



Road Safety
Camera
Commissioner

REPORT OF THE ROAD SAFETY CAMERA COMMISSIONER TO THE MINISTER FOR POLICE

Investigation into four fixed road safety cameras operating in 40km/h speed limit zones

Release date: 23 July 2015



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1 PURPOSE

The purpose of this investigation is to determine the accuracy and reliability of four fixed road safety cameras operating in 40km/h speed limit zones. In addition, this investigation also examines the level of speed limit signage, the road environment, motorist behaviour and the accident history of each of the relevant lengths of road.

2 BACKGROUND OF INVESTIGATION

In March 2014, four fixed road safety cameras installed in 40km/h speed limit zones were progressively activated to enforce the speed limits at those intersections. As at the date of this report, my office has received 178 written complaints and many telephone calls regarding the four fixed road safety cameras located at:

- The intersection of Warrigal Road and Batesford Road in Chadstone,
- The intersection of Exhibition Street and Victoria Street in Melbourne,
- The intersection of Flinders Street and William Street in Melbourne, and
- The intersection of Fitzroy Street and Lakeside Drive in St Kilda.

The vast majority of complaints regarding these cameras have focused on traffic infringements received by motorists for exceeding the speed limit. There have been three enquiries regarding red lights at these intersections in total.

Public concern regarding these cameras has also been expressed repeatedly in the media, especially in relation to the number of infringements detected. Due to the number of complaints received by my office, I undertook a full technical investigation into the accuracy and reliability of these four fixed road safety cameras, pursuant to my powers under section 10(e) of the *Road Safety Camera Commissioner Act 2011* (as amended).

2.1 FIXED ROAD SAFETY CAMERAS IN PERMANENT AND VARIABLE 40KM/H SPEED LIMIT ZONES AT VICTORIAN INTERSECTIONS

There are currently eleven fixed road safety cameras operating at Victorian intersections where there is a permanent or variable 40km/h speed limit. Apart from the four fixed road safety cameras in this investigation, the other seven locations are:

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- The intersection of Glenferrie Road and Burwood Road, Hawthorn (permanent 40km/h speed limit),
- The intersection of Barkly Street and Carlisle Street, St Kilda (variable speed limit zone between 40km/h and 60km/h),
- The intersection of Johnston Street and Wellington Street, Collingwood (variable speed limit zone between 40km/h and 60km/h),
- The intersection of Duke Street and Ballarat Road, Braybrook (school zone),
- The intersection of Punt Road and High Street, Prahran (school zone),
- The intersection of Punt Road and Toorak Road, South Yarra (school zone), and
- The intersection of Whitehorse Road and Surrey Road, Blackburn (school zone).

None of these other seven fixed road safety cameras has seen the same speed infringement level as the cameras this investigation involves. However, it must be noted that because the majority of these locations are school zones, where the 40km/h speed limit applies for a relatively short time over the course of a year, the number of infringements issued at these locations for the 40km/h speed limit should, in theory, be lower regardless.

2.2 FIXED ROAD SAFETY CAMERA ALONG WARRIGAL ROAD, CHADSTONE

The primary device installed at the intersection of Warrigal Road and Batesford Road in Chadstone is a Gatsometer GTC-GS11, which is a prescribed device for use in Victoria under the *Road Safety (General) Regulations 2009*.

This type of road safety camera uses a set of two inductive loops, set a short distance apart in each lane, to detect a vehicle's presence and calculate speed. When the ferrous content in a vehicle passes over the sensors, the change in the sensors' inductance is measured by the road safety camera system, and used in calculations. The secondary system installed at this intersection projects two infrared beams across the road, which are used to detect vehicle presence and calculate speed.

The road safety camera monitors speed limit and traffic signal compliance for south bound traffic along Warrigal Road across four lanes of traffic. The left lane, Lane One, allows vehicles to turn

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left or travel straight through the intersection. Lane Two is for straight through traffic and Lane Three is a fully controlled right turn lane.

At the north bound approach of the intersection, another fixed road safety camera is installed. This road safety camera is an older wet film system, which can only monitor compliance with red lights and turning arrows and is not part of this investigation.

The speed limit along this length of Warrigal Road is 40km/h between 8AM and 8PM, Monday to Saturday, including public holidays that fall on those days of the week. Outside those hours, the speed limit is 60km/h. Although the fixed road safety camera was initially installed in 2010, the fixed road safety camera did not begin enforcing the speed limit until 28 May 2014.

2.3 FIXED ROAD SAFETY CAMERA ALONG FITZROY ST, ST KILDA

The primary device installed at the intersection of Fitzroy Street and Lakeside Drive in St Kilda is a Gatsometer GTC-GS11, which is a prescribed device for use in Victoria under the *Road Safety (General) Regulations 2009*. This type of road safety camera uses a set of two inductive loops to detect vehicle presence and calculate speed.

The secondary system installed at this intersection is a system based on infrared lasers projected across the road, which can be used to detect vehicle presence and calculate speed.

The speed limit along this length of road is 40km/h, with the road safety camera monitoring speed limit and traffic signal compliance for northeast bound traffic along Fitzroy Street across three lanes of traffic. Lanes One and Two allow vehicles to travel straight through the intersection and Lane Three is a fully controlled right turn lane.

The fixed road safety camera began enforcing red light compliance on 3 November 2011, and speed limit compliance on 7 March 2014.

On the southwest bound approach to the intersection, there is a fixed road safety camera monitoring compliance with the traffic lights along Fitzroy Street. This fixed camera is an older wet film system and is not part of this investigation.

2.4 FIXED ROAD SAFETY CAMERA ALONG EXHIBITION STREET, MELBOURNE

The primary device installed at the intersection of Exhibition Street and Victoria Street in Melbourne is a ROBOT TRAFFIPAX Traffistar SR520, a prescribed device for use in Victoria under

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the *Road Safety (General) Regulations 2009*. This type of road safety camera uses a set of two inductive loops to detect vehicle presence and calculate speed.

The secondary device installed at this intersection is a type of radar that can track vehicles in all lanes over a short distance, and calculates their speed based on hundreds of measurements per second.

Exhibition Street is within the Melbourne CBD, which has a speed limit of 40km/h. The road safety camera monitors speed limit and traffic signal compliance for north bound traffic along Exhibition Street across three lanes of traffic. Lanes One and Two allow vehicles to travel straight through the intersection and Lane Three is a right turn lane.

The fixed road safety camera was first activated on 11 October 2011, and monitored compliance with the speed limit and red lights. On 16 December 2012, the speed limit along Exhibition Street was reduced to 40km/h from 50km/h, and the camera was deactivated on this date. The road safety camera was reactivated for red light compliance on 26 November 2013. Monitoring of speed limit compliance began again on 7 March 2014.

2.5 FIXED ROAD SAFETY CAMERA ALONG FLINDERS STREET, MELBOURNE

The primary device installed at the intersection of Flinders Street and William Street in Melbourne is a REDFLEXred-speed HDX system, a prescribed device for use in Victoria under the *Road Safety (General) Regulations 2009*. This type of road safety camera uses a combination of two in-road piezoelectric sensors straddling one inductive loop sensor to calculate speed and detect a vehicle's presence, respectively.

Piezoelectric sensors respond to being squeezed by creating a voltage, which is measurable. These sensors rely on direct contact with a vehicle's wheels, which changes the sensors' shape and creates a short spike of voltage. With two piezoelectric sensors installed in close proximity, a very accurate calculation of a vehicle's speed can be effected.

The secondary device installed at this intersection is a set of two inductive loops, which can calculate speed and detect a vehicle's presence.

On the north bound approach to the intersection, there are two fixed road safety cameras monitoring compliance with the speed limit of 50km/h and traffic lights along Queensbridge Street. These fixed cameras are not part of this investigation.

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Flinders Street is within the Melbourne CBD, which has a speed limit of 40km/h. The road safety camera monitors speed limit and traffic signal compliance for west bound traffic along Flinders Street across three lanes of traffic. Lane One allows vehicles to turn left or travel straight through the intersection. Lane Two allows vehicles to travel straight through the intersection and Lane Three is a fully controlled right turn lane.

This road safety camera has been installed at this intersection for some time, and was originally operational on 28 August 2006, when the speed limit was 50km/h in the CBD. When the CBD speed limit was reduced to 40km/h in late 2012, the camera was deactivated. It began enforcing the speed limit again on 28 March 2014.

2.6 VICTORIA'S FIXED ROAD SAFETY CAMERAS

All fixed road safety cameras monitoring speed limits in Victoria comprise two independently calibrated and operating systems: the primary speed calculation unit, also known as the primary device, and the secondary speed calculation unit, also known as the secondary device.

In all cases, the measurement of a vehicle's speed made by the primary device is compared with the measurement of the same vehicle's speed made by the secondary system, to ensure that they correlate. If the two measurements do not correlate, the road safety camera rejects the measurement, the data and images recorded of this type of incident are quarantined, and cannot be used as the basis for a traffic infringement notice.

This double measurement of a vehicle's speed is independent of whether a motorist receives a traffic infringement for allegedly entering an intersection against a red light or red arrow.

All road safety cameras operating in Victoria must comply with the requirements set out in the *Road Safety (General) Regulations 2009*. An integral part of this compliance is the requirement for each road safety camera to undergo an annual calibration and certification process by independent Testing Officers, to ensure that it can measure the speed of vehicles accurately and reliably and record changes in traffic signals.

2.7 TESTING AND MAINTENANCE OF ROAD SAFETY CAMERAS

In addition to the annual certification and calibration requirements, the Department of Justice & Regulation subjects all fixed road safety cameras to a rigorous program of monitoring, maintenance and testing performed by independent qualified organisations. This program is aimed

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at ensuring the road safety cameras continue to operate within the requirements set out in the *Road Safety (General) Regulations 2009*.

All fixed road safety cameras are monitored remotely on a daily basis to ensure they are functioning correctly. Maintenance, in the form of electrical, electronic and physical checks, is carried out on each road safety camera once a month, to ensure they are operating correctly.

Testing by an independent qualified organisation is carried out on each fixed camera every three months to ensure that they are operating within the requirements set out in the *Road Safety (General) Regulations 2009*. There are three main tests, which all road safety cameras must pass in order to remain operational.

The first test is to ensure that any in-road sensors are in sound electrical and physical condition, and that they operate within the specifications and technical requirements of the manufacturer, in the installed environment.

In the second test, the accuracy of the road safety camera's speed measurements is determined by driving a vehicle with a calibrated speedometer past the road safety camera. The speed at which the vehicle is travelling is displayed on a board, and photographic evidence of the vehicle's speed is recorded. The speeds must correlate for the road safety camera to pass this second test.

The third test is in relation to the repeatability of the road safety camera's speed measurements. This is done by installing a third independently calibrated speed measurement device at the location temporarily over a reasonable period. During this time, the speeds of all vehicles driving past the camera are recorded and the data recorded must correlate between every device for the road safety camera to pass this test.

2.8 VARIABLE SPEED LIMITS AND ROAD SAFETY CAMERAS

Fixed road safety cameras operating in an area with variable speed limits, have additional requirements placed on them, to ensure that the correct speed limit is monitored.

In areas where the speed limit changes according to a fixed pattern, such as school zones and the shopping area along Warrigal Road, near the intersection of Batesford Road in Chadstone, the road safety camera is programmed to monitor the correct speed limit at the relevant time.

Further, every time the speed limit is lowered, the road safety camera is programmed to ensure that a grace period of ten minutes duration (five minutes before and after the change in speed

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limit) is applied, so that motorists are given an opportunity to adjust to the new speed limit. This grace period is not applied when the speed limit is raised.

2.9 PROCESSING OF DETECTED INCIDENTS

Infringement notices for alleged offences detected by fixed and mobile road safety cameras are not issued automatically. When fixed and mobile road safety cameras detect a vehicle exceeding the speed limit or entering an intersection against a red light or arrow, otherwise known as an "incident", the images and data are packaged into encrypted files for further processing, as long as they pass internal software checks.

All incidents that pass the software checks will then undergo manual processing by an independent organisation. During manual processing, each incident is viewed by at least two people, who must independently conclude that the images and data presented to them show a motorist committing an offence. If there is disagreement, a third person also makes an independent assessment.

If an incident is accepted as valid during this process, it is passed on to Victoria Police to ensure it is satisfied the evidence is accurate and fair, before it authorises the issuing of an infringement notice to the registered owner of the vehicle.

3 NATURE OF COMPLAINTS

As at the date of this report, my office has received 178 written complaints about the four intersections that are the subject of this investigation. Specifically, I have received:

- 77 complaints regarding the camera monitoring south bound traffic at the intersection of Warrigal Road and Batesford Road in Chadstone,
- 34 complaints regarding the camera at the intersection of Exhibition Street and Victoria Street in Melbourne,
- 5 complaints regarding the camera monitoring west bound traffic at the intersection of Flinders Street and William Street in Melbourne,
- 48 complaints regarding the camera monitoring northeast bound traffic at the intersection of Fitzroy Street and Lakeside Drive in St Kilda, and
- 14 general complaints concerning the road safety cameras in these 40km/h speed zones.

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Except for two complaints regarding alleged red light infringements detected by the camera installed on Flinders Street and one red light infringement detected by the camera on Fitzroy Street, all of the complaints I have received about these intersections deal with vehicles detected exceeding the speed limit at those intersections, and other associated concerns. Specifically, the concerns raised were:

- The accuracy and reliability of the fixed road safety cameras,
- The activation of the road safety cameras was not sufficiently promulgated,
- The speed limit of 40km/h, permanent or otherwise, is inappropriate,
- 40km/h speed limits should be limited to school zones,
- The speed limit signage is inconspicuous, confusing, difficult to read or insufficient,
- Changes in the speed limit were not sufficiently promulgated,
- The cameras are “revenue raisers” and do not improve the safety at these locations, and
- A general lack of confidence in the reasons for the installation of the road safety cameras at these locations.

4 SCOPE OF INVESTIGATION

The scope of this investigation will focus on the main issues raised in the complaints my office has received. However, as my statutory powers do not allow me to set speed limits, I was unable to examine the issue of whether 40km/h speed limits should be limited to school zones. The issues this report examined are:

- The general operation of the four road safety cameras,
- All testing, maintenance and certification activities of the four road safety cameras,
- The detection rate of incidents recorded by the road safety cameras,
- Infringements referred to me by motorists to assist in examining the validity of the fines,
- The history of the speed limit along the relevant length of road,

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- The reasons for the installation of the road safety cameras,
- When the road safety cameras were installed and activated,
- The level of signage promulgating the speed limits on approach to the road safety cameras, and
- Any other factors that may have influenced the large number of traffic infringements detected at these four intersections.

As the written complaints sent to me referred mainly to the accuracy and reliability of the road safety cameras and the speed limit itself, this investigation did not examine the manual processing of images and data recorded by the fixed road safety cameras. These policies and procedures do not have any influence on the operation of the cameras or the speed limits themselves.

However, to assist in the examination of the operation of the road safety cameras, I examined the images of traffic infringements that were referred to my office, to satisfy myself that they were issued correctly and fairly.

In this report, the phrase "speed incident" refers to the road safety cameras detecting a vehicle exceeding the speed limit. This phrase does not refer to the final number of traffic infringements issued by Victoria Police, as that number may change during manual processing.

As I have already stated in Section 3 of this report, I have only received three complaints regarding red light infringements detected by two of these four road safety cameras, both of which relate to vehicles entering an intersection against right turn arrows. As the standard duration of yellow arrows is three seconds, this report will not examine the issue of the duration of yellow lights at these intersections.

To determine whether the road safety cameras were operating, and continue to operate, accurately and reliably, the Department of Justice & Regulation provided raw data recorded by the fixed road safety cameras between the 7 March 2014 and 31 December 2014. This data was used to analyse the behaviour of the road safety cameras.

As part of the investigation, I visited the two fixed road safety camera sites in Chadstone and St Kilda with a member of my technical staff. My staff members also visited the fixed camera sites in

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Melbourne. These visits were used to understand the level of speed limit signage available to motorists and the general environment around the road safety camera sites.

5 RESULTS OF INVESTIGATION

5.1 OPERATION OF THE ROAD SAFETY CAMERAS

Through examination of the testing and certification activities conducted by the independent testing authorities, I am satisfied the four fixed road safety cameras have been operating accurately and reliably, and continue to do so. The testing and maintenance reports show that the road safety cameras continuously operated in accordance with the requirements set out by the *Road Safety (General) Regulations 2009*.

I am satisfied the road safety cameras were, and continue to be, maintained to a sound physical and electrical condition in accordance with the specifications set out by the manufacturers and the Department of Justice & Regulation.

After examining the data recorded by the road safety camera at the intersection of Warrigal Road and Batesford Road in Chadstone, I am also satisfied that it correctly adjusted the monitored speed limit, in accordance with the time and day of the week. It also correctly applied the Victoria Police mandated grace period on the days when the speed limit reduced to 40km/h, ensuring motorists were afforded an opportunity to adjust to the lowered speed limit.

5.2 SPEED LIMIT AND SIGNAGE ALONG WARRIGAL ROAD, CHADSTONE

On 10 August 2010, VicRoads began operating a variable speed limit along Warrigal Road in Chadstone, between Green Gables Avenue and Power Avenue. The speed limit was 40km/h between 8AM and midnight, Monday to Saturday, due to accidents involving pedestrians. Outside these periods, the speed limit was 70km/h.

On 24 January 2012, VicRoads altered the time of operation of the 40km/h speed limit, to 8AM to 8PM, Monday to Saturday, after an assessment of road accidents that had occurred in the area showed that there were not a large number of accidents involving pedestrians between 8PM and midnight.

In accordance with the Speed Limit Review carried out by VicRoads, the general speed limit along Warrigal Road, between High Street Road and Dandenong Road was lowered from 70km/h to 60km/h on 4 September 2014. The hours of operation of the variable speed limit zone between Green Gables Avenue and Power Avenue did not change.

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My technical staff and I have now visited this area three times, to gauge the level of signage promulgating the times and dates of the operation of the variable speed limit. The first visit occurred on 12 June 2014, and the most recent inspection occurred on 30 March 2015. Prior to the fixed road safety camera beginning to enforce the speed limit, VicRoads upgraded the speed limit signage along both carriageways to ensure they were visible.

At the time of the road safety camera's activation for speed enforcement, there were three sets of two speed limit signs on the southbound carriageway on the approach to the road safety camera, including one set of two LED illuminated signs. The LED signs are programmed to display the relevant speed limit for the time and day. The remaining two sets of static signs display the times of operation of the 40km/h speed limit.

On 27 October 2014, VicRoads installed a further set of two speed limit signs between the railway bridge and the road safety camera, bringing the total number of speed limit signs promulgating the variable speed limit to eight. A diagram of the area, including speed limit signage, can be found in **Appendix B**.

On 12 June 2014, a photograph taken by a motorist was shared on social media depicting the LED illuminated signs contradicting each other. One showed the 40km/h speed limit, while the other showed the higher speed limit, then 70km/h.

The cause of this issue was a GPS timing unit malfunction in the sign showing 70km/h. This forced the internal software to begin using its backup clock, which was approximately 60 seconds behind. VicRoads rectified the issue on the same day, and the sign is currently operating correctly. As this issue occurred within the grace period mandated by Victoria Police (see **Section 2.8**), no speed infringements were detected when the signs were contradictory.

It is important to note that the LED illuminated signs at this intersection operate independently from the fixed road safety camera system.

5.3 DATA RECORDED AT THE INTERSECTION OF WARRIGAL ROAD AND BATESFORD ROAD, CHADSTONE

The Department of Justice & Regulation provided data recorded by the fixed road safety camera from 28 May 2014 to 31 December 2014, with the number of recorded traffic movements totalling over 2.82 million.

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During this period, 74,218 speed incidents were detected, with an overall speed limit compliance rate of 97.4 per cent. **Figure C1.1** and **Figure C1.2** in **Appendix C1** show the daily traffic volume and daily number of speed incidents detected, during this period. Note that between 19 August 2014 and 22 September 2014, the fixed road safety camera was deactivated due to maintenance and testing, and no data was recorded.

These diagrams show that the weekly traffic volume pattern remains relatively consistent, with a peak in traffic volume from winter to just before Christmas, before falling away dramatically. The data also shows a downward trend in the number of vehicles detected exceeding the speed limit throughout this period. It must be noted that due to the nature of the variable speed limit along Warrigal Road, very few speed incidents were recorded on Sundays, as can be seen in **Figure C1.2**.

Figure C1.3 shows the average number of speed incidents detected at the intersection of Warrigal Road and Batesford Road in Chadstone by the hour of the day and day of the week and **Figure C1.4** compares the average traffic volume, and rate of detection of speeding vehicles by the hour of the day.

Unsurprisingly, the data showed that when the speed limit was not 40km/h, such as Sundays, the road safety cameras detected a very low level of speed incidents. The average speed limit compliance, when the speed limit was 60km/h, was over 99.5 per cent, at or above the average speed limit compliance for all of Victoria. When the speed limit was lowered to 40km/h, the average speed limit compliance fell to less than 97 percent, which is significantly below the average rate of speed limit compliance across Victoria.

The number of speed incidents can be broken up into the following categories, as shown in the table below:

Detected exceeding the speed limit by	Number detected
Less than 10km/h *	33,683
Between 10km/h – 14km/h inclusive *	29,364
Between 15km/h – 24km/h inclusive	10,808
Between 25km/h – 44km/h inclusive ^	353
45km/h or more ^	10

* - Motorists with a good driving record may be eligible for an Official Warning if they receive a traffic infringement notice

^ - Motorists in these categories may face a period of automatic licence suspension due to excessive speeds

It is interesting to note that a majority of motorists (54.62 per cent) who were detected exceeding the speed limit, were doing so by more than 10km/h. This is the opposite to the normal case of fixed and mobile road safety cameras, where most detections are where motorists are exceeding the speed limit by less than 10km/h. The detected average speed above the speed limit during this period was 10.86km/h.

During some of the visits to this area, my staff observed pedestrians jay walking across Warrigal Road's carriageways to access either Holmesglen TAFE or the shops, despite the high traffic volume, and the relatively high proportion of heavy vehicles travelling along that road. I consider this type of behaviour would contribute to the high proportion of pedestrian casualties resulting from accidents at this location, as shown in **Section 5.12**.

5.4 SPEED LIMIT AND SIGNAGE ALONG FITZROY STREET, ST KILDA

Originally, the speed limit along Fitzroy Street in St Kilda was 60km/h. On 21 July 2004, VicRoads introduced a variable speed limit beginning at Acland Street and ending just after the intersection with Lakeside Drive, changing it to 40km/h from midnight to 2AM and 6AM to midnight, seven days a week. Outside these hours, the speed limit was 60km/h. The speed limit along this length of Fitzroy Street was then changed permanently to 40km/h in July 2008 by VicRoads.

In early 2014, prior to the camera's activation, VicRoads installed additional speed limit signage along Fitzroy Street, promulgating the 40km/h speed limit zone, bringing the total number of speed limit signs along Fitzroy Street, between Acland Street and Lakeside Drive, prior to the road safety camera to seven, including two that are LED illuminated. Refer to **Appendix B** for a diagram including the speed limit signage.

On 7 August 2014, the permanent 40 km/h speed limit was extended to encompass the full length of Fitzroy Street between St Kilda Junction and Acland Street, with additional signage installed between Lakeside Drive and St Kilda Junction.

Several motorists have written to me, claiming that the speed limit along Fitzroy Street was 50km/h, or that school zone times applied to the 40km/h speed limit near St Kilda Park Primary School. These claims are false, and VicRoads has confirmed that it has never implemented such speed limits along Fitzroy Street in St Kilda.

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My office has also been contacted about speed limit signage installed along Lakeside Drive, on approach to its intersection with Fitzroy Street. Lakeside Drive has a speed limit of 50km/h and once across the intersection, becomes Princes Street, which attracts a speed limit of 60km/h. In addition to any signage promulgating the speed limit along Lakeside Drive, there is a sign installed along Lakeside Drive warning motorists that by effecting a left or right turn, they are entering a street with a 40km/h speed limit.

Media articles have been published asserting that the signage along Lakeside Drive is confusing and may be contributing to the high number of traffic infringements detected by the fixed road safety camera. I do not accept this assertion. It is my firm belief that a basic level of common sense must be attributed to motorists, and it is very common in Victoria to have intersections where different roads have different speed limits.

5.5 DATA RECORDED AT THE INTERSECTION OF FITZROY STREET AND LAKESIDE DRIVE, ST KILDA

The Department of Justice & Regulation provided data recorded by the fixed road safety camera from 7 March 2014 to 31 December 2014, with more than 1.32 million traffic movements recorded during this period, an average of approximately 6,700 per day.

During this time, there were 46,921 speed incidents detected by the road safety camera, with an average speed limit compliance rate of 96.46 per cent. **Figure C2.1** and **Figure C2.2** in **Appendix C2** show the daily traffic volume and daily number of speed incidents detected, during this period. Note that between 18 May 2014 & 9 August 2014 and 3 October 2014 & 23 October 2014, the fixed road safety camera was deactivated for maintenance and testing, and no data was recorded.

These diagrams show that traffic volume follows a relatively consistent pattern, with a peak in traffic volume during the weekends, with a trend of increasing traffic up to Christmas, before falling away dramatically, presumably due to seasonal factors. The data also shows a downward trend in the number of vehicles detected exceeding the speed limit throughout this period from the initial activation of the road safety camera.

Figure C2.3 shows the average number of speed incidents detected at the intersection of Fitzroy Street and Lakeside Drive in St Kilda by the hour of the day and day of the week and **Figure C2.4** compares the average traffic volume, and rate of detection of speeding vehicles by the hour of the day.

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Despite the speed limit of 40km/h, the average speed limit compliance still changes markedly over an average day. The rate of speed limit compliance is at its best at night and in the early morning, when it hovers at approximately 98 per cent. However, during the main daylight trading hours, this drops to under 96 per cent.

The number of speed incidents can be broken up into the following categories, as shown in the table below:

Detected exceeding the speed limit by	Number detected
Less than 10km/h *	20,722
Between 10km/h – 14km/h inclusive *	19,077
Between 15km/h – 24km/h inclusive	6,849
Between 25km/h – 44km/h inclusive ^	264
45km/h or more ^	9

* - Motorists with a good driving record may be eligible for an Official Warning if they receive a traffic infringement notice

^ - Motorists in these categories may face a period of automatic licence suspension due to excessive speeds

In a similar vein to the fixed road safety camera in Chadstone, a larger proportion of motorists (55.84 per cent) who were detected exceeding the speed limit, were doing so by more than 10km/h, rather than less. This is the opposite to the normal case of fixed and mobile road safety cameras, where most detections are where motorists are exceeding the speed limit by less than 10km/h. The detected average speed of speed incidents during this period was 50.82km/h.

5.6 SPEED LIMIT AND SIGNAGE ALONG EXHIBITION STREET, MELBOURNE

Exhibition Street is located within Melbourne's CBD, and its speed limit is controlled by the City of Melbourne (CoM). In December 2012, the speed limit within the CBD area was lowered to 40km/h by CoM, where previously the CBD was subject to the default speed limit of 50km/h.

A member of my technical staff visited this site on 30 March 2015 and confirmed that eight speed limit signs are installed along Exhibition Street, between Bourke Street and Victoria Street. A diagram of the area is found in **Appendix B**.

On 28 October 2014, the CoM extended the 40km/h speed limit north, along Rathdowne Street to adjoin the school zone operating between Pelham Street and Grattan Street. Previously, the 40km/h speed limit ended shortly after Exhibition Street's intersection with Victoria Street.

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Before this occurred, I understand that the north bound speed limit along Rathdowne Street increased to 60km/h a short distance after Victoria Street, with some motorists arguing that as the speed limit sign was visible, they began to accelerate up to that speed limit, and received a fine for doing so. This argument fundamentally misrepresents section 21 of the *Road Safety Road Rules 2009* (**Appendix A**), which clearly states that a new speed limit begins when a motorist passes a sign with that new speed limit.

5.7 DATA RECORDED AT THE INTERSECTION OF EXHIBITION STREET AND VICTORIA STREET, MELBOURNE

The Department of Justice & Regulation provided data recorded by the fixed road safety camera from 7 March 2014 to 31 December 2014, with a total traffic volume of over 1.38 million.

During this period, there were 35,339 vehicles detected exceeding the speed limit of 40km/h, resulting in an overall speed limit compliance rate of 97.45 per cent. **Figure C3.1** and **Figure C3.2** in **Appendix C3** show the daily traffic volume and daily number of speed incidents detected, during this period. Note that between 6 November 2014 and 11 November 2014, the fixed road safety camera was deactivated for maintenance and testing, and no data was recorded.

Traffic volume follows a consistent pattern, with a large spike in late April, possibly due to the Easter public holidays and long weekend. There is also an overall increase in traffic volumes during the lead up to the Christmas holidays, with a small fall in the number of vehicles detected exceeding the speed limit. It is also possible the lowering of the speed limit along Rathdowne Street (from 60km/h to 40km/h) contributed to this reduction in the number of vehicles exceeding the speed limit.

Figure C3.3 shows the average number of speed incidents detected at the intersection of Exhibition Street and Victoria Street in Melbourne by the hour of the day and day of the week and **Figure C3.4** compares the average traffic volume, rate of detection of speeding vehicles by the hour of the day.

Though the speed limit is permanently 40km/h at this intersection, the speed limit compliance rate changes significantly during an average day. The rate of speed limit compliance is at its best at night and in the early morning, where it hovers at approximately 99 per cent. However, during the main daylight trading hours, this drops to under 97 per cent.

The number of speed incidents can be broken up into the following categories, as shown in the table below:

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Detected exceeding the speed limit by	Number detected
Less than 10km/h *	19,887
Between 10km/h – 14km/h inclusive *	12,410
Between 15km/h – 24km/h inclusive	2,927
Between 25km/h – 44km/h inclusive ^	113
45km/h or more ^	2

* - Motorists with a good driving record may be eligible for an Official Warning if they receive a traffic infringement notice

^ - Motorists in these categories may face a period of automatic licence suspension due to excessive speeds

Unlike the two fixed road safety cameras operating outside the Melbourne CBD, this site's average incident detection speed was 49.96km/h, with the majority (56.27 per cent) of vehicles detected speeding in the lowest category.

5.8 SPEED LIMIT AND SIGNAGE ALONG FLINDERS STREET, MELBOURNE

Flinders Street is located within Melbourne's CBD, and its speed limit is controlled by the CoM. In December 2012, the speed limit within the CBD area was lowered to 40km/h by the CoM, where previously the CBD was subject to the default speed limit of 50km/h.

Since the speed limit was reduced from the default speed limit to 40km/h, there have been no further changes to signage or the speed limit along Flinders Street.

A member of my technical staff visited this location, and noted there are four speed limit signs installed on Flinders Street, between Swanston Street and William Street. A diagram of the area is included in **Appendix B**.

5.9 DATA RECORDED AT THE INTERSECTION OF FLINDERS STREET AND WILLIAM STREET, MELBOURNE

The Department of Justice & Regulation provided data recorded by the fixed road safety camera from 7 March 2014 to 31 December 2014, with a total traffic volume of over 2.3 million.

During this period, there were 58,330 vehicles detected exceeding the speed limit of 40km/h, resulting in an overall speed limit compliance rate of 97.47 per cent. **Figure C4.1** and **Figure C4.2** in **Appendix C4** show the daily traffic volume and daily number of speed incidents detected, during this period. Note that between 27 May 2014 & 1 June 2014 and 27 to 28 November 2014, the fixed road safety camera was deactivated for maintenance and testing, and no data was recorded.

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The traffic volume follows a consistent pattern, as with the other locations. There is no overall increase in traffic volumes during the lead up to the Christmas holidays, though there is a fall in the number of vehicles travelling along Flinders Street after Christmas. There has also been a small drop in the number of vehicles detected exceeding the speed limit, but the number has remained relatively steady since June 2014 until the end of the 2014 calendar year.

Figure C4.3 shows the average number of speed incidents detected at the intersection of Exhibition Street and Victoria Street in Melbourne by the hour of the day and day of the week, and **Figure C4.4** compares the average traffic volume, rate of detection of speeding vehicles by the hour of the day.

As the speed limit is permanently 40km/h at this intersection, it is interesting to see that the speed limit compliance rate at this camera remains between 97 per cent and 98 per cent. The rate of speed limit compliance is at its best at night and in the early morning, but drops during the main daylight trading hours.

The number of speed incidents can be broken up into the following categories, as shown in the table below:

Detected exceeding the speed limit by	Number detected
Less than 10km/h *	33,332
Between 10km/h – 14km/h inclusive *	19,748
Between 15km/h – 24km/h inclusive	5,058
Between 25km/h – 44km/h inclusive ^	191
45km/h or more ^	1

* - Motorists with a good driving record may be eligible for an Official Warning if they receive a traffic infringement notice

^ - Motorists in these categories may face a period of automatic licence suspension due to excessive speeds

The speed incidents detected by the fixed road safety camera at the intersection of Flinders Street and William Street involved an average speed of 49.94km/h. This is very similar to the situation found at the intersection of Exhibition Street and Victoria Street in Melbourne. This is welcome news, and I am hopeful that the average speed of all motorists travelling past all four of these road safety cameras will continue to fall over time.

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5.10 SIGNAGE AND ENVIRONMENT STUDY

After having my technical staff inspect the four locations, I was satisfied that the level of signage on the approach to these four intersections is more than adequate. However, as many people had written to me expressing their concerns that the signage was not conspicuous or clear enough, I decided to engage an expert in “distracted driving” to assess the visibility of signage at these four sites.

The expert I engaged to conduct this study is Professor Michael Regan from the Australian Road Research Board (ARRB), an experimental psychologist specialising in distracted driving and human-machine interfaces. ARRB is a highly respected organisation that is involved with road safety and infrastructure development, and the development of the Austroads standards used by all roads authorities in Australia and New Zealand.

The study concluded that all the speed limit signage installed met the Austroads standards, were conspicuous, readable and clear. However, some aspects of the surrounding environments were nominated as potential factors in the high levels of infringements detected at these intersections. The report raised concerns regarding the visibility of the “Road safety cameras operate in this area” signs, also known as the camera warning sign and the road safety cameras themselves. However, I am conscious that these signs are not required by regulation, and are only installed as a courtesy, through a policy decision made by the Department of Justice & Regulation.

The issue of visibility of the cameras and the associated warning signs was raised, as these four intersections are environments where many things may be happening simultaneously, including pedestrians coming on to the road from between parked cars, trams and multiple traffic lights within short distances. They are also visually “busier” than some other areas, where signage and other elements are a significant part of the built environment. This could lead some motorists, who are easily distracted or otherwise uninterested in the task of driving, to miss every single speed limit sign, camera warning sign and the road safety cameras themselves, installed on approach to these intersections. Some of the complaints directed to my office are to this effect.

Another aspect of these four locations is that the posted speed limit of 40km/h, variable or permanent, does not match the design of the road itself, lulling motorists into subconsciously thinking the speed limit should be higher, or the speed at which they are travelling is lower than it actually is, without checking their speedometers at sensible intervals. These locations shared similar characteristics, with wide cross sections, multiple lanes and a more “open” environment.

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However, I cannot accept that so many motorists either choose to ignore the speed limit and camera warning signage or are sufficiently distracted whilst driving to miss such pertinent information, especially at locations that are widely promulgated as 40km/h speed limit areas. That the vast majority of motorists (more than 95 per cent) do not receive a fine when driving through these intersections shows that the signage is sufficiently conspicuous.

5.11 COMPARISON TO OTHER AREAS WITH 40KM/H SPEED LIMITS

There are currently eleven fixed road safety cameras installed at Victorian intersections that operate in variable and permanent 40km/h speed limit zones, but the four fixed road safety cameras in this investigation are the only road safety cameras to appear in the top twenty for most infringements detected per quarter, since their activation.

As part of my investigation, I wanted to explore the behaviour of motorists in 40km/h speed limit zones in order to establish whether a problem existed solely at the four camera sites that are the subject of this report, or whether a wider issue exists across lengths of road or areas with a speed limit of 40km/h.

To do this, I commissioned a series of traffic studies at six locations over a period of two weeks each, to record the traffic volume and the speed of vehicles. These studies would build an accurate picture of how motorists behaved, in general, at those locations.

The traffic studies were conducted at the following locations:

- The south bound carriageway of Warrigal Road in Chadstone, between Power Avenue and The Boulevard,
- Northeast bound along Fitzroy Street in St Kilda near William Balluk Close,
- Northeast bound along Fitzroy Street in St Kilda, approximately 100 metres after the intersection with Lakeside Drive,
- North bound along Russell Street in Melbourne, between Latrobe Street and Victoria Street,
- Barkly Street in St Kilda, between Vale Street and Carlisle Street, and

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- Barkly Street in St Kilda, approximately 200 metres after the intersection with Carlisle Street.

These sites were chosen for several reasons. The first is that these locations are where traffic would be reasonably free flowing throughout most of the day, as they are far enough from any traffic lights. They are also relatively flat, with no significant gradients at the sites. The site along Russell Street and two sites along Barkly Street were chosen as control locations.

The Russell Street site was chosen as a control location where there is no road safety camera installed, to see whether motorists adhere to the posted speed limit of 40km/h.

Barkly Street was chosen as a control site because a fixed road safety camera is installed at this location, less than one kilometre from the fixed road safety camera installed on Fitzroy Street. Understanding the free flowing speed of traffic before and after this camera would prove useful in this investigation, as a direct comparison with the traffic travelling along Fitzroy Street.

The final site, situated approximately 200 metres prior to the road safety camera at Warrigal Road, was used to determine traffic behaviour leading up to it. As there is a large gradient directly after the intersection of Warrigal Road and Batesford Road, I felt that an additional site after the camera would not be directly comparable.

It was not technically feasible to install temporary data acquisition equipment before the two CBD cameras due to the close proximity of traffic light controlled intersections on approach to the road safety cameras, which limits the value of any data gathered along that length of road.

The results recorded at the six locations are an interesting comparison between road environments and motorist behaviour.

Along Russell Street, between Latrobe Street and Victoria Street, the average speeds recorded over any hour of the day ranged from 37km/h in the afternoon peak period to 42km/h in the early hours of the morning. The 85th percentile speed (the speed at which 15 per cent of all vehicles is travelling above), did not drop under 44km/h at any time. Russell Street is relatively wide, with two lanes in each direction, separated by a median strip, and Lygon Street shares similar characteristics, though the traffic volume and behaviour along Lygon Street is not normally conducive to higher speeds.

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Along Warrigal Road, the traffic study showed that motorists did slow down when the 40km/h speed limit was active. However, some motorists do not slow down enough. The average speed detected from 8AM to 8PM Monday to Saturday was consistently between 30km/h and 35km/h. This is due to the traffic lights at the intersection of The Boulevard, which can restrict free flow of traffic, depending on the traffic volume. Despite this, the 85th percentile speed remained consistently at, or slightly above, the 40km/h speed limit.

In comparison, when the 60km/h speed limit was active during the same hours on Sundays, the average speed does not exceed 45km/h and the 85th percentile speed does not exceed 57km/h. This contrast between the 85th percentile speeds when different speed limits are active shows that motorists are happy to drive to a 60km/h speed limit along this length of road, compared to a speed limit of 40km/h. This may confirm the mismatch of the road environment and the posted speed limit.

Similarly, Fitzroy Street in St Kilda is also a relatively wide road, with two lanes in each direction. Although there is no median strip along Fitzroy Street, the tram lines act to separate traffic. The traffic studies showed that on approach to the road safety camera, the average speed of traffic varied between 35km/h in daylight hours to 37km/h during the late night and early mornings. Approximately twenty per cent of vehicles were detected travelling above the speed limit in this location.

In comparison, motorists increased their average speed once past the intersection of Lakeside Drive by at least 3km/h across all times of the day. The 85th percentile speed along Fitzroy Street on approach to the road safety camera was never lower than 40km/h, also increased by 3km/h once past the road safety camera. At this location, more than 37 per cent of all vehicles detected were travelling above 40km/h. This effect is possibly due to the mismatch between the road environment and the speed limit along Fitzroy Street, identified earlier in this report.

The speed limit along Barkly Street in St Kilda is 40km/h from 8AM to 7PM Monday to Saturday and 60km/h at all other times. On approach to the road safety camera, between the hours of 8AM and 7PM of any day, the average and 85th percentile speeds did not differ appreciably, remaining at 31km/h and 39km/h respectively, regardless of the active speed limit. This statistic was somewhat surprising to me, and in seeking an explanation, I concluded that the road environment itself was the main factor.

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While Barkly Street has two traffic lanes in each direction, much of the length of the road between Princes Street and Carlisle Street has vehicles parked on the street in the left hand lane. This effectively forces all motorists to drive down the right hand lane, and acts to lower the average speed of all vehicles, irrespective of the speed limit. In short, motorists feel that the road environment and the traffic volume are aligned to a 40km/h speed limit.

These traffic study results show that if the road environment suits the posted speed limit, motorists will be inclined to drive at that speed limit. Therefore, if 40km/h speed limit exists along any length of road for a significant proportion of time, changes to the road environment should be made to ensure motorists are comfortable driving to the posted speed limit.

5.12 ACCIDENT STATISTICS

Many motorists who wrote to me said that they had never heard of any accidents at these four camera locations. Similarly, many complainants were sceptical that a speed limit of 40km/h at these locations was justified by the number, or risk of accidents resulting in injuries or fatalities to pedestrians and other road users.

Fixed road safety cameras are installed at Victorian intersections that have a history of crashes resulting in serious injuries or fatalities over a significant period, also known as "blackspots". A "blackspot" was defined by Infrastructure Australia as a location where at least three crashes resulting in an injury or fatality has occurred in a five year period. Starting from the 2015-16 financial year, Infrastructure Australia's definition of a "blackspot" will change to a location where two crashes resulting in an injury or fatality have occurred in a five year period.

To satisfy myself that the four intersections included in this investigation were blackspots at the time of their installation, I interrogated the VicRoads Crashstats database. This database is publicly accessible from the VicRoads website at www.vicroads.vic.gov.au, and contains all accidents recorded by Victoria Police dating from 1 January 1987 to 31 December 2013. Data recorded for the 2014 calendar year is available on the website www.data.vic.gov.au.

When an accident occurs, the details are recorded by attending Victoria Police officers, which are then forwarded to VicRoads. At the end of each calendar year, VicRoads begins a review of the data to ensure its integrity, which is usually completed by May of the following calendar year.

Appendix D contains graphs depicting the total number of casualties recorded at and a short distance around the relevant intersections for the period 1 January 1987 to 31 December 2013,

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and the hour of the day they occurred during this period. From viewing the graphs, it is clear that all of these intersections are locations where high numbers of casualties have been recorded because of accidents, since records began in 1987. The table below shows the total number of casualties and their severity at each location.

Location	Minor injuries		Serious injuries		Fatalities	
	Ped	Veh	Ped	Veh	Ped	Veh
Warrigal Road and Batesford Road, Chadstone	27	69	23	19	1	0
Fitzroy Street and Lakeside Drive, St Kilda	13	69	10	34	0	0
Exhibition Street and Victoria Street, Melbourne	13	100	11	41	0	1
Flinders Street and William Street, Melbourne	10	116	7	67	1	1

It is clear from **Figure D1** that the length of Warrigal Road, near its intersection with Batesford Road has an issue with pedestrian injuries. A significant proportion of casualties recorded at this location are where pedestrians have been injured or killed. **Figure D2** shows that the vast majority of all the casualties occurred between 8AM and 8PM, though there were still some accidents concerning pedestrians that occurred outside those hours.

Figure D3 and **Figure D4**, concerning Fitzroy Street, near the intersection with Lakeside Drive in St Kilda, shows an increasing issue with pedestrian incidents, which primarily began in calendar year 2004. This intersection has a significant casualty risk throughout most hours of the day.

The intersection of Exhibition Street and Victoria Street in the CBD (**Figure D5** and **Figure D6**), as an access road for many motorists into the City of Melbourne, also has a significant crash history, and the risk of casualty crashes, unsurprisingly, is elevated during the middle of the day, and highest during the morning and afternoon peak periods.

Finally, **Figure D7** and **Figure D8** depict the crash history for the intersection of Flinders Street and William Street in Melbourne. A significant crash history exists, though the number of casualties per year has dropped significantly from 2007.

6 CONCLUSIONS

At the end of my exhaustive examination of the four fixed road safety cameras, I was unable to find any technical issue with the operation of the four fixed road safety cameras at the intersections of:

- Flinders Street and William Street, Melbourne,
- Exhibition Street and Victoria Street, Melbourne,
- Fitzroy Street and Lakeside Drive, St Kilda, and
- Warrigal Road and Batesford Road, Chadstone,

The rigorous testing, maintenance and certification regime applied to Victoria's fixed road safety cameras ensured they were, and continue to be, accurate and reliable in their operation, complying with the demanding requirements set out by their respective manufacturers, the Department of Justice & Regulation and the *Road Safety (General) Regulations 2009*.

Analysis of the data recorded by the four fixed road safety cameras in concert with the traffic studies conducted near those locations, showed that the overall speed limit compliance for these sites was approximately 96 to 97 per cent of traffic, when the speed limit was 40km/h. When compared to the statewide average of over 99.5 per cent at other fixed road safety camera sites, this statistic is disappointing.

Once the accuracy of the cameras had been confirmed, I turned my mind to the other issues raised by motorists regarding these four road safety cameras.

The first of these was the adequacy of speed limit signage. Numerous site visits completed by my technical staff showed that the short length of road on approach to each road safety camera had varying levels of speed limit signage, depending on the space available in the environment, as well as signs warning of the presence of the road safety cameras themselves. The number of signs at each site is what I consider ample, as demonstrated by the fact that more than 96 per cent of motorists travelling through these intersections are not issued with a speed infringement.

I am also cognisant of the period afforded to motorists at each of these locations to adapt to the change in speed limits. In Chadstone, nearly three years passed between the introduction of the variable speed limit and the camera's activation. At Fitzroy Street, the camera was activated nearly

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five years after its initial installation in the 40km/h speed limit zone, and in the CBD itself, nearly eighteen months elapsed between the activation of the road safety cameras and the introduction of the 40km/h speed limit.

I am also satisfied that the casualty statistics recorded from 1987 onwards do show that all four intersections are blackspots and the installations of the road safety cameras are justified based on those statistics.

During their site visits to these four camera sites, my technical staff noted that the road environment along Flinders Street, Exhibition Street and Fitzroy Street near the road safety cameras, are characteristic of roads with a speed limit higher than 40km/h.

By comparison, good examples of roads where no motorist would contemplate travelling in excess of a permanent speed limit of 40km/h are Church Street in Brighton, between Male Street and St Andrews Street, and Barkly Street in St Kilda, between Princes Street and Carlisle Street. These lengths of road have environments that feel more constrained and closed in, with on street parking in close proximity to through traffic where motorists intuitively know pedestrians can seemingly "come out of nowhere".

It follows that, where a 40k/h speed limit is a permanent fixture along a length of road, alterations to the surrounding environment should be implemented to complement the introduction of a lower speed limit.

7 RECOMMENDATIONS

Almost always with a breach of a law, or regulation, or the happening of a collision, there is a human element. The infringement statistics published on the Cameras Save Lives website for the January to March quarter in 2015, show that the four intersection cameras which are the subject of this investigation, remain in the top five locations for the highest number of traffic infringements detected in Victoria.

Once the lack of signage and malfunction of road safety cameras are eliminated as causes of motorists exceeding the speed limit, we are left with human factors of driver attitude and inattention.

Before making the following recommendations, some of which relate to signage improvements, I stress that I am satisfied that the existing signage at all four intersections is adequate to warn all

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drivers committed to concentrating on the task of driving at the applicable speed limit, since the vast majority of motorists travelling past these cameras are not detected speeding. In short, these recommendations are directed at those who are distracted or preoccupied with something other than driving. In respect of other causes for exceeding the speed limit, such as impatience and indifference, I am not aware of any cure-all.

I recommend that:

1. Clear and concise explanations, including relevant accident statistics, of why fixed road safety cameras are installed at a location, should be made easily accessible to the public,
2. Clear and concise explanations detailing the reasons a length of road or area has a speed limit of 40km/h should be made easily accessible to the public,
3. An engineering solution, such as more substantial barriers that prevent pedestrians from walking along the median, be erected along Warrigal Road, near its intersection with Batesford Road in Chadstone to stop pedestrians from jaywalking across the carriageways of Warrigal Road. Such a construction would force pedestrians to use the existing traffic light controlled pedestrian crossings and the pedestrian overpass looping around the railway bridge,
4. For the other three fixed road safety camera sites, where the speed limit is permanently 40km/h, I recommend that VicRoads and the City of Melbourne (where relevant), implement engineering solutions to align the road environment with the posted speed limit of 40km/h. Examples of such engineering solutions include, but are not limited to; narrower roads and lanes, additional barriers or medians and landscaping,
5. Concerning the length of road along Fitzroy Street, on approach to the intersection with Lakeside Drive, VicRoads consider changing the signs reading "School Zone" near St Kilda Park Primary School to read "School Ahead", or some similar phrase, in order to avoid confusion, as many motorists have advised me they believed these signs alluded to a variation in speed limits due to an approaching school zone,
6. Concerning the length of road along Flinders Street, on approach to the intersection with William Street, I recommend that the static speed limit sign immediately preceding the road safety camera be replaced with a flashing, LED illuminated sign,

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7. Concerning the length of road along Exhibition Street, on approach to the intersection with Victoria Street, I recommend the static speed limit signs immediately preceding the road safety camera be replaced with flashing, LED illuminated signs, and
8. All current speed limit signage leading into the City of Melbourne's 40km/h speed limit area should be replaced with flashing, LED illuminated versions of those signs for additional visibility. In short, it should not be possible to enter the CBD by motor vehicle without being confronted by at least one flashing, LED illuminated 40km/h speed limit sign. I believe these steps would make hollow any complaint by a motorist that they were unaware of the relevant speed limit.

8 CONSULTATION

This investigation was conducted in consultation with:

- The Department of Justice & Regulation,
- VicRoads,
- Nationwide Traffic Surveys Pty Ltd,
- Australian Road Research Board (ARRB),

APPENDIX A

ROAD SAFETY ROAD RULES 2009

Section 21 of the *Road Safety Road Rules 2009* defines how to follow speed limits in Victoria.

Section 21(1) of the *Road Safety Road Rules 2009*:

The speed-limit applying to a driver for a length of road to which a speed-limit sign applies is the number of kilometres per hour indicated by the number on the sign.

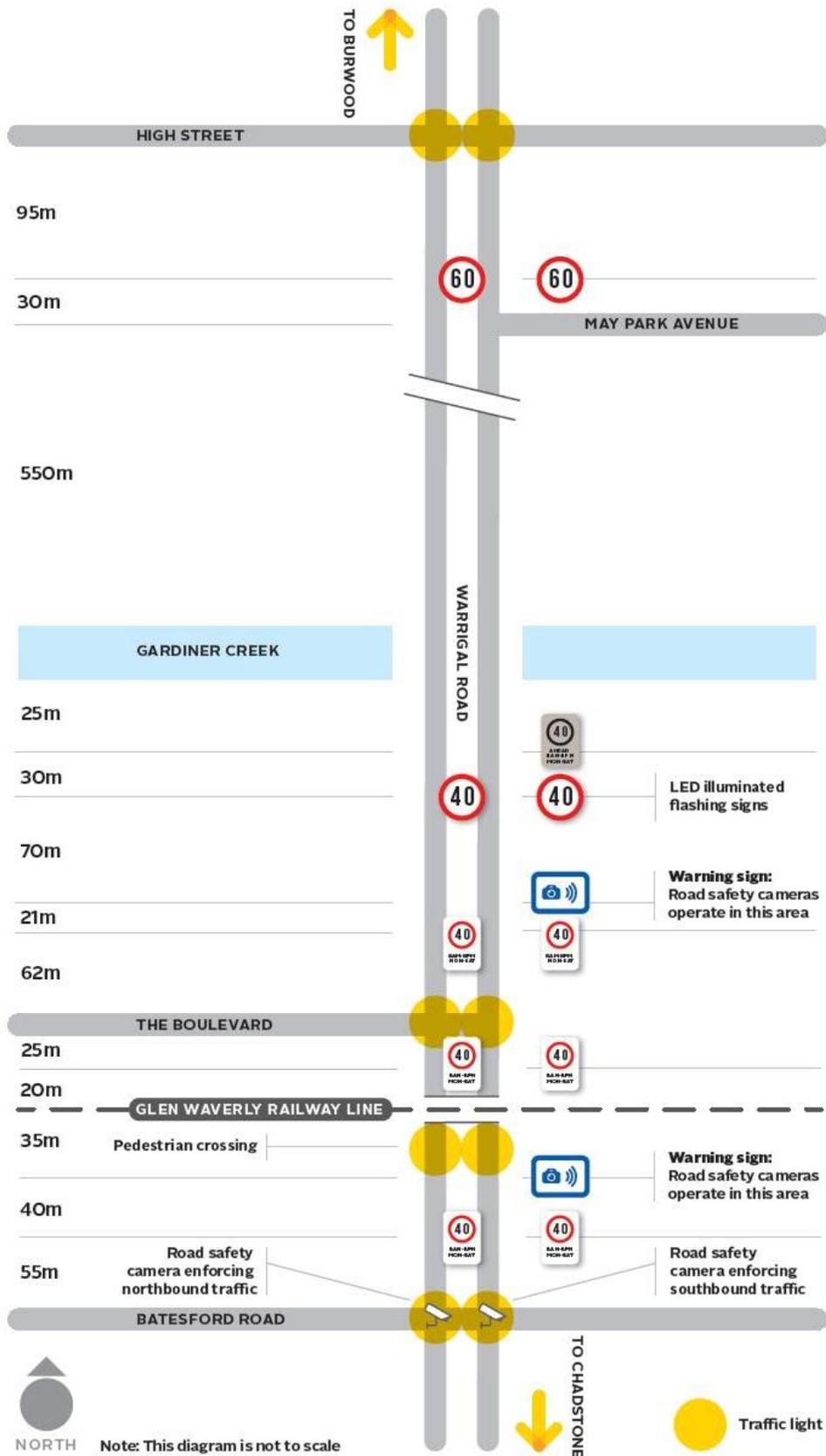
Section 21(3) of the *Road Safety Road Rules 2009*:

A speed-limit sign on a road applies to the length of road beginning at the sign and ending at the nearest of the following –

- (a) A speed-limit sign on the road with a different number on the sign;*
- (b) An end speed-limit sign or speed derestriction sign on the road;*
- (c) If the road ends at a T-intersection or dead end – the end of the road.*

APPENDIX B

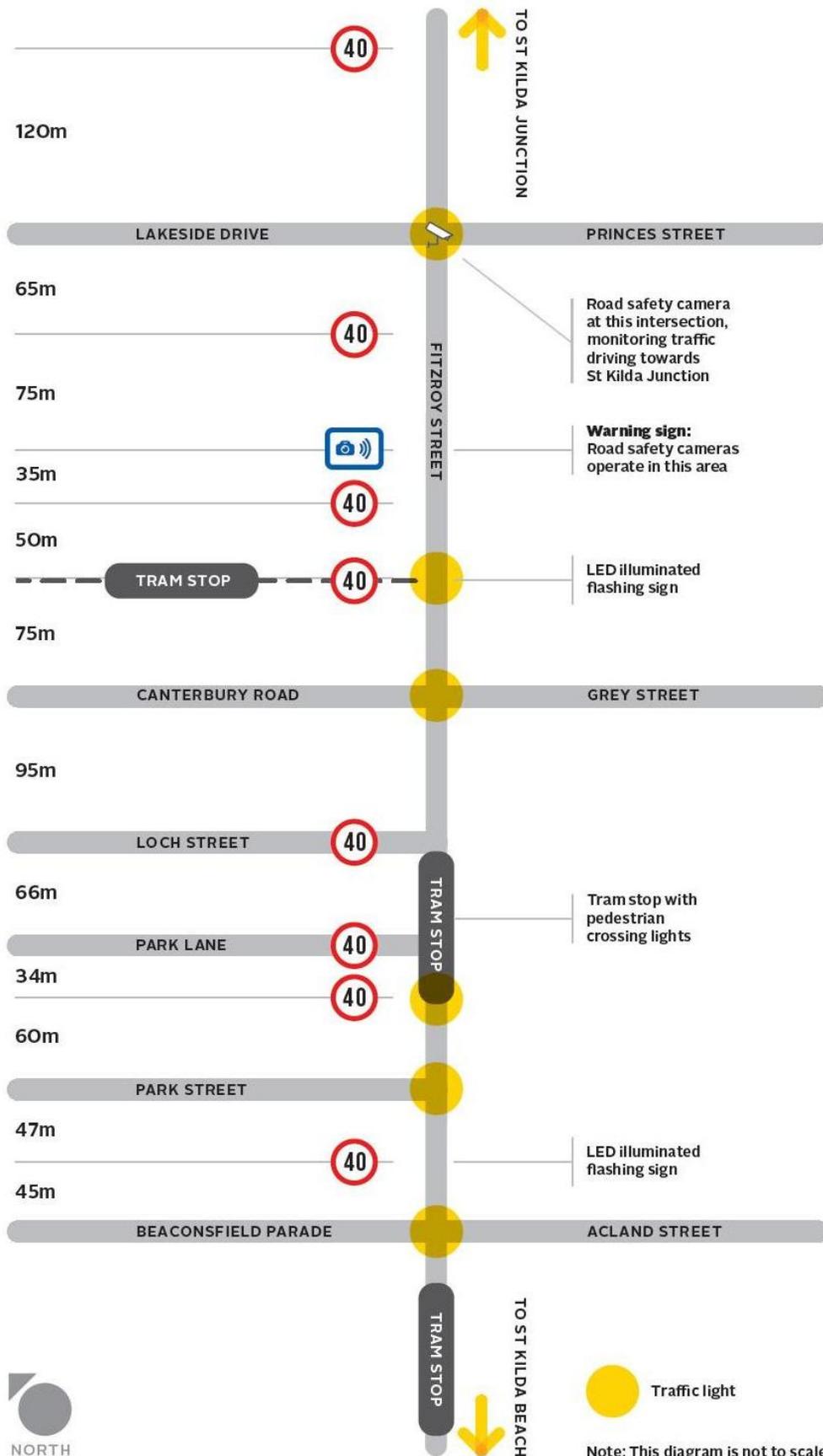
DIAGRAM OF SIGNAGE ALONG WARRIGAL ROAD, CHADSTONE



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DIAGRAM OF SIGNAGE ALONG FITZROY STREET, ST KILDA

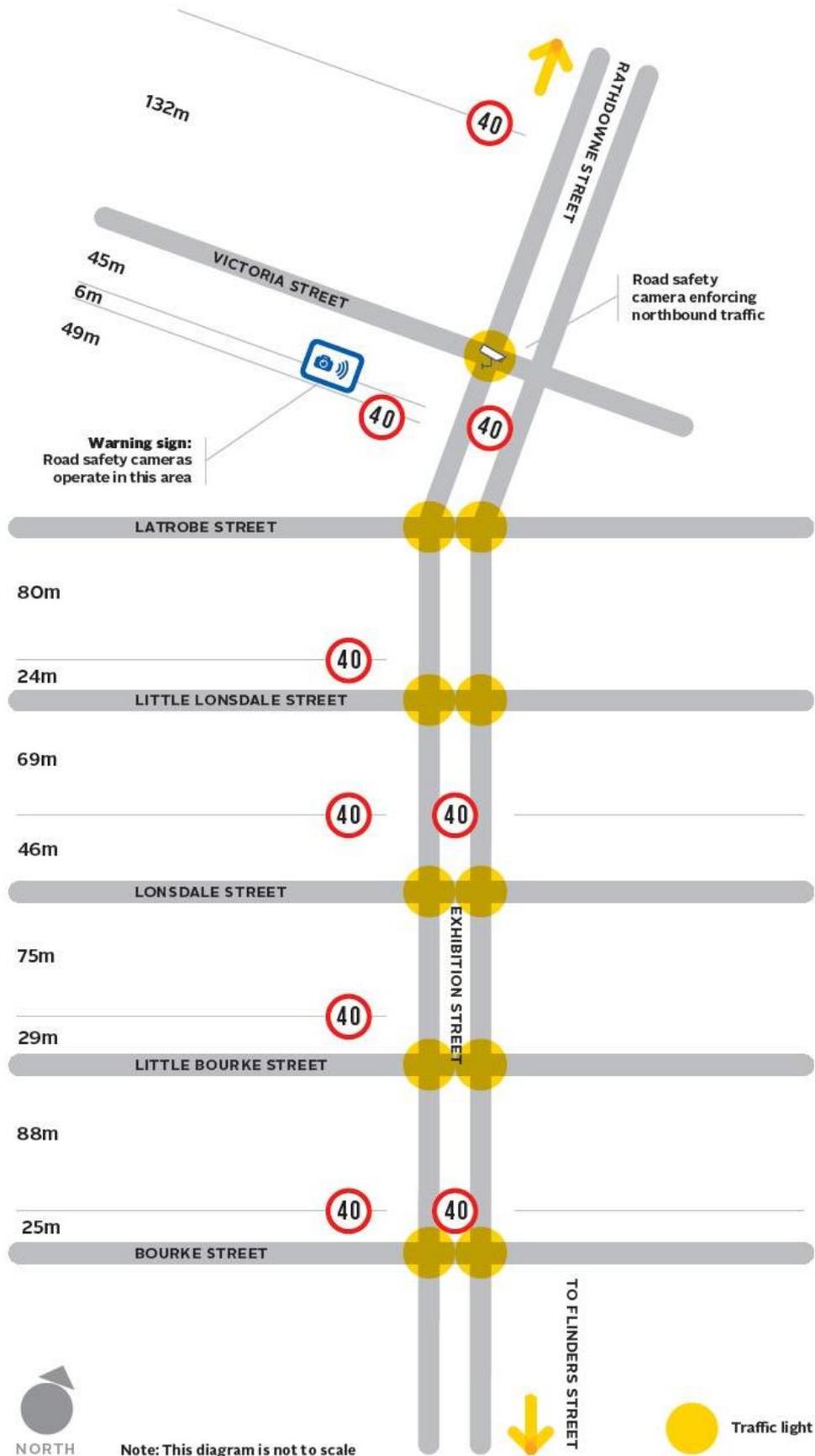


NORTH

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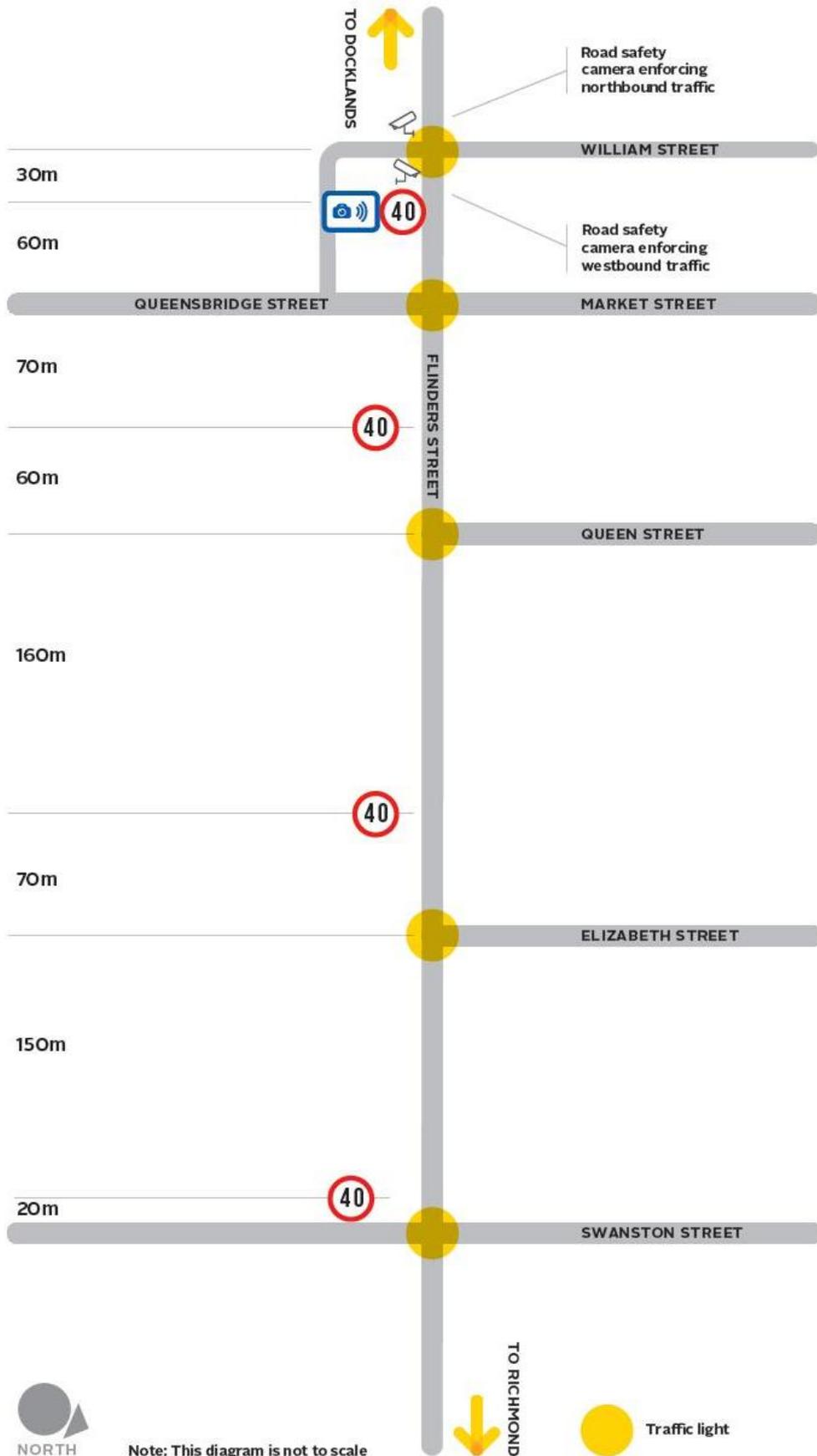
DIAGRAM OF SIGNAGE ALONG EXHIBITION STREET, MELBOURNE



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DIAGRAM OF SIGNAGE ALONG FLINDERS STREET, MELBOURNE



APPENDIX C1

GRAPHS FOR DATA RECORDED AT THE INTERSECTION OF WARRIGAL ROAD AND BATESFORD ROAD, CHADSTONE

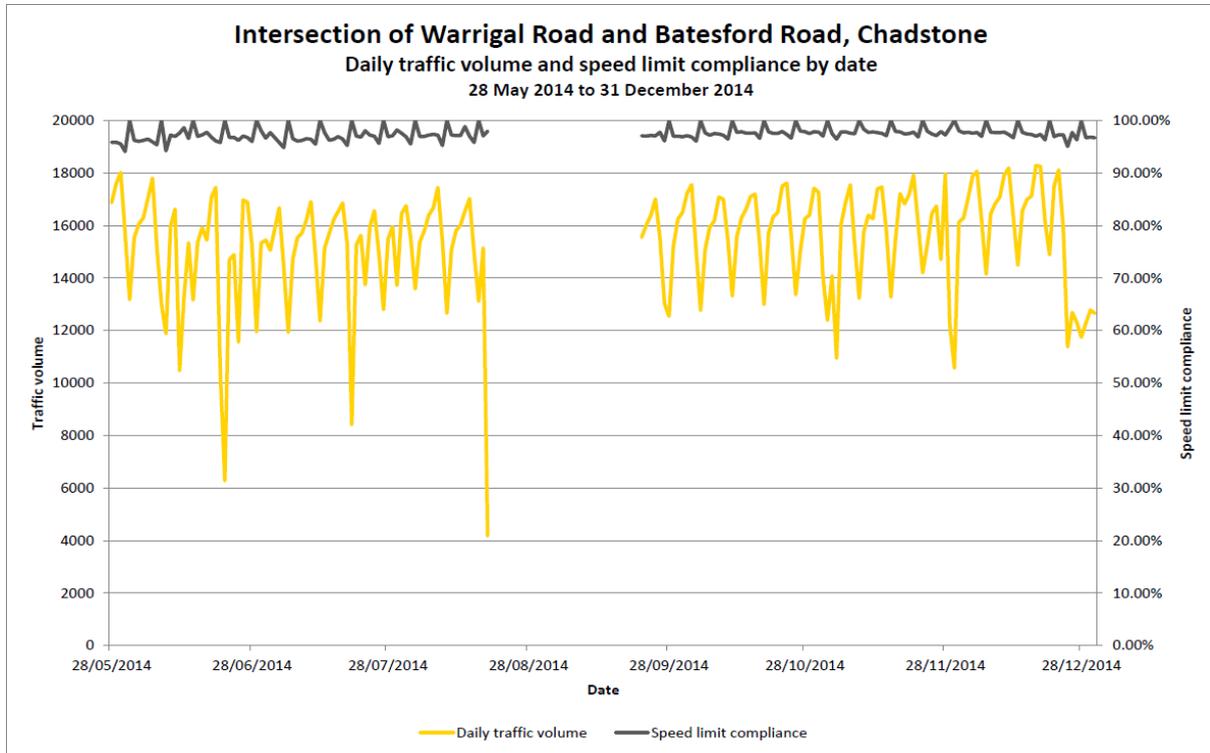


Figure C1.1 – Daily traffic volume recorded at the intersection of Warrigal Road and Batesford Road, Chadstone.

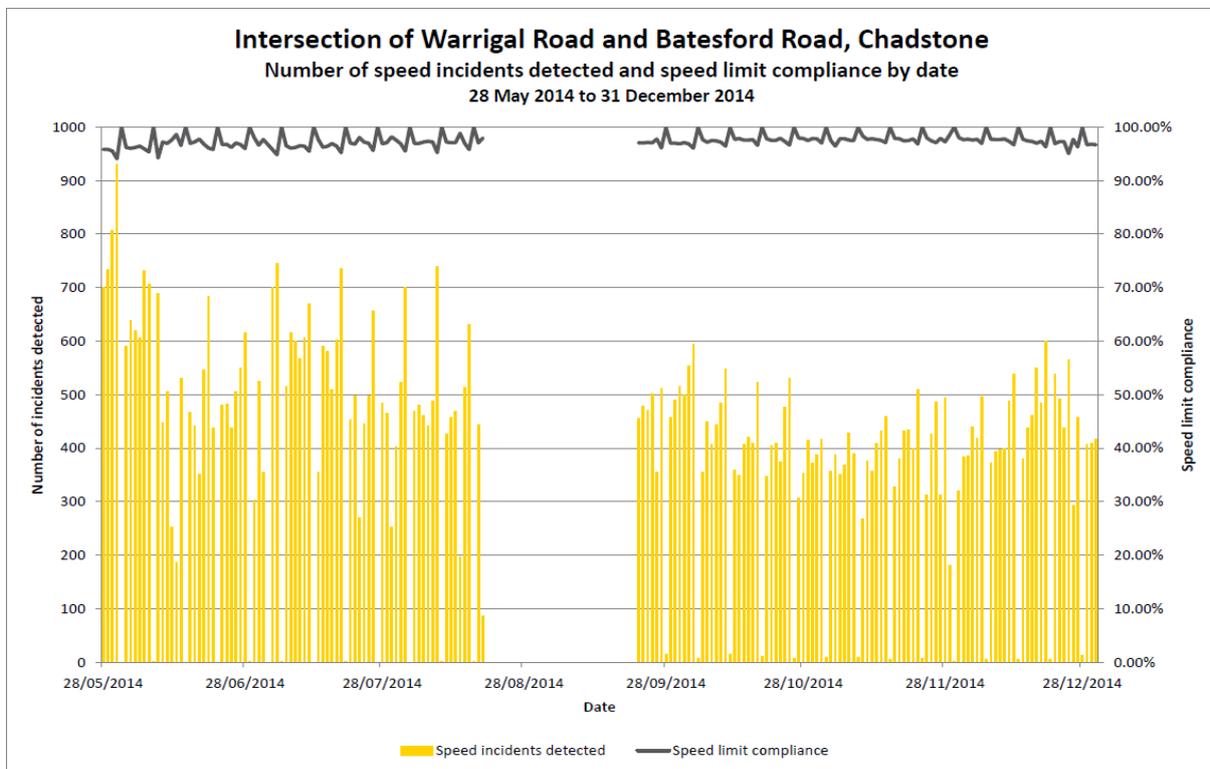


Figure C1.2 – Daily number of speed incidents recorded at the intersection of Warrigal Road and Batesford Road, Chadstone.

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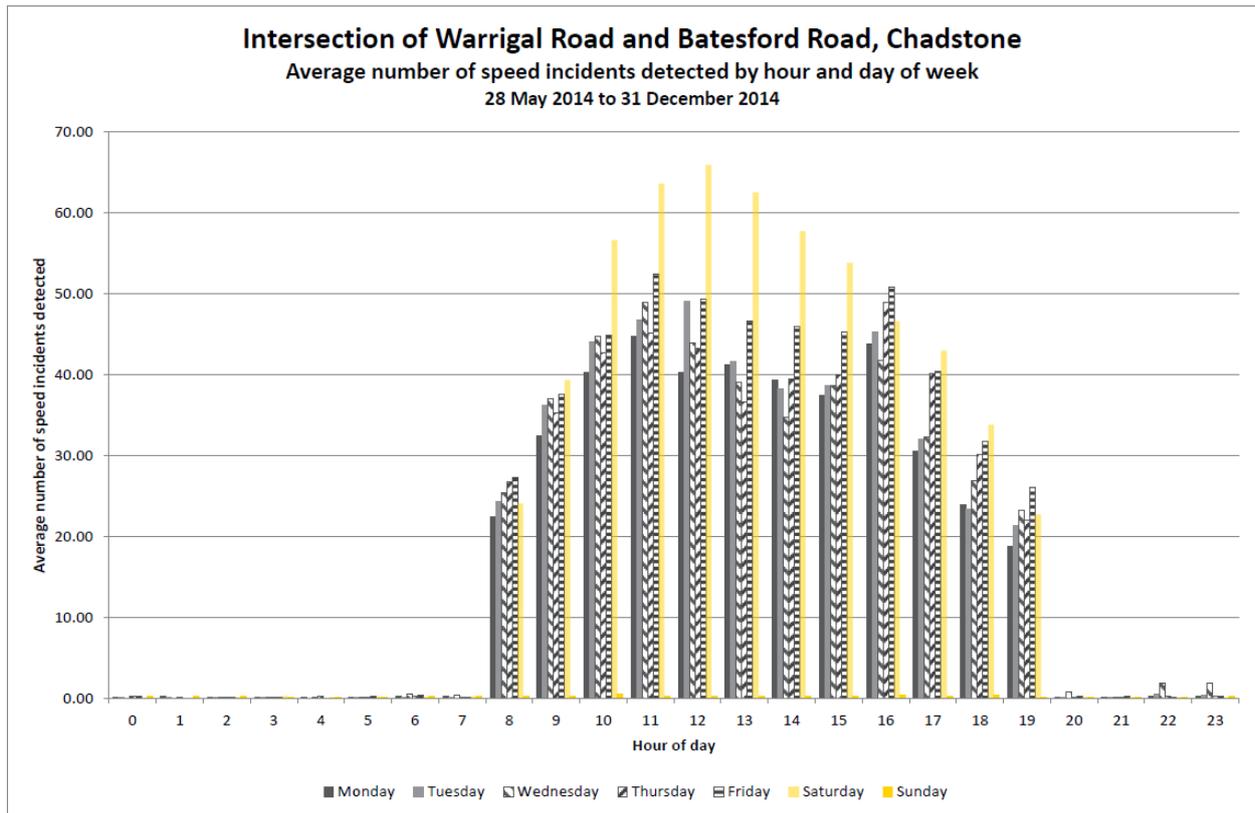


Figure C1.3 – Average number of speed incidents recorded at the intersection of Warrigal Road and Batesford Road, Chadstone, by hour of day, and day of week.

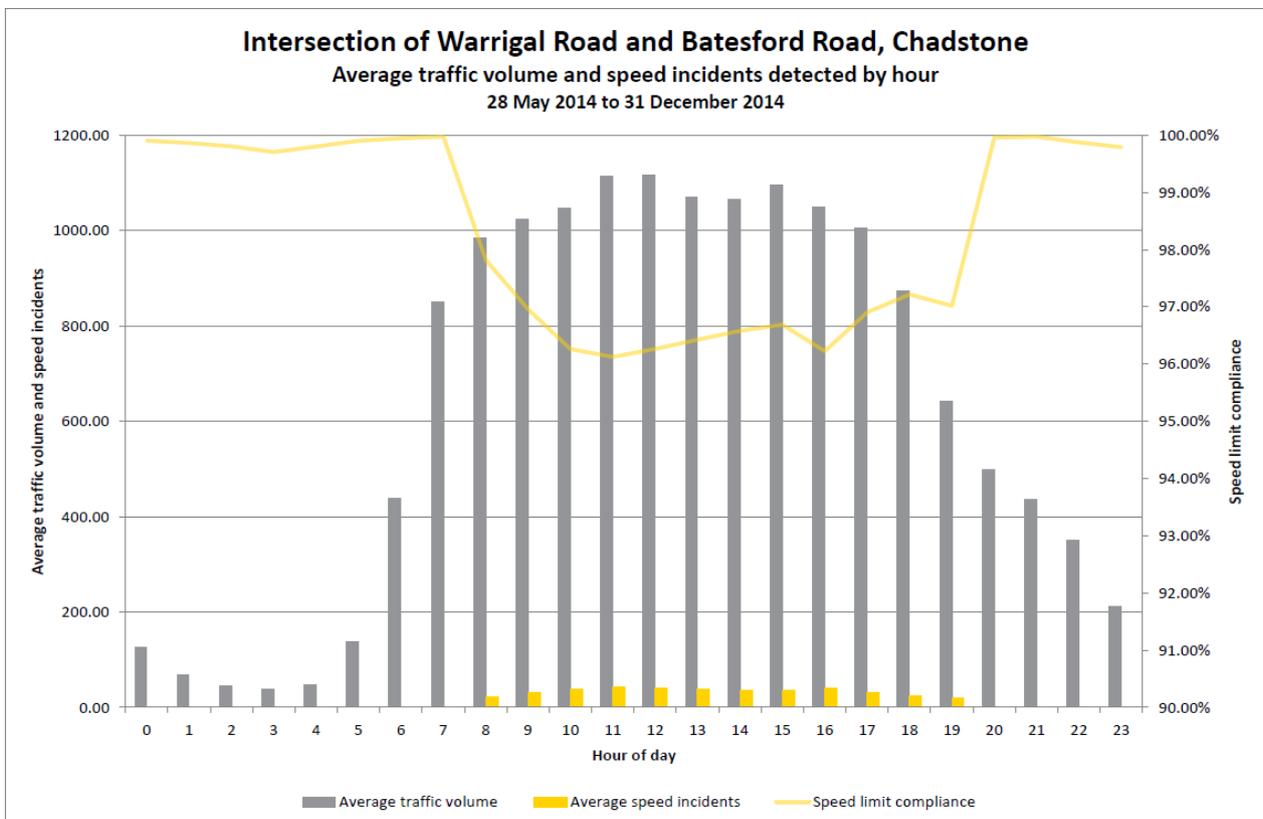


Figure C1.4 – Average traffic volume and number of speed incidents recorded at the intersection of Warrigal Road and Batesford Road, Chadstone, by hour of day.

APPENDIX C2

GRAPHS FOR DATA RECORDED AT THE INTERSECTION OF FITZROY STREET AND LAKESIDE DRIVE, ST KILDA

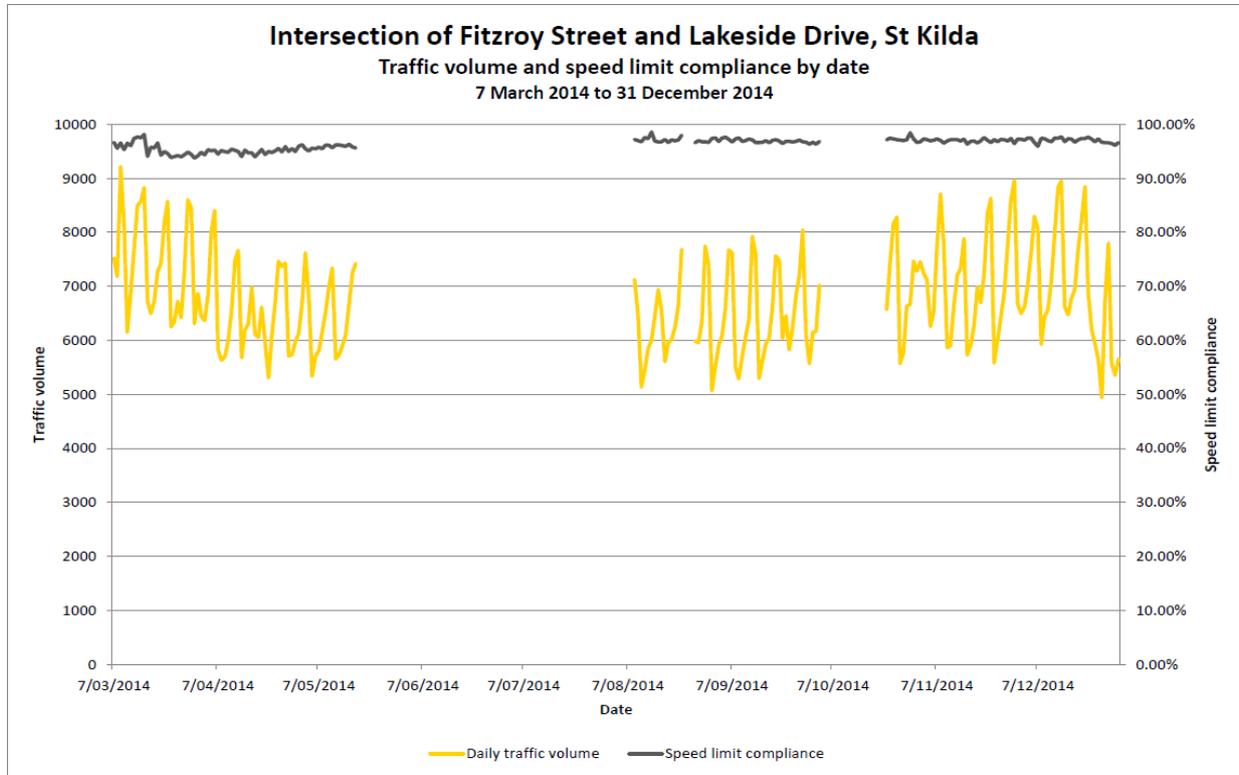


Figure C2.1 – Daily traffic volume recorded at the intersection of Fitzroy Street and Lakeside Drive, St Kilda.

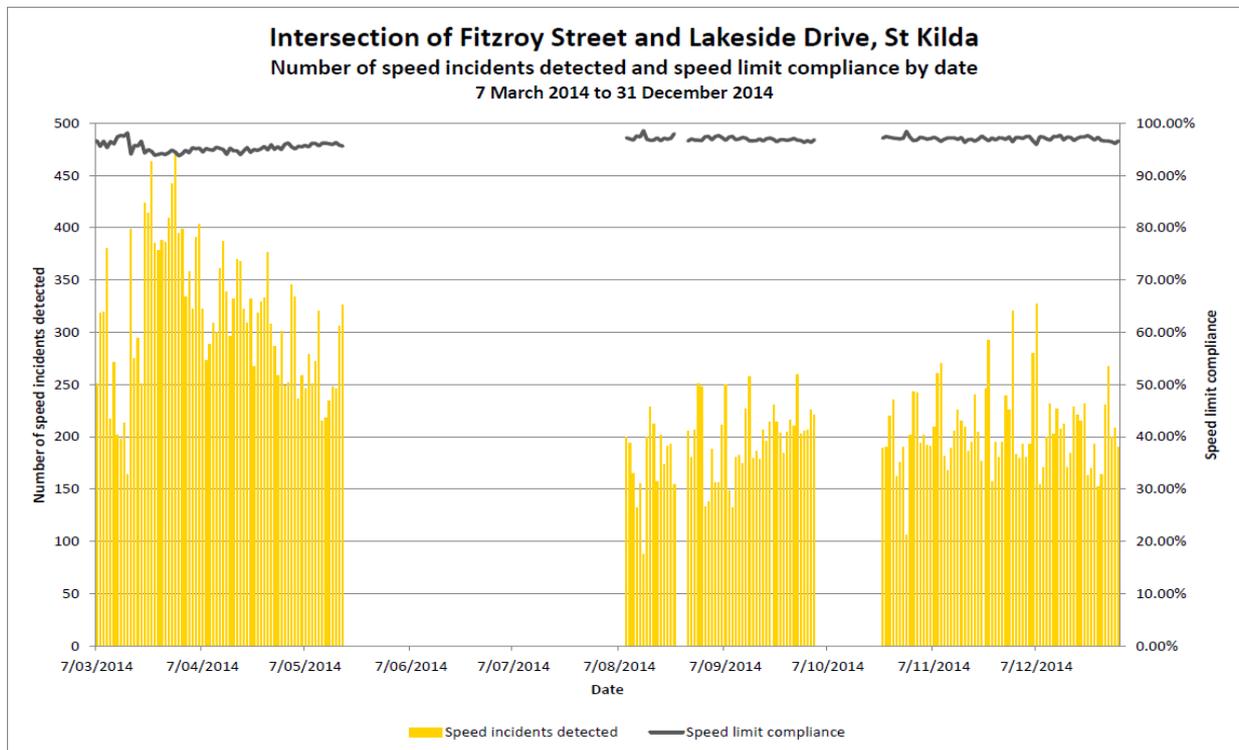


Figure C2.2 – Number of speed incidents detected at the intersection of Fitzroy Street and Lakeside Drive, St Kilda.

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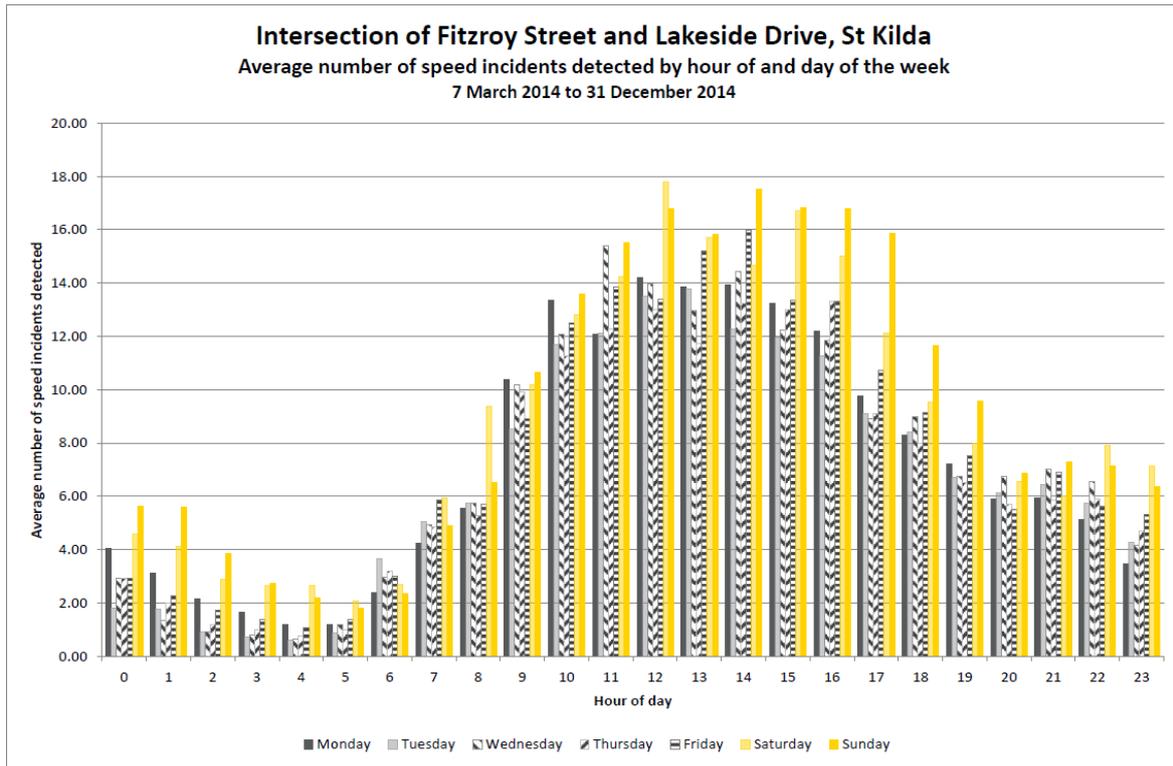


Figure C2.3 – Average number of speed incidents recorded at the intersection of Fitzroy Street and Lakeside Drive, St Kilda, by hour of day, and day of week.

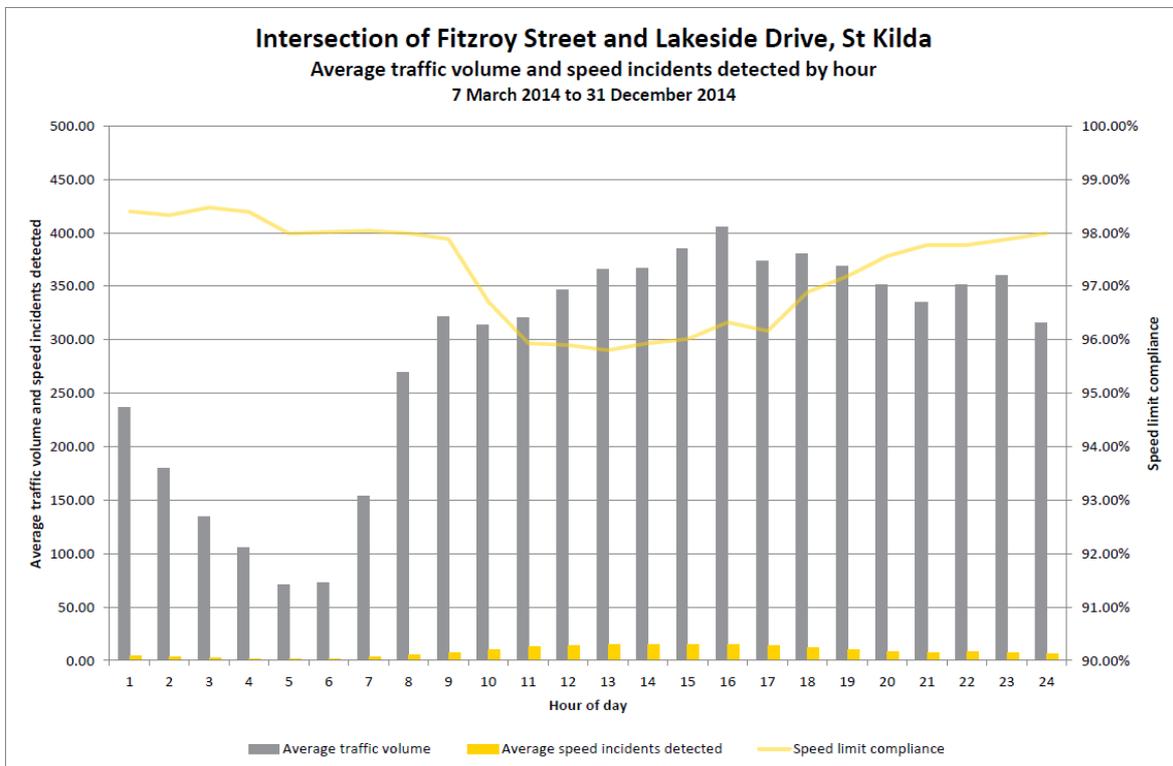


Figure C2.4 – Average traffic volume and number of speed incidents recorded at the intersection of Fitzroy Street and Lakeside Drive, St Kilda, by hour of day.

APPENDIX C3

GRAPHS FOR DATA RECORDED AT THE INTERSECTION OF EXHIBITION STREET AND VICTORIA STREET, MELBOURNE

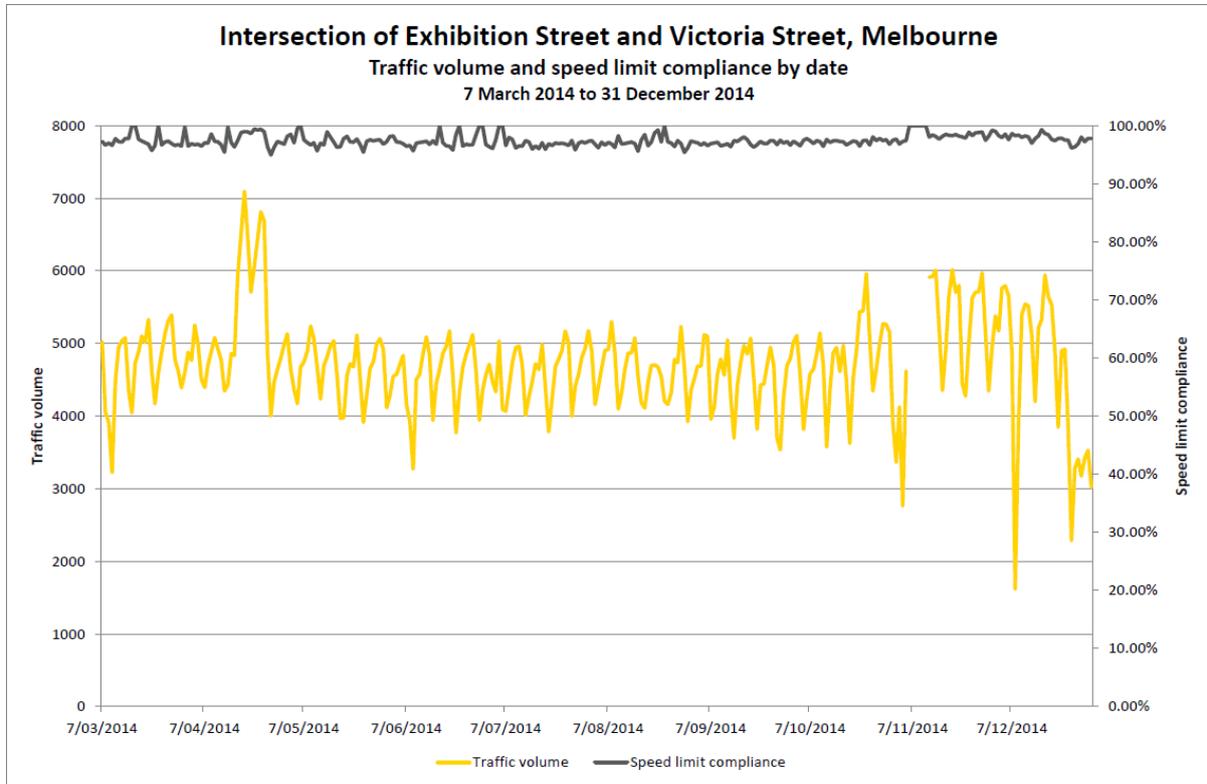


Figure C3.1 – Traffic volume recorded at the intersection of Exhibition Street and Victoria Street, Melbourne.

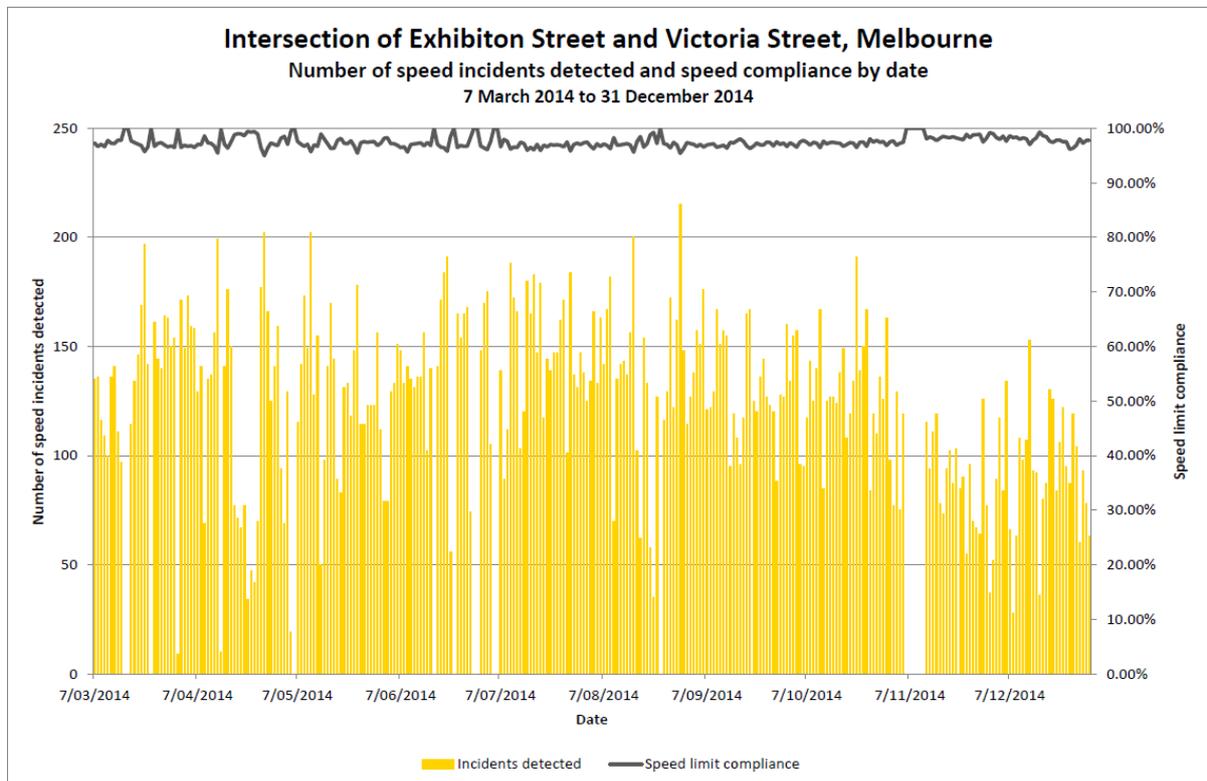


Figure C3.2 – Number of speed incidents detected at the intersection of Exhibition Street and Victoria Street, Melbourne.

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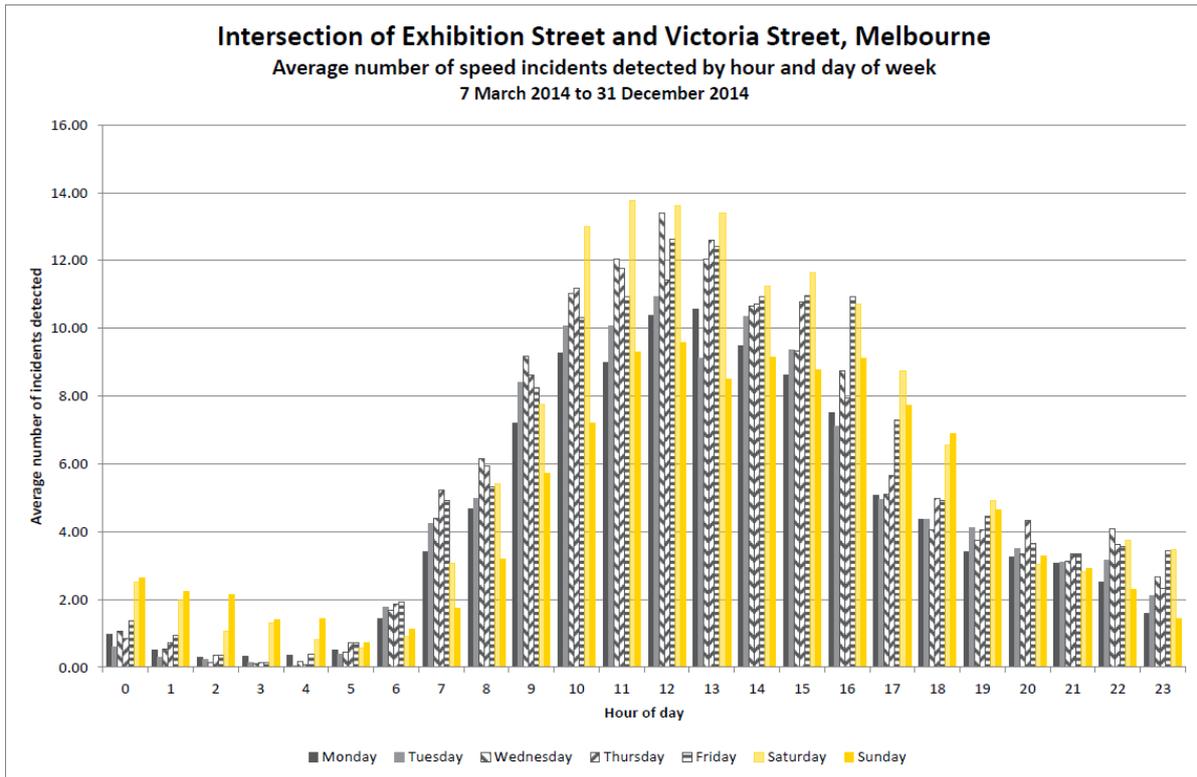


Figure C3.3 – Average number of speed incidents recorded at the intersection of Exhibition Street and Victoria Street, Melbourne, by hour of day, and day of week.

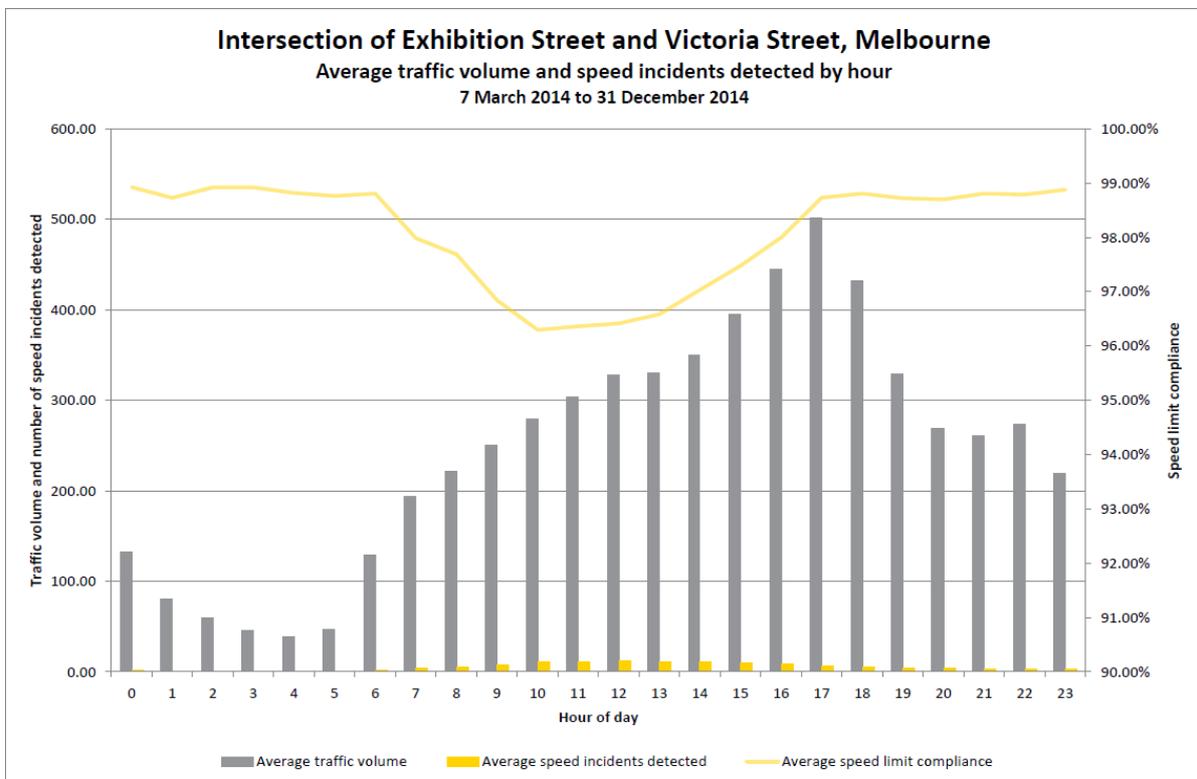


Figure C3.4 – Average traffic volume and number of speed incidents recorded at the intersection of Exhibition Street and Victoria Street, Melbourne, by hour of day.

APPENDIX C4

GRAPHS FOR DATA RECORDED AT THE INTERSECTION OF FLINDERS STREET AND WILLIAM STREET, MELBOURNE

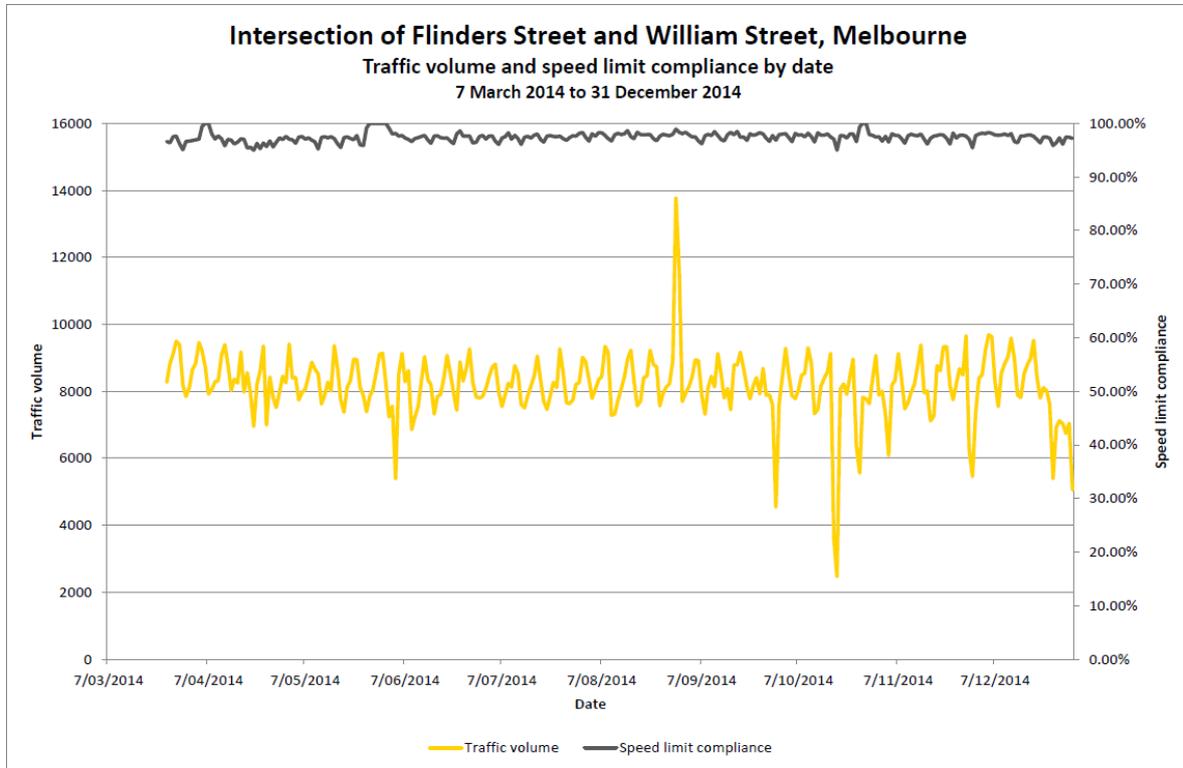


Figure C4.1 – Traffic volume recorded at the intersection of Flinders Street and William Street, Melbourne.

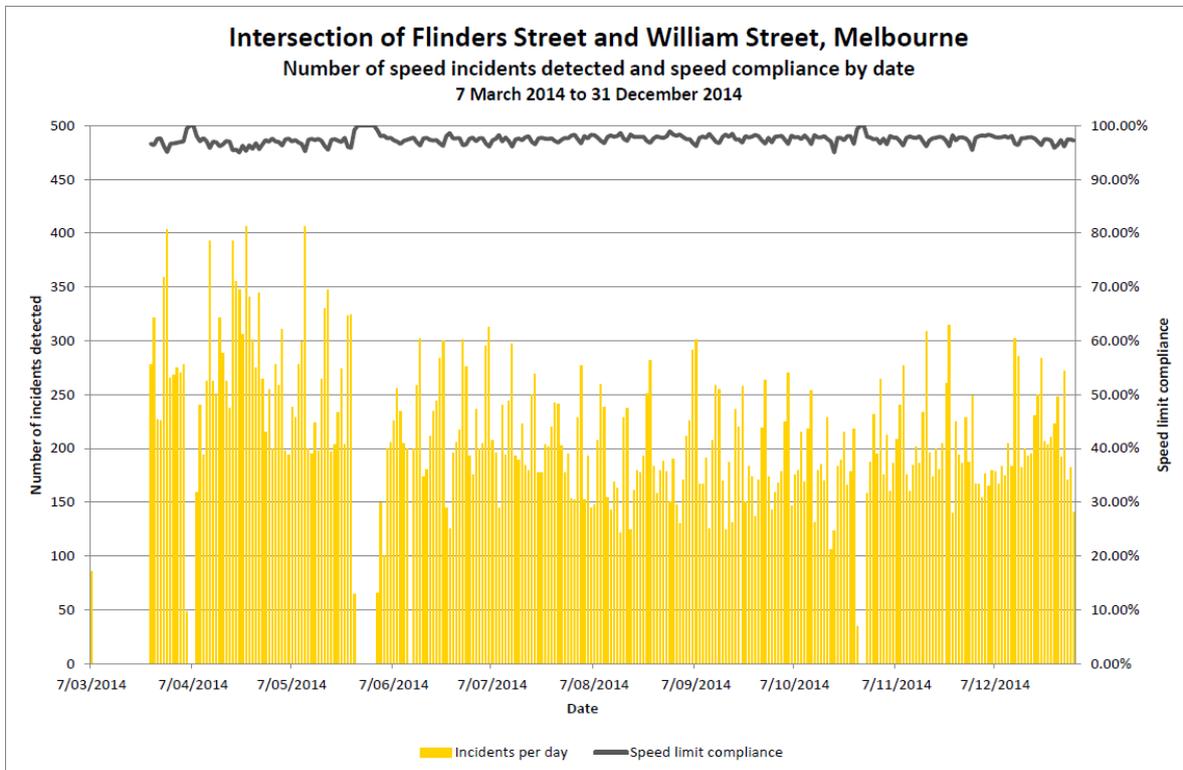


Figure C4.2 – Number of speed incidents detected at the intersection of Flinders Street and William Street, Melbourne.

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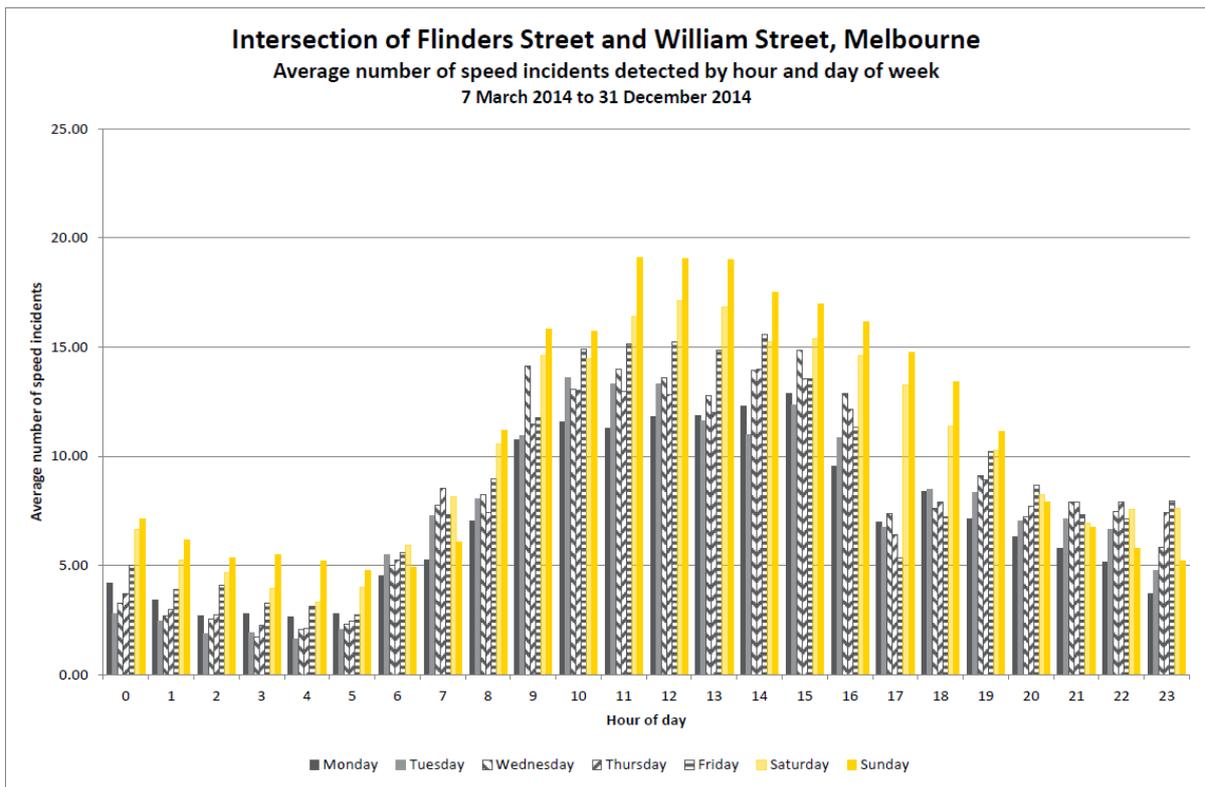


Figure C4.3 – Average number of speed incidents recorded at the intersection of Flinders Street and William Street, Melbourne, by hour of day, and day of week.

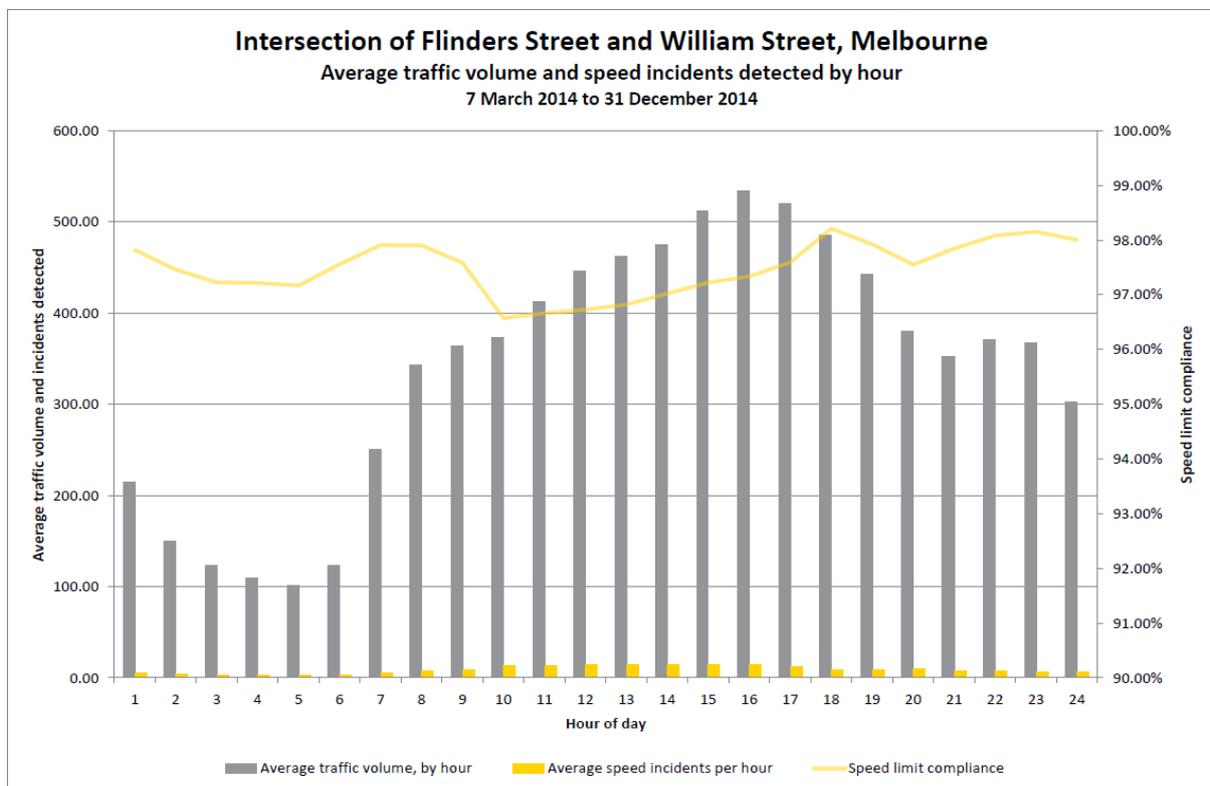


Figure C4.4 – Average traffic volume and number of speed incidents recorded at the intersection of Flinders Street and William Street, Melbourne, by hour of day.

APPENDIX D

GRAPHS OF ACCIDENT STATISTICS RECORDED FROM 1987 TO 2013

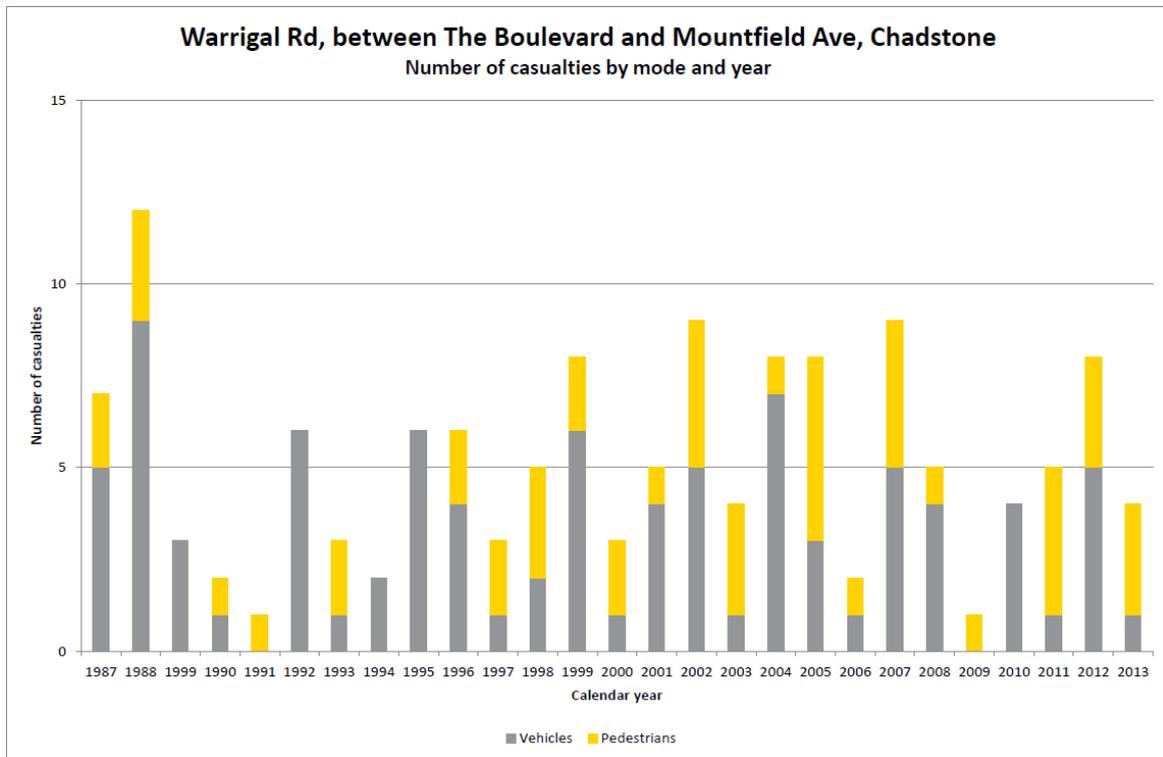


Figure D1 – Number of casualties recorded along Warrigal Road, between The Boulevard and Mountford Avenue, Chadstone from 1 January 1987 to 31 December 2013

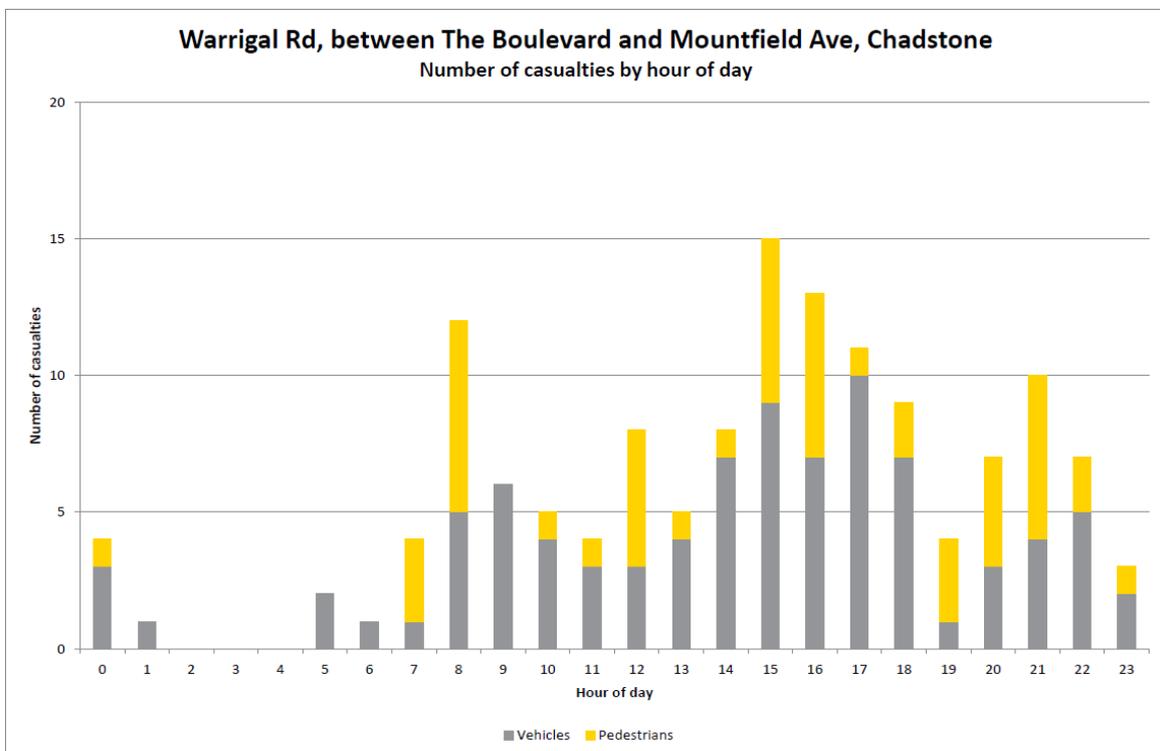


Figure D2 – Number of casualties by hour of day along Warrigal Road, between The Boulevard and Mountford Avenue, Chadstone from 1 January 1987 to 31 December 2013

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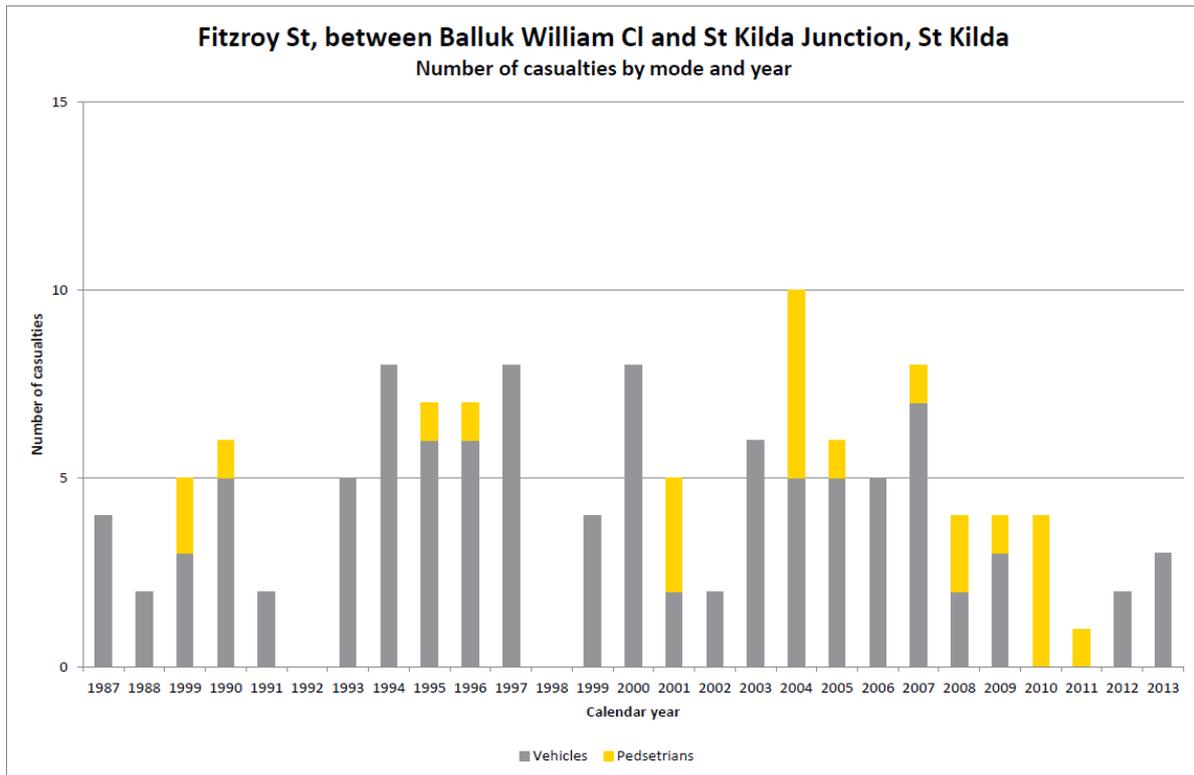


Figure D3 – Number of casualties recorded along Fitzroy Street, between Balluk William Close and St Kilda Junction, St Kilda from 1 January 1987 to 31 December 2013

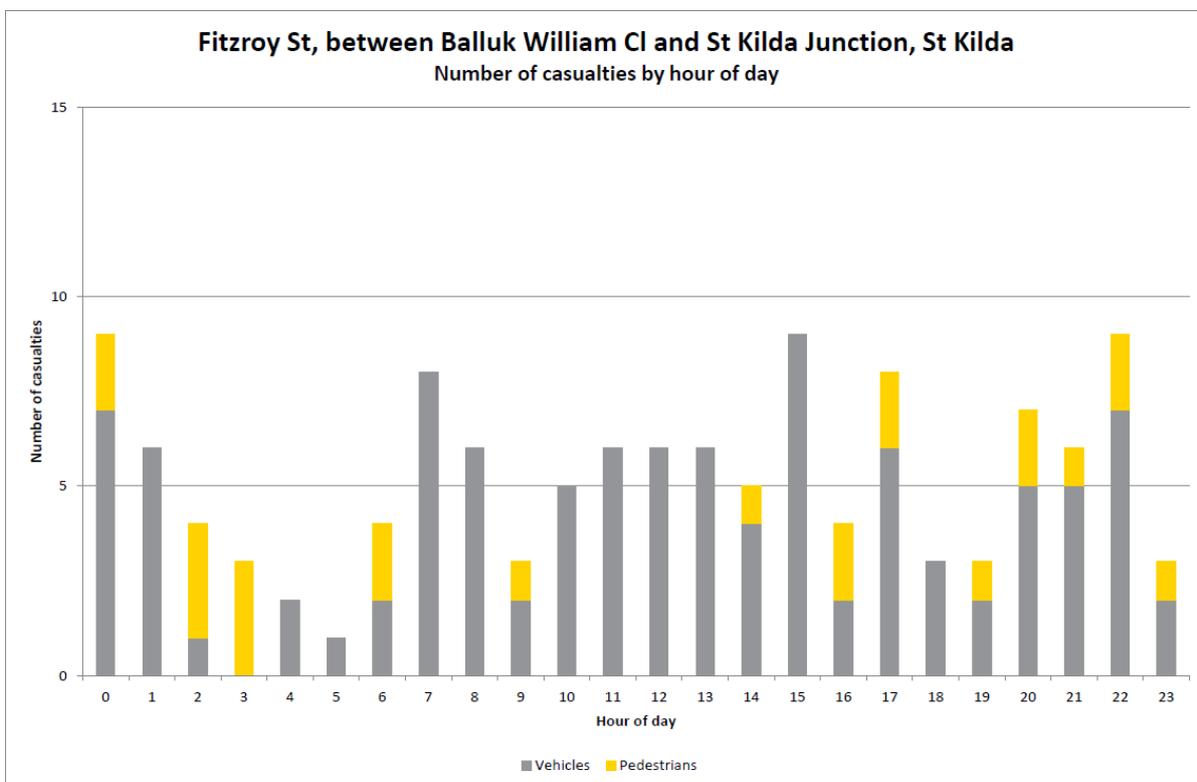


Figure D4 – Number of casualties by hour of day along Fitzroy Street, between Balluk William Close and St Kilda Junction, St Kilda from 1 January 1987 to 31 December 2013

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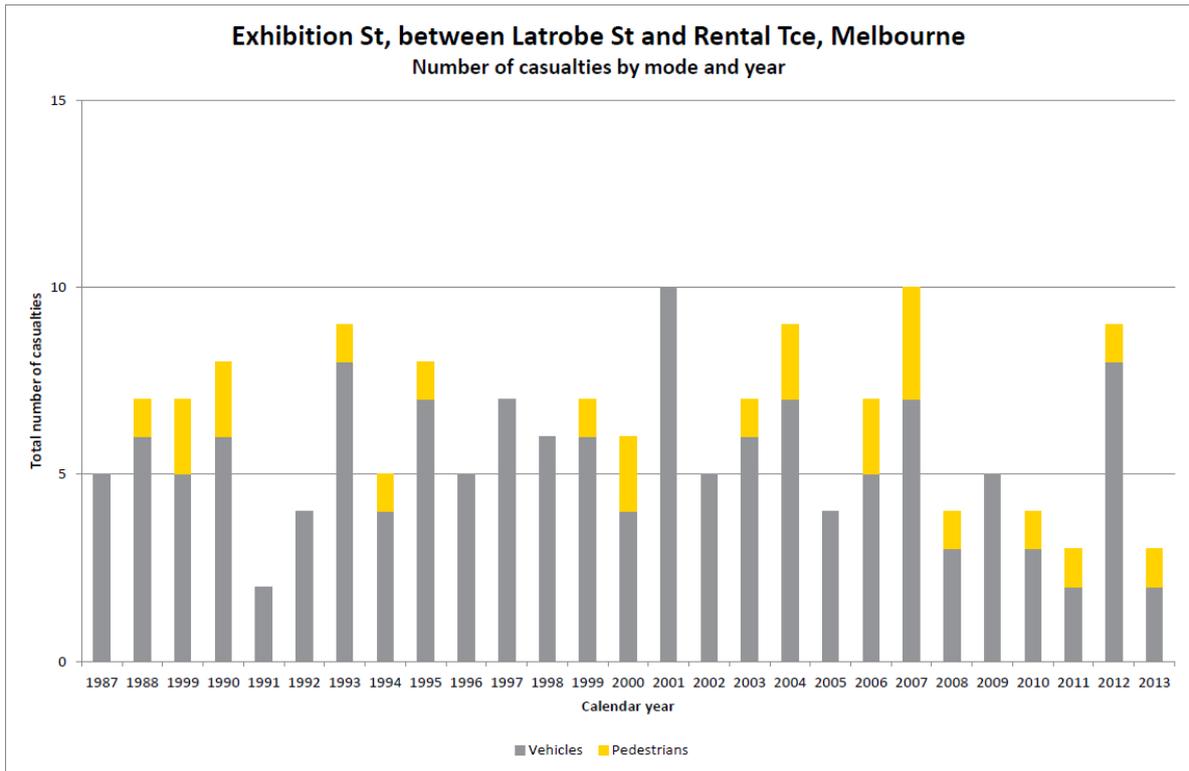


Figure D5 – Number of casualties recorded along Exhibition Street, between Latrobe Street and Rental Terrace, Melbourne from 1 January 1987 to 31 December 2013

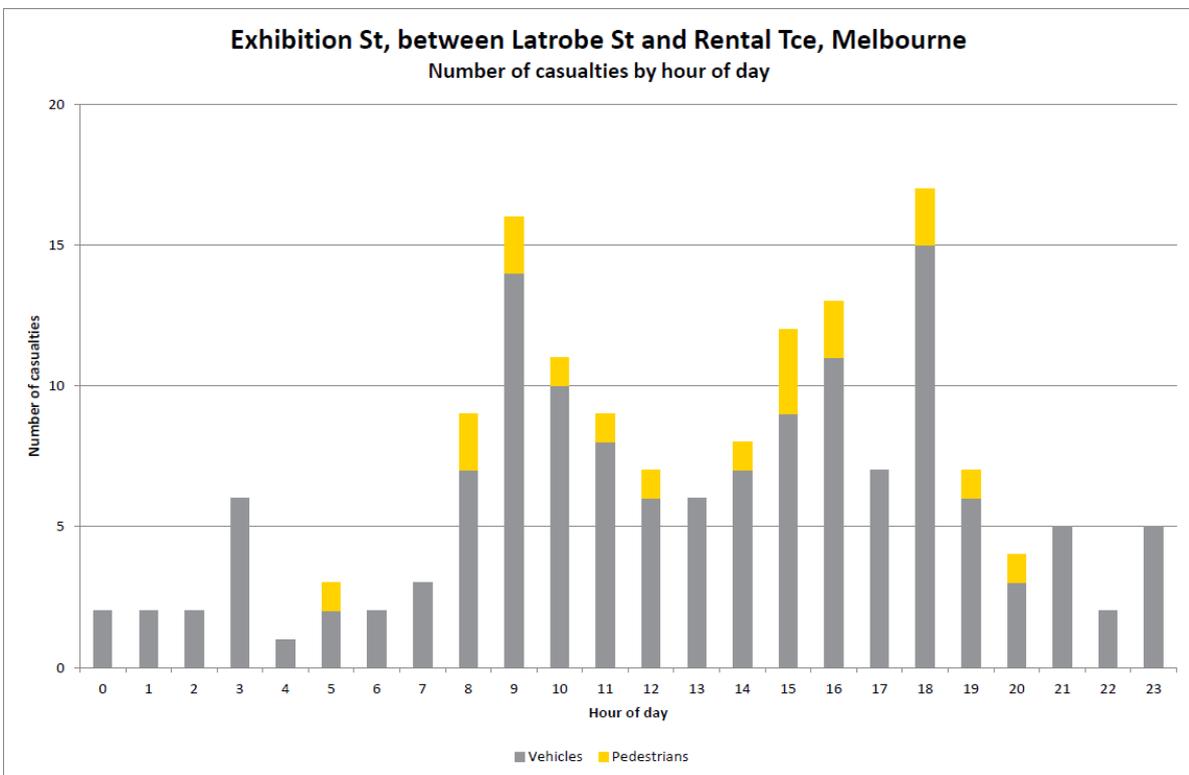


Figure D6 – Number of casualties by hour of day along Exhibition Street, between Latrobe Street and Rental Terrace, Melbourne from 1 January 1987 to 31 December 2013

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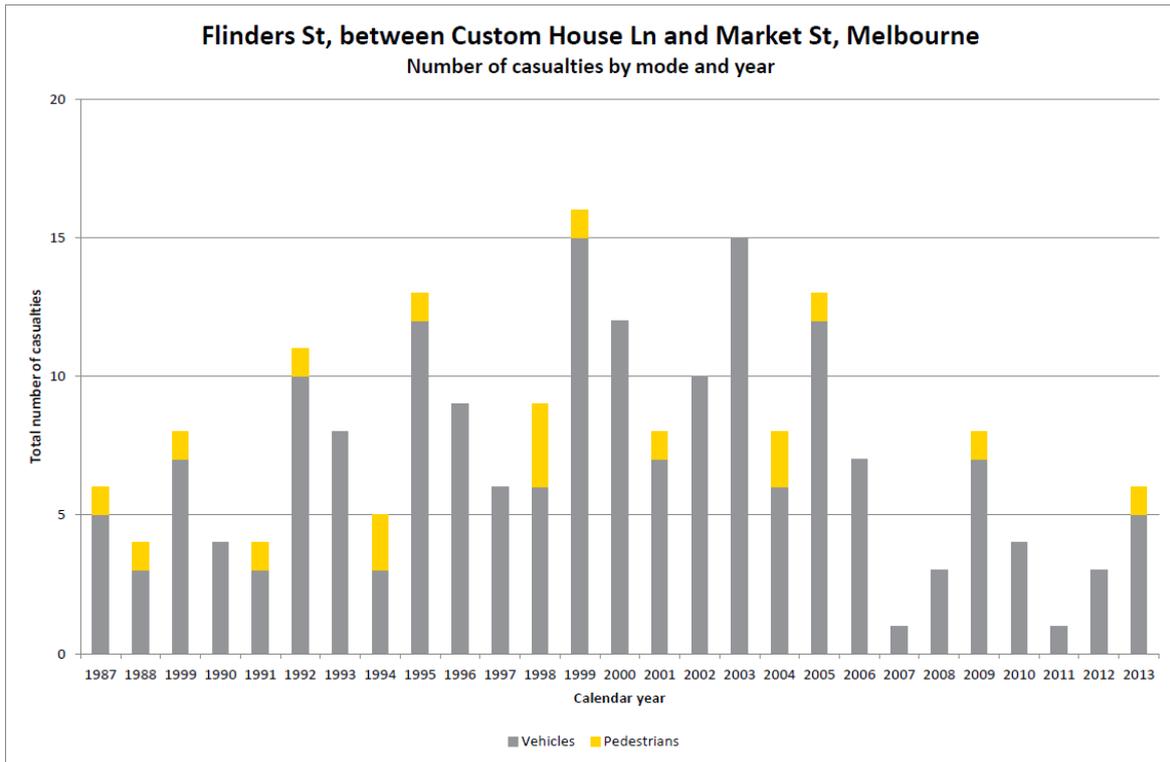


Figure D7 – Number of casualties recorded along Flinders Street, between Custom House Lane and Market Street, Melbourne from 1 January 1987 to 31 December 2013

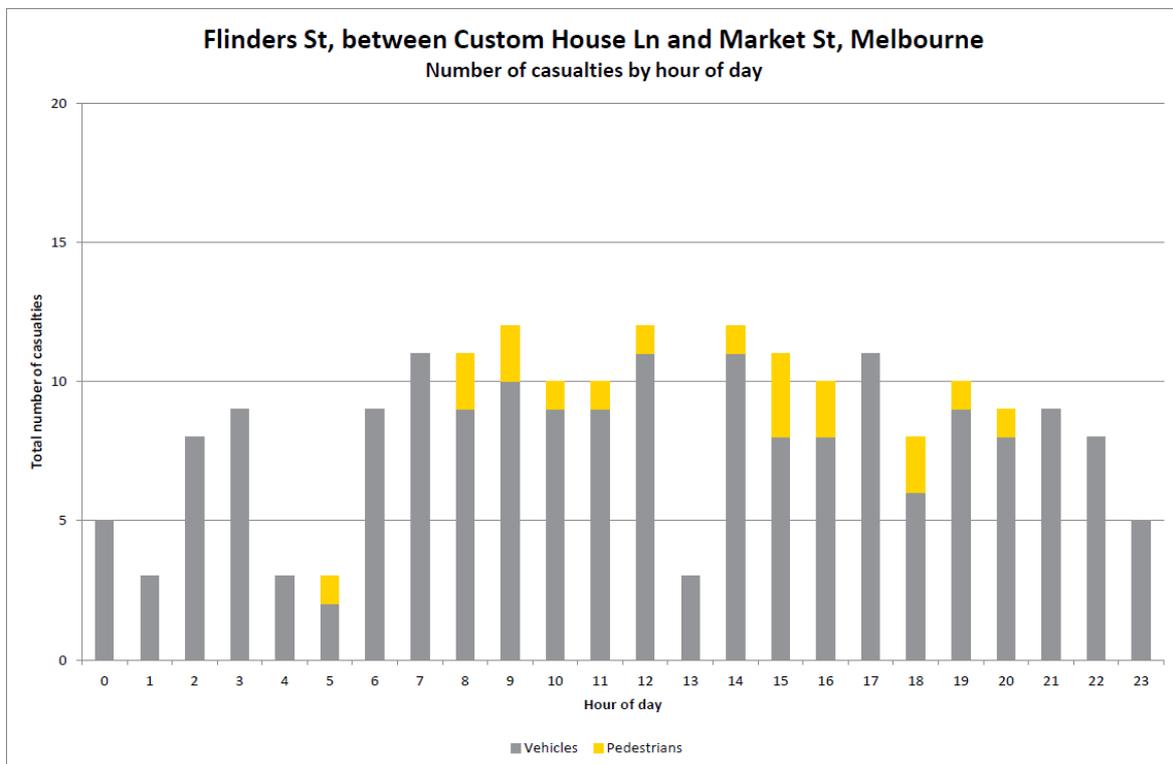


Figure D8 – Number of casualties by hour of day along Flinders Street, between Custom House Lane and Market Street, Melbourne from 1 January 1987 to 31 December 2013