

Feasibility Study for a Trial of Seat Belts on Contract School Buses Operating in Non Public Transport Areas of Western Australia

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ARRB Transport Research Ltd was contracted by the Western Australian Department of Transport to conduct a feasibility study into the potential of conducting a trial of seat belts in contract school buses in non-public transport areas. The purpose of this review was **not** to determine any relevant safety issues, but to ascertain from a close examination of Australian Design Rules (ADRs), Australian Standards, the Australian Road Rules, the WA Road Traffic Act (1974) and the WA Road Traffic Code (1975), whether it is technically possible to conduct such a trial, and whether any issues exist among these documents which might have an impact on conducting a trial. In addition, the issue is further examined to determine the potential cost and capacity implications for the WA school bus fleet if the WA Government proceeds with legislation or a code of practice to initiate the use of seat belts in school buses. The purposes of any seat belt trial (if one is conducted) would be to:

- ?? gauge the public reaction to having seat belts on buses;
- ?? determine whether students will wear them if they are provided;
- ?? determine the problems faced by drivers and other parties involved; and
- ?? determine the impact on the capacity of buses.

This report summarises developments in overseas jurisdictions relating to the fitment and legislative requirements associated with seatbelts in buses. It examines the current status in other States and Territories in Australia with regard to seat belts on school buses. The report also presents a discussion of vehicle design issues, as they relate to the vehicles used to transport children to and from school in Western Australia, identifying concerns and difficulties for consideration should a trial of seatbelts be developed for contract buses in this jurisdiction. Finally, cost and capacity implications for conducting a trial and for implementing seat belts on school buses are presented.

Australian Design Rules Relevant to Seat Belts on School Buses

Seven ADRs relate to the fitment of seat belts in motor vehicles (including buses). ADR 68/00 is most relevant to a trial of seat belts on school buses as this is the ADR in which each bus and its fitting requirements are specified.

All contract school buses in Western Australia have, by specification, low back seats (less than 1.0 metres) and are therefore exempt from ADR 68/00. In addition, there are indications in all of the relevant ADRs which clearly show that school buses are not included in the definition of "route service omnibuses", making them eligible to be fitted with seat belts, and therefore subject to these regulations if they are so fitted.

ADR 68/00

This ADR applies to omnibuses over 3.5 tonnes (MD3, MD4 and ME) which seat more than 17 persons (including the driver and crew), and in which all seats have a reference height (seat back height) greater than 1.0 metre. That is, high-backed bus seats. None of the current WA school bus fleet meet this requirement. This is interpreted to mean that buses with low-back seats cannot be fitted with lap-sash seat belts. For lap-sash seat belts to be fitted to school buses in WA, the buses must first be modified to incorporate high-back seats. ADR 68/00 specifies that in these vehicles (with seat backs greater than 1.0 metre in height), all front and rear seating positions be equipped with seatbelts. The ADR indicates that Route Service Buses are exempt from the requirements prescribed.

The ADR specifies the requirements for seat belts in buses including the strength of seats, seat-anchorage, seatbelt anchorage and, child restraints anchorage, and the provisions for protecting occupants from impact with seat backs and accessories on seats and arm rests. The most relevant section of this ADR states that each seat is to be fitted with a *Seatbelt Assembly* (5.4.1).

What action is expected to take place in the foreseeable future in ADRs with regard to seat belts on school buses?

The Australian Transport Safety Bureau has reported to the project team that no plans are in place for any National Legislation or Regulation relating to fitment of seat belts on school buses. The ATSB is, however, currently undertaking a study of seat belts in buses. The issue is expected to be mandated on a State-by-State basis, with individual jurisdictions enacting their own legislation as and when they see fit. The summary of Australian jurisdictions presented in Section 6.4 of this report provides information that is available at the present time relating to this question.

Identification of any gaps or contradictions within ADRs and between ADRs and other legislation

There are some discrepancies both within and between some Australian Design Rules regarding seat belts and seat belt anchorages. These are described in full in the body of the report (see Section 5.1 and 5.2).

Implications for a trial of seat belts on school buses from ADRs

Several implications for conducting a trial have been identified. These include:

- 1 All buses to be used in a trial must have high-back seats, or seats with a reference height of at least 1.0 metre in order to be fitted with seat belts.
- 2 Lap-only belts cannot be used on buses of any size.
- 3 The number of anchorage points required on buses with varying floor structures must be clarified prior to any trial of seat belts on school buses.
- 4 There are two potential options for fitting seat belts to school buses: either retro-fit current buses with appropriate equipment, or purchase new vehicles which meet all ADR requirements. If current fleet buses are used in a trial, they would need to be retro-fitted to meet ADR 68/00 (*Occupant Protection in Omnibuses*) standards. This retro-fitting, unfortunately, cannot be carried out on some of the buses in the current contract school bus fleet, including *all* Toyota vehicles, and any vehicles which seat less than 12 persons. An alternative would be for Transport WA to purchase new vehicles which are fully ADR 68/00 compliant to be used specifically for the trial.
- 5 The retro-fitting might include (depending on bus type) structural changes or modifications to the following sections of the bus:
 - a The bus floor must be strengthened and fitted with appropriate anchorage fittings for withstanding the required forces for relevant crash test requirements to be met;
 - b The bus seats must all be replaced with high-back seats as low-back seats cannot be fitted with lap/sash seat belts and are not ADR 68/00 compliant;
 - c The side walls and/or pillars of the buses must be reinforced to withstand the anchorage points required for the lap/sash belts required; and
 - d The anchorage points for the seats will need to be modified to account for additional anchorage points necessary to accommodate seat belt fittings.
- 6 The three-for-two seating system currently in place would not be applicable if buses are fitted with seat belts. That is, each seat could only hold as many passengers as there are seat belts provided for.

Gaps in the WA Road Traffic Code and Act

The WA Road Traffic Act 1974 does not contain any legislation or regulation pertinent to seat belts. The Australian Road Rules (which may or may not be adopted by the WA government) show the age at which an individual becomes responsible for their own seat belt usage as 16 years. In the WA Road Traffic Code (1975), the age of responsibility in motor vehicles (which does **not** include buses) is 14.

The main difficulty with the issue of responsibility for wearing seat belts (which is *only* addressed in the WA Road Traffic Code 1975 and the Australian Road Rules) is the fact that neither legislation provides for the responsibility of ensuring compliance with seat belt usage in omnibuses of any size or type (with the exception that the driver of an omnibus must ensure he or she wears their own device).

Implications from the WA Road Traffic Code 1975 for a trial of seat belts in school buses

Options to ensure students wear seat belts on school buses include:

- ?? Legislation to assign responsibility; and

?? Making the wearing of seat belts a condition of travel.

Australian Standards relevant to Seat Belts in School Buses

Ten Australian Standards were identified which apply to seat belts, their design, assembly and the performance testing of individual components. The most relevant of these is AS 2596:1995 *Seat Belt Assemblies for Motor Vehicles*.

AS 2596:1995 Seat belt assemblies for motor vehicles

This standard was developed to provide minimum performance requirements for seat belts in order to promote the provision of a high level of protection for persons travelling in motor vehicles. It specifies the requirements for seatbelts assemblies and part assemblies, intended for use with adults and larger children, or in conjunction with approved child restraints.

This standard specifies that the belt or restraint system applied must be designed so that, when it is correctly installed and properly used by a vehicle occupant, satisfactory operation can be assured and the risk of bodily injury in the event of an accident is reduced.

While the standards apply to seatbelts in general, there is no specific mention regarding the application of these standards to seatbelts on either buses in general or school buses in particular. However, if seat belts are fitted to school buses, they will be required to meet AS2596:1995 standards.

Summary of “Gaps” in all Legislation, Standards, ADRs and Regulations

While the most serious of the gaps and discrepancies in ADRs, the Australian Road Rules, the Australian Standards, and the WA Road Traffic Code have been illustrated above or further in the body of this report, it should be noted that there are numerous additional potential problems associated with the fitment of seat belts to school buses.

Current Developments Pertaining to Fitment of Seat Belts in School Buses

International information on the current status with regard to seat belts on school buses was an additional objective of this project. Specific information was obtained from the United States of America, Canada and the United Kingdom. Summaries of the findings for these jurisdictions are presented in the Table below.

Jurisdiction	Seatbelt Fitment		Seatbelt Use
	Required	Not required	
United States	<i>School buses:</i> - less than 4.5 tonnes.	<i>Large school buses:</i> - 4.5 tonnes or more. NB: other safety standards apply	Voluntary compliance. No policy to mandate seatbelt use.
Canada	<i>Small Buses:</i> - less than 4.5 tonnes - not school buses	<i>Large Buses:</i> - 4.5 tonnes or more	
United Kingdom	<i>Minibuses</i> - carrying 9-16 people <i>Coaches:</i> - carrying more than 16 people; - GVM more than 7.5t; & - maximum speed of more than 60mph	<i>Coaches:</i> if... - GVM 7.5t or less; or - maximum speed of less than 60mph	Mandated Persons 14 years or older must wear a seatbelts where vehicles, including buses, are equipped with seatbelts. Bus driver is responsible for ensuing passengers under 14 years of age wear a seatbelt, where fitted.

Australia	<i>Omnibuses:</i> (ADR 68/00) over 3.5 tonnes (MD3, MD4 and ME) that have: - more than 17 seats; & - seatback reference height more than 1.0 m <i>Omnibuses:</i> (ADR 4/03) - up to 3.5 tonnes (MD1 and MD2)	School Buses	Mandated Persons 16 years or older must wear a seatbelts where vehicles, including buses, are equipped with them. In buses with 12 seats or less, the bus driver is responsible for ensuring passengers under 16 years of age wear a seatbelt, where fitted.
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Comparison to the Australian Situation

State-by-State regulations and the differences between them are shown in two Tables on pages 20 and 21 of this report. No Australian State or Territory currently has in place legislation or regulations which require seat belts to be fitted to school buses, but some States are examining the issue and discussing potential trials.

Capacity Implications of Fitting Seat belts to School Buses

The Table below shows the number of buses in the current fleet for which additional services would have to be provided if seat belts were introduced (using four-seater rows – see later section which describes five-row seats being manufactured with seat belts).

Number of School Buses the routes of which would require additional vehicles to service passengers at existing carriage rates if seat belts were fitted

Vehicle Category/ Type	Number of Vehicles in Current Fleet	Number of Vehicles Carrying 70% or Above Adult Seated Capacity
Toyota	346	103
MD4	29	8
ME	434	434
TOTAL	809	545

The full capacity implications are difficult to estimate, and are dependent upon which seating arrangement is chosen for new buses. The above figures relate to the existing bus fleet only. Cost calculations (below) are calculated based on a 90%-10% split of MD4 and ME buses respectively. That is, it is estimated that 90% of the additional vehicle requirements could be catered for using a smaller MD4 vehicle, while 10% may require the larger ME category buses.

Cost Implications of Fitting Seat Belts to School Buses

As stated above, there are two potential options for fitting seat belts to school buses: retro-fit existing vehicles (where possible); or replace current buses with new vehicles. The cost implications for both retro-fitting vehicles and for replacing vehicles are shown here.

If a bus is to be modified to fit seat belts (where possible), what is the cost (estimated figure) for a small and large vehicle?

The costs to modify the existing MD4 class buses, based on quotes obtained from numerous providers of such services shows an *average* cost of \$23,000 per bus. For the ME class vehicles, the cost of retro-fitting each bus to meet ADR 68/00 would be approximately \$35,000 per vehicle. These costs include modifications to walls, floors, replacement of seats and fitting of seat belts and all required anchorages. The total cost for the current school bus fleet (based on figures above) for retro-fitting would therefore be approximately \$25 million.

If buses need to be replaced, what are the costs of purchasing new vehicles fitted with seat belts?

If the replacement option is chosen, then Transport WA would be faced with an increase in the cost of servicing capital relative to the price of the new buses. The rates for depreciation and return on investment would not change, but obviously the dollar amount this represents would increase (due to increased costs for vehicles).

Costs obtained for this project indicate that the replacement of the MD4 vehicles would cost approximately \$145,000 each, while ME category vehicles would cost about \$190,000 each. The approximate total charges (exclusive of GST and on-road costs) therefore, would be approximately \$140 million. Details of these costs are shown in Section 8.1.3 of this report.

Using the above figures for new buses, the capital cost to Transport for a new fleet would translate to approximately \$140 million over a ten to fifteen year period. Neither this cost nor the figure above for retro-fitting includes the additional costs due to capacity implications resulting from the introduction of seat belts on school buses. These costs are discussed in a later section.

How do these costs translate to the whole fleet?

The following sections show break-downs of the costs for both retro-fitting seat belts on existing school buses and also costs to replace the entire existing WA Contract School Bus fleet with buses which are fully ADR68/00 compliant.

What is the cost due to reduced seating capacity?

The above information relating to capacity implications from fitting seat belts to school buses is used to estimate the costs for these impacts. The actual cost calculations can only be conducted at today's costs, and it must be noted that future increases in vehicle costs cannot be estimated at this time.

According to information received from Transport WA, approximately 550 of the current 809 services will have their seating capacity impacted from the introduction of seat belts. As stated above, about 90% of these could be catered to with the addition of a smaller (MD4) category vehicle, while the remaining 10% would require a larger (ME category) vehicle to cater for the reduced seating capacity. This means 495 services would require extra smaller buses, while the remaining 55 would need to be serviced with a larger ME bus. Under Transport WA's current practice for capital cost payments, this translates into a cost of approximately \$34 million per annum.

The length of a trial of seat belts on school buses required to produce reliable results

A trial in which the evaluation of a number of non-safety-related criteria could be conducted in a period which includes one school year during which data is collected, and approximately three to four months in addition for pre-trial development and post-trial evaluation. This *does not* include the time required to fit buses with the seat belt assemblies required for the purposes of the trial, and also *does not* include the time that would be needed to develop, adopt or establish, and legislate (where necessary) any rules or regulations relating to the responsibility of wearing seat belts during the trial on the buses which are fitted with seat belts. Further details of such a trial are discussed in the Conclusions Section of this report.

Conclusions Relating to the Currently Proposed Trial of Seat Belts in Contract School Buses

It would be possible to conduct a trial of seat belts on school buses to provide information on factors which would be of interest and relevant to any eventual implementation of their use in school buses. The nature of the project could include the development of education programs for participating drivers, schools and students; determining compliance rates; evaluating comfort ratings provided by passengers of different age groups; and general acceptability of the seat belts by the users. Various types of signage to be used inside the vehicles to ensure passengers are aware of their (relative) responsibilities for wearing the provided seat belts could also be tested for effectiveness. These factors have all been shown in research to be important to the ultimate success of any implementation of seat belts in school buses.

The necessary data to be gathered from a trial such as that outlined briefly above could be conducted over a period of one school year. Additional time will be required to design the study and to fit the buses with seat belts in the pre-trial period, and a further eight weeks or so to evaluate the data and prepare the report would be required at the conclusion of the data gathering stage. Results would be

gathered through survey, interview and focus group discussions with school representatives, students on the buses fitted with seat belts, students (and their parents) on buses not included in the trial (to ascertain level of interest or demand among passengers for seat belts), and bus drivers. The results of such a study would provide the Government with a good indicator of the potential for any successful implementation of seat belts in school buses in Western Australia.

REFERENCES

ADR 68/00

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