MOTT MACDONALD

# Phase 0 Summary Report

Wesbrook Place Neighbourhood Plan

**Project:** Wesbrook Place Neighbourhood Plan

**Document ref.:** 514100789/WP/PO/001

**Subject:** Phase 0 Summary Report – Transportation Modelling Analysis

## Issue and revision record

| Revision | Date | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| A | 28 August 2024 | Fajar Ausri<br>Kritika Saini | Craig Walley | John Dooley | Draft (1) for Client review |
| B | 23 October 2024 | Fajar Ausri<br>Kritika Saini | Craig Walley | John Dooley | Draft (2) for Client review |
| C | 29 October 2024 | Kritika Saini | Craig Walley | John Dooley | Final (1) |
| D | 30 October 2024 | Kritika Saini | Craig Walley | John Dooley | Final (2) |

# 1 Executive Summary

A traffic analysis was undertaken to understand the impact of planned growth in the Wesbrook Place neighbourhood as well as the effectiveness of considered road infrastructure improvements to minimize the impacts.

A transportation model was used to conduct the analysis for the morning, afternoon and weekend peak hours. These peak hours were analysed for the scenarios summarized in Table 1.1.

**Table 1.1: Modelled scenarios.**

| No. | Scenario | Demand Year | Description |
|---|---|---|---|
| 1 | Present year base model | 2024 | Present year traffic and pedestrian demand. Present-year infrastructure and transit operations. |
| 2a | Future year – Do nothing | 2035 | Future year traffic (existing traffic + traffic growth to year 2035 + development generated traffic). Future year pedestrian demand (existing pedestrian + pedestrian growth to year 2035). Present-year infrastructure and transit operations. |
| 2b | Future year – With Improvements | 2035 | Future year traffic (existing traffic + traffic growth to year 2035 + development generated traffic). Future year pedestrian demand (existing pedestrian + pedestrian growth to year 2035). Considered infrastructural and operational interventions in 2035, and future-year transit operations. |

Six key road infrastructural improvements were considered in the future year *With Improvements* scenario, which are outlined in Table 1.2.

**Table 1.2: Considered Road Infrastructural Improvements**

| No. | Location | Description |
|---|---|---|
| A | Binning and West 16 Avenue | Implementation of pedestrian-controlled, 4-way signalized intersection. |
| B | Wesbrook Mall and West 16th Avenue | Widened northbound Wesbrook Mall at West 16$^{th}$ Avenue to provide a dedicated lane for right turns onto 16$^{th}$. |
| C | Wesbrook Mall bus prioritization | Provided additional bus-only lane along Wesbrook Mall between Binning Rd and West 16 Avenue during AM, PM, and Weekend peak hours. |
| D | West 16 Avenue | Converted bus stops along West 16$^{th}$ Avenue between the two roundabouts to in-lane stops. |
| E | Wesbrook Mall and Southwest Marine Drive | Provided additional lane to allow buses to jump the queue travelling southbound on Wesbrook Mall to turn left onto Marine Drive. |
| F | Wesbrook Mall between Thunderbird Boulevard and West 16 Avenue | Upgraded street to include additional bus only lane north of West 16$^{th}$ Avenue in the northbound travel direction. |

Note: Figure 6.1 illustrates the location of these improvements.

Traffic performance was compared for the three periods and scenarios by analyzing delays, queue lengths at intersections, and travel times experienced by vehicles and transit along key corridors.

Future year traffic increases were most notable along West 16th Avenue and Wesbrook Mall, leading to significant capacity constraints at the West 16th Avenue and Wesbrook Mall roundabout. There is an overall increase in traffic using the local roads as a result of the growth planned for neighbourhood, which does increase delays and queuing in the *Do Nothing* scenario, but any unacceptable results are mitigated by the considered infrastructure improvements in the *With Improvements* scenario.

Table 1.3 illustrates the LOS at intersections, based on simulated traffic delay performance compared to established industry standards.

**Table 1.3: Intersection Level of Service (LOS) results in the PM peak**

| No | Intersection Name | Present Year | Do Nothing | With Improvements |
|---|---|---|---|---|
| 1 | SW Marine Dr & W 16 Ave | A | A | A |
| 2 | East Mall and W 16 Ave | A | A | A |
| 3 | Wesbrook Mall and W 16 Ave | C | E | B |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | A | A | B |
| 5 | Wesbrook Mall and Hampton Pl | B | F | A |
| 6 | Wesbrook Mall and Berton Ave | B | C | A |
| 7 | Berton Ave and Binning Rd | A | A | A |
| 8 | Birney Ave and Ross Dr | A | A | A |
| 9 | Birney Ave and Webber Lane | A | A | A |
| 10 | Birney Ave and Shrum Lane | B | E | A |
| 11 | Wesbrook Mall and Birney Ave | C | E | B |
| 12 | Binning Rd and Birney Ave | A | A | A |
| 13 | Gray Ave and Ross Dr | A | A | A |
| 14 | Wesbrook Mall and Gray Ave | A | A | A |
| 15 | Gray Ave and Binning Rd | A | A | A |
| 16 | Wesbrook Mall and Ross Drive | B | B | A |
| 17 | Wesbrook Mall & Binning Rd | A | A | A |
| 18 | Wesbrook Mall & TRIUMF access | A | A | A |
| 19 | Southwest Marine Dr and Wesbrook Mall | A | B | B |

Note: LOS grading levels A to F are explained in Section 7.1.

Not all of the considered infrastructure improvements have positive impacts on traffic circulation in the neighbourhood. The key takeaways of the considered improvements are as follows:

- A fully signalized intersection at West 16th Avenue and Binning Road notably improves network performance by providing drivers with an additional route into the Wesbrook neighbourhood. Although, signalization slightly increases delay and queues experienced by drivers along 16$^{th}$ Avenue, potential safety benefits for vehicles and pedestrians should be taken into consideration.
- A right-turn only lane along northbound Wesbrook Mall at West 16th Avenue reduced delays for right-turning traffic.
- The effectiveness of bus-only lanes along Wesbrook Mall is limited by the fact that buses must queue with general traffic at Wesbrook Mall and West 16th Avenue. However, it should be noted that travel experience improves for other vehicles.
- Bus priority measures at the Southwest Marine Drive and Wesbrook Mall intersection, maintained bus journey times despite future traffic growth.

The results of this analysis will be taken forward into the next phase of planning for amendments to the Wesbrook Place Neighbourhood Plan.

# 2 Introduction

Updating the neighbourhood plan for Wesbrook Place enables opportunities to better prioritize walking, rolling, cycling and transit in the neighbourhood through improvements to streets and intersections.

This technical report provides a summary of the Phase 0: Pre-Planning activities conducted by Mott MacDonald within the transportation scope of the amendments to the Wesbrook Place Neighbourhood Plan. This included modelling the impacts of a series of potential improvements to neighbourhood transportation infrastructure, based on Campus Vision 2050 future developments (i.e. building uses and population distribution). In addition to benefits for pedestrians and cyclists, this traffic modeling confirms that the improvements considered would ensure an acceptable level of service for vehicles in the future with Wesbrook Place South completed.

This modelling has limited applications, and focuses on vehicle and transit movements, which is only one input into how transportation networks are planned. Future modelling will advance this initial work and include further study on active transportation impacts and opportunities for pedestrian, cycling and other forms of micromobility enhancements that will be considered with the Wesbrook Place Neighbourhood Plan Amendment planned developments.

## 2.1 Purpose and Scope

Expansion and development of the Wesbrook Place neighbourhood is a key priority identified in the University of British Columbia (UBC) Campus Vision 2050 (The Vision) and the update to the 10-Year Campus Plan. Phase 0 in the transportation scope of the Wesbrook Place neighbourhood plan includes an evaluation of the traffic impacts of considered network improvements through microsimulation modelling.

Transportation modelling was undertaken to include key intersections (study area as indicated in Figure 2.1) expected to be impacted by these potential future network improvements. The study area includes:

- Intersections adjacent to development areas, including the intersection at Binning Road and Wesbrook Mall
- Intersections designated as ‘primary’ and ‘secondary’ entry locations at West 16$^{th}$ and Wesbrook Mall, West 16$^{th}$ and East Mall, Southwest Marine Drive and Wesbrook Mall, and Binning Avenue and Wesbrook Mall.
- Remaining intersections along roads designated as neighbourhood collectors or local streets.

**Figure 2.1: Model extent and intersections included within the study area**

## 2.2 Model Scenarios

Mott MacDonald has modelled a total of three scenarios as outlined in Table 2.1. For each scenario, three analysis peaks were modelled.

**Table 2.1: Modelled scenarios.**

| No. | Scenario | Demand Year | Description |
|---|---|---|---|
| 1 | Present year base model | 2024 | Present year demands, present-year infrastructure, present -year transit operations. |
| 2a | Future year – Do nothing | 2035 | Future year demands, present-year infrastructure, present-year transit operations. |
| 2b | Future year – With Improvements | 2035 | Future year demands, considered infrastructural and operational interventions in 2035, and future-year transit operations. |

### 2.2.1 Analysis Peaks

Based on observed traffic volume counts, AM, PM, and weekend peaks were defined as follows:

- AM Peak: 08:30 to 09:30
- PM Peak: 16:45 to 17:45
- Weekend peak: 12:00 to 13:00

## 2.3 Report Structure

This report has been structured as follows:

- Sections 3 to 4 provide a summary of base present year model development, including inputs and assumptions, model development, and model calibration.
- Section 5 provides a summary of future year model development.
- Sections 6 to 11 present the evaluation metrics, results, and recommendations from the modelling analysis.

# 3 Model Inputs and Assumptions

## 3.1 Infrastructure

Present-year infrastructure was coded in VISSIM based on various geographically coded sources as noted in Table 3.1. This was supplemented with observations from a site visit to confirm infrastructural elements and refine the model geometry.

**Table 3.1: Present-year infrastructure**

| Feature(s) | | Source |
|---|---|---|
| Network and roadway geometry | – Number of vehicle lanes<br>– Vehicle Lane width<br>– Curb radii<br>– Permitted vehiclemovements by lane, based on lane markings | Maxar, Microsoft Corporation, and Distribution Airbus DS |
| Traffic control measures | | Google Street View |
| Posted speed limits | | Google Earth |

## 3.2 Vehicle Travel Demand

Vehicle demands for the present year (2024) were derived from demand matrices extracted from the 2022 and 2035 10-Year Priorities networks in the TransLink Regional Travel Model (RTM) version 3.6. These 2024 matrices were subsequently adjusted based on observed turn movement count data provided by UBC.

The following steps were implemented to derive base year demand matrices:

1. The RTM model was cordoned off for the study area.
2. Matrices for 2022 and 2035 were extracted for both light and heavy vehicle classes.
3. The 2024 matrices were interpolated based on the 2022 and 2035 matrices.
4. Due to the difference in spatial aggregation between the RTM and the zonal definitions used in VISSIM, these matrices were disaggregated proportionally into smaller VISSIM zones.
5. These matrices served as prior demand matrices for the base year VISSIM model calibration.
6. These prior matrices were adjusted by comparing the modeled turn counts with the observed turn counts during model calibration.

Since the TransLink RTM version 3.6 lacks weekend demand matrices, weekend demands were assumed to be the average of the calibrated weekday AM and PM peak hour demand.

## 3.3 Driving Behaviour

Driving behaviour was coded to reflect the motor vehicle act, local traffic laws, rules, and behavioural tendencies. Unless otherwise noted, drivers were assumed to behave according to local regulations. A summary of key driving behaviours is given in Table 3.2.

**Table 3.2: Coded driving behaviours**

| Behaviour | Coding | Source |
|---|---|---|
| Desired speeds | Coded to reflect posted speed limits along each link.<br>Where no posted speed limits were observed (e.g., on local streets), a desired speed of 30 km/hr has been modelled in line with UBC rules. | UBC Traffic Parking Rules (dated September 2019), clause 12(a)(i) |
| Yielding to Busses | When a bus departs a bus stop, vehicles on the lane adjacent to the bus stop will yield to the departing bus. | Motor Vehicle Act, clause 169.1 (1)(b) |

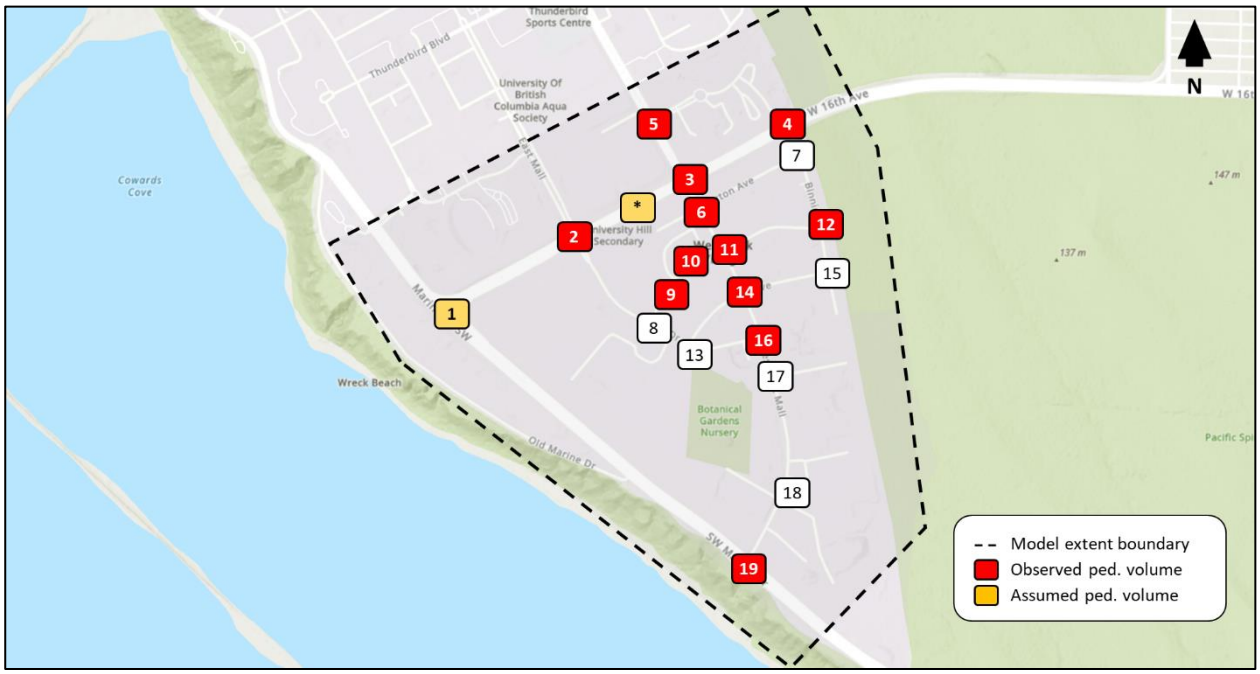
## 3.4 Pedestrian Demand

Pedestrian movement was modelled to capture delays experienced by drivers as they yield to pedestrians in a crosswalk. Figure 3.1 highlights the crosswalks for which pedestrian demand was modelled.

As highlighted in the figure, pedestrian demands were available for 12 out of 19 intersections. For two locations, pedestrian demands were assumed:

1. Pedestrian movement was modelled for the crosswalk on the eastern arm of Southwest Marine Drive and West 16th Avenue given the availability of signal timings. Here, pedestrian demands were assumed to be equal to that of the western arm crosswalk at East Mall and West 16th Avenue.
2. Pedestrian movement at the mid-block crosswalk on West 16th Avenue between Wesbrook Mall and East Mall was modelled following observations of frequent delay here during a site visit. Pedestrian demand was assumed to equal the eastern arm crosswalk at Wesbrook Mall and West 16th Avenue.

**Figure 3.1: Modelled pedestrian movements**



## 3.5 Transit Operations

Transit vehicles were included in the model to capture the effect of bus dwelling and merging behaviour on traffic operations. Information on present-year transit operations were derived from TransLink's Transit Service Performance Review (TSPR) 2023 and TransLink's online Bus Schedules webpage.

As shown in Table 3.3 and Figure 3.2, five bus services operate within the study area in the present year (2024).

**Table 3.3: Summary of bus services operating within the study area in the present year**

| Line | Line Name | Predominant Rolling Stock | Direction | Frequency during peak hour (buses per peak hour) | | |
|---|---|---|---|---|---|---|
| | | | | AM | PM | Weekend |
| 025 | Brentwood Station / UBC | Std. Bus | UBC | 11 | 7 | 4 |
| | | | Brentwood Station | 8 | 8 | 4 |
| 033 | 29 Ave Station / UBC | Std. Bus | UBC | 5 | 4 | 2 |
| | | | 29th Ave Station | 5 | 4 | 3 |
| 049 | Metrotown Station / Dunbar Loop / UBC | Artic. Bus | UBC | 12 | 14 | 5 |
| | | | Metrotown | 12 | 12 | 5 |
| 068 | UBC Exchange / Wesbrook Village | Mini-Bus | - | 3 | 3 | 3 |
| R4 | 41st Ave | Artic. Bus | UBC | 17 | 17 | 7 |
| | | | 41st Ave | 11 | 17 | 7 |

**Figure 3.2: Bus services which operate within the study area**

**Figure 3.3: Bus stops within the study area**


### 3.5.1 Dwell Times

As shown in Figure 3.4, bus dwell times were derived using the methodology outlined in the Transit Capacity and Quality of Service Manual (TCQSM). Peak hour boarding and alighting were derived using data from the TransLink Regional Travel Model (RTM) and TransLink Transit Service Performance Review (TSPR). All bus services were assumed to allow front-door boarding except for the R4 bus line. The R4 bus line serviced by articulated rolling stock was assumed to allow all-door boarding. Resulting dwell times are shown in Table 3.4.

**Figure 3.4: Methodology for estimating dwell times**

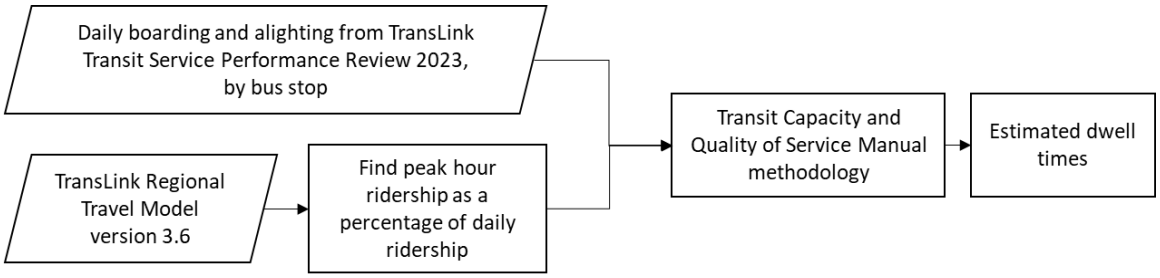


**Table 3.4: Modelled bus dwell time**

| Fig. ID | Stop ID | Stop Name | Bus Line | Dwell Time Range during Peak (s) | | |
|---|---|---|---|---|---|---|
| | | | | AM | PM | Weekend |
| A | 51600 | NB Wesbrook Mall @ 2900 Block | 25 | 10-15 | 10-15 | 10-15 |
| A | 51600 | NB Wesbrook Mall @ 2900 Block | 33 | 10-15 | 10-15 | 10-15 |
| A | 51600 | NB Wesbrook Mall @ 2900 Block | 49 | 10-15 | 10-15 | 10-15 |
| B | 51483 | SB Wesbrook Mall @ Hampton Pl | 25 | 10-15 | 10-15 | 10-15 |
| B | 51483 | SB Wesbrook Mall @ Hampton Pl | 33 | 10-15 | 10-15 | 10-15 |
| B | 51483 | SB Wesbrook Mall @ Hampton Pl | 49 | 10-15 | 10-15 | 10-15 |
| C | 61043 | WB W 16 Ave @ NS Wesbrook Mall | 25 | 10-15 | 10-15 | 10-15 |
| C | 61043 | WB W 16 Ave @ NS Wesbrook Mall | 33 | 10-15 | 10-15 | 10-15 |
| D | 51484 | EB W 16 Ave @ FS Wesbrook Mall | 25 | 20-25 | 25-30 | 40-45 |
| D | 51484 | EB W 16 Ave @ FS Wesbrook Mall | 33 | 15-20 | 20-25 | 20-25 |
| E | 61044 | NB Wesbrook Mall @ NS W 16 Ave | 68 | 30-35 | 45-50 | 40-45 |
| F | 61042 | EB W 16 AVE @ NS Wesbrook Mall | R4 | 20-25 | 10-15 | 20-25 |
| G | 51882 | WB W 16 Ave @ FS Wesbrook Mall | R4 | 10-15 | 15-20 | 20-25 |
| H | 61580 | NB Wesbrook Mall @ FS Birney Ave | 49 | 60-65 | 35-40 | 75-80 |
| I | 61579 | SB Wesbrook Mall @ Birney Ave | 49 | 20-25 | 30-35 | 35-40 |
| I | 61579 | SB Wesbrook Mall @ Birney Ave | 68 | 20-25 | 30-35 | 35-40 |
| J | 61893 | WB Ross Dr @ Birney Ave | 68 | 10-15 | 10-15 | 10-15 |
| K | 61894 | EB Ross Dr @ Birney Ave | 68 | 15-20 | 20-25 | 15-20 |
| L | 61581 | SB Wesbrook Mall @ Triumf Centre | 49 | 10-15 | 10-15 | 10-15 |
| M | 51881 | NB Wesbrook Mall @ Triumf Centre | 49 | 10-15 | 10-15 | 10-15 |

# 4 Base Model Development

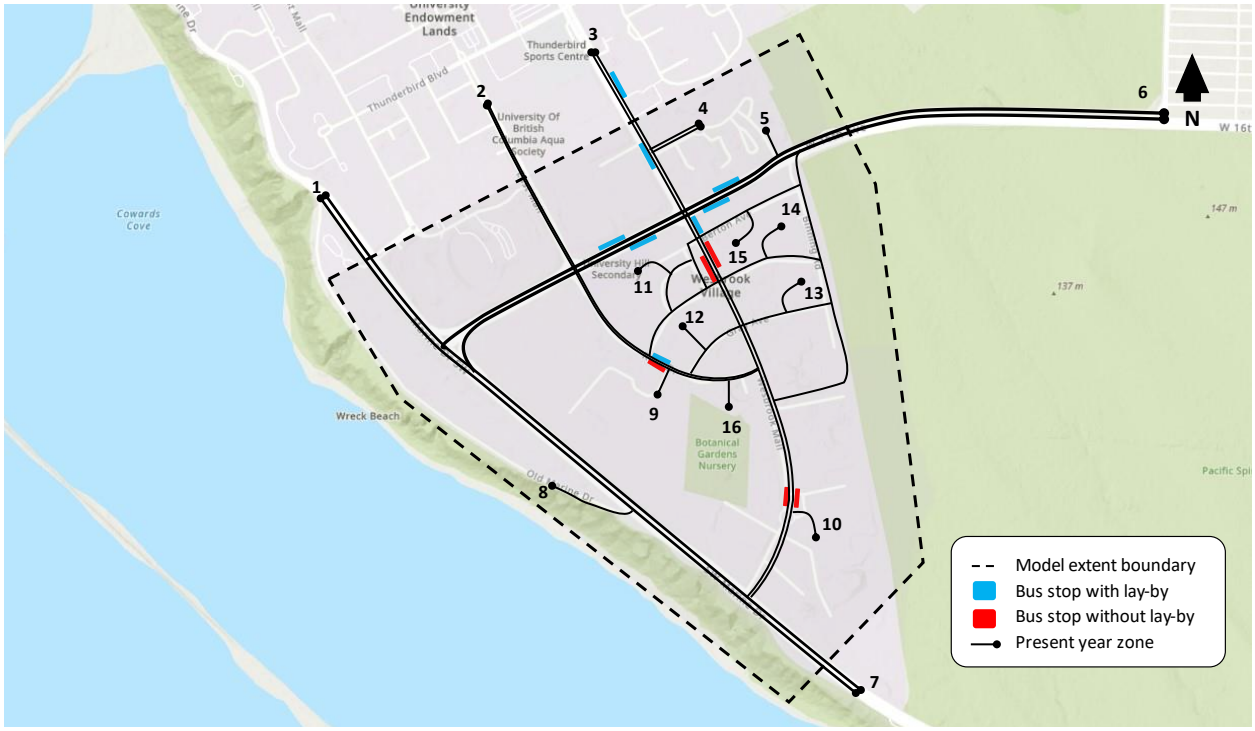
## 4.1 Software Package

Microsimulation modelling was conducted using PTV VISSIM 2023, service pack 14.

## 4.2 VISSIM Zone Configuration

The VISSIM zone structure for the Wesbrook Place neighbourhood and surrounding areas was coded as shown in Figure 4.1. This zone structure will be modified to account for the future growth planned in Wesbrook south, which is discussed in Section 5.

**Figure 4.1: Base model VISSIM zone configuration**




## 4.3 Dynamic Traffic Assignment

Vehicle routing was determined dynamically within VISSIM to better reflect real-world behaviour and allow drivers to react to changes in traffic conditions. Importantly, this allows the model to reflect changes in driver routing in response to changes in demand and road infrastructure.

Dynamic assignment is an iterative process where vehicles aim to optimize their travel time in each run based on the travel time and cost values from the previous run. This process continues until the convergence criteria are met, which require that 85% of travel times on the paths are within 15% of the previous run for three consecutive simulation runs. The concept of dynamic assignment is based on user equilibrium, where drivers choose routes considering general costs, which depends on travel time, travel distance, financial cost such as tolls, and surcharge reflecting inconvenience. This leads to a more balanced and efficient use of the network.

To ensure accurate route choice, surcharges are assigned to turns and local routes as the model cannot fully understand the driver's perceived inconvenience when navigating local roads, which may be caused by factors like on-street parking, narrow roads, and increased pedestrian activity.

# 5 Base Model Calibration

## 5.1 Calibration Methodology

The model was calibrated using the methodology shown in Figure 5.1. The GEH statistic (formula below) is used in traffic engineering to compare modelled traffic volumes with observed traffic volumes.

Acceptable calibration thresholds are presented in Table 5.1.

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}, \text{ where: } \begin{matrix} M \text{ is modelled flows } (vph) \\ C \text{ is observed flows } (vph) \end{matrix}$$

**Figure 5.1: Model calibration methodology**

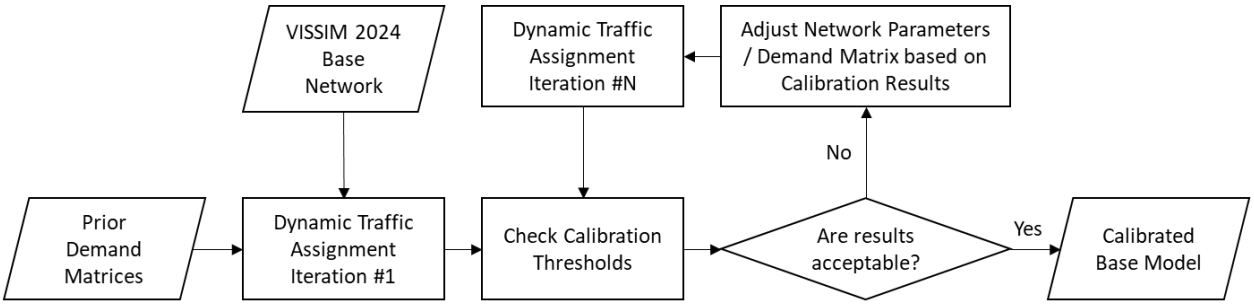



**Table 5.1: Calibration thresholds**

| Measures/Check | Target |
|---|---|
| Turn Volume: | |
| Percentage of Turns with GEH <=5 | 85% |
| Percentage of Turns with GEH <=10 | 100% |
| Travel Time: | |
| Percentage of key routes within 15% Model/Observed or within 60 seconds | 100% |

## 5.2 Survey Data

### 5.2.1 Travel Time

For calibration purposes, travel times were observed for four different routes during the weekday AM and PM peaks through a site visit. Weekend peak travel times were estimated using Google Maps. It should be noted that a notable amount of construction activity impeded travel along Wesbrook Mall during the weekday AM peak, but not during the PM peak observation period.

**Table 5.2: Observed travel times along key routes**

| Travel Route | AM Peak (sec) | PM Peak (sec) | Weekend Peak (sec) |
|---|---|---|---|
| Wesbrook Mall NB | 227.00 | 233.00 | 240.00 |
| Wesbrook Mall SB | 255.00 | 242.00 | 240.00 |
| West 16th Avenue EB | 148.00 | 134.00 | 180.00 |
| West 16th Avenue WB | 166.00 | 162.00 | 180.00 |

**Figure 5.2: Routes used for travel time measurement and calibration**

### 5.2.2 Turn Movement Counts

For calibration purposes, Mott MacDonald used the most recent turn movement counts provided by the University of British Columbia (UBC) and data collected by Premiere Traffic Data Services. As shown in Figure 5.3, observed turn movement counts were available for 12 out of 19 intersections in the study area.

**Figure 5.3: Summary of observed turn movement counts for intersections in the study area**


As shown in Table 5.3, eight out of the 12 datasets were collected in 2024. To obtain turn counts for each intersection that are representative of the 2024 demand year, turn movement counts were balanced through spreadsheet analysis. Turn movement counts were adjusted for intersections for which no observed turn counts exist or for which turn counts were observed before 2024.

In the absence of observed data for weekends, modeled weekend turn counts were compared against 0.9 times the observed weekday PM peak turn volumes. This multiplication factor of 0.9 was based on historical weekly counts provided by UBC.

**Table 5.3: Summary of available turning movement count data**

| No | Intersection Name | Date |
|---|---|---|
| 1 | SW Marine Dr & W 16 Ave | *No Data* |
| 2 | East Mall and W 16 Ave | Wednesday, October 30, 2019 |
| 3 | Wesbrook Mall and W 16 Ave | Thursday, October 26, 2023 |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | Thursday, April 27, 2023 |
| **5** | **Wesbrook Mall and Hampton Pl** | **Wednesday, March 13, 2024** |
| **6** | **Wesbrook Mall and Berton Ave** | **Wednesday, March 13, 2024** |
| 7 | Berton Ave and Binning Rd | *No Data* |
| 8 | Birney Ave and Ross Dr | *No Data* |
| **9** | **Birney Ave and Webber Lane** | **Wednesday, March 13, 2024** |
| **10** | **Birney Ave and Shrum Lane** | **Wednesday, March 13, 2024** |
| **11** | **Wesbrook Mall and Birney Ave** | **Wednesday, March 13, 2024** |
| **12** | **Binning Rd and Birney Ave** | **Wednesday, March 13, 2024** |
| 13 | Gray Ave and Ross Dr | *No Data* |
| **14** | **Wesbrook Mall and Gray Ave** | **Wednesday, March 13, 2024** |
| 15 | Gray Ave and Binning Rd | *No Data* |
| 16 | Wesbrook Mall and Ross Drive | Tuesday, October 24, 2023 |
| 17 | Wesbrook Mall & Binning Rd | *No Data* |
| 18 | Wesbrook Mall | *No Data* |
| **19** | **Southwest Marine Dr and Wesbrook Mall** | **Wednesday, March 13, 2024** |

Note: Emboldened rows highlight intersections for which data was collected in 2024

## 5.3 Calibration Results

A summary of calibration results with respect to turn movement counts and travel time are shown in Table 5.4 and

Table 5.5. Full calibration results with respect to turn movement counts are provided in Appendix A. All three present year models satisfied the calibration thresholds that were presented in Table 5.1.

**Table 5.4: Calibration measures of final, calibrated present-year model**

| Measures/Check | Target | AM | PM | Weekend |
|---|---|---|---|---|
| Turn Volume: | | | | |
| Percentage of Turns with GEH <=5 | 85% | 95% | 93% | 84% |
| Percentage of Turns with GEH <=10 | 100% | 100% | 100% | 97% |
| Travel Time: | | | | |
| Percentage of key routes within 15% Model/Observed or within 60 seconds | 100% | 100% | 100% | 100% |

**Table 5.5: Comparison of observed and modelled travel time**

| Peak | Travel Route | Observed | Modelled | Difference | % Difference |
|---|---|---|---|---|---|
| AM | Wesbrook - NB | 227 | 216 | -11 | -5% |
| | Wesbrook - SB | 255 | 230 | -25 | -10% |
| | W 16 Ave - EB | 148 | 135 | -13 | -9% |
| | W 16 Ave - WB | 166 | 165 | -1 | 0% |
| PM | Wesbrook - NB | 233 | 236 | 3 | 1% |
| | Wesbrook - SB | 242 | 269 | 27 | 11% |
| | W 16 Ave - EB | 134 | 136 | 2 | 2% |
| | W 16 Ave - WB | 162 | 154 | -8 | -5% |
| Weekend | Wesbrook - NB | 240* | 278 | 38 | 16% |
| | Wesbrook - SB | 240* | 274 | 34 | 14% |
| | W 16 Ave - EB | 180* | 135 | -45 | -25% |
| | W 16 Ave - WB | 180* | 159 | -21 | -12% |

**: Observed data sourced from Google Maps and accurate to the nearest minute*

# 6 Future Year Model Development

Two future year cases were modelled as shown in Table 6.1. The *Do Nothing* scenario evaluated the resiliency of present-year infrastructure to growth in vehicle demand. The *With Improvements* scenario evaluated the impact of considered improvements in infrastructure and transit operations on future year traffic operations.

While this modelling exercise primarily focuses on vehicle and transit movements, these improvements will not only benefit drivers and public transit users but also lead to a better experience for cyclists and pedestrians. Better traffic flow reduces congestion and delays making the transportation network more user-friendly for everyone.

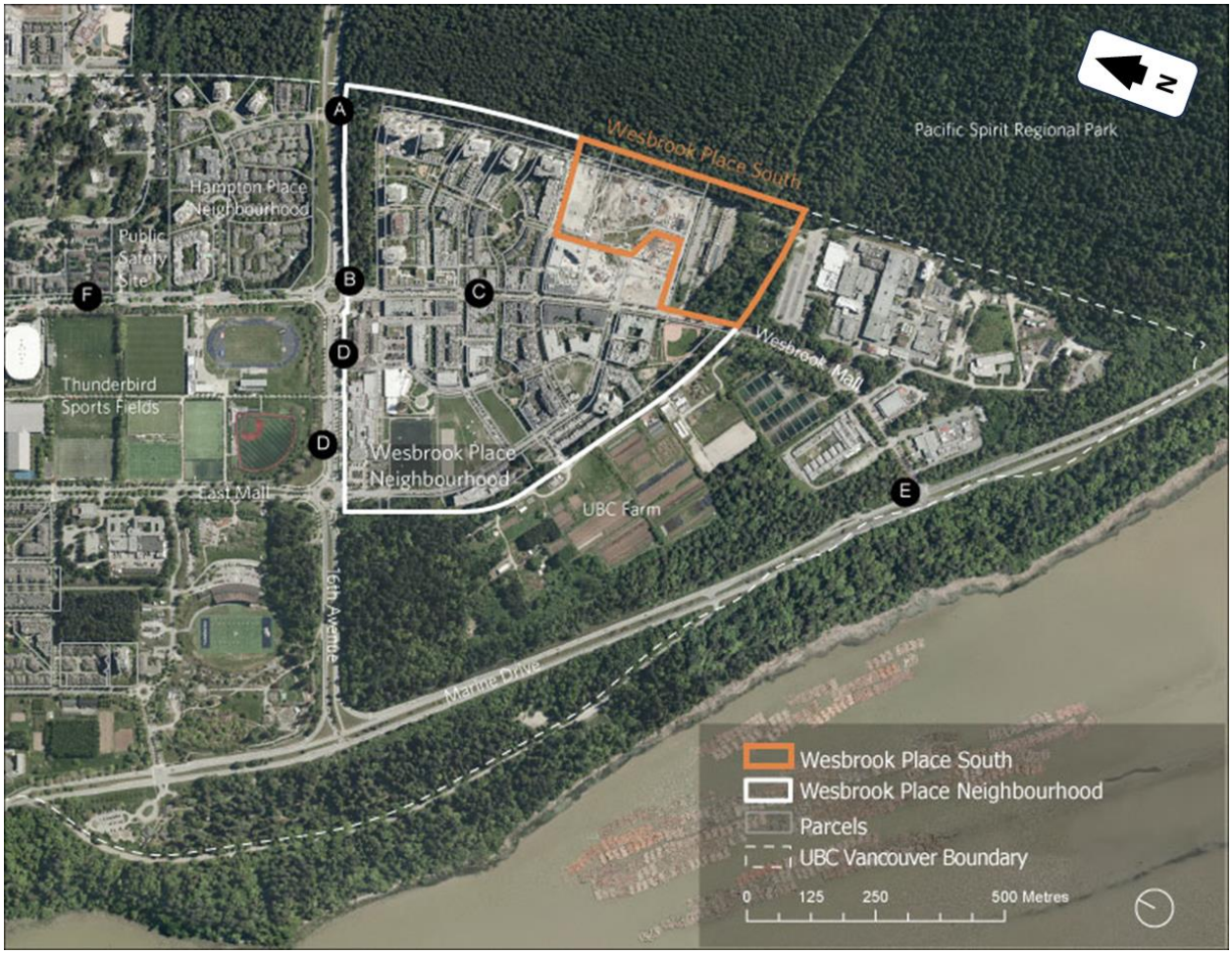
**Table 6.1: Changes in future year models with respect to present year model**

| No. | Scenario | Demand Year | Infrastructure | Vehicle Demand | Transit Operations |
|---|---|---|---|---|---|
| 1 | Present year base model | 2024 | — | — | — |
| 2a | Future year – Do Nothing | 2035 | — | ✓ | — |
| 2b | Future year – With Improvements | 2035 | ✓ | ✓ | ✓ |

## 6.1 Infrastructure

Six key road infrastructural improvements were considered in the future year *With Improvements* scenario, which are detailed in the following sections.

**Figure 6.1: Considered road infrastructure improvements**




Source: UBC Campus + Community Planning.

**Table 6.2: Considered Road Infrastructural Improvements**

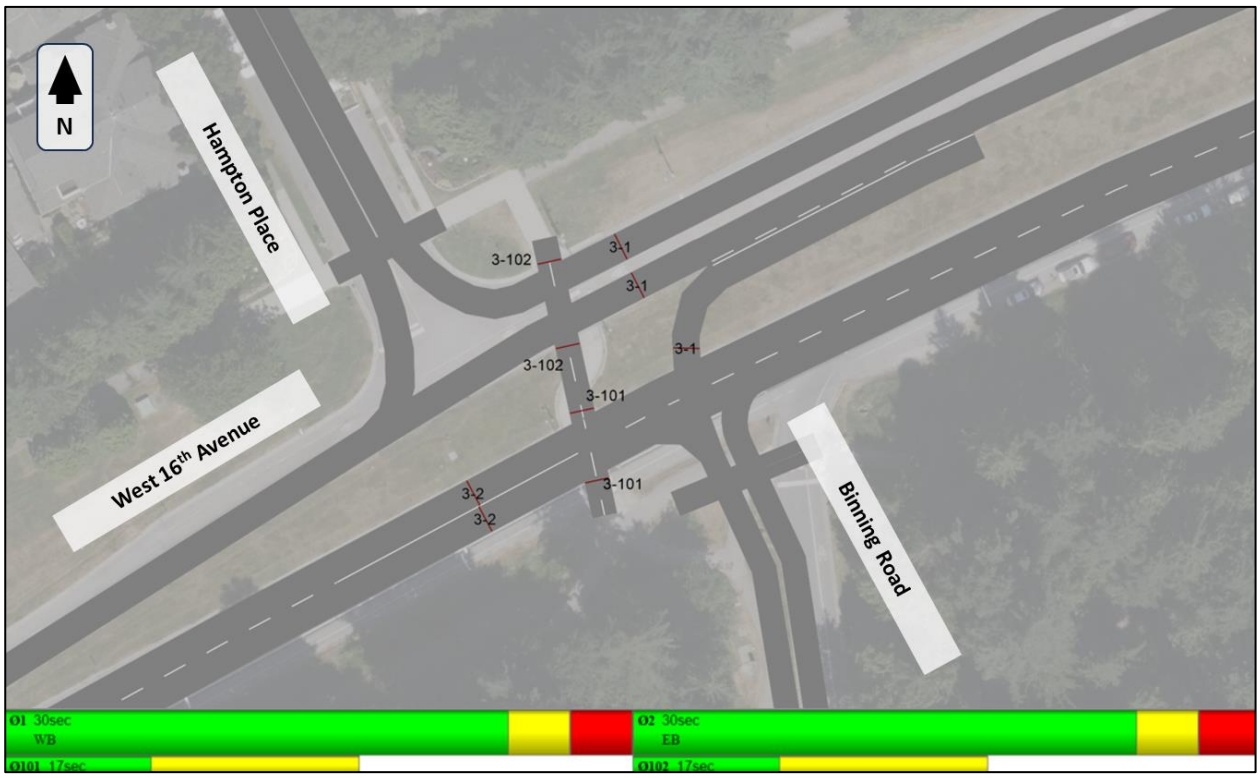
| No. | Location | Type | Description |
|---|---|---|---|
| A | Binning and West 16 Avenue | Traffic control | Implementation of pedestrian-controlled, 4-way signalized intersection. |
| B | Wesbrook Mall and West 16th Avenue | Lane addition | Widened northbound Wesbrook Mall at West 16th Avenue to provide a dedicated lane for right turns onto 16th. |
| C | Wesbrook Mall bus prioritization | Lane reconfiguration | Provided additional bus-only lane along Wesbrook Mall between Binning Rd and West 16 Avenue during AM, PM, and Weekend peak hours. |
| D | West 16 Avenue | Bus stop reconfiguration | Converted bus stops along West 16th Avenue between the two roundabouts to in-lane stops. |
| E | Wesbrook Mall and Southwest Marine Drive | Lane addition | Provided additional lane to allow buses to jump the queue travelling southbound on Wesbrook Mall to turn left onto Marine Drive. |
| F | Wesbrook Mall between Thunderbird Boulevard and West 16 Avenue | Lane reconfiguration | Upgraded street to include additional bus only lane north of West 16th Avenue in the northbound travel direction. |

### 6.1.1 Improvement A: Implementation of Pedestrian-Controlled, 4-Way Signalized Intersection at Binning Road and West 16th Avenue

As shown in Figure 6.2, a pedestrian-controlled, 4-way signal was implemented at Binning Road and West 16th Avenue, with an additional lane added along Binning Road to allow westbound left (WBL) and eastbound right (EBR) turns at the intersection. Pedestrian crossing facilitated through split phasing.

The signal was coded to operate on a fixed two-phase timing with a 60-second cycle. The pedestrian phase split is 17 seconds - 7 seconds for walking and 10 seconds for the flashing 'do not walk' signal. When westbound traffic is running, the southern crosswalk is green. Similarly, when eastbound traffic is running, the northern crosswalk is green.

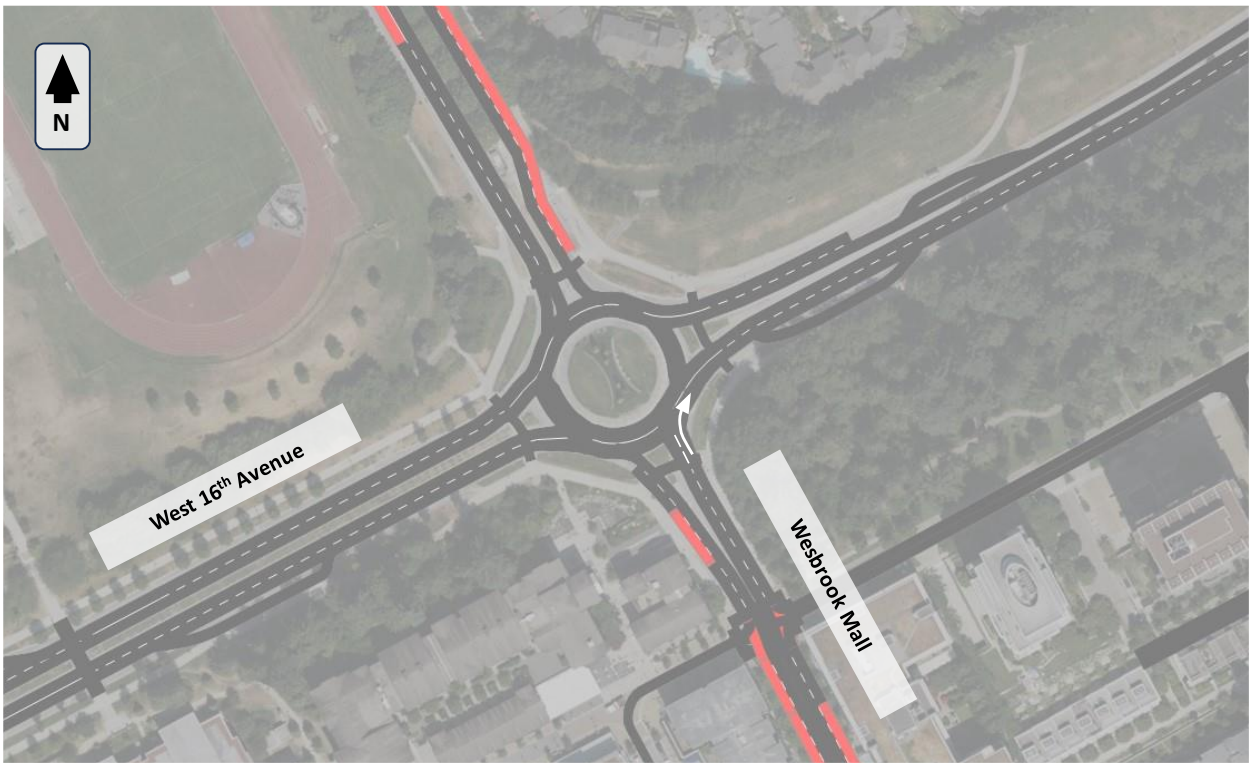
**Figure 6.2: Coding of pedestrian-controlled 4-way signalized intersection at Binning Road and West 16th Avenue**



### 6.1.2 Improvement B: Widening of northbound Wesbrook Mall at West 16th Avenue to Provide Dedicated Right-Turn Lane

As shown in Figure 6.3, the northbound approach of the intersection Wesbrook Mall at West 16th Avenue was widened to provide a dedicated lane for right turns from Wesbrook Mall onto West 16th Avenue. Lanes marked in pink in Figure 6.3 represent future potential bus-only lanes, which are discussed further in section 5.1.3.

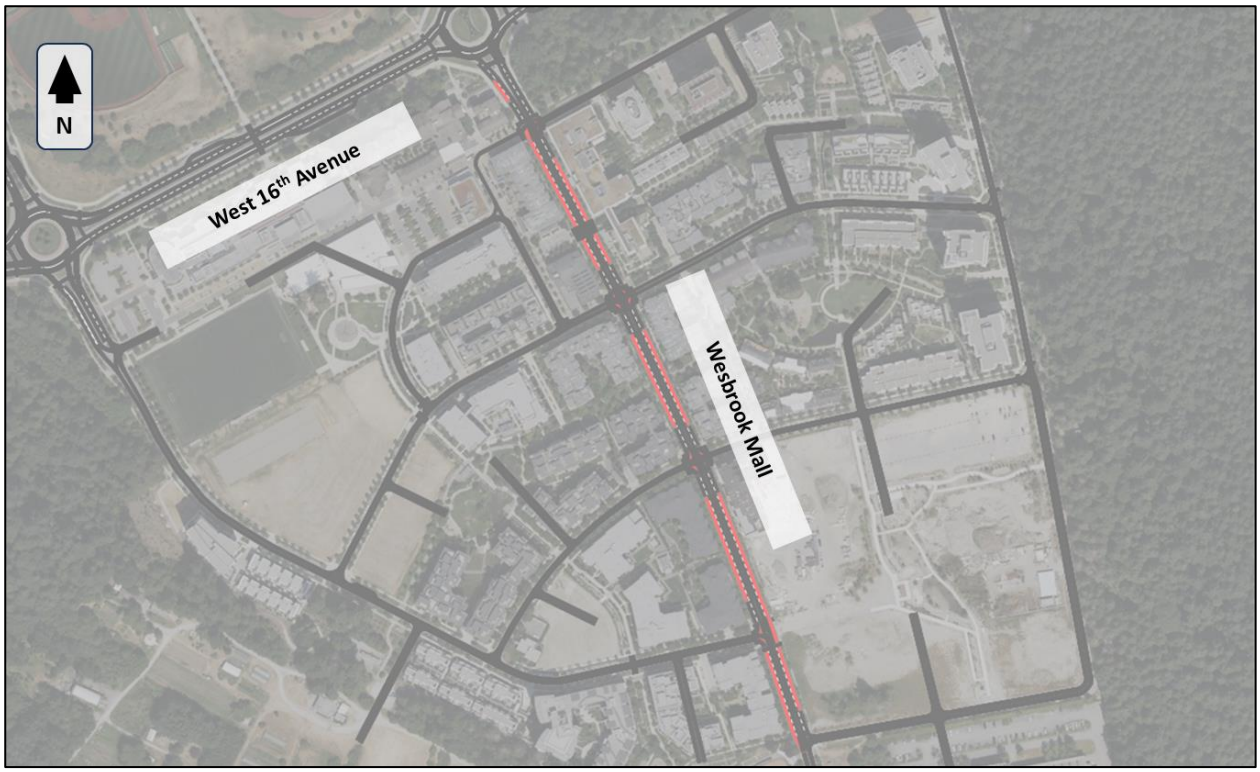
**Figure 6.3: Coding of widened northbound Wesbrook Mall at West 16th Avenue**



### 6.1.3 Improvement C: Wesbrook Mall Bus Prioritization

As shown in Figure 6.4, in pink, curbside bus-only lanes were added along both directions of Wesbrook Mall between Binning Road and West 16th Avenue to enable efficient transit operations through the neighbourhood. It was assumed that these bus-only lanes could be used by right-turning vehicles at the approach and departure arms of an intersection.

**Figure 6.4: Coding of curbside bus-only lanes along both directions of Wesbrook Mall between Binning Road and West 16th Avenue**



### 6.1.4 Improvement D: Bus Stop Reconfiguration at West 16th Avenue

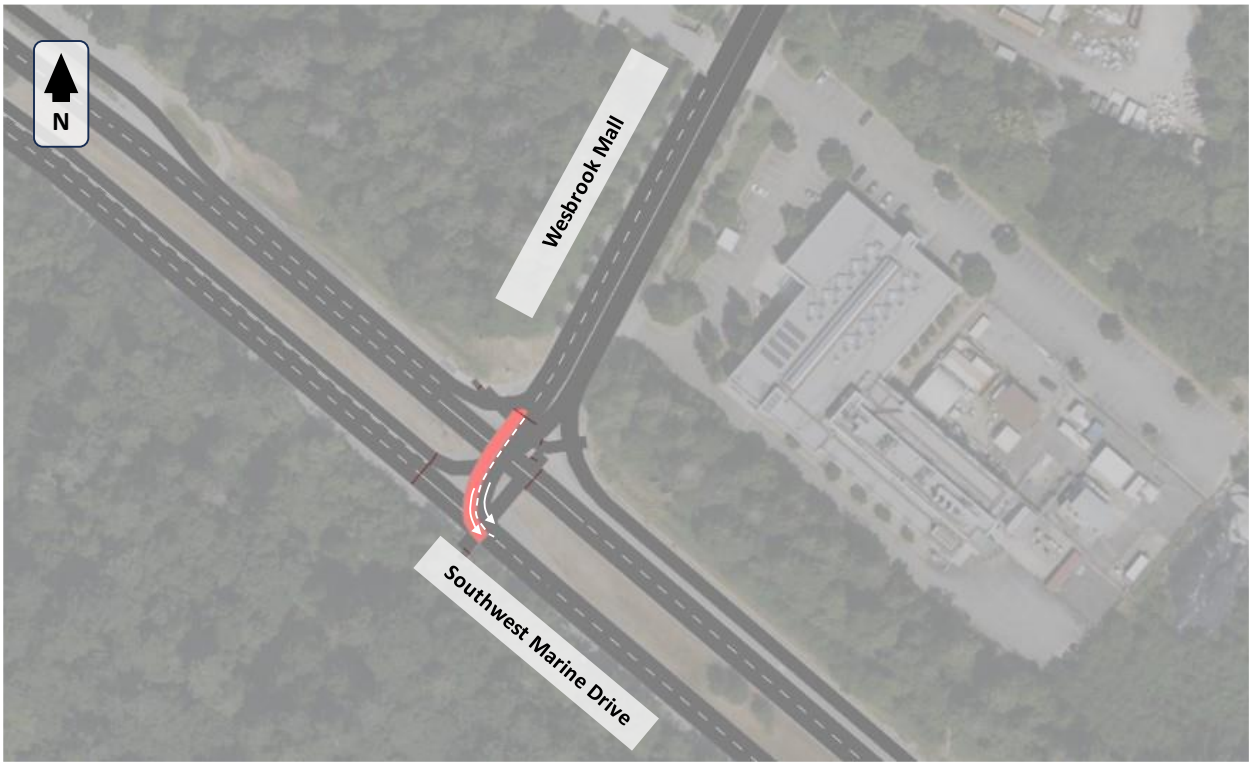
As shown in Figure 6.5, two bus stops along West 16th Avenue (with stop ID 51882 and 61042), between East Mall and Wesbrook Mall, were converted from lay-by stops to in-lane stops consistent with TransLink preferences for RapidBus stops.

**Figure 6.5: Coding of in-lane bus stops along West 16th Avenue between East Mall and Wesbrook Mall**

### 6.1.5 Improvement E: Bus Queue Jump at Wesbrook Mall and Southwest Marine Drive

As shown in Figure 6.6, an additional lane was added at the intersection of Wesbrook Mall and Southwest Marine Drive, allowing right-turning vehicles as well as left-turning buses to exit the intersection without waiting behind left-turning vehicles. This improvement was expected to reduce delays for buses traveling southbound on Wesbrook Mall and turning left onto Marine Drive.

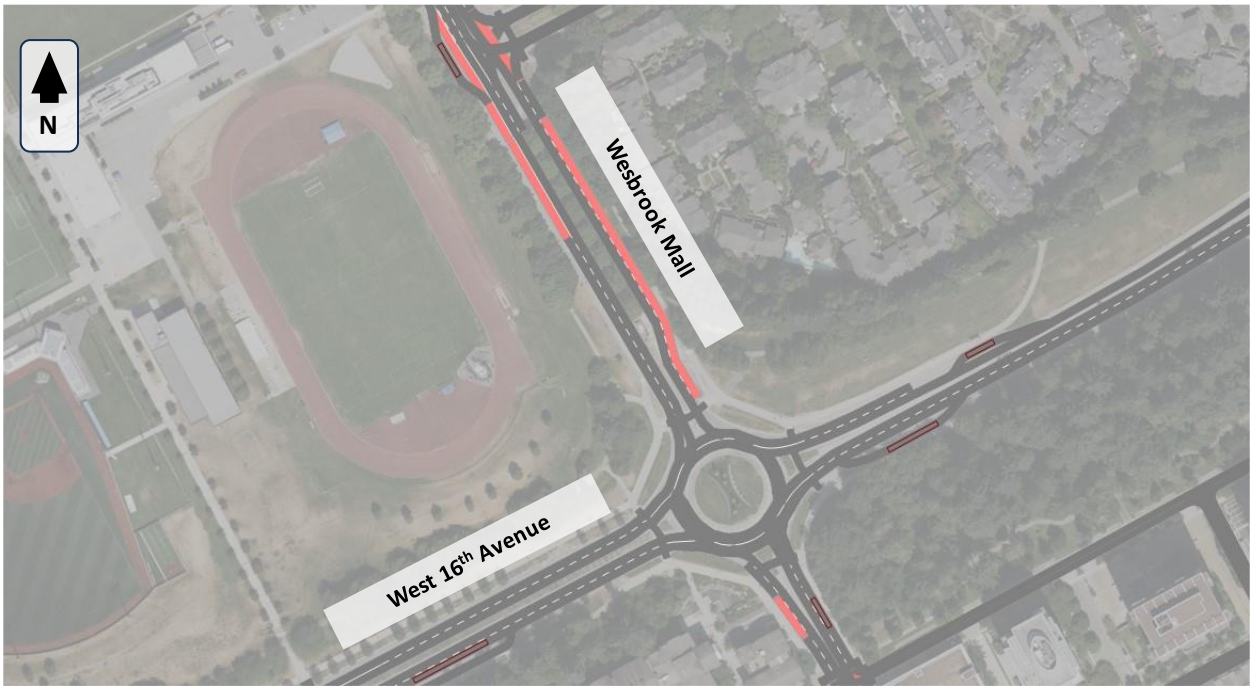
**Figure 6.6: Coding of additional lane along southbound Wesbrook Mall at Marine Drive**



### 6.1.6 Improvement F: Bus Priority at Wesbrook Mall between Thunderbird Boulevard and West 16th Avenue

As shown in Figure 6.7, Wesbrook Mall was upgraded to include an additional bus-only lane north of West 16th Avenue in the northbound direction, which is planned for Phase 4 of the Wesbrook Mall Redesign project[1]. This improvement does not result in any changes to operation of the roundabout.

**Figure 6.7: Coding of bus-only lane on Wesbrook Mall between Thunderbird Boulevard and West 16th Avenue**




[1] The Wesbrook Mall Redesign project has been ongoing since 2019 and is focused on improving the experience for people taking transit, walking, biking or rolling along the corridor. Phase 4 is the last phase of the project between 16th Avenue and Thunderbird Boulevard and is planned to be constructed summer of 2027.

## 6.2 Vehicle Demand

### 6.2.1 Future Year Traffic Demand Forecast

The 2035 traffic demand matrices[2] were estimated based on the 2024 calibrated traffic demand matrices. To estimate 2035 demand, yearly growth was calculated based on the 2022 and 2035 matrices extracted from RTM v.3.6 and this annual growth was applied to the 2024 calibrated matrices. This approach is considered more appropriate then directly using the 2035 RTM matrices as TransLink only calibrates the traffic demand in RTM at a regional level and not at a local neighbourhood level.

The RTM v.3.6 includes TransLink's 10-Year Priority investments, which includes the delivery of the Millennium Line UBC Extension with one SkyTrain station at the Trolley Loop. The 10-Year Priorities model also includes other regional investments anticipated by TransLink's Transport 2050: 10-Year Priorities Plan ("Access for Everyone"), which are also likely to impact traffic growth at UBC, given its identity as a regional destination. These regional transit investments are projected to significantly absorb the increased travel demand as a result of academic growth at UBC.

### 6.2.2 Trip Generation due to Future Developments

While academic growth is not anticipated to increase traffic volumes in Wesbrook Place, the future developments in Wesbrook Place are. More traffic will be using neighbourhood streets and existing travel patterns will change. As a result, future developments in Wesbrook Place are incorporated into the future year model scenarios.

Information on planned future developments in the Wesbrook Place neighbourhood was based on Campus Vision 2050 building uses and population, and provided by the University of British Columbia (UBC) through a file transfer on August 2, 2024. This initial Campus Vision 2050 data proposes that a total of 16 residential buildings will be constructed by the 2035 future year, all of which will be located south of Birney Avenue as shown in Figure 6.8. Note that clusters of buildings have been aggregated into zones for use in VISSIM, resulting in the new future year zone configuration shown in Figure 6.9.

The total number of expected trips generated and attracted by these future Campus Vision 2050 developments were estimated using the ITE Trip Generation Manual, 11th Edition, through the ITE Trip Generation Web-Based App. Based on the assumed land-use category, the Trip Generation Manual does not provide rates for weekend peak hour times. Therefore, weekend peak hour trip generations and attractions have been estimated as the average of weekday AM and PM peak hour values. The total number of trip generations and attractions, by zone, is summarized in Table 6.3.

It was assumed that trip generation from future year VISSIM zones would be distributed throughout the network according to the trip patterns of nearby existing residential zones.

[2] A matrix contains data on the number of trips made between various origin and destination zones.

**Figure 6.8: Summary of Campus Vision 2050 future developments, assumed to be constructed by 2035, categorized by zone**

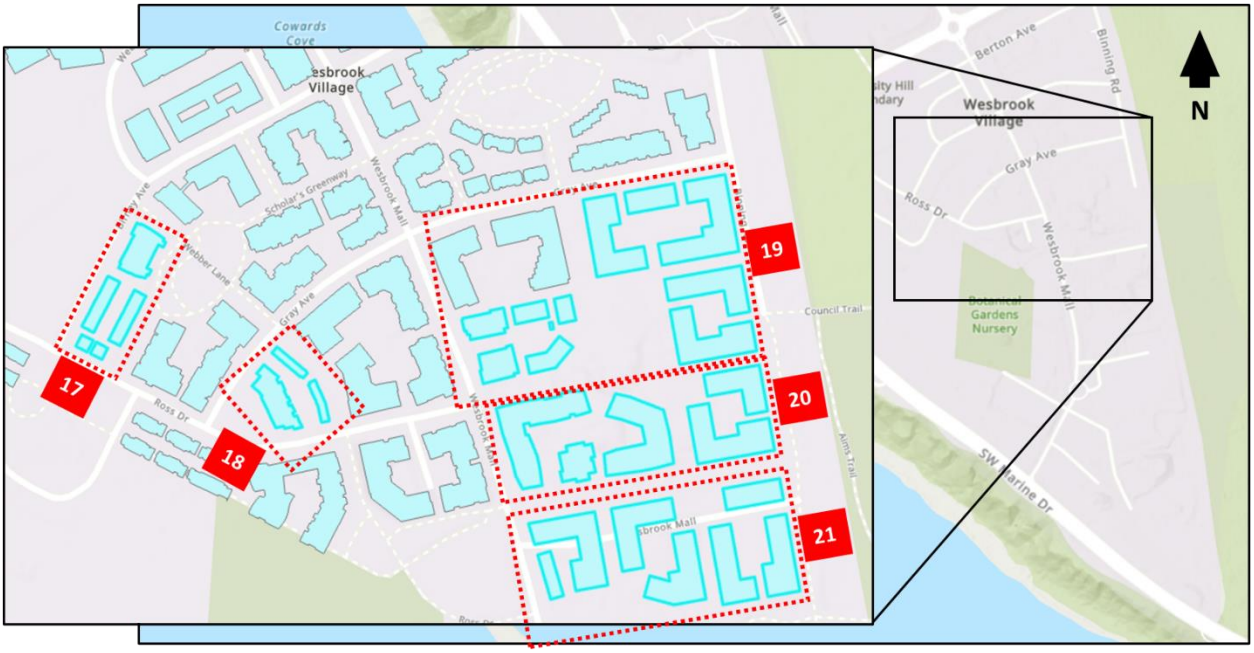



**Figure 6.9: Future year VISSIM zone configuration**

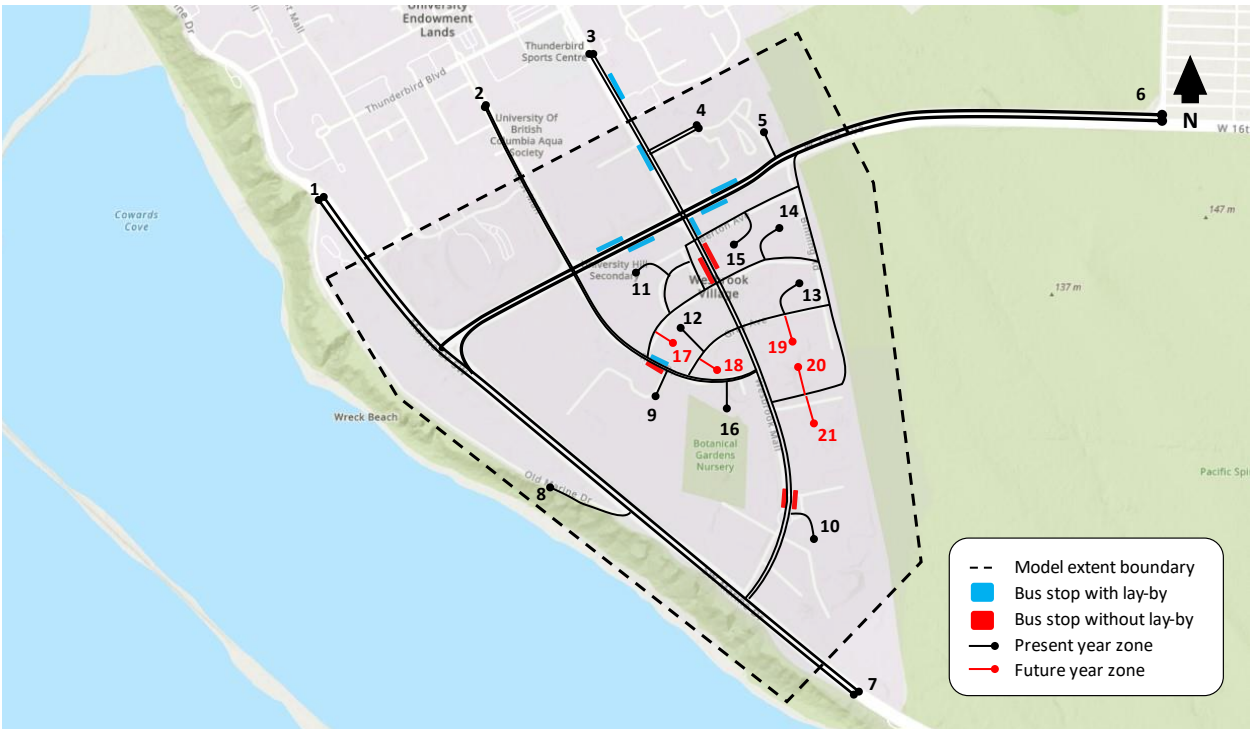


**Table 6.3: Estimated trip generations and attractions, by zone**

| | AM Peak | | | PM Peak | | | Weekend Peak | | |
|---|---|---|---|---|---|---|---|---|---|
| Zone | Trip Ends | Entries | Exits | Trip Ends | Entries | Exits | Trip Ends | Entries | Exits |
| 17 | 66 | 15 | 52 | 50 | 38 | 12 | 60 | 27 | 33 |
| 18 | 64 | 14 | 50 | 47 | 36 | 12 | 57 | 25 | 32 |
| 19 | 289 | 69 | 223 | 206 | 151 | 55 | 252 | 111 | 141 |
| 20 | 236 | 50 | 186 | 186 | 136 | 50 | 214 | 94 | 120 |
| 21 | 245 | 62 | 185 | 183 | 134 | 49 | 217 | 99 | 118 |

## 6.3 Pedestrian Demand

When forecasting the pedestrian demand for the future year scenario, we referenced two documents to arrive at a reasonable and conservative growth rate. First, the UBC Campus Vision 2050 document dated December 2023 states that the daytime population is projected to grow from 80,000 people in 2023 to 100,000 in 2050. Assuming a linear growth, there will be a 10% increase in pedestrian demand from 2024 to 2035.

We also referenced the UBC Campus Vision Phase 1-3 Summary Report dated September 2023 where we used the growth in total daily person trips as a proxy for pedestrian growth. This is to capture any potential pedestrian demand generated by trips to the campus (e.g. people taking transit to the campus and walking to the destination). In 2017, the total person trips were 131,900 which is estimated to grow to 212,000 in 2050. This represents an 18% growth from 2024 to 2035.

As a conservative measure, we used a 20% growth rate which was applied to the 2024 pedestrian demand to arrive at the 2035 pedestrian demand in VISSIM.

## 6.4 Transit Operations

As shown in Table 6.4 and Figure 6.10, five improvements in transit operations have been included in the future year *With Improvements* case following the Transit Network Concept 2035 (Underground UBCX Scenario) map prepared by Campus + Community Planning in January 2024.

**Table 6.4: Improvements in transit operations in future year scenario**

| No. | Improvement | Description |
|---|---|---|
| 1 | Revised route for bus line 68 | Route for bus line 68 has been revised such that it does not travel south of West 16th Avenue.<br>● Busses are assumed to stop at all stops along its route.<br>● Assumed to dwell for 15 to 20 seconds at each bus stop. |
| 2 | Addition of new North-South (NS) shuttle service | New shuttle service with 15-minute headways.<br>● Shuttles are assumed to stop at all stops along its route.<br>● Assumed to dwell for 15 to 20 seconds at each bus stop. |
| 3 | New bus stops along Wesbrook Mall | Two new bus stops along Wesbrook Mall between Ross Drive and Binning Road.<br>● Assumed to service the North-South (NS) shuttle and the 49 bus route<br>● Assumed to be a bus stop without a lay-by. |
| 4 | New bus stops along East Mall | Two new bus stops along East Mall north of West 16th Avenue.<br>● Assumed to service the North-South (NS) shuttle service and the 68 bus line.<br>● Bus stop along southbound East Mall is assumed to be without a lay-by while the stop along northbound East Mall is assumed to have a lay-by. |
| 5 | Reconfiguration of bus stops on West 16th Avenue | The two bus stops on West 16th Avenue between East Mall and Wesbrook Mall have been reconfigured to be on-street bus stops. |

**Figure 6.10: Future year bus services operating within the study area**


Source: Adapted from the Transit Network Concept 2035 (Underground UBCX Scenario) map prepared by Campus + Community Planning in January 2024.

# 7 Evaluation Metrics

The traffic impacts for *Existing*, *Do Nothing* and *With Improvements* scenarios were evaluated using three metrics as described in the following sections.

## 7.1 Delay and Level of Service (LOS)

Level of Service (LOS) is the primary indicator used for traffic operation purposes, and quantifies how people experience traffic based on delays experienced by drivers. LOS ranges from levels A to F, where levels A, B, C and D are considered acceptable. LOS has been extracted directly from VISSIM. As shown in Table 7.1, the software estimates LOS as a function of intersection delay, stratified by the type of traffic control. As stated in the Manual for PTV Vissim 2023, these values are “comparable to the LOS defined in the American Highway Capacity Manual of 2010”.

**Table 7.1: Level of Service definitions from VISSIM**

| LOS | Signalized intersection | Non-signalized intersection |
|---|---|---|
| A | LOS_A Delay < 10 s or no volume, as no vehicle is moving, also due to traffic jam | |
| B | > 10 s to 20 s | > 10 s to 15 s |
| C | > 20 s to 35 s | > 15 s to 25 s |
| D | > 35 s to 55 s | > 25 s to 35 s |
| E | > 55 s to 80 s | > 35 s to 50 s |
| F | > 80 s | > 50 s |

## 7.2 Average and Maximum Queue Length

Average and maximum queue lengths complement LOS by providing a physical indicator of intersection performance. In VISSIM, queue lengths are measured as the distance between the stop line and the last vehicle in a queue. Queue lengths are calculated during each timestep of a simulation run. Averages and maxima are computed across the whole simulation runtime, including timestamps during which there are no vehicles in the queue (i.e., queue length equals zero). A vehicle is considered part of the queue if its speed drops below 5 km/h and remains in the queue until its speed exceeds 10 km/h.

## 7.3 Travel Time

Travel time provides a corridor-level indicator of network performance, including delays experienced at intersections or on a road segment. Therefore, travel time can capture the cumulative effect of intersection performances on driving experience.

In VISSIM, travel time is calculated as the average time taken by vehicles to travel from the start to the end point of a travel time section. If no vehicles travel between the start and end points, the travel time will be zero.

The calibration and modelling results discussed in this report are the averages of ten simulation runs for all peaks of each scenario, except for the PM peak of the ‘*Do Nothing’* scenario. For this scenario, the average of nine simulation runs was reported, as the 9th run was removed due to inaccurate results caused by a simulation error. Each simulation was run with a different random seed to replicate real-world randomness.

# 8 Modelling Results – AM Peak

Sections 8.1 and 8.2 present and discuss the modelling results for the AM peak for each scenario.

## 8.1 Intersection Performance

Table 8.1 presents intersection LOS while Table 8.2 presents movement LOS, queue lengths, and vehicle delays.

With respect to intersection performance, the key modelling results are:

- In the present year, all intersections operate at an acceptable LOS A or B.
- In a *Do Nothing* scenario, all except six intersections operate at a similar LOS compared to the present year.
  - The intersection of Wesbrook Mall and Birney Avenue degrades from LOS B to D. Movement LOS indicates that this degradation primarily reflects increased delay experienced by drivers along the minor road (Birney Avenue) caused by increased vehicle demand along the major road (Wesbrook Mall). However, these conditions improve to LOS A in the *With Improvements* scenario.
  - The intersections of Wesbrook Mall and West 16th Avenue, Wesbrook Mall and Berton Avenue, and Birney Avenue and Shrum Lane degrade from LOS A to C.
    - The degradation at Wesbrook Mall and West 16th Avenue may be due to overall growth in and demand, with particularly notable growth in the westbound and southbound directions causing longer queues and delays. It should be noted that LOS improves to LOS B in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
    - Similarly, the degradation at Wesbrook Mall and Berton Avenue, and Birney Avenue and Shrum Lane intersections is attributed to the overall growth in demand, resulting in longer delay and queues at intersections. It should be noted that LOS improves to LOS A in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
  - The intersections of West 16th Avenue and Binning Road, and Wesbrook Mall and Ross Drive degrade from LOS A to B.
    - The degradation at West 16th Avenue and Binning Road is attributed to the increased pedestrian volumes.
    - The degradation at Wesbrook Mall and Ross Drive is attributable to growth in demand along Wesbrook Mall. It should be noted that LOS improves to LOS A in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
- In a *With Improvements* scenario, all except two intersections operate at a similar or improved LOS compared to present year.
  - The intersection of West 16th Avenue and Binning Road degrades from LOS A to B, which reflects increased delay for east- and westbound movement along West 16th Avenue caused by the implementation of a fully signalized intersection (i.e., improvement A).
  - The degradation at Wesbrook Mall and West 16th Avenue to LOS B may be due to the increased pedestrian volumes.
  - Only eleven movements in the study area operate at LOS C in the *With Improvements* scenario: four are the left turns at signalised intersections; three are northbound through (NBT) and left (NBL), and westbound right (WBR) turns at Wesbrook Mall & West 16th Avenue roundabout, as a result of increased traffic and pedestrian volumes; one is westbound through (WBT) at West 16th Avenue and Binning Road, as a result of signalization; and three are movements from minor streets affected by increased northbound traffic along Wesbrook Mall.

- The impact of considered infrastructural improvements are summarised below.
  - Improvement A: The provision of a westbound left (WBL) turn through full signalization notably improves network-level performance as it provides an additional route option for drivers travelling to the Wesbrook Place neighbourhood.
  - Improvement B: The addition of a dedicated right turn lane along northbound Wesbrook Mall and West 16th Avenue has decreased delay.
  - Improvement C: The impact of implementing a bus-only lane along Wesbrook Mall can be seen through queue lengths where Wesbrook Mall intersects with Birney Avenue and Berton Avenue. Compared to results from the present year model, there are improvements to queue lengths (relative to changes in demand) along the northbound approach of Wesbrook Mall and Berton Avenue, (where queue lengths slightly decreased despite increased demand), and the southbound approach of Wesbrook Mall and Birney Avenue (where queue lengths halved with a 30% decrease in demand).
  - Improvement D: Adverse Impact of the in-lane bus stop along West 16th Ave in between East Mall & Wesbrook Mall in the With Improvements scenario is not visible.
  - Improvement E: The addition of an extra lane allowing buses to jump the queue on Wesbrook Mall before turning left to Southwest Marine Drive resulted in only 16% increase in bus delays, for a 100% increase in southbound traffic.

**Table 8.1: Intersection Level of Service (LOS) results in the AM peak**

| No | Intersection Name | Present Year | Do Nothing | With Improvements |
|---|---|---|---|---|
| 1 | SW Marine Dr & W 16 Ave | A | A | A |
| 2 | East Mall and W 16 Ave | A | A | A |
| 3 | Wesbrook Mall and W 16 Ave | A | C | B |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | A | B | B |
| 5 | Wesbrook Mall and Hampton Pl | A | A | A |
| 6 | Wesbrook Mall and Berton Ave | A | C | A |
| 7 | Berton Ave and Binning Rd | A | A | A |
| 8 | Birney Ave and Ross Dr | A | A | A |
| 9 | Birney Ave and Webber Lane | A | A | A |
| 10 | Birney Ave and Shrum Lane | A | C | A |
| 11 | Wesbrook Mall and Birney Ave | B | D | A |
| 12 | Binning Rd and Birney Ave | A | A | A |
| 13 | Gray Ave and Ross Dr | A | A | A |
| 14 | Wesbrook Mall and Gray Ave | A | A | A |
| 15 | Gray Ave and Binning Rd | A | A | A |
| 16 | Wesbrook Mall and Ross Drive | A | B | A |
| 17 | Wesbrook Mall & Binning Rd | A | A | A |
| 18 | Wesbrook Mall & TRIUMF access | A | A | A |
| 19 | Southwest Marine Dr and Wesbrook Mall | B | B | B |

**Table 8.2: Detailed intersection results in the AM peak**

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| 1 | SW Marine Dr & W 16 Ave | Signalized | NBT | 836 | 5 | 76 | 10 | B | 836 | 5 | 96 | 11 | B | 835 | 5 | 83 | 12 | B |
| | | | NBR | 592 | 0 | 17 | 3 | A | 586 | 0 | 18 | 3 | A | 653 | 0 | 20 | 4 | A |
| | | | WBL | 267 | 5 | 42 | 13 | B | 282 | 6 | 45 | 14 | B | 274 | 5 | 46 | 13 | B |
| | | | WBR | 8 | 0 | 0 | 0 | A | 8 | 0 | 0 | 0 | A | 8 | 0 | 0 | 0 | A |
| | | | SBL | 23 | 1 | 21 | 20 | C | 27 | 1 | 21 | 20 | B | 27 | 1 | 21 | 21 | C |
| | | | SBT | 142 | 1 | 23 | 5 | A | 141 | 1 | 24 | 6 | A | 141 | 1 | 24 | 6 | A |
| 2 | East Mall and W 16 Ave | Unsignalized Roundabout | EBL | 329 | 2 | 73 | 6 | A | 305 | 2 | 89 | 7 | A | 343 | 1 | 67 | 6 | A |
| | | | EBT | 256 | 2 | 73 | 5 | A | 279 | 2 | 89 | 5 | A | 304 | 1 | 67 | 5 | A |
| | | | EBR | 33 | 2 | 73 | 3 | A | 30 | 2 | 89 | 3 | A | 31 | 1 | 67 | 4 | A |
| | | | NBL | 29 | 0 | 29 | 9 | A | 39 | 1 | 38 | 11 | B | 39 | 1 | 38 | 11 | B |
| | | | NBT | 66 | 0 | 29 | 9 | A | 133 | 1 | 38 | 10 | B | 116 | 1 | 38 | 11 | B |
| | | | NBR | 56 | 0 | 29 | 2 | A | 102 | 1 | 38 | 2 | A | 115 | 1 | 38 | 3 | A |
| | | | WBL | 36 | 1 | 46 | 6 | A | 22 | 2 | 59 | 8 | A | 18 | 1 | 54 | 7 | A |
| | | | WBT | 161 | 1 | 46 | 6 | A | 171 | 2 | 59 | 8 | A | 162 | 1 | 54 | 8 | A |
| | | | WBR | 203 | 1 | 46 | 6 | A | 228 | 2 | 59 | 7 | A | 211 | 1 | 54 | 7 | A |
| | | | SBL | 121 | 0 | 23 | 4 | A | 129 | 0 | 22 | 5 | A | 132 | 1 | 44 | 4 | A |
| | | | SBT | 17 | 0 | 23 | 3 | A | 14 | 0 | 22 | 4 | A | 15 | 1 | 44 | 5 | A |
| | | | SBR | 85 | 0 | 23 | 1 | A | 81 | 0 | 22 | 1 | A | 81 | 1 | 44 | 3 | A |
| 3 | Wesbrook Mall and W 16 Ave | Unsignalized Roundabout | EBL | 192 | 2 | 56 | 8 | A | 207 | 13 | 118 | 29 | D | 248 | 3 | 64 | 9 | A |
| | | | EBT | 138 | 2 | 56 | 5 | A | 170 | 13 | 118 | 11 | B | 174 | 3 | 64 | 5 | A |
| | | | EBR | 103 | 2 | 56 | 6 | A | 129 | 13 | 118 | 12 | B | 124 | 3 | 64 | 5 | A |
| | | | NBL | 33 | 3 | 47 | 11 | B | 58 | 11 | 66 | 17 | C | 26 | 7 | 64 | 20 | C |
| | | | NBT | 172 | 3 | 47 | 10 | B | 304 | 11 | 66 | 16 | C | 268 | 7 | 64 | 15 | C |
| | | | NBR | 37 | 3 | 47 | 7 | A | 45 | 11 | 66 | 12 | B | 41 | 7 | 64 | 4 | A |
| | | | WBL | 176 | 4 | 60 | 10 | A | 268 | 21 | 217 | 27 | D | 69 | 8 | 56 | 14 | B |
| | | | WBT | 220 | 4 | 60 | 6 | A | 218 | 21 | 217 | 16 | C | 212 | 8 | 56 | 11 | B |
| | | | WBR | 293 | 4 | 60 | 9 | A | 308 | 21 | 217 | 17 | C | 312 | 8 | 56 | 15 | C |
| | | | SBL | 165 | 5 | 80 | 13 | B | 163 | 24 | 143 | 36 | D | 175 | 4 | 70 | 11 | B |
| | | | SBT | 112 | 5 | 80 | 14 | B | 138 | 24 | 143 | 39 | E | 121 | 4 | 70 | 12 | B |
| | | | SBR | 148 | 5 | 80 | 3 | A | 145 | 24 | 143 | 5 | A | 151 | 4 | 70 | 3 | A |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | 2024: Stop Controlled (Hampton Pl/Binning Rd) 2035: Pedestrian Signal Control | EBT | 339 | 2 | 43 | 3 | A | 378 | 3 | 46 | 4 | A | 379 | 0 | 1 | 12 | B |
| | | | EBR | - | - | - | - | - | - | - | - | - | - | 11 | 0 | 1 | 14 | B |
| | | | NBR | 143 | 1 | 28 | 6 | A | 400 | 15 | 86 | 16 | C | 401 | 7 | 72 | 8 | A |
| | | | WBL | - | - | - | - | - | - | - | - | - | - | 211 | 29 | 212 | 21 | C |
| | | | WBT | 640 | 14 | 175 | 10 | B | 728 | 59 | 330 | 19 | C | 522 | 30 | 216 | 20 | C |
| | | | WBR | 50 | 0 | 0 | 3 | A | 49 | 0 | 0 | 4 | A | 49 | 0 | 0 | 11 | B |
| | | | SBR | 48 | 0 | 3 | 10 | B | 73 | 0 | 10 | 13 | B | 73 | 0 | 7 | 6 | A |
| 5 | Wesbrook Mall and Hampton Pl | Stop Controlled (Hampton Pl) | NBT | 615 | 0 | 3 | 0 | A | 777 | 0 | 4 | 0 | A | 785 | 0 | 10 | 0 | A |
| | | | NBR | 42 | 0 | 12 | 1 | A | 42 | 0 | 15 | 1 | A | 43 | 0 | 21 | 3 | A |
| | | | WBL | 53 | 1 | 21 | 14 | B | 54 | 1 | 24 | 18 | C | 54 | 1 | 22 | 16 | C |
| | | | WBR | 36 | 1 | 22 | 7 | A | 37 | 1 | 25 | 11 | B | 36 | 1 | 23 | 3 | A |
| | | | SBL | 6 | 0 | 0 | 5 | A | 6 | 0 | 8 | 7 | A | 6 | 0 | 3 | 7 | A |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | SBT | 347 | 0 | 0 | 1 | A | 368 | 0 | 8 | 1 | A | 368 | 0 | 3 | 1 | A |
| 6 | Wesbrook Mall and Berton Ave | Stop Controlled (Berton Ave) | NBL | 0 | 3 | 68 | 0 | A | 0 | 45 | 155 | 0 | A | 0 | 2 | 53 | 0 | A |
| | | | NBT | 198 | 3 | 66 | 13 | B | 330 | 44 | 153 | 39 | E | 254 | 2 | 56 | 6 | A |
| | | | NBR | 18 | 3 | 68 | 11 | B | 15 | 45 | 155 | 40 | E | 19 | 2 | 53 | 3 | A |
| | | | WBL | 1 | 1 | 27 | 16 | B | 1 | 5 | 44 | 54 | D | 6 | 3 | 39 | 16 | B |
| | | | WBT | 0 | 1 | 27 | 0 | A | 2 | 5 | 44 | 34 | D | 23 | 3 | 39 | 16 | B |
| | | | WBR | 47 | 1 | 27 | 11 | B | 79 | 5 | 44 | 38 | E | 82 | 3 | 39 | 15 | C |
| | | | SBL | 56 | 1 | 68 | 3 | A | 77 | 7 | 135 | 4 | A | 41 | 1 | 35 | 2 | A |
| | | | SBT | 219 | 1 | 68 | 2 | A | 311 | 7 | 135 | 4 | A | 148 | 1 | 35 | 2 | A |
| | | | SBR | 119 | 1 | 68 | 2 | A | 151 | 7 | 135 | 4 | A | 127 | 1 | 35 | 3 | A |
| 7 | Berton Ave and Binning Rd | All Way Stop Controlled | EBL | 29 | 1 | 34 | 7 | A | 29 | 1 | 36 | 9 | A | 29 | 1 | 30 | 10 | A |
| | | | EBR | 32 | 0 | 23 | 5 | A | 44 | 0 | 26 | 5 | A | 28 | 0 | 23 | 5 | A |
| | | | NBL | 2 | 0 | 0 | 0 | A | 30 | 0 | 0 | 0 | A | 42 | 0 | 0 | 0 | A |
| | | | NBT | 113 | 0 | 0 | 0 | A | 372 | 0 | 0 | 0 | A | 374 | 0 | 0 | 0 | A |
| | | | SBT | - | - | - | - | - | - | - | - | - | - | 189 | 0 | 1 | 0 | A |
| | | | SBR | - | - | - | - | - | - | - | - | - | - | 32 | 0 | 1 | 0 | A |
| 8 | Birney Ave and Ross Dr | Stop Controlled (Birney Ave) | NBT | 102 | 0 | 20 | 0 | A | 180 | 0 | 20 | 0 | A | 171 | 0 | 20 | 1 | A |
| | | | NBR | 12 | 0 | 20 | 1 | A | 11 | 0 | 20 | 1 | A | 24 | 0 | 20 | 1 | A |
| | | | WBL | 7 | 0 | 25 | 6 | A | 18 | 1 | 26 | 6 | A | 18 | 1 | 24 | 7 | A |
| | | | WBR | 50 | 1 | 31 | 5 | A | 93 | 2 | 32 | 6 | A | 99 | 2 | 30 | 6 | A |
| | | | SBL | 24 | 0 | 7 | 1 | A | 11 | 0 | 8 | 1 | A | 11 | 0 | 8 | 1 | A |
| | | | SBT | 62 | 0 | 1 | 0 | A | 55 | 0 | 2 | 0 | A | 53 | 0 | 1 | 0 | A |
| 9 | Birney Ave and Webber Lane | Stop Controlled (Webber Lane) | EBL | 26 | 0 | 9 | 1 | A | 11 | 0 | 8 | 1 | A | 20 | 0 | 10 | 1 | A |
| | | | EBT | 10 | 0 | 9 | 0 | A | 3 | 0 | 8 | 0 | A | 7 | 0 | 10 | 0 | A |
| | | | WBT | 15 | 0 | 26 | 0 | A | 18 | 0 | 27 | 0 | A | 24 | 0 | 29 | 0 | A |
| | | | WBR | 0 | 0 | 0 | 0 | A | 0 | 0 | 0 | 0 | A | 0 | 0 | 0 | 0 | A |
| | | | SBL | 40 | 0 | 17 | 2 | A | 41 | 0 | 13 | 2 | A | 41 | 0 | 17 | 3 | A |
| | | | SBR | 42 | 0 | 15 | 2 | A | 47 | 0 | 17 | 2 | A | 47 | 0 | 18 | 2 | A |
| 10 | Birney Ave and Shrum Lane | Stop Controlled (Shrum Lane) | EBL | 0 | 0 | 0 | 0 | A | 0 | 0 | 6 | 0 | A | 0 | 0 | 0 | 0 | A |
| | | | EBT | 50 | 0 | 0 | 0 | A | 43 | 0 | 5 | 11 | B | 48 | 0 | 0 | 0 | A |
| | | | WBT | 15 | 0 | 0 | 1 | A | 17 | 0 | 1 | 1 | A | 24 | 0 | 0 | 1 | A |
| | | | WBR | 27 | 0 | 5 | 1 | A | 23 | 0 | 7 | 1 | A | 13 | 0 | 4 | 1 | A |
| | | | SBL | 58 | 0 | 18 | 9 | A | 63 | 5 | 45 | 39 | D | 59 | 0 | 20 | 9 | A |
| | | | SBR | 0 | 0 | 18 | 0 | A | 0 | 5 | 45 | 0 | A | 0 | 0 | 20 | 0 | A |
| 11 | Wesbrook Mall and Birney Ave | Stop Controlled | EBL | 66 | 3 | 42 | 17 | C | 67 | 14 | 54 | 62 | F | 68 | 2 | 31 | 12 | B |
| | | | EBT | 29 | 4 | 43 | 16 | C | 21 | 15 | 55 | 53 | F | 21 | 2 | 31 | 13 | B |
| | | | EBR | 12 | 3 | 43 | 15 | B | 17 | 15 | 55 | 54 | F | 18 | 2 | 31 | 12 | B |
| | | | NBL | 27 | 2 | 38 | 9 | A | 23 | 21 | 113 | 31 | D | 13 | 2 | 33 | 8 | A |
| | | | NBT | 118 | 2 | 37 | 9 | A | 246 | 21 | 113 | 31 | D | 171 | 2 | 33 | 7 | A |
| | | | NBR | 22 | 2 | 38 | 8 | A | 19 | 21 | 113 | 27 | D | 17 | 2 | 33 | 8 | A |
| | | | WBL | 28 | 2 | 31 | 15 | B | 26 | 7 | 50 | 48 | E | 26 | 2 | 30 | 13 | B |
| | | | WBT | 15 | 2 | 31 | 17 | C | 17 | 7 | 50 | 45 | E | 23 | 2 | 30 | 15 | C |
| | | | WBR | 33 | 2 | 31 | 15 | B | 37 | 7 | 50 | 47 | E | 34 | 2 | 30 | 12 | B |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | SBL | 72 | 7 | 83 | 16 | C | 77 | 22 | 128 | 27 | D | 53 | 3 | 46 | 9 | A |
| | | | SBT | 148 | 7 | 83 | 15 | B | 235 | 23 | 128 | 24 | C | 101 | 3 | 47 | 8 | A |
| | | | SBR | 0 | 7 | 83 | 0 | A | 0 | 22 | 128 | 0 | A | 0 | 3 | 46 | 0 | A |
| 12 | Binning Rd and Birney Ave | Stop Controlled (Birney Ave) | EBL | 56 | 0 | 15 | 7 | A | 52 | 0 | 17 | 8 | A | 52 | 0 | 17 | 9 | A |
| | | | EBR | 21 | 0 | 15 | 6 | A | 21 | 0 | 17 | 7 | A | 21 | 0 | 17 | 9 | A |
| | | | NBL | 13 | 0 | 3 | 0 | A | 19 | 0 | 12 | 0 | A | 22 | 0 | 21 | 1 | A |
| | | | NBT | 60 | 0 | 3 | 0 | A | 351 | 0 | 12 | 1 | A | 364 | 0 | 21 | 1 | A |
| | | | SBT | 30 | 0 | 0 | 0 | A | 44 | 0 | 0 | 0 | A | 191 | 0 | 10 | 0 | A |
| | | | SBR | 1 | 0 | 0 | 0 | A | 0 | 0 | 0 | 0 | A | 26 | 0 | 10 | 1 | A |
| 13 | Gray Ave and Ross Dr | Stop Controlled (Gray Ave) | NBT | 68 | 0 | 0 | 0 | A | 114 | 0 | 0 | 0 | A | 100 | 0 | 0 | 0 | A |
| | | | NBR | 8 | 0 | 0 | 0 | A | 4 | 0 | 0 | 0 | A | 4 | 0 | 0 | 0 | A |
| | | | WBL | 1 | 1 | 32 | 5 | A | 9 | 1 | 34 | 7 | A | 9 | 2 | 27 | 7 | A |
| | | | WBR | 30 | 1 | 29 | 6 | A | 62 | 1 | 31 | 6 | A | 84 | 1 | 24 | 6 | A |
| | | | SBL | 38 | 0 | 9 | 1 | A | 28 | 0 | 7 | 1 | A | 28 | 0 | 10 | 1 | A |
| | | | SBT | 9 | 0 | 2 | 0 | A | 14 | 0 | 0 | 0 | A | 16 | 0 | 3 | 0 | A |
| 14 | Wesbrook Mall and Gray Ave | All Way Stop Controlled | EBL | 31 | 1 | 23 | 10 | A | 37 | 2 | 34 | 13 | B | 25 | 1 | 32 | 12 | B |
| | | | EBT | 23 | 1 | 23 | 11 | B | 27 | 2 | 34 | 14 | B | 29 | 1 | 32 | 12 | B |
| | | | EBR | 24 | 1 | 23 | 9 | A | 32 | 2 | 34 | 12 | B | 31 | 1 | 32 | 10 | B |
| | | | NBL | 21 | 0 | 22 | 2 | A | 23 | 0 | 27 | 3 | A | 21 | 2 | 27 | 7 | A |
| | | | NBT | 109 | 0 | 22 | 1 | A | 138 | 0 | 26 | 1 | A | 107 | 2 | 28 | 7 | A |
| | | | NBR | 22 | 0 | 22 | 6 | A | 38 | 0 | 25 | 6 | A | 33 | 2 | 28 | 8 | A |
| | | | WBL | 19 | 0 | 22 | 3 | A | 81 | 4 | 53 | 12 | B | 57 | 1 | 33 | 5 | A |
| | | | WBT | 9 | 0 | 22 | 3 | A | 21 | 4 | 53 | 10 | A | 63 | 1 | 33 | 4 | A |
| | | | WBR | 27 | 0 | 22 | 9 | A | 114 | 4 | 53 | 15 | B | 69 | 1 | 33 | 10 | B |
| | | | SBL | 21 | 2 | 38 | 7 | A | 55 | 4 | 45 | 8 | A | 16 | 2 | 30 | 7 | A |
| | | | SBT | 140 | 2 | 39 | 7 | A | 174 | 4 | 45 | 8 | A | 109 | 2 | 31 | 6 | A |
| | | | SBR | 28 | 2 | 38 | 2 | A | 49 | 3 | 45 | 3 | A | 20 | 2 | 30 | 7 | A |
| 15 | Gray Ave and Binning Rd | Stop Controlled (Gray Ave) | EBL | 59 | 0 | 22 | 6 | A | 159 | 1 | 26 | 9 | A | 161 | 2 | 36 | 10 | B |
| | | | EBR | 8 | 0 | 22 | 8 | A | 0 | 1 | 26 | 0 | A | 30 | 2 | 36 | 10 | B |
| | | | NBL | 8 | 0 | 0 | 0 | A | 65 | 0 | 16 | 1 | A | 38 | 0 | 19 | 1 | A |
| | | | NBT | 15 | 0 | 25 | 0 | A | 210 | 2 | 43 | 1 | A | 225 | 3 | 55 | 1 | A |
| | | | SBT | 25 | 0 | 0 | 0 | A | 47 | 0 | 0 | 0 | A | 119 | 0 | 5 | 0 | A |
| | | | SBR | 26 | 0 | 0 | 0 | A | 17 | 0 | 0 | 0 | A | 93 | 0 | 5 | 1 | A |
| 16 | Wesbrook Mall and Ross Drive | All Way Stop Controlled | EBL | 10 | 0 | 10 | 9 | B | 15 | 0 | 13 | 13 | B | 10 | 0 | 15 | 8 | A |
| | | | EBR | 2 | 0 | 10 | 7 | A | 15 | 0 | 13 | 11 | B | 19 | 0 | 15 | 6 | A |
| | | | NBL | 64 | 4 | 52 | 10 | A | 112 | 8 | 67 | 14 | B | 96 | 5 | 54 | 11 | B |
| | | | NBT | 143 | 4 | 52 | 11 | B | 183 | 8 | 67 | 15 | B | 152 | 5 | 54 | 12 | B |
| | | | SBT | 159 | 2 | 33 | 7 | A | 255 | 5 | 55 | 9 | A | 165 | 0 | 26 | 1 | A |
| | | | SBR | 25 | 2 | 33 | 6 | A | 31 | 5 | 55 | 9 | A | 31 | 0 | 25 | 6 | A |
| 17 | Wesbrook Mall & Binning Rd | Uncontrolled | NBT | 204 | 0 | 0 | 0 | A | 231 | 0 | 9 | 1 | A | 162 | 0 | 0 | 1 | A |
| | | | NBR | 23 | 0 | 0 | 0 | A | 112 | 0 | 9 | 1 | A | 120 | 0 | 0 | 1 | A |
| | | | WBL | 30 | 0 | 12 | 2 | A | 113 | 1 | 30 | 4 | A | 189 | 1 | 45 | 4 | A |
| | | | WBR | 3 | 0 | 5 | 2 | A | 63 | 0 | 28 | 3 | A | 85 | 1 | 43 | 2 | A |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | SBL | 0 | 0 | 0 | 0 | A | 36 | 0 | 15 | 2 | A | 12 | 0 | 17 | 2 | A |
| | | | SBT | 161 | 0 | 0 | 0 | A | 234 | 0 | 9 | 0 | A | 173 | 0 | 15 | 1 | A |
| 18 | Wesbrook Mall & TRIUMF access | Unsignalized Mini Roundabout | NBT | 170 | 0 | 31 | 2 | A | 270 | 1 | 54 | 4 | A | 204 | 1 | 53 | 4 | A |
| | | | NBR | 55 | 0 | 31 | 2 | A | 58 | 1 | 54 | 2 | A | 58 | 1 | 53 | 3 | A |
| | | | WBL | 14 | 0 | 10 | 3 | A | 10 | 0 | 16 | 5 | A | 10 | 0 | 16 | 4 | A |
| | | | WBR | 58 | 0 | 10 | 3 | A | 74 | 0 | 16 | 5 | A | 74 | 0 | 16 | 4 | A |
| | | | SBL | 63 | 0 | 36 | 2 | A | 77 | 1 | 54 | 3 | A | 77 | 1 | 84 | 8 | A |
| | | | SBT | 129 | 0 | 36 | 2 | A | 270 | 1 | 54 | 3 | A | 280 | 1 | 84 | 7 | A |
| 19 | South West Marine Dr and Wesbrook Mall | Signalized | EBL | 17 | 1 | 39 | 22 | C | 26 | 3 | 42 | 27 | C | 26 | 2 | 41 | 27 | C |
| | | | EBT | 422 | 2 | 39 | 4 | A | 430 | 3 | 42 | 6 | A | 421 | 3 | 41 | 6 | A |
| | | | WBT | 1302 | 15 | 111 | 13 | B | 1295 | 21 | 136 | 17 | B | 1359 | 22 | 140 | 16 | B |
| | | | WBR | 209 | 0 | 18 | 1 | A | 301 | 0 | 23 | 1 | A | 236 | 0 | 30 | 1 | A |
| | | | SBL | 121 | 6 | 62 | 22 | C | 233 | 17 | 102 | 28 | C | 241 | 13 | 94 | 26 | C |
| | | | SBR | 23 | 2 | 51 | 9 | A | 49 | 10 | 98 | 17 | B | 48 | 12 | 94 | 6 | A |

## 8.2 Route Travel Time

Figure 8.1 presents changes in modelled travel time for all vehicles while Figure 8.2 presents changes in modelled bus travel time in the AM peak.

With respect to vehicular travel time, the headline modelling results are:

- Travel time generally increases in future year cases compared to present year for both all vehicles and buses only.
- For all vehicles:
  - In the *Do Nothing* scenario, the percentage increase in travel time for all vehicles is as follows: 23% for northbound (NB) travel along Wesbrook Mall, 19% for southbound (SB) travel along Wesbrook Mall, 7% for eastbound (EB) travel along West 16th Avenue and 18% for westbound (WB) travel along West 16th Avenue.
  - In the *With Improvements* scenario, the percentage increase in travel time for all vehicles is as follows: 41% for northbound (NB) travel along Wesbrook Mall, 2% for southbound (SB) travel along Wesbrook Mall, 8% for eastbound (EB) travel along West 16th Avenue and 11% for westbound (WB) travel along West 16th Avenue.
  - In general, the change in travel time along Wesbrook Mall is greater than that along West 16th Avenue. This can be attributed to the increased demand along the local streets.
  - Owing to the additional route choice afforded by adding a westbound left turn (WBL) movement at West 16th Avenue and Binning Road, the increase in travel time along southbound Wesbrook Mall in the *With Improvements* scenario is minimal.
- For buses:
  - In the *Do Nothing* scenario, the percentage increase in travel time for all vehicles is as follows: 11% for northbound (NB) travel along Wesbrook Mall, 13% for southbound (SB) travel along Wesbrook Mall, 1% for eastbound (EB) travel along West 16th Avenue and 2% for westbound (WB) travel along West 16th Avenue.
  - In the *With Improvements* scenario, the percentage increase in travel time for all vehicles is as follows: 19% for northbound (NB) travel along Wesbrook Mall, 8% for southbound (SB) travel along Wesbrook Mall, 2% for eastbound (EB) travel along West 16th Avenue and 3% for westbound (WB) travel along West 16th Avenue.
  - Changes in travel time follow a similar trend to that observed with all vehicles. However, the travel times along Wesbrook Mall increases to a lesser extent in the *With Improvements* scenario for buses compared to all vehicles due to the addition of bus-only lanes.
  - Despite the addition of a dedicated bus lane, bus travel time does not improve in future year cases compared to the present year. This may be attributable to the fact that buses need to queue in the general lane at West 16th Avenue and Wesbrook Mall.
  - Travel time changes in the *With Improvements* scenario compared to the *Do Nothing* scenario can be attributed to two factors: the introduction of a bus-only lane, which decreases travel time, and the additional passenger service time at the new transit stops, which increases travel time.

**Figure 8.1: Changes in modelled travel time for all vehicles in the AM peak**

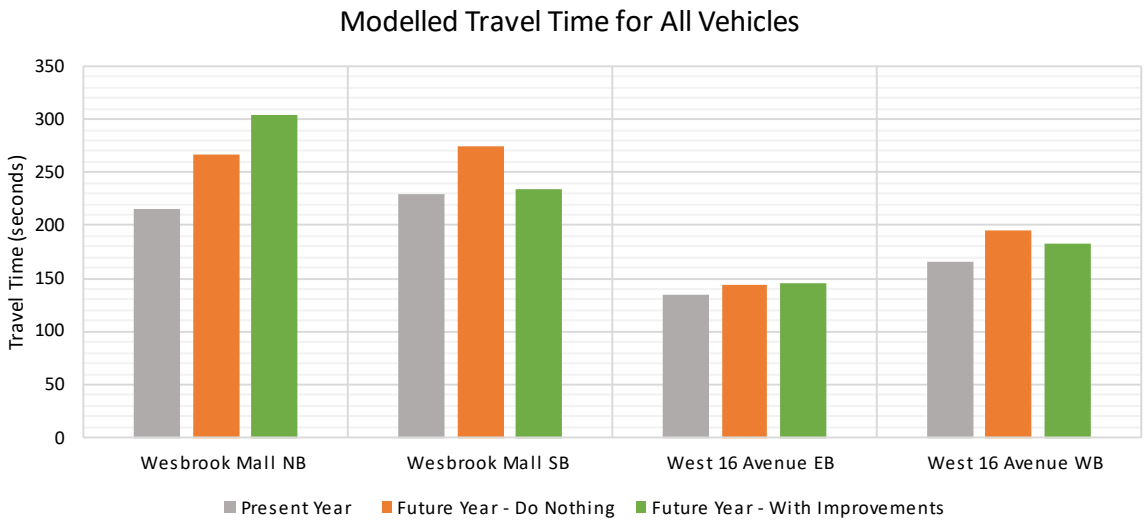
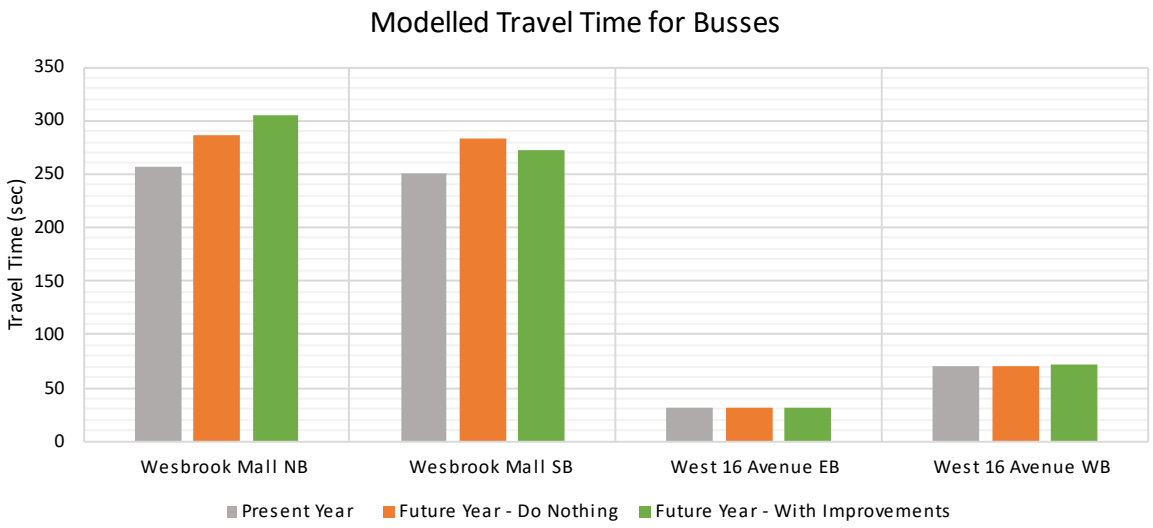



**Figure 8.2: Changes in modelled travel time for buses in the AM peak**



# 9 Modelling Results – PM Peak

Sections 9.1 and 9.2 present and discuss the modelling results for the PM peak for each scenario.

## 9.1 Intersection Performance

Table 9.1 presents intersection LOS while Table 9.2 presents movement LOS, queue lengths, and vehicle delays.

With respect to intersection performance, the key modelling results are:

- In the present year, all intersections operate at an acceptable LOS A, B, or C.
- In a *Do Nothing* scenario, all except six intersections operate at a similar LOS compared to the present year.
  - The intersection of Southwest Marine Drive and Wesbrook Mall degrades from LOS A to B, attributable to growth in demand along Wesbrook Mall.
  - The intersection of West 16th Avenue and Wesbrook Mall, and Wesbrook Mall and Birney Avenue degrades from LOS C to E.
    - The degradation at West 16th Avenue and Wesbrook Mall may be due to overall growth in demand, with particularly notable growth in the westbound and southbound directions causing longer queues and delays. It should be noted that LOS improves to LOS B in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
    - Modelling suggests that there is a capacity constraint at West 16th Avenue and Wesbrook Mall, reflected in observations of a bottleneck along southbound Wesbrook Mall in the model, maximum queue lengths of 520 metres, and warning messages indicating that 314 vehicles were unable to enter the simulation network in the Do Nothing scenario. A capacity constraint was not observed in the *With Improvements* scenario as drivers taking the westbound left at this roundabout are afforded an additional route option at Binning Road, which provides more gaps for southbound traffic on Wesbrook Mall to enter the roundabout.
    - The degradation at Wesbrook Mall and Birney Avenue is attributable to growth in demand along Wesbrook Mall. It should be noted that LOS improves to LOS B in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
  - The intersection of Wesbrook Mall and Hampton Place degrades from LOS B to F due to the capacity constraint along southbound Wesbrook Mall described above. However, LOS improves to LOS A in the *With Improvements* scenario.
  - The intersection of Wesbrook Mall and Berton Avenue degrades from LOS B to C due to the overall growth in demand, resulting longer delays and queues. However, LOS improves to LOS A in the *With Improvements* scenario.
  - The intersection of Birney Avenue and Shrum Lane degrades from LOS B to E due to the overall growth in demand, resulting longer delays and queues. However, LOS improves to LOS A in the *With Improvements* scenario.
- In a *With Improvements* scenario, all except two intersections operate at a similar or improved LOS compared to the present year.
  - The intersection of West 16th Avenue and Binning Road degrades from LOS A to B due to the implementation of full signals causing additional delay.
  - The intersection of Wesbrook Mall and Southwest Marine Drive degrades from LOS A to B due to growth in demand along Wesbrook Mall.

  - Only two movements in the study area operate at LOS D in the *With Improvements* scenario. These are northbound through (NBT) and left (NBL) turns at Wesbrook Mall and West 19th Avenue roundabout and are attributed to the increased pedestrian and traffic volumes.
  - Only ten movements in the study area operate at LOS C in the *With Improvements* scenario: two are southbound through (SBT) and left (SBL) turns at West 16th Avenue and Wesbrook Mall; one is the left turn at Wesbrook Mall and Southwest Marine Drive; one is the northbound through (NBT) movement at Wesbrook Mall and Ross Drive; and six are movements from minor streets affected by the increased traffic along Wesbrook Mall.
- The impact of planned infrastructural improvements are summarised below.
  - Improvement A: The provision of a westbound left (WBL) turn through full signalization notably improves network-level performance as it provides an additional route option for drivers travelling to the Wesbrook Place neighbourhood.
  - Improvement B: The addition of a dedicated right turn lane along northbound Wesbrook Mall and West 16th Avenue results in decreased delay.
  - Improvement C: The impact of implementing a bus-only lane along Wesbrook Mall can be seen through queue lengths where Wesbrook Mall intersects with Birney Avenue and Berton Avenue. Compared to results from the present year model, there are improvements to queue lengths (relative to changes in demand) along the northbound approach of Wesbrook Mall and Berton Avenue (where queue lengths decreased more than three times with a 30% decrease in demand).
  - Improvement D: The addition of an in-lane bus stop along West 16th Ave in between East Mall & Wesbrook Mall in the With Improvements scenario does not adversely impact LOS.
  - Improvement E: The addition of an extra lane allowing buses to jump the queue on Wesbrook Mall before turning left to Southwest Marine Drive resulted in a 14% decrease in bus delays, despite a 30% increase in southbound traffic.

**Table 9.1: Intersection Level of Service (LOS) results in the PM peak**

| No | Intersection Name | Present Year | Do Nothing | With Improvements |
|---|---|---|---|---|
| 1 | SW Marine Dr & W 16 Ave | A | A | A |
| 2 | East Mall and W 16 Ave | A | A | A |
| 3 | Wesbrook Mall and W 16 Ave | C | E | B |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | A | A | B |
| 5 | Wesbrook Mall and Hampton Pl | B | F | A |
| 6 | Wesbrook Mall and Berton Ave | B | C | A |
| 7 | Berton Ave and Binning Rd | A | A | A |
| 8 | Birney Ave and Ross Dr | A | A | A |
| 9 | Birney Ave and Webber Lane | A | A | A |
| 10 | Birney Ave and Shrum Lane | B | E | A |
| 11 | Wesbrook Mall and Birney Ave | C | E | B |
| 12 | Binning Rd and Birney Ave | A | A | A |
| 13 | Gray Ave and Ross Dr | A | A | A |
| 14 | Wesbrook Mall and Gray Ave | A | A | A |
| 15 | Gray Ave and Binning Rd | A | A | A |
| 16 | Wesbrook Mall and Ross Drive | B | B | A |
| 17 | Wesbrook Mall & Binning Rd | A | A | A |
| 18 | Wesbrook Mall & TRIUMF access | A | A | A |
| 19 | Southwest Marine Dr and Wesbrook Mall | A | B | B |

**Table 9.2: Intersection results in the PM peak**

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| 1 | SW Marine Dr & W 16 Ave | Signalized | NBT | 150 | 1 | 30 | 12 | B | 154 | 1 | 34 | 11 | B | 153 | 1 | 29 | 12 | B |
| | | | NBR | 327 | 0 | 19 | 2 | A | 359 | 0 | 22 | 2 | A | 388 | 0 | 27 | 3 | A |
| | | | WBL | 628 | 8 | 56 | 11 | B | 542 | 8 | 60 | 12 | B | 644 | 9 | 60 | 12 | B |
| | | | WBR | 8 | 0 | 1 | 0 | A | 10 | 0 | 0 | 0 | A | 10 | 0 | 1 | 0 | A |
| | | | SBL | 19 | 1 | 34 | 21 | C | 24 | 1 | 36 | 20 | C | 24 | 1 | 36 | 22 | C |
| | | | SBT | 544 | 4 | 39 | 10 | B | 545 | 4 | 41 | 9 | A | 545 | 4 | 41 | 10 | B |
| 2 | East Mall and W 16 Ave | Unsignalized Roundabout | EBL | 99 | 1 | 42 | 6 | A | 127 | 1 | 47 | 6 | A | 128 | 1 | 49 | 6 | A |
| | | | EBT | 216 | 1 | 42 | 4 | A | 221 | 1 | 47 | 5 | A | 248 | 1 | 49 | 5 | A |
| | | | EBR | 33 | 1 | 42 | 3 | A | 33 | 1 | 47 | 3 | A | 34 | 1 | 49 | 3 | A |
| | | | NBL | 41 | 0 | 19 | 5 | A | 42 | 0 | 15 | 6 | A | 42 | 0 | 16 | 6 | A |
| | | | NBT | 58 | 0 | 19 | 5 | A | 30 | 0 | 15 | 6 | A | 39 | 0 | 16 | 6 | A |
| | | | NBR | 50 | 0 | 19 | 1 | A | 65 | 0 | 15 | 2 | A | 117 | 0 | 16 | 2 | A |
| | | | WBL | 31 | 1 | 49 | 4 | A | 17 | 0 | 39 | 3 | A | 24 | 1 | 47 | 3 | A |
| | | | WBT | 244 | 1 | 49 | 4 | A | 167 | 0 | 39 | 4 | A | 269 | 1 | 47 | 5 | A |
| | | | WBR | 154 | 1 | 49 | 3 | A | 157 | 0 | 39 | 3 | A | 151 | 1 | 47 | 4 | A |
| | | | SBL | 271 | 1 | 51 | 7 | A | 273 | 1 | 44 | 6 | A | 276 | 4 | 83 | 7 | A |
| | | | SBT | 9 | 1 | 51 | 6 | A | 12 | 1 | 44 | 4 | A | 12 | 4 | 83 | 8 | A |
| | | | SBR | 351 | 1 | 51 | 3 | A | 344 | 1 | 44 | 3 | A | 344 | 4 | 83 | 5 | A |
| 3 | Wesbrook Mall and W 16 Ave | Unsignalized Roundabout | EBL | 184 | 5 | 59 | 17 | C | 188 | 59 | 219 | 99 | F | 229 | 5 | 62 | 13 | B |
| | | | EBT | 280 | 5 | 59 | 8 | A | 282 | 59 | 219 | 40 | E | 335 | 5 | 62 | 7 | A |
| | | | EBR | 74 | 5 | 59 | 7 | A | 72 | 59 | 219 | 37 | E | 76 | 5 | 62 | 5 | A |
| | | | NBL | 35 | 9 | 54 | 19 | C | 42 | 8 | 59 | 18 | C | 32 | 11 | 65 | 30 | D |
| | | | NBT | 179 | 9 | 54 | 19 | C | 207 | 8 | 59 | 14 | B | 177 | 11 | 65 | 32 | D |
| | | | NBR | 103 | 9 | 54 | 14 | B | 101 | 8 | 59 | 12 | B | 32 | 11 | 65 | 4 | A |
| | | | WBL | 245 | 2 | 40 | 9 | A | 411 | 15 | 151 | 29 | D | 67 | 3 | 43 | 7 | A |
| | | | WBT | 152 | 2 | 40 | 5 | A | 142 | 15 | 151 | 10 | A | 141 | 3 | 43 | 6 | A |
| | | | WBR | 166 | 2 | 40 | 6 | A | 178 | 15 | 151 | 10 | A | 180 | 3 | 43 | 9 | A |
| | | | SBL | 383 | 81 | 243 | 45 | E | 229 | 492 | 520 | 114 | F | 410 | 23 | 169 | 22 | C |
| | | | SBT | 148 | 81 | 243 | 44 | E | 127 | 492 | 520 | 115 | F | 151 | 23 | 169 | 20 | C |
| | | | SBR | 242 | 81 | 243 | 8 | A | 158 | 492 | 520 | 18 | C | 270 | 23 | 169 | 4 | A |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | 2024: Stop Controlled (Hampton Pl/Binning Rd)<br>2035: Pedestrian Signal Control | EBT | 766 | 2 | 48 | 2 | A | 611 | 3 | 50 | 3 | A | 755 | 0 | 12 | 15 | B |
| | | | EBR | - | - | - | - | - | - | - | - | - | - | 20 | 0 | 12 | 17 | B |
| | | | NBR | 126 | 1 | 22 | 7 | A | 173 | 2 | 28 | 7 | A | 201 | 3 | 43 | 7 | A |
| | | | WBL | - | - | - | - | - | - | - | - | - | - | 348 | 16 | 131 | 19 | B |
| | | | WBT | 519 | 3 | 78 | 4 | A | 686 | 10 | 133 | 8 | A | 338 | 16 | 130 | 17 | B |
| | | | WBR | 70 | 0 | 0 | 2 | A | 71 | 0 | 0 | 2 | A | 71 | 0 | 0 | 12 | B |
| | | | SBR | 46 | 0 | 4 | 10 | A | 48 | 0 | 2 | 11 | B | 48 | 0 | 1 | 5 | A |
| 5 | Wesbrook Mall and Hampton Pl | Stop Controlled (Hampton Pl) | NBT | 481 | 0 | 7 | 0 | A | 521 | 0 | 27 | 1 | A | 532 | 0 | 5 | 0 | A |
| | | | NBR | 47 | 0 | 21 | 3 | A | 52 | 0 | 33 | 3 | A | 54 | 0 | 16 | 5 | A |
| | | | WBL | 30 | 1 | 16 | 17 | C | 31 | 5 | 38 | 88 | F | 31 | 0 | 15 | 12 | B |
| | | | WBR | 22 | 1 | 17 | 6 | A | 22 | 5 | 39 | 30 | D | 22 | 0 | 16 | 3 | A |
| | | | SBL | 20 | 27 | 132 | 10 | B | 11 | 490 | 513 | 147 | F | 19 | 1 | 60 | 6 | A |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | SBT | 722 | 27 | 132 | 18 | C | 470 | 490 | 513 | 175 | F | 772 | 1 | 60 | 4 | A |
| 6 | Wesbrook Mall and Berton Ave | Stop Controlled (Berton Ave) | NBL | 11 | 19 | 133 | 23 | C | 8 | 28 | 150 | 36 | D | 8 | 3 | 52 | 6 | A |
| | | | NBT | 290 | 19 | 131 | 26 | D | 313 | 27 | 149 | 32 | D | 203 | 3 | 53 | 9 | A |
| | | | NBR | 18 | 19 | 133 | 26 | D | 19 | 28 | 150 | 32 | D | 19 | 3 | 53 | 4 | A |
| | | | WBL | 2 | 1 | 18 | 25 | C | 7 | 3 | 28 | 46 | E | 8 | 3 | 37 | 20 | C |
| | | | WBT | 0 | 1 | 18 | 0 | A | 0 | 3 | 28 | 0 | A | 40 | 3 | 37 | 24 | C |
| | | | WBR | 29 | 1 | 18 | 27 | D | 40 | 3 | 28 | 45 | E | 38 | 3 | 37 | 24 | C |
| | | | SBL | 78 | 5 | 112 | 5 | A | 123 | 44 | 173 | 11 | B | 33 | 1 | 29 | 3 | A |
| | | | SBT | 232 | 5 | 112 | 4 | A | 338 | 44 | 173 | 11 | B | 130 | 1 | 29 | 3 | A |
| | | | SBR | 159 | 5 | 112 | 5 | A | 152 | 44 | 173 | 11 | B | 130 | 1 | 29 | 4 | A |
| 7 | Berton Ave and Binning Rd | All Way Stop Controlled | EBL | 20 | 1 | 23 | 6 | A | 21 | 1 | 29 | 8 | A | 21 | 0 | 18 | 9 | A |
| | | | EBR | 24 | 0 | 12 | 5 | A | 62 | 0 | 18 | 5 | A | 9 | 0 | 10 | 4 | A |
| | | | NBL | 3 | 0 | 0 | 0 | A | 11 | 0 | 0 | 0 | A | 10 | 0 | 0 | 0 | A |
| | | | NBT | 105 | 0 | 0 | 0 | A | 152 | 0 | 0 | 0 | A | 180 | 0 | 0 | 0 | A |
| | | | SBT | - | - | - | - | - | - | - | - | - | - | 289 | 0 | 0 | 0 | A |
| | | | SBR | - | - | - | - | - | - | - | - | - | - | 79 | 0 | 0 | 0 | A |
| 8 | Birney Ave and Ross Dr | Stop Controlled (Birney Ave) | NBT | 82 | 0 | 20 | 1 | A | 67 | 0 | 20 | 1 | A | 86 | 0 | 20 | 1 | A |
| | | | NBR | 19 | 0 | 20 | 1 | A | 24 | 0 | 20 | 1 | A | 33 | 0 | 20 | 1 | A |
| | | | WBL | 40 | 1 | 22 | 6 | A | 68 | 1 | 25 | 6 | A | 49 | 2 | 25 | 6 | A |
| | | | WBR | 66 | 2 | 29 | 5 | A | 69 | 2 | 31 | 6 | A | 110 | 3 | 31 | 6 | A |
| | | | SBL | 17 | 0 | 8 | 1 | A | 31 | 0 | 8 | 1 | A | 32 | 0 | 11 | 1 | A |
| | | | SBT | 56 | 0 | 2 | 0 | A | 30 | 0 | 1 | 0 | A | 38 | 0 | 4 | 0 | A |
| 9 | Birney Ave and Webber Lane | Stop Controlled (Webber Lane) | EBL | 24 | 0 | 7 | 1 | A | 32 | 0 | 9 | 1 | A | 41 | 0 | 8 | 1 | A |
| | | | EBT | 11 | 0 | 7 | 0 | A | 2 | 0 | 9 | 1 | A | 3 | 0 | 8 | 0 | A |
| | | | WBT | 25 | 0 | 30 | 0 | A | 28 | 1 | 34 | 0 | A | 38 | 1 | 31 | 0 | A |
| | | | WBR | 0 | 0 | 0 | 0 | A | 0 | 0 | 0 | 0 | A | 0 | 0 | 0 | 0 | A |
| | | | SBL | 54 | 0 | 20 | 2 | A | 61 | 0 | 23 | 3 | A | 8 | 0 | 20 | 4 | A |
| | | | SBR | 81 | 0 | 20 | 2 | A | 111 | 0 | 23 | 3 | A | 127 | 0 | 20 | 2 | A |
| 10 | Birney Ave and Shrum Lane | Stop Controlled (Shrum Lane) | EBL | 0 | 0 | 2 | 0 | A | 0 | 0 | 9 | 0 | A | 0 | 0 | 0 | 0 | A |
| | | | EBT | 66 | 0 | 2 | 3 | A | 63 | 0 | 6 | 18 | C | 11 | 0 | 0 | 0 | A |
| | | | WBT | 25 | 0 | 0 | 1 | A | 28 | 0 | 3 | 2 | A | 38 | 0 | 0 | 1 | A |
| | | | WBR | 28 | 0 | 6 | 1 | A | 31 | 0 | 10 | 1 | A | 22 | 0 | 5 | 1 | A |
| | | | SBL | 93 | 3 | 43 | 23 | C | 70 | 19 | 77 | 128 | F | 113 | 1 | 20 | 10 | A |
| | | | SBR | 0 | 3 | 43 | 0 | A | 0 | 19 | 77 | 0 | A | 0 | 1 | 20 | 0 | A |
| 11 | Wesbrook Mall and Birney Ave | Stop Controlled | EBL | 117 | 12 | 53 | 36 | E | 111 | 24 | 54 | 81 | F | 55 | 4 | 46 | 18 | C |
| | | | EBT | 6 | 13 | 54 | 46 | E | 2 | 25 | 55 | 68 | F | 28 | 4 | 46 | 17 | C |
| | | | EBR | 33 | 13 | 54 | 34 | D | 18 | 25 | 55 | 79 | F | 41 | 4 | 46 | 15 | B |
| | | | NBL | 28 | 4 | 50 | 13 | B | 31 | 7 | 65 | 17 | C | 22 | 2 | 24 | 8 | A |
| | | | NBT | 170 | 4 | 49 | 11 | B | 194 | 7 | 64 | 15 | B | 137 | 2 | 25 | 8 | A |
| | | | NBR | 20 | 4 | 50 | 10 | B | 16 | 7 | 64 | 14 | B | 14 | 2 | 24 | 8 | A |
| | | | WBL | 24 | 3 | 36 | 25 | D | 15 | 6 | 41 | 40 | E | 16 | 2 | 28 | 16 | B |
| | | | WBT | 25 | 3 | 36 | 28 | D | 28 | 6 | 41 | 40 | E | 38 | 2 | 28 | 16 | C |
| | | | WBR | 33 | 3 | 36 | 19 | C | 39 | 6 | 41 | 42 | E | 39 | 2 | 28 | 12 | B |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | SBL | 92 | 12 | 107 | 23 | C | 84 | 61 | 152 | 54 | F | 45 | 3 | 46 | 9 | A |
| | | | SBT | 144 | 12 | 107 | 21 | C | 261 | 62 | 152 | 52 | F | 92 | 3 | 46 | 9 | A |
| | | | SBR | 0 | 12 | 107 | 0 | A | 0 | 61 | 152 | 0 | A | 0 | 3 | 46 | 0 | A |
| 12 | Binning Rd and Birney Ave | Stop Controlled (Birney Ave) | EBL | 36 | 0 | 9 | 7 | A | 37 | 0 | 9 | 7 | A | 62 | 0 | 13 | 9 | A |
| | | | EBR | 19 | 0 | 9 | 6 | A | 18 | 0 | 9 | 6 | A | 17 | 0 | 13 | 7 | A |
| | | | NBL | 21 | 0 | 4 | 0 | A | 30 | 0 | 5 | 0 | A | 39 | 0 | 15 | 2 | A |
| | | | NBT | 72 | 0 | 4 | 0 | A | 127 | 0 | 5 | 0 | A | 127 | 0 | 15 | 1 | A |
| | | | SBT | 24 | 0 | 1 | 0 | A | 62 | 0 | 0 | 0 | A | 249 | 0 | 7 | 0 | A |
| | | | SBR | 0 | 0 | 1 | 0 | A | 0 | 0 | 0 | 0 | A | 50 | 0 | 7 | 1 | A |
| 13 | Gray Ave and Ross Dr | Stop Controlled (Gray Ave) | NBT | 62 | 0 | 0 | 0 | A | 51 | 0 | 0 | 0 | A | 74 | 0 | 0 | 0 | A |
| | | | NBR | 10 | 0 | 0 | 0 | A | 19 | 0 | 0 | 0 | A | 19 | 0 | 0 | 0 | A |
| | | | WBL | 0 | 0 | 23 | 0 | A | 3 | 0 | 22 | 6 | A | 3 | 0 | 21 | 6 | A |
| | | | WBR | 25 | 0 | 20 | 5 | A | 17 | 0 | 19 | 5 | A | 23 | 0 | 18 | 6 | A |
| | | | SBL | 51 | 0 | 8 | 1 | A | 24 | 0 | 4 | 1 | A | 26 | 0 | 3 | 0 | A |
| | | | SBT | 35 | 0 | 0 | 0 | A | 56 | 0 | 0 | 0 | A | 40 | 0 | 0 | 0 | A |
| 14 | Wesbrook Mall and Gray Ave | All Way Stop Controlled | EBL | 30 | 1 | 23 | 11 | B | 31 | 2 | 24 | 16 | B | 13 | 1 | 21 | 13 | B |
| | | | EBT | 37 | 1 | 23 | 12 | B | 30 | 2 | 24 | 15 | C | 39 | 1 | 21 | 14 | B |
| | | | EBR | 34 | 1 | 23 | 11 | B | 37 | 2 | 24 | 15 | C | 35 | 1 | 21 | 11 | B |
| | | | NBL | 48 | 0 | 19 | 2 | A | 62 | 1 | 29 | 4 | A | 62 | 3 | 29 | 7 | A |
| | | | NBT | 167 | 0 | 21 | 1 | A | 167 | 1 | 29 | 2 | A | 125 | 3 | 29 | 8 | A |
| | | | NBR | 30 | 0 | 19 | 6 | A | 90 | 1 | 29 | 7 | A | 86 | 3 | 29 | 9 | A |
| | | | WBL | 22 | 0 | 14 | 4 | A | 58 | 2 | 26 | 11 | B | 58 | 1 | 28 | 7 | A |
| | | | WBT | 7 | 0 | 14 | 2 | A | 5 | 2 | 26 | 6 | A | 43 | 1 | 28 | 3 | A |
| | | | WBR | 21 | 0 | 14 | 9 | A | 43 | 2 | 26 | 15 | B | 34 | 1 | 28 | 11 | B |
| | | | SBL | 38 | 2 | 32 | 8 | A | 91 | 4 | 39 | 9 | A | 9 | 2 | 29 | 7 | A |
| | | | SBT | 122 | 2 | 33 | 7 | A | 150 | 5 | 40 | 9 | A | 120 | 2 | 29 | 7 | A |
| | | | SBR | 43 | 2 | 32 | 3 | A | 52 | 4 | 39 | 4 | A | 21 | 2 | 29 | 7 | A |
| 15 | Gray Ave and Binning Rd | Stop Controlled (Gray Ave) | EBL | 45 | 0 | 16 | 6 | A | 64 | 0 | 15 | 7 | A | 73 | 0 | 15 | 7 | A |
| | | | EBR | 13 | 0 | 16 | 8 | A | 0 | 0 | 15 | 0 | A | 0 | 0 | 15 | 0 | A |
| | | | NBL | 29 | 0 | 3 | 0 | A | 77 | 0 | 12 | 1 | A | 74 | 0 | 14 | 1 | A |
| | | | NBT | 48 | 0 | 20 | 0 | A | 94 | 0 | 28 | 1 | A | 93 | 1 | 33 | 1 | A |
| | | | SBT | 22 | 0 | 0 | 0 | A | 61 | 0 | 0 | 0 | A | 122 | 0 | 4 | 0 | A |
| | | | SBR | 21 | 0 | 0 | 0 | A | 18 | 0 | 0 | 0 | A | 143 | 0 | 4 | 1 | A |
| 16 | Wesbrook Mall and Ross Drive | All Way Stop Controlled | EBL | 16 | 0 | 14 | 10 | A | 32 | 1 | 23 | 12 | B | 20 | 1 | 19 | 9 | A |
| | | | EBR | 20 | 0 | 14 | 7 | A | 39 | 1 | 23 | 12 | B | 43 | 1 | 19 | 7 | A |
| | | | NBL | 52 | 6 | 55 | 11 | B | 66 | 11 | 73 | 15 | C | 78 | 9 | 68 | 14 | B |
| | | | NBT | 229 | 6 | 55 | 13 | B | 288 | 11 | 73 | 16 | C | 253 | 9 | 68 | 15 | C |
| | | | SBT | 153 | 2 | 28 | 6 | A | 235 | 3 | 39 | 7 | A | 183 | 0 | 22 | 1 | A |
| | | | SBR | 24 | 2 | 28 | 5 | A | 10 | 3 | 39 | 7 | A | 29 | 0 | 22 | 7 | A |
| 17 | Wesbrook Mall & Binning Rd | Uncontrolled | NBT | 283 | 0 | 2 | 0 | A | 336 | 0 | 11 | 1 | A | 313 | 0 | 8 | 2 | A |
| | | | NBR | 78 | 0 | 2 | 1 | A | 273 | 0 | 11 | 1 | A | 271 | 0 | 8 | 1 | A |
| | | | WBL | 35 | 0 | 10 | 2 | A | 56 | 0 | 16 | 5 | A | 58 | 0 | 16 | 4 | A |
| | | | WBR | 0 | 0 | 5 | 0 | A | 19 | 0 | 19 | 4 | A | 19 | 0 | 14 | 1 | A |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | SBL | 0 | 0 | 0 | 0 | A | 68 | 2 | 45 | 8 | A | 17 | 0 | 29 | 7 | A |
| | | | SBT | 173 | 0 | 0 | 0 | A | 205 | 1 | 40 | 2 | A | 210 | 0 | 26 | 1 | A |
| 18 | Wesbrook Mall & TRIUMF access | Unsignalized Mini Roundabout | NBT | 208 | 0 | 25 | 2 | A | 420 | 1 | 51 | 4 | A | 401 | 1 | 44 | 5 | A |
| | | | NBR | 9 | 0 | 25 | 2 | A | 10 | 1 | 51 | 2 | A | 10 | 1 | 44 | 3 | A |
| | | | WBL | 51 | 0 | 20 | 3 | A | 56 | 2 | 50 | 9 | A | 63 | 3 | 54 | 9 | A |
| | | | WBR | 153 | 0 | 20 | 4 | A | 189 | 2 | 50 | 10 | B | 182 | 3 | 54 | 12 | B |
| | | | SBL | 33 | 0 | 42 | 2 | A | 38 | 2 | 66 | 4 | A | 38 | 3 | 91 | 9 | A |
| | | | SBT | 174 | 0 | 42 | 3 | A | 223 | 2 | 66 | 5 | A | 225 | 3 | 91 | 9 | A |
| 19 | South West Marine Dr and Wesbrook Mall | Signalized | EBL | 11 | 6 | 74 | 15 | B | 77 | 7 | 77 | 18 | B | 78 | 8 | 80 | 18 | B |
| | | | EBT | 1117 | 6 | 74 | 8 | A | 1036 | 7 | 77 | 8 | A | 1128 | 8 | 82 | 8 | A |
| | | | WBT | 447 | 7 | 54 | 16 | B | 481 | 8 | 56 | 18 | B | 499 | 9 | 56 | 18 | B |
| | | | WBR | 207 | 0 | 17 | 1 | A | 353 | 1 | 36 | 2 | A | 333 | 1 | 38 | 2 | A |
| | | | SBL | 203 | 8 | 64 | 18 | B | 245 | 10 | 77 | 19 | B | 248 | 8 | 89 | 18 | B |
| | | | SBR | 21 | 3 | 59 | 8 | A | 35 | 5 | 69 | 9 | A | 40 | 7 | 90 | 4 | A |

## 9.2 Route Travel Time

Figure 9.1 presents changes in modelled travel time for all vehicles while Figure 9.2 presents changes in modelled bus travel time in the AM peak.

With respect to vehicular travel time, the headline modelling results are:

- Travel time generally increases in future year cases compared to the present year for both all vehicles and buses only. Changes in travel time during the PM peak follow the same trend as the AM peak.
- For all vehicles:
  - In the *Do Nothing* scenario, the percentage increase in travel time for all vehicles is as follows: 2% for northbound (NB) travel along Wesbrook Mall, 51% for southbound (SB) travel along Wesbrook Mall, 18% for eastbound (EB) travel along West 16th Avenue and 7% for westbound (WB) travel along West 16th Avenue.
  - In the *With Improvements* scenario, the percentage change in travel time for all vehicles is as follows: 29% for northbound (NB) travel along Wesbrook Mall, -11% for southbound (SB) travel along Wesbrook Mall, 11% for eastbound (EB) travel along West 16th Avenue and 11% for westbound (WB) travel along West 16th Avenue.
  - In general, the change in travel time along Wesbrook Mall is greater than that along West 16th Avenue. This can be attributed to the increased demand along the local streets.
  - Owing to the additional route choice afforded by adding a westbound left turn (WBL) movement at West 16th Avenue and Binning Road, travel time along southbound Wesbrook Mall decreases in the *With Improvements* scenario.
- For buses:
  - In the *Do Nothing* scenario, the percentage change in travel time for all vehicles is as follows: 2% for northbound (NB) travel along Wesbrook Mall, 21% for southbound (SB) travel along Wesbrook Mall, 0% for eastbound (EB) travel along West 16th Avenue and -2% for westbound (WB) travel along West 16th Avenue.
  - In the *With Improvements* scenario, the percentage increase in travel time for all vehicles is as follows: 20% for northbound (NB) travel along Wesbrook Mall, 5% for southbound (SB) travel along Wesbrook Mall, 0% for eastbound (EB) travel along West 16th Avenue and 0% for westbound (WB) travel along West 16th Avenue.
  - Changes in travel time follow a similar trend to that observed with all vehicles. However, the travel times along Wesbrook Mall increases to a lesser extent in the *With Improvements* scenario for buses compared to all vehicles due to the addition of bus-only lanes.
  - Despite the addition of a dedicated bus lane, bus travel time does not improve in future year cases compared to the present year. This may be attributable to the fact that busses need to queue in the general lane at West 16th Avenue and Wesbrook Mall.
  - Travel time changes in the *With Improvements* scenario compared to the *Do Nothing* scenario can be attributed to two factors: the introduction of a bus-only lane, which decreases travel time, and the additional passenger service time at the new transit stops, which increases travel time.

**Figure 9.1: Changes in modelled travel time for all vehicles in the PM peak**

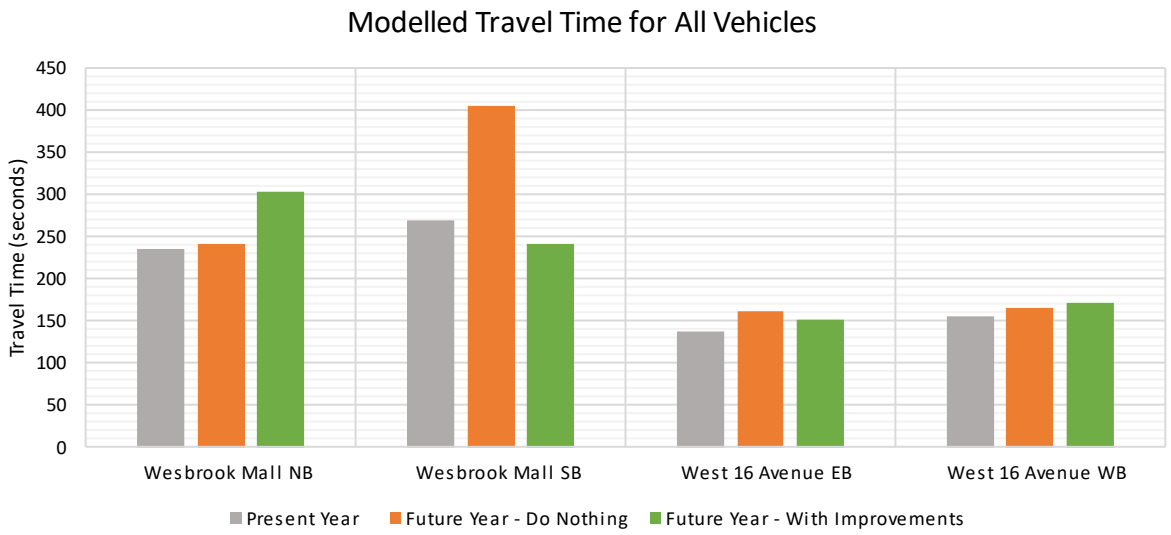
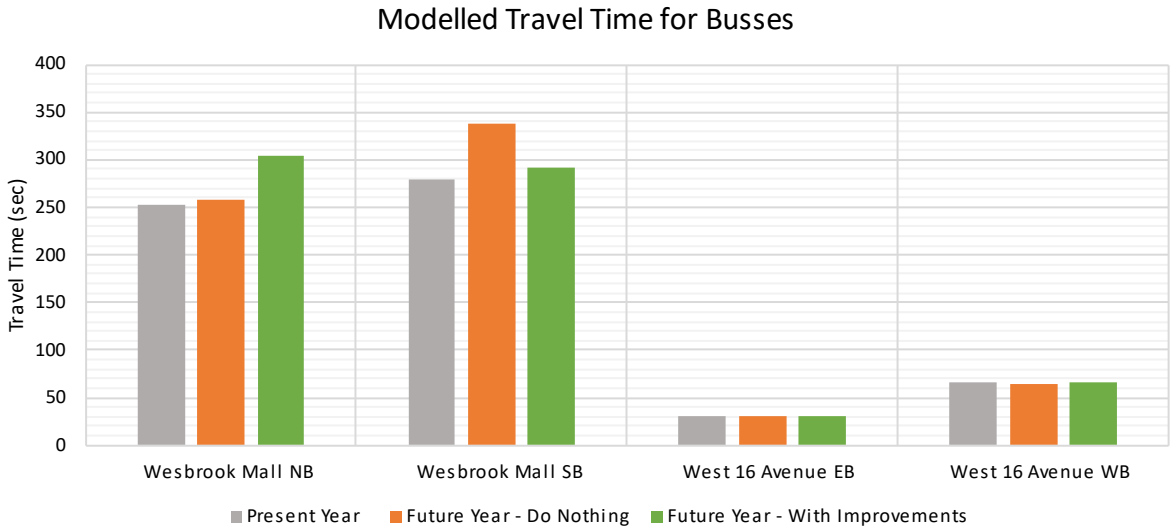



**Figure 9.2: Changes in modelled travel time for buses in the PM peak**



# 10 Modelling Results – Weekend Peak

Sections 10.1 and 10.2 summarize the modelling results for the weekend peak for each scenario.

## 10.1 Intersection Performance

Table 10.1 presents intersection LOS while Table 10.2 presents movement LOS, queue lengths, and vehicle delays.

With respect to intersection performance, the key modelling results are:

- In the present year, all intersections operate at an acceptable LOS A, B or C.
- In a *Do Nothing* scenario, all except six intersections operate at a similar LOS compared to present year.
  - The intersection of Wesbrook Mall and Ross Drive, and Southwest Marine Drive and Wesbrook Mall degrades from LOS A to B.
    - The degradation at Wesbrook Mall and Ross Drive is attributable to growth in demand along Wesbrook Mall. It should be noted that LOS improves to LOS A in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
    - The degradation at Wesbrook Mall and Southwest Marine Drive is attributable to growth in demand along Wesbrook Mall.
  - The intersection of West 16th Avenue and Wesbrook Mall, and Wesbrook Mall and Berton Avenue degrades to LOS C.
    - The degradation at West 16th Avenue and Wesbrook Mall may be due to overall growth in demand, with particularly notable growth in the westbound and southbound directions causing longer queues and delays. It should be noted that LOS improves to LOS A in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
    - The degradation at Wesbrook Mall and Berton Avenue is attributable to growth in demand along Wesbrook Mall. It should be noted that LOS improves to LOS A in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
  - The intersection of Birney Avenue and Shrum Lane degrades to LOS D. This is attributable to growth in demand along Wesbrook Mall. It should be noted that LOS improves to LOS A in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
  - The intersection of Wesbrook Mall and Birney Avenue degrades from LOS C to D. This is attributable to growth in demand along Wesbrook Mall. It should be noted that LOS improves to LOS B in the *With Improvements* scenario as drivers are afforded an additional route option at Binning Road.
- In the *With Improvements* scenario, all except two intersections operate at a similar or improved LOS compared to present year.
  - The intersection of West 16th Avenue and Binning Road degrades from LOS A to B due to the implementation of full signals causing additional delay.
  - The intersection of Wesbrook Mall and Southwest Marine Drive degrades from LOS A to B due to growth in demand along Wesbrook Mall.
  - Only one movement in the study area operate at LOS D in the *With Improvements* scenario. This is westbound left (WBL) turn at Wesbrook Mall and Berton Avenue. This is attributed to growth in demand along Wesbrook Mall.
  - Only twelve movements in the study area operate at LOS C in the *With Improvements* scenario; three are left turns at signalized intersections along Southwest Marine Drive; two are northbound left (NBL) and through (NBT) turns at Wesbrook Mall and West 16th Avenue, which reflects an increase in traffic

and pedestrian crossing; and seven movements are from minor streets affected by the increased traffic along Wesbrook Mall.

- The impact of planned infrastructural improvements are summarised below.
  - Improvement A: The provision of a westbound left (WBL) turn through full signalization notably improves network-level performance as it provides an additional route option for drivers travelling through Wesbrook Place neighbourhood.
  - Improvement B: The addition of a dedicated right turn lane along northbound Wesbrook Mall and West 16th Avenue has notably decreased delay.
  - Improvement C: The impact of implementing a bus-only lane along Wesbrook Mall can be seen through queue lengths where Wesbrook Mall intersects with Birney Avenue and Berton Avenue. Compared to result from the present year model, there are improvements to queue lengths (relative to changes in demand) along the northbound approach of Wesbrook Mall and Berton Avenue (where queue lengths and delays decreased despite constant demand).
  - Improvement D: The addition of an in-lane bus stop along West 16th Ave in between East Mall & Wesbrook Mall in With Improvements scenario does not adversely impact LOS.
  - Improvement E: The addition of an extra lane allowing buses to jump the queue on Wesbrook Mall before turning left to Southwest Marine Drive resulted in only 9% increase in bus delays, for a 80% increase in southbound traffic.

**Table 10.1: Intersection Level of Service (LOS) results in the weekend peak**

| No | Intersection Name | Present Year | Do Nothing | With Improvements |
|---|---|---|---|---|
| 1 | SW Marine Dr & W 16 Ave | A | A | A |
| 2 | East Mall and W 16 Ave | A | A | A |
| 3 | Wesbrook Mall and W 16 Ave | A | C | A |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | A | A | B |
| 5 | Wesbrook Mall and Hampton Pl | A | A | A |
| 6 | Wesbrook Mall and Berton Ave | A | C | A |
| 7 | Berton Ave and Binning Rd | A | A | A |
| 8 | Birney Ave and Ross Dr | A | A | A |
| 9 | Birney Ave and Webber Lane | A | A | A |
| 10 | Birney Ave and Shrum Lane | A | D | A |
| 11 | Wesbrook Mall and Birney Ave | C | D | B |
| 12 | Binning Rd and Birney Ave | A | A | A |
| 13 | Gray Ave and Ross Dr | A | A | A |
| 14 | Wesbrook Mall and Gray Ave | A | A | A |
| 15 | Gray Ave and Binning Rd | A | A | A |
| 16 | Wesbrook Mall and Ross Drive | A | B | A |
| 17 | Wesbrook Mall & Binning Rd | A | A | A |
| 18 | Wesbrook Mall & TRIUMF access | A | A | A |
| 19 | Southwest Marine Dr and Wesbrook Mall | A | B | B |

**Table 10.2: Intersection results in the weekend peak**

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| 1 | SW Marine Dr & W 16 Ave | Signalized | NBT | 492 | 4 | 53 | 11 | B | 494 | 4 | 54 | 12 | B | 495 | 4 | 57 | 12 | B |
| | | | NBR | 496 | 0 | 18 | 3 | A | 493 | 0 | 20 | 3 | A | 496 | 0 | 21 | 3 | A |
| | | | WBL | 487 | 7 | 50 | 12 | B | 491 | 8 | 52 | 13 | B | 496 | 8 | 57 | 12 | B |
| | | | WBR | 8 | 0 | 1 | 0 | A | 10 | 0 | 0 | 0 | A | 10 | 0 | 0 | 0 | A |
| | | | SBL | 24 | 1 | 24 | 21 | C | 27 | 1 | 27 | 21 | C | 27 | 1 | 25 | 22 | C |
| | | | SBT | 342 | 2 | 29 | 8 | A | 345 | 2 | 37 | 8 | A | 345 | 2 | 33 | 8 | A |
| 2 | East Mall and W 16 Ave | Unsignalized Roundabout | EBL | 248 | 1 | 53 | 5 | A | 242 | 1 | 56 | 5 | A | 243 | 1 | 52 | 5 | A |
| | | | EBT | 268 | 1 | 53 | 4 | A | 269 | 1 | 56 | 5 | A | 266 | 1 | 52 | 5 | A |
| | | | EBR | 3 | 1 | 53 | 2 | A | 10 | 1 | 56 | 3 | A | 14 | 1 | 52 | 4 | A |
| | | | NBL | 29 | 0 | 14 | 6 | A | 43 | 0 | 24 | 7 | A | 44 | 0 | 26 | 9 | A |
| | | | NBT | 22 | 0 | 14 | 7 | A | 59 | 0 | 24 | 7 | A | 67 | 0 | 26 | 7 | A |
| | | | NBR | 44 | 0 | 14 | 2 | A | 87 | 0 | 24 | 2 | A | 105 | 0 | 26 | 2 | A |
| | | | WBL | 12 | 1 | 49 | 5 | A | 18 | 1 | 52 | 5 | A | 24 | 1 | 59 | 5 | A |
| | | | WBT | 248 | 1 | 49 | 5 | A | 244 | 1 | 52 | 5 | A | 248 | 1 | 59 | 6 | A |
| | | | WBR | 191 | 1 | 49 | 4 | A | 194 | 1 | 52 | 5 | A | 191 | 1 | 59 | 6 | A |
| | | | SBL | 206 | 0 | 28 | 5 | A | 208 | 1 | 40 | 6 | A | 211 | 2 | 67 | 6 | A |
| | | | SBT | 6 | 0 | 28 | 4 | A | 10 | 1 | 40 | 4 | A | 11 | 2 | 67 | 8 | A |
| | | | SBR | 218 | 0 | 28 | 2 | A | 213 | 1 | 40 | 2 | A | 213 | 2 | 67 | 4 | A |
| 3 | Wesbrook Mall and W 16 Ave | Unsignalized Roundabout | EBL | 200 | 3 | 63 | 10 | B | 218 | 21 | 144 | 36 | D | 235 | 2 | 51 | 8 | A |
| | | | EBT | 205 | 3 | 63 | 6 | A | 226 | 21 | 144 | 15 | B | 238 | 2 | 51 | 5 | A |
| | | | EBR | 114 | 3 | 63 | 6 | A | 116 | 21 | 144 | 13 | B | 106 | 2 | 51 | 4 | A |
| | | | NBL | 54 | 5 | 45 | 13 | B | 47 | 11 | 62 | 18 | C | 42 | 6 | 59 | 19 | C |
| | | | NBT | 154 | 5 | 45 | 12 | B | 230 | 11 | 62 | 18 | C | 219 | 6 | 59 | 17 | C |
| | | | NBR | 97 | 5 | 45 | 9 | A | 72 | 11 | 62 | 14 | B | 57 | 6 | 59 | 4 | A |
| | | | WBL | 227 | 3 | 54 | 9 | A | 349 | 13 | 164 | 21 | C | 70 | 4 | 45 | 9 | A |
| | | | WBT | 179 | 3 | 54 | 5 | A | 183 | 13 | 164 | 10 | A | 180 | 4 | 45 | 8 | A |
| | | | WBR | 224 | 3 | 54 | 7 | A | 241 | 13 | 164 | 11 | B | 243 | 4 | 45 | 11 | B |
| | | | SBL | 272 | 12 | 124 | 19 | C | 264 | 52 | 185 | 51 | F | 287 | 5 | 72 | 12 | B |
| | | | SBT | 98 | 12 | 124 | 19 | C | 121 | 52 | 185 | 53 | F | 94 | 5 | 72 | 13 | B |
| | | | SBR | 218 | 12 | 124 | 3 | A | 226 | 52 | 185 | 6 | A | 238 | 5 | 72 | 3 | A |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | 2024: Stop Controlled (Hampton Pl/Binning Rd) 2035: Pedestrian Signal Control | EBT | 572 | 2 | 45 | 2 | A | 563 | 3 | 51 | 3 | A | 562 | 0 | 18 | 13 | B |
| | | | EBR | - | - | - | - | | - | - | - | - | | 21 | 0 | 18 | 14 | B |
| | | | NBR | 118 | 1 | 27 | 6 | A | 295 | 6 | 53 | 10 | B | 303 | 5 | 58 | 7 | A |
| | | | WBL | - | - | - | - | | - | - | - | - | | 284 | 21 | 187 | 19 | B |
| | | | WBT | 582 | 6 | 100 | 6 | A | 709 | 26 | 232 | 13 | B | 428 | 21 | 186 | 18 | B |
| | | | WBR | 60 | 0 | 0 | 3 | A | 60 | 0 | 0 | 3 | A | 61 | 0 | 0 | 11 | B |
| | | | SBR | 49 | 0 | 6 | 10 | B | 63 | 0 | 8 | 12 | B | 63 | 0 | 1 | 6 | A |
| 5 | Wesbrook Mall and Hampton Pl | Stop Controlled (Hampton Pl) | NBT | 532 | 0 | 1 | 0 | A | 639 | 0 | 22 | 1 | A | 645 | 0 | 5 | 0 | A |
| | | | NBR | 47 | 0 | 11 | 2 | A | 50 | 0 | 35 | 3 | A | 51 | 0 | 17 | 4 | A |
| | | | WBL | 43 | 1 | 18 | 12 | B | 45 | 1 | 21 | 16 | C | 45 | 0 | 18 | 13 | B |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | WBR | 29 | 1 | 19 | 6 | A | 29 | 1 | 22 | 8 | A | 29 | 0 | 19 | 2 | A |
| | | | SBL | 14 | 0 | 13 | 5 | A | 13 | 9 | 101 | 8 | A | 13 | 0 | 13 | 7 | A |
| | | | SBT | 534 | 0 | 13 | 1 | A | 562 | 9 | 101 | 9 | B | 564 | 0 | 13 | 1 | A |
| 6 | Wesbrook Mall and Berton Ave | Stop Controlled (Berton Ave) | NBL | 0 | 7 | 105 | 0 | A | 0 | 23 | 137 | 0 | A | 0 | 5 | 77 | 0 | A |
| | | | NBT | 257 | 7 | 103 | 15 | B | 296 | 22 | 135 | 30 | D | 259 | 6 | 77 | 10 | B |
| | | | NBR | 19 | 8 | 105 | 12 | B | 11 | 23 | 137 | 24 | C | 17 | 6 | 77 | 4 | A |
| | | | WBL | 0 | 1 | 26 | 0 | A | 0 | 4 | 41 | 43 | D | 0 | 3 | 36 | 29 | D |
| | | | WBT | 0 | 1 | 26 | 0 | A | 1 | 4 | 41 | 65 | E | 35 | 3 | 36 | 21 | C |
| | | | WBR | 50 | 1 | 26 | 15 | B | 58 | 4 | 41 | 41 | E | 60 | 3 | 36 | 21 | C |
| | | | SBL | 59 | 2 | 84 | 4 | A | 108 | 12 | 154 | 6 | A | 37 | 1 | 25 | 3 | A |
| | | | SBT | 221 | 2 | 84 | 3 | A | 313 | 12 | 154 | 6 | A | 100 | 1 | 25 | 2 | A |
| | | | SBR | 163 | 2 | 84 | 3 | A | 166 | 12 | 154 | 6 | A | 133 | 1 | 25 | 4 | A |
| 7 | Berton Ave and Binning Rd | All Way Stop Controlled | EBL | 25 | 0 | 29 | 6 | A | 26 | 1 | 32 | 9 | A | 26 | 1 | 26 | 9 | A |
| | | | EBR | 3 | 0 | 19 | 5 | A | 57 | 0 | 21 | 5 | A | 19 | 0 | 19 | 5 | A |
| | | | NBL | 0 | 0 | 0 | 0 | A | 21 | 0 | 0 | 0 | A | 25 | 0 | 0 | 0 | A |
| | | | NBT | 93 | 0 | 0 | 0 | A | 269 | 0 | 0 | 0 | A | 277 | 0 | 0 | 0 | A |
| | | | SBT | - | - | - | - | | - | - | - | - | | 245 | 0 | 0 | 0 | A |
| | | | SBR | - | - | - | - | | - | - | - | - | | 59 | 0 | 0 | 0 | A |
| 8 | Birney Ave and Ross Dr | Stop Controlled (Birney Ave) | NBT | 56 | 0 | 20 | 1 | A | 104 | 0 | 20 | 1 | A | 129 | 0 | 20 | 1 | A |
| | | | NBR | 14 | 0 | 20 | 1 | A | 22 | 0 | 20 | 1 | A | 28 | 0 | 20 | 1 | A |
| | | | WBL | 23 | 1 | 18 | 5 | A | 26 | 1 | 26 | 6 | A | 26 | 1 | 24 | 6 | A |
| | | | WBR | 38 | 1 | 24 | 5 | A | 84 | 2 | 33 | 6 | A | 87 | 2 | 30 | 6 | A |
| | | | SBL | 0 | 0 | 0 | 0 | A | 5 | 0 | 2 | 1 | A | 6 | 0 | 5 | 1 | A |
| | | | SBT | 21 | 0 | 0 | 0 | A | 33 | 0 | 0 | 0 | A | 44 | 0 | 1 | 0 | A |
| 9 | Birney Ave and Webber Lane | Stop Controlled (Webber Lane) | EBL | 8 | 0 | 5 | 1 | A | 8 | 0 | 5 | 1 | A | 8 | 0 | 7 | 1 | A |
| | | | EBT | 6 | 0 | 5 | 0 | A | 3 | 0 | 5 | 0 | A | 9 | 0 | 7 | 0 | A |
| | | | WBT | 6 | 0 | 32 | 0 | A | 11 | 1 | 34 | 0 | A | 10 | 1 | 38 | 0 | A |
| | | | WBR | 5 | 0 | 9 | 2 | A | 5 | 0 | 8 | 2 | A | 6 | 0 | 7 | 2 | A |
| | | | SBL | 96 | 0 | 21 | 2 | A | 104 | 0 | 25 | 3 | A | 101 | 0 | 28 | 3 | A |
| | | | SBR | 55 | 0 | 21 | 2 | A | 75 | 0 | 25 | 3 | A | 79 | 0 | 28 | 3 | A |
| 10 | Birney Ave and Shrum Lane | Stop Controlled (Shrum Lane) | EBL | 0 | 0 | 1 | 0 | A | 0 | 3 | 43 | 0 | A | 0 | 0 | 0 | 0 | A |
| | | | EBT | 102 | 0 | 0 | 1 | A | 105 | 2 | 38 | 24 | C | 110 | 0 | 0 | 0 | A |
| | | | WBT | 12 | 0 | 0 | 1 | A | 15 | 0 | 0 | 1 | A | 16 | 0 | 1 | 1 | A |
| | | | WBR | 24 | 0 | 5 | 1 | A | 36 | 0 | 7 | 1 | A | 35 | 0 | 7 | 1 | A |
| | | | SBL | 37 | 0 | 17 | 10 | B | 22 | 6 | 51 | 116 | F | 24 | 0 | 17 | 13 | B |
| | | | SBR | 0 | 0 | 17 | 0 | A | 0 | 6 | 51 | 0 | A | 0 | 0 | 17 | 0 | A |
| 11 | Wesbrook Mall and Birney Ave | Stop Controlled | EBL | 110 | 7 | 47 | 25 | C | 69 | 21 | 61 | 62 | F | 82 | 4 | 44 | 17 | C |
| | | | EBT | 3 | 7 | 49 | 29 | D | 30 | 22 | 62 | 58 | F | 26 | 4 | 44 | 15 | C |
| | | | EBR | 25 | 7 | 48 | 24 | C | 25 | 22 | 62 | 66 | F | 26 | 4 | 44 | 15 | C |
| | | | NBL | 29 | 3 | 40 | 10 | A | 41 | 12 | 77 | 21 | C | 41 | 2 | 36 | 8 | A |
| | | | NBT | 122 | 3 | 40 | 11 | B | 200 | 12 | 77 | 20 | C | 139 | 2 | 36 | 8 | A |
| | | | NBR | 32 | 3 | 40 | 9 | A | 39 | 12 | 77 | 16 | C | 16 | 2 | 36 | 8 | A |
| | | | WBL | 28 | 2 | 34 | 20 | C | 39 | 7 | 46 | 43 | E | 38 | 2 | 32 | 16 | C |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | WBT | 6 | 2 | 34 | 19 | C | 11 | 7 | 46 | 41 | E | 10 | 2 | 32 | 18 | C |
| | | | WBR | 44 | 2 | 34 | 18 | C | 40 | 7 | 46 | 43 | E | 57 | 2 | 32 | 13 | B |
| | | | SBL | 83 | 8 | 80 | 17 | C | 89 | 23 | 120 | 29 | D | 52 | 2 | 46 | 8 | A |
| | | | SBT | 138 | 8 | 80 | 16 | C | 222 | 24 | 120 | 27 | D | 49 | 1 | 46 | 8 | A |
| | | | SBR | 0 | 8 | 80 | 0 | A | 0 | 23 | 120 | 0 | A | 0 | 1 | 46 | 0 | A |
| 12 | Binning Rd and Birney Ave | Stop Controlled (Birney Ave) | EBL | 35 | 0 | 14 | 7 | A | 62 | 0 | 16 | 8 | A | 58 | 0 | 18 | 10 | A |
| | | | EBR | 23 | 0 | 14 | 6 | A | 14 | 0 | 16 | 7 | A | 16 | 0 | 18 | 8 | A |
| | | | NBL | 10 | 0 | 4 | 0 | A | 0 | 0 | 6 | 0 | A | 39 | 0 | 21 | 1 | A |
| | | | NBT | 59 | 0 | 4 | 0 | A | 227 | 0 | 6 | 1 | A | 244 | 0 | 21 | 1 | A |
| | | | SBT | 3 | 0 | 0 | 0 | A | 58 | 0 | 3 | 0 | A | 226 | 0 | 7 | 0 | A |
| | | | SBR | 0 | 0 | 0 | 0 | A | 0 | 0 | 3 | 0 | A | 38 | 0 | 7 | 1 | A |
| 13 | Gray Ave and Ross Dr | Stop Controlled (Gray Ave) | NBT | 26 | 0 | 0 | 0 | A | 69 | 0 | 0 | 0 | A | 88 | 0 | 0 | 0 | A |
| | | | NBR | 1 | 0 | 0 | 0 | A | 12 | 0 | 0 | 0 | A | 26 | 0 | 0 | 0 | A |
| | | | WBL | 0 | 0 | 27 | 0 | A | 0 | 1 | 28 | 0 | A | 0 | 1 | 30 | 0 | A |
| | | | WBR | 30 | 0 | 24 | 5 | A | 48 | 1 | 25 | 6 | A | 62 | 1 | 27 | 6 | A |
| | | | SBL | 7 | 0 | 3 | 1 | A | 15 | 0 | 4 | 1 | A | 25 | 0 | 5 | 0 | A |
| | | | SBT | 22 | 0 | 1 | 0 | A | 27 | 0 | 0 | 0 | A | 31 | 0 | 1 | 0 | A |
| 14 | Wesbrook Mall and Gray Ave | All Way Stop Controlled | EBL | 31 | 1 | 26 | 11 | B | 39 | 2 | 35 | 17 | C | 21 | 1 | 28 | 11 | B |
| | | | EBT | 17 | 1 | 26 | 13 | B | 21 | 2 | 35 | 16 | C | 30 | 1 | 28 | 12 | B |
| | | | EBR | 32 | 1 | 26 | 10 | B | 44 | 2 | 35 | 15 | B | 44 | 1 | 28 | 10 | A |
| | | | NBL | 48 | 0 | 22 | 2 | A | 49 | 2 | 32 | 4 | A | 32 | 2 | 29 | 8 | A |
| | | | NBT | 126 | 0 | 22 | 1 | A | 165 | 2 | 33 | 2 | A | 122 | 2 | 29 | 7 | A |
| | | | NBR | 35 | 0 | 22 | 6 | A | 118 | 2 | 32 | 7 | A | 71 | 2 | 29 | 8 | A |
| | | | WBL | 29 | 0 | 22 | 5 | A | 70 | 4 | 45 | 14 | B | 40 | 1 | 32 | 5 | A |
| | | | WBT | 4 | 0 | 22 | 2 | A | 12 | 4 | 45 | 14 | B | 55 | 1 | 32 | 4 | A |
| | | | WBR | 24 | 0 | 22 | 10 | A | 79 | 4 | 45 | 17 | C | 53 | 1 | 32 | 10 | B |
| | | | SBL | 44 | 2 | 33 | 7 | A | 88 | 4 | 44 | 10 | A | 11 | 1 | 28 | 7 | A |
| | | | SBT | 81 | 2 | 32 | 7 | A | 132 | 5 | 45 | 9 | A | 78 | 1 | 28 | 6 | A |
| | | | SBR | 66 | 2 | 32 | 2 | A | 66 | 4 | 45 | 4 | A | 22 | 1 | 28 | 7 | A |
| 15 | Gray Ave and Binning Rd | Stop Controlled (Gray Ave) | EBL | 46 | 0 | 20 | 6 | A | 104 | 1 | 26 | 7 | A | 112 | 1 | 26 | 9 | A |
| | | | EBR | 0 | 0 | 20 | 0 | A | 0 | 1 | 26 | 0 | A | 33 | 1 | 26 | 10 | A |
| | | | NBL | 19 | 0 | 3 | 0 | A | 19 | 0 | 2 | 0 | A | 48 | 0 | 21 | 1 | A |
| | | | NBT | 23 | 0 | 21 | 0 | A | 123 | 0 | 32 | 0 | A | 170 | 1 | 41 | 1 | A |
| | | | SBT | 26 | 0 | 0 | 0 | A | 72 | 0 | 0 | 0 | A | 122 | 0 | 7 | 0 | A |
| | | | SBR | 0 | 0 | 0 | 0 | A | 0 | 0 | 0 | 0 | A | 118 | 0 | 7 | 1 | A |
| 16 | Wesbrook Mall and Ross Drive | All Way Stop Controlled | EBL | 30 | 0 | 14 | 9 | A | 32 | 1 | 20 | 13 | B | 16 | 0 | 16 | 8 | A |
| | | | EBR | 12 | 0 | 14 | 7 | A | 24 | 1 | 20 | 12 | B | 27 | 0 | 16 | 7 | A |
| | | | NBL | 31 | 3 | 44 | 8 | A | 78 | 14 | 85 | 17 | C | 96 | 7 | 63 | 12 | B |
| | | | NBT | 179 | 3 | 44 | 11 | B | 300 | 14 | 85 | 18 | C | 209 | 7 | 63 | 14 | B |
| | | | SBT | 118 | 1 | 32 | 6 | A | 207 | 3 | 40 | 8 | A | 123 | 0 | 23 | 0 | A |
| | | | SBR | 24 | 1 | 31 | 5 | A | 39 | 3 | 40 | 7 | A | 39 | 0 | 23 | 6 | A |
| 17 | Wesbrook Mall & Binning Rd | Uncontrolled | NBT | 203 | 0 | 0 | 0 | A | 331 | 0 | 24 | 1 | A | 257 | 0 | 1 | 1 | A |
| | | | NBR | 42 | 0 | 0 | 0 | A | 120 | 0 | 24 | 1 | A | 196 | 0 | 1 | 1 | A |

| | | | | Present | | | | | Do Nothing | | | | | With Improvements | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No** | **Intersection Name** | **Intersection Type** | **Turn** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** | **Turn Volume** | **Average Queue Length** | **Max. Queue Length** | **Vehicle Delay** | **LOS** |
| | | | WBL | 20 | 0 | 8 | 1 | A | 87 | 0 | 22 | 4 | A | 139 | 1 | 33 | 4 | A |
| | | | WBR | 7 | 0 | 6 | 1 | A | 49 | 0 | 24 | 3 | A | 50 | 0 | 31 | 2 | A |
| | | | SBL | 0 | 0 | 0 | 0 | A | 44 | 0 | 19 | 3 | A | 13 | 0 | 15 | 4 | A |
| | | | SBT | 130 | 0 | 0 | 0 | A | 186 | 0 | 14 | 0 | A | 138 | 0 | 11 | 0 | A |
| 18 | Wesbrook Mall & TRIUMF access | Unsignalized Mini Roundabout | NBT | 143 | 0 | 22 | 2 | A | 322 | 1 | 38 | 3 | A | 320 | 1 | 52 | 3 | A |
| | | | NBR | 32 | 0 | 22 | 1 | A | 34 | 1 | 38 | 2 | A | 34 | 1 | 52 | 3 | A |
| | | | WBL | 38 | 0 | 11 | 2 | A | 38 | 0 | 24 | 5 | A | 38 | 1 | 24 | 5 | A |
| | | | WBR | 102 | 0 | 11 | 2 | A | 130 | 0 | 24 | 5 | A | 130 | 1 | 24 | 6 | A |
| | | | SBL | 49 | 0 | 21 | 2 | A | 61 | 1 | 45 | 2 | A | 62 | 1 | 61 | 5 | A |
| | | | SBT | 101 | 0 | 21 | 2 | A | 211 | 1 | 45 | 3 | A | 211 | 1 | 61 | 5 | A |
| 19 | South West Marine Dr and Wesbrook Mall | Signalized | EBL | 26 | 3 | 49 | 15 | B | 65 | 5 | 61 | 22 | C | 61 | 5 | 63 | 20 | C |
| | | | EBT | 806 | 3 | 49 | 5 | A | 809 | 5 | 61 | 7 | A | 815 | 5 | 63 | 6 | A |
| | | | WBT | 920 | 11 | 76 | 14 | B | 913 | 15 | 92 | 17 | B | 913 | 14 | 93 | 17 | B |
| | | | WBR | 150 | 0 | 18 | 1 | A | 291 | 0 | 30 | 2 | A | 292 | 0 | 30 | 2 | A |
| | | | SBL | 110 | 4 | 46 | 19 | B | 201 | 10 | 82 | 22 | C | 200 | 8 | 71 | 21 | C |
| | | | SBR | 27 | 1 | 42 | 7 | A | 47 | 6 | 72 | 10 | B | 46 | 7 | 71 | 4 | A |

## 10.2 Route Travel Time

Figure 10.1 presents changes in modelled travel time for all vehicles while Figure 10.2 presents changes in modelled bus travel time in the AM peak.

With respect to vehicular travel time, the key modelling results are:

- Travel time generally increases in future year cases compared to present year for both all vehicles and busses only. Changes in travel time during the weekend peak follow the same trend as the AM and PM peaks.
- For all vehicles:
  - In the *Do Nothing* scenario, the percentage increase in travel time for all vehicles is as follows: 6% for northbound (NB) travel along Wesbrook Mall, 12% for southbound (SB) travel along Wesbrook Mall, 7% for eastbound (EB) travel along West 16th Avenue and 9% for westbound (WB) travel along West 16th Avenue.
  - In the *With Improvements* scenario, the percentage increase in travel time for all vehicles is as follows: 17% for northbound (NB) travel along Wesbrook Mall, 7% for southbound (SB) travel along Wesbrook Mall, 7% for eastbound (EB) travel along West 16th Avenue and 11% for westbound (WB) travel along West 16th Avenue.
  - In general, the change in travel time along Wesbrook Mall is greater than that along West 16th Avenue. This can be attributed to the increased demand along the local streets.
  - Owing to the additional route choice afforded by adding a westbound left turn (WBL) movement at West 16th Avenue and Binning Road, travel time along southbound Wesbrook Mall decreases in the *With Improvements* scenario.
- For buses:
  - In the *Do Nothing* scenario, the percentage change in travel time for all vehicles is as follows: 6% for northbound (NB) travel along Wesbrook Mall, 12% for southbound (SB) travel along Wesbrook Mall, 1% for eastbound (EB) travel along West 16th Avenue and 2% for westbound (WB) travel along West 16th Avenue.
  - In the *With Improvements* scenario, the percentage increase in travel time for all vehicles is as follows: 17% for northbound (NB) travel along Wesbrook Mall, 7% for southbound (SB) travel along Wesbrook Mall, 1% for eastbound (EB) travel along West 16th Avenue and 3% for westbound (WB) travel along West 16th Avenue.
  - Despite the addition of a dedicated bus lane, bus travel time does not improve in future year cases compared to the present year. This may be attributable to the fact that buses need to queue in the general lane at West 16th Avenue and Wesbrook Mall.
  - Travel time changes in the *With Improvements* scenario compared to the *Do Nothing* scenario can be attributed to two factors: the introduction of a bus-only lane, which decreases travel time, and the additional passenger service time at the new transit stops, which increases travel time.

**Figure 10.1: Changes in modelled travel time for all vehicles in the Weekend peak**

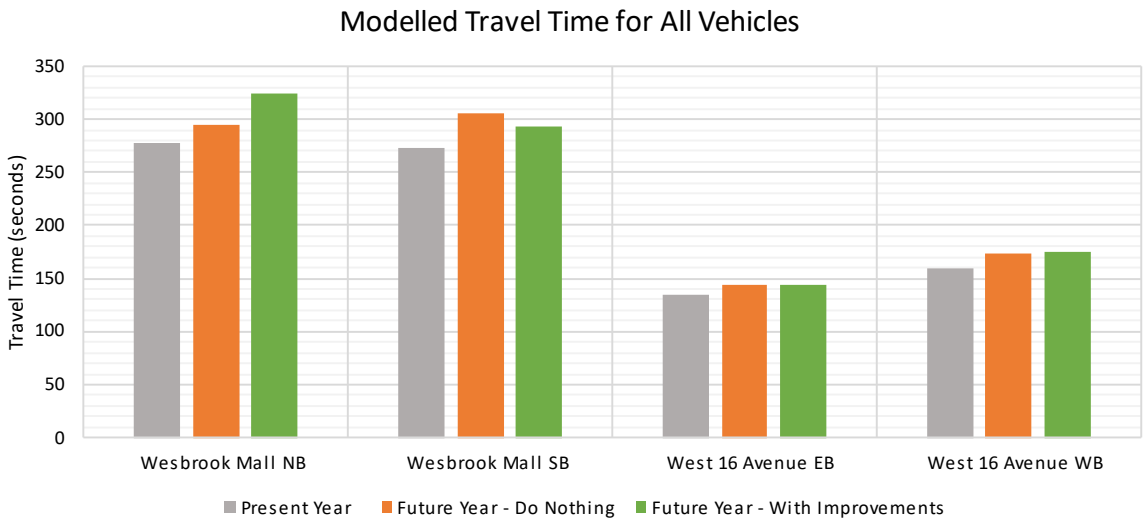
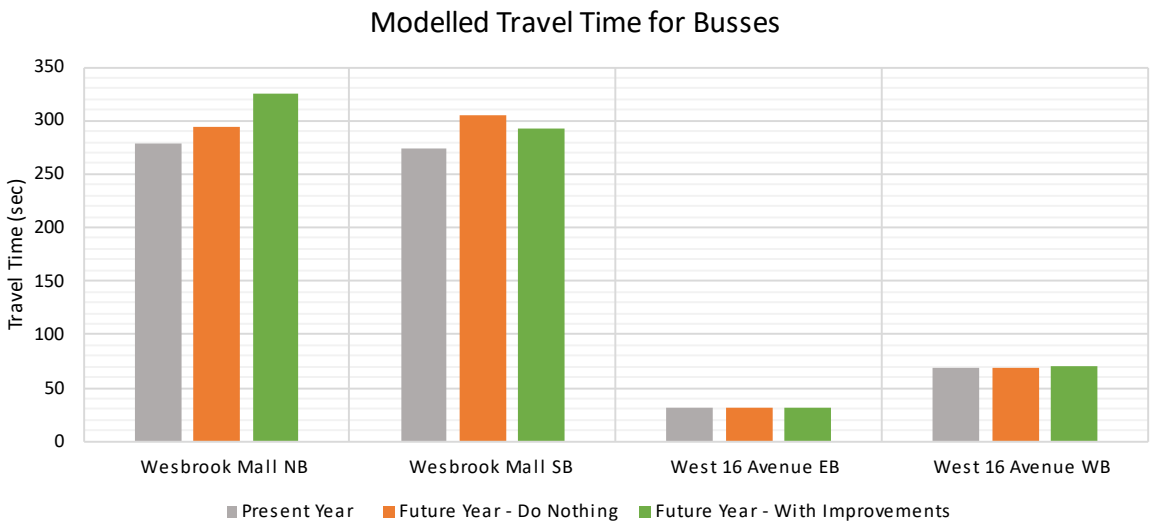



**Figure 10.2: Changes in modelled travel time for busses in the Weekend peak**



# 11 Summary, Conclusions and Limitations

## 11.1 Drivers of Vehicle Demand and Resulting Constraints

- The most notable increases in vehicle demand (from 2024 to 2035) were observed along West 16th Avenue and Wesbrook Mall, which presents as:
  - A significant capacity constraint at the roundabout at West 16th Avenue and Wesbrook Mall, causing a bottleneck and significant queueing along southbound Wesbrook Mall in the *Do Nothing* scenario.
  - Degraded LOS on the minor approaches of intersections along Wesbrook Mall, particularly in the *Do Nothing* scenario.
- Temporally, demand is higher during the PM peak, so infrastructural decisions should be driven by PM peak performance.

## 11.2 Assessment of Considered Infrastructure Improvements

### 11.2.1 Key Beneficial Improvements

- The implementation of a pedestrian-controlled, fully signalized intersection at West 16th Avenue and Binning Road, and associated affordance for drivers to make a westbound left (WBL) turn, notably improves network performance by providing drivers with an additional route option (through Binning Road) to access the Wesbrook Place neighbourhood.
  - While the signalization increases delay and queues experienced by drivers along West 16th Avenue, the potential safety improvements for vehicles and pedestrians should be noted.
- The implementation of right-turn only lanes along northbound Wesbrook Mall at West 16th Avenue shows notable improvements in travel experience for right-turning traffic.
- Bus priority measures at the Wesbrook Mall and Southwest Marine Drive intersection has resulted in a decrease in delay experienced by buses.

### 11.2.2 Other Improvements

- The effectiveness of bus-only lanes along Wesbrook Mall is limited by the fact that busses must queue with general traffic at Wesbrook Mall and West 16th Avenue. As a result, there are limited to no benefits provided to bus travel time through Wesbrook Place as a result of the bus only lanes.
- The implementation of in-lane bus stops along West 16th Avenue between Wesbrook and East Mall helps maintain speed and reliability by eliminating the need for buses to merge in and out of traffic. This allows for smoother traffic flow, benefitting both passengers and overall traffic operations.

## 11.3 Limitations

While traffic modelling attempts to reflect real world conditions, it has the following limitations:

- The model does not incorporate robust walking and cycling analysis, which can result in lower delays than reality.
- The model captures future traffic growth based on RTM version 3.6. However, the VISSIM modeling cannot predict how external changes will impact future volumes beyond the specific growth assumptions in the RTM.
- There is no weekend peak model in the RTM, so weekend analysis is an estimate using an average of the AM and PM peak hours.

# Appendices

# A. Turn Movement Calibration Results

**Table 11.1: Turn Movement Calibration Results for AM peak**

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| 2 | East Mall and W 16 Ave | EBL | EB | 382 | 324 | 1 | 4 | 383 | 328 | 3.1 | 1.9 | 2.9 |
| | | EBT | EB | 236 | 210 | 18 | 30 | 254 | 240 | 1.7 | 2.4 | 0.9 |
| | | EBR | EB | 21 | 32 | 0 | 2 | 21 | 34 | 2.1 | 2.0 | 2.5 |
| | | NBL | NB | 19 | 26 | 2 | 2 | 21 | 28 | 1.5 | 0.0 | 1.4 |
| | | NBT | NB | 44 | 62 | 0 | 1 | 44 | 63 | 2.5 | 1.4 | 2.6 |
| | | NBR | NB | 40 | 54 | 1 | 3 | 41 | 57 | 2.0 | 1.4 | 2.3 |
| | | WBL | WB | 13 | 34 | 0 | 3 | 13 | 37 | 4.3 | 2.4 | 4.8 |
| | | WBT | WB | 195 | 131 | 15 | 19 | 210 | 150 | 5.0 | 1.0 | 4.5 |
| | | WBR | WB | 167 | 202 | 6 | 1 | 173 | 203 | 2.6 | 2.7 | 2.2 |
| | | SBL | SB | 104 | 120 | 1 | 1 | 105 | 121 | 1.5 | 0.0 | 1.5 |
| | | SBT | SB | 31 | 14 | 1 | 0 | 32 | 14 | 3.6 | 1.4 | 3.8 |
| | | SBR | SB | 73 | 81 | 3 | 4 | 76 | 85 | 0.9 | 0.5 | 1.0 |
| 3 | Wesbrook Mall and W 16 Ave | EBL | EB | 201 | 148 | 18 | 27 | 219 | 175 | 4.0 | 1.9 | 3.1 |
| | | EBT | EB | 132 | 136 | 2 | 2 | 134 | 138 | 0.3 | 0.0 | 0.3 |
| | | EBR | EB | 47 | 99 | 0 | 4 | 47 | 103 | 6.1 | 2.8 | 6.5 |
| | | NBL | NB | 27 | 33 | 0 | 0 | 27 | 33 | 1.1 | 0.0 | 1.1 |
| | | NBT | NB | 156 | 146 | 24 | 13 | 180 | 159 | 0.8 | 2.6 | 1.6 |
| | | NBR | NB | 69 | 36 | 0 | 1 | 69 | 37 | 4.6 | 1.4 | 4.4 |
| | | WBL | WB | 228 | 171 | 0 | 5 | 228 | 176 | 4.0 | 3.2 | 3.7 |
| | | WBT | WB | 230 | 218 | 0 | 2 | 230 | 220 | 0.8 | 2.0 | 0.7 |
| | | WBR | WB | 201 | 267 | 15 | 10 | 216 | 277 | 4.3 | 1.4 | 3.9 |
| | | SBL | SB | 91 | 140 | 14 | 13 | 105 | 153 | 4.6 | 0.3 | 4.2 |
| | | SBT | SB | 122 | 83 | 18 | 18 | 140 | 101 | 3.9 | 0.0 | 3.6 |
| | | SBR | SB | 118 | 117 | 21 | 20 | 139 | 137 | 0.1 | 0.2 | 0.2 |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | EBT | EB | 292 | 311 | 16 | 16 | 308 | 327 | 1.1 | 0.0 | 1.1 |
| | | NBR | NB | 119 | 139 | 3 | 4 | 122 | 143 | 1.8 | 0.5 | 1.8 |
| | | WBT | WB | 612 | 608 | 15 | 17 | 627 | 625 | 0.2 | 0.5 | 0.1 |
| | | WBR | WB | 49 | 50 | 0 | 0 | 49 | 50 | 0.1 | 0.0 | 0.1 |
| | | SBR | SB | 47 | 48 | 0 | 0 | 47 | 48 | 0.1 | 0.0 | 0.1 |
| 5 | Wesbrook Mall and Hampton Pl | NBT | NB | 521 | 520 | 57 | 50 | 578 | 570 | 0.0 | 1.0 | 0.3 |
| | | NBR | NB | 36 | 42 | 0 | 0 | 36 | 42 | 1.0 | 0.0 | 1.0 |
| | | WBL | WB | 49 | 53 | 0 | 0 | 49 | 53 | 0.6 | 0.0 | 0.6 |
| | | WBR | WB | 38 | 36 | 0 | 0 | 38 | 36 | 0.3 | 0.0 | 0.3 |
| | | SBL | SB | 9 | 6 | 0 | 0 | 9 | 6 | 1.1 | 0.0 | 1.1 |
| | | SBT | SB | 282 | 285 | 53 | 51 | 335 | 336 | 0.2 | 0.3 | 0.1 |
| 6 | Wesbrook Mall and Berton Ave | NBL | NB | 10 | 0 | 0 | 0 | 10 | 0 | 4.5 | 0.0 | 4.5 |
| | | NBT | NB | 205 | 171 | 23 | 12 | 228 | 183 | 2.5 | 2.6 | 3.1 |
| | | NBR | NB | 9 | 18 | 0 | 0 | 9 | 18 | 2.4 | 0.0 | 2.4 |
| | | WBL | WB | 8 | 1 | 0 | 0 | 8 | 1 | 3.3 | 0.0 | 3.3 |

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| | | WBT | WB | 2 | 0 | 0 | 0 | 2 | 0 | 2.0 | 0.0 | 2.0 |
| | | WBR | WB | 47 | 44 | 1 | 3 | 48 | 47 | 0.4 | 1.4 | 0.1 |
| | | SBL | SB | 46 | 47 | 0 | 9 | 46 | 56 | 0.1 | 4.2 | 1.4 |
| | | SBT | SB | 205 | 191 | 16 | 13 | 221 | 204 | 1.0 | 0.8 | 1.2 |
| | | SBR | SB | 146 | 114 | 2 | 6 | 148 | 120 | 2.8 | 2.0 | 2.4 |
| 9 | Birney Ave and Webber Lane | EBL | EB | 22 | 26 | 2 | 0 | 24 | 26 | 0.8 | 2.0 | 0.4 |
| | | EBT | EB | 17 | 10 | 0 | 0 | 17 | 10 | 1.9 | 0.0 | 1.9 |
| | | WBT | WB | 23 | 15 | 0 | 0 | 23 | 15 | 1.8 | 0.0 | 1.8 |
| | | WBR | WB | 14 | 0 | 0 | 0 | 14 | 0 | 5.3 | 0.0 | 5.3 |
| | | SBL | SB | 32 | 38 | 0 | 2 | 32 | 40 | 1.0 | 2.0 | 1.3 |
| | | SBR | SB | 22 | 40 | 3 | 2 | 25 | 42 | 3.2 | 0.6 | 2.9 |
| 10 | Birney Ave and Shrum Lane | EBL | EB | 1 | 0 | 0 | 0 | 1 | 0 | 1.4 | 0.0 | 1.4 |
| | | EBT | EB | 48 | 48 | 0 | 3 | 48 | 51 | 0.0 | 2.4 | 0.4 |
| | | WBT | WB | 28 | 15 | 0 | 0 | 28 | 15 | 2.8 | 0.0 | 2.8 |
| | | WBR | WB | 27 | 27 | 1 | 0 | 28 | 27 | 0.0 | 1.4 | 0.2 |
| | | SBL | SB | 87 | 56 | 4 | 2 | 91 | 58 | 3.7 | 1.2 | 3.8 |
| | | SBR | SB | 9 | 0 | 0 | 0 | 9 | 0 | 4.2 | 0.0 | 4.2 |
| 11 | Wesbrook Mall and Birney Ave | EBL | EB | 90 | 62 | 3 | 4 | 93 | 66 | 3.2 | 0.5 | 3.0 |
| | | EBT | EB | 26 | 29 | 0 | 1 | 26 | 30 | 0.6 | 1.4 | 0.8 |
| | | EBR | EB | 19 | 12 | 1 | 0 | 20 | 12 | 1.8 | 1.4 | 2.0 |
| | | NBL | NB | 24 | 27 | 1 | 0 | 25 | 27 | 0.6 | 1.4 | 0.4 |
| | | NBT | NB | 95 | 97 | 19 | 6 | 114 | 103 | 0.2 | 3.7 | 1.1 |
| | | NBR | NB | 13 | 20 | 1 | 1 | 14 | 21 | 1.7 | 0.0 | 1.7 |
| | | WBL | WB | 17 | 26 | 0 | 2 | 17 | 28 | 1.9 | 2.0 | 2.3 |
| | | WBT | WB | 8 | 15 | 0 | 0 | 8 | 15 | 2.1 | 0.0 | 2.1 |
| | | WBR | WB | 39 | 30 | 1 | 3 | 40 | 33 | 1.5 | 1.4 | 1.2 |
| | | SBL | SB | 67 | 68 | 0 | 4 | 67 | 72 | 0.1 | 2.8 | 0.6 |
| | | SBT | SB | 123 | 124 | 16 | 9 | 139 | 133 | 0.1 | 2.0 | 0.5 |
| | | SBR | SB | 23 | 0 | 0 | 0 | 23 | 0 | 6.8 | 0.0 | 6.8 |
| 12 | Binning Rd and Birney Ave | EBL | EB | 46 | 54 | 0 | 1 | 46 | 55 | 1.1 | 1.4 | 1.3 |
| | | EBR | EB | 41 | 21 | 1 | 0 | 42 | 21 | 3.6 | 1.4 | 3.7 |
| | | NBL | NB | 22 | 13 | 1 | 0 | 23 | 13 | 2.2 | 1.4 | 2.4 |
| | | NBT | NB | 73 | 59 | 3 | 2 | 76 | 61 | 1.7 | 0.6 | 1.8 |
| | | SBT | SB | 20 | 26 | 0 | 5 | 20 | 31 | 1.3 | 3.2 | 2.2 |
| | | SBR | SB | 13 | 1 | 0 | 0 | 13 | 1 | 4.5 | 0.0 | 4.5 |
| 14 | Wesbrook Mall and Gray Ave | EBL | EB | 19 | 27 | 3 | 1 | 22 | 28 | 1.7 | 1.4 | 1.2 |
| | | EBT | EB | 12 | 22 | 0 | 1 | 12 | 23 | 2.4 | 1.4 | 2.6 |
| | | EBR | EB | 24 | 23 | 1 | 1 | 25 | 24 | 0.2 | 0.0 | 0.2 |
| | | NBL | NB | 17 | 21 | 1 | 1 | 18 | 22 | 0.9 | 0.0 | 0.9 |
| | | NBT | NB | 87 | 95 | 18 | 3 | 105 | 98 | 0.8 | 4.6 | 0.7 |
| | | NBR | NB | 17 | 21 | 3 | 1 | 20 | 22 | 0.9 | 1.4 | 0.4 |
| | | WBL | WB | 24 | 18 | 0 | 1 | 24 | 19 | 1.3 | 1.4 | 1.1 |
| | | WBT | WB | 7 | 9 | 1 | 0 | 8 | 9 | 0.7 | 1.4 | 0.3 |

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| | | WBR | WB | 26 | 24 | 0 | 3 | 26 | 27 | 0.4 | 2.4 | 0.2 |
| | | SBL | SB | 24 | 19 | 0 | 2 | 24 | 21 | 1.1 | 2.0 | 0.6 |
| | | SBT | SB | 109 | 121 | 14 | 7 | 123 | 128 | 1.1 | 2.2 | 0.4 |
| | | SBR | SB | 26 | 24 | 3 | 1 | 29 | 25 | 0.4 | 1.4 | 0.8 |
| 16 | Wesbrook Mall and Ross Drive | EBL | EB | 33 | 10 | 0 | 0 | 33 | 10 | 5.0 | 0.0 | 5.0 |
| | | EBR | EB | 18 | 2 | 0 | 0 | 18 | 2 | 5.1 | 0.0 | 5.1 |
| | | NBL | NB | 24 | 63 | 2 | 1 | 26 | 64 | 5.9 | 0.8 | 5.7 |
| | | NBT | NB | 88 | 126 | 23 | 4 | 111 | 130 | 3.7 | 5.2 | 1.7 |
| | | SBT | SB | 131 | 137 | 16 | 10 | 147 | 147 | 0.5 | 1.7 | 0.0 |
| | | SBR | SB | 26 | 25 | 0 | 0 | 26 | 25 | 0.2 | 0.0 | 0.2 |
| 19 | South West Marine Dr and Wesbrook Mall | EBL | EB | 7 | 17 | 3 | 0 | 10 | 17 | 2.9 | 2.4 | 1.9 |
| | | EBT | EB | 385 | 372 | 44 | 41 | 429 | 413 | 0.7 | 0.5 | 0.8 |
| | | WBT | WB | 1260 | 1231 | 39 | 55 | 1299 | 1286 | 0.8 | 2.3 | 0.4 |
| | | WBR | WB | 154 | 192 | 23 | 6 | 177 | 198 | 2.9 | 4.5 | 1.5 |
| | | SBL | SB | 81 | 96 | 11 | 13 | 92 | 109 | 1.6 | 0.6 | 1.7 |
| | | SBR | SB | 22 | 23 | 5 | 0 | 27 | 23 | 0.2 | 3.2 | 0.8 |

**Table 11.2: Turn Movement Calibration Results for PM peak**

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| 2 | East Mall and W 16 Ave | EBL | EB | 103 | 99 | 0 | 0 | 103 | 99 | 0.4 | 0.0 | 0.4 |
| | | EBT | EB | 207 | 181 | 19 | 19 | 226 | 200 | 1.9 | 0.0 | 1.8 |
| | | EBR | EB | 23 | 33 | 0 | 0 | 23 | 33 | 1.9 | 0.0 | 1.9 |
| | | NBL | NB | 20 | 41 | 0 | 0 | 20 | 41 | 3.8 | 0.0 | 3.8 |
| | | NBT | NB | 51 | 55 | 0 | 0 | 51 | 55 | 0.5 | 0.0 | 0.5 |
| | | NBR | NB | 47 | 50 | 0 | 0 | 47 | 50 | 0.4 | 0.0 | 0.4 |
| | | WBL | WB | 13 | 31 | 0 | 0 | 13 | 31 | 3.8 | 0.0 | 3.8 |
| | | WBT | WB | 210 | 198 | 23 | 30 | 233 | 228 | 0.8 | 1.4 | 0.3 |
| | | WBR | WB | 157 | 154 | 0 | 0 | 157 | 154 | 0.2 | 0.0 | 0.2 |
| | | SBL | SB | 220 | 271 | 0 | 0 | 220 | 271 | 3.3 | 0.0 | 3.3 |
| | | SBT | SB | 41 | 6 | 0 | 0 | 41 | 6 | 7.2 | 0.0 | 7.2 |
| | | SBR | SB | 368 | 351 | 0 | 0 | 368 | 351 | 0.9 | 0.0 | 0.9 |
| 3 | Wesbrook Mall and W 16 Ave | EBL | EB | 138 | 149 | 19 | 18 | 157 | 167 | 0.9 | 0.2 | 0.8 |
| | | EBT | EB | 282 | 280 | 0 | 0 | 282 | 280 | 0.1 | 0.0 | 0.1 |
| | | EBR | EB | 54 | 74 | 0 | 0 | 54 | 74 | 2.5 | 0.0 | 2.5 |
| | | NBL | NB | 30 | 35 | 0 | 0 | 30 | 35 | 0.9 | 0.0 | 0.9 |
| | | NBT | NB | 180 | 166 | 13 | 0 | 193 | 166 | 1.1 | 5.1 | 2.0 |
| | | NBR | NB | 145 | 103 | 1 | 0 | 146 | 103 | 3.8 | 1.4 | 3.9 |
| | | WBL | WB | 268 | 245 | 0 | 0 | 268 | 245 | 1.4 | 0.0 | 1.4 |
| | | WBT | WB | 125 | 152 | 0 | 0 | 125 | 152 | 2.3 | 0.0 | 2.3 |
| | | WBR | WB | 141 | 146 | 11 | 10 | 152 | 156 | 0.4 | 0.3 | 0.3 |
| | | SBL | SB | 323 | 360 | 9 | 11 | 332 | 371 | 2.0 | 0.6 | 2.1 |
| | | SBT | SB | 146 | 131 | 15 | 6 | 161 | 137 | 1.3 | 2.8 | 2.0 |

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| | | SBR | SB | 225 | 195 | 23 | 29 | 248 | 224 | 2.1 | 1.2 | 1.6 |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | EBT | EB | 750 | 743 | 10 | 11 | 760 | 754 | 0.3 | 0.3 | 0.2 |
| | | NBR | NB | 114 | 126 | 1 | 0 | 115 | 126 | 1.1 | 1.4 | 1.0 |
| | | WBT | WB | 494 | 498 | 10 | 10 | 504 | 508 | 0.2 | 0.0 | 0.2 |
| | | WBR | WB | 73 | 70 | 0 | 0 | 73 | 70 | 0.4 | 0.0 | 0.4 |
| | | SBR | SB | 40 | 46 | 1 | 0 | 41 | 46 | 0.9 | 1.4 | 0.8 |
| 5 | Wesbrook Mall and Hampton Pl | NBT | NB | 414 | 413 | 43 | 28 | 457 | 441 | 0.0 | 2.5 | 0.8 |
| | | NBR | NB | 44 | 47 | 0 | 0 | 44 | 47 | 0.4 | 0.0 | 0.4 |
| | | WBL | WB | 31 | 30 | 0 | 0 | 31 | 30 | 0.2 | 0.0 | 0.2 |
| | | WBR | WB | 29 | 22 | 0 | 0 | 29 | 22 | 1.4 | 0.0 | 1.4 |
| | | SBL | SB | 20 | 19 | 1 | 1 | 21 | 20 | 0.2 | 0.0 | 0.2 |
| | | SBT | SB | 663 | 658 | 47 | 47 | 710 | 705 | 0.2 | 0.0 | 0.2 |
| 6 | Wesbrook Mall and Berton Ave | NBL | NB | 19 | 11 | 0 | 0 | 19 | 11 | 2.1 | 0.0 | 2.1 |
| | | NBT | NB | 319 | 274 | 14 | 0 | 333 | 274 | 2.6 | 5.3 | 3.4 |
| | | NBR | NB | 18 | 18 | 0 | 0 | 18 | 18 | 0.0 | 0.0 | 0.0 |
| | | WBL | WB | 6 | 2 | 0 | 0 | 6 | 2 | 2.0 | 0.0 | 2.0 |
| | | WBT | WB | 1 | 0 | 0 | 0 | 1 | 0 | 1.4 | 0.0 | 1.4 |
| | | WBR | WB | 36 | 29 | 0 | 0 | 36 | 29 | 1.2 | 0.0 | 1.2 |
| | | SBL | SB | 70 | 78 | 1 | 0 | 71 | 78 | 0.9 | 1.4 | 0.8 |
| | | SBT | SB | 221 | 212 | 14 | 6 | 235 | 218 | 0.6 | 2.5 | 1.1 |
| | | SBR | SB | 177 | 159 | 0 | 0 | 177 | 159 | 1.4 | 0.0 | 1.4 |
| 9 | Birney Ave and Webber Lane | EBL | EB | 27 | 24 | 0 | 0 | 27 | 24 | 0.6 | 0.0 | 0.6 |
| | | EBT | EB | 27 | 11 | 0 | 0 | 27 | 11 | 3.7 | 0.0 | 3.7 |
| | | WBT | WB | 43 | 25 | 0 | 0 | 43 | 25 | 3.1 | 0.0 | 3.1 |
| | | WBR | WB | 24 | 0 | 0 | 0 | 24 | 0 | 6.9 | 0.0 | 6.9 |
| | | SBL | SB | 58 | 54 | 0 | 0 | 58 | 54 | 0.5 | 0.0 | 0.5 |
| | | SBR | SB | 65 | 81 | 0 | 0 | 65 | 81 | 1.9 | 0.0 | 1.9 |
| 10 | Birney Ave and Shrum Lane | EBL | EB | 8 | 0 | 0 | 0 | 8 | 0 | 4.0 | 0.0 | 4.0 |
| | | EBT | EB | 77 | 66 | 0 | 0 | 77 | 66 | 1.3 | 0.0 | 1.3 |
| | | WBT | WB | 55 | 25 | 0 | 0 | 55 | 25 | 4.7 | 0.0 | 4.7 |
| | | WBR | WB | 29 | 28 | 0 | 0 | 29 | 28 | 0.2 | 0.0 | 0.2 |
| | | SBL | SB | 169 | 93 | 1 | 0 | 170 | 93 | 6.6 | 1.4 | 6.7 |
| | | SBR | SB | 12 | 0 | 0 | 0 | 12 | 0 | 4.9 | 0.0 | 4.9 |
| 11 | Wesbrook Mall and Birney Ave | EBL | EB | 162 | 117 | 0 | 0 | 162 | 117 | 3.8 | 0.0 | 3.8 |
| | | EBT | EB | 40 | 6 | 0 | 0 | 40 | 6 | 7.1 | 0.0 | 7.1 |
| | | EBR | EB | 44 | 33 | 1 | 0 | 45 | 33 | 1.8 | 1.4 | 1.9 |
| | | NBL | NB | 35 | 28 | 0 | 0 | 35 | 28 | 1.2 | 0.0 | 1.2 |
| | | NBT | NB | 154 | 154 | 14 | 0 | 168 | 154 | 0.0 | 5.3 | 1.1 |
| | | NBR | NB | 20 | 20 | 1 | 0 | 21 | 20 | 0.0 | 1.4 | 0.2 |
| | | WBL | WB | 14 | 24 | 0 | 0 | 14 | 24 | 2.3 | 0.0 | 2.3 |
| | | WBT | WB | 8 | 25 | 0 | 0 | 8 | 25 | 4.2 | 0.0 | 4.2 |
| | | WBR | WB | 40 | 33 | 0 | 0 | 40 | 33 | 1.2 | 0.0 | 1.2 |
| | | SBL | SB | 74 | 92 | 0 | 0 | 74 | 92 | 2.0 | 0.0 | 2.0 |

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| | | SBT | SB | 112 | 124 | 14 | 6 | 126 | 130 | 1.1 | 2.5 | 0.4 |
| | | SBR | SB | 41 | 0 | 0 | 0 | 41 | 0 | 9.1 | 0.0 | 9.1 |
| 12 | Binning Rd and Birney Ave | EBL | EB | 52 | 36 | 0 | 0 | 52 | 36 | 2.4 | 0.0 | 2.4 |
| | | EBR | EB | 41 | 19 | 1 | 0 | 42 | 19 | 4.0 | 1.4 | 4.2 |
| | | NBL | NB | 18 | 21 | 0 | 0 | 18 | 21 | 0.7 | 0.0 | 0.7 |
| | | NBT | NB | 62 | 72 | 0 | 0 | 62 | 72 | 1.2 | 0.0 | 1.2 |
| | | SBT | SB | 11 | 24 | 0 | 0 | 11 | 24 | 3.1 | 0.0 | 3.1 |
| | | SBR | SB | 16 | 0 | 0 | 0 | 16 | 0 | 5.7 | 0.0 | 5.7 |
| 14 | Wesbrook Mall and Gray Ave | EBL | EB | 27 | 27 | 3 | 0 | 30 | 27 | 0.0 | 2.4 | 0.6 |
| | | EBT | EB | 13 | 37 | 0 | 0 | 13 | 37 | 4.8 | 0.0 | 4.8 |
| | | EBR | EB | 34 | 34 | 1 | 0 | 35 | 34 | 0.0 | 1.4 | 0.2 |
| | | NBL | NB | 56 | 48 | 0 | 0 | 56 | 48 | 1.1 | 0.0 | 1.1 |
| | | NBT | NB | 162 | 154 | 12 | 0 | 174 | 154 | 0.6 | 4.9 | 1.6 |
| | | NBR | NB | 39 | 30 | 0 | 0 | 39 | 30 | 1.5 | 0.0 | 1.5 |
| | | WBL | WB | 31 | 22 | 0 | 0 | 31 | 22 | 1.7 | 0.0 | 1.7 |
| | | WBT | WB | 4 | 7 | 0 | 0 | 4 | 7 | 1.3 | 0.0 | 1.3 |
| | | WBR | WB | 20 | 21 | 0 | 0 | 20 | 21 | 0.2 | 0.0 | 0.2 |
| | | SBL | SB | 30 | 38 | 0 | 0 | 30 | 38 | 1.4 | 0.0 | 1.4 |
| | | SBT | SB | 107 | 104 | 12 | 6 | 119 | 110 | 0.3 | 2.0 | 0.8 |
| | | SBR | SB | 33 | 40 | 3 | 0 | 36 | 40 | 1.2 | 2.4 | 0.6 |
| 16 | Wesbrook Mall and Ross Drive | EBL | EB | 36 | 16 | 0 | 0 | 36 | 16 | 3.9 | 0.0 | 3.9 |
| | | EBR | EB | 22 | 20 | 0 | 0 | 22 | 20 | 0.4 | 0.0 | 0.4 |
| | | NBL | NB | 41 | 52 | 0 | 0 | 41 | 52 | 1.6 | 0.0 | 1.6 |
| | | NBT | NB | 221 | 215 | 12 | 0 | 233 | 215 | 0.4 | 4.9 | 1.2 |
| | | SBT | SB | 132 | 135 | 12 | 6 | 144 | 141 | 0.3 | 2.0 | 0.3 |
| | | SBR | SB | 40 | 24 | 1 | 0 | 41 | 24 | 2.8 | 1.4 | 3.0 |
| 19 | South West Marine Dr and Wesbrook Mall | EBL | EB | 36 | 11 | 0 | 0 | 36 | 11 | 5.2 | 0.0 | 5.2 |
| | | EBT | EB | 1023 | 1062 | 26 | 38 | 1049 | 1100 | 1.2 | 2.1 | 1.6 |
| | | WBT | WB | 431 | 403 | 16 | 28 | 447 | 431 | 1.4 | 2.6 | 0.8 |
| | | WBR | WB | 163 | 193 | 12 | 0 | 175 | 193 | 2.2 | 4.9 | 1.3 |
| | | SBL | SB | 164 | 185 | 13 | 6 | 177 | 191 | 1.6 | 2.3 | 1.0 |
| | | SBR | SB | 15 | 21 | 1 | 0 | 16 | 21 | 1.4 | 1.4 | 1.2 |

**Table 11.3: Turn Movement Calibration Results for Weekend peak**

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| 2 | East Mall and W 16 Ave | EBL | EB | 93 | 244 | 0 | 3 | 93 | 247 | 11.6 | 2.4 | 11.8 |
| | | EBT | EB | 187 | 236 | 18 | 25 | 205 | 261 | 3.4 | 1.5 | 3.7 |
| | | EBR | EB | 21 | 3 | 0 | 0 | 21 | 3 | 5.2 | 0.0 | 5.2 |
| | | NBL | NB | 18 | 29 | 0 | 0 | 18 | 29 | 2.3 | 0.0 | 2.3 |
| | | NBT | NB | 46 | 19 | 0 | 0 | 46 | 19 | 4.7 | 0.0 | 4.7 |
| | | NBR | NB | 43 | 43 | 0 | 1 | 43 | 44 | 0.0 | 1.4 | 0.2 |
| | | WBL | WB | 12 | 12 | 0 | 0 | 12 | 12 | 0.0 | 0.0 | 0.0 |

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| | | WBT | WB | 189 | 209 | 21 | 32 | 210 | 241 | 1.4 | 2.1 | 2.1 |
| | | WBR | WB | 142 | 190 | 0 | 1 | 142 | 191 | 3.7 | 1.4 | 3.8 |
| | | SBL | SB | 198 | 205 | 0 | 1 | 198 | 206 | 0.5 | 1.4 | 0.6 |
| | | SBT | SB | 37 | 3 | 0 | 0 | 37 | 3 | 7.6 | 0.0 | 7.6 |
| | | SBR | SB | 332 | 216 | 0 | 2 | 332 | 218 | 7.0 | 2.0 | 6.9 |
| 3 | Wesbrook Mall and W 16 Ave | EBL | EB | 125 | 171 | 18 | 23 | 143 | 194 | 3.8 | 1.1 | 3.9 |
| | | EBT | EB | 254 | 203 | 0 | 2 | 254 | 205 | 3.4 | 2.0 | 3.2 |
| | | EBR | EB | 49 | 113 | 0 | 2 | 49 | 115 | 7.1 | 2.0 | 7.3 |
| | | NBL | NB | 27 | 53 | 0 | 1 | 27 | 54 | 4.1 | 1.4 | 4.2 |
| | | NBT | NB | 162 | 141 | 12 | 9 | 174 | 150 | 1.7 | 0.9 | 1.9 |
| | | NBR | NB | 131 | 95 | 1 | 1 | 132 | 96 | 3.4 | 0.0 | 3.4 |
| | | WBL | WB | 242 | 222 | 0 | 5 | 242 | 227 | 1.3 | 3.2 | 1.0 |
| | | WBT | WB | 113 | 177 | 0 | 2 | 113 | 179 | 5.3 | 2.0 | 5.5 |
| | | WBR | WB | 127 | 208 | 10 | 10 | 137 | 218 | 6.3 | 0.0 | 6.1 |
| | | SBL | SB | 291 | 253 | 9 | 12 | 300 | 265 | 2.3 | 0.9 | 2.1 |
| | | SBT | SB | 132 | 83 | 14 | 10 | 146 | 93 | 4.7 | 1.2 | 4.8 |
| | | SBR | SB | 203 | 181 | 21 | 30 | 224 | 211 | 1.6 | 1.8 | 0.9 |
| 4 | W 16 Ave & Hampton Pl/Binning Rd | EBT | EB | 675 | 550 | 9 | 16 | 684 | 566 | 5.1 | 2.0 | 4.7 |
| | | NBR | NB | 103 | 115 | 1 | 4 | 104 | 119 | 1.1 | 1.9 | 1.4 |
| | | WBT | WB | 445 | 559 | 9 | 17 | 454 | 576 | 5.1 | 2.2 | 5.4 |
| | | WBR | WB | 66 | 60 | 0 | 0 | 66 | 60 | 0.8 | 0.0 | 0.8 |
| | | SBR | SB | 36 | 49 | 1 | 0 | 37 | 49 | 2.0 | 1.4 | 1.8 |
| 5 | Wesbrook Mall and Hampton Pl | NBT | NB | 373 | 473 | 39 | 42 | 412 | 515 | 4.9 | 0.5 | 4.8 |
| | | NBR | NB | 40 | 47 | 0 | 0 | 40 | 47 | 1.1 | 0.0 | 1.1 |
| | | WBL | WB | 28 | 43 | 0 | 0 | 28 | 43 | 2.5 | 0.0 | 2.5 |
| | | WBR | WB | 27 | 29 | 0 | 0 | 27 | 29 | 0.4 | 0.0 | 0.4 |
| | | SBL | SB | 18 | 13 | 1 | 1 | 19 | 14 | 1.3 | 0.0 | 1.2 |
| | | SBT | SB | 597 | 475 | 43 | 52 | 640 | 527 | 5.3 | 1.3 | 4.7 |
| 6 | Wesbrook Mall and Berton Ave | NBL | NB | 18 | 0 | 0 | 0 | 18 | 0 | 6.0 | 0.0 | 6.0 |
| | | NBT | NB | 288 | 242 | 13 | 9 | 301 | 251 | 2.8 | 1.2 | 3.0 |
| | | NBR | NB | 17 | 19 | 0 | 0 | 17 | 19 | 0.5 | 0.0 | 0.5 |
| | | WBL | WB | 6 | 0 | 0 | 0 | 6 | 0 | 3.5 | 0.0 | 3.5 |
| | | WBT | WB | 1 | 0 | 0 | 0 | 1 | 0 | 1.4 | 0.0 | 1.4 |
| | | WBR | WB | 33 | 47 | 0 | 3 | 33 | 50 | 2.2 | 2.4 | 2.6 |
| | | SBL | SB | 63 | 55 | 1 | 4 | 64 | 59 | 1.0 | 1.9 | 0.6 |
| | | SBT | SB | 199 | 204 | 13 | 9 | 212 | 213 | 0.4 | 1.2 | 0.1 |
| | | SBR | SB | 160 | 159 | 0 | 3 | 160 | 162 | 0.1 | 2.4 | 0.2 |
| 9 | Birney Ave and Webber Lane | EBL | EB | 25 | 8 | 0 | 0 | 25 | 8 | 4.2 | 0.0 | 4.2 |
| | | EBT | EB | 25 | 6 | 0 | 0 | 25 | 6 | 4.8 | 0.0 | 4.8 |
| | | WBT | WB | 39 | 6 | 0 | 0 | 39 | 6 | 7.0 | 0.0 | 7.0 |
| | | WBR | WB | 22 | 5 | 0 | 1 | 22 | 6 | 4.6 | 1.4 | 4.3 |
| | | SBL | SB | 53 | 94 | 0 | 2 | 53 | 96 | 4.8 | 2.0 | 5.0 |
| | | SBR | SB | 59 | 55 | 0 | 0 | 59 | 55 | 0.5 | 0.0 | 0.5 |

| | | | | Travel demand | | | | | | GEH | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| 10 | Birney Ave and Shrum Lane | EBL | EB | 8 | 0 | 0 | 0 | 8 | 0 | 4.0 | 0.0 | 4.0 |
| | | EBT | EB | 70 | 100 | 0 | 2 | 70 | 102 | 3.3 | 2.0 | 3.5 |
| | | WBT | WB | 50 | 11 | 0 | 1 | 50 | 12 | 7.1 | 1.4 | 6.8 |
| | | WBR | WB | 27 | 24 | 0 | 0 | 27 | 24 | 0.6 | 0.0 | 0.6 |
| | | SBL | SB | 153 | 35 | 1 | 2 | 154 | 37 | 12.2 | 0.8 | 12.0 |
| | | SBR | SB | 11 | 0 | 0 | 0 | 11 | 0 | 4.7 | 0.0 | 4.7 |
| 11 | Wesbrook Mall and Birney Ave | EBL | EB | 146 | 107 | 0 | 3 | 146 | 110 | 3.5 | 2.4 | 3.2 |
| | | EBT | EB | 36 | 3 | 0 | 0 | 36 | 3 | 7.5 | 0.0 | 7.5 |
| | | EBR | EB | 40 | 24 | 1 | 1 | 41 | 25 | 2.8 | 0.0 | 2.8 |
| | | NBL | NB | 32 | 28 | 0 | 1 | 32 | 29 | 0.7 | 1.4 | 0.5 |
| | | NBT | NB | 139 | 111 | 13 | 4 | 152 | 115 | 2.5 | 3.1 | 3.2 |
| | | NBR | NB | 18 | 32 | 1 | 0 | 19 | 32 | 2.8 | 1.4 | 2.6 |
| | | WBL | WB | 13 | 27 | 0 | 0 | 13 | 27 | 3.1 | 0.0 | 3.1 |
| | | WBT | WB | 8 | 6 | 0 | 0 | 8 | 6 | 0.8 | 0.0 | 0.8 |
| | | WBR | WB | 36 | 42 | 0 | 2 | 36 | 44 | 1.0 | 2.0 | 1.3 |
| | | SBL | SB | 67 | 80 | 0 | 3 | 67 | 83 | 1.5 | 2.4 | 1.8 |
| | | SBT | SB | 101 | 124 | 13 | 6 | 114 | 130 | 2.2 | 2.3 | 1.4 |
| | | SBR | SB | 37 | 0 | 0 | 0 | 37 | 0 | 8.6 | 0.0 | 8.6 |
| 12 | Binning Rd and Birney Ave | EBL | EB | 47 | 34 | 0 | 1 | 47 | 35 | 2.0 | 1.4 | 1.9 |
| | | EBR | EB | 37 | 22 | 1 | 1 | 38 | 23 | 2.8 | 0.0 | 2.7 |
| | | NBL | NB | 17 | 9 | 0 | 1 | 17 | 10 | 2.2 | 1.4 | 1.9 |
| | | NBT | NB | 56 | 57 | 0 | 2 | 56 | 59 | 0.1 | 2.0 | 0.4 |
| | | SBT | SB | 10 | 3 | 0 | 0 | 10 | 3 | 2.7 | 0.0 | 2.7 |
| | | SBR | SB | 15 | 0 | 0 | 0 | 15 | 0 | 5.5 | 0.0 | 5.5 |
| 14 | Wesbrook Mall and Gray Ave | EBL | EB | 25 | 27 | 3 | 2 | 28 | 29 | 0.4 | 0.6 | 0.2 |
| | | EBT | EB | 12 | 17 | 0 | 1 | 12 | 18 | 1.3 | 1.4 | 1.5 |
| | | EBR | EB | 31 | 31 | 1 | 1 | 32 | 32 | 0.0 | 0.0 | 0.0 |
| | | NBL | NB | 51 | 47 | 0 | 1 | 51 | 48 | 0.6 | 1.4 | 0.4 |
| | | NBT | NB | 146 | 121 | 11 | 1 | 157 | 122 | 2.2 | 4.1 | 3.0 |
| | | NBR | NB | 36 | 35 | 0 | 1 | 36 | 36 | 0.2 | 1.4 | 0.0 |
| | | WBL | WB | 28 | 28 | 0 | 1 | 28 | 29 | 0.0 | 1.4 | 0.2 |
| | | WBT | WB | 4 | 4 | 0 | 0 | 4 | 4 | 0.0 | 0.0 | 0.0 |
| | | WBR | WB | 18 | 22 | 0 | 2 | 18 | 24 | 0.9 | 2.0 | 1.3 |
| | | SBL | SB | 27 | 41 | 0 | 3 | 27 | 44 | 2.4 | 2.4 | 2.9 |
| | | SBT | SB | 97 | 75 | 11 | 1 | 108 | 76 | 2.4 | 4.1 | 3.3 |
| | | SBR | SB | 30 | 60 | 3 | 3 | 33 | 63 | 4.5 | 0.0 | 4.3 |
| 16 | Wesbrook Mall and Ross Drive | EBL | EB | 33 | 30 | 0 | 0 | 33 | 30 | 0.5 | 0.0 | 0.5 |
| | | EBR | EB | 20 | 12 | 0 | 0 | 20 | 12 | 2.0 | 0.0 | 2.0 |
| | | NBL | NB | 37 | 31 | 0 | 0 | 37 | 31 | 1.0 | 0.0 | 1.0 |
| | | NBT | NB | 199 | 171 | 11 | 2 | 210 | 173 | 2.1 | 3.5 | 2.7 |
| | | SBT | SB | 119 | 110 | 11 | 3 | 130 | 113 | 0.8 | 3.0 | 1.5 |
| | | SBR | SB | 36 | 24 | 1 | 0 | 37 | 24 | 2.2 | 1.4 | 2.4 |
| 19 | | EBL | EB | 33 | 26 | 0 | 0 | 33 | 26 | 1.3 | 0.0 | 1.3 |
| | | EBT | EB | 921 | 754 | 24 | 45 | 945 | 799 | 5.8 | 3.6 | 4.9 |

| | | | | Travel demand | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Light Vehicle | | Heavy Vehicles | | Cumulative | | GEH | | |
| No | Intersection Name | Turn | Direction | Observed | Modelled | Observed | Modelled | Observed | Modelled | Light Vehicle | Heavy Vehicles | Cumulative |
| | South West Marine Dr and Wesbrook Mall | WBT | WB | 388 | 870 | 15 | 43 | 403 | 913 | 19.2 | 5.2 | 19.9 |
| | | WBR | WB | 147 | 142 | 11 | 3 | 158 | 145 | 0.4 | 3.0 | 1.1 |
| | | SBL | SB | 148 | 102 | 12 | 3 | 160 | 105 | 4.1 | 3.3 | 4.8 |
| | | SBR | SB | 14 | 27 | 1 | 0 | 15 | 27 | 2.9 | 1.4 | 2.6 |