0	0	0					6		6		0	0	11	11	
	Seclusion Bay Road	Stop Controlled				6		6		0	0	4	0					5		5		0	0	3	0	
West Kelowna	Dobbin/ Herbert Road	Signalized	6	11			9	18	59	59	48				23	25			13	23	219	221	221			
	Dobbin/ Elliott Road	Signalized	51	55			60	39	96	98	98				46	46			135	58	211	212	212			
	Dobbin/ Brown Road	Signalized	20	40			19	29	55	55	55				16	32			20	28	58	58	53			
	Dobbin/ Old Okanagan Hwy	Signalized	32	20			10	22	91	93	93				2	15			14	5	99	99	97			
	Herbert Road	Signalized		3	11	26	26					114	114	109		5	32	37	37					103	109	109
	Elliott Road	Signalized		51	34	62	85					128	129	129		51	43	70	134					192	197	197
	Brown Road	Signalized		35	35	35	29					85	85	82		125	125	33	26					182	182	175
	Old Okanagan Hwy	Signalized		8	9	30	12					66	62	62		8	10	32	14					85	85	82
	Gosset Road	Signalized	34	37	37	47	88	88	18	64	29	33	96	29	47	94	94	48	79	79	21	63	31	57	105	34
	Butt Road	Signalized	0	0	0	0	0	0	0	0	0	0	142	36	73	113	40	73	210	38	21	100	3	38	198	53
	Daimler Drive	Signalized	50	65	65	43	27	0	24	56	7	24	109	45	56	133	133	47	43	0	29	53	0	23	104	46
	Bartley Road	Signalized	68	198	198	27	49	49	58	98	36	36	176	0	59	85	85	51	98	98	69	112	57	56	563	101
	Ross Road	Signalized	38	23	19	37	50	43	37	789	15	36	82	0	33	20	12	18	11	5	16	94	0	21	58	0
	Westlake Road	Signalized	49	143	0	27	38	0	52	1069	0	16	122	0	50	142	0	18	20	0	41	94	0	35	185	0
	Boucherie Road	Signalized	48	48	48	37	61	61	16	690	36	93	283	0	30	30	30	27	71	71	37	217	39	111	369	63

Community	Intersection (Hwy 97 &)	Control Type	95 th Percentile Queue Length (m)																							
			AM												PM											
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Kelowna	Abbott Street	Signalized			7			4	51	0	0		59	55			108			15	61	110	14		109	109
	Pandosy Street	Signalized		31	0	63	349	236		110	79	67	249	120		161	47	63	280	188		116	97	61	251	209
	Ellis Street	Signalized	17	79	79	48	22	22	19	45	43	81	272	250	65	147	147	66	71	71	68	211	140	63	461	461
	Richter Street	Signalized	38	146	156	44	160	151	25	73	49	54	139	132	43	153	166	47	178	110	10	99	102	20	468	456
	Ethel Street	Signalized	59	132	33	57	174	24	29	56	52	44	119	110	58	142	41	58	142	16	93	204	150	56	365	347
	Gordon Drive	Signalized	60	157	169	60	152	151	36	93	0	94	240	76	69	147	148	64	141	162	21	133	25	49	160	42
	Burtch Road	Signalized	43	145	145	48	136	136	26	178	27	32	50	12	48	160	160	41	111	111	57	133	13	21	269	30
	Spall Road	Signalized	56	257	51	58	100	28	57	207	27	73	144	60	57	233	53	52	212	51	127	502	14	85	764	71
	Cooper Road	Signalized	45	54	56	79	169	74	11	178	10	48	145	12	50	200	202	95	180	64	31	284	31	47	178	19
	Dilworth Drive	Signalized	27	91	91	30	78	100	67	140	102	35	84	19	33	118	115	65	131	129	66	464	452	120	170	0
	Leckie Road	Signalized	12	22	22	61	30	0	17	60	59	15	56	29	64	251	251	83	117	0	17	212	206	166	421	0
	Banks Road	Signalized	51	45	0	36	62	32	31	94	0	35	95	72	73	114	76	75	151	44	77	485	488	97	447	55
	Highway 33	Signalized	28	36	0	154	321	29	71	349	33	47	184	19	44	182	20	155	328	15	25	234	51	91	157	11
	Leathead Road	Signalized	71	199	19	71	219	219	6	145	51	38	207	6	63	249	28	69	238	238	7	31	0	30	145	20
	McCurdy Road	Signalized	103	120	3	13	42	70	34	247	40	130	747	27	115	154	16	29	0	155	87	331	48	145	200	22
	Sexsmith Road	Signalized	28	41	14	51	59	59	49	82	33	35	105	45	44	48	19	44	82	82	57	143	52	22	72	22
	Edwards Road	Signalized	144	144	144	377	377	377	5	101	113	136	876	687	115	115	115	355	355	355	36	216	227	130	808	581
	University Way	Signalized	51		19					96			715	176	268		40					141			258	0
	Airport Way	Signalized	28	63	63	48	18	18	66	104	26	60	274	93	57	334	334	57	79	79	125	580	99	44	365	88
Lake Country	Commonwealth Road	Signalized				56		56		205	14	31	105					65		65		0	573	79	258	
	Beaver Lake Road	Signalized	76	244	244	70	55	55	32	96	126	33	377	400	69	209	209	70	584	584	85	756	749	37	695	697
	Pollard Road	Signalized				22		0	8	82	16	16	87	84				33		8	29	185	167	77	96	93
	Woodsdale Road	Signalized	25	29	29	13	23	23	17	50	0	0	0	0	27	27	27	15	34	34	35	109	0	0	0	0
	Crystal Waters / Rawsthorne*	Stop Controlled	4		0	8		0	1	0	0	0	0	0	0		0	9		0	3	0	0	1	0	0
	Crystal Waters*	Stop Controlled				0		0		0	0	2	0					0		0		0	0	3	0	
	Clerke Road / College Way*	Signalized				34	0	0		39	0	13	29	0				45	32	32		72	0	32	61	0

* Forecasts based on representative growth rates from adjacent intersections, as model did not extend to this intersection

Threshold:
95th Percentile Queue > Storage Bay Length

3.4 Interchange Performance

Interchange performance analysis was conducted at the Highway 97 interchanges located at Glenrosa Road, Westside Road, and UBCO / John Hindle Drive. The results of the future 2040 performance analysis at each of these interchanges are summarized in **Table 3.7**.

Table 3.7: Future 2040 Interchange Analysis Summary

Interchange	Analysis Type	AM		PM	
		NB	SB	NB	SB
Glenrosa	Merge	B	B	B	B
	Diverge	A	A	B	B
	Ramp Terminal	A	B	B	A
Westside	Merge	D	B	C	D
	Diverge	D	B	C	D
	Ramp Terminal		A		C
UBCO	Merge		C		C
	Diverge	C		C	
	Ramp Terminal				

The analysis indicates acceptable future performance at all three interchanges as no individual merge, diverge, or ramp terminal operation resulted in a level of service worse than LoS D.

3.5 Travel Time

To forecast future 2040 travel times, highway corridor link travel time outputs from the existing 2014 and future 2040 regional transportation models were utilized. Travel time sections were identified in the regional models to correspond with the travel time sections defined in the 2014 Central Okanagan Traffic Data Collection Program. Travel times from the regional models were then extracted for each section for the AM and PM peak hours in both the existing 2014 and future 2040 scenarios. The percentage difference in travel times between the 2040 and 2014 mode outputs were applied to the observed Bluetooth travel times to estimate future travel times.

3.5.1 Future Travel Times

The formula used to estimate the future travel time is shown as follows.

$$2040 \text{ Projected TT} = 2014 \text{ Observed TT} * \frac{2040 \text{ EMME TT}}{2014 \text{ EMME TT}}$$

Where:

2040 Projected TT = Future 2040 projected travel times;

2014 Observed TT = Observed average travel times from 2014 Bluetooth survey;

2014 EMME TT = 2014 EMME model travel times (regional model);

2040 EMME TT = 2040 EMME model travel times (regional model).

The estimated average weekday travel times are summarized in **Table 3.8** for the existing 2014 and future 2040 horizons.

Table 3.8: Existing and Future Average Weekday Travel Times (Minutes)

Community	Segment	Description	Northbound					Southbound				
			Ref	AM		PM		Ref	AM		PM	
				2014	2040	2014	2040		2014	2040	2014	2040
West Kelowna	2A	West of Glencoe Road to Elk Road	3.7	5.0	6.3	6.4	9.3	3.9	5.5	7.3	7.2	10.5
		Elk Road to Bartley Road	2.4	2.6	3.3	2.8	3.5	2.2	2.3	2.5	2.3	2.7
	2B	Bartley Road to west end of W.R. Bennett Bridge	5.7	7.4	9.8	7.6	9.1	5.8	6.6	7.6	11.7	17.7
Kelowna	3A	West end of W.R. Bennett Bridge to east of Water Street	1.9	2.5	4.3	2.3	3.0	1.8	2.0	2.2	2.0	3.5
		East of Water Street to west of Burch Road	2.7	3.3	4.4	4.5	6.0	2.8	3.7	4.6	5.7	8.0
		West of Burch Road to west of Leckie Road	3.0	4.0	4.9	7.6	10.5	2.9	3.3	4.1	4.7	6.2
	3B	West of Leckie Road to Commercial Drive	4.8	6.4	7.4	9.9	12.7	5.3	6.5	7.8	7.8	9.0
	3C	Commercial Drive to Old Vernon Road	5.9	6.6	6.4	7.5	7.5	5.2	6.1	7.5	6.7	7.1
Lake Country	4A	Old Vernon Road to Robinson Road	7.3	8.0	9.3	9.1	14.0	7.5	8.1	12.4	8.8	10.6
	4B	Robinson Road to Evans Road	5.9	5.9	6.0	5.8	6.6	6.2	6.3	6.9	6.3	6.8
		Evans Road to N End of Crystal Waters Road	2.2	2.2	2.2	2.1	2.2	2.0	2.0	2.1	2.0	2.1
		N End of Crystal Waters Road to Clerke Road	6.4	6.4	6.4	6.4	6.4	6.6	6.6	6.6	6.6	6.6
Overall	All	West of Glencoe Road to Clerke Road	51.9	60.3	70.7	72.0	90.8	52.2	59.0	71.6	71.8	90.8

December 2016

According to the results in **Table 3.8**, future travel times are projected to increase significantly in both directions between Glencoe Road and Elk Road in the PM peak period. Future significant increases are also noted between the W.R. Bennett Bridge and West of Glencoe Road in the southbound direction during the PM peak period. The highway segment between the W.R. Bennett Bridge and Commercial Drive is also projected to experience substantial increases in travel time, particularly in the PM peak period.

3.5.2 Future Travel Time Indices

Future 2040 travel time indices were calculated using the same methodology as the travel times and are summarized in **Table 3.9**.

Table 3.9: Existing and Future Travel Time Indices

Community	Segment	Description	Northbound				Southbound			
			AM		PM		AM		PM	
			2014	2040	2014	2040	2014	2040	2014	2040
Peachland	1	Hardy Street to Beach Avenue	1.05	1.10	1.14	1.27	1.04	1.05	1.08	1.10
		Beach Avenue to north of Highway 97C	1.13	1.27	1.20	1.47	1.07	1.31	1.24	1.75
		North of Highway 97C to west of Glencoe Road	0.94	0.95	1.00	1.04	1.06	1.07	1.06	1.11
West Kelowna	2A	West of Glencoe Road to Elk Road	1.33	1.69	1.70	2.49	1.39	1.85	1.82	2.66
		Elk Road to Bartley Road	1.10	1.37	1.15	1.47	1.05	1.14	1.05	1.22
	2B	Bartley Road to west end of W.R. Bennett Bridge	1.30	1.73	1.34	1.60	1.13	1.30	2.00	3.02
Kelowna	3A	West end of W.R. Bennett Bridge to east of Water Street	1.28	2.26	1.22	1.57	1.12	1.18	1.12	1.92
		East of Water Street to west of Burtch Road	1.22	1.66	1.70	2.24	1.33	1.64	2.04	2.86
		West of Burtch Road to west of Leckie Road	1.33	1.61	2.54	3.51	1.12	1.39	1.60	2.12
	3B	West of Leckie Road to Commercial Drive	1.33	1.54	2.07	2.65	1.23	1.48	1.47	1.70
	3C	Commercial Drive to Old Vernon Road	1.12	1.08	1.27	1.26	1.18	1.46	1.29	1.37
Lake Country	4A	Old Vernon Road to Robinson Road	1.10	1.27	1.25	1.92	1.08	1.65	1.17	1.41
	4B	Robinson Road to Evans Road	1.00	1.02	0.98	1.11	1.02	1.12	1.02	1.11
		Evans Road to N End of Crystal Waters Road	1.00	1.00	0.95	0.99	1.00	1.03	1.00	1.03
		N End of Crystal Waters Road to Clerke Road	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

The future travel time indices suggest increased congestion in the majority of the highway segments in both peak periods and in both directions. The northbound direction is expected to experience travel time index increases between West Kelowna and Commercial Drive in Kelowna in both peak periods. Significant increases are anticipated from Water Street to Commercial Drive.

In the southbound direction, the PM peak period experiences higher increases in travel time indices, especially from Commercial Drive to Bartley Road in West Kelowna. In the AM peak period, significant increases are noted in the western section of West Kelowna and in Lake Country from Robinson Road to Old Vernon Road.

4.0 SUMMARY OF DEFICIENCIES

Based on the results of the performance assessment conducted in the previous section, numerous additional deficiencies were noted along Highway 97 over and above those noted under current conditions and existing traffic volumes. These future deficiencies are summarized in **Table 4.1** as defined by the results of the future traffic performance assessment. For comparison purposes, and to note the potential changes in corridor performance between 2014 and 2040, the table also includes the existing corridor performance results.

Table 4.1: Summary of Deficiencies

Community	Segment ID	From	To	Location	Deficiencies									
					Mainline Capacity		Intersection v/c Ratio		Intersection Level of Service		Intersection Queuing		Travel Time Index	
					2014	2040	2014	2040	2014	2040	2014	2040	2014	2040
Peachland	1	Greata Ranch	Highway 97C	Hardy Street		x				x				x
				Renfrew Road		x				x				x
				Princeton/Beach Avenue		x		x			x	x		x
				Ponderosa Road		x								x
				Clements Crescent		x					x			x
				Todd Road		x		x		x				x
				Chidley Road		x		x	x	x				x
				Trepanier Bench Road		x		x	x	x		x		x
				Buchanan Road (South)		x		x	x					x
				Buchanan / Huston Road		x	x	x	x					x
				Drought Road	x	x								x
				Seclusion Bay Road	x	x								x
				Highway 97C	x	x								x
West Kelowna	2A	Highway 97C	South of Daimler Drive	Dobbin / Herbert Road									x	x
				Dobbin / Elliott Road				x				x	x	x
				Dobbin / Brown Road									x	x
				Dobbin / Old Okanagan Hwy									x	x
				Herbert Road									x	x
				Elliott Road			x	x				x	x	x
				Brown Road			x						x	x
				Old Okanagan Hwy									x	x
				Gellatly / Gosset Road				x		x	x	x	x	x
				Butt Road			x	x				x	x	x
	2B	South of Daimler Drive	West End of Bennett Bridge	Daimler Drive				x		x		x	x	x
				Bartley Road			x	x	x	x	x	x	x	x
				Ross Road			x	x					x	x
				Westlake Road		x	x	x		x	x	x	x	x
				Boucherie Road		x	x	x	x	x	x	x	x	x
Kelowna	3A	West End of Bennett Bridge	North of Highway 33	Abbott Street		x	x	x		x	x		x	x
				Pandosy Street / Water Street			x	x	x	x		x	x	x
				Ellis Street				x	x	x	x	x	x	x
				Richter Street				x	x	x	x	x	x	x

Community	Segment ID	From	To	Location	Deficiencies									
					Mainline Capacity		Intersection v/c Ratio		Intersection Level of Service		Intersection Queuing		Travel Time Index	
					2014	2040	2014	2040	2014	2040	2014	2040	2014	2040
				Ethel Street			x	x	x	x	x	x	x	x
				Gordon Drive			x	x	x	x	x	x	x	x
				Burtch Road			x	x	x	x	x	x	x	x
				Spall Road			x	x		x	x	x	x	x
				Cooper Road			x	x	x	x	x	x	x	x
				Dilworth Drive			x	x	x	x	x	x	x	x
				Leckie Road			x	x	x	x	x	x	x	x
				Banks Road			x	x	x	x	x	x	x	x
				Highway 33			x	x	x	x	x	x	x	x
	3B	North of Highway 33	North of Sexsmith Road	Leathead Road			x	x	x	x	x	x	x	x
				McCurdy Road			x	x	x	x	x	x	x	x
				Sexsmith / Old Vernon Road			x	x	x	x	x	x	x	x
	3C	North of Sexsmith Road	North of Old Vernon Road	Edwards Road			x	x	x	x	x	x	x	x
				University Way				x		x		x	x	x
				Airport Way				x		x	x	x	x	x
				Old Vernon Road				x		x		x	x	x
Lake Country	4A	North of Old Vernon Road	South of Oceola Road	Commonwealth Road				x		x	x	x		x
				Beaver Lake Road			x	x		x	x	x		x
				Pollard Road				x				x		x
	4B	South of Oceola Road	College Way / Clerke Road	Crystal Waters / Rawsthorne						x				
				Crystal Waters										
				Clerk Road / College Way				x						

APPENDIX A

Future Land Use Technical Memorandum

Technical Memorandum

To: Ross Coates, Kathryn Weicker Date: December 3, 2015
Copy: Hazel Christy Project #: 602202
From: Stephen Power

RE: Central Okanagan Planning Study - Future Land Use

Introduction

Demand for transportation is influenced by land use and the activities associated with those uses. Land use is therefore a fundamental component in any traffic forecast. Forecasting future regional land uses is a challenging task, particularly in the Central Okanagan region, which is comprised of several communities, each with its own Official Community Plan, growth forecasts and economic development ambitions. At the same time, regional growth and development is affected by provincial, national, and to a lesser extent, international economic influences.

For the purpose of forecasting future transportation demand in the region, and most importantly, demand that will impact the provincial highway system in the region, three base land use scenarios have been developed:

- **Near Term Trend** – approximately 10-year horizon that assumes future growth will occur in approximately the same manner as it has in the past;
- **Future Base Trend (2040)** – the future base against which alternative land use and transportation scenarios will be compared, representing approximately a 25-year horizon and an assumption that growth will continue generally according to historical trends; and
- **Long-Range** – assumes approximately full development of lands designated within current Official Community Plans, representing a time horizon of 40 to 50 years.

Future Base Trend (2040)

The primary forecast is the Future Base Trend. The other base land use scenarios have been derived from this forecast. The Future Base Trend was developed in cooperation with the Sustainable Transportation Partnership of the Central Okanagan (STPCO) for the purpose of populating the regional transportation model. As noted above, this scenario represents a base against which land use and transportation alternatives can be assessed.

The Future Base Trend is not an endorsed growth plan and does not necessarily represent the future growth expectations of the communities within the region. The key growth assumption is that past trends will continue into the future. While allocation of growth within each jurisdiction respects the land use designations within individual OCPs and other growth plans (i.e., growth only placed in areas appropriately designated), no consensus has been reached among the STPCO members regarding the rate, sequencing, and allocation of growth among the communities.

While the Future Base Trend land use scenario is the primary forecast representing the base case, it is important to note that other scenarios can and will be tested, including some that will specifically test the sensitivity of localized alternate growth options. These sensitivity tests will be conducted through the option generation and evaluation stage of the COPS, and also through the regional transportation planning process to be completed by STPCO.

This scenario uses a horizon year of 2040. The detailed technical inputs to the forecast are provided in Appendix A (Regional Land Use Models, Technical Memo V.1.3, by STPCO), and summarized in this section.

Population Growth

The BC Stats population forecast for the Central Okanagan was used as the regional control population. This forecast has a regional population of 273,845 in 2040, an increase of 43% from the 2014 regional population. It should be noted that summing individual OCPs and other growth management documents for the individual communities would result in a 2040 population of 306,895.

The allocation of population growth between 2014 and 2040 to the municipalities, WFN and RDCO was estimated by considering past trends in the share of total population for each community, as shown in Figure 1.

“The preferred base scenario, where each municipality maintains its 18-year percentage of growth, presents a few challenges, but as base scenario it was seen as a good compromise for all. West Kelowna and Lake Country felt that the number might be a little low considering some the developments planned for their jurisdictions. WFN also projected higher growth. Peachland expressed concern, given the unique developments expected in the area. Peachland is a challenging case because its population growth rate has been lower than the other local governments; however, given its size, individual developments can have a large impact on Peachland’s population and growth rate,- this highlights the need to explore a number of potential development scenarios.”

- STPCO Regional Land Use Models, Technical Memorandum

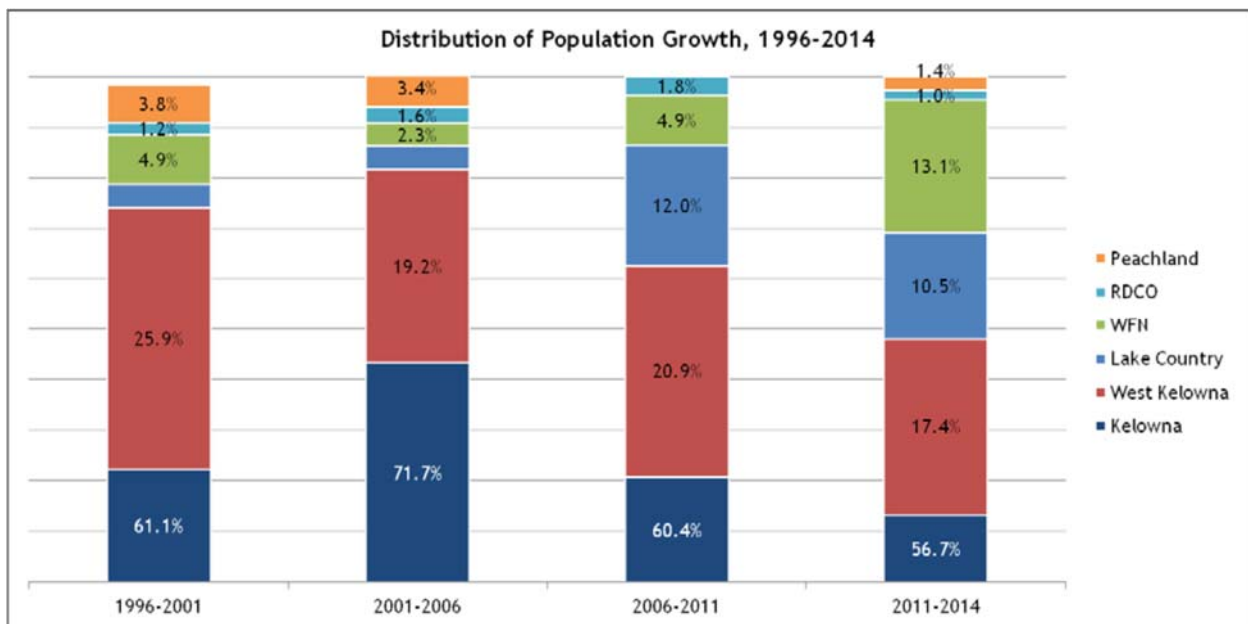


Figure 1: Distribution of Population, 1996 to 2011 (Source: STPCO, BC Stats)

Using the regional population forecast for 2040 as produced by BC Stats, assuming the trend in historical population distribution continues among the communities, the population growth by municipality is summarized in Table 1. The municipal totals presented in Table 2 are somewhat different than those presented in the STPCO technical memorandum. The allocation in Table 2 was completed later than the original STPCO and reflects minor changes that occurred through the detailed allocation to traffic zones. Table 2 reflects the values ultimately included in the regional travel demand model.

Table 1: Base Trend Scenario Population by Community

Community	2014 Population	2014 Share of Regional Population	Base Trend (2040) Forecast Population	Base Trend (2040) Forecast Share of Regional Population
Kelowna	124,000	64.7%	179,300	65.4%
West Kelowna	32,900	17.2%	47,400	17.3%
Lake Country	12,900	6.7%	18,600	6.8%
WFN	8,600	4.5%	13,600	5.0%
RDCO	5,900	3.1%	7,000	2.6%
Peachland	5,400	2.8%	6,100	2.2%
Other Rural	2,100	1.1%	2,000	0.7%
TOTAL	191,800	100.0%	274,000	100.0%

For the purpose of developing the regional transportation model, population was further allocated to traffic analysis zones within each community. This task was completed with the assistance of planning staff in each community, using existing OCPs for guidance.

Employment Growth

The regional employment forecast incorporates two interrelated components:

- Bottom up forecast of employment for key industrial sectors utilizing population and other industrial drivers; and
- Development of a forecast of the size of the Kelowna Census Metropolitan Area (CMA) labour force as a means to validate forecasts derived the bottom up approach.

A full description of the methodology and employment forecast results is provided in Appendix B.

Table 2 provides employment forecasts by industry for 2020 and 2040. In 2020, employment is estimated at 100,911. By 2040, employment is expected to increase to 132,128. Compared with the estimated labour force of 106,212 and 139,126 in 2020 and 2040, respectively, an unemployment rate of approximately 5% in each of these years is implied. This forecast unemployment rate can be considered a realistic, although somewhat conservative, when compared to historical average provincial unemployment rates. Recent commercial bank short-term provincial employment forecasts to 2016 anticipate an unemployment rate of about 5.5% to 5.8% under a relatively positive GDP growth.

The 2040 forecast is used as the regional total for the Future Base Trend forecast.

Table 2: Employment Forecasts and Other Economic Metrics Forecasts for Central Okanagan

Industry (with NAICS Codes)	2020	2040
Agriculture (111-112, 1100, 1151-1152)	1,800	2,000
Forestry, Fishing, Mining (21, 113-114, 1153, 2100)	1,000	1,200
Utilities (22)	639	844
Construction (23)	10,404	11,775
Manufacturing (31-33)	8,300	9,572
Trade (41, 44-45)	15,003	19,542
Transportation and Warehousing (48-49)	4,019	5,596
Finance, Insurance, Real Estate (52-3)	4,155	5,594
Professional and Scientific Services (54)	8,085	11,454
Business Building and Other Support Services [55-56]	4,449	7,146
Educational Services (61)	5,340	6,959
Health Care Services (62)	15,240	21,749
Information, Culture and Recreation [51, 71]	5,294	6,994
Accommodation and Food Services (72)	9,872	12,046
Other Services (81)	4,400	5,812
Public Administration (91)	2,911	3,846
TOTAL EMPLOYMENT	100,911	132,128
ECONOMIC PERFORMANCE METRICS		
Implied average annual rate of employment growth from 2014	1.87%	1.47%
Total Population	207,295	273,845
Population growth, average annual from 2014	1.53%	1.43%
Estimated Labour Force	106,212	139,126
Labour Force Growth, average annual from 2014	1.98%	1.50%
Implied Unemployment Rate	5.0%	5.0%
Population Age 15+ not in Labour Force	72,197	97,222

The expected trends by sector are:

- **Agriculture** - future employment is likely to increase slightly.
- **Forestry, Fishing, Mining** - a constant level of employment with very limited growth
- **Utilities** - future employment is expected to correlate directly with population increases
- **Construction** - the ratio of jobs to population is likely to decline in the long-run, as major projects are completed
- **Manufacturing** - the long-run rate of growth to 2040 is expected at an average annual rate of growth equivalent to one-half of the population growth
- **Trade** - the ratio of jobs to population is expected to be lower than the last 10 year average
- **Transportation and Warehousing** – continued overall long-term growth
- **Finance, Insurance and Real Estate** – the 1.5% average annual rate of growth between 2001 and 2012 is expected to continue in the future
- **Professional and Scientific Services** – generally expected to grow at historical rates but drop by 10% for the longer term

- **Business, building and other support services** - in general, employment is expected to increase over time, with some reduction in the growth rate in the long term
- **Educational Services** – the ratio of employment to population over 2012-2014 is expected to be representative of future conditions
- **Health Care Services** - Analyses frequently point out population aging and in particular the share of population 65+ as a significant driver of health care expenditures. The ratio of employment to 100,000 population 65+ from 2012-2014 was used for forecasting purposes.
- **Information, Culture and Recreation** - the industry displays a somewhat increasing employment trend, which is expected to continue into the future
- **Accommodation and Food Services** - based on historical employment values, a modest annual rate of growth of 1% is assumed
- **Other Services** - the future ratio of employment to population assumption is based on the average calculated from 2010-2014
- **Public Administration** - in 2014 employment was at the same level as the beginning of 2000; the forecast is based on an employment to population ratio equal to an average of 2010 – 2014.

When allocated to municipalities and ultimately to traffic analysis zones, minor adjustments and rounding result in a slightly lower regional employment total being used for Base Trend. Table 3 compares the total regional employment and population for 2014 and 2040.

Table 3: Regional Population and Employment, 2014 and Base Trend Forecast

	2014	Base Trend Forecast (2040)
Population	191,800	274,000
Employment	86,100	131,900
Ratio of Jobs per 1,000 Population	449 jobs/1,000 population	481 jobs/1,000 population

The allocation of employment to municipalities and traffic analysis zones was completed by assuming proportional growth in the existing locations. The allocation of employment by municipality for the base trend scenario, along with the population allocation is presented in Table 4.

Table 4: Allocation of Population and Employment for the 2040 Base Trend Scenario

Community	2014 Jobs	2014 Jobs/ 1,000 Population	Base Trend (2040)Jobs 2	Base Trend (2040) Jobs/ 1,000 Population
Kelowna	67300	543	103100	575
West Kelowna	7800	237	12000	253
Lake Country	4300	332	6400	344
WFN	4300	505	6600	485
RDCO	700	127	1100	157
Peachland	1500	279	2300	377
Other Rural	200	79	300	150
TOTAL	86100	449	131900	481

Near Term Trend

The Near Term Trend is based on an approximate 10 to 11 year horizon and is intended to be used to evaluate potential staging of projects. As a secondary forecast scenario, the Near Term Trend has been estimated by simply adding 44% of the growth (11 years of 25) for each traffic zone between the 2014 value and the Future Base Trend value. The same procedure was used for estimating population and employment growth trends. While this approach does not consider sequencing of growth over the next decade, it provides a reasonable estimate of travel demand in order to evaluate staging of transportation options. More detailed reviews that consider localized sequencing of development may be necessary for some of these transportation options.

Long Range Trend

The Long Range Trend will be used as a sensitivity test and represents fully developed conditions within the provision of existing planning documents. For residential growth, this scenario reflects full development of the residential components of traffic analysis zones in current Official Community Plans. The exception is Kelowna, where the designated residential land within the current urban containment boundary is expected to be fully developed by 2040. However, it is unrealistic and impractical to assume no long range growth in Kelowna beyond 2040. Therefore, for the purposes of developing a long range test scenario, the total City of Kelowna population share of the regional total was assumed to remain the same as in the Future Base Trend scenario, with the additional population growth distributed proportionally among all TAZs in Kelowna. This assumption represents infill and intensification through redevelopment within the urban containment boundary.

Employment was assumed to grow proportionally with population in existing locations. In specific locations where new employment lands are located away from existing areas, some transfer of jobs to new areas was assumed. However, in most cases, new employment growth will likely be in similar locations as existing employment or adjacent to existing employment.

The Long Range Trend is not a primary forecast scenario, and there is no formal land use planning beyond the 2040 horizon. Therefore, the long range scenario cannot be developed with precision. Broad assumptions such as those described above allow the regional transportation model to be populated so that potential options can be tested to assess their general ability to support very long term growth in the region. It is not practical to use this type of long range scenario to compare options or forecast detailed traffic conditions.

Table 5 summarizes the population and employment by municipality for the long range scenario.

Table 5: Allocation of Population and Employment for the Long Range Scenario

Community	Population	Employment
Kelowna	194900	112100
West Kelowna	52100	13200
Lake Country	26800	9200
WFN	20200	9800
RDCO	8400	1300
Peachland	18100	6800
Other Rural	1900	300
TOTAL	322400	152700



APPENDIX A

Regional Land Use Models

Base 2014

Projected 2040

Technical Memo V.1.3

August 2015



Regional Land Use Models

Base 2014

Projected 2040

Sustainable Transportation Partnership of the Central Okanagan (Regional Strategic Transportation Plan)
in collaboration with Ministry of Transportation and Infrastructure (Central Okanagan Planning Study)

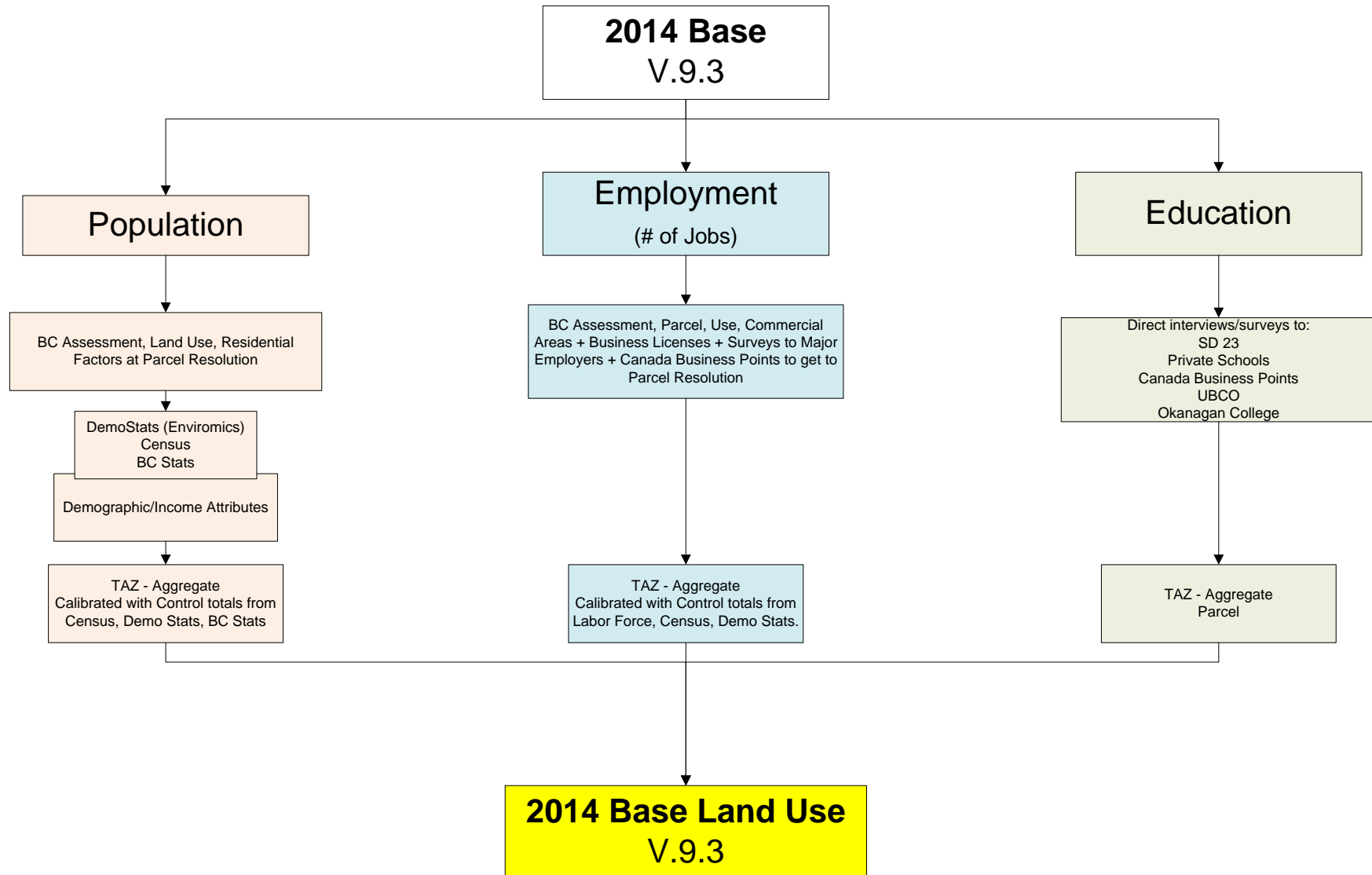
Technical Memo V.1.3

August, 2015

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2014 Land Use Process



Section One: 2014 Land Use Model

BC Assessment Datasets

1. Obtain and process parcel data from BC Assessment:
 - a. Request Building Information Report from BCA in electronic format (bcacustomer.services@bcassessment.ca)
 - b. See BCA User Guide (BCA Building Information Report_User_Guide_1_3.pdf)
 - c. Convert CSV file (from BCA) to spreadsheet and add column headings
2. Calculate number of Residential Units
 - a. Sum Number of Units for multiple buildings per parcel and create one record per parcel (i.e. unique Roll Number)
 - b. Identify Residential strata units based on Use Code 30, 34, 25, 36, 41, 57, 58, 59
 - c. Calculate number of units on each property:
 - i. Identify strata properties by land use code
 - ii. Identify properties with same Strata plan number
 - iii. Sum number of units for each strata property
 - iv. Delete all duplicate strata property records
3. Calculate ICI building Area
 - a. Sum building area (GBA, GLA, NLA) for multiple buildings per parcel and create one record per parcel (i.e. unique Roll Number)
 - b. Calculate Total Building Area (TBA) for each parcel (TBA = GBA + GLA + NLA)

Parcel Shape Files

1. Obtain and process parcel shape files
 - a. Obtain parcel shape files from jurisdictions within RTM area (need to have BCA Roll ID attribute)
 - b. Obtain latest topo-cadastral maps (Lakes, rivers etc.)
 - c. "Clean" parcel shape file by removing multiple ("pancake") polygons (not applicable to Kelowna)
2. Link BCA parcel records to parcel shape file using Roll ID as link
3. Shape file attribute data:

Field Name	Description	Notes
RollID	Parcel roll number	Field name = KID for Kelowna
TBA	Total Building Area (TBA)	TBA = GBA+GLA+NLA
Prim_use	Primary land use	
Shape_Leng		
Shape_Area	Parcel area	Area calculated from GIS in m sq
NosU_res	Number of residential units	Does not include comm. & industrial

Population

Data Sources

- BC Stats
 - BC Stats produces a yearly population estimate for each municipality in the region
- Demostats
 - Yearly demographic information produced by Environics
- BC Assessment
 - Assessment data was obtained for each jurisdiction except Westbank First Nation

Controls

- The 2014 estimates by census subdivision from BC Stats and Demostats were averaged resulting in the following control totals:

Jurisdiction	Population
Kelowna	123,965
West Kelowna	32,931
Lake Country	12,940
WFN	8,606
RDCO	5,855
Peachland	5,358
<i>Central Okanagan</i>	189,654

Expansion Factors

- Year-Round Occupancy
 - The number of residential units in each parcel was adjusted using the percentage of year-round occupants from its parent dissemination block in the 2011 Census.
- Average Household Size
 - The number of residential units in each parcel was expanded into population using the following factors by BCA Primary Landuse:

BCA Code	Expansion Factor	BCA Code	Expansion Factor
0	2.7	200-209	1.4
2	2.5	230-232	0.6
20	2.5	234	2.2
30	1.4	236	1.4
32-35	2.5	237	0.6
37-38	2.2	238	0.6
39	2.5	239	0.6
47-48	2.2	254	1.4
49-55	1.4	270	1.4
60	2.7	284-286	1.3
61-70	2.5	287	2.2
100-199	3	600-652	1.4

- Adjustments

- After examining the results, the following adjustments were made to the expansion factor for single family dwellings based on location:

Area	Value	Notes
Peachland, RDCO	2.2	Based on 2011 Census
Mission Creek (DA 59350069 & 59350068)	1.6	Two disseminations areas covering large retirement communities of detached housing

- In addition, single family dwellings in dissemination areas where the average household size was above 3 in the 2011 Census was above 3 were assigned this higher value from the census.

Employment

Data Sources

- Canada Business Points
 - Infogroup Canada Database provided a list of 7308 businesses in the Central Okanagan- including location, NAICS classification, and number of employees
- Survey to mayor employers:
 - Interior Health
 - Employee count by location
 - Employee postal code by individual by location

Worksite	Street Address	Facility Name	Employee Count
CNB	#309 - 1664 Richter Street	Development Disability Mental Health Services (Kelowna)	12
CPR	115A/118/200 - 1835 Gordon Drive	Capri Centre	481
CRP	2180 Ethel Street	Corporate Office, OK	57
KAD	#100 - 540 Groves Avenue	Seniors Mental Health & Eating Disorders Program	4
KGH	2268 Pandosy Street	Kelowna General Hospital	2988
KHC	1340 Ellis Street	Kelowna Health Centre	239
KRP	1815 Kirschner Road	Kirschner Plaza	298
KSO	106 - 1626 Richter Street	Richter Place	47
LMV	B3 - 1620 Dickson Avenue	Capital Planning & Projects	34
Grand Total			4160

- School District 23 (Public)
 - Enrolment 2014
 - Kindergarten – 1,578
 - Grades 1 – 7 – 10,602
 - Elem – 12,180
 - Grades 8-12 – 9,046
 - HS – 9,046
- SD 23 employees: 2,400
- Private Schools (called/webpage)
- Universities
 - UBCO (Enrolment)
 - Okanagan College (enrolment)

Other Major Employers, information shared by OEDC and complemented with our survey:

Major Employers	Approx. Number of Employees
Interior Health	4160
School District 23	2400
City of Kelowna	826
Okanagan College	659
UBC Okanagan	1112
Wal-Mart (Kelowna & Westbank)	573
Kelowna Flightcraft Air Charter	550
Shaw Cablesystems	380
Sun-Rype Products Ltd.	372
HBC Group of Companies	358
Overwaitea Food Group (Save-On Foods, Coopers)	356
Disney Online Studios Canada (Club Penguin)	350
Loblaws (Superstore Kelowna, Extra Food Kelowna)	342
Tolko Industries Ltd	249
Interior Savings	242
Costco Wholesale Corporation	240
The Grand Okanagan Resort	246
Fortis	191
The Home Depot (Kelowna & Westbank)	190
Sysco HRI	170
Lake City Casino	N/A
Rona Revy Incorporated	118
SRI Homes	112
Coast Capri Hotel	108
Manteo Resort	94
Campion Marine	70
Ramada Lodge Hotel	74
Best Western	64
Terasen	52
Landmark Towers	2400
Orchard Park Mall	800

- Fine-scale Landuse Database v8.2
 - The number of jobs at major centres (KGH, YLW, UBCo, Orchard Park) was found through a survey of major employers. Values for employment per parcel in v8.2 of the Landuse Database were vetted by planners from each of the municipalities

Controls

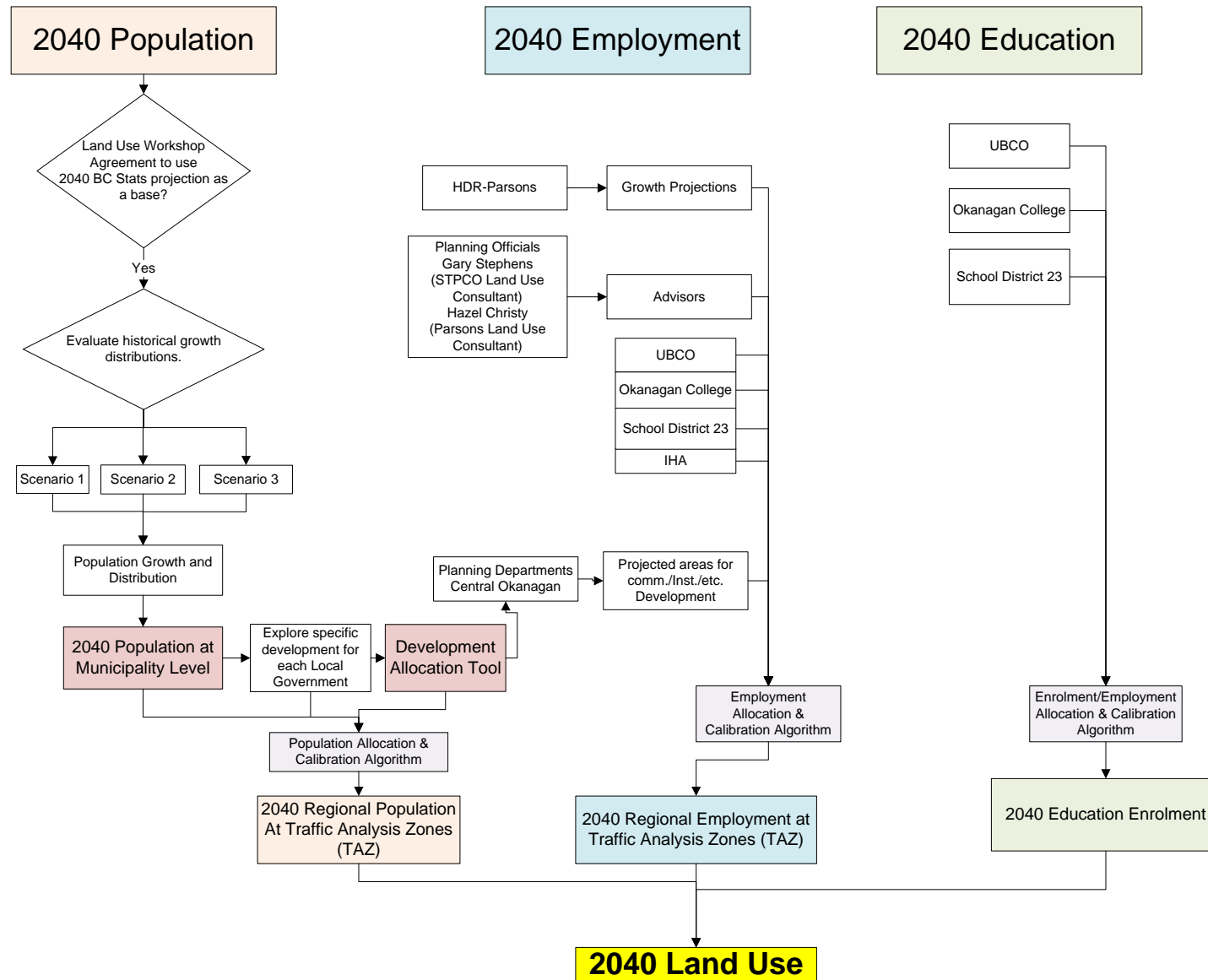
- Labour Force Survey: Table 282-0131
 - The total population employed in the Central Okanagan was estimated to be 90,400 in 2014.
- Statistics Canada Business Register
 - BC Stats published the following number of businesses by census subdivision and number of employees for 2014:

Census Subdivision	1 to 4	5 to 9	10 to 19	20 to 49	50 to 199	200+	Total
Central Okanagan	71	22	14	7	1	-	115
Central Okanagan J	31	5	3	1	1	-	41
Duck Lake 7	4	-	1	1	1	-	7
Kelowna	3,098	1,237	835	540	204	34	5,948
Lake Country	275	105	50	30	12	2	474
Peachland	86	34	9	9	3	1	142
Tsinstikeptum 9	107	51	34	20	11	3	226
Tsinstikeptum 10	22	6	4	4	3	1	40
West Kelowna	641	187	91	60	22	1	1,002

- To find the total number of employees, these location counts were multiplied by the average number of employees for businesses in each size range (from Canada Business Points). The resulting control total for employment is shown below:

Census Subdivision	1 to 4	5 to 9	10 to 19	20 to 49	50 to 199	200+	Total
Central Okanagan	175	136	179	196	78	-	764
Central Okanagan J	76	31	38	28	78	-	252
Duck Lake 7	10	-	13	28	78	-	129
Kelowna	7,621	7,657	10,655	15,147	15,941	13,135	70,155
Lake Country	677	650	638	842	938	773	4,516
Peachland	212	210	115	252	234	386	1,410
Tsinstikeptum 9	263	316	434	561	860	1,159	3,592
Tsinstikeptum 10	54	37	51	112	234	386	875
West Kelowna	1,577	1,158	1,161	1,683	1,719	386	7,684
Total	10,664	10,195	13,283	18,850	20,160	16,225	89,377

2040 Land Use Process



Section Two: Regional Planning Workshop (Land Use)

June 18th, 2015

Meeting Notes

Attending:

Greg Buchholz (DLC)	Graham Dimmick (WFN)	Cameron Taylor-Noonan (STPCO)
Jamie McEuen (DLC)	James Moore (CoK)	Gary Stephen (Consultant)
Nancy Henderson (DWK)	Tracy Guidi (CoK)	Steve Power (Parsons)
Ron Fralick (RDCO)	Ron Westlake (STPCO)	Katherine Weiker (MoTi)
Corine (Cory) Gain (Peachland)	Rafael Villarreal (STPCO)	Hazel Christy (Parsons-Consultant)

Introduction:

2040 Land Use projections: While there are various possible future growth scenarios, the objective of this workshop is to agree to some principles for projections and quantifying a base growth scenario for the region as an input to the Regional Transportation Model, to be used for the COPS and the RSTP. We will limit the scope of today's discussion to population growth.

Context: Regional Strategic Transportation plan and the MoTi's COPS study. We are updating the Regional Transportation Model, the model has an initial calibration and is hosted by the STPCO, but it is been improved in collaboration with MoTi and its consultant Parsons. **The model is regional in nature.**

Questions / Discussion:

1. Relationship between projects, and policy implications:

A: The Regional Strategic Transportation Plan and the Ministry's COPS are working in coordination to have consistent base scenarios. The scope of today's workshop is to get to a base land use to start scenarios from there.

The model is only an analytical tool, to support the policy and the strategic plans.

2. Why have you chosen a conservative growth estimate?

A: More than conservative- we are calling them Official BC Stats. We are using the 2040 BC Stats projections as the most reasonable and available estimates. BC Stats uses a demographic model, and has done all the work to assess birth rates, death rates and migration rates. In addition, the Regional Growth Strategy is based on BC Stats data. Therefore, at least for the base scenario we can be consistent.

3. There are a number of "game changers", a clear example is the the New Monaco project in Peachland. Will there be more detailed scenario analysis?

A: Definitely. To create a base scenario, the best statistical information we have available is the trends of the past to predict the future. However, those game changers have to be added as scenarios. This

process is to establish the base case which will be used for future scenario analysis. It is also important to remember that there is a time element. Any forthcoming project could take longer to completely build out or it may go more quickly.

It is important to highlight, that there will be an opportunity to revisit/update the growth scenarios as part of future reviews of the Regional Transportation Model.

4. Market share in the region might shift if Kelowna starts to run out of developable land or major developments happen in other jurisdictions

This will be part of the scenario analysis.

5. How are you going to respond to new road links – e.g. 2nd crossing? There would be a significant impact to the Raymer area.

New road links would likely be part of future detailed scenario analysis. This is the base case upon which future road links could be added as necessary.

6. Will there be an annual review to account for new or unexpected projects that come along?

While it would be good to create a system to monitor developments and growth in the region, and we might establish an initial system, we can also try to keep the infrastructure up-to-date.

However, that doesn't mean that the model will be fully recalibrated, the model itself can't be reviewed every year since all the other data (traffic, behavioral, etc) also needs to be collected, and there isn't the capacity. However, it is anticipated that there could be a review/update within 3 – 5 years to allow consideration of new projects and/or new road links.

It was suggested by the group that there would not be capacity to review annually – maybe every 3 or 5 years or longer.

Agreed – it would make more sense to review every 5 years to coincide with reviews of OCP's and the Regional Growth Strategy.

7. Would not higher growth be better from a design perspective?

While a higher growth rate might makes some sense to ensure that we are designing / planning for the worst case scenario, we first don't want to overdesign, and also have to take into consideration that we are competing for senior government funds and need to use official growth estimates. There is also the notion of a lower growth rate to ensure that DCC money collected will cover the cost of providing the necessary infrastructure. Essentially, design for the high growth case but ensure financing will cover the cost of infrastructure should a lower growth rate materialize.

Design high, finance low would not likely be palatable to UDI. (Greg)

8. Need to relate to infrastructure projects and how those are paid for.

That would be outside the scope of this work. It would be the responsibility of individual jurisdictions to prepare their own servicing and financing plans. In addition, to road / transportation projects, the data

from the model could also be used to populate other utility servicing models to derive project costs and ultimately DCCs to finance the works.

2040 Base Allocation:

Various scenarios were explored, all of the local governments have considerable higher plans for growth than the base allocation; however, they agreed to an initial base scenario based on historical growth, and work with growth scenarios.

2014*		2040					
		Retain Proportions		18yr % of Growth		OCP	
Kelowna	123,965	178,580	(65.2%)	175,579	(64.1%)	188,884	(60.6%)
West Kelowna	32,931	45,652	(16.7%)	49,982	(18.3%)	57,251	(18.4%)
Lake Country	12,940	17,537	(6.4%)	18,819	(6.9%)	25,791	(8.3%)
WFN	8,606	11,012	(4.0%)	13,505	(4.9%)	17,198	(5.5%)
RDCO	5,855	8,602	(3.1%)	7,845	(2.9%)	8,498	(2.7%)
Peachland	5,358	8,921	(3.3%)	6,160	(2.2%)	7,319	(2.3%)
Central Okanagan	191,715	273,845		273,845		306,895	
				Recommended Base Scenario**			

**2014 estimated average from Demo Stats and BC Stats.*

***The preferred base scenario, where each municipality maintains its 18-year percentage of growth, presents a few challenges, but as base scenario it was seen as a good compromise for all. West Kelowna and Lake Country felt that the number might be a little low considering some the developments planned for their jurisdictions. WFN also projected higher growth. Peachland expressed concern, given the unique developments expected in the area. Peachland is a challenging case because its population growth rate has been lower than the other local governments; however, given its size, individual developments can have a large impact on Peachland's population and growth rate- this highlights the need to explore a number of potential development scenarios.*

Next Steps

To fill the development allocation tables at TAZ, including base scenario and growth scenario with notes.

Please find in appendix 1 (next page) the **Development Allocation Manual**, and Excel files attached.

Ideally if you could provide the tables filled by **Wednesday July 15th**, we will be contacting each of you individually to arrange a support meeting.

Section Three: 2040 Land Use Model

Population

Data Sources

- BC Stats
 - BC Stats' PEOPLE model produces a regional population forecast for 2040
- Development Allocation Tool
 - Planners from each municipality supplied a projection of new single and multifamily units per traffic analysis zone by 2040

Controls

- The overall regional population growth to 2040 was allocated amongst jurisdictions according to their share of regional growth since 1996:

Jurisdiction	Population
Kelowna	175,579
West Kelowna	49,982
Lake Country	18,819
WFN	13,505
RDCO	7,845
Peachland	6,160
<i>Central Okanagan</i>	273,845

Expansion Factors

- Year-Round Occupancy
 - The number of residential units in each parcel was adjusted using the percentage of year-round occupants from its parent dissemination block in the 2011 Census.
- Average Household Size
 - The average household size was assumed to be 2.7 for single family units and 2.0 for multifamily units

Enrolment

Data Sources

- School District #23
 - Enrolment projections for each school until 2030
- Projection for other educational institutions

Controls

- The following control totals for public school enrolment were estimated by applying the current percentage of population below 19 enrolled in public schools (90%) to the forecasted under 19 cohort for 2040 from BC Stats. Students were split between elementary and secondary according to the current 52/48 split.

Total (2040)	33,359
Elementary	16,012
Secondary	17,347

Expansion Factors

- Estimates for enrollment at existing schools up to 2030 were provided by SD23. Locations for new schools were supplied by municipal planners. Newly built schools were assigned student populations of 350 for elementary, 600 for middle, and 1200 for secondary.
- The remaining unassigned students (~2600) were distributed to schools according to their predicted share of enrolment growth from 2014 to 2030. The capacity of secondary schools was limited to 2000.
- The number of staff at each school was updated by dividing the change in enrolment by ten

Employment

Data Sources

- Kelowna 2040 Employment Forecasts (HDR Consulting)
 - HDR provided forecasts for regional employment by NAICS Sector for 2040
- Development Allocation Tool
 - Planners from each municipality supplied a projection of new commercial and industrial square footage per traffic analysis zone by 2040

Controls

- The following control totals for regional employment by industry were provided by HDR. Geographic control totals were estimated following the current regional distribution of employment:

Sector		Jurisdiction	
Retail	19,542	Kelowna	103,195
Non-Retail	112,587	West Kelowna	11,977
<i>Agricultural</i>	3,200	Lake Country	6,577
<i>Institutional</i>	31,798	WFN	6,666
<i>Manufacturing</i>	21,347	RDCO	1,149
<i>Services</i>	45,898	Peachland	2,311
<i>Transportation/Utilities</i>	6,439	Duck Lake	253
<i>School Jobs</i>	3,904		
Total	132,128		

Expansion Factors

- In order to convert square footage of development into new employment, the following expansion factors were used:

Square Footage Type			
Retail	Commercial	Industrial	Institutional
855	200	1000	600

Adjustment


- The resulting totals for nonretail employment were well below the control totals given by HDR. This is understandable since employment growth might not necessarily occur through new development. In order to account for intensification of employment, the remaining nonretail jobs (~24,000) were allocated according to the current distribution amongst zones in each municipality.

Appendices

Appendix 1: Development Allocation Manual

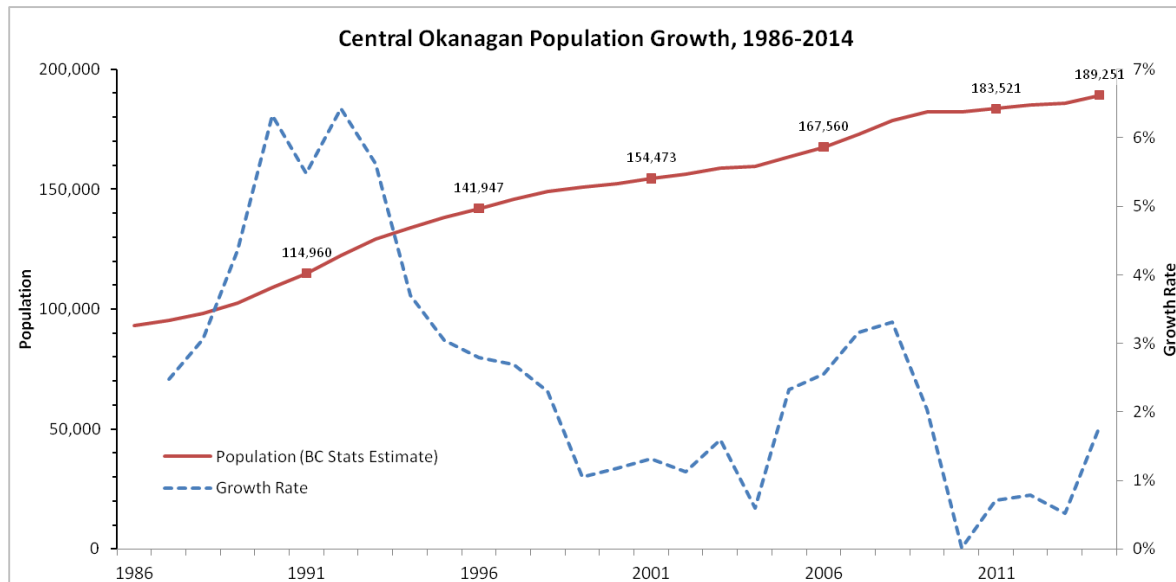
There are two tabs in the worksheet- one for a base case and another for any growth scenarios you'd like to explore

The table is divided into three sections: Major Developments, Full Build Out, and Conservative Build Out

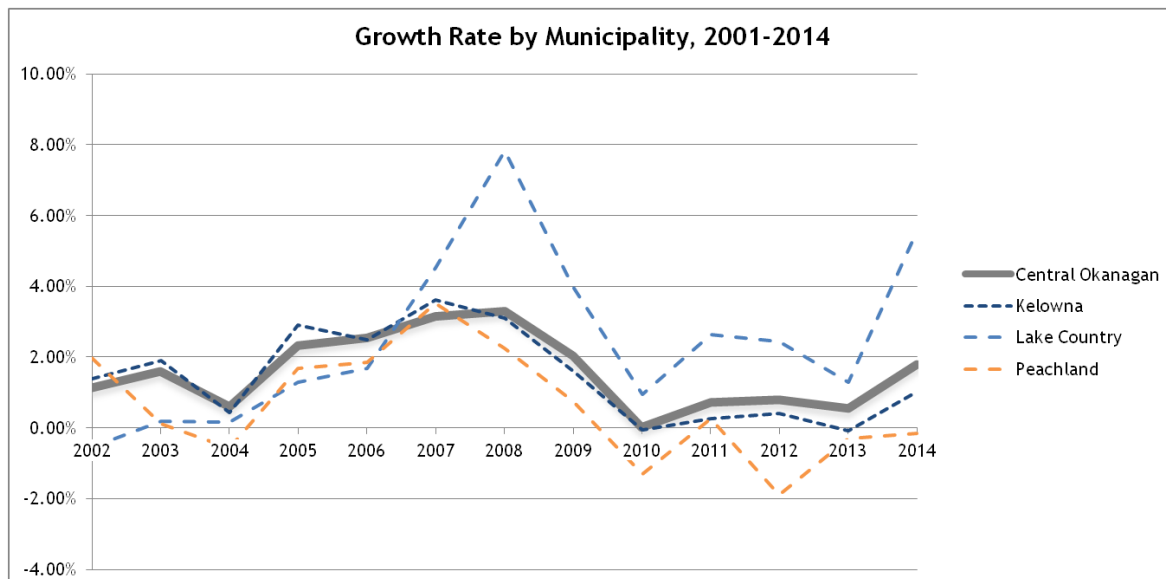
- **Major Developments**
 - This section lists the major developments for each municipality. It's based solely on information from your website, so please update or add new developments on the horizon
 - The row for each development gives the number of residential units and square footage
 - An '?' indicates a value that is unclear from the published information about a development
- **Full Planned Build Out**
 - This section groups the major developments listed above by TAZ. It is intended to show the full potential build out of each zone under current planning- possibly going beyond 2040.
 - Orange quotation marks like this:  indicate that the development spans multiple traffic analysis zones. When completing the conservative build out, please try to divide this total amongst the TAZs
 - The box on the right provides a summary of the full build out scenario and the estimated future population
- **Conservative Build Out (2040)**
 - In this section please provide your prediction of development that is likely to happen by 2040 for each zone
 - The box on the right provides a summary of the conservative build out scenario, the estimated 2040 population, the equivalent annual growth rate, the estimated municipal share of regional population growth, and the estimated share of regional population in 2040

Appendix 2: Summary of Regional Workshop Presentation Graphs

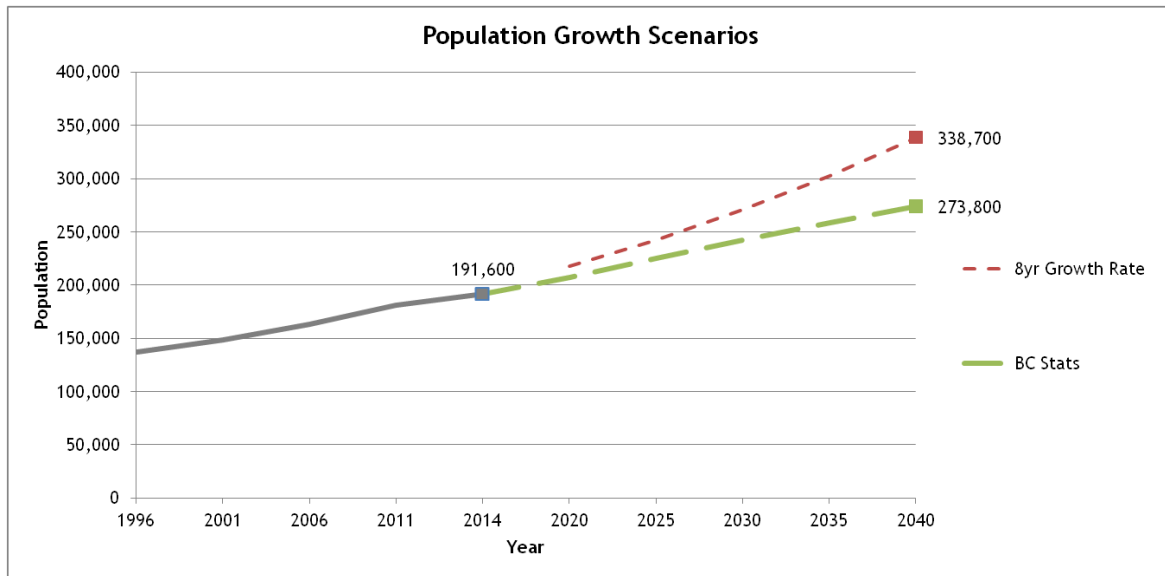
- The Central Okanagan has grown considerably since 1986, but the regional growth rate has fluctuated.



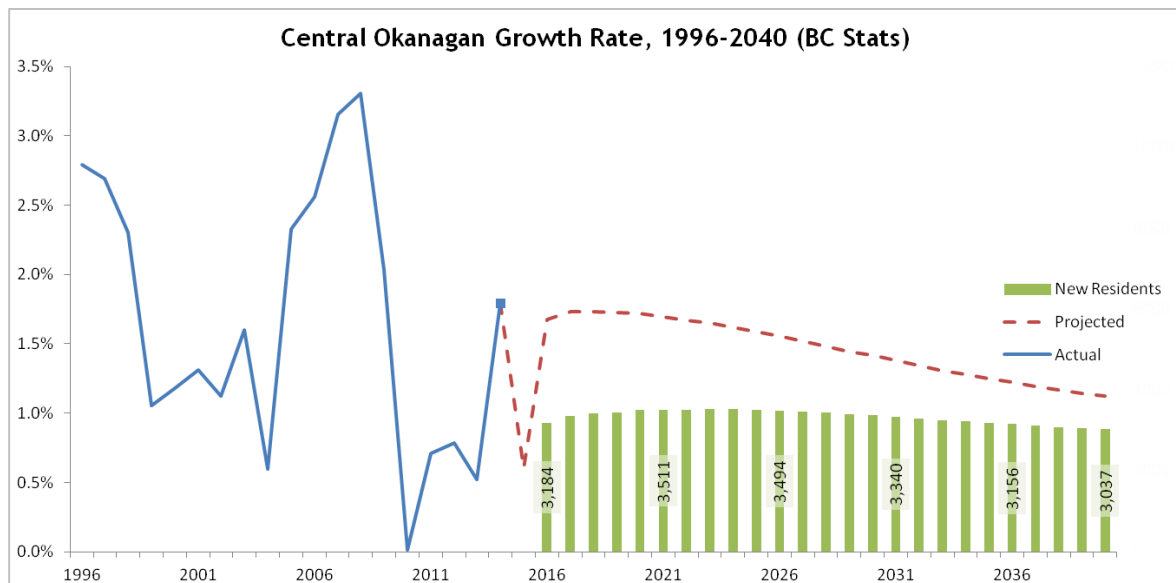
- Looking at growth rates for individual jurisdictions from BC Stats, it can be seen that some have experienced higher growth rates than others. The dark grey line shows the regional average. Figures for West Kelowna and WFN were not available for this chart.



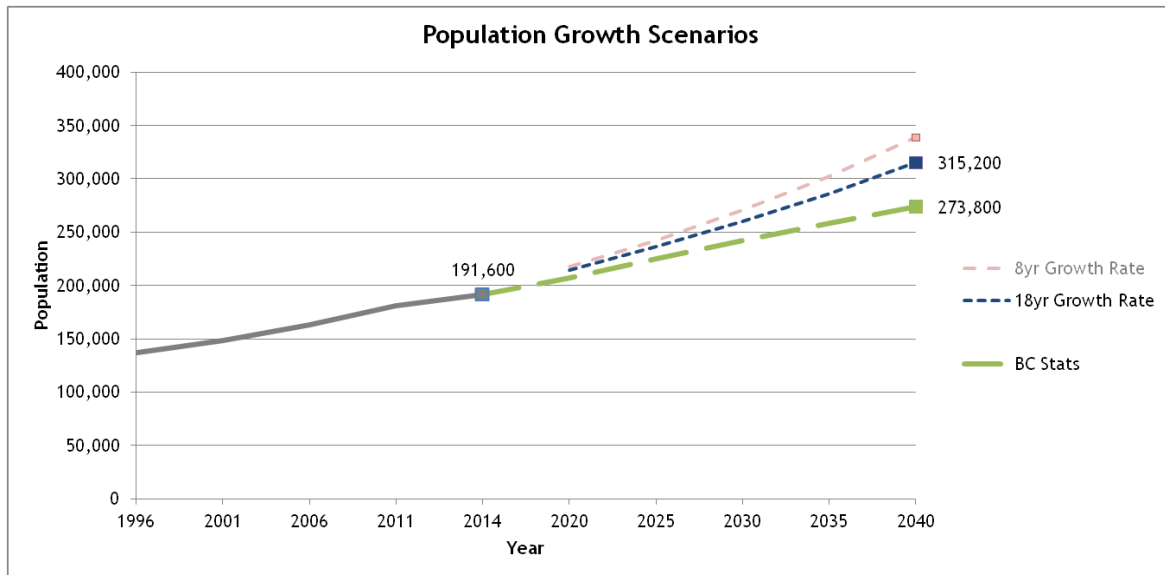
- The market has recovered from the downturn in 2008. However, if the growth rates experienced by each jurisdiction over the past eight years are sustained until 2040- the regional population will be 334 thousand. The official BC Stats projection is 274 thousand.



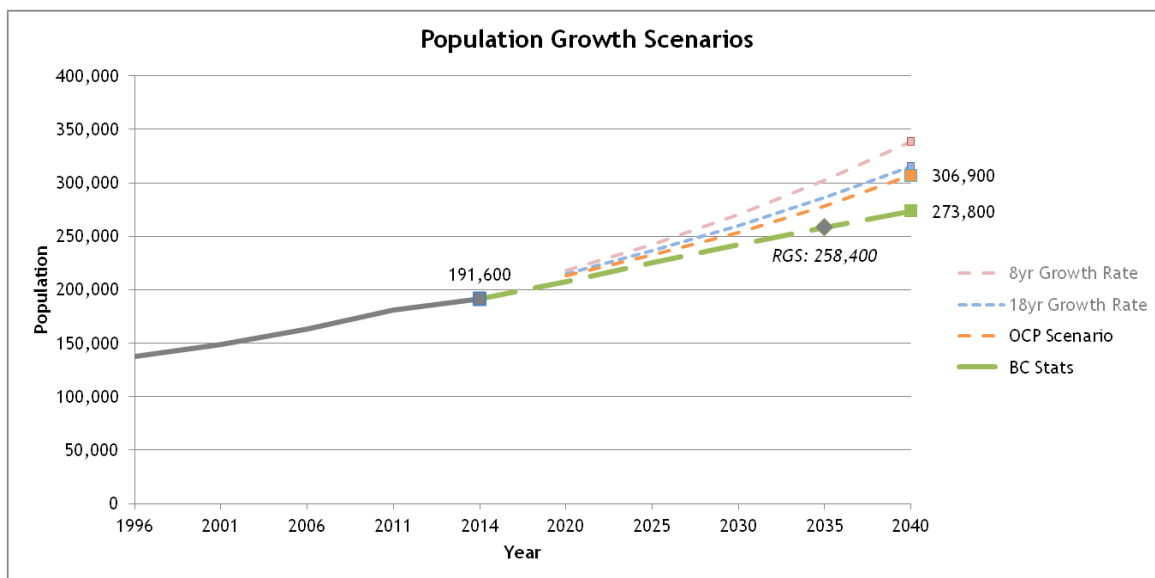
- BC Stats predicts that the regional growth rate will decline in the future, but the actual number of new residents moving to the Okanagan each year is predicted to remain fairly constant. The Central Okanagan will remain one of the fastest-growing regions in the province.



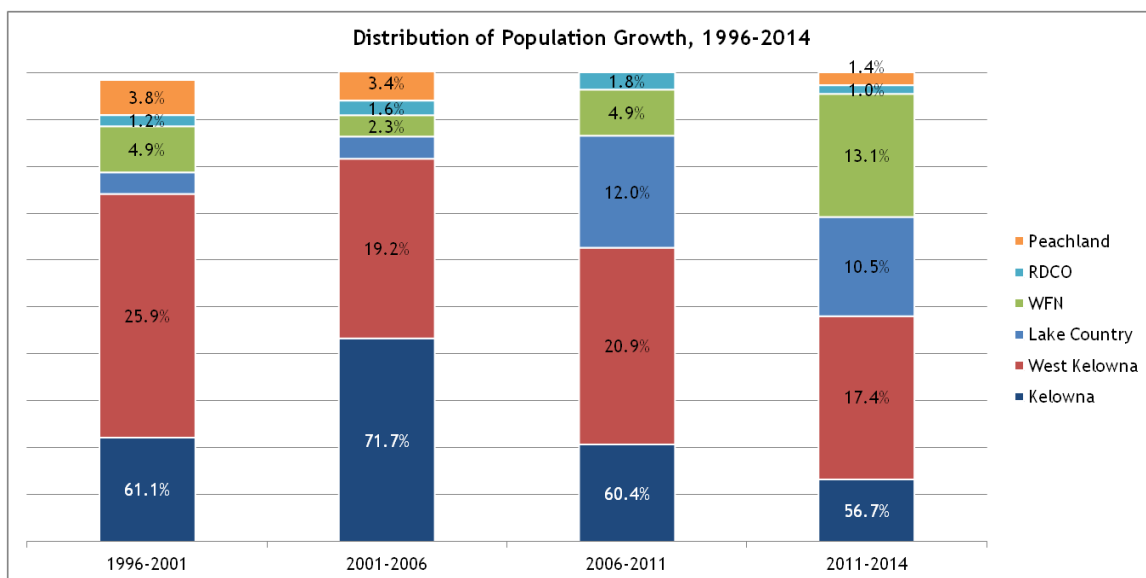
- Even sustaining our growth rates over the past 18 years will lead us to overshoot the BC Stats projection by roughly 15%



- Four out the six jurisdictions in the Central Okanagan have growth projections in their OCP. If we honor these projections, and fill in the gaps with an 18-year growth rate, the end result is 307 thousand. This is significantly higher than the projections in the Regional Growth Strategy, which were also based on BC Stats.



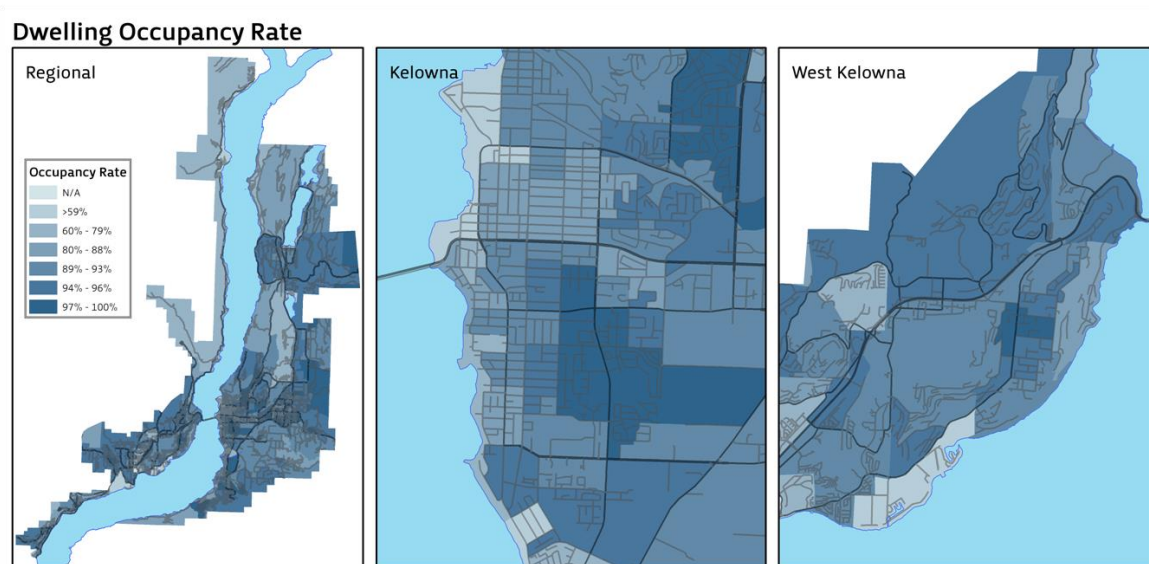
- Rather than divide the future population according to the current distribution of population, we are recommending dividing according to the historical 'market share' of regional growth for each jurisdiction. This way our projections acknowledge recent trends rather than assuming the future will be exactly like the past.



- Taking the average market share for each jurisdiction over the past 18 years, this resulting regional population breakdown for 2040. The recommended base scenario uses the average growth allocation in the last 18 years.

2014		2040					
		<i>Retain Proportions</i>		<i>18yr % of Growth</i>		<i>OCP</i>	
Kelowna	123,965	178,580	(65.2%)	175,579	(64.1%)	188,884	(60.6%)
West Kelowna	32,931	45,652	(16.7%)	49,982	(18.3%)	57,251	(18.4%)
Lake Country	12,940	17,537	(6.4%)	18,819	(6.9%)	25,791	(8.3%)
WFN	8,606	11,012	(4.0%)	13,505	(4.9%)	17,198	(5.5%)
RDCO	5,855	8,602	(3.1%)	7,845	(2.9%)	8,498	(2.7%)
Peachland	5,358	8,921	(3.3%)	6,160	(2.2%)	7,319	(2.3%)
Central Okanagan	191,715	273,845		273,845		306,895	
				Recommended Base Scenario			

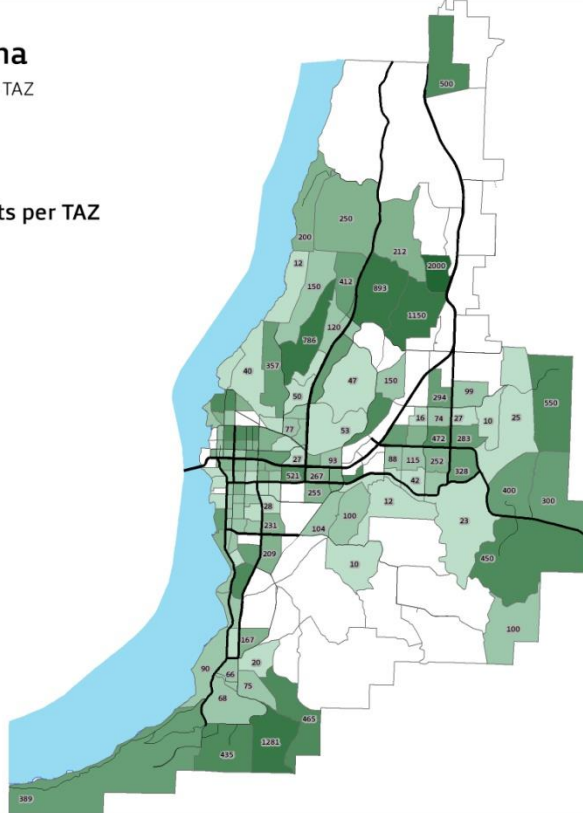
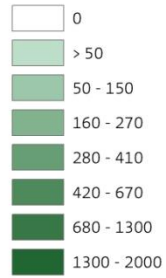
When moving from a projected population to a number of units, it is important to consider the percentage of units which are occupied year round- particularly because our model is based on a weekday in the fall. The year-round occupancy rate drops off closer to the lake.



City of Kelowna

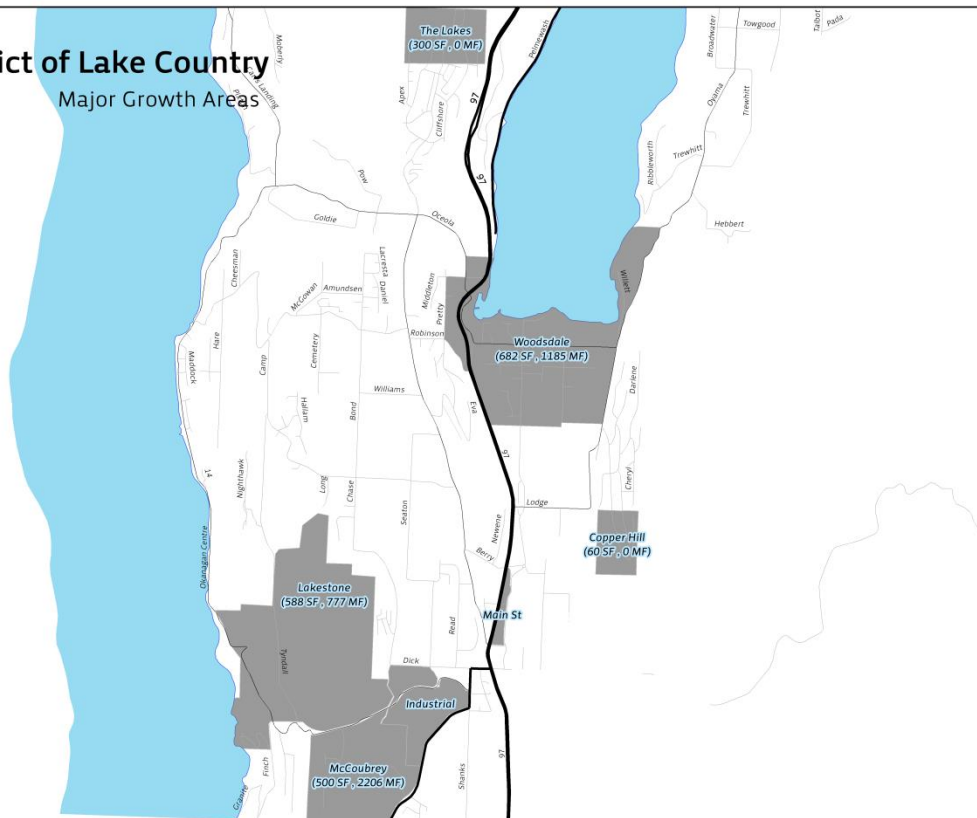
2040 Projection by TAZ

Residential Units per TAZ



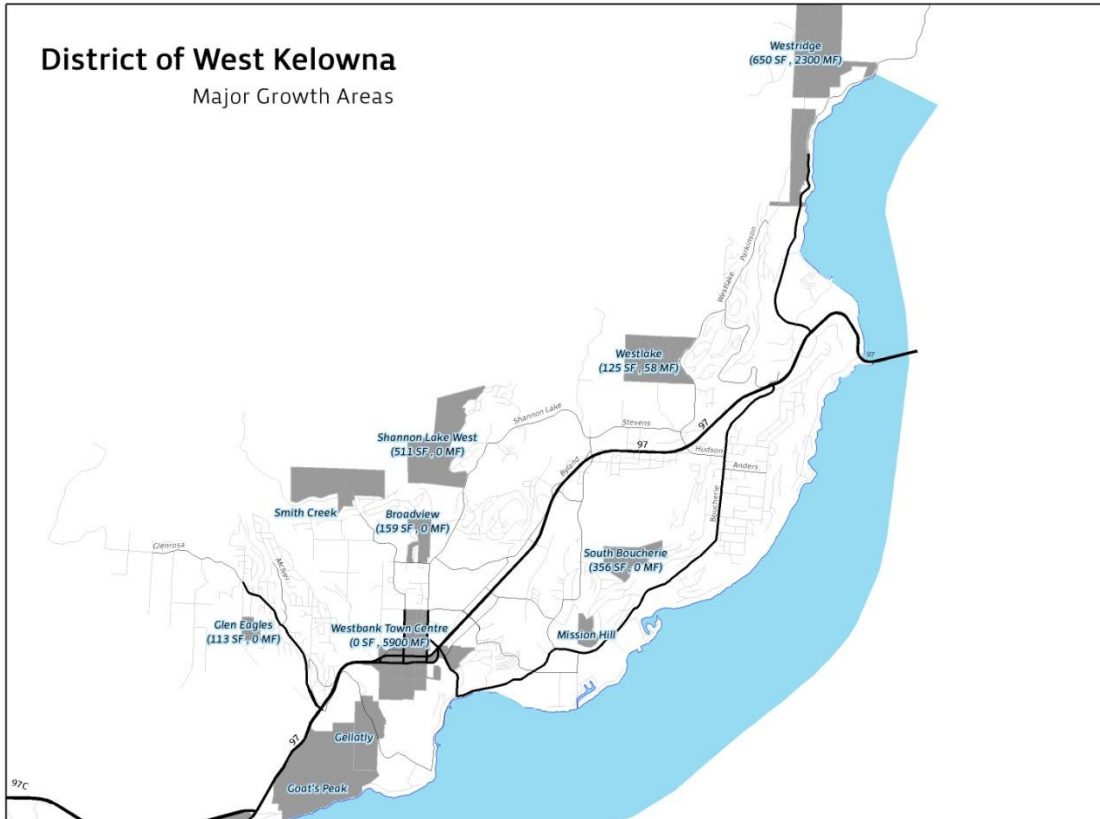
District of Lake Country

Major Growth Areas



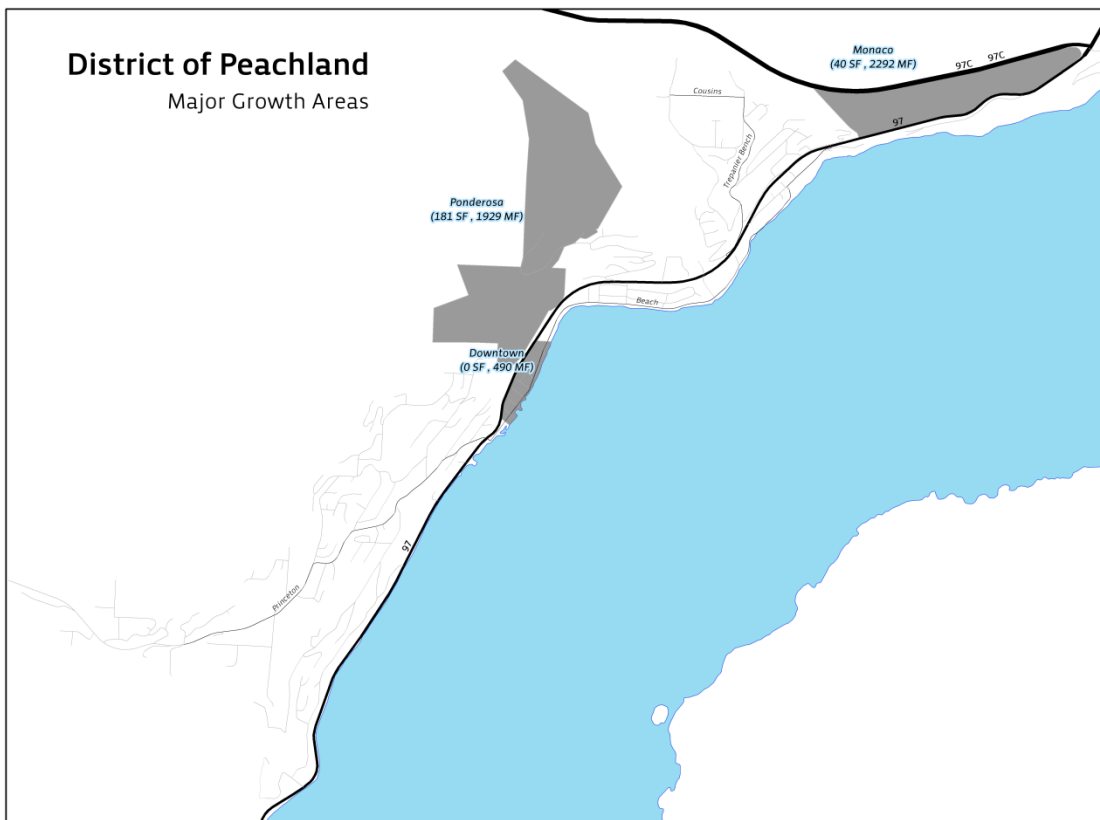
District of West Kelowna

Major Growth Areas



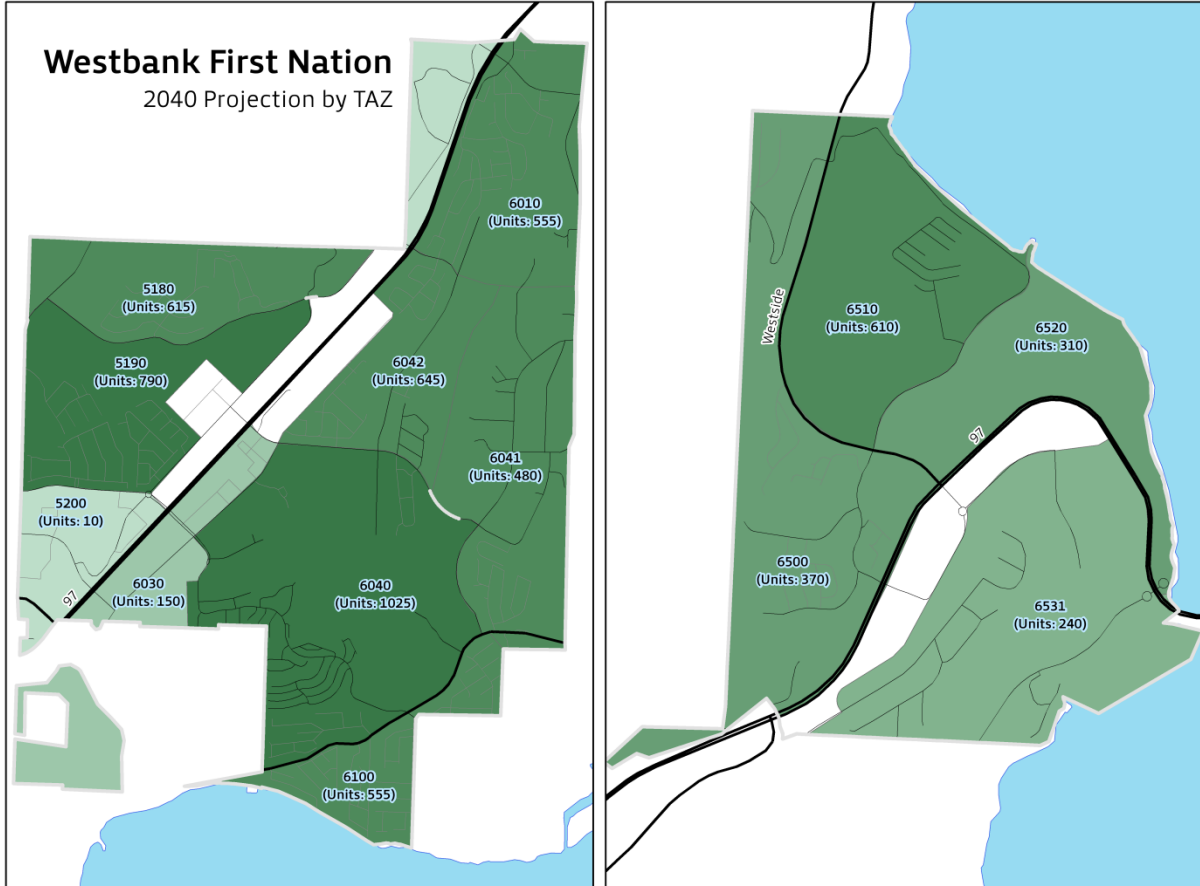
District of Peachland

Major Growth Areas



Westbank First Nation

2040 Projection by TAZ



Appendix 3: Calibration Statistics

Population			
	TAZs_2014	Control	
POP_2014	187,537	191,571	-2.11%
POPNO	8,395	7,992	5%
POPNO5	17,092	18,089	-6%
POPNO1	10,668	11,058	-4%
POP_1	12,919	13,504	-4%
POPNO2	46,517	46,540	-0.05%
POPNO4	54,446	54,175	1%
POPNO6	19,850	20,221	-2%
POPNO7	17,641	17,710	-0.4%

Kelowna	121,434	123,965	-2.0%
West Kelowna	32,375	32,931	-1.7%
Lake Country	12,709	12,940	-1.8%
WFN	8,606	8,606	0%
RDCO	5,078	5,855	-13.3%
Peachland	5,418	5,358	1.1%
Duck Lake	1,917	1,917	0%

Employment			
	TAZs_2014	Control	
EMP_2014	86,169	89,377	-3.6%
<i>NON_R_2014</i>	<i>70,338</i>	<i>75,792</i>	<i>-7.2%</i>
<i>RETAI_2014</i>	<i>15,831</i>	<i>13,585</i>	<i>17%</i>

Kelowna	67,292	70,155	-4.1%
West Kelowna	7,810	7,684	1.6%
Lake Country	4,289	4,516	-5.0%
WFN	4,347	4,467	-2.7%
RDCO	749	1,016	-26.3%
Peachland	1,507	1,410	6.9%

2040			
	TAZs_2040	Control	
POP_2040	273,969	273,845	0.05%
POPNO	10,847	11,643	-7%
POPNO5	23,686	25,854	-8%
POPNO1	13,193	14,112	-7%
POP_1	14,368	14,127	2%
POPNO2	64,237	67,589	-5%
POPNO4	72,705	76,005	-4%
POPNO6	31,132	27,391	14%
POPNO7	43,819	37,124	18%

Kelowna	179,312	175,579	2%
West Kelowna	47,384	49,982	-5%
Lake Country	18,605	18,819	-1%
WFN	14,346	13,505	6%
RDCO	7,012	7,845	-11%
Peachland	5,970	6,160	-3%
Duck Lake	1,952	1,954	0%

2040			
	TAZs_2040	Control	
EMP_2040	131,877	132,128	-0.2%
<i>NON_R_2040</i>	<i>113,019</i>	<i>112,587</i>	<i>0.4%</i>
<i>RETAI_2040</i>	<i>18,858</i>	<i>19,542</i>	<i>-4%</i>

Kelowna	103,128	103,195	-0.1%
West Kelowna	12,041	11,977	0.5%
Lake Country	6,389	6,577	-2.9%
WFN	6,641	6,666	-0.4%
RDCO	1,118	1,149	-2.7%
Peachland	2,307	2,311	-0.2%

Appendix 4: TAZs 2014 Data Dictionary

Attribute	Description	
ZONE_NUMB	Traffic Zone ID (including Super Zone)	
CSDUID	Census Subdivision ID	Unique identifier for census subdivision
NMEDIA_2014	2014 Net Median Yearly income	For households, using Demostats estimated 2014 values
MEDIA_2014	2014 Median Yearly income	For households, using Demostats estimated 2014 values
POP_2014	2014 Population Total	From v9 of the Landuse Database, expansion factors described above
POPNO	2014 Population 0-4yr	Calculated by multiplying the age distribution from the 2011 Census DA by the 2014 population estimate
POPNS	2014 Population 5-14yr	
POPNI	2014 Population 15-19yr	
POP_1	2014 Population 20-24yr	
POPNI2	2014 Population 25-44yr	
POPNI4	2014 Population 45-64yr	
POPNI6	2014 Population 65-74yr	
POPNI7	2014 Population 75yr plus	
Comm_2014	2014_Comm_Bldg_Sq_m	
Ind_b_2014	2014_Ind_Bldg_Sq_m	
EMP_2014	2014 Employment Total	Validated with various sources (Canada Business Points, StatsCan Business Register, Labour Force Survey, Major Employers Survey)
NON_E_2014	2014_Non Employment (population not in labour force)	Calculated by multiplying the nonparticipation rate from the 2011 Census DA by the 2014 population estimate
NON_R_2014	2014 Non- Retail	See above
RETAI_2014	2014 Retail	See above
AGRIC_2014	2014 Agriculture	See above
INST_2014	2014 INST_CULTURAL_HOSPITAL_UNIVERSITY_COLLEGE	From Major Employers Survey
MANU_2014	2014_MANUFATURING_CONSTRUCTION	See above
SERV_2014	2014_SERVICES_OFFICES_RESTAURANTS, ETC	See above
TRAN_2014	2014_TRAN_UTIL	See above
SCHJOB_2014	2014_SCHOOL_STAFF (TEACHERS, ADMIN, ETC)	Does not include postsecondary. Figures from SD23, Major Employers Survey (for private school), and Canada Business Points (for other educational services)
ELEM_2014	2014_ELEMENTARY ENROLLMENT	Includes public and private schools. Figures from SD23, Private Schools.
HS_EN_2014	2014_HS_ENROLLMENT	
PS_EN_2014	2014_POST SECONDARYS_ENROLLMENT	UBCo and Okanagan College
PS_RE_2014	2014_POST_SECONDARY_RESIDENTS	University Only
Hectares	Area of Traffic Zone	

Appendix 5: TAZs 2040 Data Dictionary

Attribute	Description	
ZONE_NUMB	Traffic Zone ID (including Super Zone)	
CSDUID	Census Subdivision ID	Unique identifier for census subdivision
NMEDIA_2040	2040 Net Median Yearly income	Carried over from 2014
MEDIA_2040	2040 Median Yearly income	Carried over from 2014
POP_2040	2040 Population Total	Calculated from unit counts provided by municipal planners
POPNO	2040 Population 0-4yr	Calculated by shifting the percentage in each age cohort from 2014 by the predicted region-wide change from BC Stats
POP5	2040 Population 5-14yr	In areas with more than 50% population growth, the region wide 2040 age distribution from BC Stats is assumed
POP15	2040 Population 15-19yr	
POP20	2040 Population 20-24yr	
POP25	2040 Population 25-44yr	
POP45	2040 Population 45-64yr	
POP65	2040 Population 65-74yr	
POP75	2040 Population 75yr plus	
EMP_2040	2040 Employment Total	Calculated by adding 2014 employment to factored square footage values provided by municipal planners
NON_E_2040	2040_Non Employment (population not in labour force)	Calculated by multiplying the nonparticipation rate from the 2011 Census DA by the 2040 population estimate. In areas with more than 50% population growth predicted, the 2011 regional nonparticipation rate of 36% is assumed.
NON_R_2040	2040 Non- Retail	The square footage values provided by municipal planners yielded a total for non-retail employment which was 24,000 below the control estimated by HDR. These remaining 24,000 jobs, assumed to come from intensification rather than new development, were allocated to institutional, manufacturing, and services according to the current distribution
RETAI_2040	2040 Retail	See above
AGRIC_2040	2040 Agriculture	See above
INST_2040	2040 INST_CULTURAL_HOSPITAL_UNIVERSITY_COLLEGE	See above. Note that institutional employment is defined more broadly in the employment forecast than here. Employment at UBCo was assumed to grow at 2% per annum
MANU_2040	2040_MANUFATURING_CONSTRUCTION	See above
SERV_2040	2040_SERVICES_OFFICES_RESTAURANTS, ETC	See above
TRAN_2040	2040_TRAN_UTIL	See above
SCHJOB_2040	2040_SCHOOL_STAFF (TEACHERS, ADMIN, ETC)	Does not include postsecondary. Figures from private schools are assumed to remain constant. Figures from SD23, which were provided until 2040 were adjusted assuming a ratio of 10 students per staff member
ELEM_2040	2040_ELEMENTARY ENROLLMENT	Includes public and private schools. Total public enrollment was predicted using the current percentage of population aged 5-19 enrolled (90%), divided between elementary and secondary according to the current split (52%/48%)
HS_EN_2040	2040_HS_ENROLLMENT	Locations of six new schools in Kelowna were provided by municipal planners
PS_EN_2040	2040_POST SECONDARYS_ENROLLMENT	UBCo and Okanagan College, assumed 1% growth per annum
PS_RE_2040	2040_POST_SECONDARY_RESIDENTS	University Only, assumed 1% growth per annum
Hectares	Area of Traffic Zone	

APPENDIX B

Forecasting 2040 Employment in Kelowna, BC
July 2015

Memo

Date: July 22, 2015

To: Rafael Villarreal, City of Kelowna, STPCO

Copy Steven Powers, Parsons

From: Ewa Tomaszewska, Fred Kramer

Subject: Forecasting 2040 Employment in Kelowna, B.C.

Introduction

The purpose of this memo is to document the methodology and input assumptions used to generate 2040 industry specific employment forecasts for the Kelowna Census Metropolitan Area as required for the TAZ transportation model update. The memo also presents the forecasting results. The Appendix documents detailed input assumptions adopted to derive the forecasts (i.e. in forecast modeling) as well as various data that provided the basis for the final values of forecasts.

General Approach

Employment forecasting undertaken in this engagement entailed two interrelated methodological components: (1) a bottom up forecast of employment for key industrial sectors utilizing population and other industrial drivers and (2) the development of a forecast of the size of the Kelowna CMA labour force as a means to validate forecasts derived in (1) above. The methodology of the two components is outlined below.

Industrial Sector Employment Forecast

This forecast is based on the most recent employment data by industry for Kelowna CMA (annual data for the period 2001-2014 and monthly data for January to June 2015) and extrapolation of existing and anticipated industry trends into the future. Employment forecasts by industry are then aggregated to the categories required as inputs for TAZ (for example retail and non-retail employment).

The methodology adopted here classifies industrial employment by type, or characteristics, and classifies each as: (1) Population-driven employment, and (2) Non-population driven employment.¹

Population driven employment includes industries such as: retail trade, education services, health care, construction, arts and recreation, utilities, other services, and local governments. Employment in these industries is forecasted based on the ratio of employment in each of these industries to total population. Historically observed ratios are analyzed and assessed in terms of past trends and trends likely to persist in the future. These employment ratios are then multiplied by population forecasts to obtain an estimate of future employment.

Non-population driven industries include all other industries not classified as population driven. Employment in these industries is forecasted based on assessed economic outlook for a given industry.

¹ As an example see: Hemson Consulting, "Greater Golden Horseshoe Growth Forecasts to 2041", Technical Report, November 2012, as well as SGS Economics and Planning, "Employment Forecasting 2012-2031", Final Report, City of Melbourne, January 2014.

An assumed rate of growth is then applied to recent employment data to derive the employment forecast. However, external analysis of industry specific economic outlook are typically short term in nature and are rarely available for a longer term forecast horizon as is required for this analysis. Given this, historical sector performance, rates of employment growth, industrial assessments for a broader regional/ provincial economy, and general knowledge of the industry are used to develop assumptions for future rates of growth.

The Appendix provides detailed assumptions that were made for each industry with discussion of the underlying logic and reasoning behind these assumptions.

Labour Force and Unemployment Rate Forecast

Although employment forecasts can be developed without explicitly knowing the size of the labour force, total employment is constrained by available labour force. Therefore, labour force forecasts and resulting unemployment rate calculations serve as a check of consistency and reasonableness of employment forecasts and thus help validate the final estimates.

One of the challenges of forecasting labor force for the Central Okanagan region is the lack of available data for labour force participation rate projections specific for the area. The most detailed participation rate projections data that is currently available from BC Stats is at the broader regional level i.e. for Thompson-Okanagan. However, these regional participation rates have been historically much lower than in Kelowna CMA/Central Okanagan. Therefore, use of the broader regional participation rates may significantly under-estimate the available labour force in the Kelowna CMA itself.

In order to address this, we use the projected rate of change in Thompson-Okanagan labour force participation rates as a proxy for the corresponding rate of change of future participation rates in Central Okanagan. These calculated participation rate projections were then applied to BC Statistics population projections for the Central Okanagan to derive labor force forecasts. A more detailed description of the methodology is presented below:

Step 1: Source Central Okanagan population projections for the period 2016 to 2040 by gender and age category from BC Statistics.

Step 2: Source Thompson-Okanagan forecasted participation rates for 2018, 2023, 2028 and 2033 from BC Statistics. This data is provided by age, gender, and year. Data was interpolated between the years stated above.

Step 3: Calculate the annual rate of change for Thompson-Okanagan participation rates.

Step 4: Source historical monthly data for Kelowna participation rates from Statistics Canada. This data is provided by age, gender, and year. Convert monthly data to annual by averaging over the year. Identify and address anomalies.²

Step 5: The projected annual rate of change from Step 3 were applied to the most recent average 2015 participation rates in Kelowna up to 2033. Participation rate projections beyond 2033 are assumed to be constant.

² As an example, the participation rate for 2015 for males age 15-24 was unusually low when compared to other years. Use of this outlier value may underestimate the true labour force participation rate. For forecasting purposes, the average 2015 participation rate for males in this age category was adjusted and assumed to be equal to the average over the previous 5 years.

Step 6: The population projections by gender and age category from Step 1 were multiplied by participation rate projections from Step 5 and aggregated across gender and age category to obtain raw labor force projections. Population projection data was aggregated to match age categories for which participation rate data was available (and for which projections were calculated).

Results

Table 1 provides employment forecasts by industry for 2020 and 2040. Table 2 that follows provides the employment forecasts aggregated and matched to specific categories required by the TAZ model.

Table 1 shows that in 2020, employment is estimated at 100,911. By 2040, employment increases to 132,128. Compared with the estimated labour force of 106,212 and 139,126 in 2020 and 2040, respectively, this implies an unemployment rate of approximately 5% in each of these years. This can be considered a realistic, although somewhat conservative, rate. Recent commercial bank short-term forecasts to 2016 for the province anticipate an unemployment rate of about 5.5% to 5.8% under a relatively good GDP growth.

Table 1: Employment Forecasts and Other Economic Metrics Forecasts for Central Okanagan

Industry (with NAICS Codes)	2020	2040
Agriculture (111-112, 1100, 1151-1152)	1,800	2,000
Forestry, Fishing, Mining (21, 113-114, 1153, 2100)	1,000	1,200
Utilities (22)	639	844
Construction (23)	10,404	11,775
Manufacturing (31-33)	8,300	9,572
Trade (41, 44-45)	15,003	19,542
Transportation and Warehousing (48-49)	4,019	5,596
Finance, Insurance, Real Estate (52-3)	4,155	5,594
Professional and Scientific Services (54)	8,085	11,454
Business Building and Other Support Services [55-56]	4,449	7,146
Educational Services (61)	5,340	6,959
Health Care Services (62)	15,240	21,749
Information, Culture and Recreation [51, 71]	5,294	6,994
Accommodation and Food Services (72)	9,872	12,046
Other Services (81)	4,400	5,812
Public Administration (91)	2,911	3,846
TOTAL EMPLOYMENT	100,911	132,128
<i>ECONOMIC PERFORMANCE METRICS</i>		
Implied average annual rate of employment growth from 2014	1.87%	1.47%
Total Population	207,295	273,845
Population growth, average annual from 2014	1.53%	1.43%
Estimated Labour Force	106,212	139,126
Labour Force Growth, average annual from 2014	1.98%	1.50%
Implied Unemployment Rate	5.0%	5.0%
Population Age 15+ not in Labour Force	72,197	97,222

Table 2: Employment Forecasts Matched to TAZ Inputs

Attribute	Description	2040 INPUT VALUE	SOURCE/ COMMENTS
POP_2014	2014 Population Total	273,845	BC Stats.
POP0	2014 Population 0-4yr	11,643	BC Stats.
POP5	2014 Population 5-14yr	25,854	BC Stats.
POP1	2014 Population 15-19yr	14,112	BC Stats.
POP_1	2014 Population 20-24yr	14,127	BC Stats.
POP2	2014 Population 25-44yr	67,589	BC Stats.
POP4	2014 Population 45-64yr	76,005	BC Stats.
POP6	2014 Population 65-74yr	27,391	BC Stats.
POP7	2014 Population 75yr plus	37,124	BC Stats.
EMP_2014	2014 Employment Total	132,128	Estimated by HDR (current and anticipated employment trends).
NON_E_2014	2014 Non Employment (population not in labour force)	97,222	Calculated as the difference between forecasted population 15+ years of age of 236,348 and labour force of 139,126. Population forecasts sourced from BC Stats. Labour force estimated by HDR.
NON_R_2014	2014 Non- Retail	112,587	Estimated as total employment minus retail employment.
RETAI_2014	2014 Retail	19,542	Estimated by HDR. Employment in retail and wholesale trade, NAICS 41, 44-45.
AGRIC_2014	2014 Agriculture	3,200	Estimated by HDR. Includes agriculture and forestry.
INST_2014	2014 INST_CULTURAL_HOSPITAL_UNIVERSITY_COLLEGE	31,798	Estimated by HDR. Includes employment in health care services, information and cultural services, and educational services except for employment in elementary and secondary schools. The latter component was assumed at 56.1% of total employment in educational services of 6,959, subtracted from this figure and allocated to SCHJOB category.
MANU_2014	2014_MANUFACTURING_CONSTRUCTION	21,347	Estimated by HDR. Sum of employment in manufacturing and construction industries, NAICS 31-33, 23.
SERV_2014	2014_SERVICES_OFFICES_RESTAURANTS, ETC	45,898	Estimated by HDR. Calculated as sum of employment in financial services, professional and scientific services, business and support services, accommodation and food services, other services, and public administration.
TRAN_2014	2014_TRAN_UTIL	6,439	Estimated by HDR. Sum of employment in utilities, transportation and warehousing industries, NAICS 22, 48-49.
SCHJOB_2014	2014_SCHOOL_STAFF (TEACHERS, ADMIN, ETC)	3,904	Estimated by HDR as % of total employment in education services. The % assumption of 56.1% was based on 2011 NHS employment by industry data. Total employment in education services estimated at 6,959.

Appendix

Table 3: Forecasting Assumptions for Employment Growth by Industry

Industry	Category of Employment	Forecasting Assumption - to 2020	Forecasting Assumption - to 2040	Base of Forecasting Assumption	Comments and Explanations
Agriculture (111-112, 1100, 1151-1152)	Rural-based	1,800	2,000	Absolute employment figure	In general, employment in agriculture as a share of total employment has declined in many geographies. Frequently, employment in absolute numbers declines as well. Over the period 2001-2013, agricultural employment in Central Okanagan fell below 1,500 in many years but in a few years reached a level approaching 2,000. Employment growth in this industry may be promoted by growing demand for produce, fruit, and wine. (e.g. due to population growth). On the other hand, growth may also be restricted through limited land availability, competing land uses and labour productivity improvements. Much of the growth is then likely to be achieved through intensification. As a result, employment is likely to increase somewhat over the years but stay at a basically the same level.
Forestry, Fishing, Mining (21, 113-114, 1153, 2100)	Other	1,000	1,200	Absolute employment figure	This is not a significant industry in the region. Employment was below 1,500 and thus not reported in labour force survey data. Census data indicates that employment in these industries amounted to 925 in 2011, down from 1,153 in 2006. The assumed figures represent thus a similar level of employment with very limited growth that can be expected because of population growth. It is assumed here that growth over time will be small.
Utilities (22)	Population-Related	0.308	0.308	Thousands jobs per 100,000 population.	Employment in utilities is below 1500 and thus suppressed in Stat Can Labour Force Statistics. Based on Census data, employment in utilities increased from 430 in 2001 to 520 in 2006 and 565 in 2011. This implies an average annual rate of growth of 2.7%. Over the long-run, employment in this industry can be expected to be directly related to population increases. This coefficient is assumed equal to that from 2011 and remain unchanged over time.

Construction (23)	Population and more general economy.	5.02	4.30	Thousands jobs per 100,000 population.	Employment in the construction industry has shown a declining trend in years after the 2008 recession. In general, an increase in absolute employment numbers may be required to staff the portfolio of construction projects started, planned, or required to service local needs/ population in the region (residential, commercial, infrastructure, etc., e.g. Highway 97 widening, new police headquarters, transit improvements). The assumption for short run is thus based on the continuation of most recent trends observed, the average jobs to population ratio in 2014. In the long-run, this ratio is likely to decline somewhat as major projects are completed. The ratio from 2001 is used here to provide guidance as to the ratio that may result in situations with less intensive construction activity, before the residential construction boom of mid 2000s but also before the recession of early 2000s.
Manufacturing (31-33)	Employment lands	8.11%	0.72%	Average annual rate of growth	Employment in the manufacturing industry has shown a declining trend in years after the 2008 recession. However, in 2014 employment increased significantly compared to the prior year (18%). The monthly data for 2015 shows further growth. The growth assumption used in this forecast reflects a common belief by industry and industry analysts that manufacturing still has a large role to play in an economy and a potential to employ a large number of people. Therefore, for the forecasting purposes, it is assumed that the industry would regain the level of employment from its peak in 2008 by 2020. The rate of growth would then slow down. It is assumed that the long-run rate of growth to 2040 would amount to an average annual rate of growth equivalent to half of the population growth.
Trade (41, 44-45)	Population-Related	7.24	7.14	Thousands jobs per 100,000 population.	Employment in trade fluctuated substantially over the period 2001 to 2014 displaying no consistent trend. It reached a peak of 17.1 thousand in 2011 and fell to 13.7 thousand in 2014; a reduction of nearly 20%. Although employment in this industry is frequently forecasted on the basis of its relation to population, one has to be cautious with extrapolating year-to-year changes into long-term trends. The short-term forecasting assumption uses the average ratio of jobs to population over the last 10 years. For the long-run forecast, the third lowest ratio recorded over that period is used as an indicator of a more realistic employment level.
Transportation and Warehousing (48-49)	Employment lands	1.67%	1.67%	Average annual rate of growth	Employment in this industry fluctuated up and down in the years after the recessions. In 2014, employment fell by 18% compared to the prior year. Nevertheless, the industry displays overall long-term growth. In 2013, employment was 24% higher than in 2001 implying an average annual rate of growth of 1.67%. This forecast assumes the continuation of this overall trend. Employment in 2014 is assumed to be an outlier and the rate of growth is applied to 2013 employment.

Finance, Insurance, Real Estate (52-3)	Major Office	1.50%	1.50%	Average annual rate of growth	Employment in this industry fluctuated up and down over the analysis period. It reached a peak of 6.5 thousand in 2013 followed by a decline to 3.8 thousand in 2014. This may be an outlier year and monthly data for 2015 suggest a rebound in employment. In general, this industry is expected to be growing over time due to services that it provides to the general population and business. Between 2001 and 2012, employment in the industry grew from 4.5 thousand to 5.3 thousand, or an average annual rate of 1.5%. This rate is used as the annual employment growth for forecasting purposes (Also note that this rate is similar to average annual population growth in the region).
Professional and Scientific Services (54)	Major Office	1.95%	1.76%	Average annual rate of growth	This industry is in general expected to grow over time. This assumption reflects continuation of existing trends 2001-2014. The rate is reduced by 10% for the long-run.
Business, building and other support services [55-56]	Other	2.66%	2.40%	Average annual rate of growth	Employment in this industry fluctuated over 2001-2014 but overall displayed an increasing trend. There was a large increase in employment in 2013 followed by a large decline in 2014. It is not clear whether this is a "return" to normal levels from an outlier year or whether 2014 represents a difficult year. In general, employment in this industry group is believed to be increasing over time. The rate of growth is calculated based on the average employment over last three years as compared to 2001. The rate is reduced by 10% for the long-run.
Educational Services (61)	Population-Related	10.59	10.59	Thousands jobs per 100,000 population age 0-24.	Age category 0-24 covers children and young adults. This is the life stage when they go to school/ are getting education, or receive a lot of other educational services. The industry experienced large variation in employment trends in terms of jobs per population, rates of growth, and share of employment. Overall, total employment seem to fluctuate around some "steady-state" level; total employment in 2014 was somewhat higher than in 2001 and somewhat lower than in 2002. The ratio of employment to population over 2012-2014 is used as it is stable over that period and roughly equal to the average 2001-2013.
Health Care Services (62)	Population-Related	33.71	33.71	Thousands jobs per 100,000 population age 65+.	Demand for health care and social services tend to increase as people age (young people in general tend to have fewer medical problems and issues that older people). Analyses frequently point out population aging and in particular share of population 65+ as a significant driver of health care expenditures. The ratio of employment to 100,000 population 65+ over the last three years (2012-2014) is used here as the forecasting coefficient.
Information, culture and recreation [51, 71]	Population-Related	2.55	2.55	Thousands jobs per 100,000 population.	The industry displays a somewhat increasing employment trend. The ratio of employment to population assumption is based on the average calculated from the years 2010-2014.

Accommodation and Food Services (72)	Other	1.0%	1.0%	Average annual rate of growth	Employment in this industry fluctuated substantially over the period 2001-2014 displaying no consistent trend. Much of the industry is related to serving tourism. A 2010 economic impact study of tourism in Kelowna reported an increase in direct jobs related to tourism compared to 2005 (7,072 jobs in 2010, and increase of 5.8% compared to 2005). However, visitor expenditures actually declined in 2010 compared to 2005. A modest annual rate of growth of 1% is assumed for this industry based on historical employment values.
Other Services (81)	Population-Related	2.12	2.12	Thousands jobs per 100,000 population.	The industry displays a somewhat increasing employment trend. The ratio of employment to population assumption is based on the average calculated from the years 2010-2014.
Public Administration (91)	Population-Related	1.40	1.40	Thousands jobs per 100,000 population.	Employment in this sector fluctuated significantly over the period 2001-2014. However, in 2014 employment was at the same level as the beginning of 2000s. the employment to population ratio was calculated as an average of 2010 – 2014.

Table 4: Historical Employment by Industry in Kelowna CMA

Industry	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total employed, all industries	71.5	69.7	71.1	77.5	76.2	79.7	80.4	86.1	87.2	93.2	92.9	91.9	90.3	90.3
Agriculture [111-112, 1100, 1151-1152]	x	1.9	1.8	x	1.5	x	x	1.9	1.6	1.8	x	x	1.8	x
Forestry, fishing, mining, quarrying, oil and gas [21, 113-114, 1153, 2100]	x	x	x	x	x	1.5	x	x	x	x	x	x	x	x
Utilities [22]	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Construction [23]	6.4	5.3	4.9	8.2	9.1	10.9	10.3	13	11.3	11.2	10.7	10.6	10.1	9.5
Manufacturing [31-33]	6.5	7.2	7.8	7.3	6.4	7.6	8.3	6	6.6	6.7	6.3	6.1	4.4	5.2
Trade [41, 44-45]	14.1	11.4	11.5	14	11.8	13.2	13.7	13.6	13	16.4	17.1	14.4	16.8	13.7
Transportation and warehousing [48-49]	2.5	2.7	3.9	3.4	2.6	2.4	2.8	4.1	3	4	3.8	4	3.7	3.1
Finance, insurance, real estate and leasing [52-53]	4.5	3.6	3.4	3.8	4.6	4.8	6.2	4.5	5.6	5.9	4.6	5.3	6.5	3.8
Professional, scientific and technical services [54]	5.6	3.5	4.7	2.8	6.1	4.9	3.5	4.1	6.3	6.8	6.2	8.2	6.4	7.2
Business, building and other support services [55-56]	2.7	2.9	3.1	5	1.9	3.2	2.8	3.5	4.1	2.9	2.4	3.8	5.6	3.8
Educational services [61]	5.6	5	4.7	3.5	3.3	4.8	5.8	5.1	4.9	4.7	6.3	5.1	5.7	5.2
Health care and social assistance [62]	7.9	7.3	8.5	10.4	10.1	11.1	11.7	12.1	13.3	12.7	14.4	11.7	11.1	14.4
Information, culture and recreation [51, 71]	3.3	2.4	4.6	4.8	3.2	3.6	2.4	3.4	4	5.1	4.1	4.6	4.1	5.7
Accommodation and food services [72]	3.6	7.1	6.3	6.1	8.7	5.1	5.3	6.9	6.1	6.8	7.3	9.7	6.3	9.3
Other services [81]	3.9	5.3	2.2	3.6	3.7	2.7	2.9	3.5	3.2	3.3	4.8	3.5	4	4
Public administration [91]	2.7	2.9	2.4	2.1	2.1	2.8	3.1	3	3.4	3.5	2.3	3	2.8	2.3

Source: Statistics Canada, CANSIM Table 282-0131

Table 5: Participation Rates in Central Okanagan

Year	15 to 24 years			25 to 44 years			25 to 54 years			55 to 64 years					
	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both	Male	Female	Both
2010	72.1%	73.3%	72.5%	92.7%	82.6%	87.8%	93.0%	84.2%	88.7%	73.9%	62.0%	68.4%		14.8%	14.6%
2011	71.4%	70.8%	71.2%	94.0%	88.1%	91.1%	92.9%	87.5%	90.1%	75.1%	51.6%	64.3%		13.6%	14.6%
2012	70.0%	73.3%	71.8%	95.2%	85.6%	90.6%	93.9%	85.7%	90.0%	67.0%	67.2%	67.1%		10.3%	12.0%
2013	79.0%	70.0%	76.0%	92.1%	80.9%	86.2%	90.6%	79.8%	85.3%	71.7%	62.8%	67.4%		13.0%	12.8%
2014	80.1%	77.2%	78.7%	92.2%	80.2%	85.9%	90.3%	81.0%	85.5%	64.5%	50.7%	58.1%		12.6%	11.9%
2015	65.5%	72.7%	68.1%	92.8%	81.6%	83.9%	91.5%	81.4%	86.4%	65.6%	57.7%	61.4%			9.7%

Source: Statistics Canada, CANSIM Table 282-0128

Table 6: Projected Participation Rates for Thompson-Okanagan, by Gender and Age

Males by Age	2018	2023	2028	2033	Females by Age	2018	2023	2028	2033
15-19	58.3	58.3	58.3	58.3	15-19	61.0	61.0	61.0	61.0
20-24	80.4	80.1	80.1	80.1	20-24	79.0	80.3	80.3	80.3
25-29	91.1	87.7	87.5	87.5	25-29	87.9	83.1	84.2	84.2
30-34	92.3	92.5	89.7	89.5	30-34	77.5	82.9	78.4	79.5
35-39	90.3	91.0	91.2	88.4	35-39	83.9	83.4	87.3	84.0
40-44	94.1	90.1	90.9	91.1	40-44	77.2	83.1	82.6	86.6
45-49	83.6	89.1	85.4	86.1	45-49	74.4	77.0	82.9	82.4
50-54	81.3	80.2	85.4	81.8	50-54	75.5	71.7	74.2	79.9
55-59	74.8	70.6	69.7	74.2	55-59	70.4	69.2	65.7	68.0
60-64	53.8	56.5	53.4	52.6	60-64	51.0	50.5	49.6	47.1
65+	20.9	21.3	20.1	19.5	65+	14.1	16.3	16.5	15.3

Source: BC Stats

Table 7: Population Projections For Central Okanagan

Year	2020	2020	2020	2040	2040	2040
Gender	Male	Female	Total	Male	Female	Total
<1	1,027	973	2,000	1,176	1,108	2,284
1-4	4,076	3,783	7,859	4,874	4,485	9,359
5-9	4,672	4,377	9,049	6,499	5,882	12,381
10-14	5,153	4,825	9,978	7,070	6,403	13,473
15-19	5,099	5,038	10,137	7,361	6,751	14,112
20-24	5,785	5,634	11,419	7,134	6,993	14,127
25-29	7,530	7,660	15,190	6,907	7,550	14,457
30-34	7,546	7,590	15,136	7,717	8,855	16,572
35-39	7,002	7,133	14,135	8,112	9,511	17,623
40-44	6,482	6,468	12,950	8,997	9,940	18,937
45-49	6,292	6,221	12,513	10,605	11,380	21,985
50-54	6,202	6,567	12,769	10,115	10,383	20,498
55-59	6,839	7,756	14,595	8,823	9,127	17,950
60-64	6,793	7,564	14,357	7,695	7,877	15,572
65-69	6,053	6,619	12,672	7,029	7,077	14,106
70-74	5,589	5,817	11,406	6,465	6,820	13,285
75-79	3,830	4,344	8,174	6,196	7,079	13,275
80-84	2,712	3,230	5,942	4,978	5,916	10,894
85-89	1,792	2,362	4,154	3,216	4,144	7,360
90+	1,050	1,810	2,860	2,302	3,293	5,595
Total	101,524	105,771	207,295	133,271	140,574	273,845

Source: BC Stats

APPENDIX B

Future Base Transportation Network



Ministry of
Transportation
and Infrastructure

CENTRAL OKANAGAN PLANNING STUDY

FUTURE BASE TRANSPORTATION NETWORKS

Submitted By:

PARSONS

AUGUST 2015
SW1239

1.0 Introduction

The subject technical memorandum describes the development of the future base transportation network for the 2040 regional traffic model. The 2040 future base transportation network, coupled with the 2040 future base land use, represents the basis for identifying future network performance deficiencies and as the means for comparison of potential future network improvement options. The 2040 planning horizon is the primary forecast year for analysis for the Central Okanagan Planning Study.

In addition to the primary 2040 planning horizon, the Central Okanagan Planning Study will also develop travel demand forecast scenarios to represent land use and transportation conditions for the 2025 (10 year) and 2055 (40 year) planning horizons. The land use and applicable transportation networks for these alternate planning horizons will be developed subsequent to the 2040 planning horizon elements.

2.0 Future Network Elements

The future transportation network changes that are assumed to form part of the primary 2040 base network have been established through an extensive review of previous reports, transportation plans, official community plans, and discussions with BC MoTI and municipal representatives within the Central Okanagan Region.

Through this review, a long list of previously identified future transportation network projects was generated. However, due to the uncertainty in the potential implementation of many of these projects, a need was recognized to group these potential future network components into two categories as follows:

- **Base Committed** – Base committed projects have been defined as those with a very high likelihood of being implemented within a given planning horizon. These could include projects that have announced construction dates, are currently in detailed design or tendering, or where funding reserves have been established through council resolutions, Development Cost Charges, or developer commitments.

These projects will be included in the applicable future base network.

- **Candidate** – Candidate projects are defined as those projects that may have some previous planning work completed, are already identified as future candidate projects in community or agency transportation plans, or are in the early stages of project definition with no committed funding sources or delivery dates.

Candidate projects will not be included in a future base network and will be considered as potential future improvement options.

For each agency or municipality responsible for delivery of transportation in the region, a summary of the base committed and candidate projects by horizon year, their anticipated physical and operational characteristics, whether the project can be implemented (coded) in the traffic model, as well as likely triggers and funding mechanisms has been provided in **Table 2.1** through **Table 2.7**. Further discussion on the source or means of identification of the base committed and / or candidate projects for these agencies and municipalities is provided in the following sub sections.

2.1 Ministry of Transportation and Infrastructure

The base committed and candidate projects being considered by the Ministry of Transportation and Infrastructure are shown in **Table 2.1**.

As shown in the table, BC MoTI has committed to undertake a number of highway improvement projects along the Highway 97 corridor and many of these are expected to be delivered within a 10 year horizon. In addition, a number of planning and project development studies (candidate projects) are underway for specific areas within the corridor. These candidate projects could be delivered within a 25 year horizon and will be tested as options as part of the overall study.

2.2 BC Transit

The proposed candidate projects that are being considered by BC Transit are shown in **Table 2.2**. No base committed projects have been identified.

The table summarizes a number of potential priority projects in the near term as identified in The Central Okanagan Transit Future Plan (2012) to meet various transit goals and objectives.

2.3 City of Kelowna

The proposed base committed and candidate projects being considered by the City of Kelowna are shown in **Table 2.3**.

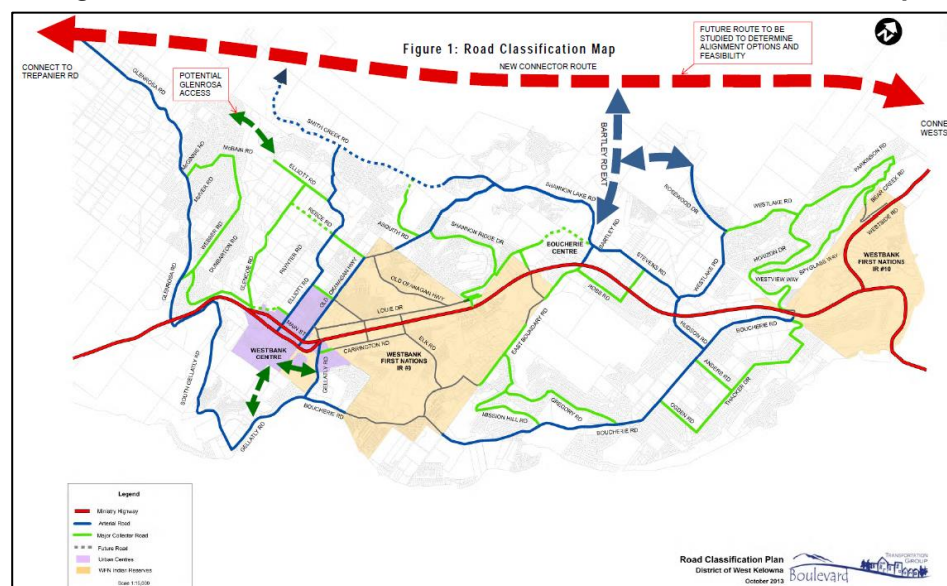
The primary source for identifying future transportation network improvements within the City of Kelowna was the Official Community Plan. The City of Kelowna's future road network is presented in Map 7.3 of the Official Community Plan. The map shows ultimate road network connections planned to the year 2030. A Development Cost Charge map highlighting funding contributions is also used to show future network connections. Key transportation network modifications include improvements along arterial and collector roadways noting that new local streets are less critical in the context of the future model network.

2.4 City of West Kelowna

The proposed committed and candidate projects being considered by the City of West Kelowna are shown in **Table 2.4**.

The City of West Kelowna has recently completed their Transportation Master Plan which includes a number of candidate road network and intersection improvement projects as shown in the aforementioned table. The most significant candidate road network projects are shown graphically along with the overall future road network in **Figure 2.1**.

Figure 2.1: District of West Kelowna Future Road Classification Map



None of the projects were identified as being required prior to 2033, which would place them within the 2040 planning horizon at the earliest. The new connector route (red dashed line on figure) has not been included in the list of potential future projects.

2.5 Westbank First Nation

The potential candidate projects being considered by the Westbank First Nation are shown in **Table 2.5**.

These candidate projects have been identified through a review of the Westbank First Nation Land Use Law which currently includes several future road network concepts for IR 9 and IR10. No base committed projects have been identified.

2.6 District of Peachland

The proposed candidate projects being considered by the District of Peachland are shown in **Table 2.6**.

These candidate projects have been identified through a review of the most recent official community plan. No base committed projects have been identified.

2.7 District of Lake Country

The proposed base committed and candidate projects being considered by the District of Lake Country are shown in **Table 2.7**.

District of Lake Country candidate projects have been selected from the 2007 Lake Country Transportation Plan Phase 2 report. Proposed connector roads were assumed to be provided within 20 years (2027, or falling between the current 2025 and 2040 planning horizons). Future road links were identified for requirements beyond 20 years which could fall within the 2040 or 2055 planning horizons.

Figure 2.2 shows the Lake Country future road network including the candidate network options in green.

Figure 2.2: Lake Country Future Road Network

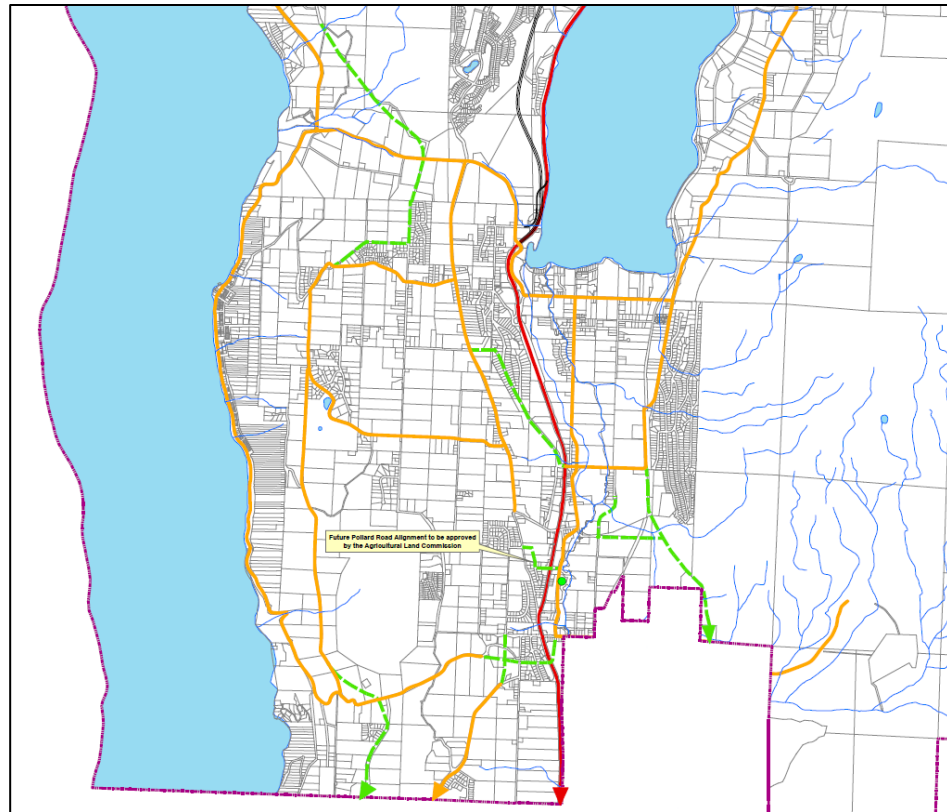


Table 2.1: MoTI Projects

Agency	Corridor or Intersection	Corridor From or At Intersection	Corridor To	Project Description	Base Committed	Candidate	Implement By	Codable	Source
BC MoTI	Highway 97	Greata Ranch	Antlers Beach Park	Widening from rural 2-lane undivided highway (RAU2) to rural 4-lane divided highway (RAD4)	✓		2025	✓	BC On the Move, 2015
	Highway 97	Daimler Drive		Advance left turn phasing provided from Highway 97 with time of day operation on cross street. Provide additional channelization and clarity or roundabouts for service road movements.	✓	•	2015	•	BC MoTI
	Highway 97	Sneena Road Overpass		Provision of overpass of a new 2-lane Sneena Road connection linking Westside Rd and Campbell Rd	✓	•	2025	•	BC On the Move, 2015
	Highway 97						2015	✓	BC MoTI
	Highway 97	Highway 33	Edwards Road	(1) Widening from 4 to 6 lanes.(HOV extension) (2) Upgrades to major intersection at Enterprise/Leathead Rd, McCurdy Rd, Findlay/Hollywood Rd (new signal) and Sexsmith Rd. (3) Realign Rutland Rd to increase separation between Hwy 97 and Rutland Rd.	✓	•	2017	✓	BC MoTI
	Highway 97	Birmie Road/Vista Road		(1) Restrict movements at Hwy 97 to right-in / right-out (EB to NB left turn movements will be diverted south to a designated jug-handle turnaround at Kalamalka Lakeview Dr). (2) Provide SB acceleration / deceleration lanes between Hwy 97 and Birmie Rd. (3) Extend SB left turn lane and provide a WB to NB acceleration lane at Kalamalka Lakeview Drive intersection to the south.	✓		2017	✓	BC On the Move, 2015
	Highway 97	Antlers Beach	Highway 97C	(1) Widening from rural 2-lane undivided highway (RAU2) to rural 4-lane divided highway (RAD4). (2) Incorporate access management measures	•	✓	2040?	✓	BC MoTI
	Highway 97	Westlake Road	Westside Road	Intersection / interchange capacity and safety improvements along this section which could include grade separations are to be determined		✓	2020?	•	BC MoTI
	Highway 97	Crystal Waters Road Underpass		Provision of a new underpass connection between Crystal Waters Rd and Rawsthorne Rd, which would allow both the north and south intersections of Crystal Waters Rd with Hwy 97 to be converted to right-in / right-out operation only.	•	✓	2040?	✓	BC MoTI
	Highway 97	Boucherie Road		Future interchange (undecided)	•	✓	2020?	✓	BC MoTI
	Highway 97	Chidley Road		Provide NB left turn lane and extend SB right turn deceleration lane	•	✓	2020?	✓	COPS Near Term Improvement
	Highway 97	Trepanier Bench Road		Extend SB right turn deceleration lane		✓	2020?		COPS Near Term Improvement
	Highway 97	Buchanan Road South		Restrict to right in / right out (divert left turns to Huston/Buchanan. Construct SB left turn lane	•	✓	2020?	✓	COPS Near Term Improvement
	Highway 97	Buchanan Road/Huston Road		Extend SB right turn deceleration lane, Restrict to right in / right out. Divert left turns to Buchanan Road South and Trepanier Bench Road		✓	2020?	✓	COPS Near Term Improvement
	Highway 97	Bartley Road		Provide additional channelization and clarity or roundabouts for service road movements	•	✓	2020?	•	COPS Near Term Improvement
	Highway 97	Ross Road		Develop access management strategy for gas station in southeast quadrant		✓	2020?	•	COPS Near Term Improvement
	Highway 97	Abbott Street		Extend Abbott westbound curbside lane to Lawrence in conjunction with one-way to two-way conversion	•	✓	2020?	✓	COPS Near Term Improvement
	Highway 97	McCurdy Road		Provide dual EB left turn and revise signal phasing. Restrict Stremel Road to right in / right out		✓	2020?	✓	COPS Near Term Improvement
	Highway 97	Sexsmith Road		Realign and signalize Findlay Road access. Class Stafford Road access. Restrict Commercial Drive to right in / right out.	•	✓	2020?	✓	COPS Near Term Improvement
	Highway 97	Pollard Road		SBL advance phasing	✓		2015	•	BC MoTI
	Highway 97	Berry Road		NBL advance phasing	✓	•	2015	•	BC MoTI
	Highway 97	Gordon Drive		NBL storage extension	✓		2015	•	BC MoTI
	Highway 97	Cooper Road		Advance left turn phasing, capacity improvements (e.g. dual lefts off the cross street)	✓	•	2015	✓	BC MoTI
	Highway 97	Dillworth Drive		Advance left turn phasing, capacity improvements (e.g. dual lefts off the cross street)	✓		2015	✓	BC MoTIs
	Highway 97	Airport Way		EBL and WBL advance phasing	✓	•	2016	•	BC MoTI
	Highway 97			EBR storage extension	✓	•	2015	•	BC MoTI
	Highway 97	Lodge Road		New signal	✓		2016	✓	BC MoTI
	Highway 97	University Way	Commonwealth Road	Provide median barrier from University Way to north end of Duck Lake.	✓	•	2015	•	BC MoTI
	Highway 97			Median barrier and access improvements from Duck Lake to Commonwealth Road	✓	•	2016	•	BC MoTI
	Highway 97	Beaver Lake Road		NB left turn lane storage improvement	✓		2016	✓	BC MoTI
	Highway 97			SB right turn lane construction		✓	2020?	✓	BC MoTI
	Highway 97	Oceola Road		Extend raised median south of intersection. Provide intersection channelization and NB accel. lane.	✓	•	2015	✓	BC MoTI
	Highway 97	Bailey Road		Provide NB roadside barrier or cable barrier. Provide shoulder rumble strips Bailey Road to College/Clerke Road		✓	2020?	•	COPS Near Term Improvement
	Highway 97	Kalamalka Lakeview Drive	Clerke Road	Prohibit WB left turn and through movements, shift to south Kalamalka Lakeview Drive intersection.	•	✓	2020?	✓	COPS Near Term Improvement
	Highway 97			Provide shoulder rumble strips to Bailey Road and College/Clerke Road					
	Highway 97	Clerke Road		Provide center median barrier to Kalamalka Lakeview Drive		✓	2020?	•	COPS Near Term Improvement

Table 2.2: BC Transit Projects

Agency	Implementation Strategy	Project Description	Base Committed	Candidate	Implement By	Codable	Source
BC Transit	Peachland Package One	Route 22 Peachland schedule adjustment which focus on 15 to 20 minute peak service, selected off peak service		✓	short term	✓	Central Okanagan Transit Future Plan (2012)
	West Kelowna / Westbank First nation Package One	(1) Routes 27, 28, 29 weekday peak hours only service (6am-9am and 3pm-6pm). (2) Routes 20, 21, 24 night service extended until 10 PM. (30 minute peak hour, 60 minute off peak until 10PM). (3) Highway 97 Express 15 to 30 minutes frequency until 7PM, hourly until 10 PM, late night service will be provided on Friday and Saturday evenings.	.	✓	short term	✓	Central Okanagan Transit Future Plan (2012)
	West Kelowna / Westbank First Nation Package Two	(1) New shoppers shuttle (existing route 21) between Westbank and Boucherie along Louie, Old Okanagan and Carrington Dr. (2) Route 24 extend service along Shannon Lake Rd to provide bi-directional service, it will connect West Kelowna's two exchanges. (3) Route 28 adjust existing Smith Creek route to provide transit service to along new developments along Asquith Rd. (4) Routes 27 and 29 provide direct and easy access to/from Westbank Frist Nation's office and Kelowna by terminating at Westside Rd instead of looping back to Boucherie exchange.		✓	short term	✓	Central Okanagan Transit Future Plan (2012)
	Kelowna Package One - North South corridor	(1) Direct service to the H2O recreation centre and the Capital News Centre (new route 5, 17, realign 1, 15, 16). (2) Improve service to Okanagan College (realign route 1, 8, maintain route 4). (3) New direct service to Kelowna General Hospital (realign route 11). (4) Increase SW Mission Service (route 16) and add new route 17 (15-30 minutes peak, 30-60 minutes off peak); (5) New Gordon Drive route 5 (15 minutes peak, 30 minutes off peak). (6) Park & Ride near terminus of Route 1 Lakeshore is recommended	.	✓	short term	✓	Central Okanagan Transit Future Plan (2012)
	Kelowna Package Two - Glenmore area	(1) Route 6 new express service between downtown to UBCO via Glenmore (15 min peak, 30 min off peak). (2) Route 7 realignment (15 min peak, 30 min off peak). (3) New UBCO / Airport / Quail Ridge service (30 min peak, selected off peak, routing TBD at implementation)		✓	short term	✓	Central Okanagan Transit Future Plan (2012)
	Lake Country Package One	(1) Increase service to/from Kelowna to 15 minutes peak periods and 30 minute off peak (route 23). (2) Terminate the stop in Oyama on route 90 North Okanagan Connector but continue service by either local service between Oyama and Lake Country Town Centre and exchange, local service between Oyama and nearest and safest stop on highway connecting to route 90, or a Park & Ride to enable Oyama residents an option to connect to the system. (3) New Park and Ride in Lake Country Town Center	.	✓	short term	✓	Central Okanagan Transit Future Plan (2012)
	Lake Country Package Two	(1) Route 90 North Okanagan Connector (Kelowna - Vernon) with 60 minute frequency over a 12 hour period; (2) New Service to The Lakes development with 30 minute frequency at peak and selected off peak times.	.	✓	short term	✓	Central Okanagan Transit Future Plan (2012)

Table 2.3: City of Kelowna Projects

Agency	Corridor or Intersection	Corridor From or At Intersection	Corridor To	Project Description	Base Committed	Candidate	Implement By	Codable	Source
City of Kelowna	Clifton Road	Clement Avenue	Lambert Avenue	Four lane arterial widening plus protected cycle tracks	✓		2017	✓	City of Kelowna website
	Dilworth Drive Active Transportation Corridor	Rails with Trails	Mission Creek Greenway	New Active Transportation Facilities between Rails with Trails and Mission Creek Greenway	✓	•	2020	•	City of Kelowna website
	John Hindle Drive Extension	Glenmore Road	UBCO Campus	Two lane east-west connection with multi-use pathway between Glenmore Road and UBCO Campus	✓		2017	✓	City of Kelowna website
	Lakeshore Road	Dehart Road	McClure Road	Urban cross section with sidewalk, bike paths, curb and gutter, street lighting and other features	✓	•	2017	•	City of Kelowna website
	South Perimeter Road	Gordon Drive	Steward Road West	Two lane urban arterial extension of Gordon Drive, two lane rural connection from Gordon Drive to Stewart Road West. On street bike paths and multi-use trail connections to be provided.	✓		2016	✓	City of Kelowna website
	Hollywood Road Extension	John Hindle Drive	Findley Drive/Hollywood Road South	Two lane arterial extension from John Hindle Drive through Sexsmith Road and across Highway 97 to Findley Drive and Hollywood Road South	✓	•	2025?	✓	City of Kelowna OCP and DCC Map
	McCurdy Road Extension	McCurdy Road	Rifle Road	A two lane westerly arterial extension to Rifle Road	✓		2025?	✓	City of Kelowna OCP and DCC Map
	Central Okanagan Multi-Modal Connector	Spall Road	Highway 33/McCurdy	A four lane arterial extension of Clement Avenue easterly from Spall Road to Highway 33 and McCurdy	✓	•	2025?	✓	City of Kelowna OCP and DCC Map
	Burtch Road connection	Byrns Road	KLO Road	A two lane arterial connection of Burtch Road north and south from Byrns Road to KLO Road	✓		2025?	✓	City of Kelowna OCP and DCC Map
	Stewart Road realignment	Crawford Road	Dehart Road	A two lane arterial realignment of Stewart Road between Crawford Road and Dehart Road	✓	•	2025?	✓	City of Kelowna OCP and DCC Map
	Highway 97	Abbott Street		Provide grade separation of pedestrian movements		✓	2020	•	City of Kelowna
	Highway 97	Pandosy Street		NB channelized right turn lane	•	✓	2020	✓	City of Kelowna
	Highway 97	Ethel Street		Potential removal or relocation of advance left turn phasing from cross street		✓	2020	•	City of Kelowna Ethel ATC
	Water Street	Leon Ave		Modify current traffic signal timings for the Leon/Water	✓	•	?	•	City of Kelowna
	Water Street	Bernard Ave		Modify current traffic signal timings for the Bernard/Water Separate left turn lanes on Water St at Bernard Ave	✓ ✓		? 2014	• ✓	City of Kelowna
	Water Street	Queensway		Roundabout installation	✓	•	2014	✓	City of Kelowna
	Doyle Avenue	Water St / Ellis St / Richter St		New roundabout at Doyle/Water, separate left turn lanes at Doyle/Ellis (remove parking north side of Doyle), and signals at Doyle/Richter.	✓		?	✓	City of Kelowna
	Highway 97	Gordon Drive		Extension of eastbound left turn storage from 65 to 120 metres at the Highway 97 left-turn to Gordon Dr	✓	•	2014	•	City of Kelowna
	Queensway	Ellis Street		New signal	✓		2015	✓	City of Kelowna
	Rose Avenue	Richter Street		New signal	✓	•	2015	✓	City of Kelowna

Table 2.4: District of West Kelowna Projects

Agency	Corridor or Intersection	Corridor From or At Intersection	Corridor To	Project Description	Base Committed	Candidate	Implement By	Codable	Source
District of West Kelowna	New Connector Route	Glenrosa Road	Westside Road	New 2-lane arterial from Glenrosa Road to Westside Road	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Glenrosa Road Extension	Carre Road	New Connector Route	Extend 2-lane arterial from Carre Road to New Connector Route	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Bartley Road Extension	Bartley Road	New Connector Route	Northerly 2-lane arterial extension of Bartley Road to New Connector Route	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Rosewood Drive Extension	Rosewood Drive	Bartley Road Extension	New 2-lane arterial extension to Bartley Road extension	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Smith Creek Road	Copper Ridge Drive	New Connector Route	2-lane arterial connection between Copper Ridge Drive and New Connector Route	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Tallus Ridge Drive	Cobblestone Road	Smith Creek Road	2-lane arterial extension from Cobblestone Road to Smith Creek Road	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Asquith Road	Iron Ridge Road	Tallus Ridge Drive	2-lane collector connection from Iron Ridge Road to Tallus Ridge Drive	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Auburn Road Extension	Auburn Road	Bartley Road	2-lane collector extension to Bartley Road	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Reece Road	Elliot Road	Glencoe Road	2-lane collector extension from Elliot Road to Glencoe Road	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Lower Glenrosa Road	Glencoe Road	Elliot Road	2-lane new collector from Glencoe Road to Elliot Road	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Westbank Centre Network	Ingram Road	Gellatly Road East	2-lane new collector road from Ingram Road to Gellatly Road East	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan
	Westbank Centre Network	Waterfront	Brown Road	2-lane new collector road connection to Waterfront via extended / realigned Brown Road	•	✓	2033+	✓	District of West Kelowna Master Transportation Plan

Table 2.5: Westbank First Nation Projects

Agency	Corridor or Intersection	Corridor From or At Intersection	Corridor To	Project Description	Base Committed	Candidate	Implement By	Codable	Source
Westbank First Nation	Red Cloud Way extension	Elk Road	Cougar Road	A 2-lane extension of Red Cloud Way southerly from the Elk Road / Cougar Road intersection to Boucherie Road	.	✓	?	✓	Westbank Land Use Law
	Carrington Road extension	Carrington Road	Grizzly Road	A 2-lane extension of Carrington Road / Ironwood Drive northerly parallel to Highway 97 with a connection to the east leg of Grizzly Road	.	✓	?	✓	Westbank Land Use Law
	Cougar Road extension	Cougar Road	Daimler Drive	A 2-lane northerly extension and realignment of Cougar Road to Daimler Drive	.	✓	?	✓	Westbank Land Use Law
	Nancee Way to Horizon / Boucherie	Nancee Way	Boucherie/Horizon	A 2-lane southerly extension of Nancee Way adjacent to Highway 97 connecting to the west leg of the Boucherie / Horizon intersection at Highway 97	.	✓	?	✓	Westbank Land Use Law

Table 2.6: District of Peachland Projects

Agency	Corridor or Intersection	Corridor From or At Intersection	Corridor To	Project Description	Base Committed	Candidate	Implement By	Codable	Source
District of Peachland	Somerset Avenue - Ponderosa Drive connector	Somerset Avenue	Ponderosa Drive	New major east-west 2-lane connection and secondary emergency route	.	✓	?	✓	Peachland OCP Schedule C
	Renfrew Street - Hardy Avenue connector	Renfrew Street	Hardy Avenue	Renfrew Street realignment to provide improved Hardy Avenue connection in conjunction with adjacent development	.	✓	?	✓	Peachland OCP Schedule C
	Clements Crescent - Ponderosa Drive connector	Clements Crescent	Ponderosa Drive	2-lane collector road connection between Clements Crescent and Ponderosa Drive along the north side of Highway 97		✓	?	✓	Peachland OCP Schedule C
	Clements Crescent - Chidley Road connector	Clements Crescent	Chidley Road	2-lane connection between Clements Crescent and Chidley Road, allowing Chidley Road to be closed at Highway 97	.	✓	?	✓	Peachland OCP Schedule C

Table 2.7: District of Lake Country Projects

Agency	Corridor or Intersection	Corridor From or At Intersection	Corridor To	Project Description	Base Committed	Candidate	Implement By	Codable	Source
District of Lake Country	Tyndall Road at Okanagan Centre Road West			Road and intersection realignment with turn lanes, sidewalk and multi-use pathway	✓	.	2015	✓	Lake Country Transportation Plan Phase 2,
	Okanagan Centre Road West to Main Street connector	Glenmore Road	Main Street	Realignment and 2-lane extension to intersect Glenmore Road and Highway 97 with southerly extension of Main Street at new Highway 97 signal (replaces some turning movements at Beaver Lake)	.	✓	2027	✓	Lake Country Transportation Plan Phase 2
	Okanagan Centre Road East to Glenmore Road connector	Okanagan Centre Road East	Glenmore Road	A southerly 2-lane extension of Okanagan Centre Road East to Glenmore Road at the new Okanagan Centre West intersection	.	✓	2027	✓	Lake Country Transportation Plan Phase 2
	Okanagan Centre Road East to Lodge Road connector	Okanagan Centre Road/Williams Road	Lodge Road/Highway 97	New 2-lane diagonal link between Okanagan Center Road at Williams Road to the west leg of Lodge Road at Highway 97	.	✓	2027	✓	Lake Country Transportation Plan Phase 2
	Okanagan Centre Road East to Pollard Road connector	Okanagan Centre Road East	Pollard Road/Highway 97	The south leg of Okanagan Centre Road East would be realigned to tie in with the west leg of the Pollard Road intersection at Highway 97	.	✓	2027	✓	Lake Country Transportation Plan Phase 2
	Lodge Road to Airport connector	Beaver Lake Road	Airport	A southerly 2-lane extension of Lodge Road to connect through Beaver Lake Road to the Airport on the east side of Ellison Lake	.	✓	2027	✓	Lake Country Transportation Plan Phase 2
	McGowan Road to Goldie Road connector	McGowan Road north	Goldie Road/Oceola Road	A 2-lane connection from McGowan Road north to Goldie Road and Oceola Road	.	✓	2027	✓	Lake Country Transportation Plan Phase 2
	Moberly Road to Oceola Road connector	Moberly Road	Oceola Road	2-lane connection which connects Moberly Road to Oceola Road / Okanagan Centre Road East at Pow Road	.	✓	2027+	✓	Lake Country Transportation Plan Phase 2

3.0 Model Development

Prior to actually coding the committed projects into the model, the base committed and candidate projects listed in Section 3 of this document will be forwarded to each agency for validation and or refinement with respect to the category, description, and timing. Once these projects are confirmed (committed, candidate, or neither), the committed projects will be incorporated into the travel demand model to establish a future base network(s). The candidate projects will be retained for future consideration as part of the option testing and evaluation.

A final step to complete the future base network will involve testing the model network to identify deficiencies on links where indicators such as volume/capacity ratios and link travel time are extraordinarily high. If any deficiencies are identified, such as on minor links serving high growth traffic zones, localized road improvements will be proposed. Inclusion of these minor network adjustments (as required) will complete the future network.