To: City of Burnaby Mayor & Council

From: Matt Craig, Director, System Planning, TransLink

Date: November 18, 2024

Subject: Hastings St Bus Speed & Reliability Improvements report

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Purpose & Summary

Congestion-related delays negatively affect the experience of taking transit and increase the cost of operating bus service. Focusing bus priority measures on corridors of high delay and high ridership is a critical measure to make transit a reliable transportation choice, while making the most effective use of service hours and reinvesting savings back into communities.

Hastings Street is a key transit corridor in North Burnaby and among the top five corridors in the region for person-hours of bus delay. Five bus routes operate in the segment of Hastings between Willingdon and Duthie Avenues, and 5.3 million bus trips are made annually by Burnaby residents. Today, up to one-third of people moving along this segment of Hastings St are on transit. Yet, buses operate in mixed-traffic, and riders are subject to increasing delay due to growing congestion.

TransLink and Burnaby staff have been studying Hastings St to develop a solution that reduces travel time delay and variability for bus riders, while considering trade-offs. This report provides a summary of assessment completed, and recommends a solution for Burnaby Council endorsement.

Based on the assessment outlined in this report, as well as collaboration with City of Burnaby staff in assessing different approaches, **our recommendation is to dedicate the curbside lanes on Hastings St between Willingdon and Duthie avenues to buses from 7AM to 7PM, seven days a week.**

1. Background

In 2020, TransLink launched the R5 RapidBus along Hastings Street, connecting SFU to downtown Vancouver. At the time of launch, R5 RapidBus did not receive any bus priority improvements despite being a high delay and high ridership bus corridor in Burnaby.

TransLink and the City of Burnaby partnered to study Bus Speed and Reliability (BSR) improvements along Hastings Street between Willingdon Avenue and Duthie Avenue. This report includes an analysis of existing travel times and delays, expected travel times with transit priority improvements, and parking demand and supply.

Based on the study completed in partnership with Burnaby staff, this reports recommends an approach for improving bus speed and reliability on Hastings St between Willingdon and Duthie Avenues.

1.1. Policy Context

TransLink's *2023 Bus Speed and Reliability Report* identifies Hastings Street as one of 20 Profile Areas suitable for a very high intensity of bus priority infrastructure (i.e., continuous bus lanes). This is due to Hastings Street generating high bus ridership, as well as contributing to significant bus and person delay.

TransLink's *Transport 2050 Regional Transportation Strategy* identifies Hastings as a part of the Reliable & Fast Transit Network Major Transit Network by 2050, and TransLink's *Transport 2050: 10-Year Priorities for TransLink* Plan includes the implementation of BRT along the Hastings Corridor between SFU Burnaby and Downtown Vancouver. While the Hastings BSR project described in this report will not directly contribute infrastructure to these medium- and long-term projects, it will help build ridership along the corridor to support future higher capacity transit improvements.

This section of the Hastings corridor is located in the City of Burnaby, and aims to improve public transit speed and reliability. Once completed, these improvements will make transit a more competitive transportation option, and contribute to the following targets and goals set in the following documents:

- **City of Burnaby Transportation Plan**
  - Mode Split – Have ¾ of all trips made by public transit and active transportation by 2050
  - Zero Emissions – Reduce vehicle emissions by 100% by 2050
- **City of Burnaby Climate Action Plan** – Recognizing the dangers posed by climate change, Burnaby City Council declared a climate emergency in 2019. This emergency declaration set

new greenhouse has (GHG) reduction targets for the City for the next three decades:

- 45% reduction by 2030
- 75% reduction by 2050
- 100% reduction (carbon neutrality) by 2050

- **TransLink Transport 2050 Regional Transportation Strategy – Access for Everyone:**
  - Convenient Choices for Everyone – By 2050, active transportation and transit are competitive choices accounting for at least half of all passenger trips, with taxi, ride-hailing, and carshare accounting for most of the remaining passenger trips.
  - Reliable Choices for Everyone – By 2050, people and goods are spending 20% less time stuck in congestion, compared to today.

1.2. Existing Conditions

The extents of this project along Hastings Street are entirely within the City of Burnaby, as seen in **Figure 1**. In the section, Hastings Street, between Willingdon Avenue and Duthie Avenue, is 3.6 km long, classified as a Major Arterial, and is part of TransLink's Major Road Network (MRN). It runs in the east-west direction and generally has a six-lane undivided cross-section. The curbside lanes function as HOV lanes in the peak direction during peak hours, and as parking lanes at all other times. The peak hours are from 6:00 AM to 8:30 AM in the westbound direction, and from 3:30 PM to 6:00 PM in the eastbound direction. Sidewalks are provided on both sides of the street; however, widths vary, and in some blocks are narrow due to the vehicle lanes occupying the majority of the right-of-way, and existing private property setbacks are limited.

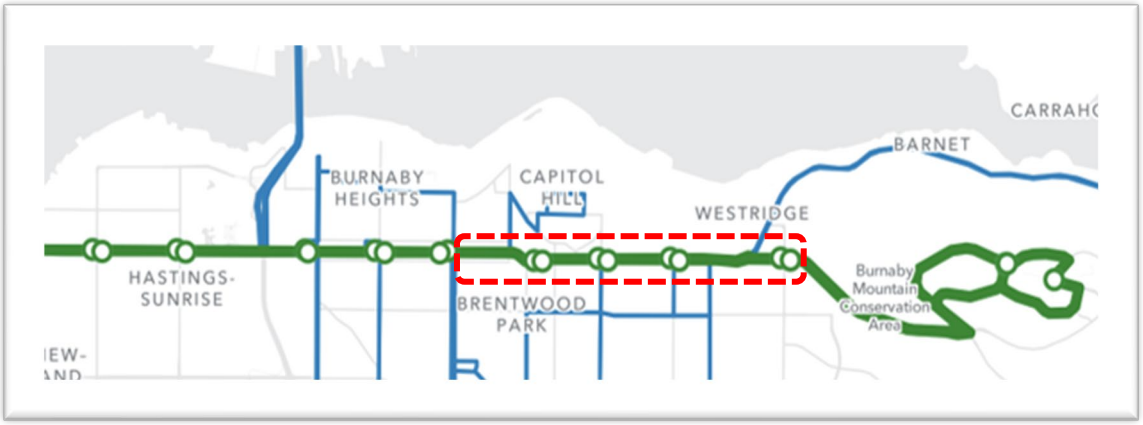

Figure 1 – Project extents

Ridership and Mode Share

This section of Hastings is served by 5 bus routes, including the R5 RapidBus that connects SFU in Burnaby to Downtown via Burnaby Heights. In 2023 the corridor had a combined daily ridership of 24,000 people. For the R5 this represents 88% of pre-covid ridership. As such, this report uses 2019 data to represent the expected near-term ridership growth.

From the 2019 data, it was observed that buses carry up to 1/3 of all road users through the study corridor during peak hours when looking at the off-peak directions, which amounts to approximately 24,000 daily riders across all routes. Of these daily riders, there are approximately 16,000 daily riders on the R5 line between Willingdon and Duthie daily. **Figure 2** summarizes the person throughput along Hastings Street by direction and **Figure 3** illustrates the average daily ridership and passenger load and each R5 stop.

In addition, analysis of Compass card data showed that of the average weekday R5 boarding in Fall 2023, approximately 40% of boardings were made by customers living in Burnaby, while 60% of boardings were made by customers that either live outside of Burnaby or do not have consistent or frequent enough transit usage to determine where they live. Other local buses operating on the corridor have between 62% and 80% of trips made by customers living in Burnaby. Overall, at least 5.3 million trips are made by Burnaby residents on the Hastings corridor over a year.

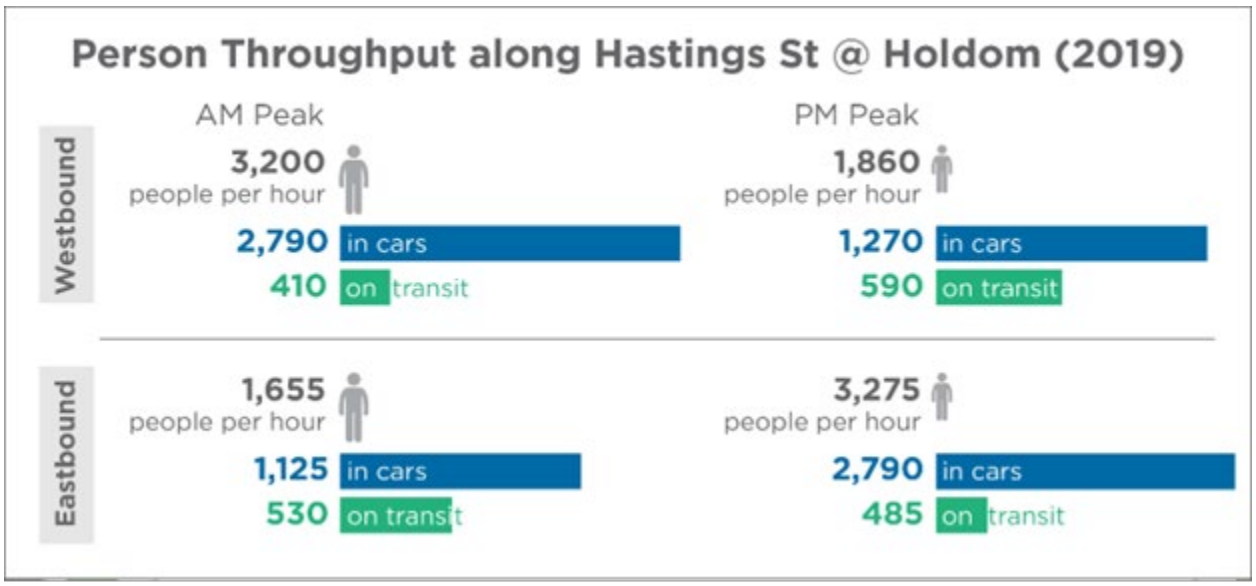

Figure 2 – Person Throughput along Hastings Street

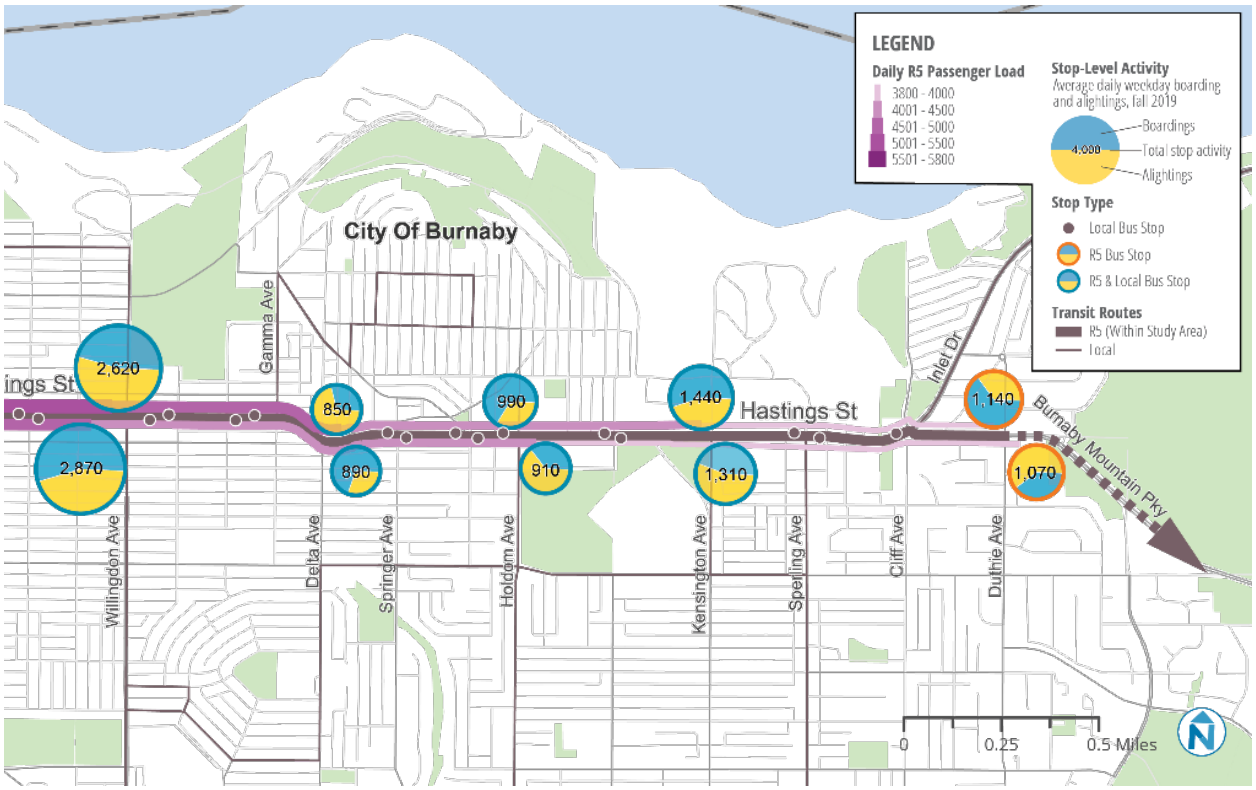

Figure 3 - Average Daily Ridership at R5 Stops and R5 Passenger Load (Fall 2019)

Figure 4 and **Figure 5** show the total daily passenger activity and load across all bus routes along Hastings Street between Willingdon Avenue and Duthie Avenue. While there is significant bus ridership in the area, no dedicated space or transit priority measures results in slow and unreliable bus operations.

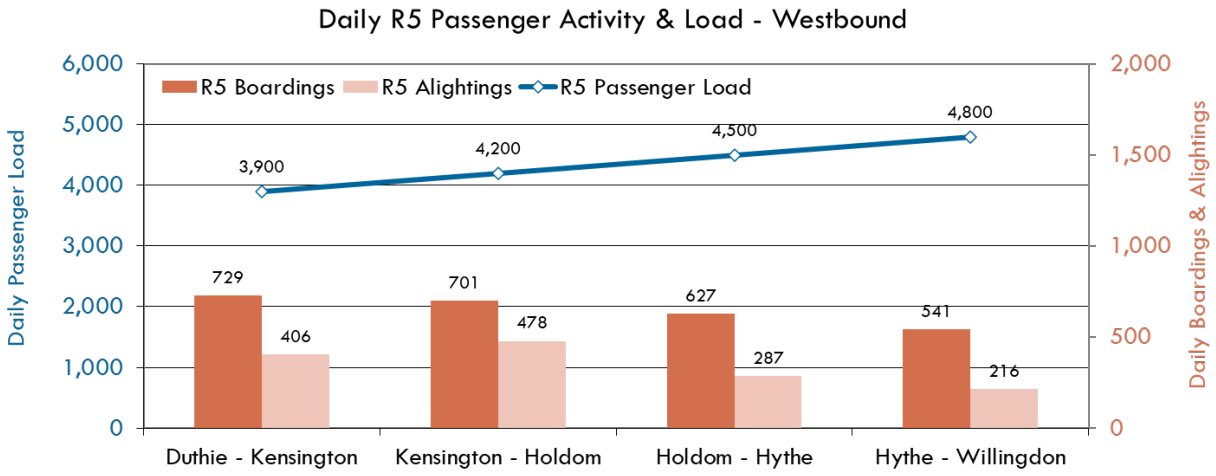

Figure 4 - Westbound Daily Passenger Activity and Load, R5 and Local Buses (Fall 2019)

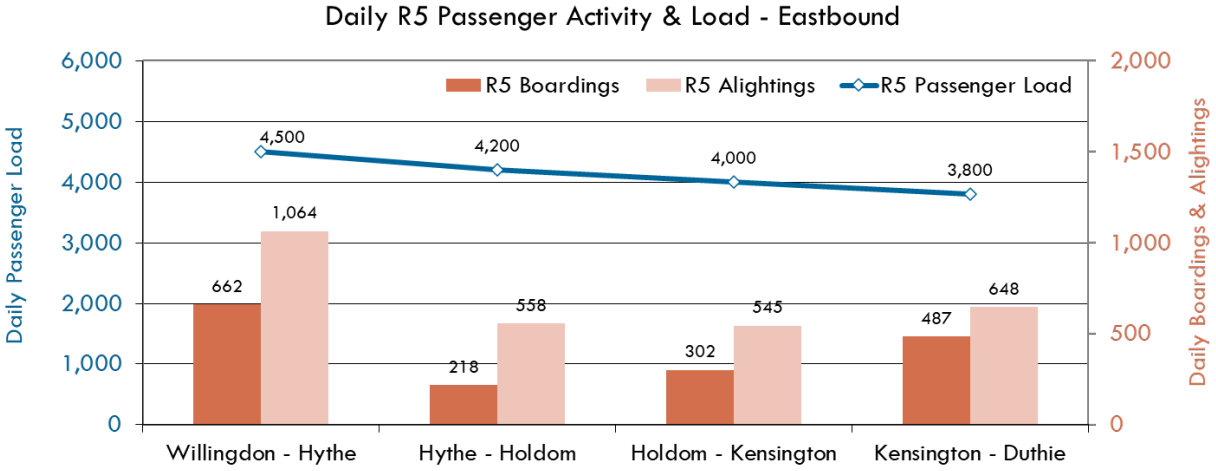

Figure 5 - Eastbound Daily Passenger Activity and Load, R5 and Local Buses (Fall 2019)

Existing Transit Travel Time, Delay, and Variability

Slow and unreliable bus operations arise from many factors that result in delays. Key points of delay within the study corridor include:

- The HOV lanes along the corridor are only in effect during the AM rush hour in the westbound direction, and PM rush hour in the eastbound direction. The lanes do provide a benefit for transit; however, buses experience delay during the hours after the AM

peak period and before the PM peak period when the HOV lanes are not in effect, as well as on weekends.

- Traffic signals.
- Closely spaced pedestrian signals between fully signalized intersections, which may stop traffic multiple times in quick succession.
- Left-turning vehicles at locations where dedicated left turn-lanes are not present.
- Vehicles turning right, including from the HOV lanes.
- Local buses stopping in-lane when the HOV lane is active.
- Buses pulling out from bus stops when the HOV lane is not active.

The prevalence of increased delay during certain time periods resulted in varied travel time throughout any given day. **Figure 6** illustrates the travel times of vehicles travelling along the study corridor in both directions during typical weekdays, Saturdays, and Sundays, which are on average 20.6 minutes, 20.7 minutes, and 20.1 minutes respectively. Furthermore, the weekend midday peak is observed to be up to 22.1 minutes while the weekday peaks are up to 21.7 minutes. The weekend peak being higher may be attributed to the existing weekday peak hour HOV lanes. Analysis has determined that travel time in both directions

an vary up to 2.4 minutes on weekdays, up to 4.7 minutes on Saturdays, and 4.8 minutes on Sundays.

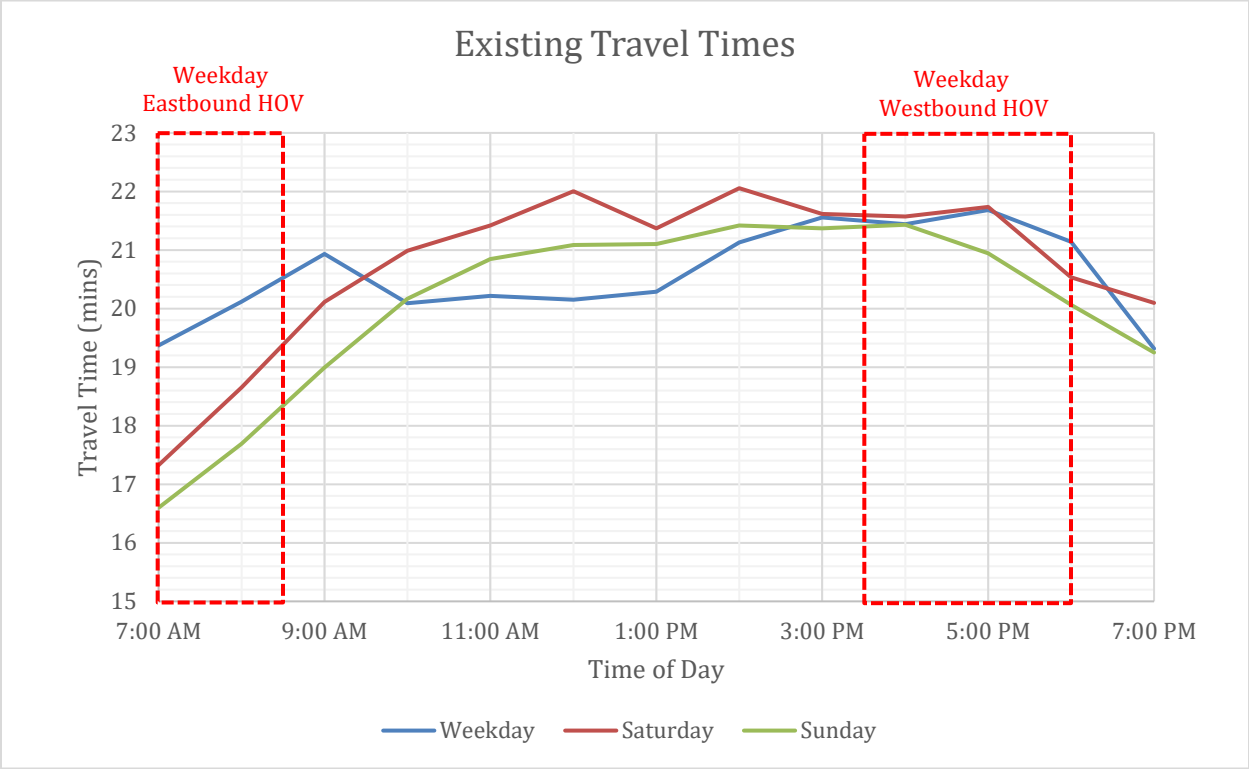

Figure 6 – Existing Travel Times

2. Technical Analysis

A feasibility study investigated alternate design solutions, and showed that a curbside bus lane was the preferred solution. The following analysis examines this solution in more depth.

Solutions eliminated for this project include:

- Centre Running Bus Lane - The study found that bus lanes in the centremost lanes of Hastings Street and the resulting streetscape changes could not be delivered within the project's time horizon (3-5 years).
- Off-set bus lane – The study also tested and off-set bus lane with one GP lane per direction, but resulted in significant traffic impacts beyond the study area.

2.1. Travel Time Analysis

A travel time analysis was conducted to compare the travel time difference of transit vehicles along the study corridor, with and without a dedicated curbside bus lane. **Figure 7**, **Figure 8**, and **Figure 9** show the difference between travel times on typical weekdays, Saturdays, and Sundays respectively. It was observed that with the inclusion of a curbside bus lane, transit travel times along the study corridor improved by several minutes for all days of the week.

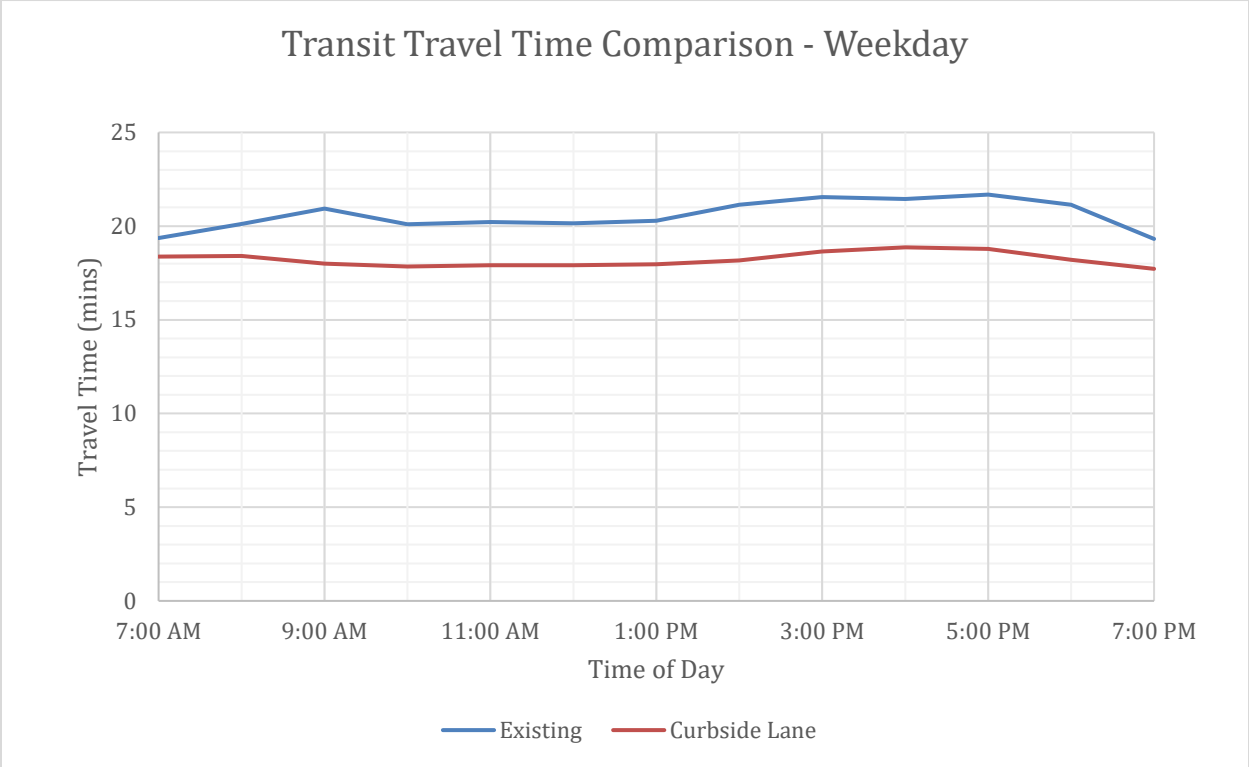

Figure 7 – Transit Travel Time Comparison - Weekday

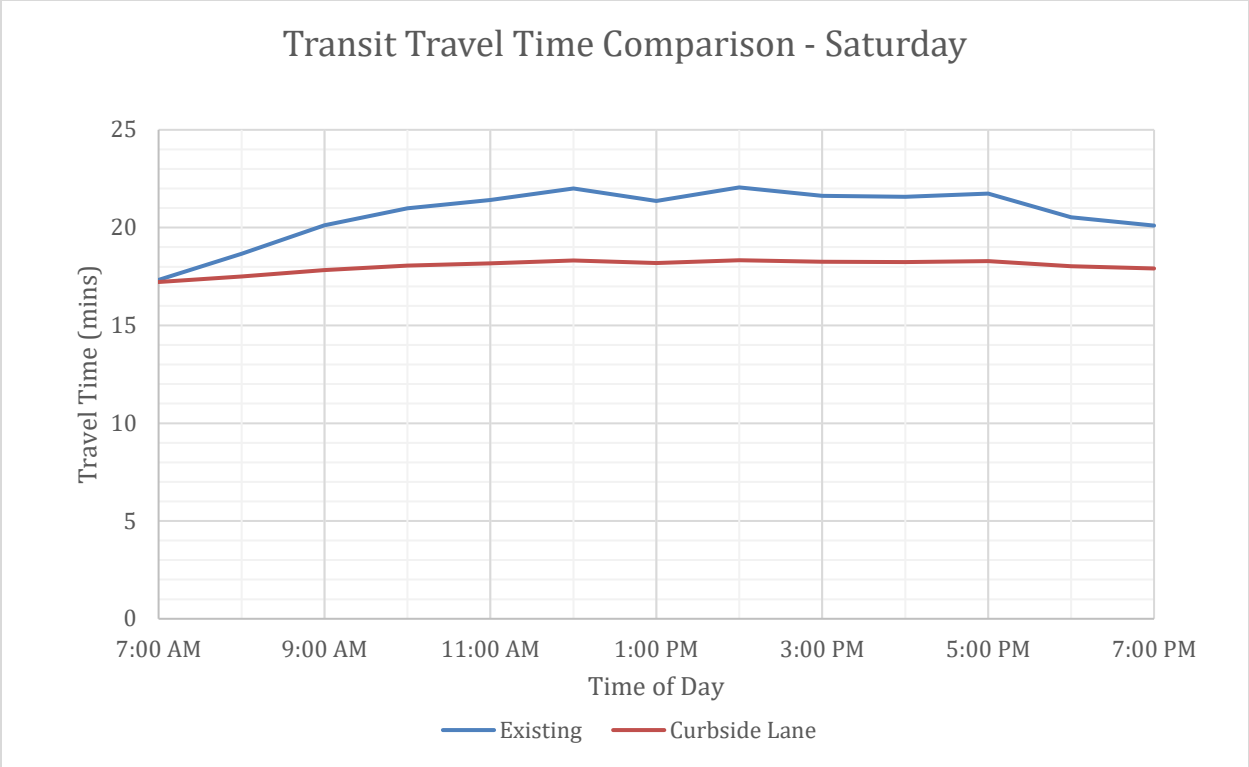

Figure 8 – Transit Travel Time Comparison - Saturday

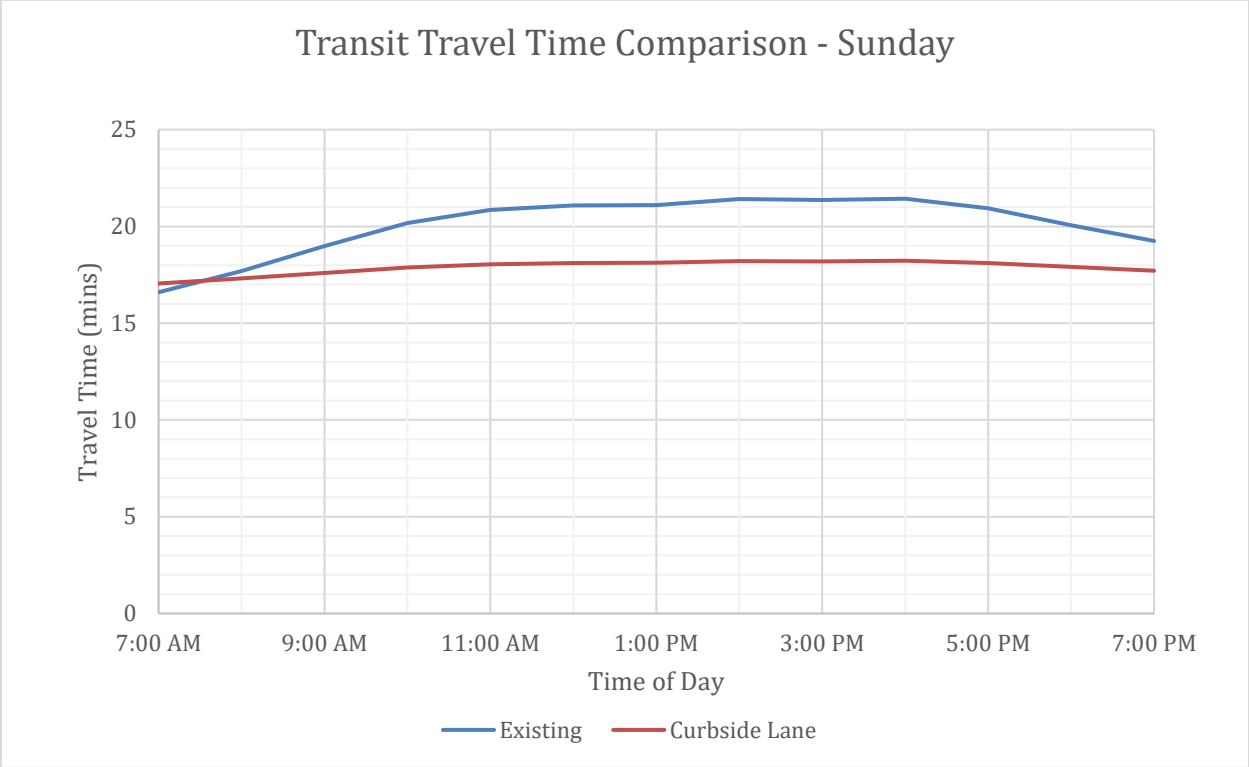

Figure 9 – Transit Travel Time Comparison – Sunday

From the transit travel time savings, it is observed that travel time savings are greatest on weekdays during commuter peak periods, as well as midday and early afternoon on weekends. This benefit of the curbside bus lane to transit travel times is relatively less in the early mornings and late evenings.

Using the transit travel time savings along with daily ridership information, daily travel time savings and daily person hour savings were calculated and summarized into **Table 1**.

Table 1 – Transit Travel Time and Person-Hour Savings for Curbside Bus Lanes

Scenario	Daily Travel Time Savings (mins)	Daily Person-Hour Savings
Typical Weekday	31	81
Saturday	35	52
Sunday	28	37

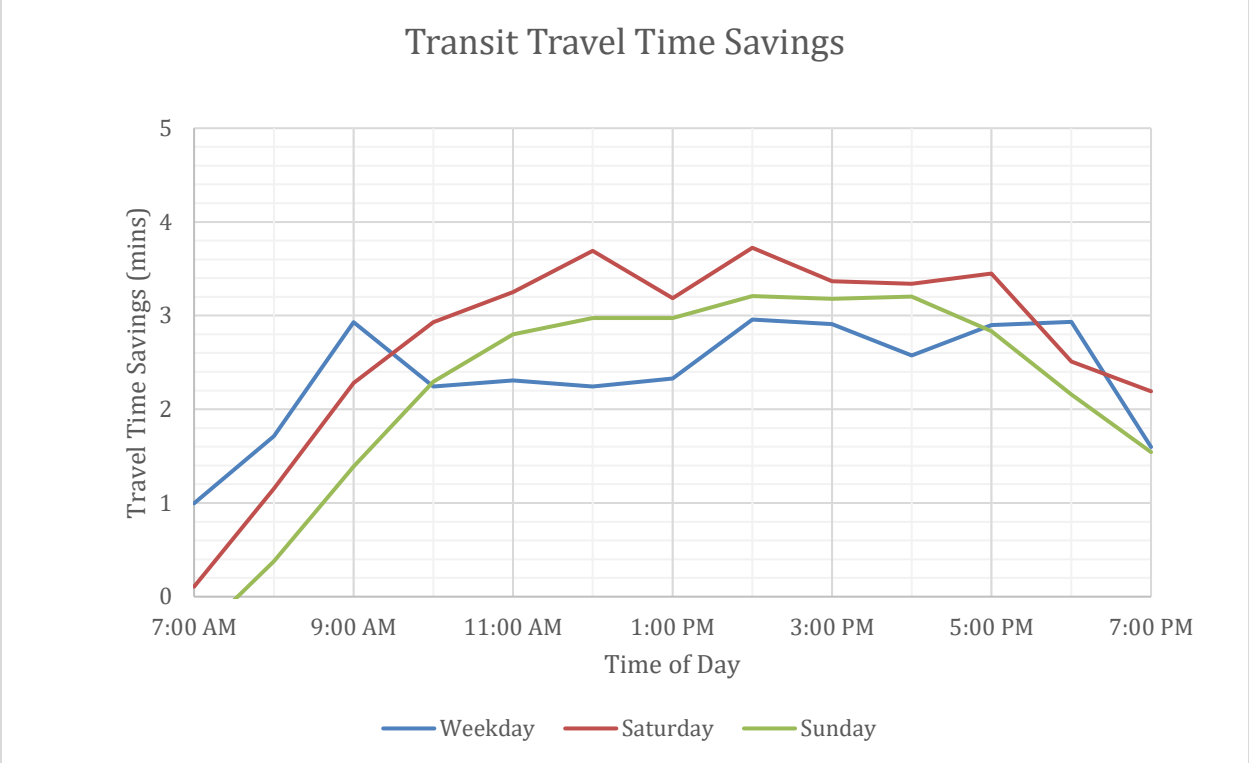

Figure 10 – Transit Travel Time Savings

To assess transit reliability, transit travel time variance was calculated by comparing the maximum and minimum travel times observed and comparing it to the average travel time. As illustrated in **Figure 11**, the introduction of a curbside transit lane reduces travel time variability throughout the day significantly, up to 80% change in variability on a typical Sunday. Less travel

time variance means buses will be on schedule more often, therefore greatly increasing reliability.

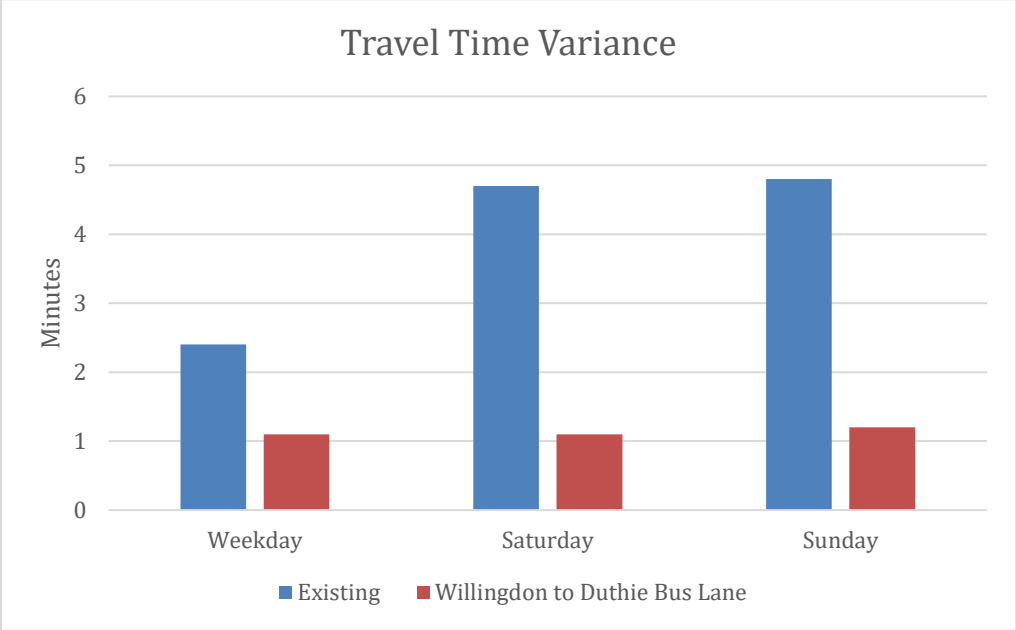

Figure 11 – Transit Travel Time Variance

Significant improvements to both travel time and travel time variance means faster and more reliable service. With daily travel time savings in both directions of up to 35 minutes and a reduction in travel time variability of up to 80%, accessing Hastings Street and Burnaby via transit becomes a more attractive and feasible option.

2.2. Vehicular Capacity Analysis

The introduction of a curbside transit travel lane would replace the existing HOV lane; as such, general purpose traffic that would normally use the HOV lanes during rush hour must now use the general purpose lanes. To determine the potential impact of removing the HOV lanes during peak hours, microsimulation traffic analysis was conducted to assess existing and proposed travel times. Two traffic scenarios were analyzed: 100% traffic and 80% traffic. The 80% traffic scenario assumed that with the reduction in lane capacity for general purpose vehicles and the additional of a dedicated transit lane, up to 20% of existing traffic would either divert to other routes, or shift to a different mode of travel (e.g. transit). The travel time results are summarized in **Figure 12** and **Figure 13**. In the 100% traffic scenario, general purpose vehicle travel times are observed to increase marginally when compared to the existing scenario. In the 80% traffic scenario, general purpose vehicle travel times are observed to decrease marginally when compared to the existing scenario. While there appear to be travel time savings in the 80% traffic scenario, in reality, when proposed travel times are the same as the existing travel times, vehicles will not divert so travel times

will only stay the same, and not decrease.

GP travel time Willingdon to Duthie – AM Peak (minutes, difference from existing shown in brackets)			
	Existing	2GP + bus lane, 100% GP volume	2GP + bus lane, 80% GP volume
EB	6.4	6.5 (+2 sec)	6.2 (-12 sec)
WB	9.9	10.9 (+59 sec)	8.3 (-1 min 34 sec)

Figure 12 – General Purpose Travel Times (AM Peak)

GP travel time, from Willingdon to Duthie – PM Peak (minutes, difference from existing shown in brackets)			
	Existing	2GP + bus lane, 100% GP volume	2GP + bus lane, 80% GP volume
EB	11.1	12.2 (+1 min 9 sec)	7.7 (-3 min 21 sec)
WB	7.9	7.9 (-2 sec)	7.4 (-30 sec)

Figure 13 – General Purpose Travel Times (PM Peak)

2.3. Parking Capacity Analysis

A parking study was conducted to determine the impacts of removing parking lane (outside HOV hours) on supply in the study area. The study corridor is made up of three distinct neighbourhoods: the Heights, Capitol Hill, and Lochdale. The Capitol Hill section primarily consists of low density residential, and the Lochdale section is mainly low-density retail with on-site parking, and the removal of on-street parking is not expected to affect supply. For the Heights area, there is higher demand for parking and therefore the parking analysis area was expanded to include a two-block extension along Hastings Street and one-block extension to the cross-streets, as seen in **Figure 14**. This extension captures the walkshed of the businesses along Hastings.

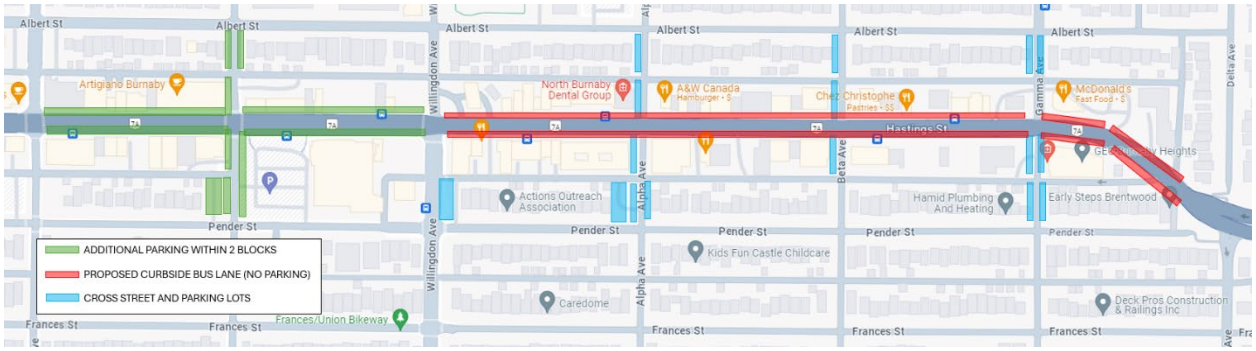

Figure 14 – Parking Supply within a 2-Block Radius of the Study Corridor

Capacity during a typical weekday is shown in **Figure 15**. During a typical weekday, parking demand is not expected to exceed capacity, even with the addition of the curbside bus lane and removal of on-street parking. During a typical Saturday, as shown in **Figure 16**, parking demand is expected to exceed capacity by up to 63 vehicles between 10:00 am and 4:00 pm. However, the improvements in bus speed and reliability is anticipated to encourage more transit usage, and therefore parking demand is anticipated

to decrease.

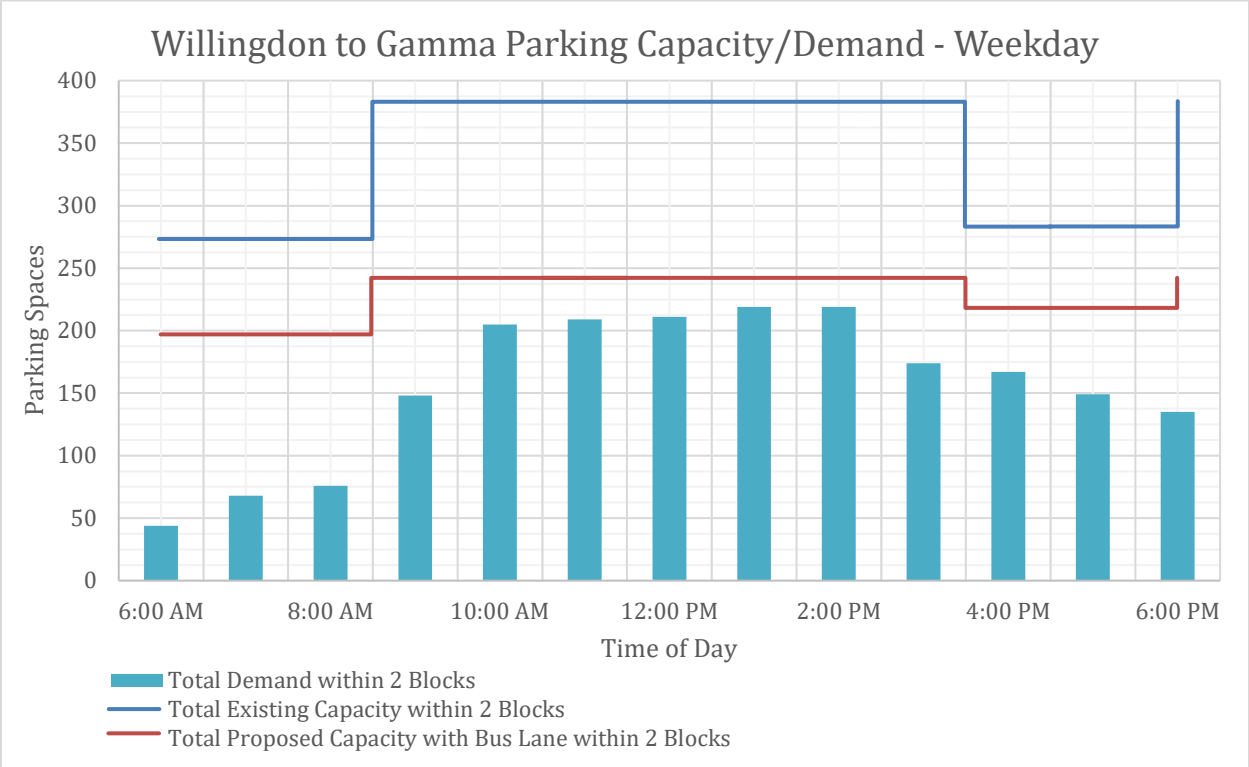

Figure 15 – Willingdon to Gamma Parking Capacity/Demand – Weekday

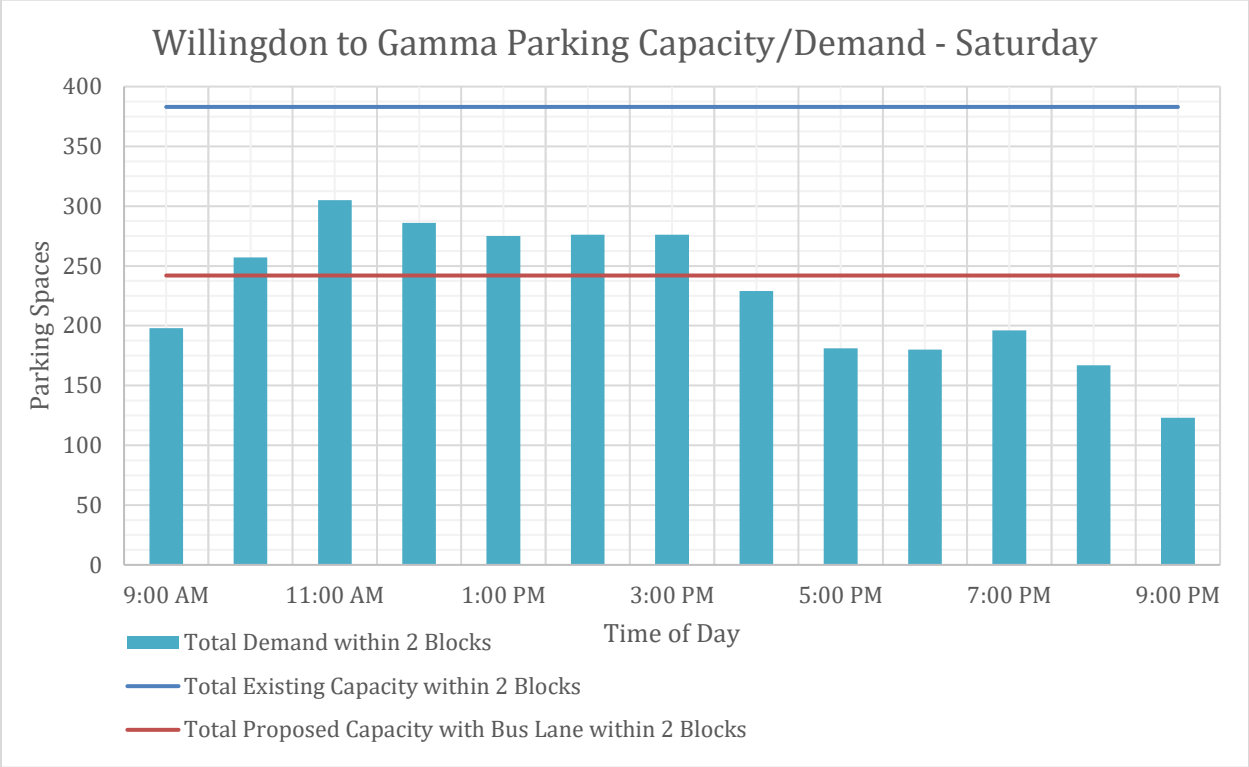

Figure 16 – Willingdon to Gamma Parking Capacity/Demand – Saturday

3. Recommendation

Based on the assessment outlined in this report, and collaboration with City of Burnaby staff in assessing different approaches, **our recommendation is to dedicate the curbside lanes on Hastings St to bus from 7AM to 7PM, seven days a week.**

This recommended solution will provide faster and more reliable bus service along Hastings St, thereby making buses competitive with automobile, and advancing the City of Burnaby and TransLink's targets to increase transit mode share and reduce GHG emissions.

The primary considerations for this recommendation include:

- Additon of curbside bus lanes will provide fast and reliable bus service on Hastings St, decreasing overall travel time by up to 13% and improving reliability by up to 80%.
- Removal of HOV lanes will have a negligible impact on vehicle travel times along Hastings St.
- Removal of parking in off-peak periods will generally result in some people who arrive by car needing to walk two or more blocks in the commercial area between Willingdon and Gamma avenues. To the east of Gamma Ave, on-street parking demand is low and impacts are negligible.

In conclusion, the dedicated bus lanes will greatly improve transit travel time and reliability. This solution will aid in achieving both the City of Burnaby and TransLink's objectives to make transit a convenient and reliable transportation choice, thereby increase transit mode-share and reduce GHG emissions.

Matt Craig
Director, System Planning
TransLink