



Office of Transport Safety Investigations

BUS SAFETY INVESTIGATION REPORT

**FATAL INJURIES SUSTAINED BY A PEDESTRIAN
STRUCK BY A VEOLIA BUS
KENSINGTON AND MONTGOMERY STREETS
KOGARAH**

2 MAY 2006



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KENSINGTON AND MONTGOMERY STREETS
KOGARAH

TUESDAY 2 MAY 2006

OTSI File Ref: 04265

21 February 2007

**Office of Transport Safety Investigations
Level 17, 201 Elizabeth Street
Sydney NSW 2000**

The Office of Transport Safety Investigations (OTSI) is an independent NSW agency whose purpose is to improve transport safety through the investigation of accidents and incidents in the rail, bus and ferry industries.

Established on 1 January 2004 by the *Transport Administration Act 1988*, and confirmed by amending legislation as an independent statutory office on 1 July 2005, OTSI is responsible for determining the causes and contributing factors of accidents and to make recommendations for the implementation of remedial safety action to prevent recurrence.

OTSI investigations are conducted under powers conferred by the *Rail Safety Act 2002* and the *Passenger Transport Act 1990*. OTSI investigators normally seek to obtain information cooperatively when conducting an accident investigation. However, where it is necessary to do so, OTSI investigators may exercise statutory powers to interview persons, enter premises and examine and retain physical and documentary evidence. Where OTSI investigators exercise their powers of compulsion, information so obtained cannot be used by other agencies in any subsequent civil or criminal action against those persons providing information.

OTSI investigation reports are submitted to the Minister for Transport for tabling in both Houses of Parliament. Following tabling, OTSI reports are published on its website www.otsi.nsw.gov.au.

OTSI's investigative responsibilities do not extend to overseeing the implementation of recommendations it makes in its investigation reports. However OTSI is kept informed of the extent to which its recommendations have been accepted and acted upon through advice provided in the Quarterly Report on the status of recommendations arising from OTSI investigations which is submitted to the Minister for Transport by the Independent Transport Safety and Reliability Regulator (ITSRR) which monitors the implementation of OTSI recommendations by those organisations to whom they are directed.

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The Office of Transport Safety Investigations also provides a Confidential Safety Information Reporting facility for rail, bus and ferry industry employees. The CSIRS reporting telephone number is 1800 180 828

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GLOSSARY of TERMS and ABBREVIATIONS

CCTV	Closed Circuit Television
ITSRR	Independent Transport Safety and Reliability Regulator
MoT	New South Wales Ministry of Transport
OTSI	Office of Transport Safety Investigations
RTA	Roads and Traffic Authority, NSW

ACKNOWLEDGEMENTS

OTSI acknowledges the assistance of the NSW Police Crash Investigation Unit which provided valuable technical assistance and advice throughout the course of its investigation.

EXECUTIVE SUMMARY

The Accident

At approximately 4:00pm on 2 May 2006, a passenger bus operated by Veolia Transport (formerly operating as Connex) struck an elderly female pedestrian at the intersection of Kensington and Montgomery Streets in Kogarah, Sydney. The bus driver did not see the pedestrian as he commenced a right turn at the four way intersection, but stopped the bus when he felt the impact. However, the pedestrian was trapped between the front right wheel and the wheel arch and was dragged approximately two metres before the bus came to rest. She sustained serious injuries to her right leg and was conveyed by ambulance to St George Hospital but died shortly after admission.

Local Police arrived at the scene within minutes and the Police Crash Investigation Unit later examined the bus in situ. OTSI was not advised of the accident until 9:03pm and commenced its investigation the following day. The bus driver was later charged by NSW Police with Negligent Driving Causing Death. Pending the outcome of legal proceedings, the driver's accreditation was suspended by the Ministry of Transport (MoT) in accordance with its standing procedures in such circumstances.

Findings

In relation to those matters prescribed by the Terms of Reference as the principal lines of inquiry, OTSI finds as follows:

- a. **Circumstances of the Accident.** The five witnesses to the accident all described the pedestrian as using the designated pedestrian crossing and being struck by the bus shortly after it commenced a right turn from Kensington Street into Montgomery Street. Three witnesses described the pedestrian as walking normally, with the benefit of a green light, across Montgomery Street in a North-Easterly direction. A fourth witness agreed with this description of the direction of movement, but described the pedestrian as running. A fifth witness initially stated that the pedestrian was moving in a South-Westerly direction, which would

have meant that she had commenced her crossing of the intersection from the same side of road as the bus. However, this witness has subsequently indicated that he is less certain in relation to this matter. After detailed examinations of the vehicle and the intersection, access to CCTV footage, post-mortem results, consultation with the Police, and given her normal pattern of activity as described by her family, OTSI considers that it is most likely that the pedestrian commenced her crossing from the opposite site of the road to the bus and was moving in a North-Easterly direction towards her home.

b. Causal and Contributory Factors

i. Exclusions:

- (1) Having been employed within the bus industry for 27 years and having operated the same bus, on average, five days a week for 22 months, the driver did not lack experience or knowledge. He was also familiar with the route.
- (2) The driver commenced his duties at 07:23am and had enjoyed a rest break during the day. There was nothing to suggest that the driver was fatigued or in any other way impaired.
- (3) The driver operated the bus, which was found to be in good mechanical condition, at low speed and at a time when weather and traffic conditions were good.
- (4) All traffic lights were functioning properly and there was nothing about the layout of the intersection to suggest that it presented risks that might not have been apparent.
- (5) Both the bus driver and the pedestrian began their respective movements with the benefit of a 'proceed'/green traffic light indication and both were appropriately positioned on the road and in the pedestrian crossing respectively.

ii. **Causation.** The accident occurred because the bus driver did not see, and therefore did not give way to, the pedestrian as she crossed Montgomery Street on the designated pedestrian crossing.

iii. **Contributory Factors**

(1) The placement of the external rear vision mirror on the driver's side did not meet requirements identified in *Australian Design Rule 14/02 (Rear Vision Mirrors)* and, in combination with the Right forward windscreen pillar, might have limited or obstructed the bus driver's view of the pedestrian as she moved from the opposite side of the road towards the bus. However, the driver was conscious of this obstruction and the need to adjust his driving position to look around it.

(2) The requirement to contend with vehicle traffic that was coming from the opposite direction and negotiate a tight right turn might have placed competing, albeit not unusual, demands upon the bus driver.

c. **Adequacy of the Emergency Response.** Several witnesses to the accident used their mobile phones to contact emergency services and a physician from an adjacent medical centre acted quickly to provide medical assistance to the pedestrian. Response agencies arrived in quick succession and acted effectively at the scene.

d. **Other Matters that would enhance the Safety of Bus Operations.** With the exception of those matters already specified above, this investigation did not find any other safety issues that required remedial action to enhance the safety of bus operations.

Recommendations

The following recommendations are made to prevent recurrence of this type of bus accident:

a. Veolia Transport Pty Ltd

- i. Seek expert assistance to review the positioning of all external mirrors throughout its fleet to ensure that the requirements of *ADR 14/02* are met and to eliminate 'blind spots' to the extent that it is possible.
- ii. Alert its drivers to the presence of any known blind spots and the driving techniques necessary to overcome them.
- iii. Ensure that its drivers are reminded of the need for additional caution at tight intersections and are refreshed periodically in the required driving techniques.
- iv. Undertake periodic monitoring of its drivers' performance to ensure that appropriate driving techniques are being employed at such intersections.

b. Roads and Traffic Authority

- i. Conduct a survey of both pedestrian and vehicular traffic density and behaviour at the site of the accident, over different times of the day and over a number of days, to determine whether traffic arrangements need to be revised in any way.
- ii. Give particular consideration to reconfiguring the traffic lights at the intersection of Montgomery and Kensington Streets to provide pedestrians with exclusive use of the intersection for limited periods. That is, make the intersection a 'scramble crossing' or, alternatively, install red arrows, to reduce the likelihood of conflicting movements of vehicles with pedestrians using the designated crossings.

- iii. Assess whether there are other intersections with similar characteristics under its jurisdiction that could be made safer by the re-configuration or re-sequencing of their traffic lights.
- iv. Review the current general standards and requirements of *Australian Design Rule 14/02* with a view to determining whether a more specific requirement can, and should, be articulated in respect of the minimum arc of vision that must be provided for on all buses.

c. NSW Ministry of Transport

- i. Bring this accident and its related lessons to the attention of the bus industry and accredited operators in particular.
- ii. Monitor Veolia's implementation of those safety actions directed to it in the recommendations of this report.

PART 1 INTRODUCTION

Notification and Response

- 1.1 At 9:03pm on Tuesday 2 May 2006, the Office of Transport Safety Investigations (OTSI) Duty Officer was notified by the Operations Manager of Veolia Transport that one of its buses had struck and seriously injured an elderly female pedestrian at a pedestrian crossing at Kogarah shortly after 4:00pm. On the following day, media reports indicated that a pedestrian had died in hospital after having been struck by a bus. OTSI contacted the NSW Police who confirmed the media reports and in the process established the connection with the bus operator's report.
- 1.2 Based on the information provided by the Police and Veolia, the Chief Investigator directed the deployment of an OTSI Investigating Officer to the incident site the next day. The designated Investigating Officer in Charge (IIC) arrived at the incident site at 10:00am on 3 May 2006 to commence the inspection, assessment and evidence collection process.

Initiation of Investigation

- 1.3 As a result of the primary evidence collected by the OTSI Investigating Officer at the incident site and from a record of interview with the bus driver, the Chief Investigator determined that the incident warranted independent investigation and initiated a Bus Safety Investigation in accordance with s46BA of the *Passenger Transport Act 1990*.

Interim Factual Statement

- 1.4 An Interim Factual Statement notifying OTSI's investigation and describing the incident in terms of what had happened was published on the OTSI website on 5 May 2006. On the same day, the Chief Investigator notified all of the Directly Involved Parties (DIP) that OTSI

was investigating the collision and requested that an officer be nominated in each organisation to act as the point of contact for all inquiries made by the appointed OTSI Investigator in Charge. The Terms of Reference for the Investigation were provided to the DIPs with this notification.

Terms of Reference

- 1.5 The Chief Investigator established the following Terms of Reference to determine why the accident had occurred and what to do to prevent recurrence:
- a. identify the circumstances surrounding the accident;
 - b. identify those factors that caused or contributed to the accident with consideration being given to, but not limited by, the following factors:
 - i. the actions of the bus driver and the pedestrian;
 - ii. conditions at the intersection including, but not limited to, vehicular and pedestrian control devices;
 - iii. the design and mechanical condition of the bus;
 - iv. whether the bus was operated in accordance with NSW road rules and regulations and any conditions attached to the operating company's accreditation;
 - c. the adequacy of the emergency response, and
 - d. any other matters arising from the investigation that would enhance the safety of bus operations in NSW.

Methodology

- 1.6 OTSI utilises the ICAM (Incident Cause Analysis Method) approach in the conduct of its investigations and applies the Reason Model of Active Failures and Latent Conditions to its analysis of causative and contributory factors.

- 1.7 The underlying feature of the methodology is the “Just Culture” principle with its focus on safety outcomes rather than the attribution of blame or liability.

Consultation

- 1.8 On 2 February 2007, a copy of the investigation Draft Report was forwarded to all DIPs to provide them with the opportunity to contribute to the compilation of the Final Report by verifying the factual information, scrutinising the analysis, findings and recommendations, and providing any commentary that would enhance the structure, substance, integrity and resilience of the investigation Report. DIPs were requested to submit their comments by 16 February 2007. Submissions were received from Veolia, ITSRR, the RTA and MoT.
- 1.9 The Chief Investigator considered all representations made by DIPs and where appropriate, reflected their advice in this Final Report. On 21 February 2007 the Chief Investigator informed DIPs which matters from their submissions had been incorporated in this Final Report and, where any proposal was not included, the reasons for not doing so.

Investigation Report

- 1.10 This report describes the accident that occurred at Kogarah on 2 May 2006 and explains why it occurred. The recommendations that are made are designed to minimise the potential for a recurrence of this type of accident.

PART 2 FACTUAL INFORMATION

Accident Synopsis

2.1 At approximately 4:00pm on 2 May 2006, a passenger bus operated by Veolia Transport (formerly operating as Connex) struck an elderly female pedestrian at the intersection of Kensington and Montgomery Streets in Kogarah, Sydney. The bus driver stated that he did not see the pedestrian as he commenced a right turn at the four way intersection, but stopped the bus when he felt the impact. However, the pedestrian was trapped between the front right wheel¹ and the wheel arch and was dragged for approximately two metres before the bus came to rest. She sustained serious injuries to her right leg and was conveyed by ambulance to St George Hospital where she died shortly after admission.

Before the Accident

2.2 Immediately prior to the accident, the bus had stopped at traffic lights in Kensington Street, at the intersection with Montgomery Street, in Kogarah, Sydney. The bus was in the outer lane, preparing to turn right into the inner lane of Montgomery Street before stopping at a bus stop about 20 metres beyond the intersection. The bus, operating on Route 947 from Ramsgate to Kogarah, was carrying only one passenger at the time and was on schedule.

The Accident

2.3 Three witnesses, who were occupants of cars 1 and 2 (see *Figure 1*) waiting in the outer lane of Montgomery Street and intending to turn Right into Kensington Street across the intersection, reported seeing the pedestrian at the crossing and then walking normally across Montgomery Street in a North-Easterly direction. They indicated that

¹ As viewed from the bus driver's perspective. All other references to right or left sides elsewhere in the report are also described from the driver's perspective.

she was the sole user of the pedestrian crossing at the time and that she had a green pedestrian light indication. They described the front right hand side of the bus as striking the pedestrian moments after the bus commenced its right turn and the pedestrian being pushed under the bus's front right wheel and then being dragged across the ground until the bus stopped. These witnesses were closest to the point of impact.

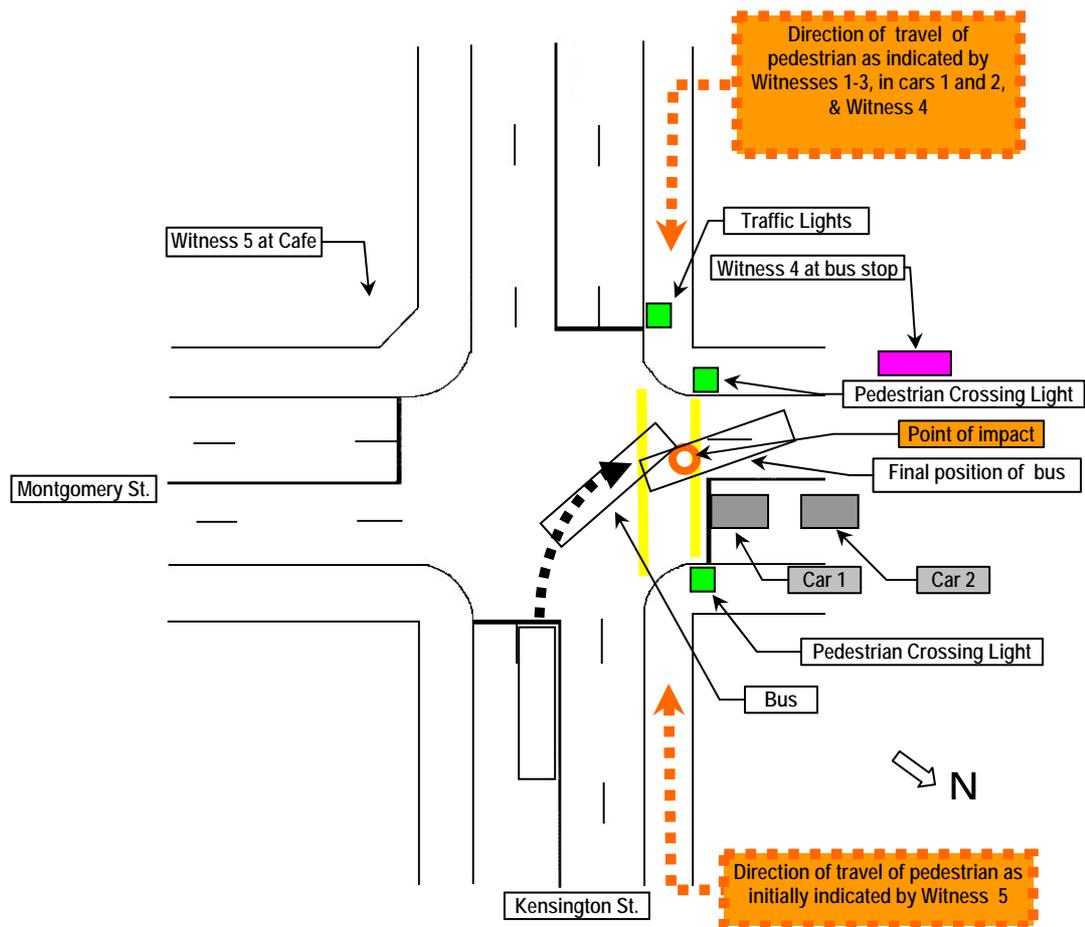


Figure 1: Accident Location

- 2.4 A person waiting at the bus stop in Montgomery Street (indicated as Witness 4 in *Figure 1*) also indicated that the pedestrian was moving, in a North-Easterly direction but described her as appearing to have delayed her crossing, then running. Another witness (Witness 5) who was looking across the intersection from the opposite side of Kensington Street, described the pedestrian as crossing from the opposite direction, i.e., moving in a South Westerly direction. The sole passenger on the

bus did not see the pedestrian until after the collision when he alighted from the bus.

- 2.5 The driver recalled getting a ‘proceed’ indication/green light but having to wait for vehicles coming from the opposite direction to pass before he could commence the turn. He also remembered taking a wide arc as he started the tight right turn. He did not recall seeing a pedestrian as he turned. He became aware that he had been involved in some form of accident when he felt the impact of the collision with the pedestrian and immediately stopped the bus. Having done so, he observed the pedestrian lying beside the bus in the bus’s right rear vision side mirror. This side mirror can be seen in *Photo 1*.



Photo 1: Driver’s side rear vision mirror from which the bus driver detected the pedestrian after she was struck by the bus. Note also, the extent to which the screen pillar and mirror can obscure the driver’s forward vision

Operator’s Details

- 2.6 Veolia Transport was accredited by MoT in NSW in October 2002. It had formerly traded as Connex. Veolia operates 65 buses from its Taren Point depot, servicing various routes in South Sydney.

Driver's Details

- 2.7 The 55 year old bus driver had been driving buses for 27 years. He described himself as being very familiar with the bus he was operating on the day of the accident having driven it, on average, five days a week for 22 months. While the driver usually drove this bus on charter runs, he described himself as being familiar with the route he was driving on the day of the accident because he had operated over it as a relief driver on a number of occasions.
- 2.8 The driver had been employed by Veolia since 2001 during which time he had been involved in two minor traffic incidents. Neither of these accidents was of a magnitude that required them to be reported to the bus industry's regulator. OTSI's examination of the driver's driving record prior to 2001 revealed that he had been issued with a number of traffic infringement notices over an extended period, all of which were for relatively minor offences.

Pedestrian's Details

- 2.9 The pedestrian was an 83 year-old woman. She was 1.42 metres tall and was wearing a light/cream coloured bowling dress and carrying a white shopping bag at the time. Family members described her as enjoying good health and as being alert and mobile.

Bus Information

- 2.10 The Scania K94 bus, pictured in *Photo 2*², was first registered in 2004 and is one of six such buses operated by Veolia Transport. It is 12.5 metres long and 2.48 metres wide, with a wheelbase of 6.5 metres. The bus is licensed to accommodate 62 seated and 15 standing passengers. It is fitted with two backward-facing CCTV recording cameras, one above the driver's location and the other in the mid-section.

² This photo was taken in 2004 and therefore depicts Connex's signage. *Photo 3* on p.13 is more recent and shows the same bus with Veolia's signage.



Photo 2: The bus involved in the accident

The Intersection

- 2.11 The RTA advised OTSI that it had no record of any other fatalities at this intersection. Prior to this accident, there had been six reported accidents at the intersection since 2001 and only one of these had involved a pedestrian.³
- 2.12 The layout of the intersection and relative position of the bus and pedestrian, at the moment of impact, are indicated in *Figure 1*.⁴ The inner and outer lanes on each of the roads were 3.3 metres and 3.1 metres wide respectively. The pedestrian crossing lanes were 2 metres wide. Each of the pedestrian crossing points featured standard button press activation and audio sound alerts.
- 2.13 The road traffic and pedestrian control lights were the standard type employed at a four lane crossing, with no turning lane control or red arrow pedestrian protection, and operated on a phased sequence that

³ Accidents will generally only be reported to the RTA by the Police when they are of a magnitude or consequence that requires Police or other emergency services to attend the scene.

⁴ There were four designated crossing points at the four-way intersection. In order to reduce the amount of detail on what is an already 'busy' diagram, the only pedestrian crossing depicted is the one on which the pedestrian was struck.

could be altered via an underground induction loop depending on traffic flows. There was a fixed period of two seconds between each permissible traffic movement sequence during which all signals were at 'Stop'. They were configured so that parallel road and pedestrian traffic could cross the intersection simultaneously. Pedestrians could cross on a green signal during a period of eight seconds. This was followed by a flashing red 'Don't Walk' indication of 11-12 seconds duration, after which a steady red 'Don't Walk' indication was displayed.

Environmental Conditions

- 2.14 Witnesses described the weather conditions as dry and clear at the time and this was consistent with the Bureau of Meteorology weather forecast. One witness indicated that the bus driver would have been driving into the sun's glare as he turned, however the bus driver did not recall his vision being affected at the intersection or as he turned. He also described the traffic density at the time as being moderate.

PART 3 ANALYSIS

Conditions at the Intersection

- 3.1 OTSI's IIC visited the intersection over several days to observe the traffic light sequences and to monitor traffic density and the behaviour of drivers and pedestrians. He noted that the traffic lights, signs and markings were typical of those put in place by the RTA at most intersections of the same type in Sydney and were functioning properly. Vehicles on the double lane streets are free to continue straight ahead or to turn left or right provided they have a proceed/green indication. Drivers intending to make turns need to not only ensure the turn is permitted, they also need to be alert to the presence of opposing vehicle traffic and pedestrians crossing their path because of the absence of dedicated turning, or 'filter', lanes and traffic control light sequences to provide them with exclusive use of the road. These cognitive demands are not excessive, but they do fall more heavily on bus and truck drivers who must also commit considerable attention to the act of manoeuvring their sizeable vehicles during what are quite tight turns at the intersection.
- 3.2 While at the site, OTSI's IIC noted the proximity of the intersection to a hospital, a school and a TAFE. He also noted that at various times of the day the area became very congested, with many instances where pedestrians and vehicles were in close proximity, because either or both parties disregarded the traffic lights. The proximity of the hospital means that some of the users of the crossing are less mobile than might otherwise be the case.

Mechanical Condition of the Bus

- 3.3 The bus was examined in situ by a NSW Police vehicle inspector soon after the accident. No mechanical defects or indications of irregular operation were discovered. A later check of the vehicle's service

records indicated that it had been serviced at the specified intervals. OTSI concluded that the condition of the bus was not at issue.

Condition of the Bus Driver

- 3.4 The bus driver was tested for the presence of both drugs and alcohol and returned negative results.

- 3.5 The driver commenced work on the day of the accident at 7:23am, enjoyed a rest break between 11:03am and 2:49pm and was due to conclude his driving duties at 6:12pm. An examination of the driver's roster for the previous 14 days indicated that he was being tasked within industry fatigue assessment standards.

- 3.6 The driver indicated that he did not have a second job, enjoyed good health and had stable domestic circumstances. CCTV footage taken from the bus showed nothing untoward, but because the recorders were positioned to capture events within the bus, there was no footage of the impact with the pedestrian. OTSI concluded that there was nothing to suggest that the driver was in any way 'impaired'.

Condition of the Pedestrian

- 3.7 Autopsy results established that the pedestrian was not affected by alcohol or illicit substances. Traces of a prescribed medicine were evident but in an amount that was consistent with the prescribed dosages. This medication would not have impaired the pedestrian's sensory system or affected her mobility. The post-mortem indicated the cause of death as being complications arising from multiple injuries sustained in the accident.

Direction and Manner of Crossing the Intersection

- 3.8 As previously indicated, there was a degree of conjecture about the direction and manner in which the pedestrian was moving at the time she was struck. Three witnesses describe the pedestrian as walking in a

North-Easterly direction across Montgomery Street, i.e., towards the front of the bus. A fourth witness said that pedestrian appeared to delay her crossing, and then commenced to run. A fifth witness initially described the pedestrian as moving in a South-Westerly direction but has subsequently indicated that he is now less certain in relation to this matter.

- 3.9 Despite detailed examinations of the vehicle and the intersection, access to CCTV footage, post-mortem results and consultation with the Police, there remains some conflicting information about the pedestrian's direction and manner of movement. Nevertheless, given her normal pattern of activity as described by her family and the reported injury indications, OTSI is satisfied that on the balance of probabilities, it is most likely that the pedestrian commenced her crossing from the opposite side of the road to the bus and was moving in a North-Easterly direction towards her home.

Matters Affecting Visibility

- 3.10 In response to a question by the IIC, the driver indicated that he did not recall being troubled by glare at the time of the accident. He did recall having adjusted the front and side sunshade blinds earlier in the day to mitigate glare. He also recalled wearing his sunglasses early on the day of the accident, but the CCTV showed that he did not have them on at the time of the accident⁵.
- 3.11 On the day following the accident, OTSI's IIC devoted considerable time with the driver examining matters that might have affected his visibility. Mirror and seat seatings were as they had been on the day of the accident and this allowed a variety of measurements to be taken and estimations to be made in relation to visibility. Several days later, the IIC and NSW Police Crash Unit investigators reconstructed the incident at the scene of the accident and at the same time of day, using the same

⁵ Retrieved from the front on-board bus camera

bus and driver. It was apparent from video recordings taken during the reconstruction that the width of the supporting pillar on the front right side of the bus in combination with the positioning of the right side mirror obstructs a driver's view of objects in the middle distance if the driver remains static in the seat. In order to overcome this obstruction, drivers must alter their seating position to look around the pillar and mirror (see *Photos 3 and 4*).



Photo 3: The bus involved in the accident – note the pillar and position of the external rear vision mirror

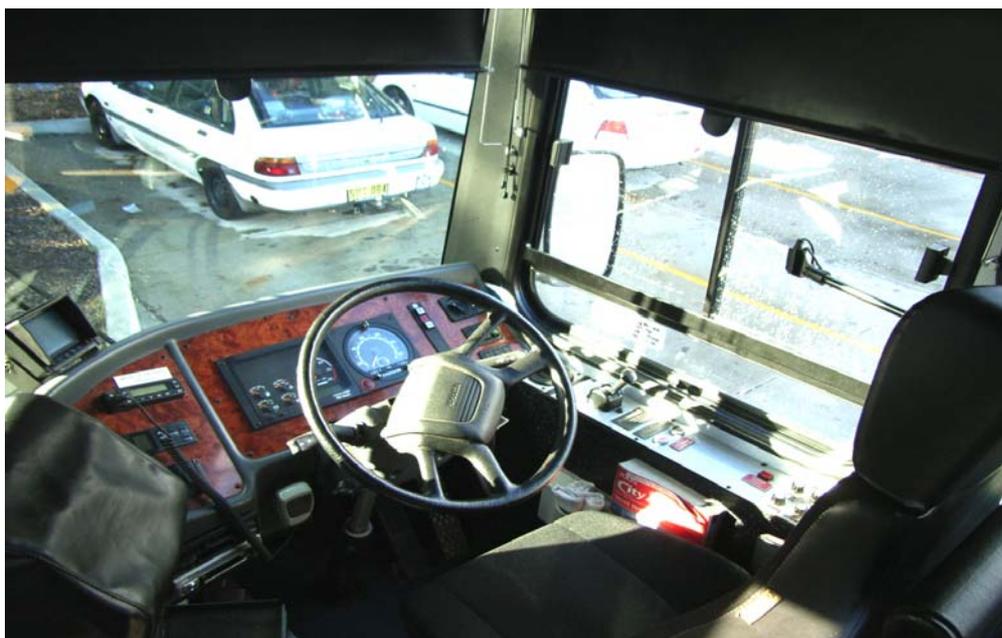


Photo 4: Obscuration caused by the front screen pillar and external rear vision mirror

- 3.12 The extent of obscuration, which was partial rather than total, was calculated as being about 6 metres wide by 3 metres high at a range of 19 metres. This was also approximately the same distance from the point at which the driver commenced to make his turn and the point at which the pedestrian would have stepped onto the pedestrian crossing if she was crossing from the opposite side of the road. It was also apparent from the reconstruction that the driver's view of a pedestrian within this field would remain partially obstructed if the pedestrian was crossing in the opposite direction to that of the bus. Measurements also showed that the pedestrian would not have been visible to the driver if she was forward, and within half a metre, of the right side of the bus unless the driver altered his position.
- 3.13 The driver indicated that he was aware that the pillar and right external side mirror, under certain circumstances, obstructed his field of view and that he habitually moved his head to see around the obstruction, as he had been trained to do. He also described and demonstrated how he also included checks of his rear view mirrors whilst preparing to turn. He further described his approach to this intersection on the day. His first action was to monitor the opposing traffic ahead after which he checked the pedestrian crossing to his right. He indicated that he did not see anyone on the pedestrian crossing, but did observe a female waiting to board at the Montgomery Street bus stop beyond the crossing (indicated as Witness 4 in *Figure 1*). As he commenced to turn, he checked his left side mirror to ensure the left rear corner of the bus did not converge with any traffic in the inner lane of Kensington Street, as was his usual practice.
- 3.14 OTSI noted the presence of two poles on the footpath, about a metre apart, on the Kensington Street side of, and adjacent to, the pedestrian crossing (see *Photo 5*). One was the galvanised metal traffic light control post and the other was a timber power pole, measuring approximately 10 and 24 centimetres in diameter respectively. These poles might also have partially obscured the bus driver's line of sight if

the pedestrian had been waiting behind the poles. However, the position of the marks, later painted onto the road by the attending Police, indicate that this was not the case (see *Photo 5*). The point of impact is highly significant because it indicates that the pedestrian had been moving for some time, as opposed to having just stepped out from behind these poles.

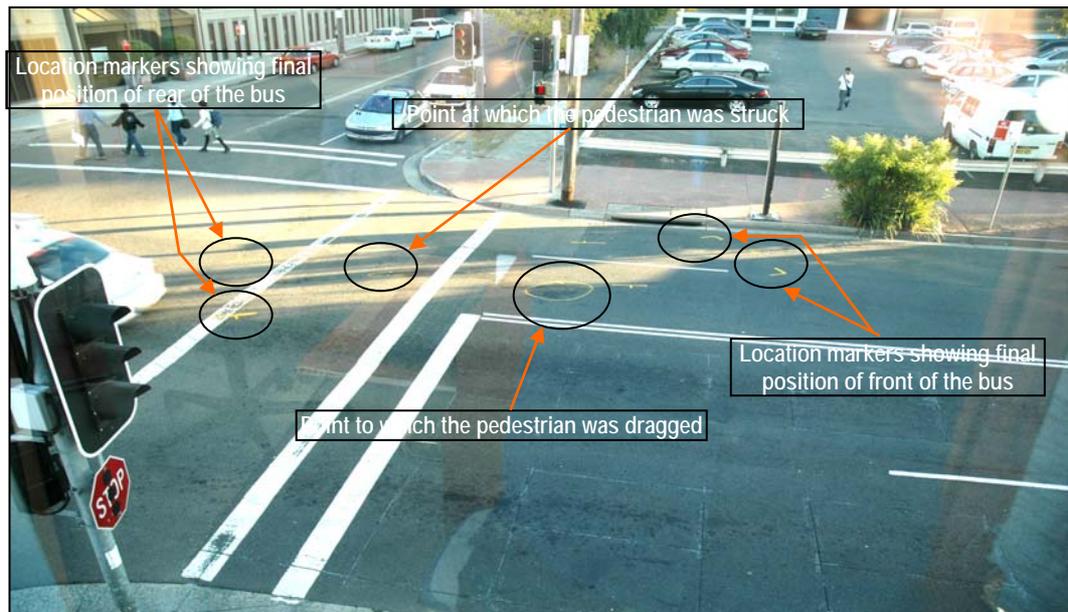


Photo 5: Showing the pedestrian crossing and the accident location markings

3.15 OTSI noted that the design and standards governing bus rear vision mirrors and driver visibility are contained in the *Commonwealth Motor Vehicle Standards Act*, as *Australian Design Rules 14/02* (Rear Vision Mirrors) and *42/04* (General Safety Requirements). These ADRs do not stipulate a specific minimum ‘arc’ of vision that must be achieved but do identify the requirement for side mirrors to be positioned in such a way that they do not obscure a driver’s view of traffic. Section 15.2.2.1 of *ADR 14/02* specifically states that “Mirrors must be so placed that the driver, when sitting on the driving seat in a normal driving position, has a clear view of the road to the rear, side(s) or front of the vehicle.” OTSI does not consider that the placement of the rear vision mirror on the driver’s side of the bus met the requirement of Section 15.2.2.1.

Emergency Response

3.16 The prompt actions of a number of witnesses in calling 000 provided response agencies with immediate notification of the accident. The prompt actions of a physician from a nearby medical clinic, who had heard the disturbance, meant that the pedestrian received very timely medical assistance. Local police officers in a patrol car further along Montgomery Street proceeded to the scene quickly, secured the area, identified witnesses and commenced to divert traffic. They were followed in quick succession by an ambulance and the fire brigade. Police investigators and RTA vehicle inspectors arrived thereafter. OTSI considers the emergency response to have been timely and effective.

PART 4 FINDINGS

4.1 In relation to those matters prescribed by the Terms of Reference as the principal lines of inquiry, OTSI finds as follows:

a. Circumstances of the Accident.

Five witnesses provided three different accounts as to the pedestrian's manner and direction of movement. All of the witness described the pedestrian as using the designated pedestrian crossing and being struck by the bus shortly after it commenced a right turn from Kensington Street into Montgomery Street. Three witnesses described the pedestrian as walking normally across Montgomery Street in a North-Easterly direction. A fourth witness agreed with this description of the direction of movement but describes the pedestrian as running. A fifth witness initially stated that the pedestrian was moving in a in South-Westerly direction, which would have meant that the pedestrian commenced her crossing of the intersection from the same side of road as the bus; this witness has subsequently indicated that he is less certain in relation to this matter. After detailed examinations of the vehicle and the intersection, access to CCTV footage, post-mortem results, consultation with the Police, and given her normal pattern of activity as described by her family, OTSI considers that it is most likely that the pedestrian commenced her crossing from the opposite side of the road to the bus and was moving in a North-Easterly direction towards her home.

b. Causal and Contributory Factors

i. Exclusions:

- (1) Having been employed within the bus industry for 27 years and having operated the same bus, on average, five days a week for 22 months, the driver did not lack experience or knowledge. He was also familiar with the route.

- (2) The driver commenced his duties at 07:23am and had enjoyed a rest break during the day. There was nothing to suggest that the driver was fatigued or in any other way impaired.
- (3) The driver operated the bus, which was found to be in good mechanical condition, at low speed and at a time when weather and traffic conditions were good.
- (3) All traffic lights were functioning properly and there was nothing about the layout of the intersection to suggest that it presented risks that might not have been apparent.
- (4) Both the bus driver and the pedestrian began their respective movements with the benefit of a 'proceed'/green traffic light indication and both were appropriately positioned on the road and in the pedestrian crossing respectively .

ii. **Causation.** The accident occurred because the bus driver did not see, and therefore did not give way to, the pedestrian as she crossed Montgomery Street on the designated pedestrian crossing.

iii. **Contributory Factors**

- (1) The placement of the external rear vision mirror on the driver's side did not meet requirements identified in *Australian Design Rule 14/02 (Rear Vision Mirrors)* and, in combination with the Right forward windscreen pillar, might have limited or obstructed the bus driver's view of the pedestrian as she moved from the opposite side of the road towards the bus. However, the driver was conscious of this obstruction and the need to adjust his driving position to look around it.
- (2) The requirement to contend with vehicle traffic that was coming from the opposite direction and negotiate a tight

right turn might have placed competing, albeit not unusual, demands upon the bus driver.

c. Adequacy of the Emergency Response.

Several witnesses to the accident used their mobile phones to contact emergency services and a physician from an adjacent medical centre acted quickly to provide medical assistance to the pedestrian. Response agencies arrived in quick succession and acted effectively at the scene.

d. Other Matters that would enhance the Safety of Bus Operations.

With the exception of those matters already specified above, this investigation did not find any other safety issues that required remedial action to enhance the safety of bus operations.

PART 5 RECOMMENDATIONS

5.1 The following recommendations are made to prevent recurrence of this type of bus accident:

a. Veolia Transport Pty Ltd

- i. Seek expert assistance to review the positioning of all external mirrors throughout its fleet to ensure that the requirements of *ADR 14/02* are met and to eliminate 'blind spots', to the extent that it is possible.
- ii. Alert its drivers to the presence of any known blind spots and the driving techniques necessary to overcome them.
- iii. Ensure that its drivers are reminded of the need for additional caution at tight intersections and are refreshed periodically in the required driving techniques.
- iv. Undertake periodic monitoring of its drivers' performance to ensure that appropriate driving techniques are being employed at such intersections.

b. Roads and Traffic Authority

- i. Conduct a survey of both pedestrian and vehicular traffic density and behaviour at the site of the accident, over different times of the day and over a number of days, to determine whether traffic arrangements need to be revised in any way.
- ii. RTA give particular consideration to reconfiguring the traffic lights at the intersection of Kensington and Montgomery Streets to provide pedestrians with exclusive use of the intersection for limited periods, i.e., to making the intersection a 'scramble crossing' or alternatively to installing red arrows to reduce the prospect of conflicting movements with pedestrians using the designated crossings.

- iii. Assess whether there are other intersections with similar characteristics under its jurisdiction that could be made safer by the reconfiguration of their traffic lights.
- iv. Review the current general standards and requirements of *Australian Design Rule 14/02* with a view to determining whether a more specific requirement can, and should, be articulated in respect of the minimum arc of vision that must be provided for on all buses.

c. NSW Ministry of Transport

- i. Bring this accident report to the attention of the bus industry and accredited operators in particular.
- ii. Monitor Veolia's implementation of those safety actions directed to it in the recommendations of this report.