

Memorandum

SUBJECT	Traffic Modelling - The Strand SVL
PREPARED BY	section 9(2)(a)
DATE	31 Mar 2023

1 INTRODUCTION

Waka Kotahi have prepared a new design for The Strand that includes a Special Vehicle Lane (SVL) in each direction, a shared walking/cycling path, three additional midblock signalised pedestrian crossings over The Strand, one new signalised crossing over Gladstone Road and numerous other new signalised and raised pedestrian improvements.

This memo provides a summary of the traffic modelling of this proposed design.

2 TRAFFIC MODEL

A traffic model was developed in 2019 to assist with the integration of the Tamaki Dr cycleway improvements and earlier options for The Strand. A detailed overview of the model is provided in the AFC modelling memo dated 14 August 2019.

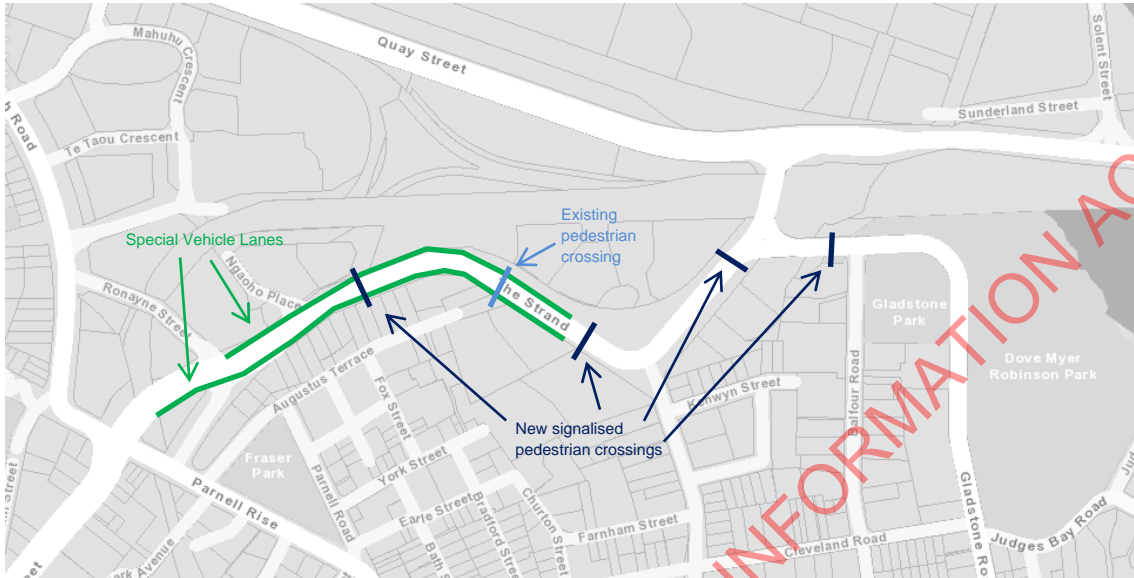
The model uses the Aimsun microsimulation software, allowing detailed analysis of individual vehicle movements and the interactions between closely spaced intersections.

There are the morning and evening commuter peak models. The model extent is shown below.



3 DESIGN OVERVIEW

An overview of the main changes around The Strand road corridor with the proposed design is provided below. These are the features of the design that have been input into the traffic model.



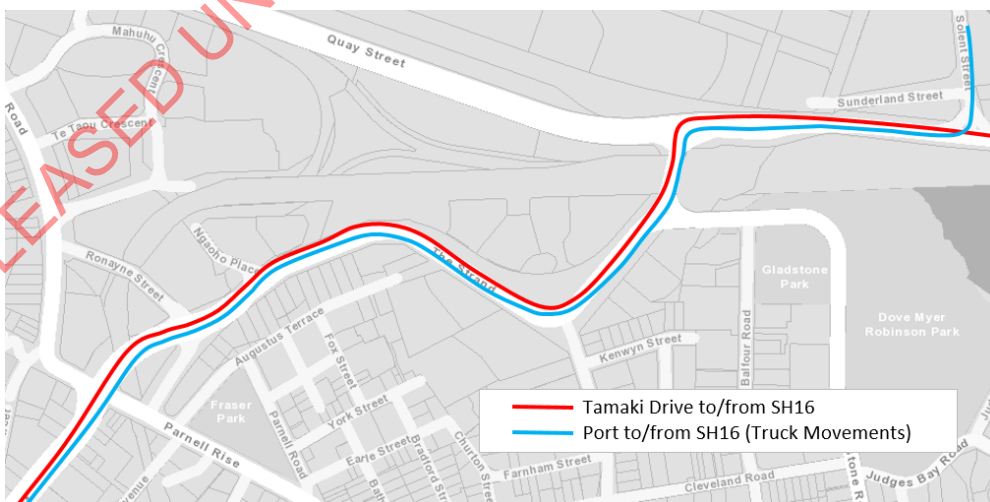
4 MODELLING

4.1 SVL Options

Two options have been modelled for the SVL, 'Bus and Freight' or 'T2 and Freight'. Other aspects of the design remain consistent between modelled options.

4.2 Travel Times

The key performance outcomes extracted from the traffic model are the travel times for private vehicles and freight along The Strand. The routes used in the travel time analysis are shown below.



4.3 Model Results

The travel times are presented below for the existing layout along The Strand and the proposed design for each SVL Option. Shading is used to categorise the changes in travel time from the existing layout, with red showing a worsening in travel time, green an improvement, and darker and lighter shades being higher or lower change.

Car Travel Times (mins)

AM Peak Hour	Existing Layout	Bus/Freight SVL	T2/Freight SVL	
			T1	T2
SH16 to Tamaki	4.5	5.6	5.7	4.8
Tamaki to SH16	8.6	13.6	9.8	8.0
PM Peak Hour				
Existing Layout	Bus/Freight SVL	T1	T2	
SH16 to Tamaki	4.5	6.9	6.5	5.6
Tamaki to SH16	7.7	9.5	9.8	6.5

Truck Travel Times (mins)

AM Peak Hour	Existing Layout	Bus/Freight SVL	T2/Freight SVL
SH16 to Port - Trucks	4.4	5.0	4.9
Port to SH16 - Trucks	7.5	7.2	5.8
PM Peak Hour			
Existing Layout	Bus/Freight SVL	T2/Freight SVL	
SH16 to Port - Trucks	4.6	5.8	5.2
Port to SH16 - Trucks	8.0	7.0	6.9

The modelling shows that the Bus/Freight SVL option provides some benefit for Trucks from the Port to SH16, but is providing worse outcomes towards the Port. The SVL is having a significant negative impact on general traffic, with travel times increasing by 1-5 minutes, and this is offsetting some of the intended benefits of the SVL in both directions.

The T2/Freight SVL option improves travel times for Trucks, with a reduction in travel time of 1-1.5 minutes towards SH16. A similar benefit of around 1 minute is predicted for T2 vehicles.

However, in the other direction towards the Port, all vehicles are predicted to experience additional delay of up to 1 minute in comparison with the existing situation. There are two issues in this direction. Firstly, the three additional pedestrian crossings add some delay. The second issue is that the SVL towards the Port terminates with an extra merge prior to St Georges Bay Road, adding another point of delay in comparison with the existing layout where all traffic has previously merged after the Parnell Road/Beach Road intersection.

4.4 Sensitivity

4.4.1 Pedestrian Demand

The model assumes that a pedestrian will call each of the new signalised crossings during each 120 second signal cycle. This is true of the single existing crossing on The Strand, but this pedestrian demand may get dispersed among the four crossing points and result in less frequent demand per crossing at times.

The model has been used to test the sensitivity of the outcomes to the pedestrian frequency at these new signalised crossings.

The travel times are presented below for the T2/Freight SVL option, with full pedestrian frequencies, half frequencies and no demands.

Pedestrian Sensitivity Testing, T2 Travel Times (mins)

AM Peak Hour	Existing	Full Peds	Half Peds	No Peds
SH16 to Tamaki	4.5	4.8	4.3	4.1
Tamaki to SH16	8.6	8.0	6.4	5.9
PM Peak Hour	Existing	Full Peds	Half Peds	No Peds
SH16 to Tamaki	4.5	5.6	5.0	5.0
Tamaki to SH16	7.7	6.5	6.3	6.5

This testing shows:

- With each pedestrian crossing called every 120 second cycle, T2 are predicted to have a reduction in travel time of 30-70 seconds in the more congested direction towards SH16. However, travel times towards Tamaki Dr are predicted to be 20-60s longer than existing for T2 vehicles with the new design.
- Not running the pedestrian crossing at all shows that providing only the SVL improves travel times in the more congested direction towards SH16 by 1.2-2.7 minutes. However additional delays of up to 30 seconds are still predicted towards Tamaki Dr.
- If the crossing is called only 50% of the time the impact is similar to if the crossings are not called at all.

4.4.2 Critical Pedestrian Crossing

Reviewing the performance of the T2/Freight SVL option in detail, the majority of the additional vehicle delay is experienced at the new signalised crossing located adjacent to the St Georges Bay Road intersection. The reason is that in both directions there is only a single lane at the stopline at this crossing, and therefore queues quickly extend back. Also, significantly, heading towards the Port the queue goes back into the T2 lane and disrupts the merge at the termination of the T2 lane, more severely impacting T2 vehicles.

An option was modelled where this single crossing was removed but all other remained and were called every signal cycle. The model results are provided below and compared with the option including all crossings and the option with no new pedestrian crossings.

Remove Crossing Option, T2 Travel Times (mins)

AM Peak Hour	Existing	Full Peds	No Peds	Remove Crossing
SH16 to Tamaki	4.5	4.8	4.1	4.2
Tamaki to SH16	8.6	8.0	5.9	7.1
PM Peak Hour	Existing	Full Peds	No Peds	Remove Crossing
SH16 to Tamaki	4.5	5.6	5.0	5.1
Tamaki to SH16	7.7	6.5	6.5	6.4

This shows that removing this crossing eliminates the majority of the additional delay associated with the new signalised crossings, reducing travel times by up to 1 minute.

5 SUMMARY

5.1 Bus vs T2 SVL

Providing a Bus/Freight SVL is predicted to have a significant negative impact on general traffic, with travel times increasing by up to 5 minutes from Tamaki Dr to SH16. This is offsetting the benefits of the SVL for freight and providing worse outcomes than the existing situation.

The T2/Freight SVL improves travel times for Trucks, with a reduction in travel time of 1-1.5 minutes towards SH16.

However, T2 and Freight are still predicted to experience additional delay of 0.5-1 minute towards the Port. The three additional pedestrian crossings add some of this delay. The second issue is that the SVL towards the Port adds another point of delay where the SVL terminates with a merge prior to St Georges Bay Road.

5.2 Signalised Pedestrian Crossings

With the proposed design including three new signalised pedestrian crossings over The Strand, the improvements for freight will be sensitive to pedestrian demands.

If the new pedestrian crossings are not utilised at all, providing the T2/Freight SVL improves travel times in the more congested direction towards SH16 by 1.2-2.7 minutes, an improvement of up to 2 minutes in comparison with the outcome where all crossings were fully utilised.

If each new pedestrian crossing is called only 50% of the time the outcome is predicted to be similar to the situation where they are not called at all.

Additional delays of up to 30 seconds are still predicted towards Tamaki Dr due to the additional point of delay where the SVL terminates with a merge.

The new pedestrian crossing that has the biggest impact on vehicle travel times is the one provided adjacent to the St Georges Bay Road intersection, where only a single traffic lane is available at the stopline. This results in queues extending quickly and impacting T2 and freight not just the general traffic. This specific crossing accounts for the majority of the additional delay when all crossings are fully utilised.