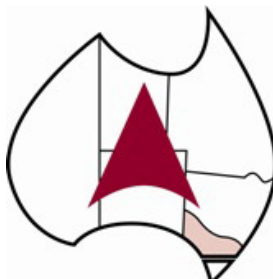


Municipal Engineering Foundation Victoria 2007 Overseas Study Tour

International Experiences of Pedestrian Safety



Daniel Kollmorgen
July 2008



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I would like to acknowledge the grant provided by the Municipal Foundation Victoria that has allowed me to participate in the 2007 Study Tour and their ongoing support to develop and promote municipal engineering.

Gratitude to the City of Stonnington in allowing me the time to participate in the Study Tour.

To Robert Ward (Trustee) thank you for your advice and guidance whilst on the Study Tour and your human moments which made us all laugh...“No I don’t want a transfer, I just got on”.

Thank you also to Claude Cullino and Warren Roberts for reviewing this report and offering their advice.

Above all else I would like to thank my wife Ann who selflessly managed Olivia and Lucy while travelled around the world on the Study Tour...I expect I’ll be in ‘brownie point’ deficit for a long time.

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Executive Summary

A Study Tour sponsored by the Municipal Engineering Foundation Victoria was undertaken in September 2007. The Study Tour, consisting of four (4) municipal engineering professionals travelling through the US and northern Europe, provided an excellent opportunity to review policies, practices and approaches across a number of countries and road safety philosophies.

The objective of this report as part of the Study Tour is to explore international perspectives and attitudes of pedestrian safety and reflect on possible improvements that could be adopted by Victorian local and State governments.

There are many influences on the severity and frequency of road crashes involving pedestrians and the ways that we approach them, which can be broadly categorised as follows:

- **Road Safety Policy:** the relative importance of road trauma and vision to address it;
- **Road Environment:** the characteristics of road and road related infrastructure;
- **Vehicle Design:** the inherent safety of the vehicle for its driver and occupants as well as other road users that it may be involved with in a crash;
- **Road User Behaviour:** the way drivers and pedestrians perceive things and make decisions;
- **Regulation and Enforcement:** the road rules, the legislative consequences of disobeying them and the ways they are enforced;
- **Government:** the way government structure may effect road safety outcomes.

The report assesses each of these areas with respect to international experiences and concludes that Victorian pedestrian safety conditions are generally good, with sound road safety policy and road user behaviour programs, notwithstanding there is work to do in the areas of the road environment, vehicle design and regulation.

The following recommendations are made to improve the road safety of pedestrians within Victoria:

ROAD SAFETY RECORD AND ATTITUDES

1. That Victorian State and local governments continue to raise road safety awareness with the aim of improving societal acceptance of road safety initiatives.

ROAD SAFETY POLICY

2. That Victorian State and local governments actively pursue and support the implementation of the road safety policy *arrive alive 2008-2017* and that the design of road environments and new vehicles be guided by human characteristics.

THE ROAD ENVIRONMENT

3. That VicRoads trial pedestrian countdown clocks with both red and green phase counts at both fixed cycle and actuated signalised intersections, and that the impacts of the count being visible to drivers be considered as part of the detailed design of the infrastructure.

THE ROAD ENVIRONMENT

4. That State and local government road authorities consider grade separation solutions at busy signalised intersections in long term planning and as opportunities allow.
5. That local governments seek to minimise the number of new crossovers in new developments to reduce the locations of conflict between vehicles and pedestrians.
6. That local governments consider driveway crossover treatments of contrasting tactile and colour finishes on footpaths where driveways and laneways have insufficient pedestrian sight distance.
7. That Victorian road authorities not install pedestrian fencing in all situations without consideration of its full effects and alternative treatments.
8. That within the context of Victoria's Road Safety Strategy *arrive alive 2008-2017* the Victorian government consider the outcomes of future research on the suitability and criteria for installation of pedestrian fencing.
9. That VicRoads consider zigzag linemarking as a No Stopping treatment on approaches to signalised intersections, pedestrian operated signals and zebra crossing.
10. That Victorian local governments develop and trial lower speed themed advisory signs in areas of high vulnerable pedestrian activity.

VEHICLE DESIGN

11. That the Australian Federal Government undertake appropriate research to adapt pedestrian friendly design requirements of the European Union to Australian conditions and adopt them in the Australian Design Rules for new vehicles.
12. That the Australian Federal Government undertake appropriate research to adopt side under-run protection for heavy vehicles in the Australian Design Rules for new vehicles.

ROAD USER BEHAVIOUR

13. That local governments and schools consider including students as safe crossing supervisors in local street approaches to primary schools.
14. That the Victorian government evaluate the success of the Traffic Safety Education Action Plan 2002-2007 and develop a new Action Plan for future years.

REGULATION

15. That Victorian local governments as part of their activity centre planning consider pedestrian streets without traditional kerb and channel as an alternative to traditional treatments.
16. That local governments assess their opportunity and desire to conduct a car-free day within a local activity centre to promote sustainable transport and road safety and to discourage single occupant motor vehicle use.
17. That the Victorian State government through VicRoads and the Department of Justice assess the impacts of giving priority at law to pedestrians to continuously traverse a footpath across a side road from both turning vehicles and vehicles approaching from the side road.
18. That VicRoads in collaboration with local Councils investigate extending the 40km/hr speed limits adjacent schools and trialled in strip shopping centres to all areas of high pedestrian activity, and the general urban speed limit of 50km/hr be reviewed for residential streets.

GOVERNMENT

19. That local and State government agencies engage each other more regularly and encourage open and transparent communication, particularly in the area of road safety.

1.Introduction

1.1.Background

A Study Tour was sponsored by the Municipal Engineering Foundation Victoria and conducted between 5 September 2007 and 25 September 2007. Four engineering professionals were awarded grants to participate in the tour and one of the Trustees also attended. The participants shown left to right in the following photograph:

- Daniel Kollmorgen, Transport and Parking Coordinator - City of Stonnington
- Mauro Covacci, Special Projects Engineer - Wyndham City Council
- Jane Waldock, Customer Services Engineer - City of Manningham
- Robert Ward, Trustee - Municipal Engineering Foundation Victoria
- Phillip Warner, General Manager Infrastructure - City of Whitehorse



Figure 1-1: Study Tour Participants

The Study Tour commenced in the USA with all five participants attending the American Public Works Association (APWA) Congress. At the completion of the Congress Jane Waldock and myself proceeded directly to Europe as our focus was on road safety topics while Mauro Covacci and Phillip Warner remained in the US for an additional period before travelling to the United Kingdom. Appendix A provides a detailed itinerary of places and organisations visited as part of the Study Tour.

Each awardee had a unique topic of interest deemed significant to municipal engineering in Victoria¹ that they investigated as part of the Study Tour. Copies of other awardee reports can be accessed through the Municipal Engineering Foundation Victoria website, www.mefvic.org.au.

¹ Awardees were selected in part by their proposed topic of investigation during the Study Tour.

1.2.Objective

Road safety in general in Australia and Victoria is a topic of societal interest, with many of us being touched in some personal way by road trauma, and although we have made great improvements in our road safety performance it is my belief that as a society we are still too tolerant and accepting of fatalities and severe injuries caused by road crashes.

The most vulnerable road user is the pedestrian and there are great health and environmental benefits attributed to walking. Indeed improving road safety for pedestrians could help break down the real and perceived barriers to walking and lead to a healthier, more active population.

The objective of this report as part of the Study Tour is to explore international perspectives and attitudes of pedestrian safety and reflect on possible improvements that could be adopted by Victorian local and State governments.

1.3.Scope of this Report

There are many influences on the frequency and severity of road crashes involving pedestrians and the ways that we have approached them, which can be broadly categorised in the following way:

- **Road Safety Policy:** the relative importance of road trauma and the vision to address it;
- **Road Environment:** the characteristics of the infrastructure;
- **Vehicle Design:** the inherent safety of the vehicle for its driver and occupants as well as other road users that it may be involved with in a crash;
- **Road User Behaviour:** the way drivers and pedestrians perceive things and make decisions;
- **Regulation and Enforcement:** the road rules and the legal consequences of disregarding them;
- **Government:** the way government structure may effect road safety outcomes.

In order to add some context a brief description of the respective road safety performances and attitudes of the countries visited as part of the Study Tour is provided then observations and experiences of each of the above points will be addressed with conclusions drawn and recommendations made. Useful references and resources for improving pedestrian safety are also provided in the Reference section of this report.

This report does not seek to provide a comprehensive expose on the various issues but rather to identify differences between Victorian and overseas practices and to target opportunities for improvement for Victorian local and State governments.

2. Road Safety Record and Attitudes

2.1. Road Safety Performance

The road safety record of the four (4) countries visited as part of the Study Tour is quite different, which may be explained by their different attitudes towards the private motor vehicle and road safety in general. Northern European countries typically have low vehicle ownerships and the United States has high levels, whilst Australia is somewhere in between but generally considered to be on the high side. Figure 2.1 illustrates this and also indicates that vehicle ownerships have increased in Denmark, Netherlands, Sweden and Australia in the past 10 years while US rates have remained steady.

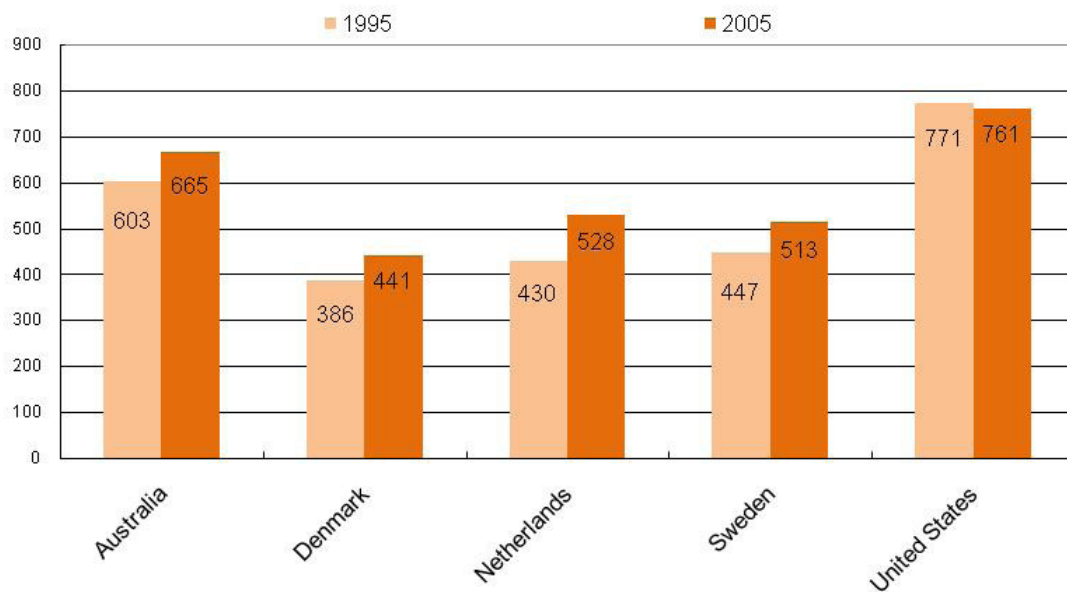


Figure 2-1: Motor Vehicle Ownership (per 1000 Population)²

Vehicle ownership figures also give us an insight into the way the motor vehicle is viewed in different societies. The US is clearly car orientated and dominated and Australia also to a strong but lesser extent. Almost everything is car orientated from freeways to acres of shopping centre car parks. Whilst the car has dominated society in Europe as well there is a much greater acceptance of active transport (walking and cycling) and of public transport, perhaps this is because the distances are shorter and public transport is available and accessible.

Crash rates are also high in the US compared to Australia and the northern European countries. Figure 2.2 on the following page shows road crash fatalities per population of each country in 1995 and 2005. The level of reduction of road crash fatalities in the ten year period has been substantial for Australia, Denmark, Netherlands and Sweden, whilst only modest gains are evident in the US.

² OECD Factbook 2007: Economic, Environmental and Social Statistics - ISBN 92-64-02946-X - © OECD 2007

International Experiences of Pedestrian Safety

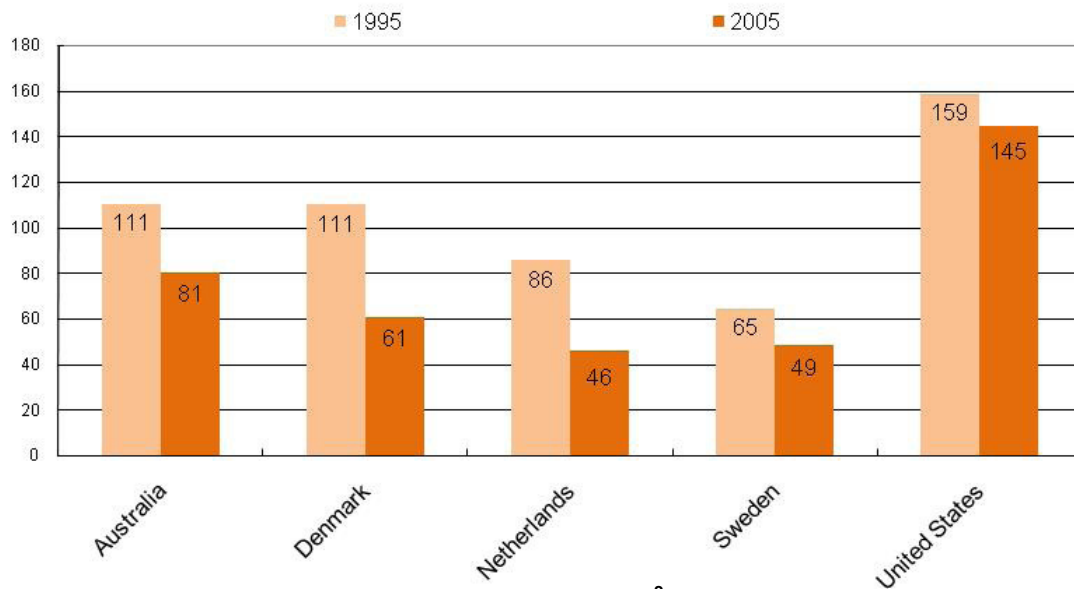


Figure 2-2: Road Crash Fatalities (per 1,000,000 Population)²

The issue of exposure both population and distances travelled is extremely important when considering these comparisons. Of course the US and Australia are very large countries, 9.4 million km² and 7.7 million km² respectively, and approximately 200 times larger than the Netherlands and Denmark and 20 times larger than Sweden². This translates into orders of magnitude more vehicle kilometers travelled in the US and Australia. When adjusting for the distances travelled we see a narrowing in the road fatality rates between the US, Australia and the northern European countries as shown in Figure 2.3 below.

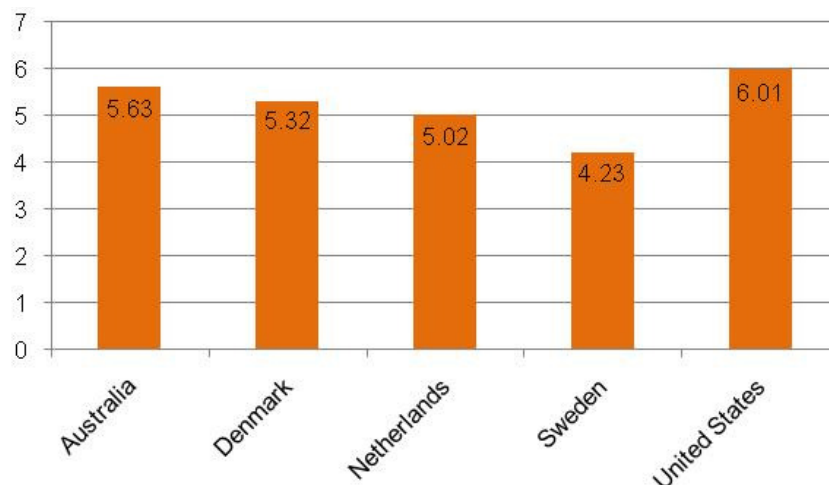


Figure 2-3: Road Crash Fatalities (per billion passenger km travelled)²

This in itself is not considered to be a justification of US and Australian road safety performance as both countries have higher fatality rates once the adjustment is made. So there remains something within transport systems, be it driver behaviour, the road environment, the safety of the vehicle fleet or the regulatory environment, that allows the northern European countries to

perform better than Australia and the US. Perhaps if we could reduce our exposure by travelling less in our cars and walking more, we may be able to improve our performance.

In terms of pedestrian safety Table 2.1 and Figure 2.4 indicate relative performance over the last 25 years of each country. In absolute terms the US had an astounding 8070 pedestrian fatalities in 1980 which reduced to 4881 in 2005. However in relative terms with respect to population Australia had a worse record in 1980 with 44 pedestrian fatalities per million population compared to 36 for the US.

The data also shows significant improvement for all countries in 2005 compared to 1980, but more so in Australia and the northern European countries with reductions of between 62- 72% compared to 40% for the US.

Table 2-1: Pedestrian Fatalities Over Time

Country	1980	2005	Percentage Reduction
Australia	644	225	65%
Denmark	138	44	68%
Netherlands	295	83	72%
Sweden	133	50	62%
USA	8070	4881	40%

Source: International Road Traffic and Accident Database <http://cemt.org/IRTAD/IRTADPUBLIC/we33.html>

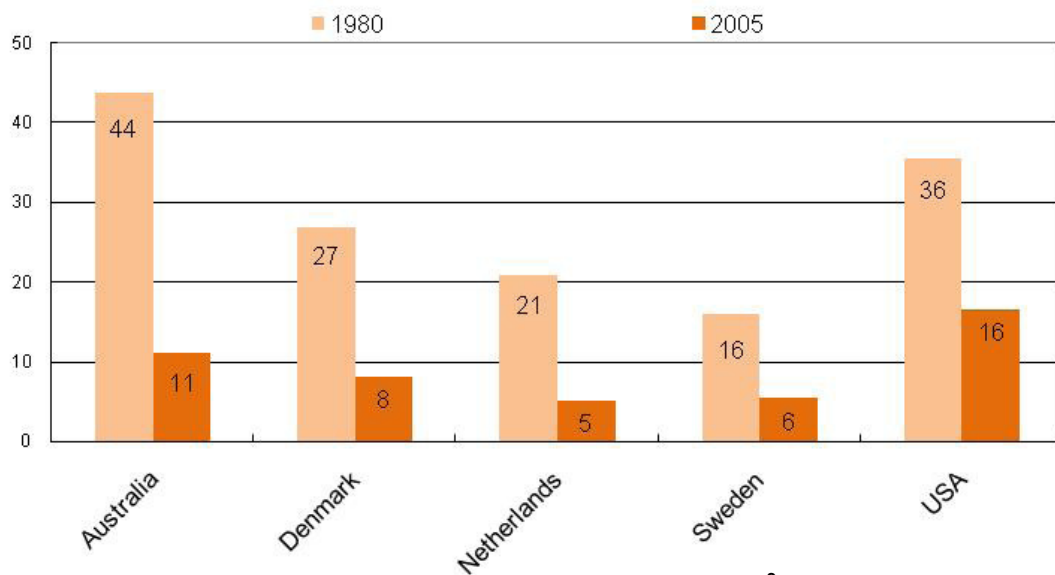


Figure 2-4: Pedestrian Road Crash Fatalities (per 1,000,000 Population)²

2.2.Road Safety Attitudes

The relative road safety records of the countries discussed above seemed to be reflective of societal attitudes. Certainly from my observations on the Study Tour the car in the US is relied on heavily for personal mobility and is seen as a right of passage with teenagers able to obtain their drivers licenses at a young age. This is not the case in the northern European countries visited where active transport (walking and cycling) and public transport were very popular.

Attitudes in northern Europe were focused on both road safety and sustainable transport issues. Individuals seemed to be more conscious of safety when driving, using public transport, cycling or walking and organisations are committing substantial resources to improve safety and encourage alternate modes to the motor car. The staff in local government organisations that we met appeared passionate about achieving road safety and environmental outcomes for the community.

The local authorities that we visited were generally more traditional traffic engineering in nature and were extremely car oriented. Neither of the two Cities had road safety policies, and staff from one were clearly critical of traffic calming devices, which are reasonably rare in the US, because of the impact on the general mobility of the motor car.

Notwithstanding, subsequent research indicates this is not the case for all local governments in the US, for example the Cities of Chula Vista and Berkley in California have undertaken substantial road safety initiatives in recent years. In general though a predict-and-provide mentality exists in the US with the focus on reducing congestion not improving road safety.

Victoria's Road Safety Strategy *arrive alive 2008-2017* indicates that road safety should be important and relevant to everyone, and that it is indeed a shared responsibility with all Victorians able to contribute. Raising awareness and maintaining a presence in societies collective mind is important to achieving road safety outcomes.

Recommendation

1. That Victorian State and local governments continue to raise road safety awareness with the aim of improving societal acceptance of road safety initiatives.

3. Road Safety Policy

There are clear philosophical differences between the Northern European countries and the US. Sweden, Denmark and The Netherlands have the most advanced road safety policies and they are generally driven by an ethical perspective, for example:

- **Sweden, “Vision Zero”**: No-one should be killed or injured for life in road traffic³;
- **Denmark, “Every Accident is One Too Many”**: Accidents involving risk of serious injury are not tolerated in general society and road accidents are to be seen in a similar light⁴; and
- **The Netherlands, “Advancing Sustainable Safety”**: The goal of inherently or sustainably safe road traffic is to prevent crashes and, where this is not possible, to reduce the chance of severe injury to (almost) zero⁵.

Contained centrally within these policies is a deep understanding of vulnerability of road users, particularly the pedestrian and cyclist. Indeed the guiding principles are derived from the biomechanical tolerances of the human body, for example the risk of pedestrian death increases substantially above approximately 30km/hr, refer Figure 3.1, which has driven the focus on reducing speeds in highly pedestrianised areas.

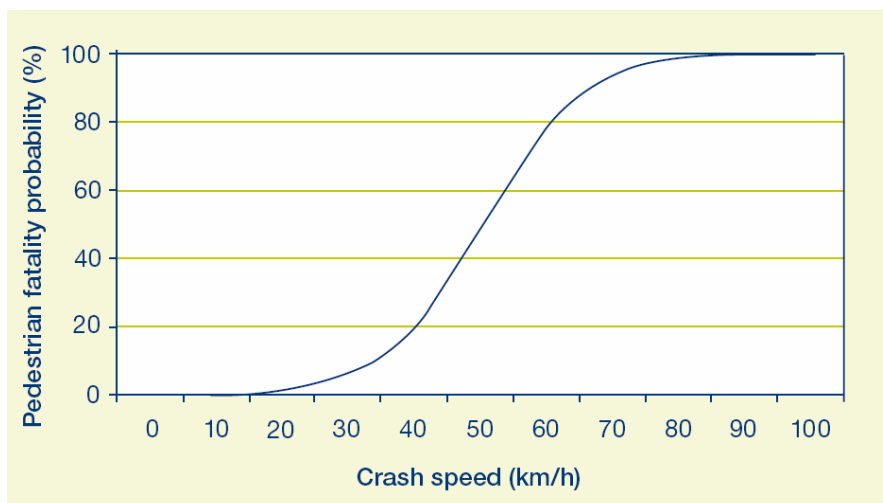


Figure 3-1: Probability of Pedestrian Fatality with Crash Speed⁵

In contrast the US does not appear to have a national road safety strategy or policy. The US Department of Transport does however have a strategic plan, “*New Ideas for a Nation on the Move*” which has six (6) strategic goals and one of which addresses safety⁶. The stated outcomes of the safety strategic goal are simply a “*reduction in transportation related deaths*” and a “*reduction in transportation related injuries*”.

³ Calm, Safe and Secure in Goteborg, City of Goteborg, 2007.

⁴ Every Accident is One Too Many, The Danish Road Safety Commission, 2000.

⁵ Advancing Sustainable Safety, National Road Safety Outlook 2005-2020, SWOV Institute for Road Safety Research, 2006.

⁶ <http://www.dot.gov/stratplan2011/index.htm>

US national targets are set at a fatality rate of 1.00 fatality per 100 million vehicle miles travelled by 2011, which is philosophically different to setting a zero target. Perhaps the US is more pragmatic on their ability to achieve road safety outcomes, or maybe from a more pessimistic perspective, they have come to accept road trauma as a part of life. Certainly without the aim of eliminating road trauma we will never achieve it, which is why the European examples are considered to be best practice.

From a Victorian perspective, since 2003 VicRoads has adopted many of the principles of the northern European road safety policies in its *Safe System* approach. This has now with Victoria's Road Safety Strategy *arrive alive 2008-2017* been translated into tangible policy. This is considered a step forward that aligns us with best practice policy.

The Strategy as summarised in Figure 3.2 revolves around safer road users, safer roads and roadsides, and safer vehicles with the aim to reduce the number and severity of crashes.

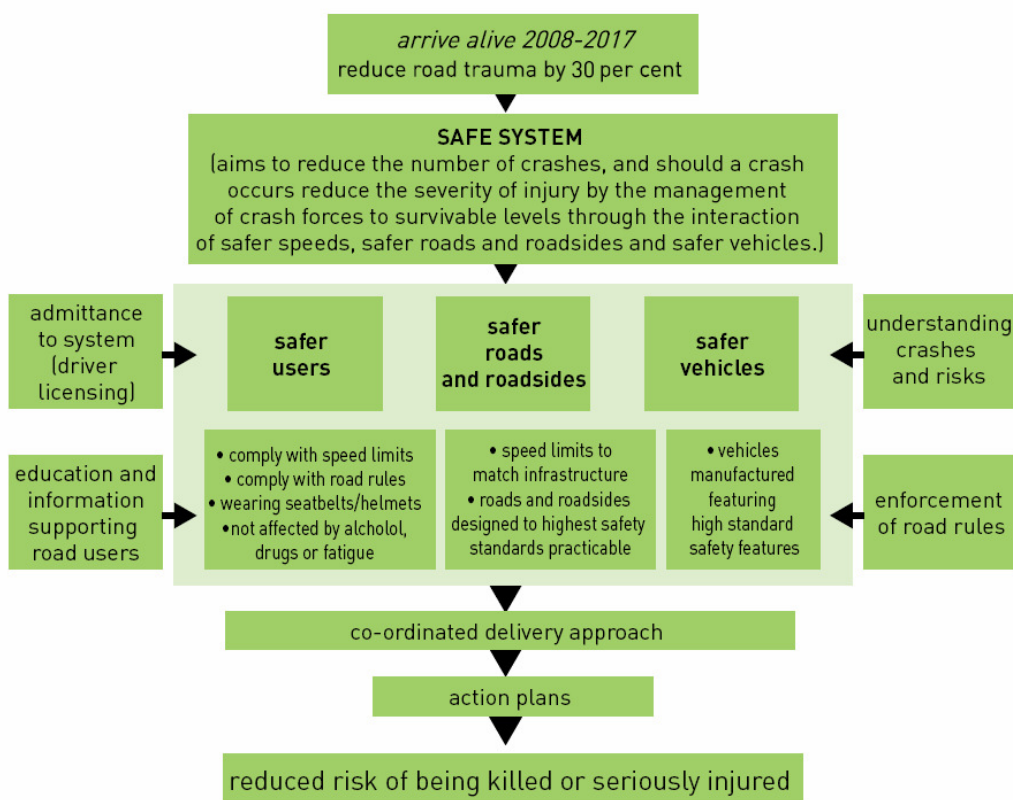


Figure 3-2: Victoria's Safe System Road Safety Strategy⁷

One of the consequences of the *Safe System*, whereby any crashes that do occur will be survivable, is that human characteristics should begin to drive vehicle and road environment design.

Recommendation

2. That Victorian State and local governments actively pursue and support the implementation of the road safety policy *arrive alive 2008-2017* and that the design of road environments and new vehicles be guided by human characteristics.

⁷ Victoria's Road Safety Strategy *arrive alive 2008-2017*, www.arrivealive.vic.gov.au

4. The Road Environment

A wide variety of pedestrian safety infrastructure treatments were observed throughout the Study Tour, many of which were similar in nature and intent. They are broadly grouped into the following categories:

4.1. Intersection Safety

4.1.1. Pedestrian Countdown Clocks

The most prominent infrastructure treatment adopted at signalised intersections in numerous countries overseas which are not widespread in Australia was the pedestrian countdown clock⁸. Although the countdown clock was observed to operate differently and inconsistently in various countries, the basic idea is to improve pedestrian compliance with signals through advising pedestrians of the:

- time available to cross the road, similar to the flashing red man in Victoria; and
- waiting time before the next green phase.

Pedestrians tended not to walk at the end of the “walk” phase with only a second or so of green or “walk” count left, and also pedestrians tended to be more patient and waiting the few extra seconds that were displayed before the green or “walk” phase returned.

The Danish system has a green walking man with a green count above and a red standing man with a red count below. The different symbols of a walking and standing man coupled with the count above and below allow colour blind people to be able to interpret the signals. The US system shows a red stop hand and a white walking man both with the count next to it. Figure 4.1 below illustrates typical pedestrian countdown clock configurations observed in Denmark and the USA.



Figure 4-1: Pedestrian Countdown Signals – Denmark and USA

The Californian Metropolitan Transportation Commission has assessed the benefits and disbenefits of pedestrian countdown clocks and are shown in Table 4.1 on the following page.

⁸ It is acknowledged that a trial is currently underway of countdown clock infrastructure at the Kew junction intersection.

Table 4-1: Pedestrian Countdown Signals Benefits and Disbenefits

Benefits	Disbenefits
Easily understood by all age groups	Not accessible to pedestrians with impaired vision
Increases the feeling of safety	Some suppliers start the countdown at the beginning of the pedestrian phase and others at the beginning of the pedestrian clearance interval; this may confuse some pedestrians
Reduces the number of pedestrians stranded in the crosswalk when the light changes	Drivers may use the countdown to get a head start before they have a green light
Appropriately suited for wide crossing and areas where there are many senior citizens and people with walking disabilities	May create a possible legal conflict if a pedestrian starts during the pedestrian clearance interval but cannot finish crossing before the countdown timer reaches zero
The great majority of installations are simple drop-in replacement	May encourage pedestrians to begin crossing during the Flashing Don't Walk phase

Source: Californian Metropolitan Transportation Commission⁹

Whilst the countdown clocks in the US were useful for pedestrians they also displayed the countdown to motorists which is an acknowledged disbenefit, however this may be overcome through the use of louvers and/or increasing the intergreen time between phases.

When considering the technical operation of signals in order to display a count the phase times need to be known ahead of time, i.e. one cycle in advance. This is relatively easy for signals that have set cycle and phase times, however when signals are actuated as is typically the case in Victoria cycle and phase times are variable (managed through SCATS) due to the broader conditions within the network and as such the introduction of pedestrian countdown clocks would be difficult. Indeed there are competing demands of the flexibility of the signal network to respond to broader traffic conditions on a cycle by cycle basis and the need to set the cycle and phase times one cycle ahead of time. Whilst this may be a technical challenge and possibly cause a marginal reduction in network performance for vehicles the benefits in pedestrian compliance and consequentially reduced frequency of pedestrian crashes at signalised intersections should be considered worthwhile.

Recommendation

3. That VicRoads trial pedestrian countdown clocks with both red and green phase counts at both fixed cycle and actuated signalised intersections, and that the impacts of the count being visible to drivers be considered as part of the detailed design of the infrastructure.

⁹ <http://www.mtc.ca.gov/planning/bicyclespedestrians/tools/countdownSignal/index.htm>

4.1.2. Grade Separation

On a fundamental level the optimal road safety outcome is for pedestrians to be allocated their own space i.e. to be physically separated from other modes. This simply eliminates conflict and reduces the associated likelihood of casualty crashes.

Large cities in Germany and the UK provide pedestrians the ability to choose whether they wish to cross busy intersections at-grade or at a different, generally below ground, level. Whilst this may have originated out of the need to avoid severe winter weather conditions there are real road safety and walkability benefits. The underground level usually connects with an underground rail system and is typically thriving with active shop frontages. The grade separation not only provides pedestrians with a safe crossing opportunity, travel is usually quicker as there are no waiting at traffic signals and access to shops adjacent to the road reserve it is more convenient. Figure 4.2 below illustrates the extent and the activity of the underground connections in Munich Germany.



Figure 4-2: Grade Separated Intersection – Munich, Germany

Probably the best example of what can be done with grade separation is demonstrated by the RiverWalk in San Antonio, Texas, US¹⁰; shown in Figure 4.3. The San Antonio River winds through the San Antonio 'downtown' area at approximately 4-5 metres below street level and it cannot be accessed by motor vehicle. The River Walk is attraction in itself for tourists and locals due to the pleasant green surroundings, the river itself and the many cafes, bars, restaurants and other attractions along the way.

The RiverWalk also provides connections at river level that allows pedestrians to avoid crossing roads and travel unimpeded in beautiful surrounds to destinations or without destinations enjoying the ambiance. During the Study Tour many locals were observed using the RiverWalk as a cut through to avoid crossing roads and either connecting in to properties at river level or returning to street level. I guess the relatively lower temperature at river level would encourage this to some extent as it is hot in Texas. It was also fantastic to see many mobility impaired

¹⁰ <http://www.sanantonio.gov/>

people enjoying the atmosphere of the RiverWalk as it is accessible to disabled with elevators, ramps and wide paths.



Figure 4-3: Grade Separated Attraction and Connections – San Antonio River Walk, Texas, USA

In general, grade separation at locations of high pedestrian and vehicle conflict is a preferred road safety solution. In Goteborg Sweden, shown in Figure 4.4, a wide pedestrian thoroughfare has been created under a busy highway. The design of this type of infrastructure needs to consider community safety and crime including the ability for pedestrians to see through to the other side of the underpass.



Figure 4-4: Attractive Grade Separated Pedestrian Way – Goteborg, Sweden

Perceptions of safety can deter pedestrians from using an underpass¹¹. Consider Figure 4.5 as an example as a perceived unsafe underpass. It is dirty, has no lighting and there appears to be a high fence trapping the exit.



Figure 4-5: Unattractive Underpass – Goteborg, Sweden

Naturally the costs associated with grade separation are high; however other overseas countries have committed the resources and continue to reap the road safety, walkability and associated community health benefits.

There are locations in Melbourne where grade separation is successfully providing safe, efficient and high capacity connections; for example the intersection of Flinders Street and Elisabeth Street having an underground connection to Flinders Street railway station, and the Melbourne Central underground connections. Melbournians use these facilities in high numbers, mainly as connections to public transport but also in the case of Melbourne Central for shopping, etc, similar to those in Munich in Figure 4.2 above.

It is accepted that grade separation would work best in busy locations with high levels of pedestrian activity and high levels of conflict. A suitable site for grade separation would be the intersection of Flinders Street and Swanston Street in Melbourne where there are multiple modes (cars, trucks, buses, pedestrians, cyclists, trams) competing for the same at-grade road space. The pedestrian flows are high in all directions and an underground activity area connecting Federation Square with Flinders Street Railway Station, St Paul's cathedral and Swanston Street would reduce conflict and improve accessibility if it could be engineered and afforded.

¹¹ Factors which influence people's willingness to walk, presentation by Sonja Forward, VTI, 18/9/07.

As the cost of grade separation are high, particularly in inner urban areas, contributions may be negotiated from adjacent land owners with a quid-pro-quo of active underground/above ground frontage as development opportunities. Private public partnerships could also be considered.

Recommendation

4. That State and local government road authorities consider grade separation solutions at busy signalised intersections in long term planning and as opportunities allow.

4.2. Footpath Safety

4.2.1. Laneway / Crossover Treatments

The basic conflict of pedestrians with vehicles entering and exiting properties or laneways walking along the footpath is significant in almost all cities. Reducing the number of crossovers would reduce the level of conflict; realistically however this would only be possible when assessing applications for new developments. The City of Darebin is currently working on a crossover policy which aims to minimise the number of crossovers.

In existing built up environments a bollard treatment similar to those observed in Paris shown in Figure 4.6 may assist in improving pedestrian safety in these locations.



Figure 4-6: Driveway Crossover Treatments - Paris, France

The treatment was generally installed in locations where there was little or no pedestrian sight distance from a vehicle within a property or laneway to the footpath. The treatment consists of bollards and a differentiated footpath surface over the crossover. It allows the pedestrian to be alerted by seeing the bollards or feeling the change in surface under their feet that vehicles may be entering or exiting. The heightened level of awareness aimed at reducing the frequency and severity of pedestrians crashes at these locations.

From a pure walkability perspective such bollard treatments would be considered to be an obstruction. The treatment may also be problematic for sight impaired pedestrians who were not travelling along the building line and possibly walking into the bollard.

Perhaps a similar treatment without the bollard but with colour and tactile contrasting crossover may be sufficient to raise pedestrian awareness both able bodied and mobility impaired. This is not to say that all crossovers should have accepted Australian Standard Tactile Guidance Surface Indicators (TGSIs); merely that local government should trial these types of treatments to improve pedestrian safety in locations of relatively high pedestrian activity and less than adequate pedestrian sight distance.

The treatment is simple and low cost and therefore considered to be readily applicable to similar inner urban situations in Victoria.

Recommendation

5. That local governments seek to minimise the number of new crossovers in new developments to reduce the locations of conflict between vehicles and pedestrians.
6. That local governments consider driveway crossover treatments of contrasting tactile and colour finishes on footpaths where driveways and laneways have insufficient pedestrian sight distance.

4.2.2. Pedestrian Fencing

The use of pedestrian fencing was observed in many countries, particularly in Europe and also in Hong Kong. Pedestrian fencing has road safety benefits in restricting access and movement of pedestrians onto the road in unsafe areas. A recent UK study¹² found that locations with pedestrian fencing had lower average levels of pedestrian conflict, lower total crashes and statistically significant lower pedestrian collisions. It also found that although overall pedestrian safety was improved in some instances it encouraged riskier pedestrian behaviour.

Whilst pedestrian fencing has road safety benefits it is also restrictive and in some locations makes pedestrian travel unattractive as routes may be circuitous and footpaths narrow. Pedestrian fencing may also give drivers a false sense of the safety of an area and speeds may be higher compared to a treatment where pedestrians could walk onto the road, i.e. if drivers feel that there could be pedestrian conflicts then they are likely to drive slower.

One of the major problems of pedestrian fencing is the effect of trapping those pedestrians who may not be crossing the road in the right location within the carriageway, and thus forcing them to have greater and more severe exposure to traffic for longer and in unexpected locations for drivers.

¹² Zheng and Hall, 2003, Pedestrian Guard Railing: A Review of Criteria for Installation, University of Southampton.

From observations on the Study Tour pedestrians generally behave consistently around the world. We are reluctant to wait at signalised crossing points and obey road rules, and we all prefer to walk in direct line to our destinations.

Figure 4.7 shows a long installation of pedestrian fencing funnelling pedestrians to a safe crossing point and also illustrates the potential disbenefits of forcing pedestrians to deviate from their desired path.



Figure 4-7: Typical Pedestrian Fencing Treatment - Paris, France

At this time the use of pedestrian fencing has both positive and negative aspects and it is unclear whether it will ultimately be considered favourably in future. To this end Transport for London has currently commissioned TRL, a private transport research foundation, to undertake a review of criteria for the use of pedestrian fencing.

Research undertaken in Melbourne by Monash University Accident Research Centre (MUARC) associated with the WalkSafe program conducted around 2000 suggests that there may be some benefits to installing pedestrian fencing close to intersections which have pedestrian crash clusters close to crosswalks, however the findings were not conclusive and did not provide an guidance on the wider use of the treatment¹³.

Therefore despite the direction of Victoria's Road Safety Strategy: *First Action Plan 2008-2010*¹⁴ to install fencing on walkways and other pedestrian facilities there should be some consideration to the risks and disbenefits of doing so on a site by site basis and the blind application of pedestrian fencing to all locations should be guarded against. To this end the City of Darebin is heavily scrutinising any new proposals for pedestrian fencing, and is only likely to install the infrastructure in situations of clear and severe safety concerns.

¹³ Conversations with Bruce Corben, Senior Research Fellow, MUARC

¹⁴ http://www.arrivealive.vic.gov.au/action_plan

An alternate treatment in lower volume, lower speed environments is shown in Figure 4.8 where bollards protect pedestrians but also allow permeability.



Figure 4-8: Footpath Protection / Guidance Treatment - Paris, France

Recommendation

7. That Victorian road authorities not install pedestrian fencing in all situations without consideration of its full effects and alternative treatments.
8. That within the context of Victoria's Road Safety Strategy *arrive alive 2008-2017* the Victorian government consider the outcomes of future research on the suitability and criteria for installation of pedestrian fencing.

4.3. Signage and Linemarking

A variety of different types of signage and linemarking was observed in each country, most of which reflects that used in Australia. There were however two observations that were considered to be sufficiently different and potentially beneficial to Victorian practice.

4.3.1. United Kingdom Zigzag Linemarking

At zebra and pelican pedestrian crossings in the United Kingdom zigzag linemarking is a statutory requirement¹⁵ and they carry statutory obligations for motorists and pedestrians. It is illegal for motorists to park or overtake another vehicle adjacent to zigzag linemarking and pedestrians are also required to cross at the crossing, not walk through the zigzag linemarking.

¹⁵ http://www.legislation.gov.uk/si/si1987/Uksi_19870016_en_5.htm

Independent of the statutory obligations associated with the zigzag linemarking the treatment itself tends to narrow the carriageway and alerts the driver of the approaching pedestrian crossing. Figure 4.8 below illustrates effect the zigzag marking has in increasing driver awareness.



Figure 4-8: Zigzag Linemarking – Walton-on-Thames London, United Kingdom

Recommendation

9. That VicRoads consider zigzag linemarking as a No Stopping treatment on approaches to signalised intersections, pedestrian operated signals and zebra crossing.

4.3.2. Swedish Advisory Signage

Whilst regulatory speeds in local streets are 50km/hr in Sweden, the City of Goteborg¹⁶ has developed a series of themed advisory signs which are typically installed with traffic calming measures to reinforce to the motorist that lower speeds are appropriate in these more sensitive areas.

It is known that the risk of pedestrian fatality increases dramatically when struck by a vehicle travelling above approximately 30 km/hr (refer Figure 3.1), that elderly pedestrians take longer to cross the road and that children can be unpredictable in that they unaware of dangers when

¹⁶ City of Goteborg, Presentation by the City of Goteborg Traffic Department, 19/9/07

crossing the road so this type of treatment could assist to reduce the likelihood and severity of pedestrian crashes.

Examples of the signs are shown in Figure 4.9 where the advisory speed is reinforced by the image of school children and elderly crossing. Other images include an adult and child and also a child with a ball.



Source: City of Goteborg, Presentation by the City of Goteborg Traffic Department, 19/9/07.

Figure 4-9: Themed Advisory Speed Signs - Goteborg, Sweden

Themed speed advisory signage could be adapted to Victoria to reinforce lower speeds (30 or 40 km/hr) in areas where vulnerable pedestrians are expected, for example in residential streets adjacent to retirement villages or playgrounds.

Recommendation

10. That Victorian local governments develop and trial lower speed themed advisory signs in areas of high vulnerable pedestrian activity.

5. Vehicle Design

5.1. Pedestrian Friendly Car Fronts

Forgiving vehicle design can reduce the severity of crashes with pedestrians with Japan and the European Union leading the way in legislating in favour of pedestrian friendly design. Article 2 of Directive 2003/102/EC of the European Parliament states:

“The purpose of this Directive is to reduce injuries to pedestrians and other vulnerable road users who are hit by the frontal surfaces of the vehicles defined in paragraph 1.”¹⁷

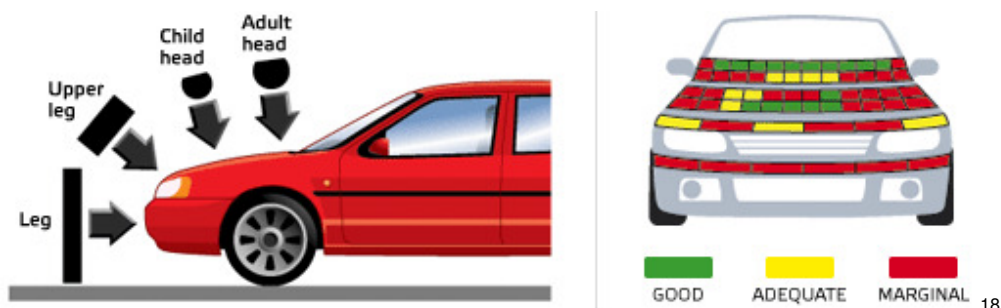


Figure 5-1: Pedestrian Frontal Impact Areas and Safety Assessment

The basic elements of the design requirements are to control the locations of impact and to provide some ability for the vehicle surface to deflect with clearance to hard structural elements beneath.

It is understood that testing is carried out on new vehicles through the Australasian New Car Assessment Program (ANCAP)¹⁹ and this provides some information to buyers as to the safety of the vehicle for a pedestrian in the event of a crash, which will hopefully influence buyers to purchase safer vehicles. However the third edition Australian Design Rules²⁰ appear to stop short of stipulating design requirements for pedestrian safety as legislated in the European Union.

Victoria’s Road Safety Strategy *Arrive Alive 2008-2017* indicates that the Victorian government will attempt to influence a review of the Australian Design Rules to “ensure that pedestrian safety standards are addressed by vehicle designers”.

Recommendation

11. That the Australian Federal Government undertake appropriate research to adapt pedestrian friendly design requirements of the European Union to Australian conditions and adopt them in the Australian Design Rules for new vehicles.

¹⁷ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0102:EN:NOT>

¹⁸ <http://www.euroncap.com/Content-Web-Page/ed4ad09d-1d63-4b20-a2e3-39192518cf50/pedestrian-protection.aspx>

¹⁹ <http://www.ancap.com.au/media/technicalpapers/6/>

²⁰ http://www.infrastructure.gov.au/roads/motor/design/adr_online.aspx

5.2.Side Under-run Protection

Side under-run protection is principally applicable to heavy vehicles and the reduction of severity of crashes involving pedestrians. The intent of the various schemes are to prevent the heavy vehicle from actually running over the pedestrian which produces much more severe outcomes than if the pedestrian is struck by the side of the vehicle.

Australian studies²¹ of heavy vehicle safety indicate that the introduction of under-run protection measures for heavy vehicles could potentially result in a reduction of 20% in pedestrian fatalities and >25% in severe injury outcomes in heavy vehicle–pedestrian crashes. The associated benefits were calculated to be approximately 3.9 times the cost of introducing the measures. Future side under-run protection treatments for heavy vehicles are shown in Figure 5.2 below.



Figure 5-2: HINO Motors Concept Truck with Side Under-run Protection

Victoria's Road Safety Strategy Arrive Alive 2008-2017 recognises the need for improved heavy vehicle design and specifically cites improved side under-run protection as possible changes to the Australian Design Rules.

Recommendation

12. That the Australian Federal Government undertake appropriate research to adopt side under-run protection for heavy vehicles in the Australian Design Rules for new vehicles.

²¹ A Cost-Benefit Analysis of Heavy Vehicle Underrun Protection, Mark Symmons, MUARC
<http://www.rsconference.com/pdf/RS030141.pdf>

6. Road User Behaviour

Road safety education and behavioural programs appear to exist in some form in all of the countries visited, many of which are aimed at drink driving, speeding and seat belts. According to SWOV of the Netherlands in their road safety strategy *Advancing Sustainable Safety*²² the role of education is not well understood in achieving road safety outcomes but certainly important.

“It is, by the way, remarkable that, despite the lack of knowledge about effectiveness, the importance of traffic education is not disputed. This is reflected in the fact that all countries have some form of traffic education.”

When it comes to pedestrian safety the role of formal and informal education and behavioural programs through pre-schools and schools is critical. The Danish example provides a comprehensive and integrated framework across many aspects of society and specifically includes road safety education in schools. The following discussion broadly outlines Danish education programs in schools.

6.1. The Danish Education Example

Road safety education is compulsory in Danish schools and the curriculum is set by the Ministry of Education. The intent of the road safety program is to manage a person’s safety from “cradle to steering wheel”. Road safety is integrated with other subjects and is aimed to combine the theory with real world practice. The focus is primarily on responsible behaviours and is taught from the children’s point of view with curriculum material developed specifically for different ages. Importantly the Police are involved in the program by assisting in with education presentations and supervising the various tests. The program is understood²³ to be widely supported by schools and parents. An overview of the program is summarised in the following table.

Table 6-1: Danish Traffic Education and Training

Age	Activity
3-6 years (Before school)	Children’s Traffic Club Teaching materials for kindergarten
6-7 years	Pedestrian Test
9 years	Little Bike Test
12 years	Bike Test
14-16 years	Traffic Test Traffic Informers
16-17 years	Teaching Material – Drivers License for Moped
15-21 years	Youth Education Campaigns

²² http://www.sustainablesafety.nl/Boek/boek_UK.htm

²³ Through discussions with the Danish Road Safety Council and the City of Copenhagen visited in September 2007.

In relation to pedestrian safety the Children's Traffic Club provides an introduction to the dangers of the road and vehicles as well as teaching simple messages about crossing the road, for example with an adult. While membership of the Traffic Club is voluntary it is widely adopted as the materials used are designed to be fun and include computer games, books and CD's. The mascot is the main character and grows with the child through the various ages of the wider program. Figure 6.1 on the flowing page shows a selection of materials for a boy involved in the Traffic Club (girls have pink material).



Source: Road Safety Campaigns and Education, Presentation by the Danish Road Safety Council, 21/9/07.

Figure 6-1: Children's Traffic Club Material – Denmark

The program also includes a specific pedestrian test for 6-7 year olds in crossing the road. Figure 5.2 shows an image of a Policeman teaching the children prior to giving the test.



Source: Road Safety Campaigns and Education, Presentation by the Danish Road Safety Council, 21/9/07.

Figure 6-2: Pedestrian Test for 6-7 Year Olds – Denmark

The Danes also have a tradition in self managing the safety around their schools. Figure 6.3 shows a yesteryear safe crossing attendant and present day youths aged between 11-14 years helping to make it safer for smaller children to cross the road. A position on the 'safety patrol' is said²⁴ to be well respected, and peer-to-peer benefits of such a program are potentially enormous in terms of encouraging leadership and making it 'cool' to behave responsibly.



Source: Road Safety Campaigns and Education, Presentation by the Danish Road Safety Council, 21/9/07.

Figure 6-3: Then and Now, School Safety Patrol – Copenhagen, Denmark

Whilst a system of youth crossing supervisors may have leadership and road safety educational benefits in the current typically risk adverse environment facing Victorian local governments it is difficult to see the model translating to Victoria. Notwithstanding, local governments do tend to find it difficult to source crossing supervisors and looking to youth may have potential provided systems can be put in place to select, train and monitor suitable candidates.

Recommendation

13. That local governments and schools consider including students as safe crossing supervisors in local street approaches to primary schools.

Victoria's progress in this area is considered to be on par with the countries visited. Victoria's Traffic Safety Education Action Plan 2002-2007²⁵ provides a comprehensive and integrated strategy to providing road safety education to Victorian children through programs in pre-school, primary and secondary schools. The framework for the action plan shown in Figure 6.4 illustrates the various partnerships and continuous education provided through the Action Plan. Parent behaviour and programs like Starting Out Safely²⁶ are considered to be important to developing safe pedestrian behaviour from an early age.

²⁴ Through discussions with the Danish Road Safety Council and the City of Copenhagen visited in September 2007.

²⁵ <http://www.vicroads.vic.gov.au/Home/RoadSafety/RoadSafetyEducation/>

²⁶ <http://www.vicroads.vic.gov.au/Home/RoadSafety/RoadSafetyEducation/PrePrimarySchoolAge.htm>

Although still operational the Action Plan has now expired and it is recommended that it be reviewed and updated to incorporate current thinking and recent innovations in the area.

Recommendation

14. That the Victorian government evaluate the success of the Traffic Safety Education Action Plan 2002-2007 and develop a new Action Plan for future years.

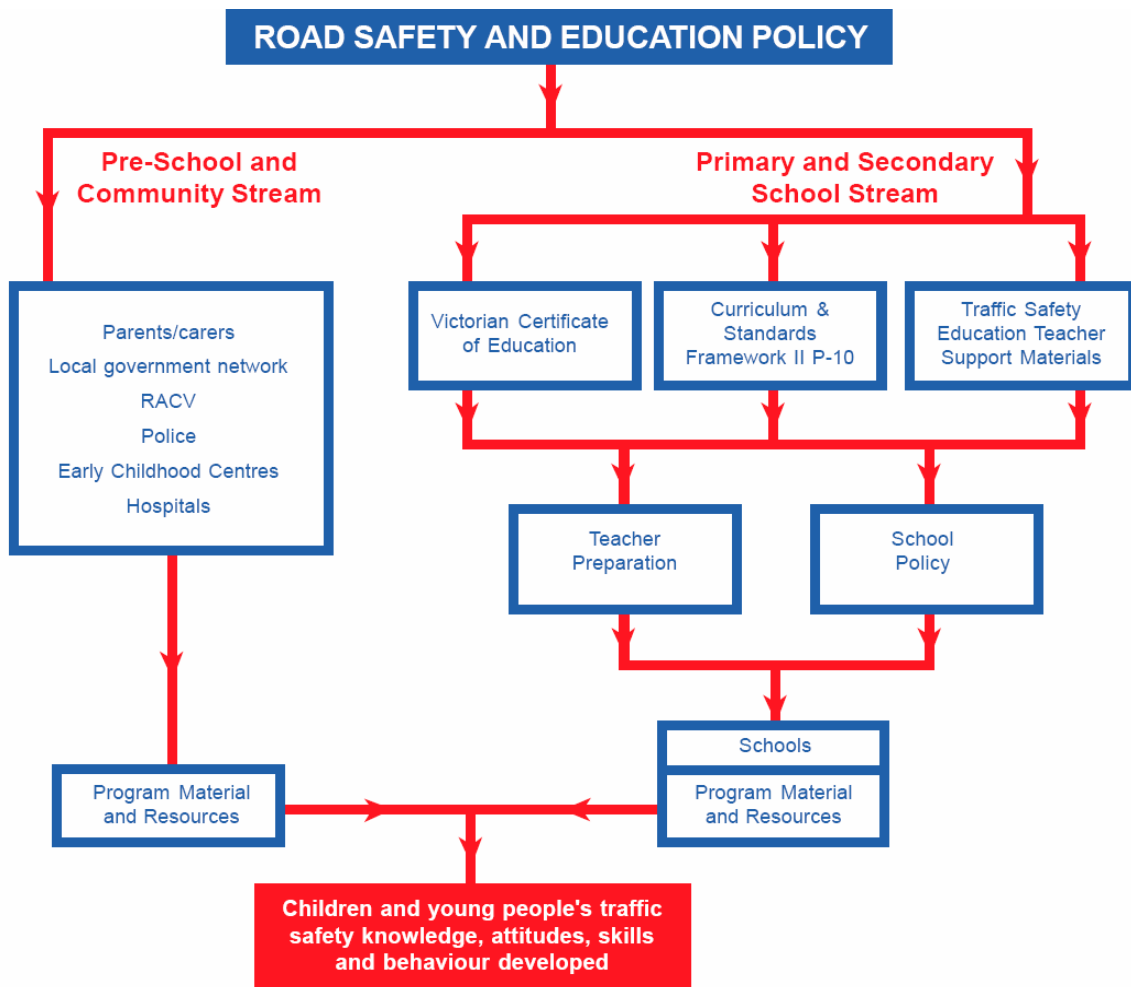


Figure 6-4: Victoria's Road Safety Education Framework

7.Regulation

This chapter on regulation is not intended to be a comprehensive review of traffic laws in each country, but simply identifying those areas where specific regulations improves pedestrian road safety outcomes. In general these areas can be categorised as 1) providing pedestrians priority wholly or partially over the motor vehicle and 2) reducing vehicle speeds.

7.1.Pedestrian Streets

7.1.1.Permanent Treatments

Many cities in Europe have streets which are pedestrian friendly and in fact ban motor vehicles during all or part of the day. Figure 7.1 shows an example of a pedestrian street in Goteborg Sweden with pedestrians free to mingle (with cyclists) across the whole road reserve and traditional kerb and channel removed eliminating trip hazards and reinforcing the pedestrian priority. These types of treatments of course improve pedestrian safety as the potential conflict with motor vehicles is eliminated or reduced depending on the length of their journey.



Figure 7-1: Pedestrian Street - Goteborg, Sweden

Streets in hearts of older European cities are often narrower than those in Melbourne and are thus more easily adapted to solely pedestrian environments. Many due to their era of construction already have no kerb and channel, but this is certainly not the case everywhere. Goteborg, for example is undertaking a program of introducing more pedestrian streets and removing traditional kerb and channel. The City of Bendigo is also embarking on a similar process.

The pedestrian streets observed usually allowed vehicular access for deliveries and waste removal early in the morning, typically between 6am and 9am, with no physical controls on vehicular access. The success of the pedestrian street therefore relies on the enforcement of

regulations to keep vehicles out, and the likely presence of pedestrians which makes the route undesirable in any event.

There are however physical threshold treatments available to regulate vehicular access, including the luminous rising bollard at the entrance to pedestrian streets in Amsterdam, The Netherlands as shown in Figure 7.2. The bollards can be programmed to rise and fall at set times and that emergency vehicles with transponders can also activate the bollards.



Figure 7-2: Luminous Rising Bollard Threshold Treatment - Amsterdam, The Netherlands

Whilst removing pedestrian-vehicle conflict altogether is the safest possible outcome there are other considerations that must be balanced before proceeding with pedestrian street treatments in Victoria. There would need to be a thorough public consultation and education campaign for local residents and traders, and there would need to be an assessment of the traffic impacts, although these would be expected to reduce over time. The success of any such treatment would also need to be assessed with respect to its economic impact as the centre may decline without passing traffic.

Recommendation

15. That Victorian local governments as part of their activity centre planning consider pedestrian streets without traditional kerb and channel as an alternative to traditional treatments.

7.1.2. Car-Free Days

Car-free days have been trialled in the old centre of Copenhagen, Denmark with great success. They are basically normal streets with non-essential vehicular movements banned from areas of the city for between 1 and 3 days. Their stated aim was to:

“..create debate in order to identify the advantages and disadvantages of traffic calming in the historic city centre with due regard to commercial interests and

*residents. In addition the car-free days are meant to focus attention on travel modes chosen by commuters and visitors to the city centre.*²⁷

They have been reported as reducing vehicle trips into the inner city by up to 50% and increasing pedestrian volumes by 7%. Most importantly though, the car-free days have raised the awareness and stimulated debate to such a level that pedestrian interests (safety and mobility) are beginning to be prioritised within the old centre of Copenhagen.

On another level, car-free days provide opportunities for social and cultural events making use of the full road reserve as shown in Figure 7.3.



Source: City of Cyclists, Presentation by City of Copenhagen, 20/9/07.

Figure 7-3: Car-Free Day Cultural Events - Copenhagen, Denmark

Whilst it is considered unrealistic for pedestrian streets to be adopted in the short-term in Melbourne, a once-off car-free day in the CBD or local activity centre could be trialled within a year or so. Appropriate consultation with local authorities, traders and residents would be required, but this would be similar to normal event planning and should not present too many problems. The benefits of the car-free day would be to raise public awareness and debate of transport issues, including walking and road safety.

Recommendation

16. That local governments assess their opportunity and desire to conduct a car-free day within a local activity centre to promote sustainable transport and road safety and to discourage single occupant motor vehicle use.

²⁷ Assessment of Copenhagen Mobility Week and Car-Free Days 2005, City of Copenhagen, November 2005.

7.2. Pedestrian Priority

Priority for pedestrians as they walk along the footpath is provided in many countries, and by forcing vehicles to give way the road safety onus is on the driver. The footpaths in Copenhagen Denmark reflect this priority by providing a continuous uninterrupted footpath while the vehicle traverses a vertical rise from the road pavement level to the footpath level. This vertical displacement acts as a road hump which requires the driver to negotiate the treatment at a slower speed to maintain comfort in the vehicle, and slower speeds equate to less frequent and severe casualty crashes. Figure 6.4 on the following page illustrates a typical Danish local road threshold treatment.



Figure 7-4: Local Road Threshold Treatments - Frederiksberg, Denmark

Whilst Victorian Road Rules require turning drivers to give way to pedestrians, drivers from approaching from the side (discontinuing) road do not have to give way. The differential treatment of pedestrians at the same location could be a source of confusion. If all drivers were to approach these locations with the anticipation of giving way to pedestrians these locations would become safer.

Recommendation

17. That the Victorian State government through VicRoads and the Department of Justice assess the impacts of giving priority at law to pedestrians to continuously traverse a footpath across a side road from both turning vehicles and vehicles approaching from the side road.

7.3. Speed Limits

Research indicates that the risk of death increases dramatically when a pedestrian is hit by a vehicle travelling above 30km/hr²⁸, refer Figure 3.1. In residential areas and those of high pedestrian activity lower speeds are appropriate to minimise the frequency and severity of pedestrian casualty crashes.

In the US residential speed limits are 25mph which is equivalent to 40km/hr. Many countries in Europe also had lower speed zones in residential areas. Sweden has 30km/hr speed zones in residential areas, with Figure 7.5 used in Stockholm's public awareness campaign. Denmark also has lower residential speed limits of 40km/hr and Figure 7.6 shows a typical threshold treatments.



30-zones in Stockholm's residential areas

Figure 7-5: 30km/hr Residential Speed Zones – Sweden



Figure 7-6: 40km/hr Speed Zones – Denmark

²⁸ Advancing Sustainable Safety, SWOV Institute for Road Safety Research.

Whilst the lower speed limits are in place elsewhere in the world it is difficult to imagine at this time that the Victorian public would accept a 40km/hr general urban speed limit, regardless of the road safety benefits. This is primarily due to the relatively recent reduction to the current 50km/hr limit. Notwithstanding, assessments of the benefits of reducing the speed limit should be undertaken and further public education campaigns undertaken to begin the task of community acceptance. One step along the way would be extend the 40km/hr strip shopping centre trial and 40 km/hr school zones to other areas of high pedestrian activity.

There are many traffic calming solutions available for individual sites and resources are shown in the References section of this report.

Recommendation

18. That VicRoads in collaboration with local Councils investigate extending the 40km/hr speed limits adjacent schools and trialled in strip shopping centres to all areas of high pedestrian activity, and the general urban speed limit of 50km/hr be reviewed for residential streets.

8. Government

The most significant observation in relation to government was that those countries which had fewer levels were better able to achieve road safety outcomes and communicate with their communities.

In Northern Europe countries like Sweden and Denmark there were generally only two (2) tiers of government, at national and local levels. As a consequence local governments in these countries have greater scope and responsibilities than they do here in Australia. For example the City of Copenhagen in Denmark controls all aspects of the road network within City boundaries including the operation of all categories of roads and signals and they are thereby able to make holistic and strategic decisions on the prioritisation of competing modes and the subsequent allocation of road space.

The US system makes an interesting contrast to the European forms of government observed during the Study Tour. The US has four layers of government: federal, state, county, and local. As a consequence the feedback from local practitioners in the US was that State and federal governments and agencies were very bureaucratic whose role was to effectively set a broad direction and to administrate funding allocations of various programs including those of traffic and road safety. This being the case local governments were quite dependent on the success of their funding submissions to be able to undertake initiatives in these areas. A good 'grant writer' was seen to be extremely valuable.

Notwithstanding the above and similar to European experiences, local governments in the US do have a greater control of their road network than the shared system in Victoria. Local governments in Victoria need to work cooperatively with the State level of government and in particular VicRoads, as VicRoads manages all signalised intersections and the declared main road network. There are a number of areas where the State and local government need to work together to achieve outcomes, including the road safety education and behavioural programs discussed earlier.

Speed limits (reducing the frequency and severity of pedestrian crashes) and road space allocation (improving walkability and pedestrian safety) are also areas where there are competing interests which can only be resolved when State and local governments work together in a cooperative way. In order to achieve this there needs to be greater engagement between the various State agencies and local government with open and transparent communication.

RECOMMENDATION

19. That local and State government agencies engage each other more regularly and encourage open and transparent communication, particularly in the area of road safety.

**"The care of human life & happiness...is the first and only objective of good government"
- Thomas Jefferson**

9. Conclusion

The Study Tour through the USA and northern Europe provided an excellent opportunity to review pedestrian safety policies and practices across a wide sphere of approaches in the following areas:

- **Road Safety Policy:** the relative importance of road trauma and the vision to address it;
- **Road Environment:** the characteristics of the infrastructure;
- **Vehicle Design:** the inherent safety of the vehicle for its driver and occupants as well as other road users that it may be involved with in a crash;
- **Road User Behaviour:** the way drivers and pedestrians perceive things and make decisions;
- **Regulation and Enforcement:** the road rules and the legal consequences of disregarding them;
- **Government:** the way government structure may effect road safety outcomes.

Notwithstanding the lead being shown by the northern European countries Victoria's own road safety policy arrive alive 2008-2017 is world class, as is our road user behavioural and education programs. In terms of pedestrian safety there is room for improvement in the areas of the road environment, vehicle design and road regulations.

Specific improvements can be made by introducing pedestrian countdown clocks, encouraging separation of pedestrians from other vehicle, incorporating pedestrian friendly design into our vehicles and by lowering speed limits in residential and highly pedestrianised areas.

There are contrasts in the forms of government, with the more autonomous Europeans better able to achieve their stated road safety outcomes, while the US beurocracy ancedotally tended to inhibit the efficiency and funding of local governments. Notwithstanding they do have a greater control of local outcomes onces funded.

In working towards achieving our goals of reducing the road toll by 30% by the end of 2017²⁹ it is important that State and local governments work more closely together in a spirit of cooperation. There is a clear need for greater engagement and and clearer communications.

The detailed recommendations contained within the body of the report in these areas are consolidated in the next chapter.

²⁹ Victoria's Road Safety Strategy *arrive alive 2008-2017*, www.arrivealive.vic.gov.au

10. Recommendations

The following recommendations are made to improve pedestrian safety in Victoria:

ROAD SAFETY RECORD AND ATTITUDES

1. That Victorian State and local governments continue to raise road safety awareness with the aim of improving societal acceptance of road safety initiatives.

ROAD SAFETY POLICY

2. That Victorian State and local governments actively pursue and support the implementation of the road safety policy *arrive alive 2008-2017* and that the design of road environments and new vehicles be guided by human characteristics.

THE ROAD ENVIRONMENT

3. That VicRoads trial pedestrian countdown clocks with both red and green phase counts at both fixed cycle and actuated signalised intersections, and that the impacts of the count being visible to drivers be considered as part of the detailed design of the infrastructure.
4. That State and local government road authorities consider grade separation solutions at busy signalised intersections in long term planning and as opportunities allow.
5. That local governments seek to minimise the number of new crossovers in new developments to reduce the locations of conflict between vehicles and pedestrians.
6. That local governments consider driveway crossover treatments of contrasting tactile and colour finishes on footpaths where driveways and laneways have insufficient pedestrian sight distance.
7. That Victorian road authorities not install pedestrian fencing in all situations without consideration of its full effects and alternative treatments.
8. That within the context of Victoria's Road Safety Strategy *arrive alive 2008-2017* the Victorian government consider the outcomes of future research on the suitability and criteria for installation of pedestrian fencing.
9. That VicRoads consider zigzag linemarking as a No Stopping treatment on approaches to signalised intersections, pedestrian operated signals and zebra crossing.
10. That Victorian local governments develop and trial lower speed themed advisory signs in areas of high vulnerable pedestrian activity.

VEHICLE DESIGN

11. That the Australian Federal Government undertake appropriate research to adapt pedestrian friendly design requirements of the European Union to Australian conditions and adopt them in the Australian Design Rules for new vehicles.
12. That the Australian Federal Government undertake appropriate research to adopt side under-run protection for heavy vehicles in the Australian Design Rules for new vehicles.

ROAD USER BEHAVIOUR

13. That local governments and schools consider including students as safe crossing supervisors in local street approaches to primary schools.
14. That the Victorian government evaluate the success of the Traffic Safety Education Action Plan 2002-2007 and develop a new Action Plan for future years.

REGULATION

15. That Victorian local governments as part of their activity centre planning consider pedestrian streets without traditional kerb and channel as an alternative to traditional treatments.
16. That local governments assess their opportunity and desire to conduct a car-free day within a local activity centre to promote sustainable transport and road safety and to discourage single occupant motor vehicle use.
17. That the Victorian State government through VicRoads and the Department of Justice assess the impacts of giving priority at law to pedestrians to continuously traverse a footpath across a side road from both turning vehicles and vehicles approaching from the side road.
18. That VicRoads in collaboration with local Councils investigate extending the 40km/hr speed limits adjacent schools and trialled in strip shopping centres to all areas of high pedestrian activity, and the general urban speed limit of 50km/hr be reviewed for residential streets.

GOVERNMENT

19. That local and State government agencies engage each other more regularly and encourage open and transparent communication, particularly in the area of road safety.

References

Individual references are shown progressively throughout the report as footnotes. This section categorises references and resources used in researching and preparing this report into the primary areas of investigation.

Road Safety Record

ATSB, Australian Transport Safety Bureau, <http://www.atsb.gov.au/road/index.aspx>

IRTAD, International Road Traffic and Accident Database,
<http://cemt.org/IRTAD/IRTADPUBLIC/index.htm>

OECD, Organisation for Economic Cooperation and Development, www.oecd.org/

Road Safety Policy / Research

ARRB, Australian Road Research Board, www.arrb.com.au

Danish Road Directorate, www.vejdirektoratet.dk/

European Road Safety Observatory, <http://euroris.swov.nl/index.html>

MUARC, Monash University Accident Research Centre, www.monash.edu.au/muarc

SWOV, Netherlands Institute for Road Safety Research, www.swov.nl/index_uk.htm

Victorian Government, Road Safety Strategy *arrive alive 2008-2017*, www.arrivealive.vic.gov.au

VTI, Swedish National Road and Transport Research Institute, www.vti.se

United Kingdom, Department for Transport, www.dft.gov.uk/

United Kingdom, TRL, www.trl.co.uk/

Education and Behavioural Programs

Danish Road Safety Council, www.rfsf.dk/

RACV, www.racv.com.au/wps/wcm/connect/Internet/Primary/road%20safety/

United Kingdom, <http://www.thinkroadsafety.gov.uk/arrivealive/index.htm> , www.kerbcraft.org

Victorian Government, <http://www.vicroads.vic.gov.au/Home/RoadSafety/RoadSafetyEducation/>

Victorian Government, TAC, www.tacsafety.com.au

Individual Programs associated with pedestrian safety:

Walk with Care, Looking out for Pedestrians, Not So Fast

Pedestrian Focused Traffic Calming

Manual for Streets, www.dft.gov.uk/pgr/sustainable/manforstreets/

Pedsafe, Pedestrian Safety Guide and Countermeasure Selection System, US Department of Transportation, Federal Highway Administration, www.walkinginfo.org/pedsafe/

Appendix A – Study Tour Itinerary

Details of the places and organisations visited as part of the Study Tour are summarised in the following Table.

Table A-1: Study Tour Itinerary

Date	Location	Organisation	Contact
6/9/07	San Francisco, USA	City of San Mateo	Gary Heap, Senior Engineer
7/9/07	San Francisco, USA	Daly City	Joseph Curran, Assistant City Manager
9-12/9/07	San Antonio, USA	American Public Works Association (APWA) Congress	Various
13/9/07	San Antonio, USA	Texas Transport Institute	Russell Henk, Division Head
14-16/9/07	London, UK	-	-
17/9/07	Linköping, Sweden	VTI, Swedish National Road and Transport Research Institute	Magdalena Green, Communication Specialist
19/9/07	Göteborg, Sweden	City of Göteborg	Suzanne Andersson, Road Safety Coordinator
20/9/07	Copenhagen, Denmark	City of Copenhagen	Steffen Rasmussen, Director
21/9/07	Copenhagen, Denmark	Danish National Traffic Police Danish Road Directorate City of Fredriksberg Danish Road Safety Council	Jorn Andresen Anne Eriksson, Engineer Peter Rasmussen, Manager Vibeke Toft, Director
24/9/07	Liedschendam, The Netherlands Utrecht, The Netherlands	SWOV, Institute for Road Safety Research ROV-Utrecht	Letty Aarts, Researcher Jacqueline ven der Spek, Program Administrator
25/9/07 onwards	Paris, France Lausanne, Switzerland Munich, Germany Hong Kong, China	-	-