

# Travel Demand Model Update Technical Memorandum

## West Kelowna Transportation Master Plan

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### Table of Contents

1	Introduction .....	1
2	Validation .....	1
3	Calibration.....	2
	Input and Network Adjustments .....	2
	Demand Adjustments .....	3
	Calibrated 2020 Outputs .....	3
4	Forecasting .....	4

## Introduction

Travel demand modelling was carried out as part of the technical analysis for the West Kelowna Transportation Master Plan and to provide travel demand forecasts for the infrastructure and policy proposed in the 2040 planning horizons. The Regional District of Central Okanagan Transportation (RDCO) Model was used for this analysis. The model was originally specified and calibrated for use as the travel demand forecasting model for the Regional District of Central Okanagan. Adoption of the RDCO model allowed for both fast and cost-effective adoption of a travel demand model for the City and better integration and consistency with long term planning conducted by the Region of Central Okanagan.

This report documents the process and provides some results and analysis from the modelling. It is broken down into sections that correspond to each major step of the modelling process.

## Validation

The RDCO model was calibrated to the macroscopic travel patterns of the entire Region of Central Okanagan in 2014; therefore, it was not well calibrated to the travel patterns within the City of West Kelowna in 2020. As such, the model needed to be first validated and calibrated for West Kelowna under the base-year 2020 horizon before being used to forecast the projected traffic volume at the 2040 horizon. This section of the report documents the validation process and provides some comments and analysis on the model outputs prior to calibration.

For the validation, the model was mainly used in an “as is” state. All model inputs used were exactly as prescribed in the model’s documentation, with the exception of land use inputs,

where 2020 land use matrices provided by the City were used instead of the original 2014 matrices. Outputs from the model were validated against two sets of observed data. Trip generation, trip distribution and mode split outputs from the model were validated against available data from the 2018 Okanagan Travel Survey. Assigned traffic volume outputs from the model were validated against traffic counts collected in the two designated focus areas of the TMP – Stevens Road, and Westbank Urban Centre. The locations of the focus areas are marked in red in Figure 1.

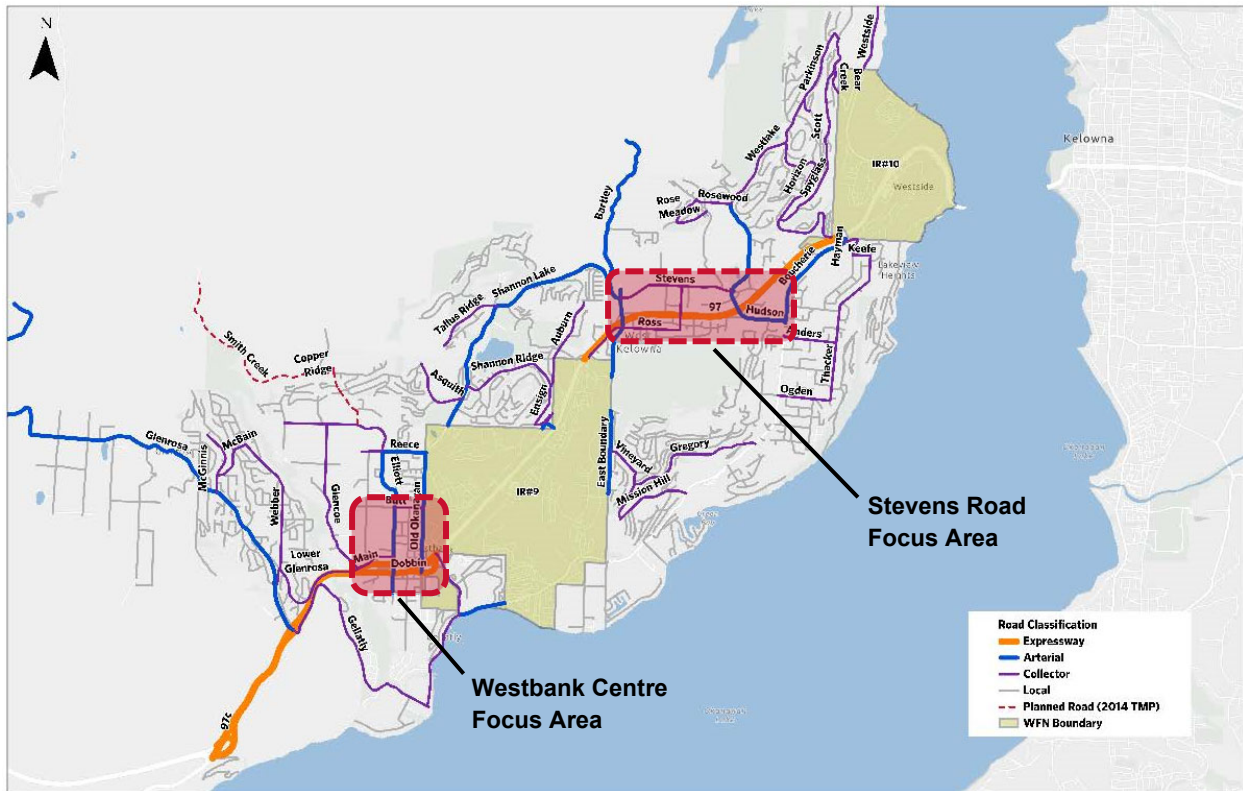


Figure 1: Focus Areas

Comparisons between the model outputs and data from the 2018 Okanagan Travel Survey showed no significant discrepancies and validated the model’s performance in trip generation, trip distribution and mode split in aggregate. Comparison between the uncalibrated model volume outputs and the traffic counts showed good agreement along Highway 97, but significant discrepancies on many of the cross streets, particularly those in the Westbank Urban Centre focus area. This indicated the need for an additional calibration step to provide a closer fit to observed numbers.

## Calibration

### Input and Network Adjustments

Guided by the findings from the validation, calibration of the model started with some further review and analysis of the model inputs and the model network, with particular attention on the focus areas. A detailed review of the land use inputs using recent satellite images and Google

Street View images showed a number of new developments in the Westbank Urban Centre area, which were not accounted for in the original 2020 land use inputs provided. This points to the existence of trip generators that were potentially unforeseen during the projection of the original 2020 land use inputs. A review of the model network also showed a number of discrepancies when compared with the existing network on the ground.

As a result of the review and analysis above, a number of updates and changes were made to the land use inputs and the model networks to bring the model into better agreement with real world conditions:

- Resident population totals were increased at three traffic planning zones in the Westbank Urban Centre area just north and south of Highway 97. The magnitudes of the increases (shown in Table 1) were based on unit counts from available studies filed for newly completed developments not accounted for in the provided land use inputs
- The previously proposed connection between Ingram Rd and Witt Rd was removed
- The configuration of the connection between Bartley Road and Shannon Lake Road was modified to reflect the current configuration
- Zone connectors were added or modified to better reflect actual property entrance and exit configurations
- Volume delay functions were modified on a number of road links along Highway 97 and Gosset Road in the Westbank Urban Centre area to better reflect the actual road cross-sections design

Population modifications were applied as follows:

**Table 1: 2020 population modifications**

Traffic Zone	Original 2020 Population	Modified 2020 Population
5160	491	791
5170	456	656
6090	677	1000

## Demand Adjustments

Further demand adjustments were also made to the single occupancy vehicle (SOV) and high occupancy vehicle (HOV) demands during the calibration process. The demand adjustments were made based on the collected traffic counts in the two focus areas to produce an adjusted demand matrix. The adjustment ratios (factors) were calculated from the adjusted demand and capped at a maximum of 7.5. The adjustment ratios were applied to unadjusted SOV and HOV demand to produce the final “adjusted” SOV and HOV demand OD matrices, which were assigned to the model network. This process was carried out during the 8th and final iteration of the RDCO model.

## Calibrated 2020 Outputs

The final calibrated model outputs closed the discrepancies between the model output and observed traffic volumes considerably, particularly in the Stevens Road Focus Area. Some discrepancies remained, but after a further review of the traffic pattern from model outputs and the observed volumes, two probable causes were identified. The first cause was a difference in

routing decisions made by the modelling software and those made by real world drivers. While different from the observed behaviour, the predominant routing produced by the model appears entirely logical based on the network configurations, and therefore no further adjustments were made to bring the model to an agreement with the observed data. The second cause of discrepancies was a slight under-production of trips by the model in the south Westbank area. This discrepancy doesn't appear to correlate with any recent development in the area and addressing it would require re-calibration of the trip production rates, which was not practical to undertake with the available data. Therefore, no further adjustments were made here, either.

## Forecasting

Once the model calibration was complete, the resulting tool was used to carry out forecasts for a 2040 horizon year. This involved running the model with 2040 land use and the same demand adjustment ratios applied in the calibration stage, assuming that these adjustments (representing over or underestimation trends on the part of the model) would also be valid under future conditions.

The resulting demand projections for 2040 are illustrated below by mode and time period in Figure 2, Figure 3, Figure 4, and Figure 5. These assume a growth in West Kelowna's population from 35,320 in 2020 to 49,401 in 2040. The main area of capacity constraint is the Okanagan Highway in the peak direction (eastbound in the AM and westbound in the PM), a corridor that also experiences transit crowding.

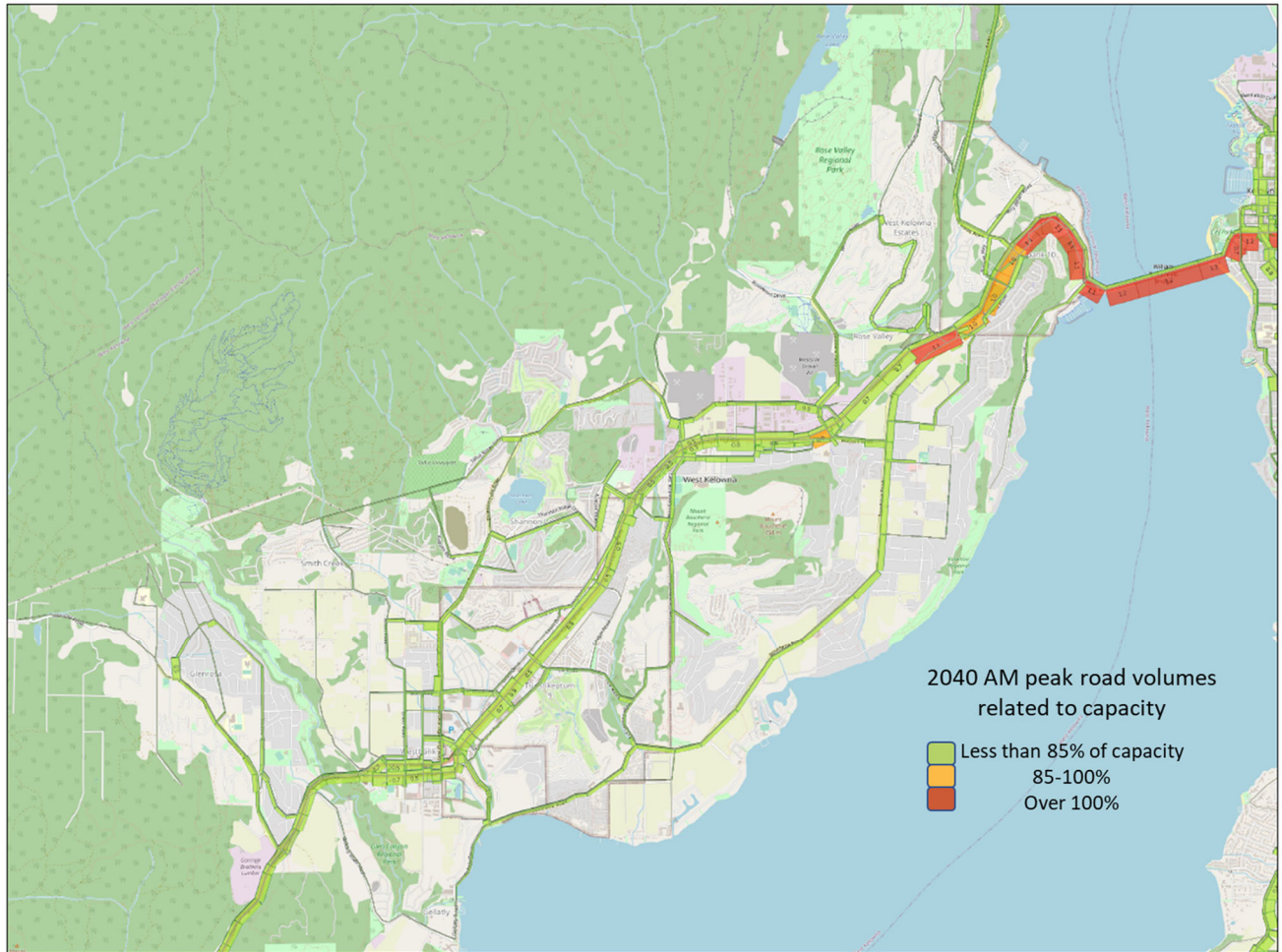


Figure 2: 2040 AM auto volumes and congestion levels

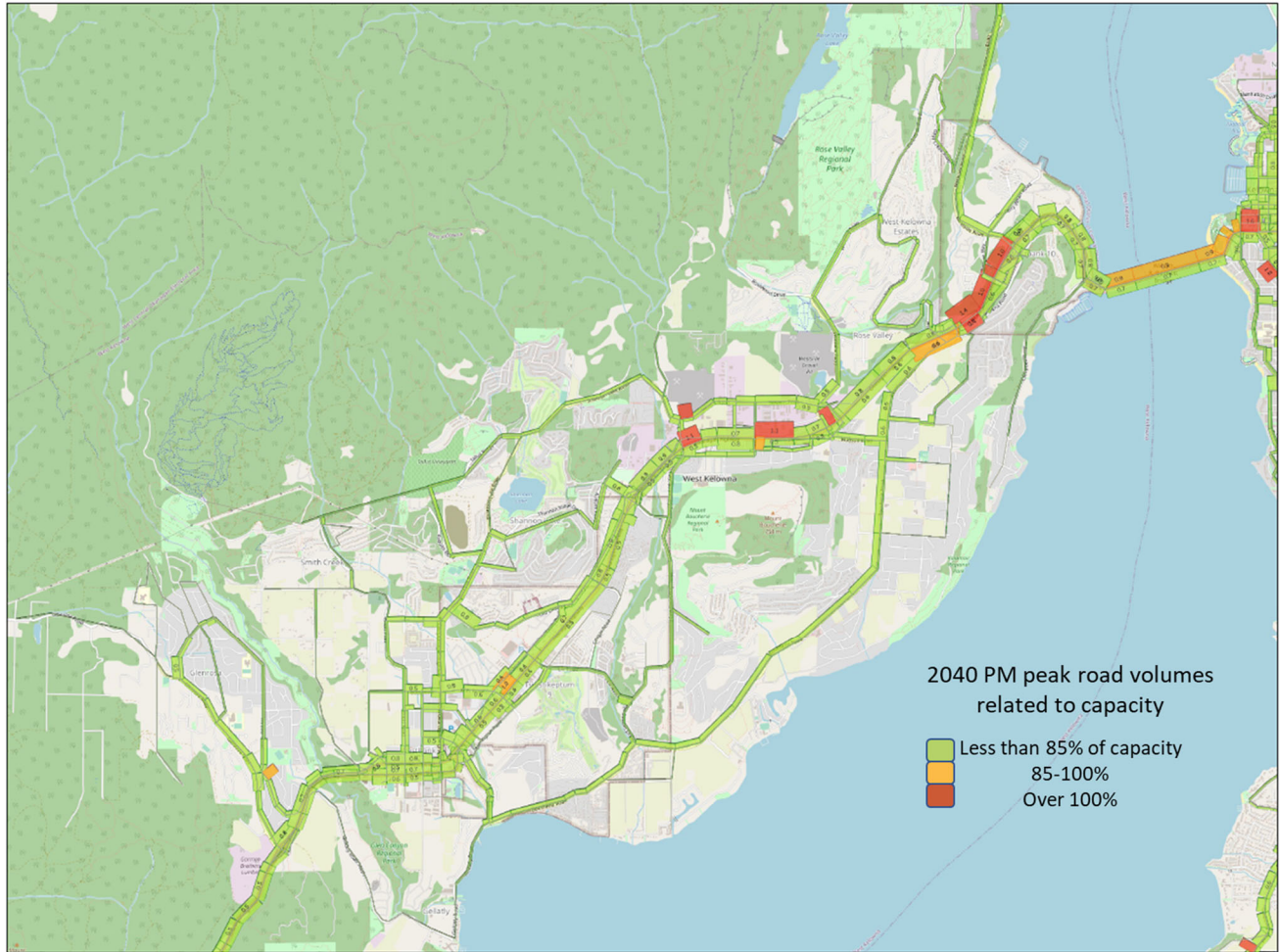


Figure 3: 2040 PM auto volumes and congestion levels



Figure 4: 2040 AM transit volumes and crowding levels



Figure 5: 2040 PM transit volumes and crowding levels