



**Office of Transport Safety Investigations**

# **BUS SAFETY INVESTIGATION REPORT**

## **PEDESTRIAN FATALITY, BUGATTI DRIVE, INGLEBURN**

**5 AUGUST 2009**



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**Investigation Reference 04450**

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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. Importantly, however, OTSI does not confine itself to the consideration of just those matters that caused or contributed to a particular accident; it also seeks to identify any transport safety matters which, if left unaddressed, might contribute to other accidents.

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Once OTSI has completed an investigation, its report is provided to the NSW Minister for Transport for tabling in Parliament. The Minister is required to table the report in both Houses of the NSW Parliament within seven days of receiving it. Following tabling, the report is published on OTSI's website at [www.otsi.nsw.gov.au](http://www.otsi.nsw.gov.au).

OTSI cannot compel any party to implement its recommendations and its investigative responsibilities do not extend to overseeing the implementation of recommendations it makes in its investigation reports. However, OTSI takes a close interest in the extent to which its recommendations have been accepted and acted upon. In addition, a mechanism exists through which OTSI is provided with formal advice by the Independent Transport Safety and Reliability Regulator (ITSRR) in relation to the status of actions taken by those parties to whom its recommendations are directed.

# TABLE OF CONTENTS

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<b>FIGURES AND TABLES</b>	<b>ii</b>
<b>TABLE OF PHOTOS</b>	<b>ii</b>
<b>ACKNOWLEDGEMENTS</b>	<b>ii</b>
<b>ABBREVIATIONS</b>	<b>iii</b>
<b>EXECUTIVE SUMMARY</b>	<b>iv</b>
<b>PART 1      FACTUAL INFORMATION</b>	<b>1</b>
Accident Synopsis	1
Accident Narrative	1
Location of the Accident	3
Bus Information	4
Road Information	5
Rosa Bus Driver's Information	5
Interline Bus Driver's Information	5
Meteorological Information	6
<b>PART 2      ANALYSIS</b>	<b>7</b>
Pedestrian's Actions	7
Exclusions	7
Examination of Accident Scene	7
Traffic Arrangements in Bugatti Drive	8
Bus Management	10
Accident Data	12
Management of Risk	14
NSW Safety Education Framework	14
NSW Road Rules	16
Bus Safety Within the NSW Regulatory Framework	18
Related School Bus Safety Research and Experience in NSW	18
The New Zealand and North American Experience	24
<b>PART 3      FINDINGS</b>	<b>29</b>
Causation	29
Contributory Factors	29
Management of Risk	29
<b>PART 4      RECOMMENDATIONS</b>	<b>32</b>
Roads and Traffic Authority and NSW Transport and Infrastructure	32
Roads and Traffic Authority	32
NSW Department of Education and Training and Association of Independent Schools NSW	32
William Carey Christian School and Macarthur Adventist College	32
Interline Bus Services	33
<b>PART 5      SOURCES, REFERENCES AND SUBMISSIONS</b>	<b>34</b>

## FIGURES AND TABLES

---

Figure 1:	Accident location	3
Table 1:	Incident statistics from OTSI incident notification database	13

## TABLE OF PHOTOS

---

Photo 1:	Path of girl on alighting from stationary Interline bus	2
Photo 2:	Path of passing Southbound bus and impact point	3
Photo 3:	Mitsubishi Rosa showing impact damage	4
Photo 4:	Debris on roadway from collision damage	8
Photo 5:	Bus stop on Bugatti Drive, relative to final stopping position of bus	9
Photo 6:	Rear of bus in CBD with prominent advertising	22
Photo 7:	Rear of two buses in CBD with different sized warning signage	22
Photo 8:	Typical North American yellow school bus	25
Photo 9:	A typical Canadian yellow school bus	25
Photo 10:	Yellow school bus with STOP arm deployed and warning lights flashing	25
Photo 11:	Yellow school bus with front boom arm fitted, but not deployed	26
Photo 12:	Close up of a typical STOP arm	27

## ACKNOWLEDGEMENTS

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The locality map on page 3 is used with the permission of *Geoscience Australia*.

## ABBREVIATIONS

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<b>ADR</b> .....	Australian Design Rules
<b>AIS</b> .....	Association of Independent Schools of NSW
<b>ARRB</b> .....	Australian Road Research Board
<b>BCA</b> .....	Bus and Coach Association NSW (now BusNSW effective Oct 2008)
<b>BOM</b> .....	Bureau of Meteorology
<b>BSAC</b> .....	Bus Safety Advisory Committee (within former MoT)
<b>BusNSW</b> .....	BusNSW (formerly BCA)
<b>CCTV</b> .....	Closed Circuit Television
<b>CEC</b> .....	Catholic Education Commission
<b>DET</b> .....	NSW Department of Education and Training
<b>DIP</b> .....	Directly Involved Parties
<b>HVIS</b> .....	Heavy Vehicle Inspection Scheme
<b>ITSRR</b> .....	Independent Transport Safety and Reliability Regulator
<b>LED</b> .....	Light Emitting Diode
<b>LR</b> .....	Light Rigid (class of driver licence)
<b>LTSA</b> .....	Land Transport Safety Authority, New Zealand
<b>MAC</b> .....	Macarthur Adventist College, Macquarie Fields
<b>MoT</b> .....	Ministry of Transport (now NSWTI effective 1 July 2009)
<b>MoU</b> .....	Memorandum of Understanding
<b>NSWTI</b> .....	NSW Transport and Infrastructure (formerly MoT)
<b>OTSI</b> .....	Office of Transport Safety Investigations
<b>PDHPE</b> .....	Personal Development, Health and Physical Education
<b>RTA</b> .....	Roads and Traffic Authority, NSW
<b>SMS</b> .....	Safety Management System
<b>USA</b> .....	United States of America
<b>WCCS</b> .....	William Carey Christian School, Prestons

## EXECUTIVE SUMMARY

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At approximately 8:05am on 5 August 2009, the NSW Ambulance Service responded to an accident involving a school bus and a pedestrian at Bugatti Drive, Ingleburn, near the intersection with Cadillac Place. A nine year old female student from William Carey Christian School (WCCS) was preparing to board a school bus operated by Interline Bus Services when she changed her mind and, despite a protest from the driver, ran around in front of the bus with the apparent intention of crossing to the other side of the road. At that instant, a mini-bus operated by Macarthur Adventist College (MAC) was passing the stationary Interline bus. The front driver's side of the MAC mini-bus struck the girl causing injuries which proved to be fatal. The reason for the girl's action is not completely clear but the opinion of the Interline bus driver is that her action was influenced by her concern to ensure that her sisters didn't miss the bus.

OTSI initiated an investigation with a primary focus on safety measures and issues associated with stationary buses embarking or disembarking school children, and on school road safety education in general. The implications of speed and control of the MAC mini-bus are being investigated by NSW Police in accordance with the provisions of the *Road Transport (Safety and Traffic Management) Act 1999*.

In examining the circumstances of the accident, OTSI considered the measures to enhance safety for bus users in NSW that were introduced in the 1990s, including the fitment of rear-mounted warning (wig wag) lights which flash when the bus is stationary at bus stops, and the display of 40 km/h speed limit signage between the wig wag lights. Since 2005 there have been four revisions of RTA *Technical Specification 142: Warning signs and lights for school buses* but these have dealt mainly with clarification of equipment requirements. However, OTSI found that the only significant review of school bus safety measures in the decade since the introduction of the 40km/h speed limit, has been an evaluation of the speed restriction in 2000 which found that drivers slowed when in the vicinity of stationary buses at bus stops, but not necessarily to the 40 km/h limit.



For comparative purposes, school bus safety measures in North America and New Zealand were examined. This analysis revealed that school bus safety systems in North America are based on a quite different risk profile to Australia, the response to which is the utilisation of sole-purpose school buses which are readily distinguishable by their standardised colour, signage and mechanised stop signals which apply to all other vehicular traffic. In New Zealand, the application of a strict speed limit of 20km/h for any vehicle passing a school bus in either direction, until it is well clear, is designed to reduce to virtually zero the potential for a pedestrian to sustain fatal injuries if struck by a passing motor vehicle.

The investigation found that the accident occurred as a result of the young girl running around the front of the stationary Interline bus directly into the path of the MAC school mini-bus. OTSI investigators formed the view that it would not have been an uncommon occurrence for the MAC mini-bus to pass the Interline bus as it picked up its morning passengers. Since it was travelling in the same direction as the stationary bus, the driver of the MAC mini-bus could not have anticipated the sudden appearance on the carriageway of a pedestrian from in front of a stationary bus which was picking up students to deliver to school. Because of the proximity of the child to the front of the passing bus as she ran onto the carriageway, the driver had no time to react to her presence and take action to avoid striking her.

The investigation also found that the warning (wig wag) lights on the Interline bus were operating and the 40 km/h speed limit sign on the rear of the bus was in place. Although the sign did not meet specifications in that it had faded, apparently due to the effects of graffiti removal, it was still visible and its condition did not contribute to the cause of the accident. Furthermore, there was no evidence that the road, bus stop location, weather conditions, the Interline driver or operation of the Interline bus contributed in any way to the accident.

However, in the course of the investigation, OTSI investigators observed, and were apprised of, the following shortcomings concerning the extant road rules relating to bus, passenger and pedestrian safety measures which were introduced in the 1990s:

- there are examples of non-compliance in the size and visibility of the 40 km/h speed limit signs on the rear of some buses;

- advertising on the rear of buses distracts and adversely affects the visibility and effectiveness of the wig wag lights and speed limit signs;
- there is an apparent lack of familiarity, and/or compliance, with the rules, and
- there is lack of clarity as to the distance over which the 40 km/h speed limit extends.

Consequently, the major recommendation from the investigation is that the NSW Roads and Traffic Authority (RTA) and NSW Transport and Infrastructure (NSWTI), in partnership, undertake a comprehensive review of the relevance and effectiveness of current safety measures applicable to school buses. In addition to the issues identified above, it is recommended that the review should also consider a pedestrian and driver safety awareness promotion and publicity campaign; opportunities to exploit technology; and enforcement and compliance measures.

While the above recommendations are made in response to the circumstances of a tragic accident and are designed to improve safety in the operational environment of school buses, the investigation has also established that the NSW education system provides a mature framework at all levels to promote and enhance road safety. Road safety education in all Government, Independent and Catholic schools is actively supported by the Department of Education and Training (DET), the Association of Independent Schools (AIS), and the Catholic Education Commission (CEC) respectively. They are assisted by the provision of comprehensive road safety funding, literature, material and support from the RTA. William Carey Christian School has used available resources in developing an active and comprehensive road safety education program. The contribution of each of these parties reflects a cooperative and collaborative commitment to improving road safety awareness, education and training.

## PART 1      FACTUAL INFORMATION

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### Accident Synopsis

- 1.1 At approximately 8:05am on 5 August 2009, the NSW Ambulance Service responded to an accident involving a school bus and a pedestrian at Bugatti Drive, Ingleburn, near the intersection with Cadillac Place. A nine year old female student from William Carey Christian School (WCCS) was preparing to board a school bus operated by Interline Bus Services when she changed her mind and, despite a protest from the driver, ran around in front of the bus with the apparent intention of crossing to the other side of the road. At that instant, a mini-bus operated by Macarthur Adventist College (MAC) was passing the stationary Interline bus. The front driver's side of the MAC mini-bus struck the girl causing injuries which proved to be fatal. The reason for the girl's action is not completely clear but the opinion of the Interline bus driver is that her action was influenced by her concern to ensure that her sisters didn't miss the bus.

### Accident Narrative

#### Before the Accident

- 1.2 A Southbound bus operated by Interline Bus Services had pulled up near a designated bus stop at the Southern end of Bugatti Drive, Ingleburn, which is part of its regular school bus route. The driver of the bus indicated that the warning lights<sup>1</sup> had been activated when the bus stopped.
- 1.3 Several school children boarded including one of the victim's older siblings. As she was about to board the bus the girl suddenly changed her mind and, despite protests from the driver, ran around in front of the stationary bus (see *Photo 1*).

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<sup>1</sup> These lights are referred to in the NSW Roads and Traffic Authority (RTA) *Technical Specification 142* and the NSW road rules as 'wig wag' lights. When turned on by the driver, these flashing lights automatically activate when the doors open and turn off again approximately 40 seconds after the doors have closed.



**Photo 1: Path of girl on alighting from stationary Interline bus**

### **The Accident**

- 1.4 At that instant, another Southbound bus, a Mitsubishi Rosa (Rosa) operated by Macarthur Adventist College (MAC), was passing the stationary Interline bus and the front driver's side of the Rosa struck the girl (see *Photo 2*).

### **After the Accident**

- 1.5 Prior to an ambulance arriving, witnesses and bystanders alerted the parents of the girl who then administered cardiopulmonary resuscitation (CPR). The girl was subsequently transferred by ambulance to Liverpool Hospital but was pronounced dead on arrival.
- 1.6 NSW Police arrived shortly after the ambulance and assumed control of the site, closing the road pending the arrival of crime scene investigators from Macquarie Fields and a forensic team from the Forensic Services Group. OTSI's investigators arrived on site at 11:20am.
- 1.7 The driver of the Rosa was also taken by ambulance to Liverpool Hospital suffering shock and, at the request of Police, to provide samples for drug and alcohol testing.



Photo 2: Path of passing Southbound bus and impact point

## Location of the Accident

- 1.8 The incident occurred on Bugatti Drive, Ingleburn, adjacent to the intersection with Cadillac Place where the victim's family resides. Ingleburn is located in the South Western outskirts of Sydney approximately 35km from the Sydney CBD.

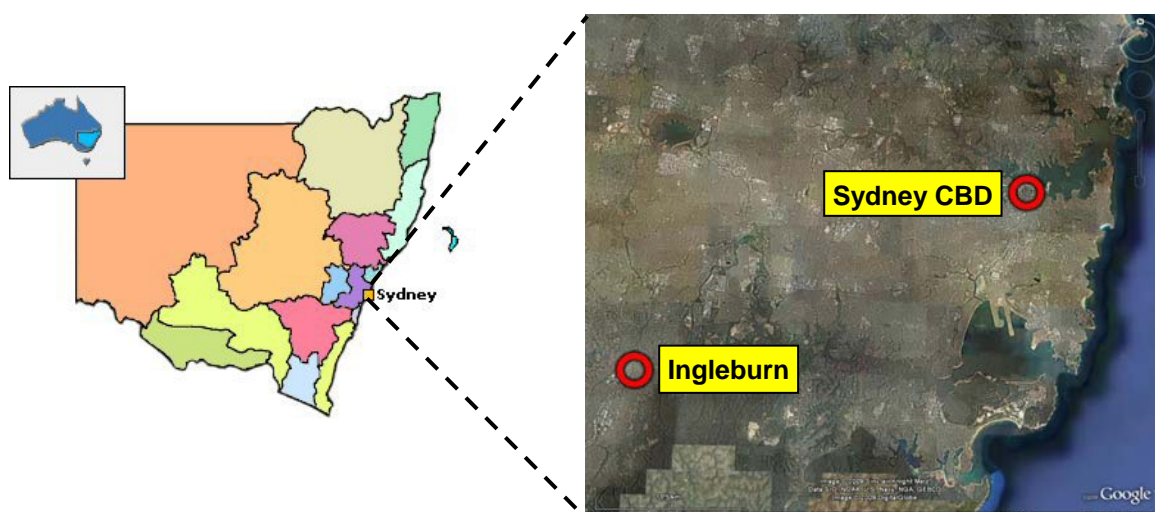


Figure 1: Accident location



## Bus Information

- 1.9 The MAC mini-bus, a 2004 model Mitsubishi Rosa, is owned, operated and maintained by MAC and has the capacity to carry 24 seated adult passengers (plus the driver), or up to 32 seated primary school-aged children. At the time of the accident it was on a scheduled school run and had 24 students on board.
- 1.10 The bus was examined at the scene by members of the RTA and there were no immediate indications that the accident was caused or contributed to by any form of mechanical failure or defect. Subsequently, a full vehicle examination confirmed there were no significant defects with the vehicle. However, a *Vehicle Defect Notice* was issued requiring the accident damage be repaired within 14 days (see *Photo 3*).
- 1.11 As the Rosa is used exclusively to provide a bus service for children attending MAC, it does not come under the definition of a public passenger service as specified in the *Passenger Transport Act 1990*.<sup>2</sup> Therefore, MAC is not required to be accredited as an operator by NSWTI.



**Photo 3: Mitsubishi Rosa showing impact damage**

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<sup>2</sup> Refer to the *Passenger Transport Act 1990, Part 1, Section 3 – Definitions*.

- 1.12 The Interline bus, a Hungarian made 1999 model CSepel, is operated by Interline Bus Services and is licensed to carry 35 seated and 12 standing passengers. At the time of the accident it was on a scheduled school route service and had approximately 20 students on board. The 40km/h speed sign on the rear of the bus was visible and the vehicle had passed a Heavy Vehicle Inspection Scheme (HVIS) inspection on 16 April 2009. Subsequent to an examination at the scene by members of the RTA, the bus was subjected to a full vehicle examination and a *Vehicle Defect Notice* issued recording that both the 40km/h sign and number plate at the rear of the bus were faded (see *Photo 2*). Interline indicated that the fading had occurred over time as a result of graffiti removal.
- 1.13 The bus was fitted with internal rear facing CCTV cameras but, on checking the equipment, it was found that there was a previously undetected hardware fault that resulted in the equipment not recording any images at the time of the accident.

## **Road Information**

- 1.14 Bugatti Drive is part of Campbelltown Council's local road network and has a signposted 50km/h speed limit for all traffic. The approach to the intersection with Cadillac Place is straight but immediately beyond the bus stop at the Northern end of the road it curves very slightly to the left.
- 1.15 The bus stop adjacent to the intersection with Cadillac Place caters for both school and regular public passenger route services.

## **Rosa Bus Driver's Information**

- 1.16 The Rosa was operated by a 40 year old female driver employed by MAC. The driver was appropriately licensed having held a current LR (light rigid) class licence for a period of approximately 11 months. There was no evidence to suggest that the driver may have been fatigued or impaired.

## **Interline Bus Driver's Information**

- 1.17 The Interline bus was being operated by an experienced driver who had been with the Company since 12 November 1997 and had 18 years experience driving buses. The driver had a good driving record with the Company.

## **Meteorological Information**

- 1.18 The weather conditions at the time of the accident were mild, dry and clear. The Bureau of Meteorology recorded a 9.00am temperature of 7.8°C at Holsworthy, approximately 6km North East of the accident site, and a temperature of 10.5°C at Campbelltown, approximately 10km to the South West.



## PART 2 ANALYSIS

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### Pedestrian's Actions

- 2.1 Accounts provided by the two bus drivers and independent witnesses agree in that the young girl, despite a protest from the driver, ran around in front of the bus with the apparent intention of crossing back over to the other side of the road.

### Exclusions

- 2.2 OTSI found no evidence that the operation of the stationary Interline bus or the actions of its driver contributed to the accident. Also, the road surface on Bugatti Drive was in excellent condition.
- 2.3 The manner in which the MAC bus was driven was also excluded as a contributory factor on the basis of advice from the investigating Police Officer that there was no evidence which could substantiate a finding that the bus was being driven in excess of 40km/h when passing the Interline bus.

### Examination of Accident Scene

- 2.4 OTSI Investigators arrived at the scene after the victim had been conveyed to hospital but the two buses remained in situ. It was apparent that the victim had been propelled, from the point of impact, some 28 metres forwards and to the opposite side of the roadway.
- 2.5 Debris on the roadway from impact damage to the front of the Rosa assisted in determining the point at which the collision occurred (see *Photo 4*). The absence of skid marks corroborated the driver's statement that she did not brake heavily or swerve.



**Photo 4: Debris on roadway from collision damage**

- 2.6 Police at the scene indicated that the accounts provided by the two bus drivers and independent witnesses were generally consistent with the physical evidence at the scene.
- 2.7 OTSI sought to examine whether the actual traffic arrangements at the site, and the safety arrangements for school buses, might have contributed in some way to the accident. It also sought to establish a framework perspective relative to this tragic incident and so examined accident data, the evolution of the school bus warning lights and international experiences with road safety around school buses.

## **Traffic Arrangements in Bugatti Drive**

### **Management of the Road**

- 2.8 Campbelltown Council, like many other NSW councils, has been delegated responsibility by the RTA to manage the local road network within their Council area.<sup>3</sup> Campbelltown Council has a Local Traffic Committee which meets regularly to deal with issues such as traffic management, traffic

<sup>3</sup> This delegation is detailed under *Section 50* of the *Transport Administration Act 1988*.

accidents and parking controls within the Council area which includes Bugatti Drive.

### **Road Condition and Speed Limit**

2.9 The road surface is in good condition with double line markings for a short distance at the Southern end intersection with Oxford Road (see *Photo 4*). Two area speed limit signs are positioned at the Southern end of Bugatti Drive indicating a speed limit of 50 km/h for the entire length of road. This speed limit is consistent with limits imposed over the network of local roads in other suburban areas within NSW.

### **Location and Usage of the Bus Stop**

2.10 The bus stop near the intersection of Bugatti Drive and Cadillac Place is marked with a commonly used yellow post (see *Photo 5*) and is used by all bus services. Its location was established in March 1995 on the recommendation of Campbelltown Council's Local Traffic Committee.



**Photo 5: Bus stop on Bugatti Drive, relative to final stopping position of bus**

- 2.11 The Interline bus stopped some distance short of the actual bus stop marker (see *Photo 5*). This action was not unusual as there is no mandated regulation specifying where school buses (or any bus) are required to stop relative to a bus stop marker. There appears to be only a general understanding within the industry that buses stop as close to the bus stop as possible, and as close to the curb as possible, with due consideration to any site-specific risks assessed by the driver. Typical considerations at each site may include other vehicles occupying the stop, visibility of other vehicles and of the bus itself, time and space needed to merge back into passing traffic, and structures such as poles and shelters protruding into stopping spaces.
- 2.12 Anecdotal evidence suggests that drivers stop in a designated bus zone, but not necessarily always closest to the bus stop or shelter. This action is attributable to various prevailing factors including when, on approach to a congested bus stop, the driver will stop short at the edge of the waiting passenger group to allow room for passengers to disembark and for a more orderly loading of intending passengers. During interview, the driver of the Interline bus indicated that he pulled up some distance from the actual bus stop marker as he thought it safe to do so and because it enabled him to see the front of the house where the victim's family resided. This provided him with a clear view of the victim's mother who was out the front of the house making last minute preparations with the victim's other two siblings.
- 2.13 The driver further indicated that this had developed into a regular practice at bus stops for the 11 years he had been driving with Interline, which included up to eight years driving the children from Cadillac Place. In his opinion, the final position of his bus short of the actual bus stop did not introduce any additional risks at that bus stop. It is noted that this has never been raised as a safety issue in the Council's Local Traffic Committee.

## **Bus Management**

### **Actions of the Rosa Bus Driver**

- 2.14 The Rosa was being operated by a relatively inexperienced bus driver who had been driving for the school for a period of 11 months, being the duration for which she had held her LR licence. She advised OTSI that she did not

hold any form of secondary employment and an examination of her roster indicated that she was not being excessively tasked.

- 2.15 The bus driver indicated that she thought the bus was running close to on time. A cross check of the driver's pick-up schedule provided by the School indicated that the bus may have been running approximately five minutes behind schedule at the time of the accident.
- 2.16 The driver described how she did not have enough time to avoid striking the victim as the child just appeared in front of the bus and was impacted before she could react. Immediately following the impact, the driver managed to maintain control of the bus and bring it to a stop under emergency braking without any of her young passengers being thrown forward or from their seats.
- 2.17 OTSI investigators formed the view that it would not have been an uncommon occurrence for the MAC mini-bus to pass the Interline bus as it picked up its morning passengers. Since it was travelling in the same direction as the stationary bus, the driver of the MAC mini-bus could not have anticipated the sudden appearance on the carriageway of a pedestrian from in front of a stationary bus which was picking up students to deliver to school.
- 2.18 OTSI established that the driver of the Interline bus had activated the bus wig wag warning lights, thereby requiring passing vehicles to slow to 40km/h when they passed the bus. However, the Rosa driver stated that she did not notice the flashing lights on approach to the Interline bus and consequently maintained her speed, which she estimated at approximately 40km/h, until impact. She also described her understanding of the speed restriction and, while having a general knowledge of the meaning of the flashing lights warning, she appeared uncertain as to where the speed restriction actually commenced.

### **Condition of the MAC Bus**

- 2.19 An on-site examination of the five year old Mitsubishi Rosa by RTA officers did not reveal any obvious conditions or defects which could have affected the operation of the bus. Specifically, its tyres were found to be in good condition and its brakes, steering and horn were all adequately adjusted and operable. The vehicle did show signs of frontal damage around the driver's side

headlights and panelling, consistent with a pedestrian impact (see *Photo 3*). At the request of the Police, the vehicle was taken to an RTA facility and subjected to brake testing and roadworthy examination by the RTA. The results indicated that the brakes, steering and other key functions were operating within the required performance parameters.

- 2.20 As the bus was not operating within the accreditation framework for a public passenger service, the bus was not required to have CCTV equipment fitted.

### **Condition of the Interline Bus**

- 2.21 During an RTA HVIS inspection after the accident, the rear 40km/h sign was found to be faded although the “40” part of it appeared quite visible. The defect was categorised as “minor” but it may have reduced the prominence of the warning signage to motorists and could partly explain why the Rosa driver did not notice the warning signs and lights when passing the Interline bus.
- 2.22 Unfortunately, no evidence was available from the rear-facing CCTV fitted to the bus due to a hardware fault. At the time of drafting this Report, NSWTFI was finalising an Order under the Passenger Transport Regulation 2007 establishing the “*Requirements for Approved Security Camera Systems and Duress Alarm Systems for Buses*”. It will apply to all new metropolitan route service buses and include installation of multiple digital cameras. OTSI welcomes this initiative not only for its primary purpose of providing for the safety and security of bus drivers and passengers, but also for the potential to assist in improving outcomes from accident safety investigations. However, it will not apply to non-regulated buses such as the MAC owned mini-bus.

### **Accident Data**

- 2.23 The information in *Table 1* below has been extracted from OTSI’s incident notification database. It shows the reported number of children struck by motor vehicles when boarding or after alighting from school buses for the period 4 November 2004 to 5 August 2009.

Year	Number of incidents of children struck when boarding, or after alighting from school buses	Fatalities
2004	4	
2005	1	
2006	11	1
2007	6	
2008	6	
2009	8	1

**Table 1: Accident statistics from OTSI incident notification database**

- 2.24 Most incidents occurred when alighting from the bus, including the two fatalities.
- 2.25 An examination of accident data for Campbelltown Council area, and Bugatti Drive in particular, did not reveal any statistics of significance warranting further investigation. OTSI also noted that in May 2009, the NSW Parliament's STAYSAFE (Road Safety) Committee was requested by the Minister for Roads to conduct a public hearing in connection with its inquiry into pedestrian safety, given a rise in pedestrian fatalities and serious injuries.<sup>4</sup> At the time of drafting this Report, the Committee had not tabled the results of its inquiry.
- 2.26 The RTA advised OTSI that their Centre for Road Safety had completed an analysis of crash and casualty trends relevant to the introduction of the 40km/h school zone measures:

*"The analysis was based on spatial data from a sample of 820 school zones in South West and Sydney region and compared the pre-school zone period (1998 to 2000) to the post school zone period (2004 to 2008). The analysis highlighted a 45% decrease in average annual pedestrian casualties during school zone times in the selected school zones when comparing the post to the pre period and a 46% reduction for pedestrians aged 5 to 16 years. The results suggested that the benefits of school zones (and the lowering of speeds) applied to all pedestrians and not just school age children."*

<sup>4</sup> For information on the Staysafe Committee (now referred to as the Joint Standing Committee on Road Safety) refer to the website: <http://www.parliament.nsw.gov.au/staysafe>



## Management of Risk

### NSW Safety Education Framework

- 2.27 The NSW Office of the Board of Studies is responsible for school curriculum development. Road safety education is incorporated in the syllabus content for the key learning area of Personal Development, Health and Physical Education (PDHPE). The program of road safety education in all NSW schools is actively supported by the Department of Education and Training (DET), supporting Government schools; the Association of Independent Schools (AIS), supporting independent schools; and the Catholic Education Commission (CEC), supporting Catholic schools.
- 2.28 The DET supports public (Government) school education and training from early childhood (pre-school) through to Year 12 and it receives funding and resources from the RTA to support delivery of road safety education in NSW public schools<sup>5</sup>. The RTA has a comprehensive range of education materials and resources that are distributed to NSW school principals and school communities. These are distributed to all NSW schools free of charge. Implementation in schools is assisted by a network of RTA funded road safety education consultants and advisers. Resources provided by the RTA are based on their main bus safety message: *"Wait till the bus has gone, then use a safe place to cross"*.
- 2.29 Similarly, the Association of Independent Schools of NSW<sup>6</sup> caters to the independent and Christian school system (of which WCCS is a member) and also receives funding as part of the agreement with the RTA to support delivery of road safety education, but exclusively to independent schools. Typically, this support is provided through professional development opportunities being offered to schools and their staff, promoting access to road safety education resource materials and communicating key road safety messages. The AIS encourages a holistic approach to the issue, which includes a focus on the curriculum, pastoral care, resource support, and guidelines and protocols.

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<sup>5</sup> The RTA's funding is provided to the AIS, CEC and DET under an agreement called the *Road Safety Education in Schools Program*.

<sup>6</sup> Refer to the AIS NSW website: <http://www.aisnsw.edu.au/>



- 2.30 Typical ways in which the AIS encourages independent schools to engage with road safety education-related professional development is through conducting publicly advertised courses and through inviting school-based consultancy requests. According to literature provided by the AIS:

*“Professional development is most commonly conducted through courses and consultancies related to the Personal Development, Health and Physical Education (PDHPE) area, Pastoral Care, the primary school curriculum, English, and Information, Communication and Technology (ICT) across the curriculum”.*

- 2.31 WCCS<sup>7</sup> is encouraging its students and parents to be supportive of its endeavours in working through the School’s safe travel programme. WCCS recognises that road safety education needs to be developmentally appropriate, ongoing and sequential, particularly until the age of 10, up to which age children require active supervision whenever they are in the traffic environment. Their literature acknowledges that the high rate of pedestrian accidents among five to nine year olds reflects the increasing mobility of children who may be unsupervised and who have not yet developed the skills necessary to function safely in the traffic environment. WCCS provided information to their school community which stipulated that parents should always set a good example when crossing the road. A key part of that communication states:

*“... safety of young children as pedestrians in the traffic environment is enhanced when they are accompanied and actively supervised by a responsible adult. They benefit from the adult’s height, road safety experience, perceptual capabilities and decision-making skills. When holding an adult’s hand, the child’s unpredictable behaviour, including the tendency to dart onto the road, is restrained. This also provides an opportunity for the adult to explain and model appropriate pedestrian behaviour. Similarly, when young children are near a bus, active supervision by an adult is important in helping them manage this very complex and potentially dangerous setting.”*

- 2.32 OTSI was advised that the school’s current road safety programme includes training some senior students to help on the bus, either as mentors (like a ‘buddy system’) or as safety advocates. This informal system involves these senior students riding at the front seat to help students board, travel and leave safely, and calm down those who are becoming noisy or are distracting the

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<sup>7</sup> For more information on William Carey Christian School’s programs, refer to their website: <http://www.wccs.nsw.edu.au/>

driver. The Interline driver indicated he also adopts a similar informal arrangement. However, on the day of the accident, there were no particular arrangements in place and there were fewer senior students on board than is usually the case. The School has also engaged the assistance of DET and AIS and drawn on its own road safety education program to develop and deliver the road safety component of its PDHPE curriculum.

- 2.33 In addition, the School has established a dedicated bus bay area at the School, and conducts practical exercises and role plays in the classroom and at the School's "zebra" crossing to further educate its students and reinforce the outcomes of road safety instruction. While OTSI does not have visibility of the standard of such programs across NSW, it has reviewed the undertakings of a number of schools in the course of several of its investigations<sup>8</sup> and only some of them were as well developed as that of WCCS. The School is ensuring that key content in the AIS's Road Safety Education program is taught well and has benefited from consultancy support provided by the AIS and the use of resources developed by the AIS and the RTA.
- 2.34 It is readily apparent that DET, AIS, CEC and the RTA are very active in promoting and supporting road safety education in schools and that WCCS is diligent in developing and delivering appropriate programs.
- 2.35 In summary, the NSW education system provides a mature framework at all levels that supports and promotes road safety. The obligation then falls on the students, parents and wider community to reinforce the values being taught, to comply with the road rules, and to provide adequate supervision for those under the age of 10 years which, together, should facilitate a better safety outcome for pedestrians and road users alike.

## NSW Road Rules

- 2.36 Rules covering Australian road and traffic issues are contained in the Australian Road Rules and are published by the National Transport

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<sup>8</sup> Refer to the OTSI website [www.otsi.nsw.gov.au](http://www.otsi.nsw.gov.au) and reports *Bus Accidents Occasioning Death and Serious Injury, West Pennant Hills, Rutherford and Sydney CBD, 19-27 June 2007*, and *Serious Injuring of Young Cyclist After Being Struck by a Bus, Parklea, 12 November 2007*.

Commission. From 1 July 2008, NSW has incorporated the Australian Road Rules and its local rules into a single set of NSW road rules.

- 2.37 *Rule No 222* of the Australian Road Rules specifically refers to using *warning lights* on buses carrying children. *Rule No 21* specifically applies to the school bus stop zone speed limits and signage, whilst *Rule No 23* covers speed limits and signage at school zones. *Rule No 21* is an additional NSW road rule and there is no corresponding rule in the Australian Road Rules.
- 2.38 To complement these Rules, the RTA developed a School Bus Warning System *Technical Specification 142*.<sup>9</sup> This Technical Specification is prescribed as part of *clauses 93 and 94* of the *Road Transport (Safety and Traffic Management) (Road Rules) Regulation 1999* (the Regulation). It applies to any bus that:
- a. carries school children to or from school on weekdays between the hours of 7:00am to 9:30am, or 2:30pm to 5:00pm, or
  - b. is used solely for the purpose of conveying children to or from school.
- 2.39 *Clause 94* of the Regulation specifically refers to the ‘*warning system*’ being a system of *signs and flashing lights* that is designed to warn motorists of the presence of children on a bus which complies with the requirements of the *Technical Specification 142*. The stationary Interline bus had the wig wag lights fitted and activated at the time of the accident, but the warning signage was determined to have faded to the extent that it no longer complied with *Technical Specification 142*.
- 2.40 The outcome of a survey of a small sample of bus and car drivers conducted by OTSI revealed that respondents’ understanding of the wig wag lights, school safety zones and associated rules varied widely. The main misconceptions and confusion related to:
- a. what the flashing lights mean;
  - b. operating times for the school bus warning lights;

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<sup>9</sup> *Technical Specification 142* can be accessed at the RTA's website at [http://163.189.217.150/registration/downloads/technical\\_specifications/ts142\\_rev8\\_august2008.pdf](http://163.189.217.150/registration/downloads/technical_specifications/ts142_rev8_august2008.pdf)

- c. why these times differ from those for school zones<sup>10</sup>;
- d. where the bus warning lights restriction start (i.e., some distance before the bus or along the bus); and
- e. if the restriction applied to both passing and approaching vehicles.

No-one could recall any recent promotion or publicity highlighting the key safety messages around school buses.

2.41 Given this apparent general unfamiliarity with the rules, and that the driver of the Rosa did not notice the wig wag warning lights, OTSI conducted background research into the introduction of this system, the principles behind it and what international jurisdictions may be doing to address the issue of safety around school buses.

### **Bus Safety Within the NSW Regulatory Framework**

2.42 NSWTI is responsible for the contracting and regulation of passenger bus services in NSW and, as part of its charter, regularly circulates bus safety information and reference material. Recent publications have included:

- a. *Guidelines for Managing School Student Behaviour on Buses*, issued as a mailout to all accredited bus operators in July 2006, and
- b. *Safety Management System (SMS) A guide for bus and coach operators*, issued as a mailout to all accredited bus operators in January 2007.

2.43 These publications detail the responsibilities of both bus operators and drivers when operating buses, and cover general safety principles on and around school buses.

### **Related School Bus Safety Research and Experience in NSW**

2.44 Prior to 1992, the *Motor Traffic Act 1909*, together with its Regulations, was the principal legislation covering traffic safety in NSW, but did not contain specific principles for safety on and around school buses. It was not until 1977, when the then Department of Transport commissioned a report into

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<sup>10</sup> Times for the speed limit in a school zone can vary in certain circumstances, but are more commonly on weekdays between 8:00am and 9:30am and again between 2:30pm and 4:00pm.

school bus safety which recommended (or rather signalled the option of fitting) a special flashing light system on school buses. In the period between 1977 and 1992, a number of persons and organisations put forward flashing, or rotating, light systems for the Government to evaluate. Information from this period indicated that, from 1983, rural bus operators had been using four-way hazard lights on school buses.

- 2.45 In 1992, the Minister for Transport requested the Bus and Coach Safety Standing Committee<sup>11</sup> (the Committee) to review several school bus safety issues, including flashing lights. At the same time, an RTA report suggested fitting a flashing light to the front of rural buses. On 20 August 1992, the Committee recommended flashing lights and set up a technical sub-committee to develop Government specifications. The specifications set minimum standards which manufacturers were to meet when they competed to supply mechanisms to fulfil legislative requirements and which also led to the development of the original *Technical Specification 142*.
- 2.46 In the same period, a number of options and safety principles were put forward to enhance the conspicuity, awareness and impact of the school bus warning lights, some of which were raised in a Department of Transport report dated May 1992 on *School Bus Safety (Road Safety Bureau, School Bus Safety Taskforce, Report 1: Pedestrian Phase, May 1992)*. This report stated that there was considerable visual clutter on the rear of metropolitan buses which competed with the attention of the driver (*page 8*). It added that the necessary approach to reducing front crossing collisions with passing vehicles was to prevent school students walking in front of the bus. Two recommendations, which may have relevance in the context of this accident, were to investigate an automatic sensor system which could provide an immediate warning when pedestrians cross in front of the bus (*page 9*), and the other was a small fold out barrier (*page 12*), similar to those used in North America.
- 2.47 Following release of the Committee's findings, on 15 October 1993 and again on 31 January 1994, the Minister for Transport announced an initiative to

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<sup>11</sup> In other correspondence dating back to this period, this Committee also appeared to be referred to as the Bus Safety Advisory Committee (BSAC).

commence from 1 February 1994<sup>12</sup> requiring buses used solely or principally for conveying school students to and from school to fit a new flashing lights system and distinctive bus signs. However, due to the inability of bus operators to obtain sufficient quantities of flashing lights from suppliers, an exemption was given to operators of school bus services until 25 June 1994. Complementing this initiative, the Department of Transport ran an extensive publicity and awareness campaign during school terms one and three of 1994, to highlight the new flashing lights requirement and its importance for enhancing the safety of school bus travellers.

2.48 Following the introduction of the flashing light warning system, there was considerable debate about the effectiveness of the system, culminating in a report from the STAYSAFE Committee and tabled in the NSW Parliament in November 1994<sup>13</sup> which recommended flashing lights be altered to require alternating red and blue lights. STAYSAFE also recommended the introduction of a 40km/h speed zone around buses with the flashing lights in operation. BSAC, on reviewing the STAYSAFE recommendations, then decided to arrange for the testing of several possible signalling systems. Subsequently, a company trading as Vehicle Design and Research Pty Ltd was engaged by the Department of Transport to carry out this work.

2.49 Vehicle Design and Research Pty Ltd subsequently ran controlled trials at Gosford of four different flashing lights systems and presented its final report to the Department of Transport in May 1995. The context of the safety issue to be addressed was expressed in the report as:

*“School children who are hurrying to catch a bus in the morning, or who have just disembarked from a bus in the afternoon might not cross the road with care. Motorists in the vicinity of the bus should be alert to the possibility of children on the road. These motorists should be travelling at a speed which gives them a reasonable chance to stop in time if a hazardous situation arises”.*

The report made other observations including that, unlike overseas experience, relatively few buses in NSW are used exclusively to transport school children. At that time, it had been estimated that approximately 90% of the total NSW bus fleet (not including coaches) was used to transport

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<sup>12</sup> This was stipulated in the then *Motor Traffic Regulations 1935*, clause 136A.

<sup>13</sup> Refer to the STAYSAFE website: <http://www.parliament.nsw.gov.au/staysafe>

school children. In effect, virtually all NSW buses (other than coaches) were likely to be used as school buses on a frequent basis. Ultimately, the report from Vehicle Design and Research Pty Ltd recommended amendments to *Technical Specification 142* covering signal brightness, intensity, colours and flashing rate.

- 2.50 During the warning system evaluation in the 1990's, one company, Spotlight Communications Systems Pty Ltd, suggested the installation of an LED panel on the rear of buses displaying safety messages. The company also suggested banning commercial advertising on the back of buses and/or substituting an information campaign targeting school bus safety.
- 2.51 The space on the rear of buses is an area that has been seen as having the greatest potential for raising awareness about school buses. Debate in the 1990s over the positioning of a removable sign above the rear window resulted in this being mandated in *Technical Specification 142* for dedicated school buses, but not for route buses that doubled up as a school bus. Removing signs manually was seen as problematic, as it was impractical for the bus driver's duties to include attaching and removing the signs to suit the run. However, the proposal is worth revisiting given the technological advances and reduction in cost of LED type signage since then. MoT files dating from the 1990s contain information suggesting that advertising signage on the rear of buses should be banned, as this may detract from the visibility and impact of the wig wag lights. Advertising is now more commonly displayed on the rear of many buses, some of which is quite distracting (see *Photo 6*). This means that the flashing lights and signage have to successfully compete for the attention of a driver, before they have any effect at all. OTSI also noted that there are variations in the size of the warning signage, some of which may not be compliant with *Technical Specification 142* (see *Photo 7*).





Photo 6: Rear of bus in CBD with prominent advertising



Photo 7: Rear of two buses in CBD with different sized warning signage

2.52 In August 2000, the RTA commissioned the Australian Road Research Board (ARRB) to evaluate the 40 km/h speed restriction around school buses, an initiative introduced in January 1999 with the intention of increasing the safety of school children. Observations and speed measurements conducted



along school bus routes, as part of the evaluation, indicated that drivers in the trial area were likely to slow down but rarely slowed to the 40 km/h speed limit.<sup>14</sup>

2.53 According to the RTA, data from that period showed that there were significant reductions over recent years in incidents involving young children as pedestrians, and the NSW Government's package of school bus safety initiatives was aimed at further improving school bus safety. The State-wide package had been jointly funded by the Government and private bus companies. Implementation commenced at the beginning of Term 1, 1999, and involved:

- a. a prominent warning system of static signs and flashing lights on the 7,700 Government and private buses used to convey children to and from school;
- b. a requirement for traffic to slow to 40 km/h when overtaking a bus which has its wig wag lights flashing;
- c. the introduction of clearly marked school bus zones with a 40 km/h speed limit on dual carriageways where speed limits are greater than 70 km/h;
- d. bus headlights that flash to warn oncoming motorists when school children are being picked-up or set-down at bus stops; and
- e. a State-wide education campaign to inform parents and drivers about school child safety issues and the new regulations.<sup>15</sup>

2.54 OTSI considers that these initiatives are still relevant and the objectives still appropriate, but it may be timely for the RTA and NSWTI to review the current effectiveness of the warning signage and lights on school buses given:

- a. encroachment of advertising affecting conspicuity and impact,
- b. inconsistencies in the size of the warning signage,

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<sup>14</sup> *A method for evaluating the 40 km/h initiative around school buses in NSW* Green F.K., Newman S. L., Stephenson W.J. and Taylor R.D., ARRB Transport, 2001

<sup>15</sup> *Pedestrian Safety – Problem Definition and Countermeasure Survey* RTA 2002

- c. lack of recent publicity or promotional campaigns, and
- d. an apparent lack of familiarity with the rules.

### The New Zealand and North American Experience

- 2.55 Legislation in New Zealand includes speed restrictions requiring drivers, on approaching a school bus, to slow down to 20 km/h<sup>16</sup> or less until well past, no matter in which direction the driver is travelling. The regulations also require that, when any school patrol sign is out, vehicles coming from both directions must stop and remain stationary until all signs have been pulled in, and that drivers need to look out for school patrol warning signs.<sup>17</sup> These signs include cones which may be placed in the centre of the road close to the crossing, or red flags attached to poles at the side of the road.
- 2.56 When one examines international experience in school bus safety, comparisons are often made to that of the United States of America and Canada. Most American school buses have been painted yellow since 1939. In that year, Dr. Frank W. Cyr, a professor at Teachers College at Columbia University in New York, organised a meeting to establish national school bus construction standards. It established yellow as the colour for body paint, which became known officially as *National School Bus Chrome Yellow* and later came to be more commonly referred to as 'school bus yellow'. This colour was selected because black lettering on that hue was the easiest to see in the semi-darkness of early morning and late afternoon (see *Photos 8 and 9*).

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<sup>16</sup> Kloeden C.N., McLean A.J., Moore V.M., and Ponte G. (1997) found that the probability of a fatal injury to a pedestrian impacted by a car increases uniformly from virtually zero at 20 km/h to about 16% at 40 km/h, then increases exponentially to about 95% at 55 km/h.

<sup>17</sup> The New Zealand School Patrol system was introduced in 1931 and acknowledged in legislation since 1944. It involves the practice of relying on schools to look after students travelling to and from school using School Traffic Safety Teams (school patrols, traffic wardens and bus wardens) and is unique to New Zealand. More information can be obtained from the following website: <http://www.ltsa.govt.nz/road-user-safety/schools/stst-manual/>



**Photo 8: Typical North American yellow school bus**



**Photo 9: A typical Canadian yellow school bus**

- 2.57 Canadian school buses are very similar to their USA counterparts. Many American-manufactured school buses are imported into Canada, and vice versa.
- 2.58 Most of the changes made to the American school bus over the past 70 years have had to do with safety in response to progressively more stringent regulations. Along with federal mandates, more advanced engineering has made school buses safer for drivers and passengers alike. Because of their size and design, school buses have many blind spots which can endanger passengers getting on or off the bus and people standing or walking near it. This safety challenge is addressed through the design and configuration of the bus windows, body panels and mirrors.



**Photo 10: Yellow school bus with STOP arm deployed and warning lights flashing**

- 2.59 During the early 1950s, States in the USA began to specify a mechanical stop arm which the driver would swing out from the left side of the bus to warn traffic of a stop in progress (see *Photo 10*). The portion of the stop arm protruding in front of traffic was initially a rectangle with "STOP" painted on it.

In later years, electromechanical wig wag flasher controls were replaced by electronic ones, and the warning lights were increased from four (two front and two rear, all red), to eight (two amber to warn of an impending stop, and two red to indicate a stop in progress, front and rear). *Photo 10* also shows that the rear of these buses (and indeed the whole bus) is free of visual clutter, such as advertising.

- 2.60 In the USA, approximately two thirds of students killed outside a school bus are not struck by other vehicles, but by their own bus. To reduce the driver's blind zones, more sophisticated and comprehensive mirror systems have been developed. Additionally, windshields on almost all late model buses have been significantly enlarged to remove obstacles from the driver's lines of sight.
- 2.61 To prevent pedestrians walking so close to the front of the bus that the hood hides them from the driver, most new buses are equipped with crossing (or boom) arms, which swing out from the front bumper while the bus is stopped for loading or unloading (see *Photo 11*). These force passengers to walk some two or more metres forward of the bus before they can begin to cross the road in front of it.



**Photo 11: Yellow school bus with front boom arm fitted, but not deployed**

- 2.62 Today, Canada and US Federal Motor Vehicle Safety Standards regulate the specifications of the stop arm as a double-faced regulation octagonal red stop sign at least 45cm across, with white border and uppercase legend. It must be retro reflective and/or equipped with alternately-flashing red lights. Alternately, the "STOP" legend itself may also emit red light (see *Photo 12*).



**Photo 12: Close up of a typical STOP arm**

- 2.63 Basically, North Americans have assimilated these safety arrangements over the past 70 years (three generations) and accept the need for these safety measures and of the impact they have on passing motorists. Importantly, the use of the crossing or boom arms coming out from the front of the bus was a specific control measure to reduce the risk of people crossing in front of the bus, being lost in the drivers blind spot created by the long hood, and being inadvertently run over by that bus. Whilst an effective control measure for the risk in North American buses, it does not mean it would necessarily be appropriate, or feasible, for Australian circumstances and risk levels.
- 2.64 In summary, the North American buses are specially designed and solely used for the transport of school children. They are painted a bright yellow colour which is designed to be highly visible and which clearly identifies them to other motorists as school buses. The rear of all school buses is free of visual clutter, such as advertising.
- 2.65 Integration of issues and the changing way that students travel to school need to be considered in developing all home-to-school travel programmes. Taking engineering devices in isolation, or ignoring the substantial research into traffic

education, will not achieve the best safety results. *Bishai et al (2003)* report that parents are concerned with the safety of their children, and are prepared to spend time and money on safety improvements, and these safety improvements can be physical measures or educational measures. It is important that any safety message to be considered is relevant. *Hoffage et al (2003)* have a novel approach to safety education: instead of targeting all children with general rules, they recommend targeting those children who are more likely to make risky decisions when crossing. (Source: *School journey safety: a comparative study of engineering devices*, Land Transport New Zealand Research Report 271.)

## **PART 3 FINDINGS**

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### **Causation**

- 3.1 The accident resulted from the young girl's action in running across the front of the stationary Interline bus directly into the path of the MAC school mini-bus.

### **Contributory Factors**

- 3.2 The reason for the girl's action is not known precisely but the opinion of the Interline bus driver is that her action was influenced by her concern to ensure that her sisters didn't miss the bus. Notwithstanding this lack of certainty about why she behaved as she did, it is known that children under the age of 10 do not necessarily have a sufficiently well developed sense of risk to safely cross roads independently and without supervision. Though there is usually an informal supervisory arrangement on the Interline bus, there was nothing specific in place on the day. The girl did not respond to the bus driver's verbal protest at her running across the front of the bus.
- 3.3 Because the MAC bus was travelling in the same direction as the stationary bus which was taking passengers onboard, the MAC driver had no warning of the girl's sudden appearance in front of her bus and so could not avoid a collision. The wig wag warning lights on the Interline bus were working, but the MAC driver did not notice them and maintained her speed. The speed sign on the back of the Interline bus was visible but faded.
- 3.4 The road, location of the bus stop and the prevailing conditions played no part in the accident. The location and operation of the Interline bus and the mechanical condition of both buses did not contribute in any way to the accident. A fault in the recording equipment fitted to the Interline bus precluded CCTV as a possible source of evidence.

### **Management of Risk**

- 3.5 Both the public and private arms of the NSW education system, with comprehensive material support from the RTA, have a well established framework which promotes and supports road safety education through their

curricula. WCCS is to be commended for the conscientious manner in which it discharges its obligations and responsibilities. Beyond the school education system, it remains the responsibility of the wider community, notably parents and road users, to look out for the safety of school children.

- 3.6 NSW has rules and regulations, and *Technical Specification 142*, dealing with warning lights and signs on buses involved with the conveyance of school children. However, there is reason to believe the average road user's knowledge of the rules and/or compliance with them may generally not be as good as perhaps is assumed, or expected.
- 3.7 There was considerable debate about the effectiveness of wig wag lights immediately after their introduction in 1994. No immediate significant changes resulted until the introduction in January 1999 of the 40km/h speed zone around a bus with wig wag lights operating, a strategy which had been recommended in a STAYSAFE Committee report in November 1994. A review in August 2000 found that drivers generally slowed, but not necessarily to 40 km/h. Apart from several revisions of *Technical Specification 142* dealing mainly with clarifications of requirements, there appears not to have been any subsequent significant review of the safety measures in place around school buses, but some key issues remain, primarily:
  - a. encroachment of distracting advertising on the rear of buses;
  - b. inconsistencies in the size of warning signage and possible non-compliance with *Technical Specification 142*;
  - c. an apparent general lack of familiarity and/or compliance with the rules; and
  - d. a lack of clarity as to the extent over which the 40 km/h limit applies.
- 3.8 New Zealand has a strict speed limit of 20km/h for any vehicle passing a school bus in either direction until well clear. Theoretically this reduces the likelihood of a pedestrian fatality to almost zero in a collision with a car.
- 3.9 There is a limited amount that can be taken from the North American experience. Their safety systems have evolved in the past 70 years and are based on a different set of risks to those faced in Australia. The most notable differences are that they have dedicated school buses with particular safety



features associated with vehicle design. However, their specifications for the lighting associated with warning systems may be worthy of further examination.

## PART 4 RECOMMENDATIONS

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- 4.1 In order to reduce the potential for recurrence of this type of accident, the following actions are recommended for implementation by the organisations specified below.

### **Roads and Traffic Authority and NSW Transport and Infrastructure**

- 4.2 In partnership, undertake a review of the effectiveness of current safety measures surrounding school buses with particular emphasis on:
- a. the visibility of speed signs on the rear of buses,
  - b. the visibility and effectiveness of wig wag lights,
  - c. the nature and extent of advertising on the rear of buses,
  - d. the 40 km/h speed limit and its application,
  - e. enforcement and compliance measures,
  - f. promotion, publicity and driver education,
  - g. opportunities to exploit technological advances, and
  - h. any consequential need to revise *Technical Specification 142*.

### **Roads and Traffic Authority**

- 4.3 Continue to actively and materially support road safety education programs in schools through DET, CEC and AIS.

### **NSW Department of Education and Training and Association of Independent Schools NSW**

- 4.4 Continue to actively support the development and delivery of road safety programs within their schools.

### **William Carey Christian School and Macarthur Adventist College**

- 4.5 Continue to emphasise to staff, students and parents the importance of maintaining heightened vigilance around school bus stops, and of reporting unsafe activity.

- 4.6 Continue to place high importance on the inclusion of quality road safety education in their curricula and promotion among staff and parents.

**Interline Bus Services**

- 4.7 Continue to emphasise to drivers the importance of maintaining heightened vigilance around school bus stops and of reporting unsafe activity to respective schools.
- 4.8 Ensure all school buses fully comply with and are maintained in accordance with the requirements of *Technical Specification 142* and that all CCTV equipment fitted to buses is maintained in full working order.

## PART 5 SOURCES, REFERENCES AND SUBMISSIONS

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### Sources of Information

- Bureau of Meteorology (NSW)
- Officers of the NSW Police Force, Macquarie Fields Local Area Command
- NSW Roads and Traffic Authority
- NSW Transport and Infrastructure (formerly Ministry of Transport)
- NSW Department of Education and Training
- The Association of Independent Schools of NSW
- Macarthur Adventist College, Macquarie Fields
- William Carey Christian School, Prestons
- Interline Bus Services, Macquarie Fields
- Drivers of both buses
- USA and New Zealand websites
- Academic and third party sources

Other witnesses gave evidence on the basis of the provisions of Section 45C (3) of the *Transport Administration Act 1988 (NSW)* and that they would not be identified by name in any material published by OTSI.

### References

- OTSI Investigation Report: *Bus Accidents Occasioning Death and Serious Injury, West Pennant Hills, Rutherford and Sydney CBD, 19-27 June 2007 (2008)*.
- RTA *Technical Specification 142 - Warning signs and lights for school buses*.
- *Passenger Transport Act 1990 (NSW)*.
- *Transport Administration Act 1988 (NSW)*.

## Submissions

The Chief investigator forwarded a copy of the Draft Report to the Directly Involved Parties (DIP) 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 to submit recommendations for amendments to the Draft Report that they believed would enhance the accuracy, logic, integrity and resilience of the Investigation Report. The following DIP were invited to make submissions on the Draft Report:

- *NSW Police Force, Macquarie Fields Local Area Command*
- *NSW Roads and Traffic Authority*
- *NSW Transport and Infrastructure*
- *NSW Department of Education and Training*
- *The Association of Independent Schools of NSW*
- *Macarthur Adventist College, Macquarie Fields*
- *William Carey Christian School, Prestons*
- *Interline Bus Services, Macquarie Fields*
- *Independent Transport Safety and Reliability Regulator*

Submissions were received from all the DIPs listed above.

The Chief Investigator considered all representations made by DIPs and responded to the author of each of the submissions advising which of their recommended amendments would be incorporated in the Final Report, and those that would not. Where any recommended amendment was excluded, the reasons for doing so were explained.