MONASH University
Accident Research Centre

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CAMERA EFFECTIVENESS AND BACKOVER COLLISIONS WITH PEDESTRIANS: A FEASIBILITY STUDY

by

Brian Fildes

Stuart Newstead

Michael Keall

Laurie Budd

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Camera effectiveness and backover collisions with pedestrians: a feasibility study

Author(s):

Brian Fildes, Stuart Newstead, Michael Keall, Laurie Budd

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Abstract:

This study set out to examine the feasibility of mounting an international project to determine the extent of injury due to reversing vehicles colliding with Vulnerable Road Users (in particular pedestrians and bicyclists) and the effectiveness of reversing cameras to address this road safety problem. There were a number of key findings.

Preliminary analyses of police reported and in-depth data from Australia and overseas showed that backover crashes involve all road users and span all injury outcomes. However national police data alone, even if sourced from multiple countries, is not sufficient to define the full extent of backover crashes. The data needs to be supplemented with information from non-road traffic crashes, as many occur in settings that are outside the scope of official traffic injury data collections (i.e. when not on public roads). An internationally based study involving major Australian, European and US organisations is proposed and a four-tier research program is outlined.

There is also a need to better understand the events leading up to a backover crash if the aim is to help maximise the benefits of camera or other technologies. In this regard it may also be important to use information programs to highlight the limitations of this technology.

The US is presently working towards developing a new Regulation on Backover Crash Avoidance Technologies, while algorithms to support the automatic detection of pedestrians by camera systems are under development in Europe and may improve the detection of pedestrians for both forward and rearward facing cameras. As part of the background to its proposed regulation, the US has examined reversing technologies and may favour the fitment of reversing cameras, especially if costs can be reduced.

Key Words:

crash, injury outcome, reversing camera, data, feasibility

Monash University Accident Research Centre,
Building 70, Clayton Campus, Victoria, 3800, Australia.
Telephone: +61 3 9905 4371, Fax: +61 3 9905 4363
www.monash.edu.au/muarc

PREFACE

Project Manager / Team Leader:

Professor Brian Fildes

Research Team:

- Associate Professor Stuart Newstead
- Dr. Michael Keall
- Ms Laurie Budd

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GLOSSARY OF TERMS

ANCAP	Australasian New Car Assessment Program
BACKOVER	A collision in which a pedestrian or cyclist is struck by a reversing vehicle
BASt	Federal Highway Research Institute (Bundesanstalt für Straßenwesen)
CARE	Community Road Accident Database of the European Union
CARRS-Q	Centre for Accident Research and Road Safety - Queensland: QUT
CCIS	Cooperative Crash Injury Study – UK In-Depth Database
DCA	Definitions for Classifying Accidents
DfT	Department for Transport, UK
DG MOVE	Directorate-General for Mobility and Transport (European Commission)
EACS	European Accident Causation Study
ETAC	European Truck Accident Causation study
ETSC	European Transport Safety Council
EU 15	European Union 15 member states
GIDAS	German In-Depth Accident System
GRSG	United Nations Global Road Safety Group
HASS	Home Accident Surveillance System (UK)
LASS	Leisure Accident Surveillance System (UK)
MAIDS	Motorcycle Accident In-Depth Study
MUARC	Monash University Accident Research Centre
MMH	Medical University of Hannover (Germany)
MUNDS	MUltiple National Database Study
NCIS	National Coronial Information System (Aus)

NHTSA	National Highway Traffic Safety Administration (US)
NiTS	Not-in-Traffic Surveillance system (US)
NPRM	Notice of Proposed Rulemaking
NRMA	National Roads and Motorists' Association (NSW)
OECD	Organisation for Economic Co-operation and Development
OEM	Original Equipment Manufacturer (automotive)
OTS	On-The-Spot crash investigation study (UK)
PENDANT	EU Pan-European Co-ordinated Accident and Injury Database
RACV	Royal Automotive Club of Victoria (Aus)
RAIDS	Road Accident In-Depth Study (UK In-Depth study)
ROSPA	The Royal Society for the Prevention of Accidents (UK)
STATS19	National Police Database (UK)
STBA	Statistisches Bundesamt Federal Statistical Office (Germany)
TAC	Transport Accident Commission of Victoria (Aus)
TRL	Transport Research Laboratory (UK)
TSRC	Transport Safety Research Centre, Loughborough, UK
VEMD	Victorian Emergency Minimum Dataset (Aus)
VISAR	Victorian Injury Surveillance and Applied Research System

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EXECUTIVE SUMMARY

This study for the Australian Department of Infrastructure and Regional Development set out to examine the feasibility of mounting an international project to determine the extent of injury due to reversing vehicles colliding with Vulnerable Road Users (in particular pedestrians and bicyclists) and the effectiveness of reversing cameras to address this road safety problem.

Study Aims and Objectives

The study involved discussions with government representatives in the US, Germany, the European Commission and the Department for Transport in the UK, as well as undertaking preliminary data analyses in Germany and Australia on the extent of the problem and crash circumstances. Previous published literature was also addressed to gain a comprehensive understanding of the problem.

If feasible, an international collaborative study may be considered, bringing together international crash data of backover collisions using meta-analysis methodology as developed in the MUNDS research approach, described in detail in a recent publication by Fildes et al (2013).

Major Findings

Data Suitability

National (police) data was available in the four countries visited and was reasonably consistent in the crash and injury outcome factors collected. These data were able to identify backover collisions using various descriptors available, albeit of relatively small numbers per database. Each organisation was willing to be involved in a collaborative study if it were to go ahead.

It was apparent, however, that national police data alone, even if sourced from multiple countries, is not sufficient to define the full extent of backover crashes. These data need to be supplemented with information from non-road traffic crashes, as many incidents occur in settings that are outside the scope of official traffic records (i.e. when they occur on other than public roads).

Extent of Backover Collision Research

Previous research by Austin (2008) estimated that there were approximately 18,000 backover collisions annually in the US of which only 4,000 (22%) occurred on public roads and highways. The majority were in driveways, parking lots and workplaces and not reported to the police. Hence, there is a need to source other health-related databases to appreciate the full extent of the problem.

Apart from the US, none of the other transport departments or agencies visited was actively involved in research on this issue and able to identify the extent of these non-road traffic crashes and injuries in their region. Better protection of Vulnerable Road Users was however of concern to all countries and all expressed interest in knowing more about the extent and characteristics of these crashes.

German Analyses

A preliminary analysis of GIDAS (German In-Depth Accident Study) was generously undertaken on our behalf as part of this research study. These findings showed that of the 68 backover collisions on public roads and highways investigated by the in-depth crash investigators, pedestrians were the major source of backover injury, accounting for 45% of all passenger car collisions and 48% of truck crashes. Of the people injured, 70% were females, and 74% were aged over 60 years. Children less than 9 years comprised 6% of those attended by the crash investigators on public roadways.

Pre-Crash Manoeuvres

Very little detailed information was currently available on the events leading up to a backover crash. Detailed in-depth data available in Germany, the UK and the USA would potentially be useful in addressing this shortcoming. An in-depth case analysis examining these types of crashes by the impact point, crash severity, vehicle and pedestrian/cycle movement involved, and the pre-crash scenario would be invaluable for understanding the causes of backover accidents involving pedestrians and cyclists.

Backover Crashes in Australia

Preliminary analyses were undertaken using Australian police data, National Coronial Information System (NCIS) data, Insurance (TAC) data, and Victorian Emergency Minimum Dataset (VEMD) hospital attendance data to illustrate their suitability. A number of relevant findings were reported from these analyses.

NCIS Database: Among the killed or seriously injured cases in Australia in recent times, children 0-14 years comprised 20% of severe outcomes, and as in Germany, adults, especially the aged, accounted for the bulk of these life-threatening outcomes.

National Database: An analysis of combined police data from Victoria, South Australia, Western Australia, New South Wales and Queensland was undertaken. Among single vehicle pedestrian crashes reported to the police, reverse parking manoeuvres predominated where "*reversing without due care"* was listed as driver error. Vehicles included passenger vehicles, light commercial vehicles and heavy vehicles having a Gross Vehicle Mass greater than 3.5 tonne.

Variations were noted across the states databases in many variable categories such as the make and model of the vehicle reversing, how the pedestrian was hit, and the crash location. However, for crashes that could be influenced by reversing cameras, these findings were reasonably consistent.

Surveillance Data: An analysis of the Victorian Emergency Minimum Dataset showed the extent and circumstances of those attending hospital in the state from a backover incident. While the majority of cases were not admitted, nevertheless, these data revealed a sizeable number of pedestrian injuries in backover incidents, albeit of relatively minor severity, and again confirmed many of the trends reported by the more severe crashes. It was noted that these data added value in terms of non-road backover trauma and the disproportionate number of elderly events.

Transport Accident Commission: While it was not possible to include a full analysis of TAC Insurance claims in this scoping study, nevertheless, they could supplement the findings from the national data and add extra cases of backover collisions that occur in the workplace.

Limitations

This scoping study was not intended to be a comprehensive analysis of backover crashes in Australia or internationally, but rather to highlight data issues and initial trends to indicate the importance of backover crashes and the need for further research.

The analyses presented here showed some interesting issues that could be followed-up and further confirmed the value of a more thorough international analysis with additional data beyond police reports to highlight the full extent of the problem, both here in Australia and overseas.

Potential Interventions

Camera Technologies

This scoping study further aimed to identify the likely effectiveness of reversing cameras to address this trauma. While no studies were found that had evaluated their effectiveness in backover collisions, a number of issues relevant to this objective were highlighted from the review.

Reversing cameras have the potential to highlight objects behind the vehicle for drivers when reversing, provided the driver attends to the image portrayed on the dashboard screen. However, many drivers still prefer to look rearward when backing rather than just rely on the screen image. This is also desirable as camera images are only 2D and often distorted.

Additional technology that can analyse the image automatically and provide vital feedback to the driver, and also potentially apply the brakes automatically in a hazardous situation would overcome this deficiency and enhance their effectiveness. Software capable of analysing camera images has been designed and tested overseas for forward collision avoidance and would seem suitable also for rearward motion. Unfortunately, reversing sensors in the bumper bar alone are not currently sensitive or responsive enough to reliably detect some narrow, small and moving objects.

It was also noted that the fitment of reversing cameras is becoming quite common in modern vehicles, especially among SUV vehicles which potentially are at greater risk of a backover collision, given their extra height and diminished vision capability immediately behind the vehicle.

A cost-benefit analysis is required to substantiate the cost-effectiveness of any new technologies and/or improvements when greater knowledge is available on the circumstances of these collisions.

Government Regulations

The US is presently working towards developing a new Regulation on Backover Crash Avoidance Technologies, (Docket NHTSA-2010-0162, NHTSA 2010) and examined reversing technologies, favouring the fitment of reversing cameras to address these crashes if costs can be reduced.

The Federal Highway Research Institute (BASt) in Germany identified current research work on an improved algorithm for frontal cameras to enhance detection of pedestrians (which may also be useful for reversing cameras). However there was no regulation planned at this stage by Germany to address backover collisions.

Recommendations

An internationally based study involving major Australian, European and US organisations is proposed and a four-tier research program is outlined.

There is also a need to better understand the events leading up to a backover crash if the aim is to help maximise the benefits of camera or other technologies. In this regard it may also be important to use information programs to highlight the limitations of this technology.

Algorithms capable of supporting the automatic detection of pedestrians by camera systems are under development in Europe and may improve the detection of pedestrians for both forward and rearward facing cameras. The US is presently working towards developing a new Regulation on Backover Crash Avoidance Technologies which might favour the fitment of reversing cameras, especially if costs can be reduced.

1. INTRODUCTION

Rear-end collisions are very common on our roads. Recent analysis of crashes involving two or more vehicles, showed rear end collisions amounted to over 10% of all multi vehicle casualty crashes each year. While most involved vehicle to vehicle impacts at intersections, a proportion do involve colliding with a vulnerable road user (a pedestrian, cyclist, or motorcyclist) during a backover manoeuvre, although the extent of these is unclear but would be expected to involve a pedestrian such as a child, an adolescent, or someone much older.

A particular concern is the risk of small children being run-over from vehicles belonging mainly to family members backing out of the driveway and not seeing their infant or young child behind the vehicle. In the UK for example, data collected for the Home Accident Surveillance System (HASS) and the Leisure Accident Surveillance System (LASS) from 16-18 hospital accident and emergency departments, shows in 2002, there were 202 reported incidents of backing accidents to children aged 0-4 years. Half of these were to children under 2 years and split between both genders (ROSPA 2012). Most were relatively minor crashes and no details were available on how many were killed, however, the social and emotional cost to the families is very high and often devastating for both the family and the community.

BITRE (2012) reported that in the 10 year period 2001 to 2010, there were 66 pedestrians aged 0 to 14 years killed from being struck by a four-wheeled motor vehicle around the home (7 young people per year on average). Furthermore, the report states that 483 children aged 0-14 were seriously injured around the home due to being hit by a four-wheeled motor vehicle in the eight year period 2002–03 to 2009–10 (60 young people per year on average). The majority of these were aged 4 years or younger.

Accidents involving trucks reversing are also of some concern (Austin, 2008). It has been claimed in the US that while 95 per cent of back-over accidents involve passenger cars, 5 per cent involve trucks and buses which are costly to companies as they can involve severe bodily injuries to individuals and in some cases significant property damage as well (Peterson, 2013). This indicates that it is worthwhile to investigate the degree of trauma involved in these rear-end collisions with a particular focus on injuries to young children and adults, whether existing reversing technology is playing an effective role and what else in the future can be done to prevent these injurious crashes.

Accordingly, Australia has proposed an international study on the effectiveness of reversing cameras. Depending on the results, an option could be to submit the results to the expert working party on general safety (GRSG) of the United Nations World Forum for the Harmonization of Vehicle Regulations (UN WP.29) to consider the potential for an international vehicle regulation on reversing cameras.

Project Outline

The Monash University Accident Research Centre was commissioned to undertake a preliminary study aimed at better understanding the problem. Given that backover crashes appear to be an international problem and that reversing technology is varied in design and currently only fitted to a small proportion of the fleet, it was important that the study had an international focus in order to access a larger pool of data. It was proposed that a staged approach be adopted to examine this issue and what data and methodology would be required to mount a possible international collaborative research program. This first stage involved the series of tasks outlined below:

- A minor literature review, focussed on recent publications in the international literature that have addressed the extent of the problem, injury severity, crash types and potential countermeasures and/or other solutions;

- Visits to potential collaboration partners, who had been contacted and had expressed possible interest in partnering in such a collaborative study.
- An examination of potentially suitable existing Australian data, including police reported crash data from Australian states, National Coronial Information System data for all reported deaths covering both road and non-road vehicle crashes, insurance data from no-fault injury compensation and injury surveillance data. A broad spread of data is important as police do not always attend backing crashes which occur off public roads.
- Preliminary analyses of both local and overseas data to gauge the extent of the problem and similarity of these data.
- Completion of a scoping report, outlining the findings and recommendations for how to proceed.

The project brief noted that due consideration should be given to the need for an international collaborative study with a select number of local and overseas partners. The format of this collaborative study should identify a suitable methodology among the partners, possibly using the recent MUNDS meta-analysis methodology (Fildes et al, 2013) or a multi-centre collaborative study, where each country would do their own analyses using whatever suitable data they have available within a common framework.

2. LITERATURE REVIEW

Many of the published studies examining backing and backover collisions are quite old and have various limitations, including reliance on experimental methods to determine the effectiveness of reversing technology. A minor literature review was undertaken to update and supplement earlier findings and address more topical issues related to these crash outcomes.

This study is primarily concerned with understanding accidents in which vehicles have reversed over pedestrians and the potential that camera technology may have in reducing these accidents. These accidents have been labelled as either "reversing" or "backover" collisions. Pedestrians involved in these crashes have been referred to as unintentionally run-over or impacted by a reversing vehicle. These keywords have been used in the literature search.

2.1 Backing Accidents

NHTSA (2010) describe a backover crash as a "*specifically-defined type of incident, in which a non-occupant of a vehicle (i.e., a pedestrian or cyclist) is struck by a vehicle moving in reverse*". There is some existing evidence of the extent and problems associated with accidents to pedestrians while a vehicle is reversing in North America but scant evidence elsewhere.

In the US, for example, Austin (2008) reported an estimated 292 total backover fatalities during 2007. This comprised 71 on-road crashes (from official statistics) and a further 221 deaths off-road from the newly created Not-in-Traffic Surveillance (NiTS) database. This NHTSA report further estimated that the total annual backover injuries in the US that year was around 18,000 (4,000 on-road, and 14,000 off-road). The Insurance Institute for Highway Safety (2009) noted that Government databases generally record only crashes on public roads, but most backover crashes occur in driveways and parking lots, as is evident from the above statistics.

In Canada, Glazduri (2005) reported that there are approximately 900 pedestrians struck and injured by reversing vehicles each year in Canada (Transport Canada 2004). However, he noted that this is likely to be an underestimate as it only represents those pedestrians struck in traffic situations, and not those that are injured or killed in private driveways or parking lots.

In Europe (EU 15), there were 4,130 pedestrian fatalities in 2007, comprising 10% of all road deaths. However, the proportion of these from backover crashes was not reported.

2.1.1 Children in backover collisions

There is wide concern about the risk of small children being run-over by vehicles backing out of home driveways, given that small children located behind reversing vehicles may not be easily seen, or may not be able to be seen at all, by driver's (often family members) of these vehicles.

Data collected for the Home Accident Surveillance System (HASS) and the Leisure Accident Surveillance System (LASS) in the UK from 16-18 accident and emergency departments, shows there were 202 reported backover collisions to children aged 0-14 years in 2002. Half of these were to children under 4 years and split between both genders (ROSPA 2012). They further noted that in a follow-up study over 12 years between 2001 and 2012, there were 24 reported deaths of young children killed in driveways, of which 60% were hit by a reversing vehicle. Most of these were toddlers aged 1-2 years.

In Australia, Paine et al (2002) reported an increasing concern about accidents involving young children being run over in private driveways in NSW. Between January 1996 and June 1999 (3½ years), they estimated that 17 children were killed by reversing motor vehicles, many of whom were toddlers.

CARRS-Q (2011) further reported that in a 3 year collaborative study with the Queensland Ambulance Service, low speed run-over crashes were the third most frequent cause of injury or death to Queensland children, aged between 1 and 4 years (CARRS-Q, 2011).

Mortimer (2006) reported that a minimum of 93 children were killed by backing cars in the US in 2003. Most of these accidents involved children aged less than 5 years in residential driveways with a parent or relative driving an SUV, light truck or a van. Brauni (2012) noted that while electric cars are known to be environmental friendly vehicles, they are also very quiet which has the potential of causing more frequent backing crashes than vehicles with internal combustion engines. GRSG WP.29 has established an informal working group to develop a global technical regulation for quite road transport vehicles (QRTV) to emit a pedestrian alert sound.

Relative to national road tolls these numbers don't suggest that injuries to young children from reversing vehicles are a major cause of road trauma, but young children rely on protection by adults as they are incapable of appreciating the dangers they face from vehicles.

2.1.2 Responsibility of drivers when reversing

Devito (2013) reported on the issue of the responsibility of a driver when reversing among pedestrians. He noted that the basic premise is that drivers owe a duty of care to pedestrians but that pedestrians are also obligated to exercise due care for their own safety and the safety of others.

He claimed that many pedestrians believe that they have an absolute right of way when they seek to cross or in some other way, engage upon a roadway. When pedestrians do not observe due care for their own safety, courts have found them either completely or partly responsible for the collision or injuries that result. Similarly, a driver has an obligation to maintain a proper lookout when reversing.

He notes a reverse onus in many backovers where a driver is presumed negligent unless proven otherwise. Regardless of what the pedestrian is doing, a court will likely assume that the driver is at least partially liable if he/she fails to keep a proper look out or was negligent by speeding.

2.2 Sensing Technology

Technology to identify pedestrians behind the vehicle comprises proximity sensors (ultra-sonic, electromagnetic or radar) fitted by the manufacturer (OEM) or as an aftermarket feature and, more recently, cameras aimed at detecting objects behind the vehicle. Rear sensors are activated when reverse is activated in the vehicle and become inactive when another gear is selected or when the ignition is off. They are mostly used to assist in parking or backing manoeuvres against large stationary objects.

We understand from discussions with industry that current sensors are not sensitive at detecting narrow, small or moving objects. As noted in Wikipedia (2013) "*As the system relies on the reflection of sound waves, it may not detect some items that are not flat or large enough to reflect sound, for example a narrow pole or a longitudinal object pointed directly at the vehicle or near an object*".

Reversing cameras are increasingly being fitted to assist parking manoeuvres and/or detect objects behind the vehicle. The best reversing cameras largely cut down on dangerous blind spots and make backing out of the driveway much safer if there are children, small pets, or obstacles at home or in the neighbourhood. They also help to see these things that cannot be seen in a conventional rear-view mirror (Toptenreviews, 2013).

Reversing cameras in vehicles (as shown opposite) typically have a small video camera built into a license-plate holder and include a video screen built into the dashboard. Drivers can see what is behind their vehicles when backing, providing they use the video image. If a driver looks behind or is distracted while backing, obviously, the camera image alone cannot effectively help the driver to detect objects behind the vehicle. While many OEMs are now fitting both cameras and reversing sensors to their vehicles, they are unlikely to provide a completely effective solution to backover crashes for the reasons discussed above.

2.2.1 Reversing Visibility Frequency

Automobile Clubs in Australia such as the RACV in Victoria and the NRMA in New South Wales have published what they call ratings of a vehicle's reversing visibility. It is based on a 5-star rating, published by the clubs for a range of vehicles and their reversing technology.

RACV's Reversing Visibility Index (RACV 2012) was developed to encourage motorists to compare the safety design features of vehicles. It takes into account the visible area and distance across the rear of a vehicle and whether a camera and sensors have been installed. Results are rated on a scale of zero to five stars with a rating of five indicating better reversing visibility than all other vehicles.

Not surprisingly, vehicles that have a reversing camera fitted tend to rate higher than those without. They further noted that for optimum safety, "*drivers should not rely just on a reversing camera or sensors but also check their rear-view mirror and look over their shoulder before reversing*" (RACV 2012). A copy of the RACV's listing of Australian vehicles available with reversing technology (December 2012) is listed in Appendix 1 and summarised below in Table 2.1.

Table 2.1: Summary RACV Reversing visibility index listings of cars with/without backing technologies

Vehicle Class*	Cameras only	Sensors Only	Nothing	Total Vehicles
Small cars	2	7	23	**32**
Small-Medium cars	7	19	26	**52**
Medium cars	5	7	2	**14**
Large cars	5	7	3	**15**
SUVs	28	8	20	**56**
People Movers	2	2	6	**10**
Luxury cars	15	12	2	**29**
Sports cars	3	3	5	**11**
Light Commercial vehicles	1	3	18	**22**
TOTALS	**68**	**68**	**105**	**241**

*As categorised by Australian NCAP

Of particular interest here, 29 percent of all 241 recent vehicle makes and models assessed by RACV had a camera fitted, another 28 percent had only reversing sensors, while 44 percent had no reversing technology fitted. SUVs and luxury cars had the highest proportion of reversing cameras (50 and 52 percent respectively) and the lowest proportion of no reversing technology.

Furthermore, small and small-medium size cars and light commercial vehicles had the lowest fitment rates of cameras and sensors only, compared with the rest of the vehicles assessed.

3. VISITS TO OVERSEAS ORGANISATIONS

As noted earlier, Australia contacted transport ministers/senior officials from the USA, Germany, the UK and the European Commission (EC) regarding the need for a study on the effectiveness of reversing cameras and the possibility of international collaborative research. Meetings were arranged between the lead author (Professor Fildes) and transport officials from the USA, Germany, the UK and the EC during May and June 2013 to discuss the extent of the problem in their region, any current relevant research underway, any data they have available for future research, and their willingness to collaborate on an international project.

3.1 Current research

Following a Preliminary Regulatory Impact Analysis (NHTSA, 2010), the Office of Regulatory Analysis and Evaluation in the USA have issued a Notice of Proposed Rulemaking (NPRM) on Backover Crash Avoidance Technologies (Docket No. NHTSA-2010-0162) to expand the required field of view to enable the driver of a motor vehicle to more reliably detect a person behind the vehicle during a reversing manoeuvre. This research investigated the extent and circumstances of backover pedestrian crashes in the USA.

The research focussed on a variety of technologies to mitigate these types of crashes, such as reversing camera systems, sensor systems, and mirrors to detect pedestrians, and how drivers would use these technologies. They proposed requirements that could be met by the use of reversing cameras for both passenger cars and light trucks and while a cost-effectiveness analysis showed a low Benefit-Cost-Ratio from these technologies, they sought comment on alternative, less costly but reliable systems, aimed at reducing net costs and how to increase the sensitivity of drivers to sensor warnings.

While the NPRM is still under discussion, the research behind it is available on the NHTSA website www.regulation.gov and provides a wealth of information on this topic.

Apart from the USA, there had been little previous research conducted by the other three countries/regions in relation to backover collisions. Europe certainly saw Vulnerable Road Users as a priority for improved safety, especially for pedestrians and cyclists. However, as mentioned by several of those who engaged in discussions in Europe, it would be necessary to first establish the case for backover collisions in particular as an area in need of priority attention.

3.2 Camera effectiveness research

The only definitive study found on the effectiveness of reversing cameras to detect pedestrians and cyclist seems to have been that conducted by NHTSA (2010) in developing their Notice of Proposed Rule Making, Docket NHTSA-2010-0162 mentioned above. They reported that the use of reversing cameras for both passenger cars and light trucks seemed to be the only practical system to address this problem, given that backing sensors alone seem to be less reliable at assessing pedestrian and/or cycle movements across the rear of a vehicle. They did note, however, that the costs associated with reversing cameras would need to reduce for them to be cost effective.

Another issue is that the cameras would only be effective if the driver was looking at the screen while backing and spotted the pedestrian or cyclist. It is not clear how often drivers do this, as in many instances, drivers tend to look over their shoulder while backing. Thus, the camera would need to be linked with additional sensing technology to provide an audible signal to the driver when backing and/or apply the brakes in an emergency situation, to enhance their effectiveness.

The German Federal Highway Research Institute (BASt) reported on the development of an algorithm to detect pedestrians in forward collision situations that could potentially be adapted for this purpose. In addition, many of the reversing camera performance issues raised in NHTSA (2010), including minimum camera field of view requirements, image response time, linger time, display intensity and brightness, ambient light level, and malfunction rates also need to be assessed in developing an effective reversing camera system to substantially reduce backover collisions.

3.3 Data availability

National police road crash casualty databases are maintained by the US, German, UK and EC transport departments/agencies visited as well as in Australia. While similar in objectives, these databases differ in terms of their coverage, details available and crash types captured. For the most part, inclusion in each national database requires an injury crash, but the definition of this can differ substantially across countries. Details of data available and methods used by each of the four departments/agencies visited are listed below:

3.3.1 USA Crash Data

In the USA, national road crash casualty data systems include the Fatal Analysis Reporting System (FARS) and the General Estimates System (GES). FARS contains data on a census of fatal traffic crashes within the 50 states, the District of Columbia (D.C.) and Puerto Rico. GES data is obtained from a nationally represented probability sample of police-reported crashes. A police accident report must be completed for each crash and must involve at least one motor vehicle on a roadway, resulting in property damage, injury or death.

In addition to these national data collection systems, NHTSA also collect in-depth crash data for a representative, random sample of thousands of minor, serious, and fatal crashes through the National Automotive Sampling System Crashworthiness Data System (NASSCDS). Field research teams located at sampling units across the country study about 5,000 crashes a year involving passenger cars, light trucks, vans, and utility vehicles. Trained crash investigators obtain data from crash sites, studying evidence such as skid marks, fluid spills, broken glass, and bent guard rails.

3.3.2 German Crash Data

In Germany, federal statistics on traffic accidents are collected from police reports on traffic accidents on public roads and are held by Statistisches Bundesamt (STBA). To be included in the database, there has to be at least one tow-away vehicle involved in the accident. General, aggregated data are available to the public and published in annual reports by the STBA. Information can also be accessed via the internet. More detailed disaggregated data is only available to organisations that meet strict legal requirements.

In addition, in-depth crash investigation data is also collected in the German In-Depth Accident Study (GIDAS) that aims to provide a representative sample of in-depth crash and injury data on traffic accidents for the whole of Germany. The GIDAS data is collected by the accident research units at the Medical University of Hannover (MMH) and at the Technical University of Dresden (TUD). The on-scene investigation is done by professional and semi-professional team members. The team consists of specially trained students, supported by professional accident investigators. Disaggregated data is only available to GIDAS members, including BASt and the automotive industry (for safety development).

3.3.3 European Crash Data

The European Commission (DG MOVE) manage the CARE database. It is a community database on road accidents where road users are either injured or killed in a traffic crash. Data are collected from police reports from 14 EU Countries, namely, Austria, Belgium, Denmark, Finland, France, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the United Kingdom.

The CARE system provides a means of identifying and quantifying road safety problems throughout Europe and evaluating the effectiveness of road safety measures. While existing national crash data systems are not always compatible and comparable among the countries, the Commission applies a common transformation structure using the Common Accident Data Set (CADaS) to the national data sets, allowing CARE to have compatible data. The CARE database currently contains 55 common road accident variables for which data are collected by the participating member states. The EC acknowledged that more variables and values are necessary to better describe and analyse the road accident phenomenon at EU level. More details on the Common Accident Data Set can be found at: http://ec.europa.eu/transport/road_safety/pdf/statistics/cadas_glossary.pdf

There are some limited European in-depth databases for more detailed analysis such as the European Accident Causation Survey (EACS), the Pan-European Co-ordinated Accident Injury database (PENDANT), the European Truck Accident Causation Study (ETAC), the Motorcycle Accident In-depth Study (MAIDS) and the Roadside Infrastructure for Safer European Roads (RISER) databases. However, many of these are of limited time-span, specific focus and/or mixed quality, so can only offer a snapshot of relevant data and/or are of limited use for understanding causation factors.

3.3.4 United Kingdom

The STATS19 Road Accident Dataset in the UK is managed by the Department for Transport (DfT) and contains approximately 200,000 records each year of crashes in England, Wales and Scotland since 1979. A limited set of variables of these STATS19 police reported road crashes is publicly available on the Department for Transport website. It contains a variety of information about each police-attended crash such as accident type, vehicles, casualties, time, date, location, and road condition, typical of police records. While the freely available version provides a subset of these data, a more comprehensive version can be obtained by researchers on application to the DfT in London.

The Department notes that users of STATS19 database need to be aware that while comparisons with surveys suggests that STATS19 is sufficiently representative of casualties on UK roads, the quality does vary according to the accident circumstances, locations and time of day. It is acknowledged for example that STATS19 under-reports minor collisions and specific types (e.g.; single vehicle cycle crashes).

In addition to the national data managed by the DfT, there are other sources of more detailed sample in-depth data collected and managed by the Department such as the Co-operative Crash Injury Study (CCIS) and the On-The-Spot (OTS) study. These data have been collected for many years in the UK by the Transport Research Laboratory (TRL), Loughborough University's Transport Safety Research Centre (TSRC), and Birmingham University. While these databases have provided a vital insight into how people are injured in road traffic accidents in the UK, data collection on both ceased in 2010 for financial reasons.

However, in 2013, the Department reported that a new in-depth data activity (RAIDS) is to commence in-depth data collection again in the UK. The RAIDS data system aims to develop a single or linked database system comprising OTS, CCIS, HVCIS, Fatal files and STATS19 data simultaneously, enabling the analysis of all specified sources and maximising the analytical value of these data for road safety improvement. Immediately, RAIDS will comprise 10 years of previous CCIS and OTS data (from 2000 to 2010) while new cases build up in the database. It is expected to be an ongoing data activity conducted by TRL and TSRC in the UK.

3.3.5 Non-Road Crash Data

It is recognised that national police data alone may not provide accurate assessment of the full extent of backover collisions as many of them are unreported as they do not happen on public roads and are not always attended by the police. Many occur at low speeds and may not result in serious injuries. Thus, there is a need for additional data (mainly Health data) to supplement the on-road statistics. Unfortunately, many of these databases have not been used in previous road crash analyses, given the focus on serious injuries or fatal outcomes. Indeed, they may be less necessary in other analyses that focus predominantly on road crashes. However, they are more important for the crash problem of interest here.

Unfortunately though, NHTSA were the only one of the departments/agencies visited that could offer access to hospital or non-road crash data (Hospital data may be available in the UK through the HASS and LASS databases but this will require further approvals through the national health systems). NHTSA maintain the US Not-in-Traffic Surveillance (NiTS) system. This is a virtual traffic and health data collection system designed to provide details on fatalities and injuries that occur in non-traffic crashes and in non-crash incidents. The NiTS system data is compiled from the following four sources of data:

- fatalities and injuries in non-traffic crashes recorded from police reports;
- death certificate information;
- a nationally representative sample of emergency department records; and
- NHTSA’s Special Crash Investigations (SCI) program.

In 2007, the NiTS system provided information about an estimated 1,159 fatalities and 98,000 injuries that occurred in non-traffic crashes on private roads, on driveways and in parking facilities. A major component of the NiTS system is the Consumer Product Safety Commission and the Center for Disease Control’s statistically valid injury surveillance and follow-back system known as the National Electronic Injury Surveillance System or NEISS. The primary purpose of NEISS has been to provide timely data on consumer product-related injuries occurring in the United States. In 2000, the system was expanded to collect data on all injuries. It should be stressed, however, that the NiTS is not likely to be totally representative of all non-traffic crashes and non-crash incidents.

3.4 Willingness to Collaborate

Each of the 4-departments/agencies visited expressed an interest in collaborating with Australia in helping to identify the extent of the road safety problem associated with backover collisions, with various constraints over what they could do within their organisation.

USA: As noted earlier, the National Highway Traffic Safety Administration (NHTSA) are somewhat constrained at this time, given they are in the midst of the Notice of Proposed Rule Making process on a regulation for backover collisions. Nevertheless, they are prepared to assist where possible. The significant data they have made available has been valuable to date.

Germany: BASt representatives acknowledged the value of an international research program as they were also concerned about Vulnerable Road Users. They expressed an interest in partnering in a collaborative effort with Australia and others if an international collaboration was formed to tackle this issue. They felt such a study was important and may be willing to undertake work on behalf of the consortium with some minor constraints.

European Commission: Direct access to European data was not possible, although DG MOVE representatives were willing to consider providing whatever analyses were required for the consortium. Members from DG Enterprise & Industry and DG MOVE thought a case could be made for a more detailed collaborative study involving Europe under the umbrella of either GRSG (WP29) or the OECD. They noted that the first step for European Commission participation would be to establish the case for continuing effort. A comprehensive data analysis would be required here, albeit with restrictions on factual evidence and some estimation of shortfalls.

United Kingdom: Again, the Department for Transport (DfT) was interested to assist with any further work in this area but this would have to be within available resources. The Department would be prepared to provide access to the DfT's rich data sources and possibly facilitate progress meetings in conjunction with other government meetings or through internet based means such as WebEx. Overall, DfT was very agreeable to participating in a collaborative effort, should the project continue to a more comprehensive research phase.

3.5 Research Methodology

It was noted in the introduction that an objective of this study was to examine what form an international collaborative study might take should it be shown to be feasible and warranted. This scoping study was to examine which international partners could be considered for an ongoing research program and to outline a suitable methodology among the partners. In terms of the partners, each of the four departments/agencies visited were keen to participate and had valuable knowledge and resources to contribute. Options regarding the form the methodology might take are outlined below:

3.5.1. A MUNDS Process

One possible method for undertaking a comprehensive analysis of national police data across different regions was recently developed in Europe by Fildes *et al* (2013) notably the MUNDS approach. As owners of these databases are reluctant to share individual case records due to various privacy and legal constraints, the MUNDS approach calls on these individual departments and agencies to undertake their own analysis, using a common analytic strategy, and these aggregate analyses are then combined using meta-analysis techniques. More information of the MUNDS process can be found in Fildes *et al* (2013).

The MUNDS process was developed initially to speed-up the time taken to evaluate real-world benefits of safety technologies by bringing together data from multiple databases in Europe and Australia. The MUNDS approach could therefore be used for the purposes of a collaborative international study on the effectiveness of reversing cameras.

3.5.2. A Multi-Centre Collaborative Study

An alternative but less conclusive study could involve a multi-centre collaborative approach, where each country would do their own analyses using whatever suitable data they have available (with more or less a common framework) and these data would then simply be assembled and relevant findings drawn from each of them. This would be part-way towards a meta-analysis but would not provide the same comprehensive and robust effect that a meta-analysis would.

It was clear from the discussions with all agencies visited that national police data alone will not be sufficient to describe the extent of backover crashes, due to limitations regarding police-attendance at non-traffic incidents which can occur on private roads, driveways, and parking lots. As demonstrated by

NHTSA (2008), police recorded incidents may only account for 20 to 25 percent of the real figure. National police data, therefore, needs to be supplemented by other health and insurance data sources, such as the NiTS or surveillance and coronial fatality data, to offset this deficiency.

3.5.3. Pre-Crash Circumstances:

It was further noted that to better understand the processes leading to a backover collision and the extent and limitations of reversing cameras to address these severe collisions with vulnerable road users, a more detailed case-by-case examination would be required, using in-depth crash data in conjunction with the national crash data findings. Most of the departments and agencies visited collect both national and comprehensive in-depth crash data and were willing to provide access to these data too and assist in establishing a more complete and definitive account of these crashes and potential interventions.

It is clear from the discussions with the four departments and agencies visited that any ongoing study of camera effectiveness in backover crashes needs to be a multi-purpose study, comprising a number of the elements outlined above. From this, an accurate estimate of the extent of the problem in participating countries may be able to be determined and thus, the cost effectiveness of new initiatives (regulations, guidelines, community programs to encourage greater and more effective systems) can be determined.

3.5.4. Summary from the Visits

It was noted that the departments and agencies visited during the scoping study were especially willing to be involved in a continuing international research program as there is a general acceptance of the importance of reducing backover collisions, particularly those involving young children. With a thorough examination of the full extent of these crashes, both locally and internationally, the need and justification for any further regulation and countermeasure development will be apparent and could lead to a concerted and harmonised approach to the problem.

4. PRELIMINARY DATA ANALYSES

Preliminary data analyses were conducted in two regions to provide some evidence on the extent of these crashes in Europe and Australia. These are discussed separately below.

4.1 GIDAS Analysis

The Medical University of Hannover (MHH) is the data collection agencies for BASt in-depth in Germany and they have been collecting these data since the early 1970s. During a recent visit by the author to this Centre, the Director, Professor Dietmar Otte agreed to run some simple analyses of the GIDAS database looking for the number of backover cases included between 1999 and 2012 involving cars and trucks. These results are shown in Tables 4.1 and 4.2 below.

Table 4.1: Recorded on-road vehicle crashes – GIDAS* 1999 to 2012

BREAKDOWN	TOTAL	DRIVING DIRECTIONS			
		STANDING	FORWARD	REARWARD	UNKNOWN
ALL CASES – STANDING, FORWARDS, REARWARDS OR UNKNOWN WITH RANGE OF ROAD USERS					
TOTAL	**30,434**	**2.703**	**27,327**	**371**	**33**
Car	11,736	1,291	10,378	55	12
Truck	1,330	118	1,210	2	-
Motorcycle	2,195	208	1,960	26	1
Bicycle	4,654	382	4,191	74	7
Pedestrian	2,177	26	1,977	168	6
Object	1,345	29	1,312	4	-
Multiple	6,353	603	5,728	20	2
Other/unknown	644	46	571	22	5
PASSENGER CAR– STANDING, FORWARDS, REARWARDS OR UNKNOWN WITH RANGE OF ROAD USERS					
TOTAL	**27,689**	**2,478**	**24,865**	**315**	**31**
Car	10,625	1,189	9,380	44	12
Truck	1,014	89	924	1	-
Motorcycle	2,060	191	1,845	23	1
Bicycle	4,336	356	3,904	70	6
Pedestrian	2,022	23	1,852	141	6
Object	1,258	28	1,226	4	-
Multiple	5,810	559	5,232	17	2
Other/unknown	564	43	502	15	4
TRUCK – STANDING, FORWARDS, REARWARDS OR UNKNOWN WITH RANGE OF ROAD USERS					
TOTAL	**2,745**	**225**	**2,462**	**56**	**2**
Car	1,111	102	998	11	-
Truck	316	29	286	1	-
Motorcycle	135	17	115	3	-
Bicycle	318	26	287	4	1
Pedestrian	155	3	125	27	-
Object	87	1	86	-	-
Multiple	543	44	496	3	-
Other/unknown	80	3	69	7	1

**GIDAS has been shown to be a representative sample of the STBA national database*

Pedestrians (and bicycles) featured highly in terms of reversing accidents in the GIDAS analysis, as did passenger cars over light commercial vehicles. While the overall numbers are small, they are, nevertheless, considerable compared with other vehicles or objects struck in reversing manoeuvres.

Table 4.2: Reversing vehicles into pedestrians – GIDAS* 1999 to 2012

BREAKDOWN	TOTAL	INJURY SEVERITY COLLISION PARTNER			
		UNINJURED	MINOR	HOSPITAL	DEAD
ALL CASES – PASSENGER CARS AND TRUCKS					
TOTAL	**168**	**-**	**99**	**68**	**1**
Male	57	-	36	20	1
Female	111	-	63	48	-
0-9 yrs	6	-	2	4	-
10-19 yrs	3	-	1	2	-
20-59 yrs	52	-	40	12	-
60+ yrs	107	-	56	50	1
VEHICLE - PASSENGER CAR					
TOTAL	**141**	**-**	**89**	**51**	**1**
Male	46	-	31	14	1
Female	95	-	58	37	-
0-9 yrs	5	-	2	3	-
10-19 yrs	1	-	-	1	-
20-59 yrs	48	-	39	9	-
60+ yrs	87	-	48	38	1
VEHICLE – TRUCK					
TOTAL	**27**	**-**	**10**	**17**	**-**
Male	11	-	5	6	-
Female	16	-	5	11	-
0-9 yrs	1	-	-	1	-
10-19 yrs	2	-	1	1	-
20-59 yrs	4	-	1	3	-
60+ yrs	20	-	8	12	-

**GIDAS has been shown to be a representative sample of the STBA national database*

When looking just at pedestrian backovers, it is clear that the group most at risk are the elderly (aged 60 and above) and women in particular. This pattern is consistent for both cars and trucks. Of particular note, there were very few children either 0 to 9 or 10 to 19 years involved in the GIDAS cases. It should be remembered that GIDAS is driven by police attendance at the crash and therefore is a reflection of what police-reported crashes in Germany are likely to show.

These findings reinforce the need to look beyond just police-reported crashes to get a comprehensive picture of the size of the problem. Assuming US multipliers, it could well be over four-times this size if all non-reported casualties are included.

4.2 Australian Analysis

Preliminary analyses were also undertaken using four potential data sources of Australian crash data, namely National Coronial Information System (NCIS) on fatalities, police data from 5-Australian states, the Victorian Transport Accident Commission's (TAC) database, and finally, the Victorian Emergency Minimum Surveillance (VEMD) database. These results are separated below as an early indication of what might be useful for a more definitive analysis. As with the GIDAS analysis, this was confined to a preliminary analysis of the extent of the problem, although a more definitive analysis would be possible using these data sources.

4.2.1 NCIS Analysis

Within the time available for this preliminary scoping report, it was only possible to obtain figures on the numbers of people involved in reversing collisions. A preliminary search of the NCIS indicates that there are approx. 200 cases which would need to be manually reviewed in order to more accurately identify the number of pedestrians fatally injured due to a collision with a reversing vehicle between 2006 and 2011, from all the cases reported to a coroner in this period which are now closed. These 200 cases were identified in the preliminary search using a keyword search of reports attached to cases coded as involving a pedestrian fatality where the term "reverse" or "backing" is mentioned.

In a previous report by BITRE (2012) noted earlier, the numbers and circumstances of child injuries from reversing vehicles were analysed using NCIS data. Based on the data published in this report it can be estimated that there would have been approximately 40 children aged 0-14 years killed and approximately 360 seriously injured by a four-wheel vehicle around the home in the 6 years between 2006 and 2011. This suggests children only comprise 20 percent of all pedestrian fatalities due to reversing collisions. Thus, as shown earlier, adult fatalities comprise the largest share (80 percent) of the 200 fatalities estimated above by NCIS.

This reinforces the view that benefit-cost analysis of reversing cameras needs to take account of all crash types in which the technology may have an impact.

4.2.2 National Data Analysis

An analysis was undertaken of combined police data from five states in Australia (Victoria, South Australia, Western Australia, New South Wales and Queensland), from which comprehensive crash data records are held by MUARC.

Many crash data variables are common to all jurisdictions and were used to create an initial analysis approach able to be applied across all jurisdictions. Vehicle Type and road user type (Driver, Passenger of Pedestrian) may be identified for each jurisdiction. Vehicles, pedestrians and injuries were counted for each user type and vehicle type for each crash. For each state, data was reduced to a set of vehicles, or a set of pedestrians involved in single vehicle, pedestrian-involved crashes.

It was decided to limit the investigation to single vehicle (pedestrian involved) crashes because in pedestrian involved multi-vehicle crashes, it is difficult to determine which vehicle hit the pedestrian. Also, it is more likely that single-vehicle crashes, rather than multi-vehicle crashes, are the type of vehicle-pedestrian collisions that may be avoided by the use of reversing cameras. The investigation was also limited to crashes described in 'crash type' variables as a vehicle-pedestrian collision.

In each jurisdiction 'Hit Pedestrian' crash types made up over 96% of single-vehicle, pedestrian involved crashes: VIC 97.8%, QLD 96.8%, NSW 98.3%, SA 96.2% and WA 96.5%. Finally, the road user movement code for the crash for all jurisdictions except SA was used to remove collisions where the vehicle was a run-away parked vehicle and the collisions where the pedestrian fell from a vehicle. South Australian crash data does not have a road user movement code for the crash.

After this stage, data for each jurisdiction had to be treated differently. For New South Wales, South Australia and Western Australia, a crash variable describing the movement of the colliding vehicle unit was available. Values for this variable within the *Hit Pedestrian, single-vehicle* crash data were only missing for 0.5% of WA crashes and 0.1% of SA crashes.

Using this variable, crashes were reduced to only those where the vehicle was identified as reversing. It can be seen from Table 4.3 that reverse parking manoeuvres were clearly identified for NSW and WA. For South Australia, the reversing and parking overlap was not identified; manoeuvres were described as either reversing or parking. Since parking could involve reversing, the variable used to assign driver fault was used to identify reversing parking vehicles when *reversing without due care* was listed as the driver error. Table 4.3 lists the identified crash data set for 2000-2010 crash years for these three states.

Table 4.3: Movement classifications for reversing vehicles into pedestrians –2000 to 2010

New South Wales

	Frequency	Percent
Reverse from drive	498	27.2
Reverse in lane	561	30.7
Reverse parking	618	33.8
Other reversing	153	8.4
Total	1830	100.0

Western Australia

	Frequency	Percent
Parking: Reversing	36	9.0
Unparking: Reversing	52	13.1
Reversing Or Rolling Back: Straight	269	67.6
Reversing Or Rolling Back: Left Turn	16	4.0
Reversing Or Rolling Back: Right Turn	25	6.3
Total	398	100.0

South Australia

	Frequency	Percent
Reversing	307	48.3
Entering Private Driveway	3	.5
Leaving Private Driveway	143	22.5
Parking - Angle	12	1.9
Parking - Parallel	20	3.1
Unparking -Angle	129	20.3
UnParking - Parallel	22	3.5
total	636	100.0

Table 4.4: Location of Pedestrian-Reversing Vehicle Collisions for 2000-2010 (as a percentage of all Pedestrian-Reversing Vehicle Collisions)

LOCATION TYPE	NSW	SA	WA
Intersections: X,T,Y,multiple	24.8	6.4	2.6
Divided road	7.2	15.4	
Not Divided	66.7	36.6	
Driveway			39.7
Other	1.3	41.5	0.9
missing			56.8
Total	100.0	100.0	100.0

Table 4.4 shows the location of the crash in the road network. From Table 4.4, it can be seen that most of these collisions do not occur at intersections. In NSW it appears that collisions in driveways are either not reported or coded by the road in which the driveway is located. In WA many accident location codes are missing.

Tables 4.5 to 4.7 summarise the pedestrian injuries for reversing, hit-pedestrian*,* single-vehicle collisions from 2000-2010 in NSW, SA and WA for passenger vehicles and heavy vehicles. NSW injury severities are only coded as fatal or injured. For all other states a serious injury represents a non-fatal injury for which the pedestrian was admitted to hospital, and a minor injury represents any other non-fatal injury. In these data tables, passenger vehicles and light commercial vehicles are grouped together. Heavy vehicles are motor vehicles able to be identified as having a Gross Vehicle Mass greater than 3.5 tonne. Other units or motor vehicles (which may include motor-cycles, tractors and plant vehicles) which could not be identified are listed as 'Other_Unknown'.

Injuries from passenger vehicle collisions are also listed by vehicle market group. Vehicle model breakdown is included in Appendix 4. The model groupings listed in these tables may be wide such as 'Mitsubishi Commercials' or "Mitsubishi Triton Others'. Some model groupings were not able to be identified for example if a model year was missing, the listed model year did not fall within the actual years of manufacture, or the year of manufacture was before the range of years listed in the data classifications derived for the MUARC Used Car Safety Ratings project.

For Victorian and Queensland data, the direction of travel (forward or reverse) is not coded for the vehicle. However, a point of impact variable allowed crashes with an impact to the rear or underneath the vehicle to be chosen. The 'underneath' impact was included because it is possible that the vehicle was reversing. As rear impacts from a reversing vehicle could have also been near the rear doors or rear corners, these categories were also included.

It was further decided to examine road geometry to eliminate some unlikely crashes. It is unlikely that a vehicle travelling on the carriageway at an intersection is reversing into a pedestrian, so collisions at intersections were excluded. Some support for this exclusion criterion is evidenced in Table 4.4. In Queensland, 68%, and in Victoria, 52% of single vehicle, *Hit-Pedestrian* collisions were at unknown or non-intersections locations. Of those not at intersections, less than 6% could be identified as having a rear or underneath point of impact. Tables 4.8 and 4.9 summarise the pedestrian injuries for Queensland and Victorian rear-impact, non-intersection, *hit-pedestrian,* single vehicle collisions from 2000-2009/2010 for passenger, heavy and unknown vehicles. Vehicle model breakdown is included in Appendix 4.

In summary, from investigation of the Australian police reported crash data systems it appears possible to identify from three of the five states injuries resulting from, and vehicles involved in, reversing collisions with pedestrians which could be influenced by reversing cameras. A rough approximation of reversing vehicle collisions with pedestrians is possible for Queensland and Victoria using the point of impact. Models and market groups can be assigned to vehicles involved in these crashes from 1982 onwards, allowing data on reversing camera fitment to be associated with the crash data. A potential limitation of using the data classified by make and model of vehicle is that injuries and particularly fatalities for each particular vehicle model are relatively infrequent. Any future analysis would have to be undertaken by data aggregated at least by market group of vehicle classified by reversing camera fitment.

Table 4.5: Reversing vehicles into pedestrians: New South Wales 2000-2010

A. Pedestrians by Injury

BREAKDOWN	TOTAL	Injury Severity Collision Partner			
		Uninjured		Injured	Dead
All Cases – Passenger vehicles, light commercial vehicles and trucks					
TOTAL KNOWN	**1778**	**10**		**1739**	**29**
Male	736	5		717	14
Female	1031	2		1014	15
0-9 yrs	81	1		78	2
10-19 yrs	72	0		72	0
20-59 yrs	750	4		744	2
60+ yrs	875	5		845	25
Vehicle - Passenger and light commercial vehicles					
TOTAL	**1725**	**9**		**1692**	**24**
Male	701	5		684	12
Female	1013	1		1000	12
0-9 yrs	81	1		78	2
10-19 yrs	69	0		69	0
20-59 yrs	720	3		715	2
60+ yrs	855	5		830	20
Vehicle –Heavy trucks					
TOTAL	**53**	**1**		**47**	**5**
Male	35	0		33	2
Female	18	1		14	3
0-9 yrs	0	0		0	0
10-19 yrs	3	0		3	0
20-59 yrs	30	1		29	0
60+ yrs	20	0		15	5
Others – Unknown					
TOTAL	**2**	**0**		**2**	**0**
Male	1	0		1	0
Female	1	0		1	0
0-9 yrs	0	0		0	0
10-19 yrs	0	0		0	0
20-59 yrs	0	0		0	0
60+ yrs	2	0		2	0

B: Pedestrian injuries by colliding vehicle market group (NSW, 2000 to 2010)

MKT GRP BREAKDOWN	Injury Severity Collision Partner		
	Dead		Injury
Passenger and light commercial vehicles			
Commercial Ute	4	-	124
Commercial Van	1	-	110
People Mover	1		43
Large	8		371
Medium	1		181
Small	1		302
Light	1		110
SUV-Large	1		42
SUV-Medium	1		48
SUV-Compact	3		83
Unknown	2		278

Table 4.6: Reversing vehicles into pedestrians: South Australia 2000-2010

A. Pedestrians by Injury

BREAKDOWN	TOTAL	Injury Severity Collision Partner			
		Uninjured	Minor	Hospital	Dead
All Cases – Passenger vehicles, light commercial vehicles and trucks					
TOTAL KNOWN	**610**	**10**	**506**	**92**	**2**
Male	259	6	212	39	2
Female	3	4	294	53	0
0-9 yrs	25	1	16	8	0
10-19 yrs	34	1	26	7	0
20-59 yrs	247	4	221	21	1
60+ yrs	236	1	184	50	1
Vehicle - Passenger and light commercial vehicles					
TOTAL	**600**	**10**	**500**	**89**	**1**
Male	252	6	209	36	1
Female	0	4	291	53	0
0-9 yrs	25	1	16	8	0
10-19 yrs	34	1	26	7	0
20-59 yrs	241	4	216	20	1
60+ yrs	233	1	183	49	0
Vehicle –Heavy trucks					
TOTAL	**10**	**0**	**6**	**3**	**1**
Male	7	0	3	3	1
Female	3	0	3	0	0
0-9 yrs	0	0	0	0	0
10-19 yrs	0	0	0	0	0
20-59 yrs	6	0	5	1	0
60+ yrs	3	0	1	1	1
Others – Unknown					
TOTAL	**40**	**1**	**34**	**5**	**0**
Male	18	0	15	3	0
Female	22	1	19	2	0
0-9 yrs	2	0	1	1	0
10-19 yrs	6	0	6	0	0
20-59 yrs	17	1	14	2	0
60+ yrs	12	0	11	1	0

B: Pedestrian injuries by colliding vehicle market group

MKT GRP BREAKDOWN	Injury Severity Collision Partner		
	Minor	Hospital	Dead
Passenger and light commercial vehicles			
Commercial Ute	30	7	0
Commercial Van	29	7	0
People Mover	13	1	0
Large	125	24	0
Medium	51	7	0
Small	70	15	1
Light	22	1	0
SUV-Large	11	3	0
SUV-Medium	13	3	0
SUV-Compact	17	3	0
Unknown	119	18	0

Table 4.7: Reversing vehicles into pedestrians: Western Australia 2000-2010

A. Pedestrians by Injury

BREAKDOWN	TOTAL	Injury Severity Collision Partner			
		Uninjured	Minor	Hospital	Dead
All Cases – Passenger vehicles, light commercial vehicles and trucks					
TOTAL KNOWN	**408**	**89**	**225**	**88**	**6**
Male	173	34	89	48	2
Female	203	38	123	38	4
0-9 yrs	21	6	12	2	1
10-19 yrs	18	1	14	2	1
20-59 yrs	156	23	102	31	0
60+ yrs	107	11	54	38	4
Vehicle - Passenger and light commercial vehicles					
TOTAL	**400**	**86**	**221**	**87**	**6**
Male	169	32	88	47	2
Female	199	37	120	38	4
0-9 yrs	21	6	12	2	1
10-19 yrs	17	1	14	1	1
20-59 yrs	154	23	100	31	0
60+ yrs	103	9	52	38	4
Vehicle – Heavy Trucks					
TOTAL	**8**	**3**	**4**	**1**	**0**
Male	4	2	1	1	0
Female	4	1	3	0	0
0-9 yrs	0	0	0	0	0
10-19 yrs	1	0	0	1	0
20-59 yrs	2	0	2	0	0
60+ yrs	4	2	2	0	0
Other – Unknown					
TOTAL	**2**	**0**	**2**	**0**	**0**
Male	0	0	0	0	0
Female	2	0	2	0	0
0-9 yrs	1	0	1	0	0
10-19 yrs	1	0	1	0	0
20-59 yrs	0	0	0	0	0
60+ yrs	0	0	0	0	0

B: Pedestrian injuries by colliding vehicle market group

MKT GRP BREAKDOWN	Injury Severity Collision Partner		
	Minor	Hospital	Dead
Passenger and light commercial vehicles			
Commercial Ute	13	13	0
Commercial Van	8	9	1
People Mover	0	0	0
Large	47	21	2
Medium	26	5	0
Small	33	12	1
Light	9	7	0
SUV-Large	7	1	0
SUV-Medium	7	2	0
SUV-Compact	10	1	0
Unknown	61	16	2

Table 4.8: Rear Impact, single vehicle collision with pedestrian, not at intersection: Queensland 2000-2009

A. Pedestrians by Injury

BREAKDOWN	TOTAL	Injury Severity Collision Partner			
		Uninjured	Minor	Hospital	Dead
Vehicle - Passenger and light commercial vehicles					
TOTAL	**341**	**1**	**140**	**183**	**17**
Male	224	1	91	119	13
Female	116	0	48	64	4
0-9 yrs	33	0	12	21	0
10-19 yrs	93	0	42	50	1
20-59 yrs	164	0	67	84	13
60+ yrs	37	0	8	26	3
Vehicle – Heavy trucks					
TOTAL	**0**	**0**	**0**	**0**	**0**
Other – Unknown					
TOTAL	**2**	**0**	**0**	**1**	**1**
Male	1	0	0	0	1
Female	1	0	0	1	0
0-9 yrs	0	0	0	0	0
10-19 yrs	1	0	0	1	0
20-59 yrs	1	0	0	0	1
60+ yrs	0	0	0	0	0

B: Pedestrian injuries by colliding vehicles market group

MKT GRP BREAKDOWN	Injury Severity Collision Partner		
	Minor	Hospital	Dead
Passenger and light commercial vehicles			
Commercial Ute	17	13	1
Commercial Van	2	3	1
People Mover	3	3	0
Large	38	57	5
Medium	10	16	1
Small	34	37	2
Light	6	12	0
SUV-Large	4	6	0
SUV-Medium	2	2	1
SUV-Compact	3	7	1
Unknown	21	27	5

Table 4.9: Rear Impact, single vehicle collision with pedestrian, not at intersection: Victoria 2000-2010

A. Pedestrians by Injury BREAKDOWN	TOTAL	Injury Severity Collision Partner			
		Uninjured	Minor	Hospital	Dead
All Cases – Passenger and light commercial vehicles and trucks					
TOTAL KNOWN	**1292**	**18**	**814**	**438**	**22**
Male	572	9	355	197	11
Female	707	8	448	241	10
0-9 yrs	68	7	38	22	1
10-19 yrs	101	0	68	32	1
20-59 yrs	548	5	388	150	5
60+ yrs	535	4	291	225	15
Vehicle - Passenger and light commercial vehicles					
TOTAL	**1244**	**18**	**789**	**416**	**21**
Male	535	9	335	181	10
Female	696	8	443	235	10
0-9 yrs	67	7	37	22	1
10-19 yrs	98	0	66	31	1
20-59 yrs	515	5	371	134	5
60+ yrs	524	4	286	220	14
Vehicle – Heavy trucks					
TOTAL	**48**	**0**	**25**	**22**	**1**
Male	37	0	20	16	1
Female	11	0	5	6	0
0-9 yrs	1	0	1	0	0
10-19 yrs	3	0	2	1	0
20-59 yrs	33	0	17	16	0
60+ yrs	11	0	5	5	1
Other – Unknown					
TOTAL	**39**	**0**	**26**	**12**	**1**
Male	13	0	8	5	0
Female	26	0	18	7	1
0-9 yrs	1	0	1	0	0
10-19 yrs	5	0	4	1	0
20-59 yrs	16	0	11	5	0
60+ yrs	16	0	9	6	1

B: Pedestrian injuries by colliding vehicle market group

MKT GRP BREAKDOWN	Injury Severity Collision Partner		
	Minor	Hospital	Dead
Passenger and light commercial vehicles			
Commercial Ute	65	29	5
Commercial Van	45	28	3
People Mover	11	9	0
Large	192	112	3
Medium	67	32	1
Small	86	45	3
Light	20	10	1
SUV-Large	32	16	1
SUV-Medium	18	11	1
SUV-Compact	22	15	0
Unknown	231	109	3

4.2.3 TAC Database

Victoria has a comprehensive state-wide police and injury compensation database which permits very detailed analyses of not only the crash circumstances but also the severity and outcome of those injured in a road crash in the state of Victoria.

There are linked databases that provide the required fields for an analysis of backover crashes with pedestrians/cyclists as victims. The vehicle files provide the “initial point of impact”, which in the case of backover crashes is the rear, or rear corner of the vehicle; vehicle descriptors normally specify the precise make, model and year of manufacture, from which information on the safety devices fitted can be derived, including standard fitment of reversing cameras.

Limitations include:

(1) Aftermarket fitment of reversing cameras is not recorded. In any assessment of safety benefits, such a limitation would tend to bias any effectiveness estimates towards the null, which is an acceptable bias scientifically;

(2) Collisions occurring on private property (where most backover injuries occur) are not classified according to the safety devices on-board.

Nevertheless, there were 2,324 injuries to pedestrians from reversing vehicles recorded in TAC data over the period 1 April 2000 to 9 Sept 2009.

4.2.4 VEMD Database

The Victorian Emergency Minimum Dataset (VEMD) contains de-identified demographic, administrative and clinical data detailing presentations at Victorian public hospitals that receive the non-admitted emergency services grant, and other hospitals as designated by DHS. A similar system is also compiled for presentations at Queensland hospitals but time limits for the study prevented an analysis of these data.

Submission to the VEMD commenced in October 1995 as an initiative of the Department of Human Services in collaboration with the Victorian Emergency Department's Association, the Australasian College for Emergency Medicine Victoria Faculty, the Emergency Nurse's Association, and MUARC. MUARC has been collecting emergency department data for injury presentations through their Victorian Injury Surveillance and Applied Research System (VISAR; formerly known as the Victorian Injury Surveillance System or VISS) since 1989.

The VEMD is compiled in financial years (July to June). A list of all data fields stored in the VEMD for any given year is available from Victorian Hospital Data Reports. Cases recorded in the VEMD were searched for the following keywords: reversing vehicle/car/truck, backing up/over/out of driveway/street/park, driving backward. Cases were manually checked for relevance.

For the 13 years from 1999 to 2011, there were 1154 presentations of people injured in backover collisions at the major trauma hospitals in this state. Of these, 62 percent occurred on roads, streets and highways, 18 percent in homes, 14 percent elsewhere and 6 percent unspecified. Thirty-one percent involved those aged 0-19 years, 39 percent aged 20-59 years, and 30 percent were 60 years or above. There were roughly equal male and female presentations. Eighty-seven percent were pedestrians and the remainder were cyclists. Cars predominated as the main vehicle causing these injuries. Non-admitted out-patient treatments predominated at 78 percent, while 22 percent were either admitted or transferred to a specialist facility. Only 2 of the 1154 presentations died.

It must be stressed that the VEMD data generally reflect more minor injury events, but are often overlooked when assessing the extent of a road safety problem. What they do show, though, are two major findings: first, that there are significant numbers of people injured in backover collisions that are not obvious from police reports; and second, that again, 70 percent of these attendances at hospitals involve adults of which a disproportionate number are elderly.

5. SUMMARY AND RECOMMENDATIONS

This study set out to examine the need and scope for mounting an international project to determine the extent of reversing collisions, backover collisions with Vulnerable Road Users (in particular pedestrians and bicyclists) and the effectiveness of reversing cameras to address this road safety problem. The study involved (i) a minor literature review of previous research, (ii) visits to four major transport departments/agencies (USA, Germany, EC and the UK) to gauge their level of interest and willingness to participate in such a study; (iii) preliminary analyses of German and Australian data sources to assess their usefulness if a collaboration project was to be mounted, and (iv) an examination of any previous research in terms of technologies and camera evaluations. A number of key findings were established as a result of this research activity.

5.1 Major Findings

1. Apart from the US where they are in the process of establishing a Proposed Regulation on Backover Crash Avoidance Technologies, none of the other transport departments/agencies visited was actively involved in research on this issue. For the most part, those in Europe were unable at this stage to identify the full extent of these crashes and injuries. Better protection of Vulnerable Road Users was of concern to all countries but of the crashes relating to this group, the issue of "backovers" seemed to be less prominent. However, all agencies expressed interest in knowing more about the characteristics of these crashes.

2. There did not appear to be much current research into the effectiveness of reversing camera and sensor technologies, apart from that undertaken in the USA to support their Proposed Regulation. NHTSA Report DOT HS 808 018 (NHTSA 1993) and Docket NHTSA-2010-0162 (NHTSA 2010) addressed the use of reversing cameras to reduce these events and injury outcomes, concluding that this seemed to be the best approach but that the cost of the technology would need to reduce to make them cost effective. NHTSA further identified a number of issues needing to be improved to optimise the effectiveness of reversing cameras. The Federal Highway Research Institute (BASt) in Germany did identify current research work on an improved algorithm for frontal cameras to enhance detection of pedestrians (which may also be useful for reversing cameras). However there was no research able to be identified that was specific to backover collisions.

3. Data sources available in each of the four countries were predominantly based on national police databases of varying quality and relevant factors related to backover collisions. Nevertheless, these data were somewhat consistent and could be used in a global analysis. However, given that police do not routinely attend non-traffic incidents which occur on private roads, driveways, and parking lots, they are likely to underestimate the size of the problem substantially (NHTSA, 2008, claimed that the number of reversing incidents captured by police data could be as low as 20 to 25 percent of the real figure). National police data, therefore, would need to be supplemented with data from other health sources, such as the NiTS or surveillance and fatality data, to offset this deficiency.

4. Very little detailed information was readily available on the events leading up to backover crashes. Detailed information will be necessary to determine the nature of these events and quantify the improvement likely to be able to be achieved as a result of more widespread use of camera technology. In-depth data is available in Germany, the UK and the USA that would be useful in addressing this shortcoming. An in-depth case analysis examining these types of crashes by the impact point, crash severity, vehicle and pedestrian/cycle movement pre-crash would be invaluable for better understanding the causes of reversing accidents involving pedestrians and cyclists.

5. Preliminary data analyses conducted in Germany and Australia show that backover collisions involve all road users and all outcome severities. Older adults and young children would seem to be groups of some concern and possibly women, although this finding needs further clarification. Interestingly, these analyses confirmed the need for additional data sources beyond police reports and highlighted some potentially useful supplementary data in coronial investigations, surveillance records and insurance data that could help in estimating the full extent of the problem, both here in Australia and overseas.
6. There was strong support from the four countries/regions visited to consider participating in further research in this area. In some cases, this would involve providing access to data; in others, to undertake analyses specified by a host organisation for inclusion in the program. All those involved in the discussions would be interested in an ongoing role in any project, especially where flexible meeting arrangements were available. The European Commission's view was that it could be feasible to undertake any international initiative through an existing standards forum: GRSG, WP29 was one suggestion for this. However, there would first need to be a case made illustrating the extent of the problem and what on a cost effective basis could be done to alleviate it.

5.2 Recommendation

Given feedback to-date, it should be possible to mount an international research project involving at least the four countries/regions that were visited as well as Australia. The Australian Government would be well placed to take a leadership role in any future research effort.

5.2.1 Study Design

A multi-tiered, multi-centred, approach is recommended for continuing research.

Tier 1 – National Data Analysis – An analysis be undertaken using national police data available from each of the four departments/agencies visited (US, Germany, EC, and UK) and Australia using a common analysis strategy to determine the relative size and associated crash configurations in each region. These could then be merged into a single overall finding using a MUNDS approach and/or simply be compared across countries or regions.

Crash outcomes would focus on the type of collision, the extent of them relative to all pertinent crashes and road trauma. It should be possible also to express these in terms of population and other exposure measures such as registered vehicles and travel distance where available.

Tier 2 – Estimated Adjusted figures – Given the likelihood of under-representation, these figures would need to be adjusted, based on other supplementary data as discussed above. Relevant data sources will be sourced where possible from partners to assist in estimating the real extent of the problem, broken down by injury severity levels and impairments and disabilities (where these data are available). This information is vital for estimating the likely cost effectiveness of various treatments.

Tier 3 – Crash Causation Analysis – as noted earlier, in estimating the likely effectiveness of reversing cameras, it is necessary to appreciate the various crash scenarios involved in backover collisions. This can help define the type of cameras required, their likely range of effectiveness, and other supporting technologies such as detection algorithms. These scenarios can then be used in discussions with OEMs and suppliers to define the type of cameras that will deliver optimum benefits.

Tier 4 – Cost effectiveness – Once all this information is assembled, it will then be possible to conduct at least a Benefit Analysis from which breakeven equipment costs can be determined. Should the process be simple and straight forward, it may be possible to conduct a full Benefit-Cost-Analysis, but this will only be known later in the process.

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APPENDIX 1 – RACV VISIBILITY INDEX RESULTS

http://www.racv.com.au/wps/wcm/connect/racv/Internet/primary/my+car/car+safety/new+car+safety/reversing+visibility

The RACV Reversing Visibility Index was developed to encourage motorists to compare the safety design features of vehicles. This measure takes into account the visible area and distance across the rear of a vehicle and whether a camera and sensors have been installed. Results are rated on a scale of zero to five stars with a rating of five indicating better reversing visibility than all other vehicles.

These results are presented with RACV's approval from research undertaken on their behalf by the Insurance Australia Group Research Centre.

RACV

RACV REVERSING VISIBILITY INDEX RESULTS
CURRENT VEHICLES - DECEMBER 2012

SMALL CARS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
HYUNDAI ACCENT 4D SEDAN WITH OEM CAMERA	RB	07/11 -	5
TOYOTA PRIUS-C 5D HATCHBACK WITH OEM CAMERA	NHP10R	03/12 -	5
HYUNDAI i20 3D HATCHBACK WITH OEM SENSORS	PB	09/10 -	4
NISSAN MICRA 5D HATCHBACK WITH OEM SENSORS	K13	10/10 -	4
HYUNDAI i20 3D HATCHBACK	PB	09/10 -	3.5
MITSUBISHI i-MiEV 4D SEDAN	-	08/11 -	3.5
SUZUKI ALTO 5D HATCHBACK	GF	07/09 -	3.5
VOLKSWAGEN UP! 3D HATCHBACK	AA	10/12 -	3.5
FIAT 500 3D HATCHBACK	-	02/08 -	3
MAZDA MAZDA2 5D HATCHBACK	DE	09/07 -	3
AUDI A1 SPORTBACK 5D HATCHBACK WITH OEM SENSORS	8X	06/12 -	2.5
SKODA FABIA 4D WAGON WITH OEM SENSORS	5JF	06/12 -	2.5
VOLKSWAGEN POLO 5D HATCHBACK	6R	05/10 -	2.5
AUDI A1 3D HATCHBACK	8X	12/10 -	2
CITROEN C3 5D HATCHBACK	A5	11/10 -	2
CITROEN DS3 3D HATCHBACK WITH OEM SENSORS	-	09/10 -	2
FORD FIESTA 5D HATCHBACK	WT	10/10 -	2
HOLDEN BARINA 4D SEDAN	TM	11/11 -	2
TOYOTA YARIS 5D HATCHBACK	NCP131R	11/11 -	2
SUZUKI SWIFT 5D HATCHBACK	FZ	02/11 -	1.5
HOLDEN BARINA 5D HATCHBACK	TM	11/11 -	1
HOLDEN BARINA CLASSIC 5D HATCHBACK	TK	12/05 -	1
HYUNDAI ACCENT 4D SEDAN WITH OEM SENSORS	RB	07/11 -	1
PROTON S16 FLX 4D SEDAN WITH OEM SENSORS	BT	04/10 -	1
ALFA ROMEO MITO 3D HATCHBACK	-	09/09 -	0.5
CHERY J1 5D HATCHBACK	S2X	02/11 -	0.5
HOLDEN BARINA CLASSIC 4D SEDAN	TK	02/06 -	0.5
HONDA CITY 4D SEDAN	GM	02/09 -	0.5
KIA RIO 3D HATCHBACK	UB	02/12 -	0.5
KIA RIO 5D HATCHBACK	UB	09/11 -	0.5
HYUNDAI ACCENT 5D HATCHBACK	RB	07/11 -	0
SKODA FABIA 5D HATCHBACK	5JF	10/11 -	0

SMALL-MEDIUM CARS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
CITROEN DS4 4D WAGON WITH OEM CAMERA	-	04/12 -	5
HYUNDAI i30 5D HATCHBACK WITH OEM CAMERA	GD	05/12 -	5
LEXUS CT 200h. HYBRID 5D HATCHBACK WITH OEM CAMERA	ZWA10R	02/11 -	5
NISSAN LEAF 5D HATCHBACK WITH OEM CAMERA	ZE0	06/12 -	5
VOLKSWAGEN GOLF 2D CABRIOLET WITH OEM CAMERA	1C	11/11 -	5
HONDA INSIGHT 5D HATCHBACK WITH OEM CAMERA	-	12/10 -	4.5
TOYOTA PRIUS 5D HATCHBACK WITH OEM CAMERA	ZVW30R	07/09 -	4.5
NISSAN TIIDA 5D HATCHBACK	C11 SERIES 4	02/06 -	3.5
VOLVO C30 3D HATCHBACK	-	11/05 -	3.5
HONDA INSIGHT 5D HATCHBACK	-	12/10 -	3
HONDA CIVIC 5D HATCHBACK	FK	06/12 -	2.5
LEXUS CT 200h. HYBRID 5D HATCHBACK	ZWA10R	02/11 -	2
MAZDA MAZDA3 4D SEDAN	BL	04/09 -	2
MINI COOPER ROADSTER 2D ROADSTER WITH OEM SENSORS	R59	02/12 -	2
SUBARU IMPREZA 5D HATCHBACK	-	09/07 -	2
AUDI A3 5D HATCHBACK WITH OEM SENSORS	8P	02/05-	1.5
CHERY J3 5D HATCHBACK WITH OEM SENSORS	M1X	09/11 -	1.5
MINI COOPER COUNTRYMAN 4D WAGON WITH OEM SENSORS	R60	04/11 -	1.5
PEUGEOT 308 4D WAGON	-	08/08 -	1.5
PEUGEOT 308 5D HATCHBACK WITH OEM SENSORS	-	02/08 -	1.5
SUZUKI SX4 5D HATCHBACK	GY	09/07 -	1.5
ALFA ROMEO GIULIETTA 5D HATCHBACK WITH OEM SENSORS	-	01/11 -	1
AUDI A3 5D HATCHBACK	8P	02/05 -	1
CITROEN DS4 4D WAGON WITH OEM SENSORS	-	04/12 -	1
NISSAN LEAF 5D HATCHBACK	ZE0	06/12 -	1
BMW 1-SERIES 5D HATCHBACK WITH OEM SENSORS	F20	10/11 -	0.5
CITROEN C4 5D HATCHBACK WITH OEM SENSORS	B7	10/11 -	0.5
HONDA CIVIC 4D SEDAN WITH OEM SENSORS	SERIES 2	07/12 -	0.5
HYUNDAI ELANTRA 4D SEDAN WITH OEM SENSORS	MD	06/11 -	0.5
HYUNDAI i30 5D HATCHBACK WITH OEM SENSORS	GD	05/12 -	0.5
KIA CERATO 4D SEDAN WITH OEM SENSORS	TD	01/09 -	0.5
KIA CERATO 5D HATCHBACK WITH OEM SENSORS	TD	10/10 -	0.5
KIA SOUL 5D HATCHBACK	AM	11/11 -	0.5
NISSAN TIIDA 4D SEDAN	C11 SERIES 4	02/06 -	0.5
SKODA OCTAVIA 4D WAGON WITH OEM SENSORS	1Z	03/09 -	0.5
SKODA OCTAVIA 5D LIFTBACK WITH OEM SENSORS	1Z	03/09 -	0.5
SUBARU IMPREZA 4D SEDAN WITH OEM SENSORS	-	02/12 -	0.5
SUZUKI SX4 4D SEDAN	GY	09/07 -	0.5
TOYOTA COROLLA 5D HATCHBACK	ZRE182R	10/12 -	0.5

Small-medium cars continued over page

SMALL-MEDIUM CARS (continued)			
VEHICLE	**SERIES**	**YEAR MODEL**	**STAR RATING (OUT OF 5)**
TOYOTA RUKUS 4D WAGON	AZE151R	05/10 -	0.5
VOLKSWAGEN GOLF 5D HATCHBACK	1K	03/06 -	0.5
VOLKSWAGEN GOLF 2D CABRIOLET WITH OEM SENSORS	1C	11/11 -	0.5
VOLKSWAGEN JETTA 4D SEDAN WITH OEM SENSORS	1KM	02/06 -	0.5
HOLDEN CRUZE 4D SEDAN	JH	03/11 -	0
HOLDEN CRUZE 5D HATCHBACK	JH	11/11 -	0
KIA CERATO 4D SEDAN	TD	01/09 -	0
KIA CERATO 5D HATCHBACK	TD	10/10 -	0
KIA CERATO KOUP 2D COUPE	TD	09/09 -	0
MAZDA MAZDA3 5D HATCHBACK	BL	04/09 -	0
MITSUBISHI LANCER 4D SEDAN	CJ	10/07 -	0
MITSUBISHI LANCER 5D HATCHBACK	CJ	10/08 -	0
SUBARU IMPREZA 4D SEDAN	-	02/12 -	0

MEDIUM CARS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
CITROEN DS5 4D WAGON WITH OEM CAMERA	-	09/12 -	5
HYUNDAI i40 4D WAGON WITH OEM CAMERA	VF	10/11 -	5
KIA OPTIMA 4D SEDAN WITH OEM CAMERA	TF	01/11 -	5
SUBARU LIBERTY 4D SEDAN WITH OEM CAMERA	-	09/09 -	5
TOYOTA CAMRY 4D SEDAN WITH OEM CAMERA	ASV50R	12/11 -	5
CITROEN DS5 4D WAGON WITH OEM SENSORS	-	09/12 -	2
HYUNDAI i40 4D WAGON WITH OEM SENSORS	VF	10/11 -	1
CITROEN C5 4D SEDAN WITH OEM SENSORS	X7	09/08 -	0.5
HYUNDAI i40 4D SEDAN WITH OEM SENSORS	VF	06/12 -	0.5
PEUGEOT 508 4D SEDAN WITH OEM SENSORS	-	07/11 -	0.5
SUZUKI KIZASHI 4D SEDAN WITH OEM SENSORS	FR	05/10 -	0.5
TOYOTA CAMRY 4D SEDAN WITH OEM SENSORS	ASV50R	12/11 -	0.5
HONDA ACCORD EURO 4D SEDAN	10	06/08 -	0
SUZUKI KIZASHI 4D SEDAN	FR	05/10 -	0

LARGE CARS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
CHRYSLER 300 4D SEDAN WITH OEM CAMERA	-	07/12 -	5
FORD FALCON 4D SEDAN WITH OEM CAMERA	FG MK2	11/11 -	5
HOLDEN COMMODORE 4D SPORTWAGON WITH OEM CAMERA	VE II	09/10-	5
HONDA ACCORD 4D SEDAN WITH OEM CAMERA	50	02/08 -	5
VOLKSWAGEN PASSAT 4D SEDAN WITH OEM CAMERA	3C	02/10 -	5
VOLKSWAGEN PASSAT 4D WAGON WITH OEM SENSORS	3C	03/06 -	1
FORD FALCON 4D SEDAN WITH OEM SENSORS	FG MK2	11/11 -	0.5
HOLDEN COMMODORE 4D SPORTWAGON WITH OEM SENSORS	VE II	09/10-	0.5
HONDA ACCORD 4D SEDAN WITH OEM SENSORS	50	02/08 -	0.5
HYUNDAI i45 4D SEDAN WITH OEM SENSORS	YF	05/10 -	0.5
SKODA SUPERB 4D WAGON WITH OEM SENSORS	3T	05/10 -	0.5
VOLKSWAGEN PASSAT 4D SEDAN WITH OEM SENSORS	3C	02/10 -	0.5
FORD FALCON 4D SEDAN	FG MK2	11/11 -	0
HOLDEN COMMODORE 4D SEDAN	VE II	09/10-	0
HONDA ACCORD 4D SEDAN	50	02/08 -	0

SUVS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
AUDI Q3 4D WAGON WITH OEM CAMERA	8U	04/12 -	5
BMW X1 4D WAGON WITH OEM CAMERA	E84	04/10 -	5
BMW X3 4D WAGON WITH OEM CAMERA	F25	03/11 -	5
BMW X5 4D WAGON WITH OEM CAMERA	E70	03/07 -	5
FORD TERRITORY 4D WAGON WITH OEM CAMERA	SZ	05/11 -	5
HOLDEN CAPTIVA7 4D WAGON WITH OEM CAMERA	CG SER2	02/11 -	5
HYUNDAI SANTA FE 4D WAGON WITH OEM CAMERA	DM	09/12 -	5
JEEP GRAND CHEROKEE 4D WAGON WITH OEM CAMERA	WK	02/11 -	5
KIA SORENTO 4D WAGON WITH OEM CAMERA	XM	10/09 -	5
LEXUS LX570 4D WAGON WITH OEM CAMERA	URJ201R	04/08 -	5
LEXUS RX 4D WAGON WITH OEM CAMERA	GYL15R	06/09 -	5
MAZDA CX-5 4D WAGON WITH OEM CAMERA	-	02/12 -	5
MERCEDES-BENZ ML-CLASS 4D WAGON WITH OEM CAMERA	166	04/12 -	5
MITSUBISHI ASX 4D WAGON WITH OEM CAMERA	XB	07/10 -	5
RANGE ROVER EVOQUE 3D COUPE WITH OEM CAMERA	LV	10/11 -	5
SUBARU TRIBECA 4D WAGON WITH OEM CAMERA	-	12/07 -	5
TOYOTA FJ CRUISER 4D WAGON WITH OEM CAMERA	GSJ15R	03/11 -	5
TOYOTA KLUGER 4D WAGON WITH OEM CAMERA	GSU40R	08/07 -	5
TOYOTA LANDCRUISER 4D WAGON WITH OEM CAMERA	VDJ200R	11/07 -	5
TOYOTA LANDCRUISER PRADO 2D WAGON WITH OEM CAMERA	KDJ155R	11/09 -	5
VOLKSWAGEN TIGUAN 4D WAGON WITH OEM CAMERA	5NC	11/08 -	5
VOLKSWAGEN TOUAREG 4D WAGON WITH OEM CAMERA	7P	07/11 -	5
AUDI Q7 4D WAGON WITH OEM CAMERA	-	09/06 -	4.5
HYUNDAI iX35 4D WAGON WITH OEM CAMERA	LM	02/10 -	4.5
KIA SPORTAGE 4D WAGON WITH OEM CAMERA	SL	07/10 -	4.5
MAZDA CX-9 4D WAGON WITH OEM CAMERA	-	12/07 -	4.5
NISSAN PATROL 4D WAGON WITH OEM CAMERA	GU VIII	02/12 -	4.5
VOLVO XC60 4D WAGON WITH OEM CAMERA	DZ	03/09 -	4.5
NISSAN DUALIS 4D WAGON	J10 SERIES 3	08/09 -	2.5
NISSAN PATHFINDER 4D WAGON	R51 SERIES 4	06/10 -	2.5
NISSAN X-TRAIL 4D WAGON	T31 SERIES 5	10/07 -	2
CITROEN C4 AIRCROSS 4D WAGON WITH OEM SENSORS	1CM	07/12 -	1.5
FORD TERRITORY 4D WAGON WITH OEM SENSORS	SZ	05/11 -	1.5
SSANGYONG REXTON II 4D WAGON	Y200	04/08 -	1.5
SUBARU FORESTER 4D WAGON	-	03/08 -	1.5
SUZUKI GRAND VITARA 4D WAGON	JT	08/08 -	1.5
AUDI Q3 4D WAGON WITH OEM SENSORS	8U	04/12 -	1
BMW X1 4D WAGON	E84	04/10 -	1

SUV continued over page

SUVS (continued)

VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
BMW X5 4D WAGON WITH OEM SENSORS	E70	03/07 -	1
MITSUBISHI ASX 4D WAGON WITH OEM SENSORS	XB	07/10 -	1
MITSUBISHI OUTLANDER 4D WAGON	ZH	10/09 -	1
MITSUBISHI PAJERO 4D WAGON	NW	11/11 -	1
NISSAN PATROL 4D WAGON	GU VIII	02/12 -	1
VOLKSWAGEN TIGUAN 4D WAGON WITH OEM SENSORS	5NC	11/08 -	1
FORD KUGA 4D WAGON	TE	02/12 -	0.5
GREAT WALL MOTORS X240 4D WAGON	CC6461KY	10/09 -	0.5
HOLDEN CAPTIVA7 4D WAGON WITH OEM SENSORS	CG SER2	02/11 -	0.5
HONDA CRV - OUTGOING MODEL 4D WAGON	-	02/07 -	0.5
KIA SPORTAGE 4D WAGON	SL	07/10 -	0.5
RANGE ROVER EVOQUE 3D COUPE WITH OEM SENSORS	LV	10/11 -	0.5
SKODA YETI 4D WAGON	5L	10/11 -	0.5
CHERY J11 4D WAGON	T1X	02/11 -	0
JEEP COMPASS 4D WAGON	MK	03/07 -	0
TOYOTA LANDCRUISER 4D WAGON	VDJ200R	11/07 -	0
TOYOTA LANDCRUISER PRADO 4D WAGON	GRJ150R	11/09 -	0
TOYOTA RAV4 4D WAGON	ACA33R	02/06 -	0

PEOPLE MOVERS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
SUBARU LIBERTY EXIGA 4D WAGON WITH OEM CAMERA	-	10/10 -	5
TOYOTA PRIUS V 4D WAGON WITH OEM CAMERA	ZVW40R	05/12 -	5
CITROEN C4 PICASSO 4D WAGON WITH OEM SENSORS	-	05/07 -	3
PEUGEOT 3008 5D HATCHBACK WITH OEM SENSORS	-	06/10 -	2
KIA GRAND CARNIVAL 4D WAGON	VQ	01/06 -	1.5
TOYOTA TARAGO 4D WAGON	ACR50R	03/06 -	1.5
VOLKSWAGEN MULTIVAN 4D WAGON	T5	06/05 -	1.5
KIA RONDO 4D WAGON	UN	10/10 -	1
VOLKSWAGEN CADDY 5D WAGON	2K	07/07 -	1
DODGE JOURNEY 4D WAGON	JC	09/08 -	0

LUXURY CARS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
AUDI A5 5D HATCHBACK WITH OEM CAMERA	8T	01/10 -	5
AUDI A6 4D SEDAN WITH OEM CAMERA	4GL	07/11 -	5
HONDA LEGEND 4D SEDAN WITH OEM CAMERA	30	08/06 -	5
LEXUS GS 4D SEDAN WITH OEM CAMERA	GRL11R	04/12 -	5
LEXUS IS250 4D SEDAN WITH OEM CAMERA	GSE20R	11/05 -	5
LEXUS LS460 4D SEDAN WITH OEM CAMERA	USF40R	04/07 -	5
MERCEDES-BENZ C-CLASS 4D SEDAN WITH OEM CAMERA	W204	07/07 -	5
MERCEDES-BENZ C-CLASS 4D WAGON WITH OEM CAMERA	W204	07/07 -	5
MERCEDES-BENZ CLS-CLASS 4D COUPE WITH OEM CAMERA	218	11/11 -	5
MERCEDES-BENZ E-CLASS 2D CABRIOLET WITH OEM CAMERA	207	05/10 -	5
MERCEDES-BENZ E-CLASS 2D COUPE WITH OEM CAMERA	207	10/09 -	5
MERCEDES-BENZ E-CLASS 4D SEDAN WITH OEM CAMERA	212	09/09 -	5
VOLVO S60 4D SEDAN WITH OEM CAMERA	F	12/10 -	5
VOLVO V60 4D WAGON WITH OEM CAMERA	F	03/11 -	5
JAGUAR XF 4D SEDAN WITH OEM CAMERA	-	06/08- -	4.5
BMW 3-SERIES 2D COUPE WITH OEM SENSORS	E92	10/06 -	3
MERCEDES-BENZ C-CLASS 4D SEDAN WITH OEM SENSORS	W204	07/07 -	1.5
MERCEDES-BENZ C-CLASS 4D WAGON WITH OEM SENSORS	W204	07/07 -	1.5
VOLVO V60 4D WAGON WITH OEM SENSORS	F	03/11 -	1.5
AUDI A5 5D HATCHBACK WITH OEM SENSORS	8T	01/10 -	0.5
AUDI A6 4D SEDAN WITH OEM SENSORS	4GL	07/11 -	0.5
BMW 3-SERIES 4D SEDAN WITH OEM SENSORS	F30	02/12 -	0.5
BMW 5-SERIES 4D SEDAN WITH OEM SENSORS	F10	06/10 -	0.5
JAGUAR XF 4D SEDAN WITH OEM SENSORS	-	06/08 -	0.5
LEXUS GS 4D SEDAN WITH OEM SENSORS	GRL11R	04/12 -	0.5
LEXUS IS250 4D SEDAN WITH OEM SENSORS	GSE20R	11/05 -	0.5
VOLVO S60 4D SEDAN WITH OEM SENSORS	F	12/10 -	0.5
AUDI A5 2D CABRIOLET	8T	08/09 -	0
AUDI A5 2D COUPE	8T	05/09 -	0

SPORTS CARS			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
HYUNDAI VELOSTER 3D COUPE WITH OEM CAMERA	FS	07/12 -	5
LEXUS IS F 4D SEDAN WITH OEM CAMERA	USE20R	10/08 -	5
VOLKSWAGEN SCIROCCO 3D COUPE WITH OEM CAMERA	1S	02/12 -	5
MAZDA MX-5 2D CONVERTIBLE	NC	9/05/2012	4
PEUGEOT RCZ 2D COUPE WITH OEM SENSORS	-	10/10 -	4
HONDA CR-Z 2D COUPE WITH OEM SENSORS	-	11/11 -	3.5
AUDI TT 2D COUPE	8J	11/06 -	3
NISSAN 370Z 2D COUPE	Z34	05/09 -	2
VOLKSWAGEN EOS 2D CONVERTIBLE WITH OEM SENSORS	1F	03/07 -	0.5
SUBARU BRZ 2D COUPE	-	06/12 -	0
TOYOTA 86 2D COUPE	ZN6	06/12 -	0

COMMERCIAL VEHICLES			
VEHICLE	SERIES	YEAR MODEL	STAR RATING (OUT OF 5)
MAZDA BT50 DUAL CAB UTILITY WITH OEM CAMERA	-	11/11 -	5
MAHINDRA PIK-UP 2D UTILITY	S5	06/07 -	2.5
MAHINDRA PIK-UP DOUBLE CAB UTILITY	S5	06/07-	2.5
NISSAN NAVARA DUAL CAB UTILITY	D40	12/05 -	2.5
TOYOTA HILUX X CAB P/UP	GGN15R	03/05-	2.5
GREAT WALL MOTORS V240 C/CHAS	K2	07/09 -	2
VOLKSWAGEN AMAROK DUAL CAB UTILITY	2H	02/11 -	2
GREAT WALL MOTORS V240 DUAL CAB UTILITY	K2	07/09 -	1.5
HOLDEN COLORADO CREW CAB P/UP	RG	06/12 -	1.5
HOLDEN COMMODORE UTILITY WITH OEM SENSORS	VE II	09/10 -	0.5
MAZDA BT50 DUAL CAB UTILITY WITH OEM SENSORS	-	11/11 -	0.5
MITSUBISHI TRITON DOUBLE CAB UTILITY	MN	09/09 -	0.5
TOYOTA HILUX DUAL CAB P/UP WITH OEM SENSORS	KUN26R	03/05 -	0.5
FORD RANGER SUPER CAB UTILITY	PX	09/11 -	0
HOLDEN COMMODORE UTILITY	VE II	09/10 -	0
MITSUBISHI EXPRESS VAN	SJ	03/06 -	3
TOYOTA HIACE 4D VAN (VAN)	KDH201R	11/06 -	2.5
HYUNDAI iLOAD VAN	TQ	02/08 -	2
SUZUKI APV 4D VAN	GD	06/05 -	1.5
FIAT SCUDO VAN	-	04/08 -	1
MERCEDES-BENZ VITO VAN	-	02/10 -	1
VOLKSWAGEN CADDY VAN	2K	08/06 -	1

APPENDIX 2 – GERMAN PEDESTRIAN CODING ON FEDERAL STATISTICAL DATABASE (STBA)

These codes were provided by the Federal Highway Research Institute (Bundesanstalt fűr Straßenwesen – BASt) and show the way in which backover collisions can be identified in their national database. These codes are published with the permission of BASt.

Pedestrian Accidents in Germany

(National Police Accident data analysis, 2008 - 2010)

7th of December 2011, Berlin

Mr. Claus Pastor,
Section "Passive Vehicle Safety & Biomechanics"

Bundesanstalt für Straßenwesen

Objective

- **Structure of pedestrian accidents at national level**

- **Usage of 3-digit German Accident Type at nat. Level**
- **3-digit Accident Type is available for 6 German countries, covering 42 % of the relevant accidents**

bast

Data

- German Police data, vol. 2008 - 2010

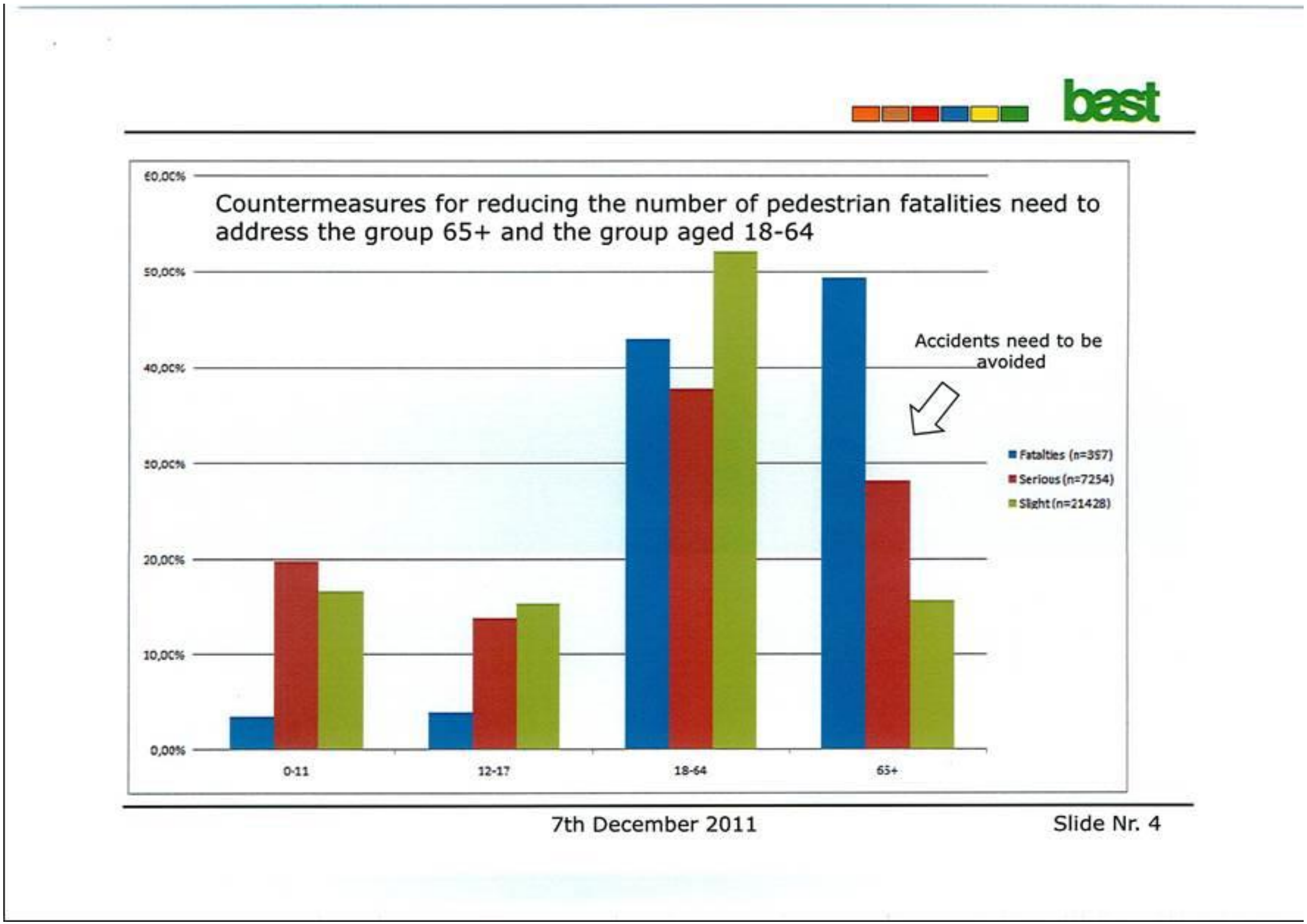
Filter

- Passenger Car (M1) to Pedestrian Accident
- Personal Injuries
- 3 digit accident type available

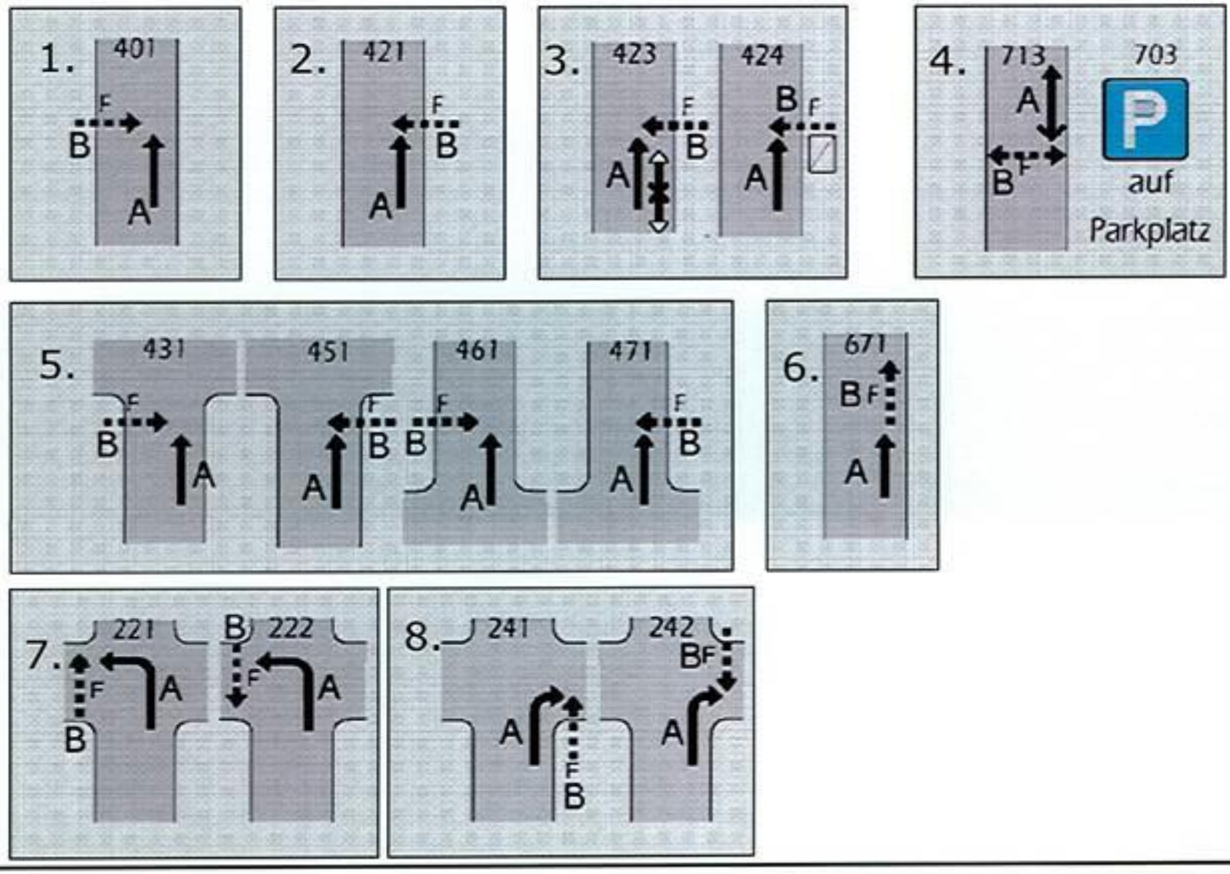
Data Structure

- Age group of pedestrian (0-11, 12-17, 18-64, 65+)
- Accident Location (urban, rural, BAB)
- Light Condition (daylight, dawn, dark)
- Injury Severity to Pedestrian(slight, serious, fatal)
- 3 digit accident type

7th December 2011 Slide Nr. 3


bast
Countermeasures for reducing the number of pedestrian fatalities need to address the group 65+ and the group aged 18-64
60,00%
50,00%
40,00%
30,00%
20,00%
10,00%
0,00%
0-11
12-17
18-64
65+
Accidents need to be avoided
Fatalties (n=357)
Serious (n=7254)
Slight (n=21428)
7th December 2011
Slide Nr. 4

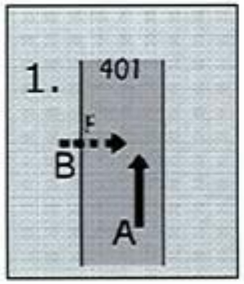
Most important pedestrian accident scenarios



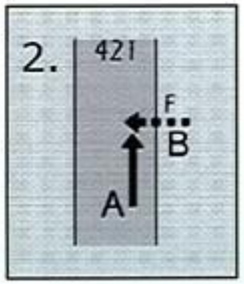
7th December 2011

Slide Nr. 5

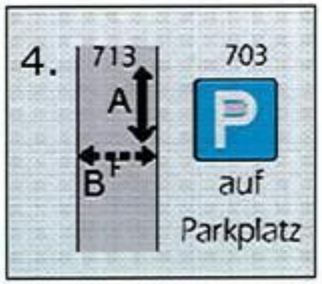
Fatal Elderly Pedestrians (are frequently unobstructed entering from the left)



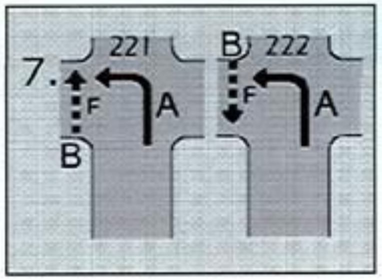
36%
dark: 72%



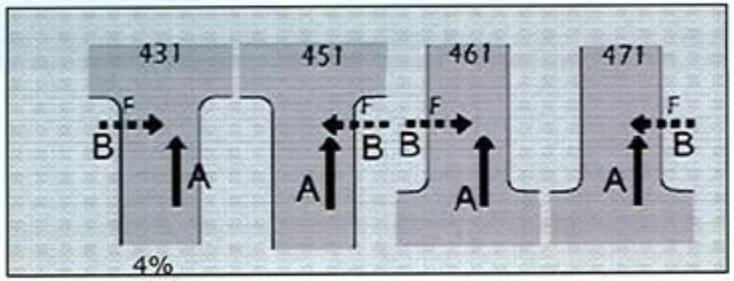
15%
dark: 50%



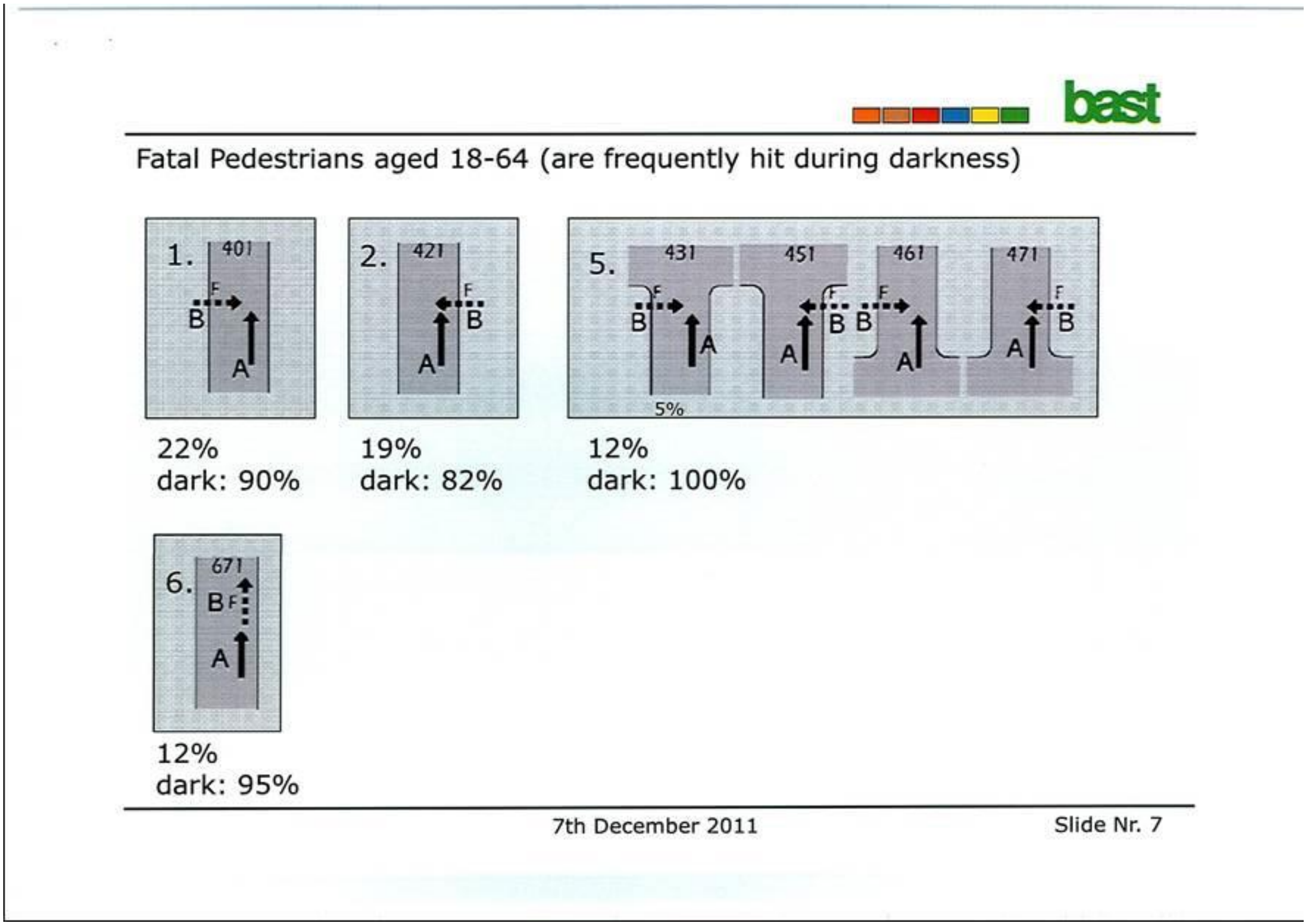
5%
dark: 28%



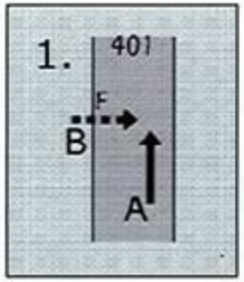
4%
dark: 25%



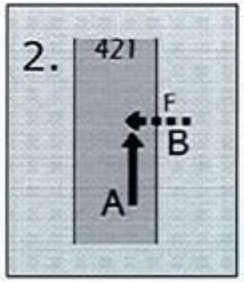
10%
dark: 63%


bast
Fatal Pedestrians aged 18-64 (are frequently hit during darkness)
1.
401
B
F
A
22%
dark: 90%
2.
421
F
B
A
19%
dark: 82%
5.
431
451
461
471
B
F
A
5%
12%
dark: 100%
6.
671
B
F
A
12%
dark: 95%
7th December 2011
Slide Nr. 7

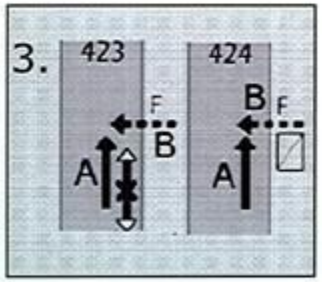
Fatal Children aged 0-11 (frequently hit jumping on the road from the right)



14%
dark: 50%

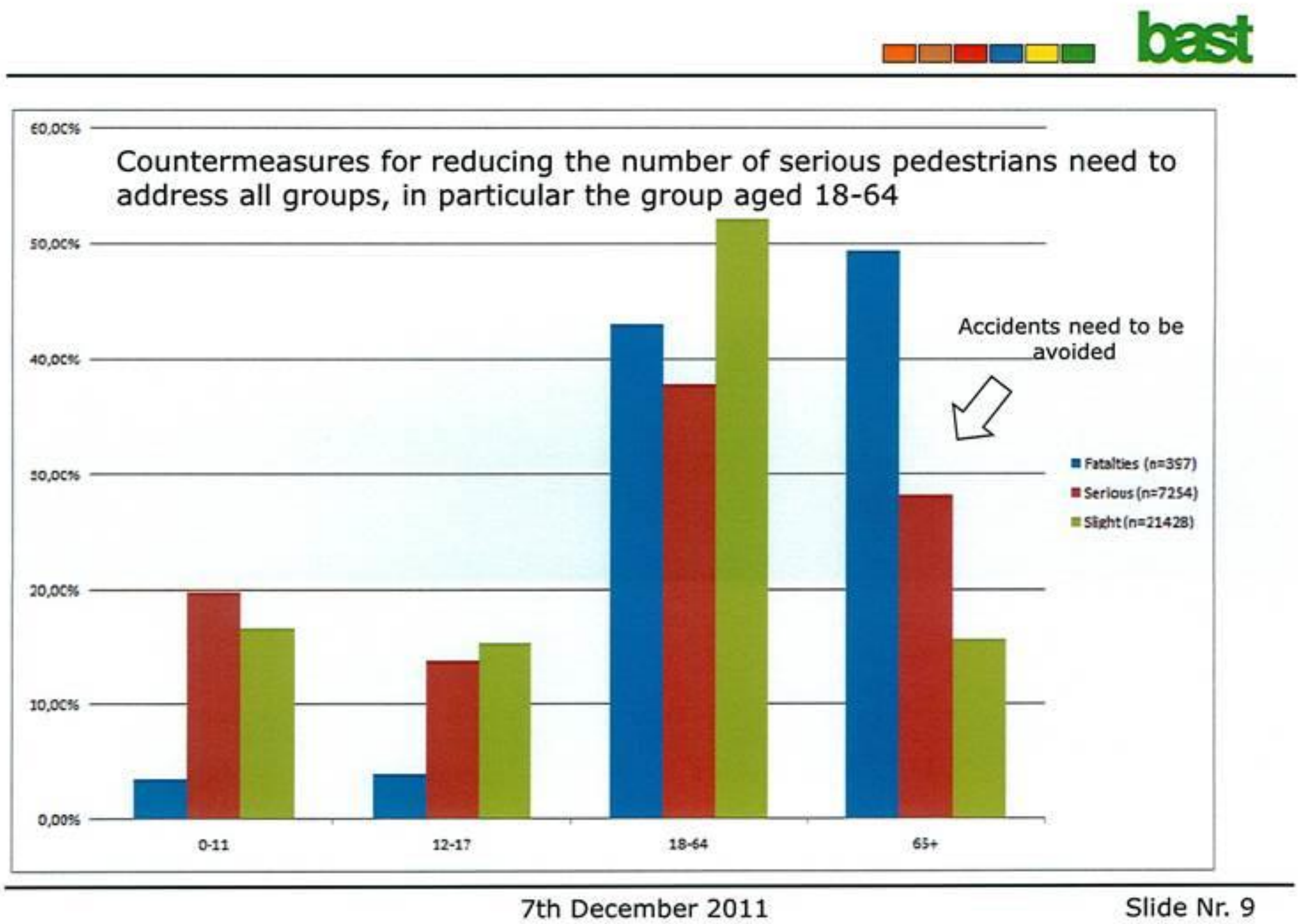


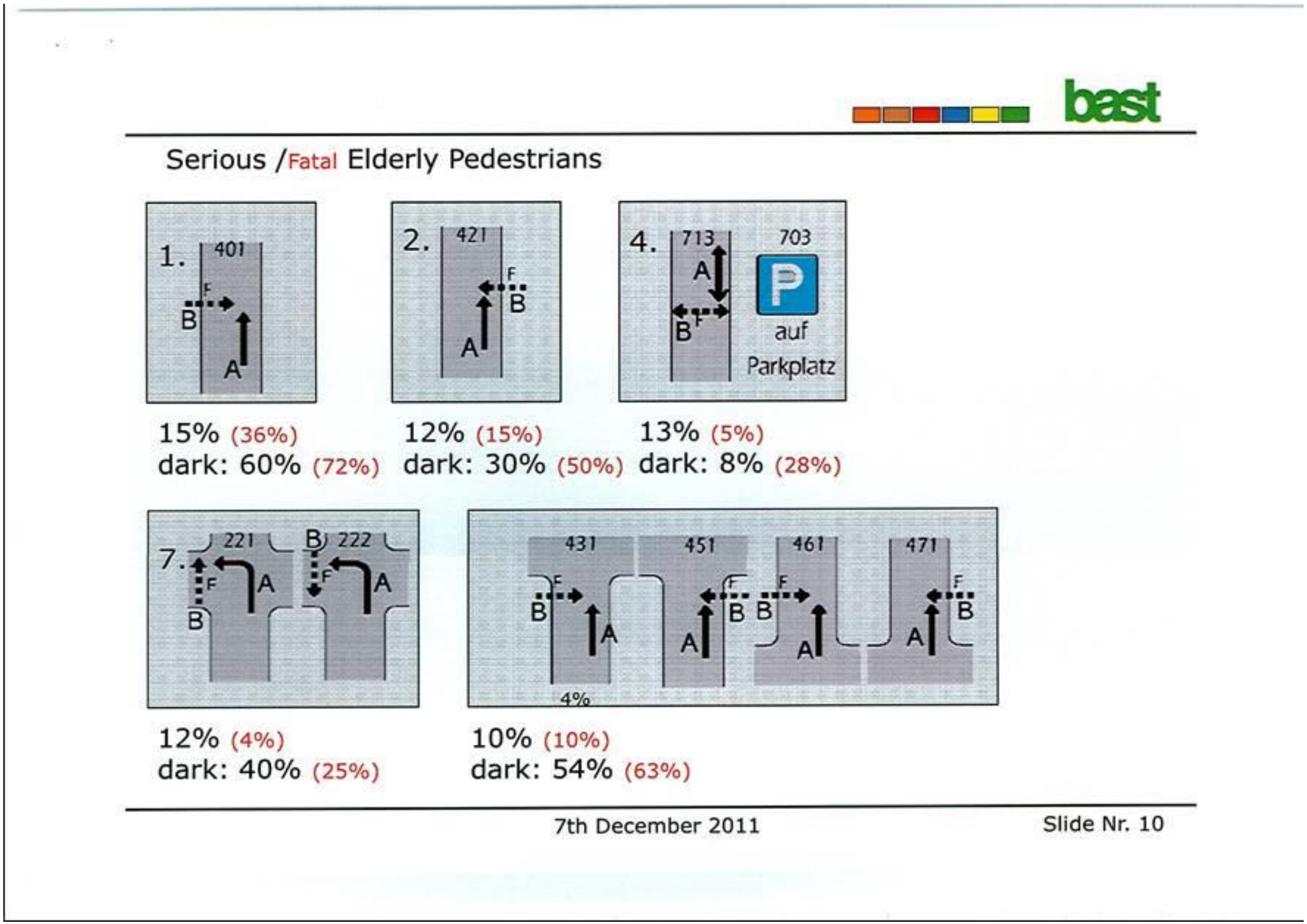
36%
dark: 0%



14%
dark: 0%

← Schoolbus


bast
Countermeasures for reducing the number of serious pedestrians need to address all groups, in particular the group aged 18-64
60,00%
50,00%
40,00%
30,00%
20,00%
10,00%
0,00%
0-11
12-17
18-64
65+
Accidents need to be avoided
Fatalties (n=397)
Serious (n=7254)
Slight (n=21428)
7th December 2011
Slide Nr. 9

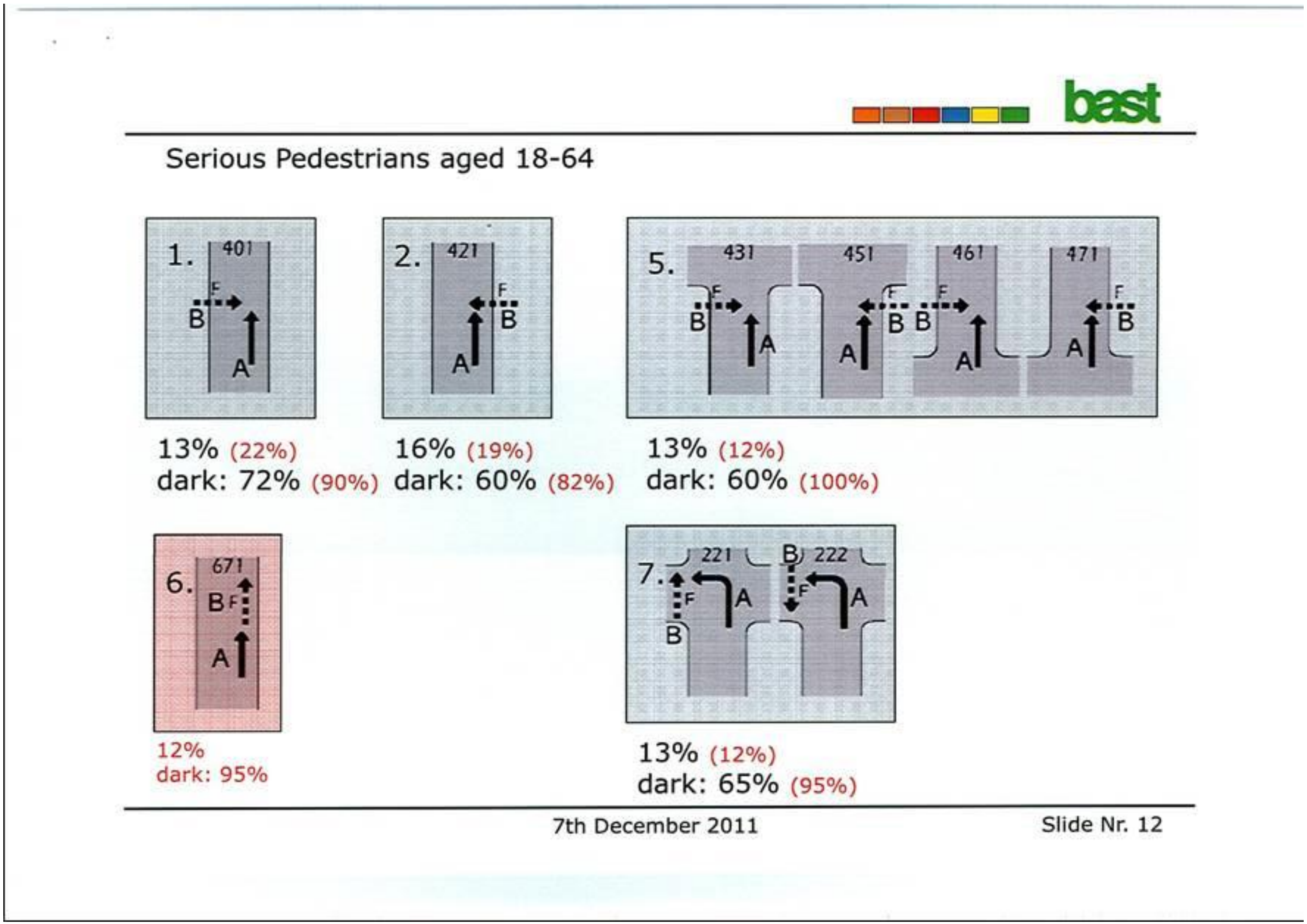

bast
Serious /Fatal Elderly Pedestrians
1.
401
F
B
A
15% (36%)
dark: 60% (72%)
2.
421
F
B
A
12% (15%)
dark: 30% (50%)
4.
713
A
B
F
703
auf
Parkplatz
13% (5%)
dark: 8% (28%)
7.
221
222
F
B
A
12% (4%)
dark: 40% (25%)
431
451
461
471
F
B
A
4%
10% (10%)
dark: 54% (63%)
7th December 2011
Slide Nr. 10

bast

Serious Elderly Pedestrians

As compared to fatal accidents

- Turning accidents get more important
- Crossing accidents from left or right get less important (whereas crossing at intersections stay constant)
- Low speed (parking place / driving backwards) accidents get more important

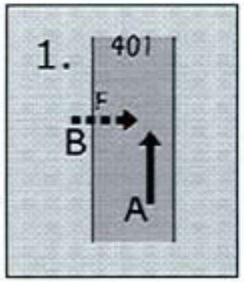

bast
Serious Pedestrians aged 18-64
1.
401
F
B
A
2.
421
F
B
A
5.
431
451
461
471
F
B
A
6.
671
B F
A
7.
221
222
F
B
A
13% (22%)
dark: 72% (90%)
16% (19%)
dark: 60% (82%)
13% (12%)
dark: 60% (100%)
12%
dark: 95%
13% (12%)
dark: 65% (95%)
7th December 2011
Slide Nr. 12

Serious Pedestrians aged 18-64

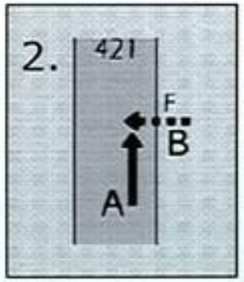
As compared to fatal accidents

- Darkness gets less important but remains to be an issue
- Turning accidents get more important
- Crossing accidents from left or right get less important (whereas crossing at intersections stay constant)
- Accidents in longitudinal traffic get less important

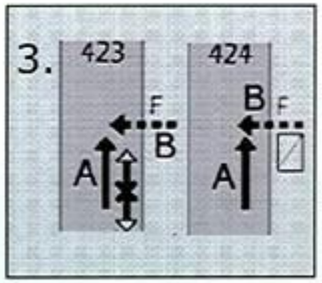
Serious Children aged 0-11



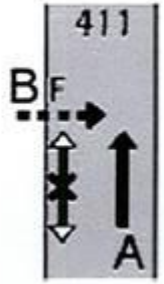
12% (14%)
dark: 25% (50%)



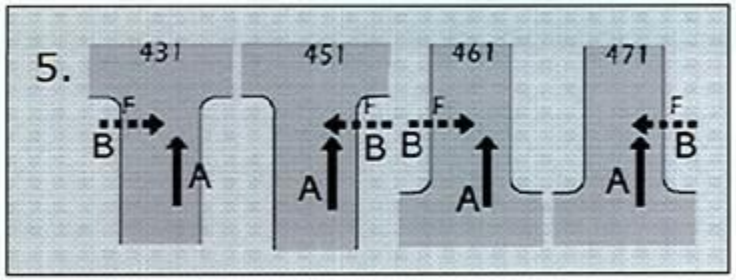
19% (36%)
dark: 15% (0%)



22% (14%)
dark: 10% (0%)



12%
dark: 12%



8%
dark: 30%

7th December 2011

Slide Nr. 14

APPENDIX 3 – A SAMPLE OF FATAL PEDESTRIAN CRASHES FROM THE EUROPEAN CARE DATABASE

DG MOVE provided a sample of fatal pedestrian from their CARE database for 2011 involving data from 13 European member states illustrating the types of crashes coded on CARE and how it would be possible to identify backover collisions.

Fatal accidents with pedestrian involved

Report Title

		2011	2011	2011	2011	2011
		1	3	5	8	9
		BE	CZ	DE	GR	ES
inside urban are <15	not applicable	6	3	23	10	10
inside urban are <15	other	-	-	-	-	-
inside urban are <15	straight ahead	-	-	-	2	2
inside urban are <15	unknown	-	2	2	-	-
inside urban are 15-17	not applicable	2	1	10	4	3
inside urban are 15-17	other	-	-	-	-	-
inside urban are 15-17	reversing	-	-	-	-	-
inside urban are 15-17	stopping	-	-	-	-	1
inside urban are 15-17	straight ahead	1	-	-	1	-
inside urban are 15-17	unknown	-	1	-	-	-
inside urban are 18-24	not applicable	5	5	24	5	3
inside urban are 18-24	other	4	-	-	5	3
inside urban are 18-24	overtaking	-	-	-	-	-
inside urban are 18-24	overtaking on th	-	-	-	-	-
inside urban are 18-24	overtaking on th	1	-	-	-	-
inside urban are 18-24	reversing	2	-	-	-	1
inside urban are 18-24	stopped	-	-	-	-	3
inside urban are 18-24	stopped/stoppir	-	-	-	-	-
inside urban are 18-24	straight ahead	5	-	-	23	16
inside urban are 18-24	turning left	-	-	-	-	-
inside urban are 18-24	turning right	-	-	-	-	2
inside urban are 18-24	unknown	1	20	58	-	3
inside urban are 25-49	changing lane	-	-	-	1	-
inside urban are 25-49	not applicable	13	25	63	20	27
inside urban are 25-49	other	3	-	-	17	14
inside urban are 25-49	overtaking	-	-	-	-	-
inside urban are 25-49	overtaking on th	2	-	-	1	2
inside urban are 25-49	reversing	1	-	-	3	8
inside urban are 25-49	stopped	-	-	-	-	13
inside urban are 25-49	stopped/stoppir	-	-	-	-	-
inside urban are 25-49	stopping	-	-	-	1	-
inside urban are 25-49	straight ahead	24	-	-	71	56
inside urban are 25-49	turning left	1	-	-	1	-
inside urban are 25-49	turning right	2	-	-	-	5
inside urban are 25-49	unknown	3	72	220	9	14
inside urban are 25-49	u turn	-	-	-	-	-
inside urban are 50-64	changing lane	-	-	-	-	-
inside urban are 50-64	not applicable	13	27	62	24	16
inside urban are 50-64	other	3	-	-	3	3
inside urban are 50-64	reversing	-	-	-	4	4
inside urban are 50-64	stopped	-	-	-	-	2
inside urban are 50-64	stopped/stoppir	-	-	-	-	-

1

2011 10 FR	2011 11 HR	2011 13 CY	2011 19 NL	2011 20 AT	2011 21 PL	2011 23 RO	2011 26 FI
26	5	1	3	4	35	57	1
-	-	-	-	-	1	-	-
2	-	-	-	-	-	-	-
-	1	-	-	-	-	3	1
5	1	-	-	2	11	5	-
-	-	-	-	-	6	-	-
1	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
3	-	-	1	-	-	-	-
2	2	-	-	1	-	4	3
11	5	1	2	4	52	22	2
2	-	-	-	1	202	-	-
-	-	-	-	1	2	-	-
3	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
4	-	-	2	-	-	-	-
-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-
41	-	3	8	-	-	-	-
6	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
4	13	-	-	8	-	111	5
-	-	-	-	1	-	-	-
45	6	3	6	7	231	128	4
5	-	-	1	1	461	-	-
-	-	-	-	-	5	-	-
6	-	-	-	-	-	-	-
16	-	-	2	1	-	-	-
-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-
116	-	1	10	-	-	-	-
11	-	-	-	-	-	-	-
16	-	-	2	1	-	-	-
8	35	-	-	24	-	387	11
1	-	-	-	-	-	-	-
-	-	-	1	-	-	-	-
60	18	3	5	12	256	144	5
1	-	-	1	2	199	-	-
1	-	-	2	1	-	-	-
-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-

2

inside urban are 50-64	stopping	-	-	-	1	-
inside urban are 50-64	straight ahead	10	-	-	16	18
inside urban are 50-64	turning left	-	-	-	-	1
inside urban are 50-64	turning right	1	-	-	1	1
inside urban are 50-64	unknown	1	25	102	2	8
inside urban are 65+	changing lane	-	-	-	-	-
inside urban are 65+	not applicable	37	58	261	105	143
inside urban are 65+	other	1	-	-	2	3
inside urban are 65+	overtaking on th	-	-	-	-	-
inside urban are 65+	reversing	-	-	-	1	-
inside urban are 65+	stopping	-	-	-	1	-
inside urban are 65+	straight ahead	3	-	-	8	8
inside urban are 65+	turning left	-	-	-	1	1
inside urban are 65+	turning right	-	-	-	-	2
inside urban are 65+	unknown	-	11	69	-	4
inside urban are 65+	u turn	-	-	-	-	1
inside urban are unknowr	not applicable	-	-	1	13	4
inside urban are unknowr	other	1	-	-	4	1
inside urban are unknowr	overtaking	-	-	-	-	-
inside urban are unknowr	straight ahead	4	-	-	11	3
inside urban are unknowr	turning left	1	-	-	-	-
inside urban are unknowr	turning right	-	-	-	-	1
inside urban are unknowr	unknown	1	-	11	4	6
outside urban ai <15	not applicable	6	-	9	2	5
outside urban ai <15	other	-	-	-	-	1
outside urban ai <15	overtaking on th	-	-	-	-	1
outside urban ai <15	straight ahead	-	-	-	-	4
outside urban ai <15	unknown	-	4	4	1	2
outside urban ai 15-17	not applicable	-	-	9	-	1
outside urban ai 15-17	other	1	-	-	-	-
outside urban ai 15-17	straight ahead	1	-	-	-	3
outside urban ai 15-17	unknown	-	1	2	-	-
outside urban ai 18-24	not applicable	3	8	35	2	10
outside urban ai 18-24	other	2	-	-	2	1
outside urban ai 18-24	overtaking	-	-	-	-	-
outside urban ai 18-24	overtaking on th	1	-	-	-	-
outside urban ai 18-24	reversing	-	-	-	-	-
outside urban ai 18-24	stopped	-	-	-	-	-
outside urban ai 18-24	straight ahead	10	-	-	8	19
outside urban ai 18-24	turning left	-	-	-	-	-
outside urban ai 18-24	turning right	-	-	-	-	-
outside urban ai 18-24	unknown	1	7	36	-	1
outside urban ai 25-49	changing lane	-	-	-	-	-
outside urban ai 25-49	not applicable	9	29	61	20	48
outside urban ai 25-49	other	5	-	-	2	7
outside urban ai 25-49	overtaking	-	-	-	-	-
outside urban ai 25-49	overtaking on th	-	-	-	-	-
outside urban ai 25-49	reversing	1	-	-	-	-

1	-	-	-	-	-	-	-
48	-	-	8	-	-	-	-
6	-	-	-	-	2	-	-
6	-	-	-	-	-	-	-
3	15	-	-	12	-	81	3
-	-	-	-	1	-	-	-
217	34	5	26	31	339	252	16
3	-	-	-	-	34	-	-
1	-	-	-	-	-	-	-
4	-	-	-	1	-	-	-
-	-	-	-	-	-	-	-
30	-	-	3	-	-	-	-
-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-
3	7	-	-	5	-	11	6
-	-	-	-	-	-	-	-
-	-	-	-	-	13	3	-
-	-	-	-	-	33	-	-
-	-	-	-	-	1	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	2	-	2	1
8	-	-	-	1	7	8	2
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
10	-	-	2	1	6	3	-
-	-	-	-	-	3	-	-
2	-	-	1	-	-	-	-
1	-	-	-	1	-	1	-
36	-	-	4	5	34	6	1
3	-	-	-	1	85	-	-
-	-	-	-	-	3	-	-
-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-
-	-	-	1	-	-	-	-
28	-	-	5	-	-	-	-
2	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-
4	2	-	-	6	-	25	2
2	-	-	-	-	-	-	-
55	2	-	5	7	202	44	5
4	-	-	1	1	278	-	-
-	-	-	-	-	5	-	-
3	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-

outside urban ai	25-49	stopped	-	-	-	-	4
outside urban ai	25-49	stopped/stoppin	-	-	-	-	-
outside urban ai	25-49	straight ahead	14	-	-	25	89
outside urban ai	25-49	turning left	-	-	-	-	-
outside urban ai	25-49	turning right	-	-	-	-	1
outside urban ai	25-49	unknown	1	42	96	1	9
outside urban ai	50-64	not applicable	11	16	34	5	38
outside urban ai	50-64	other	-	-	-	2	5
outside urban ai	50-64	overtaking	-	-	-	-	-
outside urban ai	50-64	overtaking on th	2	-	-	1	2
outside urban ai	50-64	reversing	-	-	-	-	-
outside urban ai	50-64	stopped	-	-	-	-	-
outside urban ai	50-64	straight ahead	4	-	-	3	28
outside urban ai	50-64	turning right	-	-	-	-	-
outside urban ai	50-64	unknown	-	18	52	1	2
outside urban ai	65+	not applicable	11	11	44	19	56
outside urban ai	65+	other	-	-	-	1	1
outside urban ai	65+	reversing	-	-	-	-	-
outside urban ai	65+	stopped	-	-	-	-	-
outside urban ai	65+	straight ahead	2	-	-	3	11
outside urban ai	65+	turning right	-	-	-	-	-
outside urban ai	65+	unknown	1	3	17	1	-
outside urban ai	unknowr	not applicable	-	-	-	3	3
outside urban ai	unknowr	other	-	-	-	1	2
outside urban ai	unknowr	overtaking	-	-	-	-	-
outside urban ai	unknowr	stopped	-	-	-	-	-
outside urban ai	unknowr	straight ahead	1	-	-	2	1
outside urban ai	unknowr	unknown	-	-	2	1	13
unknown	25-49	not applicable	-	-	-	-	-
unknown	25-49	straight ahead	-	-	-	-	-
unknown	50-64	not applicable	-	-	-	-	-

5

-	-	-	1	-	-	-	-
2	-	-	-	-	-	-	-
74	-	-	6	-	-	-	-
3	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-
5	2	-	-	16	-	101	9
29	1	-	4	8	175	45	1
1	-	-	-	-	79	-	-
-	-	-	-	-	2	-	-
-	-	-	-	-	-	-	-
1	-	-	-	-	-	-	-
-	-	-	1	-	-	-	-
24	-	-	5	-	-	-	-
2	-	-	-	-	-	-	-
-	1	-	-	3	-	23	2
38	1	-	5	7	56	50	5
-	-	-	-	-	15	-	-
-	-	-	-	1	-	-	-
-	-	-	1	-	-	-	-
18	-	-	3	-	-	-	-
3	-	-	-	-	-	-	-
-	-	-	-	-	-	2	1
-	-	-	-	-	11	1	-
-	-	-	-	-	35	-	-
-	-	-	-	-	1	-	-
-	-	-	1	-	-	-	-
-	-	-	1	-	-	-	-
-	-	-	1	1	-	5	2
-	-	-	1	-	-	-	-
-	-	-	2	-	-	-	-
-	-	-	1	-	-	-	-

6

APPENDIX 4 - PEDESTRIAN INJURIES BY COLLIDING VEHICLE MODEL AND MARKET GROUP

New South Wales

Model by MKT GRP BREAKDOWN		Injury Severity Collision Partner	
		Injury	Dead
Passenger vehicles			
Commercial - Ute	FORD FALCON UTE 82-95	4	0
	FORD FALCON UTE 96-98	1	0
	FORD FALCON UTE AU	3	0
	FORD FALCON UTE BA	1	1
	FORD COURIER	2	1
	HOLDEN RODEO 82-85	1	0
	HOLDEN RODEO 86-88	1	0
	HOLDEN RODEO 89-95	4	0
	HOLDEN RODEO 96-98	2	0
	HOLDEN RODEO 99-02	6	0
	HOLDEN COMMODORE VS/VR UTE	6	0
	HOLDEN COMMODORE UTE VU	3	0
	HOLDEN COMMODORE VY/VZ UTE	3	0
	HOLDEN RODEO RA	6	1
	MITSUBISHI TRITON 78-954	4	0
	MITSUBISHI TRITON OTHERS	6	0
	ISUZU NPR SERIES	0	1
	MAZDA COMMERCIALS	4	0
	MAZDA BRAVO / FORD COURIER 03 on	3	0
	MAZDA BRAVO / FORD COURIER OTHERS	2	0
	MAZDA BT-50 / FORD RANGER	4	0
	NISSAN NAVARA 86-91	2	0
	NISSAN NAVARA >= 97	3	0
	NISSAN NAVARA D40	2	0
	TOYOTA 4RUNNER/HILUX 82-85	1	0
	TOYOTA 4RUNNER/HILUX 86-88	2	0
	TOYOTA 4RUNNER/HILUX 89-97	23	0
	TOYOTA 4RUNNER/HILUX 98-02	7	0
	TOYOTA 4RUNNER/HILUX 03 on	2	0
	TOYOTA HILUX 05 on	6	0
Commercial - Van	CITROEN BERLINGO	1	0
	FORD TRANSIT 94-00	7	0
	FORD TRANSIT 01 on	3	0
	FORD ECONOVAN /MAZDA BONGO E SERIES	8	1
	MITSUBISHI EXPRESS	16	0
	ISUZU NKR SERIES	1	0
	ISUZU NPR SERIES	1	0
	ISUZU HEAVY VEHICLES	1	0
	KIA PREGIO	2	0
	MAZDA COMMERCIALS	2	0
	MERCEDES 100/140 VAN	1	0
	MERCEDES VITO VAN	3	0
	MERCEDES SPRINTER W903/904	1	0
	MERCEDES VITO / VIANO VAN 639	1	0
	NISSAN VANS(NOMAD/URVAN/C22/E24/VANETTE)	1	0
	TOYOTA HIACE/LITEACE 82-86	1	0
	TOYOTA HIACE/LITEACE 87-89	2	0
	TOYOTA HIACE/LITEACE 90-05	11	0
	TOYOTA HIACE/LITEACE 96-02	17	0
	TOYOTA HIACE/LITEACE 05 on	6	0
	TOYOTA COMMERCIALS	14	0
	TOYOTA TOWNACE	1	0

	TOYOTA OTHERS	1	0
	VOLKSWAGEN CARAVELLE/TRANSPORTER 95 on	5	0
People Mover	CHRYSLER VOYAGER	3	0
	CHRYSLER (GRAND) VOYAGER	1	0
	FORD SPECTRON	1	0
	HOLDEN ZAFIRA TT	2	0
	MITSUBISHI NIMBUS 92-97	2	0
	MITSUBISHI NIMBUS >=98	3	0
	MITSUBISHI STARWAGON 87-94	4	0
	MITSUBISHI STARWAGON SJ	1	1
	MITSUBISHI STARWAGON WA	7	0
	MITSUBISHI EXPRESS	1	0
	KIA CARNIVAL	1	0
	MAZDA MPV 93-99	1	0
	HONDA ODYSSEY 95-99	1	0
	HONDA ODYSSEY 2000-2004	1	0
	TOYOTA TARAGO 83-89	5	0
	TOYOTA TARAGO 91-99	5	0
	TOYOTA TARAGO 2000 on	1	0
	TOYOTA AVENSIS	2	0
	TOYOTA TARAGO 50 SERIES	1	0
Large	BMW 7 02 on	1	0
	FORD FALCON X SERIES	10	0
	FORD FALCON EA/EB S1	18	0
	FORD FALCON ED/EB S2	15	0
	FORD FALCON OTHERS	1	0
	FAIRLANE N&LTD D 95-98	1	0
	FAIRLANE & LTD AU 99-02	3	0
	FORD FALCON EF/EL	34	0
	FORD FALCON AU	39	0
	FORD FALCON 09-11	1	0
	FORD FALCON BA	27	0
	HOLDEN COMM VN/VP	19	1
	HOLDEN COMMODORE VS/VR	22	0
	HOLDEN COMMODORE VT/VX	37	2
	HOLDEN STATESMAN/CAPRICE WH	1	1
	HOLDEN COMMODORE VY/VZ	13	0
	HOLDEN COMMODORE VB-VL	4	0
	HOLDEN COMMODORE VE	2	0
	HYUNDAI SONATA <=97	6	0
	HYUNDAI GRANDEUR	3	0
	MITSUBISHI MAGNA TN-TP	9	0
	MITSUBISHI MAGNA VERADA TE-TJ/KE-KJ	19	1
	MITSUBISHI MAGNA/VERADA TR-TS/KR-KS	10	0
	MITSUBISHI MAGNA/VERADA TL/TW/KL/KW	2	0
	MERCEDES E-CLASS W124	1	0
	MERCEDES E-CLASS W210	1	0
	MERCEDES S-CLASS W126	1	0
	MERCEDES S-CLASS W129	1	0
	MERCEDES E-CLASS W211	2	0
	NISSAN SKYLINE	1	0
	NISSAN 300ZX	1	0
	NISSAN MAXIMA J31	1	0
	HONDA LEGEND 86-95	1	0
	HONDA LEGEND 99 on	1	0
	TOYOTA CAMRY >=98	26	2
	TOYOTA CROWN/CRESSIDA 80-85	2	0
	TOYOTA CRESSIDA >= 89	1	0
	TOYOTA SUPRA	1	0
	LEXUS ES300	6	0
	LEXUS LS400	1	0
	LEXUS GS300	2	0

	TOYOTA AVALON XH10	6	0
	LEXUS SC430	1	0
	TOYOTA CAMRY XK36	9	0
	TOYOTA AURION	1	0
	TOYOTA CAMRY 40 SERIES	1	0
	VOLVO 850/S70/V70/C70	2	1
	VOLVO 700/900 SERIES	2	0
	VOLVO V70 / XC70 00-07	2	0
Medium	ALFA 156	2	0
	ALFA 147	2	0
	AUDI 80	1	0
	AUDI A4	5	0
	AUDI A4 B6	1	0
	BMW 5 SERIES E60	1	0
	BMW 3 92-98	4	0
	BMW 3 99 on	6	0
	BMW 5 96-03	1	0
	FORD MONDEO	3	0
	HOLDEN CAMIRA	1	0
	HOLDEN VECTRA	7	0
	MITSUBISHI SIGMA/SCORPION	3	0
	MITSUBISHI GALANT >= 89	1	0
	MAZDA 626/MX6 / TELSTAR 83-86	5	0
	MAZDA 626/MX6 / TELSTAR 88-91	3	0
	MAZDA 626/MX6 / TELSTAR 92-97	4	0
	MAZDA 626/MX6 >=98	2	0
	MAZDA EUNOS 500	1	0
	MAZDA 6	4	0
	MAZDA 6 GH	1	0
	MERCEDES C-CLASS W201	1	0
	MERCEDES C-CLASS W202	3	0
	MERCEDES CLK W208	1	0
	MERCEDES C-CLASS W203	1	0
	NISSAN PINTARA <=88	2	0
	NISSAN PINTARA >=89	5	0
	NISSAN BLUEBIRD <=88	2	0
	NISSAN 200SX	2	0
	HONDA ACCORD EURO	5	0
	HONDA ACCORD US	2	0
	HONDA ACCORD 86-90	1	0
	HONDA ACCORD 94-98	3	0
	HONDA ACCORD 99 on	1	0
	HONDA ACCORD 08 on	1	0
	HONDA PRELUDE 83-91	1	0
	HONDA PRELUDE 92-96	1	0
	HONDA PRELUDE >=97	1	0
	SAAB 900/ 9-3 >=94	2	0
	SAAB 9000	2	0
	SUBARU 1800/LEONE	2	0
	SUBARU LIBERTY <=94	5	1
	SUBARU LIBERTY 95-98	5	0
	SUBARU LIBERTY 99-03	5	0
	SUBARU LIBERTY 03 on	4	0
	TOYOTA CORONA	6	0
	TOYOTA CAMRY 82-87	1	0
	TOYOTA CAMRY/APOLLO 88-92	20	0
	TOYOTA CAMRY/APOLLO 93-97	30	0
	TOYOTA CELICA 86-89	1	0
	TOYOTA CELICA 90-93	1	0
	TOYOTA CELICA 00 on	1	0
	LEXUS IS200	2	0
	LEXUS IS250/ IS350/ IS F	1	0

	VOLKSWAGEN PASSAT 98 on	2	0
Small	ALFA ALFASUD	2	0
	AUDI A3/S3	2	0
	BMW 1 SERIES E87	1	0
	CITROEN XSARA	1	0
	DAIHATSU APPLAUSE	3	0
	DAEWOO CIELO	1	0
	DAEWOO NUBIRA	2	0
	DAEWOO LANOS	2	0
	FORD LASER/MET 90	1	0
	FORD LASER/MET 91-94	12	0
	FORD LASER/MET 95-98	5	0
	FORD FOCUS	2	0
	FORD FOCUS LS / LT	3	0
	HOLDEN ASTRA JAP 87	1	0
	HOLDEN ASTRA TR	1	0
	HOLDEN ASTRA TS	20	0
	HOLDEN ASTRA AH	7	0
	HYUNDAI EXCEL 82-89	1	0
	HYUNDAI EXCEL 90-94	4	0
	HYUNDAI EXCEL 95-98	15	1
	HYUNDAI ELANTRA	1	0
	HYUNDAI LANTRA 91-95	2	0
	HYUNDAI LANTRA 96-00	5	0
	HYUNDAI COUPE	1	0
	HYUNDAI ACCENT	3	0
	MITSUBISHI CA LANCER 82-92	1	0
	MITSUBISHI CC LANCER 94-95	3	0
	MITSUBISHI CE LANCER/MIRAGE >=96	16	0
	MITSUBISHI LANCER CG/CH	4	0
	KIA MENTOR	1	0
	KIA RIO	1	0
	KIA CERATO	1	0
	MAZDA 323 /LASER 82-88	11	0
	MAZDA 323 94	1	0
	MAZDA 323 95-98	2	0
	MAZDA 323 / LASER 99 on	10	0
	MAZDA 3	4	0
	MAZDA MX5 02 on	1	0
	MERCEDES A-CLASS W169	1	0
	NISSAN PULSAR/VECTOR / ASTRA 82-86	1	0
	NISSAN PULSAR/VECTOR 88-90	8	0
	NISSAN PULSAR/VECTOR 91	1	0
	NISSAN PULSAR 92-95	4	0
	NISSAN PULSAR >=96	13	0
	NISSAN GAZELLE	2	0
	NISSAN PULSAR N16 2000 on	5	0
	HONDA CIVIC 88-91	1	0
	HONDA CIVIC 92-95	5	0
	HONDA CIVIC >=96	7	0
	HONDA CRX 87-91	1	0
	HONDA S2000	1	0
	HONDA CIVIC GEN 7 2000 on	2	0
	HONDA CIVIC GEN 8	4	0
	HONDA INTEGRA 94-01	1	0
	HONDA CONCERTO	1	0
	RENAULT SCENIC	1	0
	SEAT IBIZA	1	0
	SUBARU IMPREZA 93-00	1	0
	SUBARU IMPREZA 2001-2007	4	0
	SUBARU IMPREZA 2008 on	1	0
	SUZUKI BALENO	1	0

	TOYOTA COROLLA 82-84	2	0
	TOYOTA COROLLA 86-88	10	0
	TOYOTA COROLLA 90-93 / NOVA 88-93	12	0
	TOYOTA COROLLA 94-98 / NOVA 95 on	22	0
	TOYOTA COROLLA 98-00	7	0
	TOYOTA COROLLA 120 SERIES	17	0
	TOYOTA COROLLA 150 SERIES	2	0
	COROLLA 4WD WAGON AE95	1	0
	VOLKSWAGEN GOLF 95-98	1	0
	VOLKSWAGEN GOLF 99 on	6	0
	VOLKSWAGEN NEW BEETLE	1	0
Light	CITROEN C3 PLURIEL	1	0
	CHARADE 80-86	2	0
	CHARADE 88-92	3	0
	CHARADE 93-00	1	0
	DAIHATSU SIRION	1	0
	DAIHATSU MIRA	1	0
	DAEWOO MATIZ	1	0
	FORD FESTIVA WB/WD/WH/WF 94-2000	14	0
	FORD FIESTA WP/WQ	1	0
	FIAT PUNTO	1	0
	HOLDEN BARINA XC	6	0
	HOLDEN BARINA COMBO & EURO >=95	3	1
	HOLDEN BARINA TK	1	0
	HYUNDAI GETZ	6	0
	MITSUBISHI COLT	5	0
	MITSUBISHI COLT Z2	1	0
	MAZDA 121 82-93 / FORD FESTIVA WA	1	0
	MAZDA 121 94-96	4	0
	MAZDA 121 97-98	4	0
	MAZDA 2	2	0
	MAZDA 2 DE	2	0
	HONDA JAZZ	6	0
	HONDA CITY	1	0
	PEUGEOT 206	1	0
	PROTON SATRIA	2	0
	SUZUKI SWIFT <=84	1	0
	SUZUKI SWIFT/BARINA 85-88	4	0
	SUZUKI SWIFT/BARINA >= 89	13	0
	SUZUKI SWIFT RS415	1	0
	SUZUKIWAGON R	1	0
	TOYOTA ECHO	12	0
	TOYOTA YARIS	5	0
	VOLKSWAGEN POLO 96-00	2	0
SUV - Large	BMW X5 E53	1	0
	LAND ROVER DISCOVERY to 1991-2002	3	0
	MERCEDES M-CLASS W163	4	0
	NISSAN PATROL 88-97	3	0
	NISSAN PATROL 98 on	2	0
	RANGE ROVER 95 on	1	0
	RANGE ROVER 02 on	1	0
	TOYOTA LANCRUISER 90-97	12	0
	TOYOTA LANCRUISER >=98	15	1
SUV - Medium	FORD TERRITORY SX	7	0
	HOLDEN JACKAROO >= 98	1	0
	HOLDEN FRONTERA	1	0
	HOLDEN ADVENTRA	1	0
	HYUNDAI SANTA FE	1	0
	HYNDAI TERRACAN	1	0
	MITSUBISHI PAJERO 82-90	1	0
	MITSUBISHI PAJERO 91	1	0
	MITSUBISHI PAJERO >=92	7	1

	MITSUBISHI PAJERO NM	9	0
	MITSUBISHI PAJERO NS / NT	1	0
	MITSUBISHI CHALLENGER	4	0
	NISSAN PATHFINDER <=94	1	0
	NISSAN PATHFINDER R50 >=95	3	0
	NISSAN PATHFINDER R51 05 on	1	0
	SUBARU TRIBECA	1	0
	TOYOTA KLUGER	1	0
	TOYOTA PRADO 95 SERIES	2	0
	TOYOTA PRADO 120 SERIES	4	0
	LEXUS RX350/400h	1	0
SUV - Compact	DAIHATSU TERIOS	1	0
	MITSUBISHI OUTLANDER	3	0
	MITSUBISHI OUTLANDER CW	1	0
	KIA SPORTAGE KM	1	0
	MAZDA TRIBUTE	7	1
	MAZDA CX-7	2	0
	NISSAN X-TRAIL	13	0
	HONDA CR-V 97-01	5	0
	HONDA CRV 01 on	5	0
	HONDA HR-V	3	0
	HONDA CR-V RE	1	0
	LANDROVER FREELANDER	1	0
	SUBARU FORESTER S3	1	0
	SUBARU FORESTER	6	0
	SUBARU FORESTER II	4	0
	SUZUKI VITARA	6	0
	SUZUKI GRAND VITARA	1	0
	SUZUKI SIERRA/DROVER	1	0
	SUZUKI JIMNY	1	0
	SUZUKI GRAND VITARA JB	1	0
	TOYOTA RAV4 94-00	7	1
	TOYOTA RAV4 2001 on	8	1
	TOYOTA RAV4 30 SERIES	3	0
	TOYOTA OTHERS	1	0

South Australia

Model by MKT GRP BREAKDOWN		Injury Severity Collision Partner		
		Minor	Hospital	Dead
Passenger vehicles				
Commercial - Ute	FORD FALCON UTE AU	0	1	0
	FORD FALCON UTE BA	1	0	0
	FORD F-SERIES	1	0	0
	FORD COURIER	2	0	0
	HOLDEN KINGSWOOD UTE/VAN	0	1	0
	HOLDEN RODEO 89-95	1	1	0
	HOLDEN RODEO 99-02	3	0	0
	HOLDEN WB SERIES	0	1	0
	HOLDEN RODEO RA	1	0	0
	MITSUBISHI COMMERCIALS	2	0	0
	MITSUBISHI TRITON 78-954	2	0	0
	MITSUBISHI TRITON MK	2	0	0
	MAZDA BRAVO / FORD COURIER 98-02	0	1	0
	MAZDA BT-50 / FORD RANGER	1	0	0
	NISSAN NAVARA 92-96	2	0	0
	NISSAN NAVARA >= 97	1	0	0
	NISSAN NAVARA D40	1	0	0
	NISSAN OTHERS	2	0	0
	TOYOTA 4RUNNER/HILUX 82-85	1	0	0
	TOYOTA 4RUNNER/HILUX 86-88	1	0	0
	TOYOTA 4RUNNER/HILUX 89-97	2	1	0
	TOYOTA 4RUNNER/HILUX 98-02	2	0	0
Commercial - Van	DAIHATSU HANDIVAN	0	1	0
	FORD TRANSIT 01 on	1	1	0
	FORD ECONOVAN /MAZDA BONGO E SERIES	3	1	0
	HOLDEN KINGSWOOD UTE/VAN	0	1	0
	MITSUBISHI EXPRESS	8	1	0
	KIA PREGIO	1	0	0
	MAZDA OTHERS	1	0	0
	MERCEDES 100/140 VAN	1	0	0
	MERCEDES VITO VAN	1	0	0
	MERCEDES SPRINTER W903/904	1	0	0
	NISSAN VANS(NOMAD/URVAN/C22/E24/VANETTE)	1	0	0
	TOYOTA HIACE/LITEACE 82-86	1	0	0
	TOYOTA HIACE/LITEACE 90-95	3	0	0
	TOYOTA HIACE/LITEACE 96-04	3	1	0
	TOYOTA HIACE/LITEACE 05 on	1	0	0
	TOYOTA OTHERS	1	0	0
People Mover	CHRYSLER VOYAGER	1	0	0
	FORD SPECTRON	1	0	0
	MITSUBISHI STARWAGON/L300 82-86	2	0	0
	MITSUBISHI STARWAGON WA	1	0	0
	KIA CARNIVAL	2	0	0
	NISSAN PRAIRIE	1	0	0
	TOYOTA TARAGO 83-89	2	0	0
	TOYOTA TARAGO 91-99	1	0	0
	TOYOTA TARAGO 2000 on	3	1	0
Large	FORD FALCON X SERIES	6	0	0
	FAIRLANE Z&LTD F	1	1	0
	FORD FALCON EA/EB S1	6	1	0
	FORD FALCON ED/EB S2	1	2	0
	FORD FALCON OTHERS	1	0	0
	FAIRLANE N&LTD D 95-98	1	0	0
	FORD FALCON EF/EL	6	2	0
	FORD FALCON AU	4	0	0

	FORD FALCON BA	4	0	0
	HOLDEN COMM VN/VP	8	2	0
	STATESMAN/CAPRICE -->89	1	0	0
	STATESMAN/CAPRICE 94-98	2	0	0
	HOLDEN KINGSWOOD	1	0	0
	HOLDEN COMMODORE VS/VR	8	3	0
	HOLDEN COMMODORE VT/VX	13	6	0
	HOLDEN STATESMAN/CAPRICE WH	1	0	0
	HOLDEN COMMODORE VY/VZ	3	0	0
	HOLDEN COMMODORE VB-VL	5	0	0
	HOLDEN COMMODORE VE	1	2	0
	MITSUBISHI MAGNA TN-TP	13	0	0
	MITSUBISHI MAGNA VERADA TE-TJ/KE-KJ	15	2	0
	MITSUBISHI MAGNA/VERADA TR-TS/KR-KS	9	0	0
	MITSUBISHI MAGNA/VERADA TL/TW/KL/KW	1	0	0
	MITSUBISHI 380	0	2	0
	MAZDA 929 82-90	2	0	0
	NISSAN SKYLINE	1	0	0
	NISSAN MAXIMA 89-94	1	0	0
	TOYOTA CAMRY >=98	6	0	0
	TOYOTA SUPRA	1	0	0
	TOYOTA AVALON XH10	1	0	0
	TOYOTA CAMRY XK36	1	0	0
	TOYOTA AURION	1	0	0
	TOYOTA CAMRY 40 SERIES	0	1	0
	VOLVO 850/S70/V70/C70	1	0	0
Medium	AUDI 80	1	0	0
	AUDI A6/S6 95-04	0	0	0
	BMW 5 SERIES E60	1	0	0
	BMW 3 SERIES E90	2	0	0
	BMW 3 99-04	1	0	0
	BMW 5 96-03	0	1	0
	HOLDEN CAMIRA	0	1	0
	HOLDEN VECTRA	4	0	0
	HOLDEN VECTRA ZC	1	0	0
	HYUNDAI SONATA EF 98-01	1	0	0
	HYUNDAI SONATA EF 02 on	1	0	0
	MITSUBISHI SIGMA/SCORPION	1	0	0
	MAZDA 626/MX6 / TELSTAR 82	2	0	0
	MAZDA 626/MX6 / TELSTAR 83-86	3	0	0
	MAZDA 626/MX6 / TELSTAR 88-91	2	0	0
	MAZDA 626/MX6 / TELSTAR 92-97	1	1	0
	MERCEDES C-CLASS W202	1	0	0
	MERCEDES C-CLASS W204	1	0	0
	NISSAN PINTARA >=89	1	0	0
	NISSAN 200SX	1	0	0
	HONDA ACCORD EURO	0	1	0
	PORSCHE 968	1	0	0
	SAAB 900 82-93	1	0	0
	SAAB 900/ 9-3 >=94	1	0	0
	SUBARU 1800/LEONE	1	0	0
	SUBARU LIBERTY <=94	1	0	0
	SUBARU LIBERTY 95-98	1	0	0
	SUBARU LIBERTY 99-03	1	0	0
	TOYOTA CORONA	1	0	0
	TOYOTA CAMRY 82-87	1	0	0
	TOYOTA CAMRY/APOLLO 88-92	8	2	0
	TOYOTA CAMRY/APOLLO 93-97	5	1	0
	TOYOTA CELICA 81-85	1	0	0
	TOYOTA CELICA 90-93	1	0	0

	TOYOTA CELICA 00 on	1	0	0
	VOLVO OTHERS	1	0	0
Small	DAIHATSU APPLAUSE	1	0	0
	DAEWOO CIELO	1	0	0
	DAEWOO LANOS	0	1	0
	FORD LASER/MET 91-94	3	0	0
	FORD LASER/MET 95-98	2	0	0
	FORD LASER/MET OTHERS	1	0	0
	FORD ESCORT	1	0	0
	FORD FOCUS LS	1	0	0
	HOLDEN ASTRA TS	1	3	0
	HOLDEN ASTRA AH	1	0	0
	HOLDEN VIVA JF	1	0	0
	HYUNDAI EXCEL 95-98	6	1	0
	HYUNDAI ELANTRA	1	0	0
	HYUNDAI LANTRA 91-95	1	0	0
	HYUNDAI LANTRA 96-00	1	0	0
	HYUNDAI ACCENT	1	0	0
	MITSUBISHI CA LANCER 82-92	0	1	0
	MITSUBISHI CC LANCER 94-95	1	0	0
	MITSUBISHI CE LANCER/MIRAGE >=96	10	1	0
	I09 F	1	0	0
	KIA RIO	0	1	0
	MAZDA 323 /LASER 82-88	4	0	0
	MAZDA 323 / LASER 99 on	1	0	0
	MAZDA 3	5	0	0
	NISSAN PULSAR/VECTOR 88-90	2	1	0
	NISSAN PULSAR 92-95	1	1	0
	NISSAN PULSAR >=96	2	0	0
	NISSAN PULSAR N16 2000 on	1	0	1
	HONDA CIVIC 88-91	1	0	0
	HONDA CIVIC >=96	1	0	0
	HONDA CRX 87-91	1	0	0
	HONDA CIVIC GEN 7 2000 on	1	0	0
	PROTON WIRA	1	0	0
	MG MGA/MGB	0	1	0
	SUBARU IMPREZA 93-00	1	2	0
	SUBARU IMPREZA 2001-2007	1	0	0
	SUZUKI BALENO	1	0	0
	TOYOTA COROLLA 82-84	1	0	0
	TOYOTA COROLLA 90-93 / NOVA 88-93	2	2	0
	TOYOTA COROLLA 94-98 / NOVA 95 on	3	0	0
	TOYOTA COROLLA 120 SERIES	3	0	0
	TOY COROLLA 66-81	1	0	0
	TOYOTA PRIUS II	3	0	0
Light	CHARADE 93-00	1	0	0
	DAEWOO MATIZ	1	0	0
	FORD FESTIVA WB/WD/WH/WF 94-2000	2	1	0
	FORD FIESTA WP/WQ	2	0	0
	HOLDEN BARINA XC	1	0	0
	HOLDEN BARINA COMBO & EURO >=95	3	0	0
	HOLDEN BARINA TK	1	0	0
	HYUNDAI GETZ	2	0	0
	MITSUBISHI COLT	1	0	0
	MITSUBISHI COLT Z2	2	0	0
	HONDA JAZZ	1	0	0
	PEUGEOT 206	1	0	0
	SUZUKI SWIFT/BARINA >= 89	1	0	0
	TOYOTA ECHO	2	0	0
	VOLKSWAGEN POLO III	1	0	0

SUV - Large	JEEP CHEROKEE GRAND WJ/WG	1	0	0
	LAND ROVER DISCOVERY 3	1	0	0
	NISSAN PATROL 88-97	1	1	0
	NISSAN PATROL 98 on	2	1	0
	TOYOTA LANCRUISER <=89	1	0	0
	TOYOTA LANCRUISER 90-97	3	1	0
	TOYOTA LANCRUISER >=98	2	0	0
SUV - Medium	FORD TERRITORY SX	1	0	0
	HOLDEN JACKAROO 92-97	1	0	0
	HOLDEN JACKAROO >= 98	1	0	0
	HOLDEN ADVENTRA	0	1	0
	HYUNDAI SANTA FE	1	0	0
	MITSUBISHI PAJERO >=92	1	0	0
	MITSUBISHI PAJERO NM	1	0	0
	JEEP CHEROKEE	1	0	0
	LAND ROVER DEFENDER	0	1	0
	NISSAN PATHFINDER R50 >=95	2	0	0
	TOYOTA PRADO 95 SERIES	3	0	0
	TOYOTA PRADO 120 SERIES	1	1	0
SUV - Compact	DAIHATSU TERIOS	1	0	0
	MITSUBISHI OUTLANDER	1	0	0
	MITSUBISHI OUTLANDER CW	1	0	0
	MAZDA TRIBUTE	2	1	0
	NISSAN X-TRAIL	2	0	0
	HONDA CR-V 97-01	0	1	0
	HONDA CRV 01 on	1	1	0
	LANDROVER FREELANDER	1	0	0
	SUBARU FORESTER	2	0	0
	SUZUKI VITARA	1	0	0
	SUZUKI GRAND VITARA	2	0	0
	TOYOTA RAV4 94-00	2	0	0
	TOYOTA RAV4 2001 on	1	0	0

Western Australia

Model by MKT GRP BREAKDOWN		Injury Severity Collision Partner		
		Minor	Hospital	Dead
Passenger vehicles				
Commercial - Ute	FORD FALCON UTE 82-95	1	1	0
	FORD FALCON UTE 96-98	1	0	0
	FORD FALCON UTE BA	1	0	0
	FORD F-SERIES	1	0	0
	HOLDEN RODEO 89-95	0	0	0
	HOLDEN RODEO 96-98	0	0	0
	HOLDEN COMMODORE VS/VR UTE	0	2	0
	HOLDEN OTHERS	0	2	0
	MITSUBISHI TRITON MK	2	1	0
	MITSUBISHI TRITON ML	0	0	0
	MITSUBISHI OTHERS	0	1	0
	ISUZU NPR SERIES	1	0	0
	MAZDA BRAVO / FORD COURIER 98-02	1	1	0
	MAZDA BRAVO / FORD COURIER OTHERS	0	1	0
	MAZDA BT-50 / FORD RANGER	0	1	0
	NISSAN OTHERS	1	1	0
	TOYOTA 4RUNNER/HILUX 82-85	0	1	0
	TOYOTA 4RUNNER/HILUX 89-97	1	1	0
	TOYOTA 4RUNNER/HILUX 98-02	0	0	0
	TOYOTA 4RUNNER/HILUX 03-04	2	0	0
	TOYOTA HILUX 05 on	1	0	0

Commercial - Van	FORD FALCON PANEL VAN 82-95	1	0	0
	FORD TRANSIT 01 on	0	1	0
	FORD ECONOVAN /MAZDA BONGO E SERIES	1	2	0
	MITSUBISHI EXPRESS	2	2	0
	KIA PREGIO	1	0	0
	MERCEDES SPRINTER W903/904	0	1	0
	NISSAN VANS(NOMAD/URVAN/C22/E24/VANETTE)	1	0	0
	NISSAN OTHERS	0	1	0
	TOYOTA HIACE/LITEACE 96-04	0	0	1
	TOYOTA TOWNACE	1	0	0
	VOLKSWAGEN CARAVELLE/TRANSPORTER 95 on	1	1	0
People Mover	KIA CARNIVAL	0	0	0
Large	FORD FALCON X SERIES	2	1	0
	FORD FALCON EA/EB S1	2	0	0
	FORD FALCON ED/EB S2	1	2	0
	FAIRLANE N&LTD D 88-94	0	1	0
	FORD FALCON FG	1	0	0
	FORD FALCON EF/EL	6	0	1
	FORD FALCON AU	3	2	0
	FORD FALCON BA	5	2	0
	FORD FALCON 60-81/OTHERS	0	1	0
	STATESMAN/CAPRICE 90-93	0	1	0
	HOLDEN COMMODORE VS/VR	3	2	0
	HOLDEN COMMODORE VT/VX	4	1	0
	HOLDEN COMMODORE VY/VZ	3	1	0
	HOLDEN COMMODORE VB-VL	2	0	0
	HOLDEN COMMODORE VE	1	1	0
	HYUNDAI SONATA <=97	0	1	0
	MITSUBISHI MAGNA TN-TP	0	0	0
	MITSUBISHI MAGNA VERADA TE-TJ/KE-KJ	6	0	0
	MITSUBISHI MAGNA/VERADA TR-TS/KR-KS	1	1	0
	MITSUBISHI 380	0	0	0
	JAGUAR S-TYPE	0	1	0
	NISSAN MAXIMA 89-94	0	0	1
	HONDA LEGEND 86-95	1	0	0
	TOYOTA CAMRY >=98	3	1	0
	TOYOTA CRESSIDA >= 89	1	0	0
	TOYOTA AVALON XH10	0	1	0
	TOYOTA CAMRY XK36	2	1	0
Medium	ALFA 156	1	0	0
	AUDI A6/S6 95-04	0	1	0
	AUDI A4 B6	1	0	0
	BMW 5 SERIES E60	1	0	0
	BMW 5 96-03	0	0	0
	DAEWOO LEGANZA	0	0	0
	HOLDEN CAMIRA	1	0	0
	MITSUBISHI SIGMA/SCORPION	2	0	0
	JAGUAR X-TYPE	2	0	0
	MAZDA 626/MX6 / TELSTAR 83-86	2	0	0
	MAZDA 626/MX6 / TELSTAR 92-97	1	1	0
	MAZDA RX7 80-85	1	0	0
	NISSAN PINTARA <=88	1	0	0
	NISSAN PINTARA >=89	1	0	0
	HONDA ACCORD EURO	0	0	0
	HONDA ACCORD 91-93	1	0	0
	HONDA ACCORD OTHERS	0	1	0
	HONDA PRELUDE 92-96	1	0	0
	SAAB 900/ 9-3 >=94	0	1	0
	SUBARU 1800/LEONE	1	0	0
	TOYOTA CORONA	1	0	0

	TOYOTA CAMRY/APOLLO 88-92	5	0	0
	TOYOTA CAMRY/APOLLO 93-97	3	0	0
	TOYOTA CELICA 81-85	0	1	0
Small	DAIHATSU APPLAUSE	1	0	0
	DAEWOO LANOS	1	0	0
	FORD LASER/MET 90	0	1	0
	FORD LASER/MET 91-94	0	1	0
	FORD FOCUS LS	0	1	0
	HOLDEN ASTRA JAP 87	0	1	0
	HOLDEN VIVA JF	1	0	0
	HYUNDAI EXCEL 90-94	1	0	0
	HYUNDAI EXCEL 95-98	4	0	0
	HYUNDAI ACCENT CM	0	0	1
	HYUNDAI S-COUPE	1	0	0
	HYUNDAI LANTRA 96-00	1	1	0
	MITSUBISHI CC LANCER 94-95	1	2	0
	MAZDA 323 /LASER 82-88	2	0	0
	MAZDA 323 / LASER 99 on	1	0	0
	MAZDA 3	0	1	0
	MERCEDES A-CLASS W168	0	0	0
	HONDA CIVIC 79-83	0	1	0
	HONDA CIVIC 84-87	1	0	0
	HONDA CIVIC 88-91	2	0	0
	HONDA INTEGRA 94-01	0	0	0
	PEUGEOT 306	1	0	0
	PROTON WIRA	0	0	0
	SUBARU IMPREZA 2001-2007	1	0	0
	SUBARU IMPREZA 2008 on	0	0	0
	TOYOTA COROLLA 86-88	1	0	0
	TOYOTA COROLLA 90-93 / NOVA 88-93	3	0	0
	TOYOTA COROLLA 94-98 / NOVA 95 on	5	2	0
	TOYOTA COROLLA 98-00	1	0	0
	TOYOTA COROLLA 120 SERIES	3	1	0
	TOYOTA PRIUS II	1	0	0
Light	DAEWOO MATIZ	0	1	0
	DAEWOO KALOS	1	0	0
	FORD FESTIVA WB/WD/WH/WF 94-2000	0	1	0
	HOLDEN BARINA XC	1	0	0
	HYUNDAI GETZ	1	2	0
	MAZDA 121 82-93 / FORD FESTIVA WA	1	1	0
	MAZDA 121 97-98	0	0	0
	HONDA JAZZ	0	1	0
	RENAULT CLIO	1	0	0
	SUZUKI SWIFT/BARINA 85-88	1	0	0
	SUZUKI SWIFT/BARINA >= 89	2	0	0
	TOYOTA ECHO	1	1	0
SUVL	FORD EXPLORER	1	0	0
	JEEP CHEROKEE GRAND ZG	1	0	0
	JEEP CHEROKEE GRAND WJ/WG	1	0	0
	NISSAN PATROL 88-97	0	0	0
	NISSAN PATROL 98 on	1	1	0
	TOYOTA LANCRUISER <=89	1	0	0
	TOYOTA LANCRUISER 90-97	0	0	0
	TOYOTA LANCRUISER >=98	2	0	0
SUVM	HYUNDAI SANTA FE	1	0	0
	MITSUBISHI PAJERO >=92	1	1	0
	MITSUBISHI CHALLENGER	0	1	0
	JEEP CHEROKEE	1	0	0
	JEEP CHEROKEE KJ	0	0	0
	LAND ROVER OTHERS	1	0	0

	HONDA MDX	1	0	0
	TOYOTA PRADO 120 SERIES	2	0	0
SUVC	DAIHATSU FEROZA	1	0	0
	KIA SPORTAGE	1	0	0
	MAZDA TRIBUTE	1	0	0
	NISSAN X-TRAIL	0	0	0
	HONDA CR-V 97-01	1	0	0
	HONDA CRV 01 on	1	0	0
	SUBARU FORESTER	2	0	0
	SUZUKI GRAND VITARA	1	0	0
	TOYOTA RAV4 94-00	2	0	0
	TOYOTA RAV4 2001 on	0	1	0

Queensland

Model by MKT GRP BREAKDOWN		Injury Severity Collision Partner		
		Minor	Hospital	Dead
Passenger vehicles				
Commercial - Ute	FORD FALCON UTE 82-95	1	1	0
	FORD FALCON UTE AU	1	0	0
	FORD FALCON UTE BA	0	2	0
	HOLDEN KINGSWOOD UTE/VAN	0	1	0
	HOLDEN RODEO 89-95	0	1	0
	HOLDEN WB SERIES	4	0	0
	HOLDEN COMMODORE VS/VR UTE	0	2	0
	HOLDEN COMMODORE VY UTE	1	0	0
	HOLDEN RODEO RA	0	1	0
	MITSUBISHI TRITON 78-954	0	1	0
	MITSUBISHI TRITON MK	1	0	0
	MITSUBISHI TRITON ML	1	1	1
	SUBARU BRUMBY	1	0	0
	TOYOTA 4RUNNER/HILUX 86-88	0	1	0
	TOYOTA 4RUNNER/HILUX 89-97	0	1	0
	TOYOTA 4RUNNER/HILUX 98-02	5	1	0
	TOYOTA HILUX 05 on	2	0	0
Commercial - Van	MITSUBISHI EXPRESS	1	1	0
	MERCEDES 100/140 VAN	0	1	0
	TOYOTA HIACE/LITEACE 82-86	0	0	1
	TOYOTA TOWNACE	1	0	0
	VOLKSWAGEN CARAVELLE/TRANSPORTER	0	1	0
People Mover	FORD SPECTRON	1	0	0
	HOLDEN ZAFIRA TT	1	0	0
	MITSUBISHI STARWAGON 87-94	0	1	0
	MITSUBISHI STARWAGON SJ	1	0	0
	MITSUBISHI STARWAGON WA	0	1	0
	KIA CARNIVAL	0	1	0
Large	ALFA 166	0	1	0
	FORD FALCON X SERIES	3	1	1
	FAIRLANE Z&LTD F	0	1	0
	FORD FALCON EA/EB S1	2	3	1
	FORD FALCON ED/EB S2	1	2	0
	FAIRLANE N&LTD D 88-94	1	1	0
	FAIRLANE N&LTD D 95-98	0	1	0
	FORD FALCON EF/EL	4	5	1
	FORD FALCON AU	3	3	0
	FORD FALCON BA	6	5	0
	HOLDEN COMM VN/VP	1	5	0
	HOLDEN COMMODORE VS/VR	1	3	0
	HOLDEN COMMODORE VT/VX	2	5	1

	HOLDEN STATESMAN/CAPRICE WH	0	1	0
	HOLDEN COMMODORE VY	2	1	0
	HOLDEN COMMODORE VB-VL	1	4	0
	HOLDEN COMMODORE VE	0	3	0
	MITSUBISHI MAGNA VERADA TE-TJ/KE-KJ	4	3	0
	MITSUBISHI MAGNA/VERADA TR-TS/KR-KS	1	0	0
	MITSUBISHI MAGNA/VERADA TL/TW/KL/KW	1	0	0
	TOYOTA CAMRY >=98	1	3	1
	LEXUS LS400	2	0	0
	TOYOTA AVALON XH10	0	3	0
	TOYOTA CAMRY XK36	2	2	0
	TOYOTA CAMRY 40 SERIES	0	1	0
Medium	DAEWOO ESPERO	0	1	0
	HOLDEN CAMIRA	0	1	0
	HYUNDAI SONATA EF 98-01	1	0	0
	HYUNDAI SONATA EF 02 on	0	1	0
	MITSUBISHI SIGMA/SCORPION	1	1	0
	MAZDA 626/MX6 / TELSTAR 83-86	1	1	0
	MAZDA 626/MX6 / TELSTAR 92-97	0	1	0
	MAZDA 6	0	1	0
	NISSAN PINTARA <=88	0	1	0
	NISSAN 200SX	0	1	0
	HONDA ACCORD US	0	1	0
	RENAULT 21TXE	0	1	0
	SUBARU 1800/LEONE	0	1	0
	SUBARU LIBERTY 95-98	2	0	0
	SUBARU LIBERTY 99 on	0	0	1
	TOYOTA CAMRY/APOLLO 88-92	3	1	0
	TOYOTA CAMRY/APOLLO 93-97	0	1	0
	TOYOTA CELICA 81-85	1	0	0
	TOYOTA CELICA 86-89	0	1	0
	TOYOTA CELICA 90-93	1	0	0
	TOYOTA CELICA 94-99	0	1	0
Small	DAEWOO NUBIRA	1	0	0
	DAEWOO LANOS	1	0	0
	FORD LASER/MET 90	1	1	0
	FORD LASER/MET 91-94	0	1	0
	FORD FOCUS	0	1	0
	FORD FOCUS LS / LT	1	0	0
	HOLDEN ASTRA TS	1	2	0
	HOLDEN VIVA JF	0	1	0
	HYUNDAI EXCEL 90-94	0	2	1
	HYUNDAI EXCEL 95-98	2	3	1
	HYUNDAI ELANTRA	0	1	0
	HYUNDAI S-COUPE	1	0	0
	HYUNDAI LANTRA 91-95	0	2	0
	HYUNDAI LANTRA 96-00	0	2	0
	HYUNDAI ACCENT	1	0	0
	MITSUBISHI CA LANCER 82-92	1	0	0
	MITSUBISHI CC LANCER 94-95	1	1	0
	MITSUBISHI CE LANCER/MIRAGE >=96	3	0	0
	MITSUBISHI LANCER CG/CH	0	1	0
	KIA RIO	0	1	0
	KIA SPECTRA	1	0	0
	'KIA RIO JB	1	0	0
	MAZDA 323 /LASER 82-88	1	0	0
	MAZDA 323 90-93	0	1	0
	MAZDA 323 / LASER 99 on	3	1	0
	MAZDA 3	1	1	0
	NISSAN PULSAR/VECTOR 87	1	0	0

	NISSAN PULSAR/VECTOR 88-90	2	0	0
	NISSAN PULSAR >=96	1	2	0
	NISSAN PULSAR N16 2000 on	0	1	0
	HONDA CIVIC GEN 7 2000 on	1	0	0
	HONDA CONCERTO	1	0	0
	SUBARU IMPREZA 2001-2007	1	1	0
	SUBARU IMPREZA 2008 on	1	0	0
	TOYOTA COROLLA 86-88	1	0	0
	TOYOTA COROLLA 90-93	1	3	0
	TOYOTA COROLLA 94-98	2	0	0
	TOYOTA COROLLA 98-00	0	2	0
	TOYOTA COROLLA 120 SERIES	1	3	0
	TOYOTA MR2 >= 91	0	1	0
	VOLVO V40/S40	0	1	0
Light	DAIHATSU PYZAR	1	0	0
	DAIHATSU SIRION	1	0	0
	DAEWOO MATIZ	1	0	0
	FORD FESTIVA WB/WD/WH/WF 94-2000	0	3	0
	HOLDEN BARINA XC	0	1	0
	HOLDEN BARINA TK	0	1	0
	HYUNDAI GETZ	0	1	0
	MITSUBISHI COLT	0	1	0
	MAZDA 121 94-96	1	0	0
	MAZDA 121 97-98	1	0	0
	PEUGEOT 206	0	1	0
	SUZUKI SWIFT/BARINA >= 89	0	2	0
	TOYOTA STARLET	1	0	0
	TOYOTA ECHO	0	1	0
	TOYOTA YARIS	0	1	0
SUV - Large	BMW X5 E53	3	1	0
	JEEP CHEROKEE GRND 2	0	1	0
	NISSAN PATROL 88-97	1	1	0
	NISSAN PATROL 98 on	0	1	0
	TOYOTA LANCRUISER <=89	0	1	0
	TOYOTA LANCRUISER 90-97	0	1	0
SUV - Medium	HOLDEN JACKAROO 82-91	0	0	1
	MITSUBISHI PAJERO NM / NP	1	1	0
	NISSAN PATHFINDER <=94	0	1	0
	TOYOTA PRADO 95 SERIES	1	0	0
SUV - Compact	DAIHATSU TERIOS	0	1	0
	KIA SORENTO	0	1	0
	KIA SPORTAGE KM	0	1	0
	SUBARU FORESTER	0	0	1
	SUBARU FORESTER II	0	1	0
	SUZUKI VITARA	2	0	0
	SUZUKI SIERRA/DROVER	0	1	0
	TOYOTA RAV4 94-00	0	1	0
	TOYOTA RAV4 2001-2002	0	1	0

Victoria

Model by MKT GRP BREAKDOWN		Injury Severity Collision Partner		
		Minor	Hospital	Dead
Passenger vehicles				
Commercial - Ute	CHEVROLET	1	0	0
	FORD FALCON UTE 82-95	2	0	0
	FORD FALCON UTE 99	1	0	0
	FORD FALCON UTE AU	1	2	1
	FORD FALCON UTE BA	2	0	0

	FORD COMMERCIALS	0	1	0
	FORD OTHERS	1	3	2
	HOLDEN KINGSWOOD UTE/VAN	0	1	1
	HOLDEN RODEO 82-85	1	0	0
	HOLDEN RODEO 89-95	1	0	1
	HOLDEN RODEO 96-98	1	0	0
	HOLDEN RODEO 99 on	0	1	0
	HOLDEN COMMODORE VS/VR UTE	4	0	0
	HOLDEN COMMODORE UTE VU	2	1	0
	HOLDEN COMMODORE VY UTE	3	2	0
	HOLDEN RODEO RA	6	1	0
	HOLDEN COMMODORE VE UTE	1	0	0
	HOLDEN OTHERS	2	3	0
	MITSUBISHI COMMERCIALS	1	0	0
	MITS TRITON OTHERS	1	1	0
	MITSUBISHI TRITON ML	2	0	0
	ISUZU NPR SERIES	1	0	0
	MAZDA COMMERCIALS	0	1	0
	MAZDA BRAVO 98-02	2	1	0
	MAZDA BRAVO 03 on	1	0	0
	MAZDA BT-50 / FORD RANGER	1	1	0
	NISSAN 720 UTE	1	0	0
	NISSAN B120	1	0	0
	NISSAN NAVARA 86-91	0	1	0
	NISSAN NAVARA >= 97	5	0	0
	NISSAN NAVARA D40	1	0	0
	NISSAN OTHERS	1	3	0
	TOYOTA 4RUNNER/HILUX 86-88	0	2	0
	TOYOTA 4RUNNER/HILUX 89-97	8	1	0
	TOYOTA 4RUNNER/HILUX 98-02	3	1	0
	TOYOTA 4RUNNER/HILUX 03 on	2	0	0
	TOYOTA HILUX 05 on	2	0	0
	TOYOTA OTHERS	2	2	0
	UNKNOWN MAKE/MODEL	1	0	0
Commercial - Van	FORD FALCON PANEL VAN 82-95	0	0	1
	FORD FALCON PANEL VAN 96-98	1	0	0
	FORD COMMERCIALS	3	1	0
	FORD TRANSIT 94-00	0	1	0
	FORD TRANSIT 01 on	3	0	0
	FORD ECONOVAN /MAZDA BONGO E SERIES	3	0	0
	FORD OTHERS	1	2	0
	FIAT/IVECO DAILY 3.5T	1	0	0
	HOLDEN KINGSWOOD UTE/VAN	1	0	0
	MITSUBISHI EXPRESS	6	3	0
	MITSUBISHI OTHERS	2	0	0
	ISUZU NPR SERIES	0	1	0
	MAZDA COMMERCIALS	2	1	0
	MERCEDES 100/140 VAN	1	0	0
	MERCEDES VITO VAN	2	1	0
	MERCEDES SPRINTER W903/904	1	1	0
	MERCEDES VITO / VIANO VAN 639	1	0	0
	TOYOTA HIACE/LITEACE 87-89	0	1	0
	TOYOTA HIACE/LITEACE 90-05	3	2	0
	TOYOTA HIACE/LITEACE 96-02	5	3	2
	TOYOTA HIACE/LITEACE 05 on	2	5	0
	TOYOTA OTHERS	3	4	0
	VOLKSWAGEN TRANSPORTER T5	2	0	0
	VOLKSWAGEN CADDY	1	0	0
	VOLKSWAGEN MULTIVAN	0	1	0
	UNKNOWN MAKE/MODEL	2	1	0

People Mover	CHRYSLER VOYAGER	2	0	0
	CHRYSLER (GRAND) VOYAGER	1	0	0
	HOLDEN ZAFIRA TT	2	0	0
	MITSUBISHI STARWAGON WA	1	2	0
	KIA CARNIVAL	0	2	0
	KIA CARNIVAL VQ	1	0	0
	HONDA ODYSSEY 95-99	1	0	0
	HONDA ODYSSEY 2004 on	0	1	0
	TOYOTA TARAGO 91-99	2	3	0
	TOYOTA TARAGO 50 SERIES	1	1	0
Large	AUDI A8/S8/A6	1	0	0
	FORD FALCON X SERIES	9	3	0
	FAIRLANE Z&LTD F	1	0	0
	FORD FALCON EA/EB S1	3	3	0
	FORD FALCON ED/EB S2	4	4	0
	FAIRLANE N&LTD D 88-94	2	2	0
	FAIRLANE N&LTD D 95-98	0	1	0
	FAIRLANE & LTD AU 99 on	0	1	0
	FAIRLANE & LTD BA 03 on	1	1	0
	FORD FALCON FG	1	0	0
	FORD FALCON EF/EL	26	9	0
	FORD FALCON AU	18	21	0
	FORD FALCON BA	17	8	1
	HOLDEN COMM VN/VP	9	3	0
	HOLDEN KINGSWOOD	1	1	0
	HOLDEN COMMODORE VS/VR	15	5	0
	HOLDEN COMMODORE VT/VX	11	16	0
	HOLDEN COMMODORE VY	15	4	0
	HOLDEN STATESMAN/CAPRICE WK/WL	0	1	0
	HOLDEN COMMODORE VB-VL	6	1	0
	HOLDEN COMMODORE VE	6	3	0
	HYUNDAI SONATA <=97	2	0	0
	HYUNDAI GRANDEUR	1	0	0
	MITSUBISHI MAGNA TN-TP	2	2	0
	MITSUBISHI MAGNA VERADA TE-TJ/KE-KJ	11	5	0
	MITSUBISHI MAGNA/VERADA TR-TS/KR-KS	7	3	0
	MITSUBISHI MAGNA/VERADA TL/TW/KL/KW	2	1	0
	MITSUBISHI 380	0	1	0
	JAGUAR S-TYPE	1	0	0
	MERCEDES S-CLASS W220	1	0	0
	MERCEDES E-CLASS W211	1	0	0
	NISSAN SKYLINE	2	1	0
	NISSAN MAXIMA 89-94	0	0	1
	NISSAN MAXIMA 95-99	3	0	0
	NISSAN MAXIMA J31	0	1	0
	TOYOTA CAMRY >=98	4	7	1
	TOYOTA AVALON XH10	2	1	0
	TOYOTA CAMRY XK36	5	0	0
	TOYOTA AURION	0	1	0
	TOYOTA CAMRY 40 SERIES	2	0	0
	VOLVO 850/S70/V70/C70	0	1	0
	VOLVO S80	0	1	0
Medium	ALFA 164	1	0	0
	ALFA 156	0	1	0
	ALFA GTV 1998 ON	2	0	0
	AUD1A	1	0	0
	BMW 3 92-98	2	0	0
	BMW 3 99 on	3	0	0
	BMW 5 82-88	1	0	0
	BMW 5 96 on	3	3	0

	DAEWOO ESPERO	1	0	0
	DAEWOO LEGANZA	1	0	0
	FORD CORTINA	0	2	0
	FORD MONDEO MB	1	0	0
	FORD COUGAR	0	1	0
	HOLDEN CAMIRA	2	0	0
	HOLDEN VECTRA	0	4	0
	HY20Z	2	0	0
	MAZDA 626/MX6 / TELSTAR 82	0	1	0
	MAZDA 626/MX6 / TELSTAR 83-86	1	1	0
	MAZDA 626/MX6 / TELSTAR 88-91	2	0	0
	MAZDA 626/MX6 / TELSTAR 92-97	2	0	0
	MAZDA 626/MX6 >=98	4	0	0
	MAZDA EUNOS 500	0	1	0
	MAZDA 6	1	1	1
	MERCEDES C-CLASS W202	0	1	0
	MERCEDES C-CLASS W203	1	0	0
	NISSAN PINTARA <=88	0	1	0
	NISSAN PINTARA >=89	2	0	0
	NISSAN BLUEBIRD NEW	0	1	0
	HONDA ACCORD EURO	0	1	0
	HONDA ACCORD US	0	1	0
	HONDA ACCORD 99 on	1	0	0
	HONDA ACCORD EURO 08 on	1	0	0
	HONDA PRELUDE 83-91	2	0	0
	HONDA PRELUDE 92-96	1	0	0
	PORSCHE BOXTER 986	1	0	0
	SAAB 900/ 9-3 >=94	3	1	0
	SUBARU 1800/LEONE	1	0	0
	SUBARU LIBERTY <=94	2	1	0
	SUBARU LIBERTY 95-98	0	1	0
	SUBARU LIBERTY 99 on	1	4	0
	TOYOTA CORONA	2	0	0
	TOYOTA CAMRY/APOLLO 88-92	7	3	0
	TOYOTA CAMRY/APOLLO 93-97	7	2	0
	TOYOTA CELICA 00 on	1	0	0
	LEXUS IS200	3	0	0
	VOLVO 200 SERIES OTHERS	1	0	0
Small	DAIHATSU APPLAUSE	1	0	0
	DAEWOO CIELO	0	1	0
	DAEWOO NUBIRA	2	0	0
	DAEWOO LANOS	1	0	0
	FORD LASER/MET 90	1	1	0
	FORD LASER/MET 91-94	1	1	0
	FORD LASER/MET 95-98	1	1	0
	FORD CAPRI	1	0	0
	FORD FOCUS LS / LT	1	1	0
	HOLDEN ASTRA TR	1	0	0
	HOLDEN ASTRA TS	5	2	1
	HOLDEN VIVA JF	1	0	0
	HYUNDAI EXCEL 95-98	3	1	2
	HYUNDAI ELANTRA	0	3	0
	HYUNDAI ACCENT	1	0	0
	MITSUBISHI CA LANCER 82-92	1	0	0
	MITSUBISHI CC LANCER 94-95	0	1	0
	MITSUBISHI CE LANCER/MIRAGE >=96	9	1	0
	MITSUBISHI LANCER CG/CH	0	2	0
	KIA RIO	1	0	0
	KIA RIO JB	1	0	0
	MAZDA 323 /LASER 82-88	3	3	0

	MAZDA 323 89	1	0	0
	MAZDA 323 90-93	2	2	0
	MAZDA 323 94	0	1	0
	MAZDA 323 95-98	2	1	0
	MAZDA 323 / LASER 99 on	3	2	0
	MAZDA 3	4	3	0
	NISSAN PULSAR/VECTOR 88-90	1	1	0
	NISSAN PULSAR 92-95	1	0	0
	NISSAN PULSAR >=96	3	1	0
	NISSAN NX/NX-R	1	1	0
	NISSAN PULSAR N16 2000 on	5	0	0
	HONDA CIVIC 92-95	1	2	0
	HONDA CIVIC >=96	1	0	0
	HONDA CIVIC GEN 7 2000 on	1	0	0
	HONDA CIVIC GEN 8	1	1	0
	HONDA INTEGRA 86-88	1	0	0
	HONDA INTEGRA 94-01	1	0	0
	HONDA CONCERTO	2	0	0
	PEUGEOT 307	2	0	0
	SUBARU IMPREZA 2001-2007	0	1	0
	SUBARU IMPREZA 2008 on	1	0	0
	SUZUKI BALENO	1	1	0
	TOYOTA COROLLA 90-93	3	1	0
	TOYOTA COROLLA 94-98	5	1	0
	TOYOTA COROLLA 98-00	2	2	0
	TOYOTA COROLLA 120 SERIES	3	3	0
	TOYOTA COROLLA 150 SERIES	3	0	0
	COROLLA 4WD WAGON AE95	0	1	0
	VOLVO V40/S40	0	1	0
	VOLKSWAGEN GOLF 5	1	1	0
Light	CHARADE 88-92	2	0	0
	CHARADE 93-00	1	0	0
	DAIHATSU PYZAR	1	0	1
	DAIHATSU SIRION	1	0	0
	DAEWOO MATIZ	0	1	0
	FORD FESTIVA WB/WD/WH/WF 94-2000	1	1	0
	FIAT PUNTO	1	0	0
	HOLDEN BARINA XC	2	1	0
	HOLDEN BARINA COMBO & EURO >=95	1	0	0
	HOLDEN BARINA TK	1	0	0
	HYUNDAI GETZ	1	0	0
	MAZDA 121 82-93 / FORD FESTIVA WA	1	1	0
	MAZDA 2	1	0	0
	HONDA JAZZ	0	2	0
	PEUGEOT 206	0	1	0
	TOYOTA STARLET	1	0	0
	TOYOTA ECHO	2	2	0
	VOLKSWAGEN POLO 96-00	3	0	0
	VOLKSWAGEN POLO III	0	1	0
	BM14Z	1	0	0
	JEEP CHEROKEE GRND 2	3	2	0
	LAND ROVER DISCOVERY to 1991-2002	2	1	0
	LAND ROVER DISCOVERY 4	0	2	0
	MERCEDES M-CLASS W163	2	0	0
	NISSAN PATROL 88-97	3	3	0
	NISSAN PATROL 98 on	10	3	0
	RANGE ROVER III	1	0	0
	TOYOTA LANCRUISER <=89	0	0	1
	TOYOTA LANCRUISER 90-97	5	3	0
	TOYOTA LANCRUISER >=98	5	2	0

SUV - Medium	FORD TERRITORY SX	5	0	1
	HOLDEN JACKAROO >= 98	1	0	0
	HOLDEN FRONTERA	2	0	0
	HOLDEN ADVENTRA	0	1	0
	HOLDEN CAPTIVA	2	0	0
	MITSUBISHI PAJERO >=92	1	3	0
	MITSUBISHI PAJERO NM / NP	1	2	0
	JEEP WRANGLER	0	1	0
	LAND ROVER DEFENDER	0	1	0
	NISSAN PATHFINDER R50 >=95	1	0	0
	NISSAN MURANO	0	1	0
	TOYOTA KLUGER	2	1	0
	TOYOTA PRADO 95 SERIES	0	1	0
	TOYOTA PRADO 120 SERIES	3	0	0
SUV - Compact	DAIHATSU TERIOS	1	0	0
	MITSUBISHI OUTLANDER	0	2	0
	KIA SPORTAGE	0	1	0
	KIA SPORTAGE KM	1	0	0
	MAZDA TRIBUTE	4	4	0
	MAZDA CX-7	1	1	0
	NISSAN X-TRAIL	4	0	0
	NISSAN DUALIS	0	1	0
	HONDA CR-V 97-01	3	0	0
	HONDA CRV 01 on	2	2	0
	SUBARU FORESTER	0	1	0
	SUBARU FORESTER II	1	1	0
	SUZUKI VITARA	2	0	0
	SUZUKI SIERRA/DROVER	1	0	0
	TOYOTA RAV4 94-00	1	0	0
	TOYOTA RAV4 2001-2002	1	1	0
	TOYOTA RAV4 30 SERIES	0	1	0