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Windsor Bridge Replacement Project

Traffic Counts Data Comparison Between 2017 and 2019

Incorporating Hyder

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ROADS AND MARITIME SERVICES (ROADS AND MARITIME)
Windsor Bridge Replacement Project

Traffic Counts Data Comparison Between 2017 and 2019

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A	Sept 2019	Draft for internal review	RC	MR
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C	29 Oct 2019	Final Report	RC	MR

CONTENTS

1 Background

In 2017, Arcadis Australia Pacific (Arcadis) assisted Roads and Maritime Services (Roads and Maritime) on a traffic modelling study for the proposed Windsor Bridge Replacement project (the 'project'). To support the project, traffic data was collected in March 2017 which included daily automatic traffic counts, intersection turning movement counts, queue length surveys and travel time surveys.

The results of these counts and surveys were documented in '*Windsor Bridge Replacement Project, Traffic and Options Modelling Report*' prepared by Arcadis in March 2018 (hereinafter referred as the '2018 Report').

At that time, the decision was as made not to proceed with the "zip" or merge lane and instead undertake traffic counts in the future.

2 Report purpose

This technical advice memo has been prepared to document traffic changes on Windsor Bridge and four nearby intersections between 2017 and 2019.

The report has documented findings in the following areas including:

- An assessment of the traffic survey data collected in August 2019
- A comparison of the 2019 traffic survey results against the results of the 2017 traffic surveys
- Identification of changes in traffic patterns between 2017 and 2019 across the road network within the study area, and the provision of commentary on the changes in traffic patterns where required.

The 2017 and 2019 traffic data has been compared across the following factors:

1. Daily traffic volumes on the Windsor Bridge
2. Daily heavy vehicles proportions on the Windsor Bridge
3. Morning (AM) and afternoon (PM) peak hour traffic volumes on the Windsor Bridge
4. Peak hour traffic volumes at four intersections on Bridge Street / Wilberforce Road with Freemans Reach Road, George Street, Macquarie Street and Court Street
5. Peak hour travel time and travel speed on the section of Bridge Street / Wilberforce Road between Court Street and Freemans Road
6. Peak hour queue lengths on intersection approach roads at four locations including Bridge Street / Wilberforce Road intersections with Freemans Reach Road, George Street, Macquarie Street and Court Street.

This technical document should be read in conjunction with Section 3 of the 2018 Report, which was prepared using the traffic survey data collected in March 2017.

3 Reference traffic data used

This analysis was based on the following data and reference material:

- The 2017 traffic survey was undertaken in March 2017
- The 2019 traffic survey was undertaken in August 2019.
- *Windsor Bridge Replacement Project, Traffic and Options Modelling Report, Section 3,* Arcadis, March 2018.

A summary of the location, duration, dates and data collected for the traffic surveys completed in 2017 and 2019 are provided in Table 3-1.

Table 3-1 Traffic survey details - 2017 and 2019

Survey Type and Location		Date / Time / Duration	
		March 2017	August 2019
1	Daily midblock traffic counts on Windsor Bridge	Friday 24 March 2017 to Thursday 30 March 2017	Tuesday 6 August 2019 to Monday 12 August 2019
		Continuous seven-day period	
2	Intersection counts and queue length surveys 1. Wilberforce Road / Freemans Reach Road intersection 2. Bridge Street / George Street intersection 3. Bridge Street / Macquarie Street intersection 4. Bridge Street / Court Street intersection	Tuesday 28 March 2017 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)	Tuesday 6 August 2019 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)
3	Travel time and travel speed surveys for one bi-directional route A 1.5km section of Bridge Street and Wilberforce Road, between 500 metres south of Court Street / Bridge Street intersection and 500 metres east of Freemans Road / Wilberforce Road intersection	Tuesday 28 March 2017 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)	Tuesday 6 August 2019 AM Peak (7AM to 9AM) PM Peak (4PM to 6PM)

Figure 3-1 below shows the location of each of the traffic surveys within the study area.

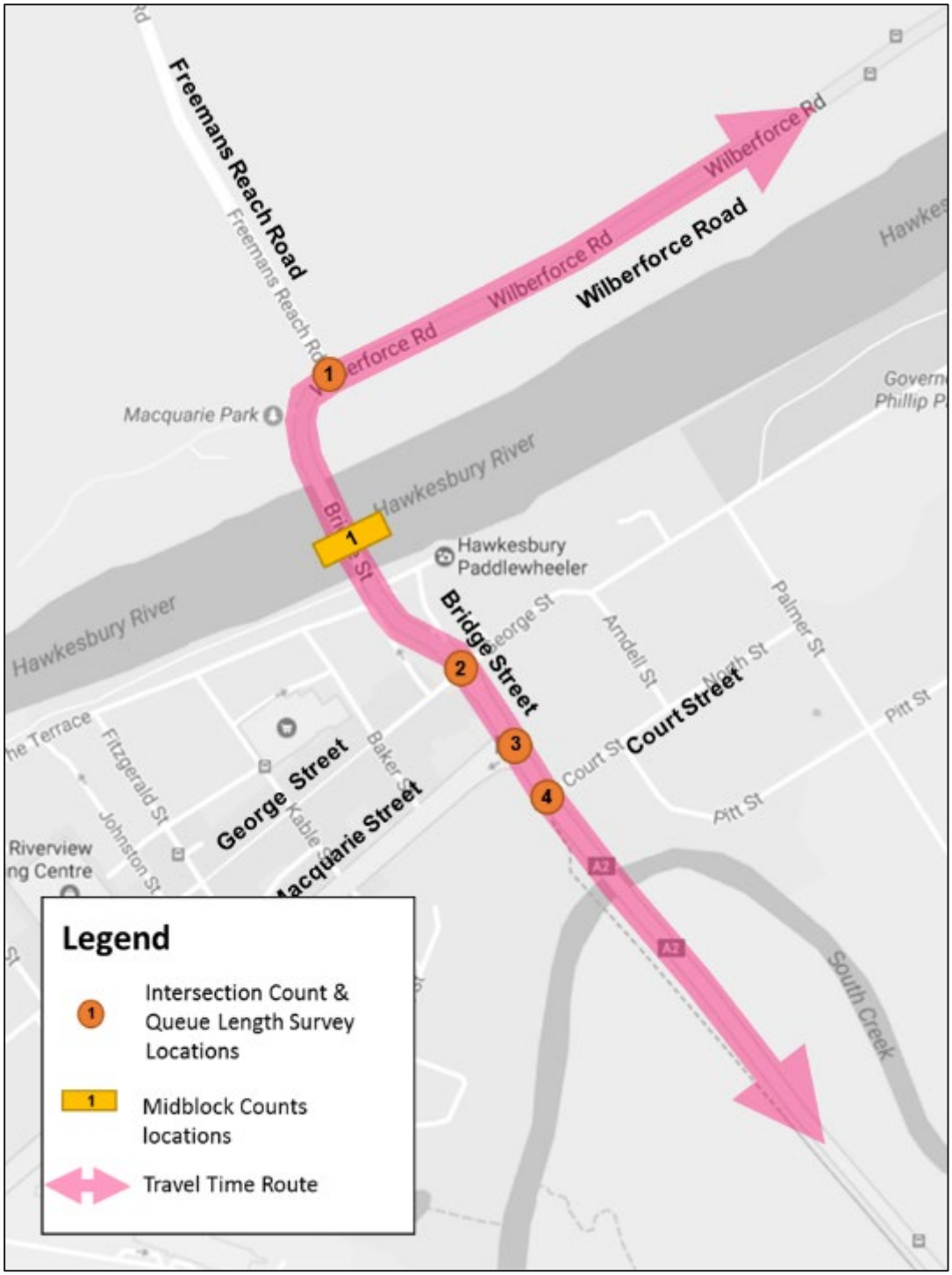

Figure 3-1 Traffic survey locations within the study area

4 Data analysis and results

The analysis and comparison of the March 2017 and August 2019 traffic survey data are discussed in this section.

4.1 Daily traffic volume on the Windsor Bridge

Midblock traffic counts were undertaken on the Windsor Bridge for a continuous seven-day period. These traffic counts were conducted at the same location in March 2017 and August 2019, as shown in Figure 3-1.

Figure 4-1 and Table 4-1 shows comparison of daily traffic volumes on the Windsor Bridge in 2017 and 2019.

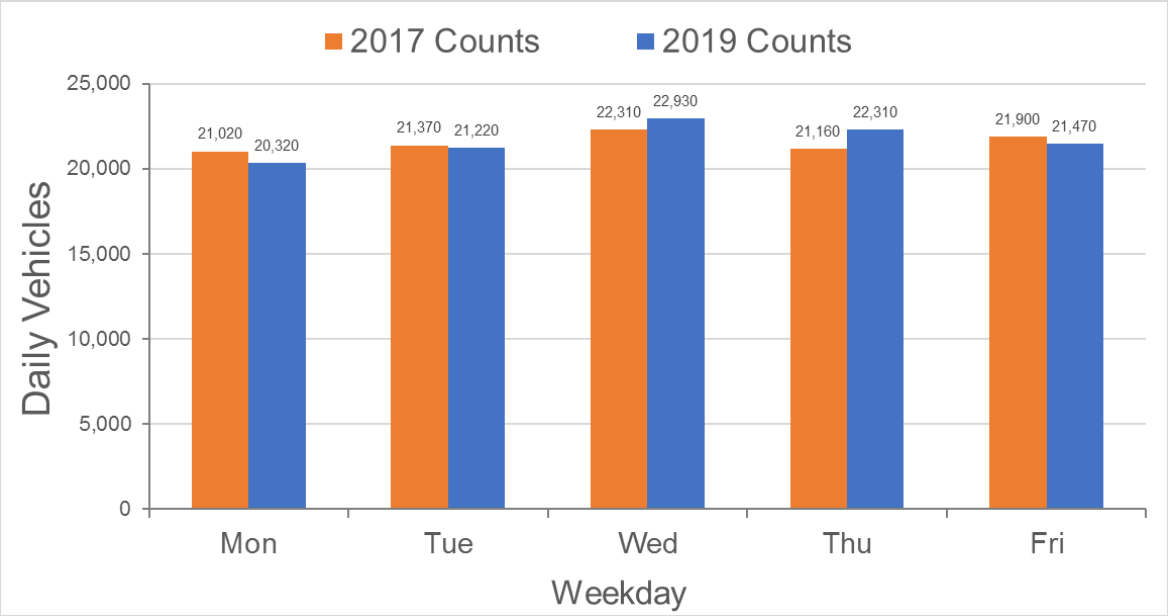

Figure 4-1 Weekday daily traffic volumes on Windsor Bridge in 2017 and 2019

Table 4-1 Weekday daily traffic volumes on Windsor Bridge in 2017 and 2019

Daily vehicle Volumes on Windsor Bridge	Survey Year		Traffic Change between survey periods	
	2017	2019	No. of Vehicles	%
Monday	21,020	20,320	- 700	-3% ▼
Tuesday	21,370	21,220	- 150	-1% ▼
Wednesday	22,310	22,930	+ 620	3% ▲
Thursday	21,160	22,310	+ 1,150	5% ▲
Friday	21,900	21,470	- 430	-2% ▼
Average weekday (5-day) traffic	**21,550**	**21,650**	**+ 100**	**0.5% ▲**

Note: Volumes have been rounded to the nearest 10 vehicles.

The results of the traffic surveys on the Windsor Bridge between 2017 and 2019, indicate the following trends:

- Traffic volumes on the Windsor Bridge varied from Monday to Friday by one per cent to five per cent each day
- When considering the five-day weekday average, traffic volumes on Windsor Bridge have increased from 21,550 vehicles in 2017 to 21,650 vehicles in 2019
- Across the two time periods, traffic on Windsor Bridge has increased by 100 vehicles (0.5 per cent) per day. This suggests that the overall traffic volumes have remained relatively consistent between 2017 and 2019.

4.1.1 Heavy vehicles on the Windsor Bridge

Vehicle volumes with regards to their Austroads class were also assessed across the weekday period, with vehicles recorded as class 1 or 2 considered to be 'light' vehicles, and vehicles recorded as classes 3 or above considered to be 'heavy' vehicles.

Vehicle classes and their corresponding volumes over the five-day weekday period for 2017 and 2019 are provided in Table 4-2.

Table 4-2 Daily heavy vehicles proportion on Windsor Bridge

Vehicle Classification	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
All Traffic Classes	21,550	21,650	100	0.5% ▲
Light Vehicles	19,180	18,860	-320	-2% ▼
Heavy Vehicles	2,370	2,790	420	18% ▲
% Heavy Vehicles	11%	13%	2% increase in heavy vehicle proportion of total vehicles	

Note: Volumes have been rounded to the nearest 10 vehicles. Volumes on Windsor Bridge are based on average weekday (5-day, Monday to Friday) traffic.

The review of the vehicle classification volumes indicates that:

- On average, the weekday heavy vehicles on the Windsor Bridge have increased from 2,370 in 2017 to 2,790 in 2019, representing an overall increase of 420 vehicles (18 per cent)
- Light vehicle volumes across the Windsor Bridge have decreased by two per cent between 2017 and 2019
- The overall proportion of heavy vehicles on the Windsor Bridge have increased from 11 per cent in 2017 to 13 per cent in 2019, representing an overall increase of two per cent over this time period.

4.2 Peak hour volumes on Windsor Bridge for average weekday traffic

In order to evaluate the change in traffic volumes during peak periods, the changes in the peak AM hour and PM hour were assessed using the average weekday (five-day, Monday to Friday) traffic volumes.

Table 4-3 shows the peak one-hour two-way traffic volumes on the Windsor Bridge for AM peak (8-9 AM) and PM peak (4-5 PM).

Table 4-3 Peak one-hour volumes on Windsor Bridge (two way)

Peak One-Hour Volumes (Two-way)	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
8-9 AM	1,480	1,530	50	3% ▲
4-5 PM	1,790	1,760	-30	-2% ▼
Combined peak hour total (AM peak + PM peak)	3,270	3,290	20	1% ▲

Note: Volumes have been rounded to the nearest 10 vehicles. Peak hour traffic volumes on Windsor Bridge are based on average weekday (5-day, Monday to Friday) traffic.

The peak hour volume analysis suggests that:

- In the AM peak period between 2017 and 2019, traffic volumes on Windsor Bridge have increased by 50 vehicles over the hour (three per cent)
- In the PM peak period, traffic volumes on Windsor Bridge have decreased 30 vehicles (-2 per cent)
- When considering both the AM and PM peak hour, traffic volumes on Windsor Bridge have marginally increased by about 20 vehicles (one per cent)
- Across the two time periods, the peak hour volumes have remained relatively consistent across Windsor Bridge.

The peak hour traffic volumes on Windsor Bridge are further analysed in northbound and southbound directions. Table 4-4 and Table 4-5 show the directional peak hour traffic volumes on the Windsor Bridge for AM peak (8-9 AM) and PM (4-5 PM) peak respectively.

Table 4-4 Directional peak one-hour volumes on Windsor Bridge 8-9 AM

Survey Year	AM PEAK HOUR (8AM-9 AM)		
	Northbound /Eastbound	Southbound /Westbound	Two-way
March 2017	430	1,050	1,480
August 2019	480	1,050	1,530
Traffic change in two years	50	0	50
	12% ▲	0% ▶	3% ▲

Note: Volumes have been rounded to the nearest 10 vehicles.

Table 4-5 Directional peak one-hour volumes on Windsor Bridge 4-5 PM

Survey Year	PM PEAK HOUR (4PM-5PM)		
	Northbound /Eastbound	Southbound /Westbound	Two-way
March 2017	1,220	570	1,790
August 2019	1,210	550	1,760
Traffic change in two years	-10	-20	-30
	-1% ▼	-4% ▼	-2% ▼

Note: Volumes have been rounded to the nearest 10 vehicles.

The directional peak hour volume analysis indicates that:

- In the AM peak period, traffic volumes on Windsor Bridge have by 50 vehicles over the hour (12 per cent) increased in the northbound direction, with no change in traffic volumes in the southbound direction
- In the PM peak period, traffic volumes on Windsor Bridge have decreased by 10 vehicles (-1 per cent) in the northbound direction and decreased by 20 vehicles (-4 per cent) in the southbound direction

The daily and peak hour traffic volumes analysis indicates Windsor Bridge has experienced minor changes in traffic volumes 2017 and 2019. The analysis demonstrates there has been no substantial increase or decrease in traffic volumes at this location.

4.3 Intersection peak hour volumes

Intersection volume counts were undertaken at the following sites in March 2017 and August 2019:

- Wilberforce Road / Freemans Reach Road
- Bridge Street / George Street
- Bridge Street / Macquarie Street
- Bridge Street / Court Street.

Table 4-6 and Table 4-7 compares total intersection volumes at four sites for AM peak hour (8-9 AM) and PM peak hour (4-5 PM) hour respectively.

Table 4-6 Total intersection volumes – AM Peak

Intersections	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
A. Freemans Reach Rd / Bridge St	1,530	1,460	-70	-5% ▼
B. George St / Bridge St	1,670	1,580	-90	-5% ▼
C. Macquarie St / Bridge St	2,390	2,360	-30	-1% ▼
D. Bridge St / Court St	1,860	1,870	10	1% ▲
Total for all sites	**7,450**	**7,270**	**-180**	**-2% ▼**

Note: Volumes have been rounded to the nearest 10 vehicles.

Table 4-7 Total intersection volumes – PM Peak Period

Intersections	Survey Year		Traffic Change in two years	
	2017	2019	No. of Vehicles	%
A. Freemans Reach Rd / Bridge St	1,780	1,750	-30	-2% ▼
B. George St / Bridge St	1,910	1,900	-10	-1% ▼
C. Macquarie St / Bridge St	2,290	2,330	40	2% ▲
D. Bridge St / Court St	1,620	1,760	140	9% ▲
Total for all sites	**7,600**	**7,740**	**140**	**2% ▲**

Note: Volumes have been rounded to the nearest 10 vehicles.

The intersection volumes analysis indicates that:

- Between 2017 and 2019, intersection volumes during the AM peak varied between – 5 percent to 9 per cent, with the total traffic volumes across the four locations decreasing by 180 vehicles over this time period
- In the PM peak, the total volumes for all four locations increased by 140 vehicles (two per cent) between 2017 and 2019
- The peak hour traffic volume change across the four intersections is minor, with a 2 per cent increase observed between 2017 and 2019.

4.4 Travel time and travel speed on the Bridge Street / Wilberforce Road

4.4.1 Travel time analysis

A Travel time survey was completed for a 1.5 kilometre route along the Bridge Street / Wilberforce Road.

Table 4-9 shows the recorded peak period travel times on Bridge Street / Wilberforce Road for March 2017 and August 2019.

Table 4-8 Average travel times on Bridge Street / Wilberforce Road in 2017 and 2019

Period	Direction	Average Travel Time		
		2017	2019	Change
7-9 AM	Northbound	2.3 minutes	2.1 minutes	-0.2 minutes (-12 seconds) ▼
	Southbound	3.7 minutes	3.7 minutes	0.0 minutes (0 seconds) ▶
4-6 PM	Northbound	3.3 minutes	2.6 minutes	-0.7 minutes (-42 seconds) ▼
	Southbound	2.2 minutes	2.1 minutes	-0.1 minutes (-6 seconds) ▼

Note: Travel time route - Bridge Street / Wilberforce Road (between 500 metres south of Court Street / Bridge Street intersection and 500 metres east of Freemans Road / Wilberforce Road intersection).

The travel time analysis indicates that:

- During the AM peak period, the average travel time in 2019 decreased by 12 seconds in the northbound direction, with no change in travel time in the southbound direction when compared to 2017
- During the PM peak period, the average travel time in 2019 decreased by 42 seconds in the northbound direction and about 6 seconds in the southbound direction compared to 2017
- The minor improvements in travel time along the Bridge Street / Wilberforce Road route supports the findings of the traffic volume analysis.

The travel times along the Bridge Street / Wilberforce Road route were further analysed by sections along the surveyed section, with Figures 4-2 to 4-5 detailing the AM and PM peak period results for each direction.

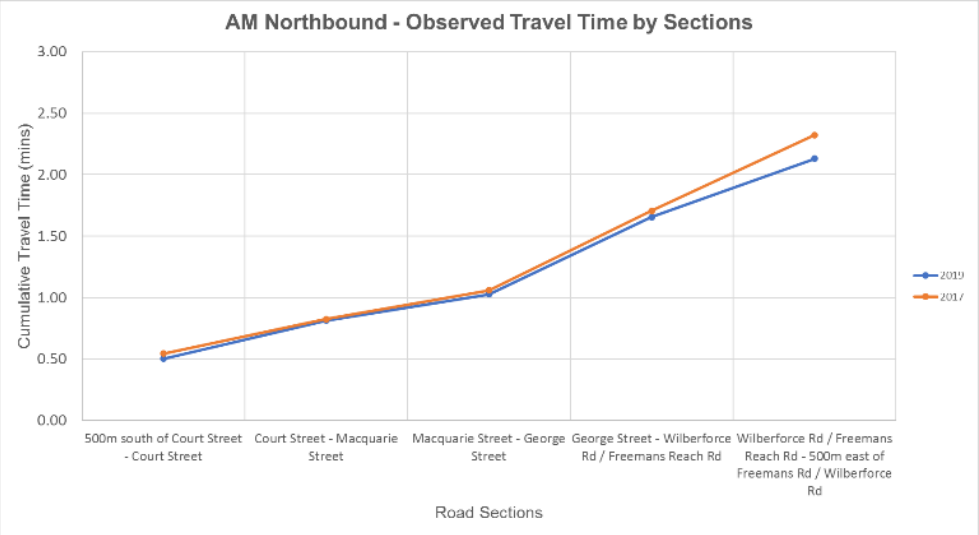

Figure 4-2 Travel time on Bridge Street / Wilberforce Road – AM Northbound

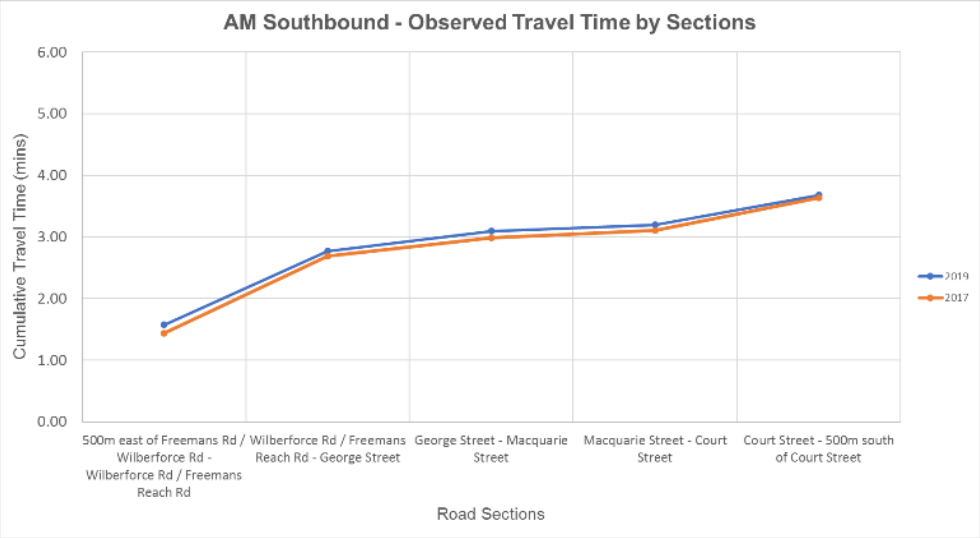

Figure 4-3 Travel time on Bridge Street / Wilberforce Road – AM Southbound

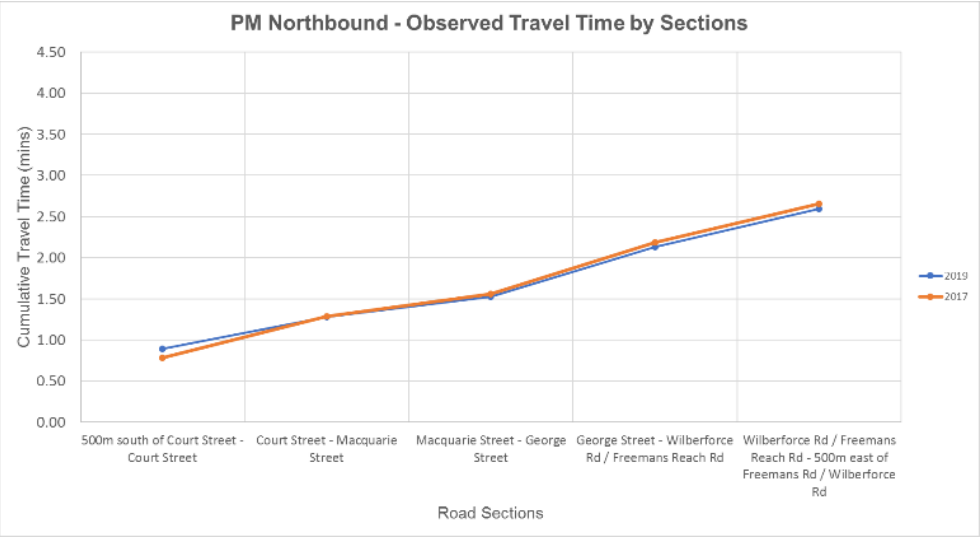

Figure 4-4 Travel time on Bridge Street / Wilberforce Road – PM Northbound

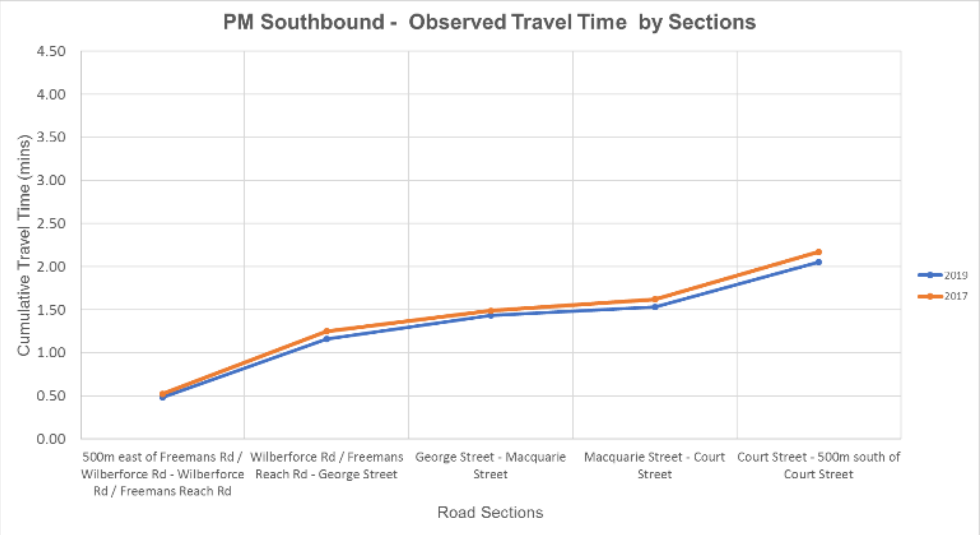

Figure 4-5 Travel time on Bridge Street / Wilberforce Road – PM Southbound

4.4.2 Travel speed analysis

A travel speed analysis was also completed along the Bridge Street / Wilberforce Road route for March 2017 and August 2019.

Table 4-10 shows the average travel speed along the Bridge Street / Wilberforce Road route during the AM and PM peak periods.

Table 4-9 Average travel speed on Bridge Street / Wilberforce Road in 2017 and 2019

Average Travel Speed (km/h)	Survey Year		Change
	2017	2019	
AM Peak Period (7-9 AM)			
Northbound	39 km/h	40 km/h	1 km/h ▲
Southbound	20 km/h	21 km/h	1 km/h ▲
PM Peak Period (4-6 PM)			
Northbound	41 km/h	42 km/h	1 km/h ▲
Southbound	35 km/h	37 km/h	2 km/h ▲

The travel speed analysis indicates that:

- In the 2019 AM peak period, the average travel speed along the Bridge Street / Wilberforce Road route increased by one kilometre per hour in the northbound and southbound directions when compared to 2017
- In the 2019 PM peak period, the average travel speed has increased by one kilometre per hour in the northbound direction and two kilometres per hour in the southbound direction compared to 2017
- The findings suggest there has been a minor improvement to the overall travel speeds across the AM and PM peak periods between 2017 and 2019.

4.5 Intersection queue length

The queue lengths were observed during the AM and PM peak periods for one weekday in March 2017 and August 2019 at the following intersections:

- Wilberforce Road / Freemans Reach Road
- Bridge Street / George Street
- Bridge Street / Macquarie Street
- Bridge Street / Court Street.

Figure 4-6 and Figure 4-7 provides the 2017 and 2019 queues (95th percentile) across the four locations for the AM peak hour (8am to 9am) and PM peak hour (4pm to 5pm) respectively.

Figure 4-6 Observed queues – AM Peak

Figure 4-7 Observed queues – PM Peak

The queue lengths across the four locations in 2017 and 2019 are similar, with minor changes observed across the study area.

5 Summary and Conclusions

This technical advice memo has been prepared to document traffic changes on Windsor Bridge and four nearby intersections between 2017 and 2019.

The 2017 and 2019 traffic data has been compared across the following factors:

1. Daily traffic volumes on the Windsor Bridge
2. Daily Heavy vehicles proportions on the Windsor Bridge
3. Morning (AM) and afternoon (PM) peak hour traffic volumes on the Windsor Bridge
4. Peak hour traffic volumes at four intersections on Bridge Street / Wilberforce Road with Freemans Reach Road, George Street, Macquarie Street and Court Street
5. Peak hour travel time and travel speed on the section of Bridge Street / Wilberforce Road between Court Street and Freemans Road
6. Peak hour queue lengths on intersection approach roads at four locations including Bridge Street / Wilberforce Road intersections with Freemans Reach Road, George Street, Macquarie Street and Court Street.

The following conclusions are made:

- Across the two time periods, traffic on Windsor Bridge has increased by 100 vehicles (0.5 per cent) per weekday. This suggests that the overall traffic volumes have remained relatively consistent between 2017 and 2019
- The peak hour traffic volume change across the four intersections is minor, with a 2 per cent increase observed between 2017 and 2019
- In the 2019 AM and PM peak period, average travel times on the Bridge Street / Wilberforce Road have marginally decreased by between six to 42 seconds when compared to 2017
- The survey results suggest there has been a minor improvement to the overall travel speeds across the AM and PM peak periods between 2017 and 2019
- The queue lengths across the four locations in 2017 and 2019 are similar, with minor changes observed across the study area.

Overall, the traffic volumes on the Windsor Bridge and the four nearby intersections have remained at similar levels between 2017 and 2019.