

AUSTRALASIAN RAILWAY ASSOCIATION INC
Association Number A03958 ABN 64 217 302 489

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23 January 2009

Ms Catherine King
Committee Chair
Standing Committee on Infrastructure,
Transport, Regional Development and Local Government
PO Box 6021
House of Representatives
Parliament House
CANBERRA ACT 2600

Dear Ms King,

TRAIN ILLUMINATION: INQUIRY INTO SOME MEASURES PROPOSED TO IMPROVE TRAIN VISIBILITY AND REDUCE LEVEL CROSSING ACCIDENTS

I refer to the request for submissions to the Train Illumination inquiry. This submission is made by the Australasian Railway Association (ARA) on behalf of its membership.

Level crossing safety is the highest safety priority of the rail industry. Accordingly, the rail industry welcomes all inquiries that endeavour to improve level crossing safety within Australia.

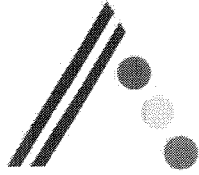
Train conspicuity at level crossings is only one aspect of the level crossing safety environment. Consequently, we have taken this opportunity to address some other areas of interest within our submission. The rail industry supports research and development into level crossing safety measures to improve level crossing safety. In addition, the ARA believes these projects should be approached in a nationally coordinated manner to ensure level crossing safety measures continue to bring Government and road and rail authorities together.

The ARA looks forward to continuing to work co-operatively with the Australian Government on issues relevant to the rail industry.

Yours sincerely,

Bryan Nye
Chief Executive Officer

Attachment 1. ARA submission to the House of Representatives standing committee on infrastructure, transport, regional development & local government



AUSTRALASIAN RAILWAY ASSOCIATION INC

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SUBMISSION

TO

**THE HOUSE OF REPRESENTATIVES STANDING
COMMITTEE ON INFRASTRUCTURE, TRANSPORT,
REGIONAL DEVELOPMENT & LOCAL GOVERNMENT**

**TRAIN ILLUMINATION: INQUIRY INTO SOME MEASURES
PROPOSED TO IMPROVE TRAIN VISIBILITY AND REDUCE
LEVEL CROSSING ACCIDENTS**

23 January 2009

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SUMMARY

The Australasian Railway Association (ARA), whose members include the major publicly and privately owned railway operators, represents the interests of the rail sector in Australia and New Zealand.

The causes of level crossing crashes are complex and involve a range of factors and interventions that are not solely related to train visibility or conspicuity.

Proposed safety interventions should be based on quality research and trials. The Australian Government should take the lead in coordinating a Research and Development program for safety interventions. Additionally, these should be implemented in a nationally coordinated approach that brings together Government, Industry, road and rail authorities.

The *National Railway Level Crossing Safety Strategy* and *Railway Level Crossing Safety Strategy Action Plan – 2003* should be revised.

The Australian Government should play a leading role in supporting the development, trialling and implementation of Intelligent Transport Systems (ITS) applications at railway level crossings. ITS may achieve a reduction in road-rail fatalities by alerting trains and road vehicles approaching a level crossing to the presence or approach of the other.

The Australian Government should take a leading role in ensuring nationwide compliance with the Australian Standard on Level Crossings.

The Australian Government should encourage state and territory governments to prepare complimentary strategies, three to four year funded work or action plans and safety targets that implement a mix of research-supported interventions.

State and territory governments should provide funds to rectify known safety issues at railway level crossings as well as ensuring that Interface Coordination Agreements between rail operators and road owners are effective.

The Federal Government should fund and coordinate a national rationalisation and grade separation program to improve efficiency and safety for both road and rail.

1. INTRODUCTION

Since the Committee's last report in June 2004, and the period up to July 2008, there have been 308 train crashes at railway level crossings with vehicles and people in Australia.¹ It is therefore timely that the House of Representatives Standing Committee on Infrastructure, Transport, Regional Development and Local Government (the Committee) has decided to update its 2004 report, *Train Illumination: Inquiry Into Some Measures Proposed to Improve Train Visibility and Reduce Level Crossing Accidents*. The Australasian Railway Association (ARA) welcomes this decision.

1.1 The Australasian Railway Association

The Australasian Railway Association (ARA) is a member-based association that represents the interests of the rail sector in Australia and New Zealand.

The ARA was established in the 1890s as the Australian and New Zealand Railway Commissioners. In 1994, it became the Australasian Railway Association Inc and was incorporated under the *Associations Incorporation Act 1981* (Vic).

Members of the ARA include public and private organisations, encompassing:

- Track owners;
- Rail operators (including Heritage and light rail);
- Rolling stock manufacturers;
- Track constructors;
- Infrastructure maintenance companies;
- Signals and communication businesses;
- Research, education & training organisations;
- Consultants; and
- Suppliers to the sector.

The membership of the ARA Executive Committee demonstrates its representative nature, including that of the major publicly and privately owned railway operators in Australia - see attachment 1.

A key priority of the ARA is to campaign to reduce level crossing collisions by working with all stakeholders.² Supporting this objective, an Industry Level Crossing strategy was developed in consultation with a number of industry stakeholders and launched in December 2007. The strategy has a number of action plans which focus on education, enforcement, engineering and 'enough is enough' (no new railway level crossings) initiatives.

The ARA has established the Rail Industry Safety and Standards Board (RISSB) to produce Rules, Codes of Practice, Standards and Guidelines as well as harmonising

¹ Australian Safety Transport Bureau (2008) *Australian Rail Safety Occurrence Data 1 January 2001 to 30 June 2008*, Tables 15 & 17, pages 10 & 11. Note, this submission does not address suicide or self harm at railway level crossings and elsewhere.

² Australasian Railway Association (2007) *Strategic Plan 2007-2017*.

safety practices (including railway level crossings) on behalf of the Rail Industry. In 2007, RISSB was accredited by Standards Australia as a Standards Development Organisation. All standards produced by the RISSB are Australian Standards. The work being undertaken by RISSB on level crossing safety is referred to later in this submission.

Main points about the ARA

The ARA is a member-based organisation that represents the rail sector.

A priority of the ARA is to campaign to reduce level crossing collisions.

1.2 This Submission

This submission by the ARA proposes that the Australian Government should:

- initiate a revision of the *National Railway Level Crossing Safety Strategy* and the *Railway Level Crossing Safety Strategy Action Plan – 2003*;
- play a leading role in supporting the development, trialling and implementation of Intelligent Transport Systems (ITS) applications at railway level crossings;
- take the lead in coordinating a Research and Development program for safety interventions associated with level crossing safety;
- encourage state and territory governments to prepare complimentary strategies, three to four year funded work or action plans and safety targets that implement a mix of research-supported safety interventions;
- fund and coordinate a national rationalisation and grade separation program; and
- continue to lead the States and Territories in a coordinated, non partisan and national approach to level crossing safety.

Although the focus of the Committee's 2004 report was on the practicality of installing additional lighting on trains, the Committee also considered other measures that had been proposed to improve train visibility and reduce level crossing crashes. Accordingly, this submission addresses the following issues that were raised in the Committee's 2004 report:

- reflectors (referred to on pages 11 & 12 of the Committee's report);
- reflective paint (page 11 of the report);
- level crossing assessments and upgrades (pages 13 & 14);
- passive and active rumble strips (pages 16 & 17);
- intelligent transport systems (page 17);
- education (page 18); and
- research (page 19).

In addition, the submission provides advice to the Committee on the need for Federal, State and Territory Governments to rationalise crossings, enforce road rules, prepare funded national strategies that facilitate a coordinated approach to level crossing safety.

This submission primarily addresses the safety of railway level crossings on public roads.

2. TYPES OF RAILWAY LEVEL CROSSINGS

2.1 Railway level crossings defined

A railway level crossing is the area where a road crosses or intersects with railway tracks at substantially the same level. The level crossing may incorporate a footpath for people travelling on foot, using mobility aids (e.g. wheelchairs and scooters) or walking with bicycles, baby carriages or animals.

There are also stand-alone pedestrian crossings designed specifically for the use of people travelling on foot, using mobility aids, or walking with bicycles, baby carriages or animals.

Railway level crossings are located on public roads, private land, within railway yards, depots and port facilities as well as those used by maintenance crews to access railway facilities.

The purpose of railway level crossings is to provide access across the railway tracks for vehicular traffic and other road users, including pedestrians.

2.2 Passive & Active Crossings

There are two types of level crossing controls, namely passive and active.

Approximately 70% of public road crossings in Australia have passive controls.³ A **passive crossing** uses static signs and pavement markings to alert road users of the level crossing.

The road user is warned of the level crossing primarily by a ‘Give Way’ or ‘Stop’ sign at the crossing itself.

Active crossings consist of audible and/or changing visible warnings that are triggered to alert drivers of an approaching train and the need to stop. Again, these devices are usually located at the crossing. The type of warning devices at active crossings, in addition to signage include flashing signals, gates or boom barriers, traffic lights or a combination of these. The signals, traffic lights, barriers or gates are activated prior to and during the passage of a train through the crossing. Importantly not all active crossings have boom gates.

In addition, where sighting difficulties exist, some crossings are equipped with automated advance warning signs.

In broad terms, state and territory governments own and are responsible for the upgrading of crossings to higher levels of safety, whilst rail operators and road authorities share responsibility for their operation and maintenance.

Main points about railway level crossings

70% of public road crossings in Australia are passive crossings.

Passive railway level crossings do not provide any active warnings to road users of approaching trains.

Most active crossings do not provide motorists with advanced warning of approaching trains.

³ Railway Safety Regulators’ Panel (2008) *Review of National Level Crossing Statistics*, page 4.

3. LEVEL CROSSING STATISTICS

In 2002, the Australian Transport Safety Bureau (ATSB) published the findings of a study of its Fatality Crash Database of 87 fatal railway level crossings crashes involving a train and road vehicle on a public road from 1988 to part of 1998. Key findings in the study that are relevant to train conspicuity or visibility are:

- 83% occurred in daylight (excluding dawn and dusk);
- 85% occurred in fine weather; and
- at 16% of the fatal crashes, the point of impact was the side of the train; most crashes involved trains crashing into vehicles.⁴

The ATSB findings also indicate that:

- 44% of examined fatalities occurred where the warning systems were ‘passive’ non-electrical devices, that is, without train-activated flashing lights or boom barriers, or a combination of these devices.
- 41% occurred where the warning system in place was some other type of ‘active’ warning system, such as flashing lights (other than boom barriers).
- 10% occurred at crossings with boom barriers.⁵

In 2003, ARRB Transport Research, in a project conducted for the ATSB, published a report on the prospects for improving the conspicuity of trains at passive railway level crossings. On the issue of day time – night time crashes, the report states:

*Under Australian conditions, it would therefore seem that approximately 70 per cent of collisions occur during daylight.*⁶

The most recent national data published by the ATSB reports that in 2007, there were 55 vehicle crashes at railway level crossings, and in the first 6 months of 2008, there were 31.⁷ In addition, there were nine level crossing collisions with pedestrians in 2007, and in the first six months of 2008, there were five.⁸

In August 2008 the ARA analysed 24 reports of crashes listed on the ATSB website (see attachment 2). These reports relate to accidents that occurred between 2002 and 2008; 16 of which involved fatalities. The ARA deduced that:

- 94% of the fatality crashes occurred in daylight from 6 am to 6pm (the other crash was at 6.30 pm). This indicates a large trend upwards from the ATSB 2002 data (83%);

⁴ Australian Transport Safety Bureau (2002) *Level Crossing Accidents*. Monograph 10, page 2.

⁵ Australian Transport Safety Bureau (2002) *Level Crossing Accidents*, page 2.

⁶ Cairney P (2003) *Prospects for Improving the Conspicuity of Trains at Passive Railway Crossings*, page 13.

⁷ Australian Safety Transport Bureau (2008) *Australian Rail Safety Occurrence Data 1 January 2001 to 30 June 2008*, Table 15, page 10.

⁸ Australian Safety Transport Bureau (2008) *Australian Rail Safety Occurrence Data 1 January 2001 to 30 June 2008*, Table 17, page 11.

- 87% occurred in fine weather. This figure is largely consistent with the ATSB 2002 data (85%); and
- only 19% of the fatality crashes were as a result of a vehicle driving into the side of the train; all of these crashes were in daylight, with one in foggy weather. Again this figure is largely consistent with the ATSB 2002 data (16%).

Importantly the reports do not blame any of the train drivers for the accidents. The key points from the reports about the condition of level crossings where the accidents occurred are:

- 81% of the crossings had a design, sign, pavement marking, sighting or maintenance issue;⁹
- 69% of the crossings were passive;
- 31% of the crossings had active flashing lights; and
- only 6% of the crossings had active boom barriers.

In one fatality report published in 2008, the Chief Investigator, Transport and Marine Safety Investigations in Victoria found that there was total reliance on seeing and comprehending the flashing warning lights.¹⁰

4.1 Comparison of Statistics with the USA

The Australian data is also reasonably consistent with statistics published by the US Federal Railroad Administration that show that at public railway level crossings in 2006:

- 72% of vehicle fatalities occurred between 6.00 am and 6.00 pm;¹¹
- 71% of vehicle fatalities occurred in clear weather;¹² and
- only 15% of vehicle fatalities were the result of highway users striking a train at a public crossing.¹³

4.2 Observation

The fact that the majority of collisions occur during daylight raises the questions of whether people drive more carefully at night, or is more observant of other lights and moving objects. Or rather, is the collision statistics representative of the traffic on the road during daylight hours?

⁹ The issue may not have contributed to the fatality; the table is an analysis of the condition of the crossings.

¹⁰ Chief Investigator, Transport and Marine Safety Investigations (2008) *Level Crossing Collision, Connex Passenger Train 8504 with a Motor Vehicle at Bungower Road Somerville, Victoria*, 22 August 2007, page 25.

¹¹ US Department of Transportation, Federal Railroad Administration (2008) *Railroad Safety Statistics – Annual Report 2006 – Final*, Table 7.6, page 93.

¹² US Department of Transportation, Federal Railroad Administration (2008) *Railroad Safety Statistics – Annual Report 2006 – Final*, Table 7.10, page 97.

¹³ US Department of Transportation, Federal Railroad Administration (2008) *Railroad Safety Statistics – Annual Report 2006 – Final*, Table 7.10, page 97.

Main points about the Statistics

The majority of railway level crossing accidents involving casualties occur during daylight hours.

The majority of railway level crossings accidents occur in good weather.

Australian railway level crossing accident statistics are comparable to those of the US.

4. THE RAILWAY LEVEL CROSSING SAFETY PROBLEM

There are two issues that drive the railway level crossing problem in Australia. The first relates to the large number of railway level crossings in Australia that need to be upgraded to a higher level of safety. The second issue is the difficulty drivers and pedestrians have managing their passage over these crossings.

4.1 Number of Railway level crossings in Australia

The Railway Safety Regulators' Panel ¹⁴, in a recent survey reported that in 2006-07, Australia had 7,943 public road crossings (pedestrian only and other crossings were not included in the count); see Table 1, *Active & Passive Public Road Crossings in 2006-07*.

Table 1. Active & Passive Public Road Crossings in 2006-07

Jurisdiction	Active	Passive	Total
Victoria	761	1111	1872
Queensland	534	1251	1785
New South Wales	320	1139	1459
Western Australia	471	783	1254
South Australia	253	892	1145
Tasmania	120	250	370
Northern Territory	28	30	58
TOTAL	2487	5456	7943

Source: Railway Safety Regulators' Panel (2008) *Review of National Level Crossing Statistics*, page 4.

Key points from Table 1 are:

- approximately 70% of public road crossings in Australia have passive controls;
- there are many other crossings, including those used by pedestrians; and
- there are a very large number of passive crossings that require upgrading.

A recent account of the costs of upgrading a passive level crossing to active status reported that:

*'the capital cost to upgrade a crossing and provide fail-safe train-activated flashing lights can be between \$250,000 and \$350,000. Installation of train-activated full boom barriers can cost between \$350,000 and \$450,000, depending on the width of the crossing road and number of railway tracks.'*¹⁵

¹⁴ The Railway Safety Regulators' Panel consists of the rail safety regulators from all States, the Northern Territory and New Zealand. The panel provides advice on rail safety regulatory issues to the Standing Committee on Transport Rail Group and the National Transport Commission.

¹⁵ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 33.

Despite the social and economic benefit of upgrading passive and other crossings to higher levels of safety, the very large number and the high cost of each upgrade means that it is unlikely all crossings in this country will ever be actively controlled.

Grade separation, such as a tunnel or overpass, can cost from \$20 million to more than \$80 million.¹⁶ Clearly, unless grade separation for railway level crossings is given a higher priority in government budgets, other options must be implemented. These options include:

- Reducing the scale of the problem by reducing the number of crossings – the ARA believes that governments should be proactive in this area and should plan and initiate the closure of crossings on many low volume roads or rationalise crossings where there are a number of crossings in close proximity of each other.
- Investigating and implementing more cost-effective ways of upgrading railway level crossings, such as that which has been undertaken in Tasmania,¹⁷ or as studied in the United Kingdom by the Rail and Safety Standards Board.¹⁸
- Utilising lower cost technologies by first trialling new technologies, in particular, Intelligent Transport Systems (ITS) on vehicles and trains, and low cost warning devices that could *supplement* signs at passive crossings.¹⁹ The Rail Cooperative Research Centre in Australia is undertaking research into low cost warning devices but the results will not be forthcoming until at least mid 2010. It is important to highlight however that the Rail Industry requires any new level crossing technological solution to meet fail safe requirements.
- The Parliamentary Committee stated in its 2004 report, that:
 - *It believes that in the long run, and short of converting all passive crossings to controlled crossings, further significant safety improvements will come from developments in Intelligent Transport Systems In the meantime, a lot can still be done to improve the safety of railway level crossings, such as improvements to active equipment, and improving signage.*²⁰
- **The ARA supports these comments.**
- Undertaking research into the role of targeted educational interventions.²¹

¹⁶ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 33.

¹⁷ Austroads (2002) *Reducing Collisions at Passive Railway level crossings in Australia*, page 17.

¹⁸ Rail Safety & Standards Board (2006) *The Cost of Railway level crossings: International Benchmarking Exercise*.

¹⁹ The introduction of these technologies is examined in Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*.

²⁰ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, page 13.

²¹ CRC for Rail Innovation (2008) *Railway level crossings Research Database*, pages 56 & 57.

- Accompanying educational interventions with technology-supported enforcement programs.

4.2 Operational Issues and Difficulties at Railway Level Crossings

4.2.1 The Economics

The economic cost of level crossing crashes is considerable. In 2008, the ATSB reported that the damage bill arising from 15 level crossing crashes between April 2006 and December 2007, was estimated at “well over \$100 million”.²² However the ARA believes that this estimate is conservative. As a consequence the ARA and Bureau of Infrastructure, Transport and Regional Economics (BITRE) are currently reassessing the level crossing collision costing model. The results of this project will be known in the latter half of 2009.

Historically, railway level crossings have been a low priority for the road industry and Governments. This can be attributed to the fact that in comparison to the road toll, railway level crossings deaths can appear minor. As a result, railway level crossing safety initiatives have been continually underfunded by Governments.

The ARA acknowledges that some Governments have increased their priorities for railway level crossings but this tends to be reactive and not deliberate. It is important that Governments keep railway level crossings as a priority within their public works programs and increase expenditure accordingly. Indeed this view is reflected in a 2008 report by Road Safety Committee of the Parliament of Victoria into improving safety at railway level crossings.²³

The Road Safe Committee reported that a State Government of Victoria assessment survey of 1,973 road and pedestrian railway level crossings, using the Australian Level Crossing Assessment Model (ALCAM), ‘... identified 21,397 issues or potential hazards’ at these crossings.²⁴ The Committee stated that if the issues identified in the survey were to be addressed and funded within a reasonable timeframe, the State Government ‘will need to significantly increase funding to the level crossing upgrade program.’²⁵

Australian Level Crossing Assessment Model (ALCAM). ALCAM is a level crossing assessment tool that was adopted by the Australian Transport Council in 2003.²⁶ It is used throughout Australia and is overseen by a national ALCAM Committee to ensure its consistency of development and implementation.²⁷ In its 2004 report, the

²² Australian Transport Safety Bureau (2008) *Railway Level Crossing Safety Bulletin*, Table 1, page 3.

²³ Parliament of Victoria, Road Safety Committee (2008) *Inquiry into Improving Safety at Railway level crossings*.

²⁴ Parliament of Victoria, Road Safety Committee (2008) *Inquiry into Improving Safety at Railway level crossings*, page 49.

²⁵ Parliament of Victoria, Road Safety Committee (2008) *Inquiry into Improving Safety at Railway level crossings*, page 51.

²⁶ For information on the operation of ALCAM, see Spicer, T (2007) *Implementing the Australian Level Crossing Assessment Model (ALCAM) in Victoria*. Paper presented to the 30th Australasian Transport Research Forum, 25-27 September 2007, Melbourne.

²⁷ NSW Level Crossing Strategy Council website viewed on 8 January 2009.

House of Representative Standing Committee recommended that ALCAM be adopted nationally as a level crossing risk scoring system²⁸; this recommendation was supported by the Australian Government.²⁹ The ARA also supports the use of ALCAM to survey and assess the condition of railway level crossings. But once surveyed it is important that action be taken to rectify deficiencies at railway level crossings. The ARA acknowledges that there is a fine balance between budget and maintenance but given the financial, emotional and commercial impacts associated with railway level crossing crashes, the ARA believes that a higher priority must be placed on repairing known deficiencies at railway level crossings. Accordingly the ARA urges state and territory governments to provide funds to rectify known safety issues at railway level crossings.

4.2.2 Heavy Vehicles

A heavy vehicle, especially a B-double or B-triple, requires more time to pass over a railway level crossing from a standing position. Accordingly sighting distances are an important safety issue. This issue of sighting has been raised on several occasions by the ATSB.³⁰ Additionally braking distances and acceleration capabilities of heavy vehicles may impact on the safety of these vehicles at railway level crossings.

Indeed the Parliament of Victoria's road safety committee has identified that there are some railway level crossings that are unsuitable for use by B-double or B-triple vehicles as the design of the crossing may not reflect heavy vehicle performance capabilities.³¹ The ARA supports this observation and holds strong reservations about the proposed B-Triple Network and the effect it could have on level crossing safety. The Victorian Road Safety committee recommends that all railway level crossings on B-double and B-triple routes be reassessed.³² The ARA strongly supports this recommendation.

Some rail industry members have previously sought copies of the original B-Triple route risk assessments from the appropriate road authorities but these have not been forthcoming. The failure of these authorities to provide these documents only exemplifies the rail industry's level crossing safety concerns on these routes. The ARA has recently written to the various State and Territory Departments of Transport/Infrastructure seeking copies of these assessments.

4.2.3 Queuing and Short Stacking

Queuing and short stacking across a railway level crossing occurs when a driver decides to enter a crossing where traffic movement is restricted from moving forwards

²⁸ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, recommendation 2, page 15.

²⁹ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 9.

³⁰ See for example, ATSB Safety Advisory Notice RS20070001 issued on 5/10/07.

³¹ Cristoforo R, Hood C, Sweatman P (2004) *Acceleration and deceleration testing of combination vehicles*.

³² Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, recommendation 16, page 60.

or if there is a short distance from the railway tracks and the nearby intersection. As a consequence vehicles stop within the striking distance of a train.

Many country roads run close and parallel to rail lines. In the majority of cases a heavy vehicle or bus do not have enough room to turn and stop at a level crossing without their trailer or rear end interfering with the traffic on the road from which they have turned. Similarly in many regional areas traffic lights are too close to the rail line. This is a real danger if a heavy vehicle stops at these lights, having crossed a railway level crossing and their trailers or rear end come to rest on the railway line.

Some of these issues could be resolved by redesigning the crossing infrastructure or linking active crossing signals to the nearby intersection's traffic signals. This is obviously extremely costly. So at its simplest (and least costly) the use of hatch marking and signage at railway level crossings has been noted anecdotally to improve driver behaviour at these locations.

Conversely however, traffic lights at a railway level crossing with a high concentration of rail traffic could make level crossings non functional because of traffic backup. In these instances, the elimination of the crossing through grade separation is the only solution.

4.3 Human Factor Issues

Despite the clarity of law about the use of railway level crossings and the existence of an Australian design Standard³³, it is clear that some pedestrians and drivers have difficulty sighting an approaching train at some crossings in time to give way or stop. Additionally, drivers also fail to comprehend the dangers when they sight a train approaching a level crossing. This is particularly problematic when vehicles are 'queued' or 'stacked' over a crossing.

Every railway level crossing has risks. These cannot be removed solely through engineering or design methods. Absolutely safe arrangements do not exist unless the crossing is completely eliminated. Obviously this is impractical for crossings yet the risks present at them reinforces the need for railway level crossings to be rationalised and where appropriate grade separated to reduce the level of risk present.

The road rules throughout Australia are consistent and clear on the obligation of the road users at railway level crossings:

- road users at passive crossings must either slow down and give way to approaching trains, or stop and look for a train before proceeding through the level crossing when the tracks are clear;
- road users at active crossings must stop when the signals are activated; and
- road users at all crossings must not proceed over the crossing if the road is blocked by a vehicle.

Extracts from the model *Australian Road Rules*³⁴ that form the basis of the Road Rules of each state and territory are at attachment 3.

³³ Australian Standard 1742.7-2007 *Manual of Uniform Traffic Control Devices Part 7: Railway Crossings*.

³⁴ National Transport Commission (2008) *Australian Road Rules*.

Unfortunately the situation at a railway level crossing is more complex than that suggested by the Road Rules.

Railway and road traffic operate as separate transport entities and have different rules, procedures, characteristics, operational limitations and safety systems.

As a rule, neither the rail or road user has advance knowledge of when the other will be at a crossing. Only very few crossings are equipped with automated advance warning signs that provide advance warning to motorists of the possibility of an approaching train. No warnings are provided to train drivers of approaching road users.

Given their size and weight it is not possible for a train to brake at the same rate as a road vehicle. Heavy freight and passenger trains may take several kilometres to stop; brakes are often applied kilometres beforehand to slow or stop the train.

In most circumstances a train driver is unlikely to sight an approaching vehicle and determine its intent to stop or not, until the train is relatively close to the crossing, by which time a crash may be imminent. In such circumstances the train driver is unable to take effective action to avoid the crash other than sounding the horn, and (if time permits) applying the emergency brake.

By comparison, a road vehicle can generally change direction and stop relatively quickly, though the latter is more problematic for heavier vehicles which are increasingly involved in level crossing crashes.

There is also evidence that suggests people have difficulty judging the arrival time of large fast-moving objects, such as trains.³⁵ This relates to depth perception and this is certainly an area that requires more research. **The ARA recommends that this topic of research be given a high priority by the Committee in its report.**

4.3.1 National Railway Level Crossing Road User Behavioural Study

So as to gain a better understanding of driver behaviour at railway level crossings, the ARA has been involved, as a member of the National Railway Level Crossing Behavioural Coordination Group (BCG), in two projects under the National Railway Level Crossing Behavioural Strategy that were endorsed in 2006 by the Australian Transport Council. These projects are the *National Road Users Survey*, and the *Targeted Education and Enforcement Pilot*. The results of the second project are discussed in section nine of this submission.

In the *National Road Users Survey*, three focus groups and 25 in-depth interviews were followed by a quantitative survey of over 4,400 road users across Australia. The study identified self-reported behaviours and attitudes to measure participant's awareness, knowledge and perceptions of the rules and risks associated with railway level crossings. It also measured how respondents view and interact with crossings.

Participants were road users aged 18 years and older in possession of a current driving licence who had travelled over a level crossing at least once within the previous six months (exclusive of being a passenger). The study intentionally over-represented regional and rural Australians in an effort to mirror the prevalence and location of Australian railway level crossings that are predominantly found in rural and regional Australia.

³⁵ Known as the Leibowitz phenomenon.

Key points from the survey were:

- 24% reported engaging in illegal usage of a level crossing one or more times. This included:
 - crossing when a train was visibly approaching;
 - not stopping at a Stop sign;
 - accelerating to pass under a lowering boom barrier;
 - not waiting for the lights and boom barriers to cease operation before proceeding across train tracks;
 - avoiding the boom barrier by driving around it; and
 - becoming trapped between lowered boom barriers in their effort to rush across a level crossing.
- approximately one in five acknowledged that they had travelled over a level crossing and not realised until after they had crossed;
- one in five were not aware of any penalties for breaking the rules at railway level crossings, while 66% believed they were less likely to be penalised for breaking rules than driving at speeds exceeding the speed limit;
- driver inattentiveness and impatience were collectively identified as the greatest factors contributing to increased risk at railway level crossings;
- one in four reported engaging in risky behaviour at railway level crossings, yet not all participants classified crossing when a train is approaching as risky; and
- 16 to 25 year old drivers were identified as the group most at risk at railway level crossings. Interestingly, this group was self-aware of their heightened risk, yet older drivers were less aware of their own risk.³⁶

The findings from this survey have been made available to each jurisdiction and are being utilised in conjunction with the education and enforcement pilot to tailor a national communications package.

The survey's findings all point to major behavioural issues at railway level crossings requiring education and enforcement interventions. As a consequence the Rail CRC has agreed to conduct research into the causal factors associated with level crossing accidents.

4.4 Summary

The operational difficulties experienced by drivers emphasise the importance of having well designed, maintained and up-to-date railway level crossings. The alternative of course is to close crossings that do not comply with standards or that are unsuitable for certain classes of vehicle, such as B-doubles or B - triples.

³⁶ Taylor K (2008) *Addressing road user behavioural changes at railway level crossings*. Paper delivered to the 2008 Joint ACRS-Travelsafe National Conference, 18 & 19 September 2008, Brisbane.

Further, the behavioural issues identified through the survey reiterate the need for education and enforcement initiatives to boost level crossing safety.

Main points about the railway level crossing safety problem

Australia has 7,943 crossings over public roads.

A significant issue is the condition of many railway level crossings.

The large number and high cost of upgrading crossings means that governments need to actively examine and implement other options.

The economic impact of a railway level crossing accident is significant.

The ARA and BITRE are reassessing economic impact of level crossing accidents.

Governments need to give higher priority to rectifying railway level crossing defects.

Safe passage over railway level crossings is more complex than that suggested by the clarity and simplicity of the Road Rules.

Risk assessments need to be undertaken to ensure that railway level crossings on B-Double or B-Triple road routes can accommodate heavy vehicles safely.

Operational difficulties at crossings emphasise the importance of well-designed and maintained crossings that fully comply with the Australian Standard.

5. RAILWAY LEVEL CROSSING STANDARDS

5.1 Introduction

A Standard sets out the specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they were intended to perform. They establish a common language that defines quality and safety criteria.³⁷

Despite the existence and use of AS 1742.7, evidence is emerging that many of the existing crossings, as well as requiring an upgrade to higher levels of safety, require redesigning, improved maintenance, or updated signage so that they accord with the Australian Standard.³⁸ Some crossings were built to earlier standards or editions of the current Standard and have not been updated, whilst others are poorly maintained. The current Standard is often only applied when level crossing devices and signs are initially installed or when the crossing is refurbished. **The ARA strongly recommends that the Federal Government take the lead in ensuring national compliance with the Australian standard - AS1742.7 -Manual of Uniform Traffic Control Devices Part 7: Railway Crossings.**

But AS1742.7 is biased towards the road infrastructure etc and less on the rail side of the equation. To address this imbalance, the RISSB is developing an Australian Standard on Railway Level Crossings. It will address issues such as ‘rail-side issues at railway level crossings’ and ‘level crossing hardware’ such as flashing lights, boom barriers and electrical circuit design.

While AS1742.7 and the new standard focuses on the technical aspects of railway level crossings, the conspicuity of trains was highlighted as an issue in the Parliamentary committee’ report of 2004. As a consequence the RISSB produced a lighting and visibility standard in 2006 and released it again in 2007 as an Australian Standard AS7531 *Railway Rolling Stock – Lighting and Visibility*. AS7531 replaced the 1992 manual of engineering standards and practices.

AS7531 describes the requirements for lighting and rolling stock visibility on locomotives and freight, passenger and infrastructure maintenance rolling stock, stating that: ‘*The main purpose of the requirements is to reduce the risk of level crossing accidents and to have sufficient illumination to enable safe operating and maintenance activities.*’³⁹

5.2 Australian Standard 1742.7

The active and passive safety measures used at public crossings is similar throughout Australia and consistent to those used internationally. In Australia, road-side safety measures must satisfy, at the time of installation, AS1742.7. The scope of the AS1742.7 is set out in clause 1.1 of the document, which states:

³⁷ Standards Australia website viewed on 24 December 2008.

³⁸ Australian Standard 1742.7-2007 *Manual of Uniform Traffic Control Devices Part 7: Railway Crossings*.

³⁹ Australian Standard 7531.1-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 1.4, page 3.

*'This Standard specifies traffic control devices to be used to control and warn traffic at and in advance of railway crossings at grade. It specifies the way in which these devices are used to achieve the level of traffic control required for the safety of rail traffic and road users, including pedestrians. Requirements and guidance are also given in appendices on the illumination and reflectorisation of signs, on their installation and location, and on selection of the appropriate sign size.'*⁴⁰

In 2007, the Standard was revised following a review by road and railway authorities. Important changes included:

- promoting the use of new signs;
- provision for active advance warning signals;
- more detail of sight distance requirements at passive crossings;
- unsafe queuing of traffic measures; and
- upgrading of standards for pedestrians, including provisions for people with disabilities.⁴¹

5.3 Development of a New Level Crossing Standard

As stated previously AS 1742.7 addresses road-side issues but does not address rail-side issues at railway level crossings or level crossing hardware such as flashing lights, boom barriers and electrical circuit design. There is also no consistency of warning times and the use of predictors between States.

To address the shortcomings in AS1742.7 the RISSB is developing a new level crossing standard that will include information on:

- types of crossings;
- protection equipment;
- telephones and communications;
- signalling and control systems;
- construction, testing and commissioning;
- maintenance and inspection;
- decommissioning; and
- risk assessment.⁴²

5.4 The Australian Train Conspicuity Standard - AS7531

In 2004 the Committee recommended that the Australian Government take steps, through the Transport Ministers Council, to require that all locomotives and rolling

⁴⁰ Australian Standard 1742.7-2007 *Manual of Uniform Traffic Control Devices Part 7: Railway Crossings*, clause 1.1, page 6.

⁴¹ Australian Standard 1742.7-2007 *Manual of Uniform Traffic Control Devices Part 7: Railway Crossings*, page 2.

⁴² See section 6.5 below for an explanation of the Standards accreditation process.

stock in the Australian rail industry are fitted with standard reflective strips or reflective paint and that all locomotives are fitted with extra lights such as rotating beacons lights.⁴³

The Australian Government in its response to the Committee's recommendation on conspicuity, only supported the recommendation in part. It supported the objective of improving train visibility with relatively low-cost reflective strips on locomotives and rolling stock.⁴⁴

AS7531 was developed with this in mind, and more. It focuses on freight rolling stock,⁴⁵ passenger rolling stock⁴⁶ and infrastructure maintenance rolling stock.⁴⁷ The standard states '*The main purpose of the standard is to reduce the risk of level crossing accidents and to have sufficient illumination to enable safe operating and maintenance activities.*'⁴⁸ The standard applies to new rolling stock and rolling stock undergoing deep maintenance.

It provides mandatory and recommended requirements for treating the hazard.⁴⁹ AS7531 addresses:

- headlights and other lights;
- livery, the exterior colour scheme and markings; and
- reflective delineators, the reflectors or reflective decals or sheeting.

5.4.1 Lighting Requirements

In summary, it is mandatory that locomotives have:

- a white headlight with a peak intensity of at least 200,000 candela that is capable of being dimmed;⁵⁰
- a red tail light (existing locomotives) and white marker lights (new and modified locomotives) with a luminous intensity of at least 0.75 candela (if operating in a

⁴³ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, Recommendation 1, page 12.

⁴⁴ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 7.

⁴⁵ Australian Standard 7531-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 2: Freight Rolling Stock*, section 3, page 6.

⁴⁶ Australian Standard 7531-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 3: Passenger Rolling Stock*, sections 2, 3, & 4, pages 7 – 12.

⁴⁷ Australian Standard 7531-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 4: Infrastructure Rolling Stock*, sections 2, 3, 6 & 7, pages 7 – 8.

⁴⁸ Australian Standard 7531.1-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 1.4, page 3.

⁴⁹ Australian Standard 7531.1-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 1.6, page 4.

⁵⁰ Australian Standard 7531.1-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 2, page 7.

network where the safe working system allows permissive working, then each tail light shall have a luminous intensity of at least 100 candela);⁵¹ and

- two white visibility lights fitted at any leading end (mandatory for new and modified locomotives) with a peak intensity of at least 20,000 candela; the visibility lights should be turned cross-eyed to improve side-on visibility of the train; the Standard recommends that the lights should alternately flash when and after the horn is sounded (although the required intensity is well below the US requirement for ditch or crossing lights, the lower output in the Australian Standard allows use of lights that can stay illuminated without causing glare or discomfort to oncoming trains and road users).⁵²

5.4.2 Livery Requirements

In summary, it is mandatory that locomotives have a high visibility colour on the leading ends, while new and modified locomotives are to have areas of high visibility colour applied to the ends and sides. The Standard recommends yellow, orange, orange-red or red with specified minimum luminance factors, or white.⁵³

The Standard also includes mandatory livery requirements for passenger rolling stock⁵⁴ and infrastructure maintenance rolling stock.⁵⁵

5.4.3 Reflector Requirements (known as reflective delineators)

In summary, it is mandatory that locomotives have reflective delineators fitted to the vertical surfaces on each side; the Standard recommends that the delineators should be white or yellow.⁵⁶

5.4.4 Rail Sector Compliance with the Conspicuity Standard

The ARA surveyed rail operators to ascertain the level of compliance with the Standard, as at 1 July 2008. Key points from the survey are:

- Commercial rail operators are 83% compliant with the Standard;
 - This percentage will improve as rolling stock undergo maintenance.
- Heritage operators (members of the Association of Tourist and Heritage Rail Australia) are 52% compliant with the Standard.

⁵¹ Australian Standard 7531.1-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 3, page 7.

⁵² Australian Standard 7531-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 4, pages 7 – 9.

⁵³ Australian Standard 7531.1-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 10, pages 10 – 11.

⁵⁴ Australian Standard 7531-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 3: Passenger Rolling Stock*, section 10, pages 10 - 11.

⁵⁵ Australian Standard 7531-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 3: Infrastructure Maintenance Rolling Stock*, section 10, pages 9 - 10.

⁵⁶ Australian Standard 7531.1-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 1: Locomotive Rolling Stock*, section 11, page 11.

- A key factor in the lower levels of compliance by heritage operators is their desire to preserve the heritage values of their locomotives and rolling stock. Additionally some heritage operators do not have level crossings on their networks

Main points about standards

AS1742.7 has a focus on the road aspects of railway level crossings.

Compliance with AS1742.7 must be mandated.

The RISSB is developing a new Australian Standard that addresses the rail aspects of railway level crossings.

Since the last Government inquiry in 2004, the RISSB has produced a standard on Train Conspicuity.

The rail Industry's compliance with AS7531 is good and will improve as rolling stock is upgraded.

6. LIGHTING, LIVERY AND REFLECTORS

This section of the submission explains where and when level crossing crashes occur and questions whether incorporating additional or different lights to trains is the key issue.

6.1 Issues Raised by the Committee in 2004

The Committee, with respect to the use of **additional lights**, stated in its 2004 report, that:

The Committee, after considering evidence concerning the conditions in which many fatal crossing accidents have occurred, is not convinced that generally placing additional lights on locomotives, or on the side of trains, will have any substantial effect in reducing the number of fatalities. The cost is likely to be considerable if lights are to be fitted to all rolling stock and would involve significant maintenance. We need a better understanding of why vehicles collide with trains during daylight hours and at controlled crossings before a broad policy of illuminating rolling stock could be advocated.’⁵⁷

The ARA supports these comments but has concern about the following reference to rotating beacons:

‘However some other options are more viable. The Committee considers that there is a case for rotating beacons to be installed on all locomotives. This could increase conspicuity during daylight hours as well as being more likely to attract attention during the night.’⁵⁸

The ARA does not support the installation of rotating beacons on trains except where it is a mandated requirement for them through legislation or a standard: for example the lighting requirements for self-propelled infrastructure maintenance rolling stock.⁵⁹

With respect to the use of **reflectors and paint**, the Committee stated:

‘The Committee also considers that adhesive reflective strips or reflective paint should be applied to the sides of all railway rolling stock. ...

The Committee notes that improving conspicuity of rolling stock has been included in the current draft Code of Practice promulgated by the Australasian Railway Association for the rail industry. ...

The option of reflector strips is attractive when compared to additional lighting. It is cost effective and no additional requirement is forced onto the

⁵⁷ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, page 11.

⁵⁸ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, page 11.

⁵⁹ Australian Standard 7531.4-2007 *Railway Rolling Stock – Lighting and Rolling Stock Visibility – Part 4: Infrastructure Rolling Stock*, section 6, page 8.

*rail industry to install fail-safe lighting devices and constant electricity sources.*⁶⁰

The ARA supports the Committee's comments on reflectors and paint.

6.2 Current Issues with Lighting, Livery and Reflectors

6.2.1 Extra Lights on Trains

With respect to additional lighting on trains, the Government stated that it would not support moves to make rotating beacons compulsory, without evidence that this would be worth the significant costs involved.⁶¹ **The ARA supports this position.**

In 2004, the Parliament of New South Wales' STAYSAFE Committee examined the question of train conspicuity and recommended that:

'The Ministry of Transport, in consultation with rail operators, rail unions, the WorkCover Authority, and other relevant agencies and organisations, identify and review the efficacy of measures to improve the conspicuity of trains, with specific attention to issues associated with trains travelling across railway level crossings, including but not limited to:

- *locomotive ditch lights,*
- *locomotive strobe lights,*
- *general locomotive lighting,*
- *the use of locomotive highlights,*
- *the use of retroreflective marking on locomotives, goods wagons and passenger carriages.*⁶²

The NSW Government in its response to that Committee stated that it supported the recommendation. It also stated that:

'The retrofitting of reflective marking or increased running lights (or both) on all rolling stock operating on the New South Wales standard gauge system was completed by the end of 2003/04 across all operators.

*The National Standing Committee on Transport (SCOT) is currently addressing "train conspicuity" (visibility) as a national issue. The Minister of Transport represents NSW on this Committee.'*⁶³

In 2008, the Parliament of Victoria's Road Safety Committee examined the value of fitting additional lights on trains. Significantly, the Committee recommended against

⁶⁰ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, pages 11 & 12.

⁶¹ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 7.

⁶² Parliament of NSW, SAFESAFE Committee (2004) *Report on the Safety of Railway level crossings — Where Roads and Railway Lines Meet at Substantially the Same Level*, recommendation 49, page 109.

⁶³ Letter from Director General, Ministry of Transport to Chairman, STAYSAFE Committee, dated 27 February 2006, viewed on STAYSAFE Committee web on 9 January 2009.

fitting extra lights on trains but instead supported further research into improving train conspicuity, including low-profile and different coloured flashing strobe lights.⁶⁴ The report suggests that the Committee was persuaded by submissions urging a more scientific approach to what had previously been conducted.⁶⁵

A 2003 ARRB report on improving the conspicuity of trains, states that because locomotives are already equipped with powerful lights, “it will be difficult to improve conspicuity by adding additional light sources.”⁶⁶

The report added that while available data suggested that active warnings would reduce crashes by more than 60%, it was not possible to say by how much increased conspicuity would reduce collisions.⁶⁷ Significantly the ARRB report states:

‘Much of the work advocating auxiliary lighting for locomotives pre-dates ditch lights or crossing lights, and in fact identified crossing lights as more effective than strobe lights. Current best practice is for locomotives to be equipped with headlights and crossing lights.’⁶⁸

Other measures to improve train conspicuity have been put into place, including the preparation of an Australian Standard on the subject.

The ARA does not support the installation of additional lights on trains because:

- the vast majority of crashes at railway level crossings occur during day light hours;
- an Australian Standard on train conspicuity has been adopted;
- the Standard reflects current good practice, and calls for locomotives to be equipped with headlights and crossing lights;
- The Standard requires that all new or updated rolling stock embrace conspicuity requirements. At present 83% of rail operators comply with the Standard and will improve when rolling stock is updated;
- research shows that additional lights, such as strobe lights, have no significant effect on the detection of trains or of a road user being able to estimate the time of arrival of a train at a crossing;⁶⁹
- the cost could not be justified in a cost-safety benefit analysis; and

⁶⁴ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 68.

⁶⁵ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 68.

⁶⁶ Cairney P (2003) *Prospects for Improving the Conspicuity of Trains at Passive Railway Crossings*, page 22.

⁶⁷ Cairney P (2003) *Prospects for Improving the Conspicuity of Trains at Passive Railway Crossings*, page 10.

⁶⁸ Cairney P (2003) *Prospects for Improving the Conspicuity of Trains at Passive Railway Crossings*, page 21.

⁶⁹ Cairney P, Cornwell D, Mabott N, *Contract report; Conspicuity of Enhanced Lighting Treatments for Railway Locomotives*, page 3.

- other measures would be more effective, for example, active warning at crossings would reduce crashes by more than 60%.⁷⁰

Similarly, it is likely Heritage operators would oppose measures such as rotating beacons on the basis of heritage values. In addition, not all heritage operators have railway level crossings on their lines.

Main points about train conspicuity

Most fatalities at level crossings occur in daylight and in fine weather.

The Australian Standard reflects 'good' practice, which is for locomotives to be equipped with headlights and crossing lights.

Additional lights, such as strobe lights, have no significant effect on the detection of trains or of a road user being able to estimate the time of arrival of a train.

The Australian Standard on Rolling Stock lighting and visibility provides good guidance on lighting and visibility requirements.

⁷⁰ Cairney P (2003) *Prospects for Improving the Conspicuity of Trains at Passive Railway Crossings*, page 10.

7. INTELLIGENT TRANSPORT SYSTEMS

7.1 Issues Raised by the Committee in 2004

Intelligent Transport Systems (ITS) facilitate communication and data transfer between trains, vehicles and infrastructure and centralised control centres.

ITS technology uses global positioning system satellites (GPS) to locate the position of vehicles and trains, and short-range radio communication devices to transmit information between vehicles and trains, or between vehicles, trains and road or rail-side infrastructure.

In 2004, the Committee recognised the importance of ITS, stating in its report that:

*... significant safety improvements will come from developments in Intelligent Transport Systems*⁷¹

Intelligent Transport Systems (ITS) provide possible solutions to increase train conspicuity. ...

*Further developments of ITS specifically for the rail industry could help to achieve a reduction in road-rail fatalities. Such systems would alert a train or a road vehicle entering a level crossing to the presence or approach of the other.*⁷²

The ARA supports these comments however it must be noted that some railways are reluctant to use ITS due to a possible reduction in the levels of ‘failsafe’.

7.2 Current Issues with ITS

Surprisingly, the Australian Government did not comment on ITS in its response to the Committee’s report.⁷³ There is also no reference to ITS in the 2003 *National Railway Level Crossing Safety Strategy*,⁷⁴ or the *Draft Railway Level Crossing Safety Strategy Action Plan – 2003*.⁷⁵

In 2008, the ARA with the ITS peak body, ITS Australia, conducted the *ITS for Railway level crossings Workshop* where road and rail industry experts, government transport officials, and technology researchers and manufacturers, briefed participants on the potential and availability of advanced technology that could improve safety at railway level crossings. One of the outcomes of the workshop was a commitment by

⁷¹ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, page 13.

⁷² Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, page 17.

⁷³ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 7.

⁷⁴ Australian Transport Council (2003) *National Railway Level Crossing Safety Strategy*.

⁷⁵ SCOT Rail Group: Working Group on Railway Level Crossing Safety (2003) *Draft Railway Level Crossing Safety Strategy Action Plan – 2003*.

transport industry leaders to further explore opportunities for ITS to improve safety at railway level crossings across Australia.⁷⁶

The report of the Parliament of Victoria's Road Safety Committee on level crossing safety includes a chapter on possible applications of these technologies.⁷⁷

In May 2008, the Australian Transport Council agreed to the following road safety measures:

- development of best practice speed enforcement measures and a national best practice speed management strategy;
- in-vehicle and at-roadside technology, including the already approved pilot of digital tachograph technology and other potential solutions that use global positioning systems (GPS); and
- subject to the Bracks review into the Australian automobile industry and international approval of a suitable technical standard for stability control, the Commonwealth Government would undertake a Regulation Impact Statement for the development of *Australian Design Rules*, taking into account the Council of Australian Federation's intention to progressively require safety technologies as a condition of registration in new passenger vehicles manufactured after 31 December 2010.⁷⁸

With respect to level crossing safety, the transport ministers also agreed to the development of a package of railway level crossing safety initiatives, including consideration of:

- a major trial of low-cost level crossing treatments; and
- national media and enforcement initiatives for railway level crossings, and other best practice initiatives to improve level crossing safety.⁷⁹

In Europe and the United States an advanced form of crossing closure has been tested. The four quadrant gates are designed to close off a crossing entirely so that cars are physically prevented from accessing a crossing when a train is approaching. In addition, sensors on the track are able to notify an oncoming train whether the track ahead is obstructed. If the driver does not react to the warning, the train's brakes will automatically engage. This is an example of intelligent transport systems (ITS) or positive train control (PTC). The US Department of Transport (2001) reported that quadrant gates reduced the risk of dangerous behaviour around railway level crossings.⁸⁰

⁷⁶ ITS Australia (2008) *ITS technologies to make rail railway level crossings safer*, media release, 6 March 2008.

⁷⁷ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, Chapter 4.

⁷⁸ Australian Transport Council (2008) *Joint Communiqué*, 2 May 2008, Canberra.

⁷⁹ Australian Transport Council (2008) *Joint Communiqué*, 2 May 2008, Canberra.

⁸⁰ Rail CRC level Crossing Research database report of 19 Nov 08 - page 32

Other examples and benefits of ITS at railway level crossings include;

- automatically alerting rail and road central control systems, individual trains and road vehicles and users of the presence of up-coming hazards such as a level crossing or an approaching train or vehicle;
- automatically alerting vehicle drivers of the need to moderate their approach speed to an up-coming crossing;
- automatic management of the passage of vehicles as they approach and pass through railway level crossings by limiting their speed to the posted speed limit;
- automatically informing rail and road central control systems, including enforcement authorities, if the train or vehicle exceeded the posted speed limit;
- automatically informing road central control systems, including enforcement authorities, if the road vehicle did not stop, as required at an active or passive crossing; and
- automatically informing rail and road central control systems of a crash.

The ARA considers that the use of ITS has the potential to reduce railway level crossing crashes and believes that the Australian Government should play a leading role in supporting the development, trialling and implementation of ITS applications at railway level crossings.

Main point about Intelligent Transport Systems

Significant safety improvements are likely to come from developments in Intelligent Transport Systems

8. RUMBLE STRIPS & PERCEPTUAL COUNTERMEASURES

8.1 Issues Raised by the Committee in 2004

The Committee made recommendations on passive and active rumble strips. Rumble strips, which are placed on the approach roads to some crossings, are designed to alert drivers of a potential hazard. They are also used to warn drivers that they are about to leave their laneway. Active rumble strips, according to the proposal submitted to the Committee, would, if developed, operate by hydraulic pressure triggered by an approaching train.

The Committee recommended that the Australian Government initiate, through the Transport Ministers Council, a program to install, as a minimum, rumble strips at high accident risk railway level crossings.⁸¹ With respect to active rumble strips, the Committee recommended that the Australian Government, through the Transport Ministers Council, support continued research into the efficacy of train activated rumble strips with a view to the installation of these strips at the most dangerous railway level crossings as according to conducted risk assessments.⁸²

8.2 The Current Position on Rumble Strips

The Australian Government in its response did not support the Committee's recommendation on passive rumble strips, stating:

The Australian Government supports research and trials in this area, but considers that any widespread implementation programme should await the outcome of these trials [in Western Australia].⁸³

The Australian Government also did not support the Committee's recommendation on active rumble strips, stating:

The Australian Government supports the continuation of research into different forms of warning systems, but would not support detailed research into train-activated rumble strips because the available evidence suggests that they are not likely to have a favourable benefit-cost ratio or to compare favourably with other active warning alternatives.⁸⁴

The ARA agrees with the Australian Government's responses on these two matters. The trial of rumble strips in Western Australia was inconclusive and

⁸¹ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, recommendation 3, page 16.

⁸² Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, recommendation 4, page 17.

⁸³ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 10.

⁸⁴ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 11.

recommended further trials.⁸⁵ More recently, rumble strips have been installed in Victoria, and ARRB has been engaged to conduct an evaluation.⁸⁶

The ARA supports further study and trials of passive rumble strips.

8.3 Perceptual Countermeasures

The Australian Government in its response made reference to perceptual countermeasures.⁸⁷ This is an issue that arose during the inquiry conducted into improving safety at crossings by the Parliament of Victoria.⁸⁸

Perceptual countermeasures are visual traffic calming measures, and include pavement markings, that are designed to slow vehicles as they approach a hazard. The Parliament of Victoria's Road Safety Committee recommended that perceptual countermeasures should be investigated and trialled at railway level crossings.⁸⁹

The Road Safety Committee also recommended that road speeds should be reduced to 80 km/hr at the approach to railway level crossings on all roads with a 100 or 110 km/hr posted speed limit.⁹⁰

The ARA has written to all Transport Ministers requesting they give favourable consideration to reducing speed limits to 80 km/hr in their respective states and territories. The ARA is still waiting for responses on this matter.

The ARA supports the study and trial of perceptual countermeasures, as well as reductions in road speed limits on approach roads to all railway level crossings.

Main points about rumble strips & perceptual countermeasures

Evaluation studies should be assessed to ascertain whether tactile stimuli and perceptive countermeasures improve safety and are cost-effective

A reduction in the speed limit for road vehicles to 80 km/hr all rail railway level crossings is a prudent perceptual countermeasure

⁸⁵ Radalj T (2004) *Effects of Rumble Strips on Driver Speed Behaviours at Approaches to Passively Controlled Railway level crossings*, page 15.

⁸⁶ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 73.

⁸⁷ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 10.

⁸⁸ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 71.

⁸⁹ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 72.

⁹⁰ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, recommendation 11, page 55.

9. DRIVER EDUCATION & ENFORCEMENT

9.1 Issues Raised by the Committee in 2004

The Committee, with respect to driver education, stated in its 2004 report, that it would be worth investigating whether Operation Lifesaver, a level crossing education program that runs in Canada and the United States of America, could be adapted for Australian conditions and culture.⁹¹

Operation Lifesaver provides a volunteer based education program which can be used to supplement other road safety programs and as such should be adopted in Australia, as well as well funded road safety initiatives.

The Committee recommended that the then Department of Transport and Regional Services, with state transport departments, formally look at Operation Lifesaver, for possible adoption into Australian state road safety programs.⁹²

The Australian Government in its response to the Committee's recommendation on *Operation Lifesaver*, supported the recommendation in principle.

The ARA believes that facets of Operation Lifesaver could be beneficial within the Australian environment. However the ARA also believes that it is crucial that level crossing safety measures are rolled out on a national scale rather than state by state.

Accordingly, the ARA would only support an Operation Lifesaver based program if it was to be conducted in a nationally coordinated manner.

9.2 Education and Enforcement

In 2007, the ARA was involved in the *Targeted Education and Enforcement Pilot* project under the National Railway Level Crossing Behavioural Strategy that was endorsed in 2006 by the Australian Transport Council.

The program was conducted to provide a basis on which to develop guidelines for level crossing enforcement and community education programs. The aim was to provide a platform on which to develop guidance materials for rail organisations to engage enforcement agencies in level crossing safety. It also aspired to create resources to guide rail organisations to engage with their local road safety agencies to conduct community awareness campaigns. The study recognised that increased compliance with the road rules would reduce the number of crashes and that enforcement is a critical element of improved level crossing safety.

A 'before and after' study, the program measured road user behaviour at level crossing sites in metropolitan and rural Victoria and examined the results of a mining company's initiatives in the Northern Territory. Behaviour at sites was monitored to measure compliance at passive crossings with Stop and Give Way signs, active crossings with flashing lights only and those fitted with lights and boom barriers. A

⁹¹ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, page 18.

⁹² Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, Recommendation 5, page 18.

local education campaign and accompanied enforcement was then conducted in these areas for four weeks. Following this, behaviour was remeasured at the test sites and control sites to determine the effectiveness of the education and enforcement programs.

The pilot demonstrated that enforcement has a positive effect on road user compliance with Stop signs at railway level crossings.

A mining company's compliance program in the Northern Territory was examined as a case study. After unsuccessfully stationing a security guard at a level crossing to enforce stopping at a Stop sign, the company introduced a log book that drivers had to sign before they travelled over the crossing. The book remained for four months before being removed and replaced intermittently with security. Over three months of monitoring, non-compliance was almost eliminated and remained very low over the following five months with only the occasional heavy vehicle failing to comply.

Findings from the project are being incorporated into a national communication package - *life before your eyes* - to ensure the resource is an effective tool for educating the public and communicating the level crossing safety message.⁹³

The CRC for Rail Innovation in its recent study on the effectiveness of engineering, enforcement and education approaches to improving level crossing safety, reported that:

'Reviewing the evidence of the effectiveness of road safety campaigns reveals that many have typically been developed in a haphazard manner, and may have limited effectiveness in improving road safety. Mass media advertising, such as those used by all jurisdictions in Australia to tackle level crossing safety and the 'Operation Lifesaver' program in the United States and Canada, have neither been evaluated for effectiveness in terms of actual or intended behaviour. Additionally, in Australia campaigns have typically been isolated (i.e. not involving increased police presence) and therefore have not attempted to apply principles for maximising the effectiveness of road safety campaigns. ...

It is well known that theoretically grounded campaigns developed in accordance with research and targeting specific road safety issues can provide a more effective means of risk management. Indeed research investigating the effectiveness of educational programs targeting specific road safety issues has found programs to be highly effective in reducing road crashes. ... Finally, evaluations of cost / benefit ratios ... of road safety initiatives programs, suggests that education and advertising campaigns produce high incremental returns as compared to alternative methods of risk management such as engineering approaches. These positive research outcomes coupled with this favourable economic evaluation, suggests that the current investment in road safety programs is below optimal and warrants further research into theoretical models and evaluative research appropriate for effective program development.

With engineering approaches at railway level crossings no longer being a viable option in terms of cost, the role of targeted educational interventions in

⁹³ Taylor K (2008) *Addressing road user behavioural changes at railway level crossings*. Paper delivered to the 2008 Joint ACRS-Travelsafe National Conference, 18 & 19 September 2008, Brisbane.

informing future programs needs to be examined. Without the evaluation of targeted interventions for specific road user groups, campaigns and programs generated by government authorities will no doubt be developed without the application of theory or the findings from scientific evidence.’⁹⁴

The ARA supports driver education, including a community-based program, which might utilise some concepts from Operation Lifesaver. It is however essential that these programs are based on research, coupled with enforcement programs and evaluation studies.

9.3 The Intelligent Access Program

Driver behaviour at crossings could be improved through the incorporation of level crossing safety into the *Intelligent Access Program* managed by Transport Certification Australia Ltd, a government owned organisation.

The *Intelligent Access Program* (IAP) using GPS monitoring, aims to facilitate improved road access for heavy vehicles granted by road authorities, in exchange for agreement that the vehicles are monitored on their compliance with the conditions of access, such as permitted route and time of travel. National model legislation has been developed and enacted by some state governments.⁹⁵ In a submission by Transport Certification Australia (TCA) to the Parliament of Victoria’s Road Safety Committee, the company suggested that an IAP-type solution to crossing safety could be developed. The Road Safety Committee noted in its report that:

‘The TCA proposed that the IAP could monitor a vehicle’s location and in combination with in-locomotive and at-crossing devices, would generate an alert or warning for both the heavy vehicle driver and locomotive.’⁹⁶

The Road Safety Committee recommended that the feasibility of incorporating the monitoring, and later the enforcement of driver behaviour at railway level crossings into the IAP, be investigated.⁹⁷

The ARA supports that Committee’s recommendation.

The ARA notes that the IAP, although developed for heavy vehicles, has the potential to be introduced into all vehicles. Importantly, it could operate at passive crossings, and has the potential to be used for enforcement purposes.

9.4 Other Enforcement Measures at Crossings and on Trains

The CRC study on the effectiveness of engineering, enforcement and education approaches to improving level crossing safety⁹⁸, and the Parliament of Victoria’s

⁹⁴ CRC for Rail Innovation (2008) *Railway level crossings Research Database*, pages 56 & 57.

⁹⁵ Transport Certification Australia website viewed on 12 January 2009.

⁹⁶ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, pages 117 & 118.

⁹⁷ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, recommendation 43 (a), page 118.

⁹⁸ CRC for Rail Innovation (2008) *Railway level crossings Research Database*, page 46.

Road Safety Committee report on improving safety at crossings⁹⁹ contain sections on trials of technology-supported measures to support enforcement and change driver behaviour. These measures include the use of red light cameras and video cameras at crossings.

The ARA strongly supports the use of red light cameras and video cameras at crossings.

Some rail operators have installed video cameras on trains to record crashes, near-misses and as a deterrent to infringements by road users. One company is conducting a trial, whilst others are investigating the matter. Agreement will, however, need to be reached with enforcement authorities on the recognition of video camera evidence for enforcement purposes.

Main points about driver education & the enforcement of road rules

Driver education should be based on research, and supported with enforcement programs.

Driver behaviour and the enforcement of road rules could be improved through the use of technology, including the Intelligent Access Program and Red Light Cameras.

⁹⁹ Parliament of Victoria, Road Safety Committee (2008) *Inquiry Into Improving Safety at Railway level crossings*, page 63.

10. RESEARCH

10.1 Issues Raised by the Committee in 2004

The Committee, with respect to research, stated in its 2004 report that it had visited the former Co-operative Research Centre for Railway Engineering and Technologies and was aware of its work into level crossing risk management, including the development of a community based intervention and education program to promote safe level crossing behaviour. The Committee stated that it “strongly endorses the value of such research and considers that the Australian, state and territory governments ought to support and participate in the development of the CRC’s program.”¹⁰⁰ The ARA supports these comments.

10.2 Current Research Issues

The Committee did not make a recommendation on research but the Australian Government in its response to another recommendation stated that it “supports the continuation of research into different forms of warning systems”.¹⁰¹

The ARA strongly agrees with the Australian Government’s support for research into different forms of warning systems.

The CRC for Rail Innovation has identified level crossing safety as an important issue for research, and has recently completed a major study on the effectiveness of engineering, enforcement and education approaches to improving crossing safety.¹⁰² On the matter of research, this recently completed report concluded in its executive summary, that:

‘A detailed human factors approach to level crossing safety is paramount in understanding how the capabilities and limitations of motorist performance is relevant to the design, operation and evaluation of railway level crossings. With motorist error being a major contributory factor in many level crossing collisions, consideration of the human element is essential when aiming to reduce collisions and improve safety on the rail network. The ultimate aim of this detailed approach would be to consider human factors to evaluate and improve current railway level crossings.

More information is needed regarding:

- *The true picture of near-miss occurrences, particularly with heavy vehicles;*
- *the extent to which attentional blindness/situational awareness plays in violations at passive crossings;*

¹⁰⁰ Parliament of the Commonwealth of Australia, House of Representatives Standing Committee on Transport & Regional Services (2004) *Train Illumination: Inquiry into some measures proposed to improve train visibility and reduce level crossing accidents*, page 19.

¹⁰¹ Truss W (2005) *Response of the Australian Government to the Report of the House of Representatives Standing Committee on Transport and Regional Services*, page 11.

¹⁰² For example the CRC’s research project on “New Affordable Level Crossing Protection Systems for Crossings in Regional Areas and Occupational Crossings in Areas with High Speed Passenger Trains”, and the completed report: CRC for Rail Innovation (2008) *Railway level crossings Research Database*.

- *methods of alerting heavy vehicles to approaching trains, particularly in non-urban areas;*
- *the extent to which intentional violations occur at railway level crossings by heavy vehicles; and*
- *the importance of the human element and the capabilities and limitations of different road user groups when driving at different railway level crossings.'*

¹⁰³

In addition, the CRC for Rail Innovation is currently working with Industry, Government, and representatives from road and rail authorities to coordinate, strategise and nationally prioritise level crossing research projects.

The ARA supports this research program because all safety interventions should be based on quality research and trials, and be agreed to nationally.

Main points about research

All safety interventions should be based on research and development

¹⁰³ CRC for Rail Innovation (2008) *Railway level crossings Research Database*, page v.

11. POLICY & STRATEGY

11.1 The Shared Responsibility for Safety at Railway level crossings

In 2006, the National Transport Commission developed a *National Model Rail Safety Bill 2006* with representatives of all rail jurisdictions, the rail industry and unions.¹⁰⁴ The NSW Parliament enacted the model Rail Safety legislation in late 2008. The new *Rail Safety Act 2008* (NSW), commenced on 1 January 2009.

As at November 2008, Victoria and South Australia have enacted legislation based on the model and a Bill is before the Parliament of New South Wales. Queensland, Western Australia and the Northern Territory are proposing to introduce legislation, whilst Tasmania has been granted an extension by COAG until the end of 2009.¹⁰⁵

The Minister for Transport, in his second reading speech introducing the *Rail Safety Bill* to the Parliament of Victoria, said that the Bill would establish “performance-based rail safety duties for rail operators, managers of rail infrastructure, contractors working on rolling stock or rail infrastructure, and rail safety workers including drivers and maintainers of rolling stock and infrastructure to ensure safety so far as reasonably practicable.”¹⁰⁶ The Minister said:

This effectively imposes rail safety duties and obligations on each person in the rail industry who is in a position to affect safety and clearly identifies the roles and the safety chain of responsibility between them. The duties emphasise the responsibility of each participant to take steps as far as reasonably practicable to identify hazards and manage risks to safety that are within their control. This includes persons whose influence on safety exists 'upstream', such as persons involved in design, manufacture, maintenance, repair and modification of rail infrastructure and rolling stock.’¹⁰⁷

11.2 Interface Coordination Agreements

A very important feature of the *National Model Rail Safety Bill 2006* is the obligation on rail operators and road owners to jointly manage risks at railway level crossings. A major weakness in level crossing safety in some jurisdictions is the lack of commitment by road owners to sign up to and ICA. The new provisions, which will be implemented over a three-year period will require participating parties to enter into interface co-ordination agreements (ICA's).

ICA's will require parties to identify potential risks at individual railway level crossings and share the ongoing safety management responsibilities.

The agreements will require the creation of one or more plans to combat the identified risks at each crossing. Not only will ICA's provide an environment to further manage risk at railway level crossings, they will ensure that rail operators and road owners

¹⁰⁴ National Transport Commission website viewed on 3 January 2009.

¹⁰⁵ National Transport Commission (2008) *Single, National Rail Safety Regulatory and Investigation Framework: Draft Regulatory Impact Statement*, page 9.

¹⁰⁶ *Rail Safety Bill* Second Reading, Legislative Assembly, Parliament of Victoria on 6 October 2005.

¹⁰⁷ *Rail Safety Bill* Second Reading, Legislative Assembly, Parliament of Victoria on 6 October 2005.

work together to formulate measures that manage and alleviate identified risks at each site. The legislation calls for periodic formal reviews to ensure that the risk management plans are up-to-date and practical.

ICAs are a very important development for the proper maintenance of railway level crossings. They will replace a culture where rail operators and road owners often worked independently to combat risk at railway level crossings. ICA's bring both parties to the table, but the cost of implementing the ICA is problematic. Clearly funding is a threat to the effective use of ICAs. And if this matter is not resolved, the present culture of division will continue. **The ARA recommends that State Governments provide greater support to road owners to boost the effectiveness and compliance levels of ICA's.**

The assigning of safety responsibilities to people who are in a position to affect rail safety is consistent with the 'safe system' approach to road safety.

11.3 The 'Safe System' Approach to Transport Safety

It is clearly inappropriate and simplistic to blame pedestrians and motorists for level crossing crashes, just as it is inappropriate to blame the worker who has suffered an occupational injury in a factory.

The ARA believes that the correct policy approach to the complex level crossing problem is to be found in the 'safe system' approach to transport safety.

Developed in Europe, the 'safe system' emphasises the responsibility of system designers for the design, operation and use of the transport system, and hence the level of safety within the entire system. The users are responsible for following the rules set by the system designers. If the users fail to comply with these rules due to a lack of knowledge, acceptance or ability, the system designers are required to take further steps to prevent people from being killed or injured.¹⁰⁸

Commonwealth, state and territory government policy on road safety is based on the 'safe system'. This is explained in the *National Road Safety Action Plan 2009 and 2010*:

'Safe System principles outlined in previous Action Plans continue to underpin Australia's approach to road safety improvement. A safe road system requires responsible road user behaviour, but human error is an inevitable factor in any transport system. A safe transport system makes allowance for human error and minimises the consequences: in particular, the risk of death or debilitating injury.

Roads, vehicles and travel speeds should be designed and managed to reduce the risk of crashes, and to prevent serious injury or death to people if a crash does happen.

*There are limits to the forces humans can withstand in a crash, and limits to the physical energy that can be absorbed by protective systems (such as vehicles and safe road infrastructure). Speed management is a critical factor in limiting the impact energy of crashes.'*¹⁰⁹

¹⁰⁸ Tingvall C & Lie A (2008) *Implementing the Safe System – a Progress Report*. Presentation delivered to Achieving Ambitious and Realistic Road Safety Targets: the Safe System Approach High Level Seminar, Paris, 25-26 September 2008.

¹⁰⁹ Australian Transport Council (2008) *National Road Safety Action Plan 2009 and 2010*, page 4.

The action plan states that in managing road safety, the Safe System approach requires:

- *'... designing, constructing and maintaining a road system (roads, vehicles and operating requirements) so that forces on the human body generated in crashes are generally less than those resulting in fatal or debilitating injury;*
- *improving roads and roadsides to reduce the risk of crashes and minimise harm: measures for higher speed roads include dividing traffic, designing 'forgiving' roadsides, and providing clear driver guidance. In areas with large numbers of vulnerable road users or substantial collision risk, speed management supplemented by road and roadside treatments are key strategies for limiting crash forces;*
- *regulating or encouraging high quality active and passive safety systems in vehicles, including enhanced pedestrian safety features, to reduce impact forces on occupants and on struck pedestrians and cyclists; and in the case of active safety systems, reducing the risk of a crash occurring*
- *managing speeds, taking into account the risks on different parts of the road system;*
- *advising, educating and encouraging road users to obey road rules and to be unimpaired, alert and responsive to potentially high-risk situations;*
- *using enforcement and penalties to deter road users from breaking the rules, including removing the privilege of road use from those who do not comply;*
- *programming research to identify the most cost-effective interventions for particular situations; and*
- *promoting public understanding and endorsement of the Safe System approach, and public participation in achieving a safer road system.'*¹¹⁰

Importantly, the National Road Safety Action Plan 2009 and 2010 refers to and is complemented by the National Railway Level Crossing Safety Strategy.¹¹¹

11.4 National Railway Level Crossing Safety Strategy

A national level crossing strategy was made and published by the Australian Transport Council in 2003, and is complimented by a *Draft Railway Level Crossing Safety Strategy Action Plan – 2003* written by the Standing Committee on Transport (SCOT) Rail Group, Working Group on Railway Level Crossing Safety.

The *National Railway Level Crossing Safety Strategy* states that improvements to level crossing safety are most likely to be achieved through the:

- *development and application of low cost active and passive countermeasures;*

¹¹⁰ Australian Transport Council (2008) *National Road Safety Action Plan 2009 and 2010*, pages 4 & 5.

¹¹¹ Australian Transport Council (2008) *National Road Safety Action Plan 2009 and 2010*, page 1.

- *development of consistent practice and identification of hazardous sites across Australia;*
- *identification and analysis of crash causes and factors;*
- *improved national data and associated information on crashes and risks;*
- *improved information about rail industry crash costs;*
- *improved information about crashes involving people with disabilities and other vulnerable road users;*
- *improved designs for pedestrians, people with disabilities and other vulnerable road users;*
- *improved road driver understanding and behaviour through improved training, information, education and awareness;*
- *ensuring legislation and enforcement are appropriate for the potential consequences;*
- *identification of vehicle performance parameters and railway level crossing protection timings;*
- *designing railway level crossings to suit the performance of road vehicles (especially heavy vehicles), and consistent application throughout Australia; and*
- *seek additional allocation of funds for railway level crossing treatments and closures.*¹¹²

Some of these points are reflected in the strategic actions and more detailed draft action plan of the strategy.¹¹³

It is six years since the strategy and action plan were prepared and the ARA considers that the documents should be reviewed and updated. There is no reference to ITS, rail safety legislation has changed, and a number of states have appointed independent investigators and regulators.¹¹⁴ The Parliaments of two States have conducted three inquiries into level crossing safety¹¹⁵, the ARA has identified level crossing safety as an important issue for research,¹¹⁶ whilst in May 2008, the Australian Transport Council agreed to the development of a package of level crossing safety initiatives.¹¹⁷

¹¹² Australian Transport Council (2003) *National Railway Level Crossing Safety Strategy*, page 8.

¹¹³ Australian Transport Council (2003) *Draft Railway Level Crossing Safety Strategy Action Plan – 2003*.

¹¹⁴ The Commonwealth, New South Wales and Victoria have independent crash investigators; New South Wales and Victoria have independent rail regulators.

¹¹⁵ NSW in 2004 and 2006, and Victoria in 2008.

¹¹⁶ For example the CRC's research project on "New Affordable Level Crossing Protection Systems for Crossings in Regional Areas and Occupational Crossings in Areas with High Speed Passenger Trains", and the completed report: CRC for Rail Innovation (2008) *Railway level crossings Research Database*.

¹¹⁷ Australian Transport Council (2008) *Joint Communique*, 2 May 2008, Canberra.

Although work is being undertaken on many of the issues identified in the strategy,¹¹⁸ additional resources and effort is required to reduce the large number of crossings, research crash causes, assess human factors, trial low cost countermeasures, including ITS, and increased enforcement of road rules.

Each state and territory government should develop their own strategy and action plan to improve safety at railway level crossings. The national strategy should be used as the basis for the development of these strategies which should compliment each other and embrace the 'safe system' approach adopted by road safety authorities. Importantly, funding should be provided by the States and Territories to satisfy the objectives identified in their respective strategies. The Federal Government should also assist in improving safety at railway level crossings by taking the lead in coordinating a rationalisation program of railway level crossings and where appropriate provide funding for grade separations.

The causes of level crossing crashes are complex and involve a range of factors and interventions that are not solely related to train conspicuity.

Proposed interventions should be based on quality research and trials, and be agreed to nationally.

The ARA welcomes the recently established Rail Level Crossing Group (RLCG) given that the previous National Railway Level Crossing Behavioural Coordination Group (BCG) was very successful in bringing all players together to address Level Crossing issues on a national scale. The new RLCG has the potential to take this cooperation to a new level and the ARA looks forward to the continued collaboration of rail and road authorities and Government to ensure level crossing safety is approached in a nationally coordinated manner.

The ARA believes that state and territory governments should have nationally co-ordinated strategies, funded work or action plans and safety targets that implement a mix of research supported interventions.

The strategies should also provide for the rationalisation of crossings, the upgrade and maintenance of crossings, and the grade separation of railway tracks from roads with bridges or tunnels.

Main points about policy and strategy

ICAs are a very important development for the proper maintenance of railway level.

Greater funding must be provided to road owners to boost the effectiveness and compliance levels of ICA's.

Assigning responsibilities to people who are in a position to affect rail safety is consistent with the 'safe system' approach to road safety.

The 'safe system' makes allowance for human error and recognises that roads, vehicles and travel speeds should be designed and managed to reduce the risk of crashes.

The 2003 national level crossing strategy and draft action plan should be reviewed and updated.

¹¹⁸ For example, the use of ALCAM by State Governments to assess crossings, improving crash data, improving the design of crossings for people with disabilities.

12. CONCLUSIONS

The causes of level crossing crashes are complex and involve a range of factors and interventions that are not solely related to train conspicuity.

National compliance with AS1742.7 must be mandated.

A risk assessment of all railway level crossings on B-double and B-triple routes must be undertaken and the results made public.

The Australian Government should play a leading role in supporting the **development, trialling and implementation of Intelligent Transport Systems (ITS)** applications at railway level crossings.

ITS may achieve a reduction in road-rail fatalities by alerting trains and road vehicles approaching a level crossing to the presence or approach of the other.

The Australian Transport Council should **review and update** the *National Railway Level Crossing Safety Strategy* and the *Railway Level Crossing Safety Strategy Action Plan – 2003*. Implementation of the revised strategies should be fully resourced to ensure maximum benefits. The *Strategy* should embrace the ‘safe system’ approach to transport safety.

The Australian Government should **encourage** state and territory governments to prepare **strategies, three to four year funded work or action plans and safety targets** that implement a mix of research-supported interventions.

The **local strategies and plans** should provide for the following mix of activities:

- reducing the scale of the problem by identifying and rationalising unnecessary crossings – governments should be proactive by funding and coordinating this program;
- grade separating high volume railway tracks and roads;
- upgrading passive crossings; the upgrading of passive railway level crossings to active status would reduce crashes by more than 60%;
- investigating and then introducing more cost-effective ways to upgrade railway level crossings;
- improving sighting, signs and road markings;
- reducing road speed limits to approach roads to all railway level crossings;
- reassessing all railway level crossings on B-double and B-triple routes; and
- enforcing road rules, with these activities supported by education and technology, including red light cameras, videos and the possibly, the Intelligent Access Program.

Local and national strategies and action plans should complement each other.

State and territory governments should provide **funds** to rectify known safety issues at railway level crossings. Proposed safety interventions should be based on **quality research and trials, and be agreed nationally**.

The Australian Government should play an active role co-ordinating a **research and development program** of safety interventions.

Research should be undertaken into:

- the causes of crashes, including the assessment of human factors;
- new and developing technologies, including ITS and low cost warning devices that could supplement existing signs and signals;
- perceptual and similar countermeasures; and
- targeted educational interventions with technology-supported enforcement measures.

Interface Coordination Agreements (ICA's) between rail operators and road owners need to be adopted nationally to ensure national consistency with ICA's and consequently, level crossing safety approaches.

But some road owners have difficulty in meeting the costs associated with maintaining level crossings. Where this is happening, State and Territory Governments should provide assistance.

ATTACHMENT 1

Membership of the ARA Executive Committee

Mr Don Telford (Chair) - Pacific National
Mr David Marchant - Australian Rail Track Corporation Ltd
Mr Alan Chaplin - Connex Melbourne
Mr Danny Broad - Downer EDI Rail
Mr Tony Braxton-Smith - Great Southern Railway
Mr Reece Waldock - Public Transport Authority of Western Australia
Mr Lance Hockridge - QR
Mr Rob Mason – Rail Corporation of New South Wales
Mr Terry Brady - Rail Infrastructure Corporation
Mr Bob Stobbe - TransAdelaide
Mr John Cleland - WestNet Rail
Mr Rob Barnett - V/Line Passenger

ATTACHMENT 2

ARA Analysis of Fatality Crash Reports

Crash Location	Time	Weather	Type of Crash	Passive Xs	Active Xs With Flashing Lights	Active Xs With Booms	Design Issues	Signs or Pavement Issues	Sighting Issues	Maint. Issues
Baining	Day	Fog	Train hit vehicle	Yes						Yes
Duri	Day	Fine	Vehicle hit side of train	Yes						
Ban Ban	Day	Fine	Train hit vehicle	Yes				Yes		
Ardeer	Day	Fine	Train hit pedestrian	Yes				Yes		
Somerville	Day	Fine	Train hit vehicle		Yes	No		Yes	Yes	Yes
Kerang	Day	Fine	Vehicle hit side of train		Yes	No		Yes		
Winchelsea	Day	Fine	Train hit vehicle	Yes				Yes		
Back Creek	Dusk 1830	Fine – sun glare issue	Train hit vehicle	Yes				Yes		
Virginia	Day	Fine	Train hit vehicle	Yes						
Wingeel	Day	Fine	Train hit vehicle	Yes				Yes	Yes	
Albury	Day	Fine	Train hit vehicle		Yes	No		Yes		
Lismore	Day	Fog	Vehicle hit side of train	Yes				Yes	Yes	
Horsham	Day	Fine	Train hit vehicle		Yes	No				
Benalla	Day	Fine	Train hit vehicle	Yes				Yes	Yes	
Aloomba	Day	Fine	Train hit vehicle	Yes				Yes	Yes	
Salisbury	Day	Fine	Train hit vehicles		Yes	Yes	Yes			Yes
TOTAL	15 in day light	14 in fine weather	13 trains hitting vehicle or pedestrian.	11 at passive Xs	5 at active Xs with flashing lights	1 at active X with boom barriers	1 at X with design issue	11 at Xs with sign or pavement issues	5 at Xs with sighting issues	3 at Xs with maint. issues
PER CENT	94%	87%	81%	69%	31%	6%	6%	69%	31%	19%

Source: ATSB Reports

ATTACHMENT 3

Road Rules for Drivers at Railway level crossings

Rule 121. *A driver at a level crossing with a stop sign must:*

- (a) stop as near as practicable to, but before reaching, the stop line or, if there is no stop line, as near as practicable to, but before reaching, the stop sign; and*
- (b) give way to any train or tram on, approaching or entering the crossing.*

Offence provision.

Rule 122. *A driver at a level crossing with a give way sign or give way line must give way to any train or tram on, approaching or entering the crossing.*

Rule 123. *A driver must not enter a level crossing if:*

- (a) warning lights (for example, twin red lights or rotating red lights) are operating or warning bells are ringing; or*
- (b) a gate, boom or barrier at the crossing is closed or is opening or closing; or*
- (c) a train or tram is on or entering the crossing; or*
- (d) a train or tram approaching the crossing can be seen from the crossing, or is sounding a warning, and there would be a danger of a collision with the train or tram if the driver entered the crossing; or*
- (e) the driver cannot drive through the crossing because the crossing, or a road beyond the crossing, is blocked.*

Rule 124. *A driver who enters a level crossing must leave the level crossing as soon as the driver can do so safely.*

Road Rules for Pedestrians at Railway level crossings

Rule 235 (1). *A pedestrian must not cross a railway line, or tram tracks, at a level crossing unless:*

- (a) there is a pedestrian facility at the crossing and the pedestrian uses the facility; or*
- (b) there is no pedestrian facility at, or within 20 metres of the crossing.*

Offence provision.

(2) *A pedestrian must not cross a railway line, or tram tracks, at a level crossing if:*

- (a) warning lights (for example, twin red lights or rotating red lights) are flashing or warning bells are ringing; or*
- (b) a gate, boom or barrier at the crossing is closed or is opening or closing; or*
- (c) a train or tram is on or entering the crossing; or*
- (d) a train or tram approaching the crossing can be seen from the crossing or is sounding a warning, and there would be a danger of the pedestrian being struck by the train or tram if the pedestrian entered the crossing; or*
- (e) the crossing, or a road beyond the crossing, is blocked.*

(2A) If any of the following events occurs after a pedestrian has started to cross a railway line, or tram tracks, at a level crossing, he or she must finish crossing the line or tracks without delay:

(a) warning lights start flashing, or warning bells start ringing;

(b) a gate, boom or barrier starts to close;

(c) a train or tram approaches the crossing.

(3) In this rule: pedestrian facility means a footpath, bridge or other structure designed for the use of pedestrians.

Rule 235A *(1). A pedestrian level crossing is an area where a footpath or shared path crosses a railway line or tram tracks at substantially the same level.*

(2) If a pedestrian approaches a pedestrian level crossing that has a red pedestrian light, he or she must not start to cross the crossing while the light is red.

(3) If a red pedestrian light at a pedestrian level crossing appears after a pedestrian has started to cross the crossing, he or she must finish crossing the crossing without delay.