

FOREWORD

Road crashes impose a massive and unacceptable burden of death, pain and suffering on New Zealanders. The government is determined to reduce this burden by making New Zealand's roads safer for everyone.

I am pleased to present the government's *Road Safety to 2010* strategy, which aims to reduce road casualties to no more than 300 deaths and 4,500 hospitalisations a year by 2010. The goal is ambitious, but I know it is achievable through action in each of:

- engineering
- education
- enforcement.

Some new activities reflecting this balanced approach are already underway; others will be announced in the near future. There are cost-effective ways to implement the strategy, and I know it has wide community support.

This strategy embodies the aims of the New Zealand Transport Strategy and underpins it in the area of road safety. *Road Safety to 2010* will contribute to an affordable, integrated, safe, responsive and sustainable transport system by increasing the safety of all road users.

Previous national road safety plans played an important part in reducing deaths from 729 in 1990 to 404 in 2002. The road safety activities developed under those plans will stay in place, but will be reinforced by the new and intensified actions in this strategy. Most deaths and injuries occur when road users operate outside the safe design limits of the road network. We need to continue our focus on improving road user behaviour by means of education and enforcement. However, we also need to focus on the entire road environment. We need to improve vehicle and road design and construction to better accommodate human error. This will enable us to maintain the encouraging downward trend in road crashes, deaths and serious injuries.

The *Road Safety Strategy 2010* consultation document was released late in 2000 to promote discussion and obtain the community's views on a road safety strategy for the coming decade. This document, *Road Safety to 2010*, responds to the community's call for safer roads with a mix of engineering, education and enforcement programmes, and was developed with the assistance of the National Road Safety Committee.

The implementation schedule released with this document describes how the National Road Safety Committee member organisations aim to achieve the strategy's initial 2004 targets, with significant effort going into engineering to develop a safer and more forgiving road network and new education programmes to raise road safety knowledge and awareness.

But we will also have to introduce highly effective new road policing measures if we are to achieve our 2010 goals. I see no reason why we should tolerate behaviour that imposes an unacceptable risk of injury or death on other citizens going about their daily lives.

Achieving our new road safety goal will depend on the commitment and efforts of central and local government, communities, organisations, families and individuals throughout New Zealand. Everyone has a part to play in the strategy and I commend it to you.



Hon Paul Swain
Minister of Transport
October 2003



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INTRODUCTION

Road Safety to 2010 provides a direction for road safety in New Zealand, and describes the results the government wants to achieve by 2010.

It sets out:

- the government's balanced approach using initiatives that are built around the three Es – engineering, education and enforcement
- the first stage of initiatives (to 2004)
- the co-ordination, funding and other mechanisms that will be involved in implementing the strategy
- the priority areas that will be a focus for the government's road safety activity up to 2010.

The road safety strategy will be an important component in achieving the New Zealand Transport Strategy goal of an affordable, integrated, safe, responsive and sustainable transport system.

The task ahead

Our goal is to reduce the number of road deaths per year to no more than 300 and hospitalisations to no more than 4,500 by 2010. This is an ambitious goal, which will require some new road safety activities, but the government believes it is achievable.

Other countries have done what we are setting out to do, and we are also building on a demonstrated track record in New Zealand. For example, road death and hospitalisation rates per 100,000 population have declined from 21.4 deaths and 245 hospitalisations in 1990 to 10.2 deaths and 164 hospitalisations in 2002 (see Figure 1). Despite traffic growth, total deaths have fallen from 729 in 1990 to 404 in 2002.

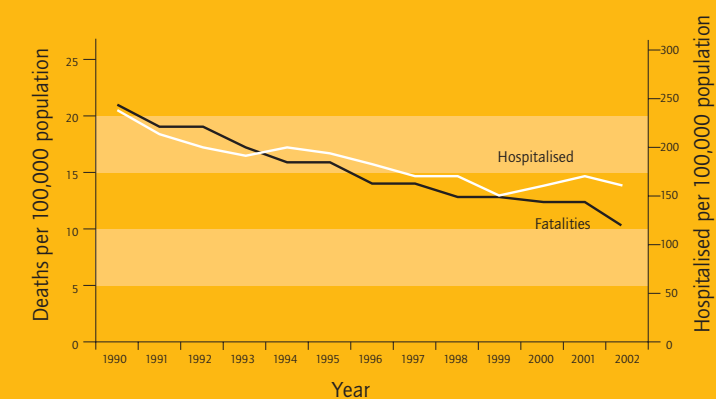


Figure 1. Deaths and hospitalisations per 100,000 population.

Source: Land Transport Safety Authority and New Zealand Health Information Service data.

Note: The rise in hospitalisation figures during 2000-2001 appears to have been the result of changes in hospital reporting procedures.

Engineering, education and enforcement – the key to success

This strategy takes a balanced approach, tackling our road safety problem on three fronts: engineering, education and enforcement. During the life of this strategy, we will introduce and implement measures that encompass improved safety engineering of the road and of vehicles, comprehensive road safety education and effective enforcement. Not only does this approach offer us the best chance of achieving our goals by 2010, but our consultation shows it is also widely supported by the New Zealand public.

By reducing our annual road casualties to no more than 300 deaths and 4,500 hospitalisations by 2010, New Zealand's road safety performance will be closer to that of countries with the best safety records. Our analysis shows this is achievable.¹ We will focus on how safety can be engineered into the road network, as well as using the power of education and advertising to influence how people use the roads. We will build up community-based road safety programmes, and introduce programmes to address the risks faced by such groups as novice drivers, heavy vehicle drivers and operators, pedestrians, cyclists and motorcyclists. We will soon have to get tougher on our major driver behaviour problems, such as drink-driving, speeding and serious repeat offending.

The early stage of the strategy involves the development of some important measures to deter risky behaviour on our roads. Announcements will be made in the months following the release of this document on what measures we will introduce, and what they are expected to achieve.

Building on past success

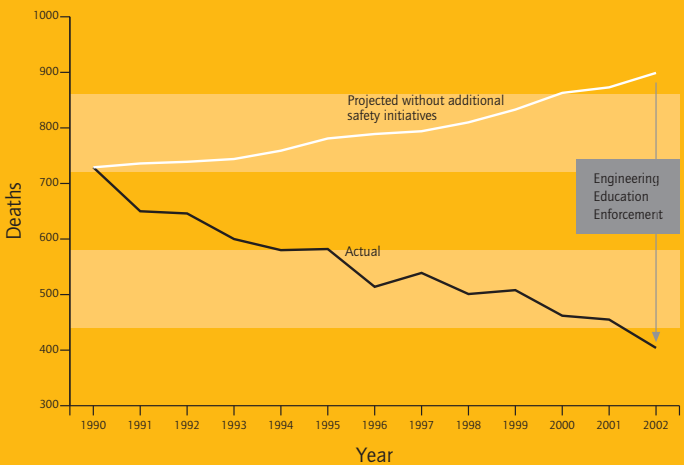


Figure 2. How the engineering, education and enforcement effort has contributed to our road safety achievements since 1990. Road and vehicle engineering contribute a steady ongoing improvement; education supports and persuades; enforcement deters past and potential risk-takers. Without this effort, traffic growth would have pushed the death rate up to around 900 a year.

EXAMPLES OF ENGINEERING

- Crash Reduction Study Programme
- Skid resistance programme (SCRIM)
- Roadside clear zones
- Median barriers on busy motorways
- Frontal impact systems (including safety belts, airbags)

EXAMPLES OF EDUCATION

- Targeted road safety advertising
- Graduated driver licensing
- RoadSense – Ata Haere in schools
- Community road safety programmes

EXAMPLES OF ENFORCEMENT

- Compulsory breath testing
- Speed cameras
- Roadside vehicle impoundment
- Highway Patrol

Past success – engineering

Highlights over the past decade from ongoing safety engineering programmes include:

- low cost engineering improvements at over 2,000 crash black spots resulting in a 50 percent drop in fatal crashes at those sites
- skid resistance programmes. An example of what can be achieved by safety resurfacing work is the Petone overbridge, north of Wellington. Since the high friction skid resistant surface was applied, there have been only two injury crashes, compared with more than one every week before resurfacing
- a requirement for median barriers on all motorways exceeding 20,000 vehicles a day. This has saved an average of three lives a year on the Auckland Harbour Bridge alone
- 35 percent of the overall state highway spend has been based on safety benefits
- a steady improvement in vehicle safety standards
- the accelerated introduction of frontal impact standards for vehicles to save more lives earlier
- the Crash Reduction Programme targeting hazardous locations (see Figure 3 below)
- major state highway works including construction, four-laning and passing lanes
- minor state highway works including mitigating obstacles, vegetation clearance, clear zones, and improved road markings, signage and visibility at intersections
- joint venture traffic monitoring with territorial authorities in Auckland, including 24-hour coverage of traffic over the Auckland network.

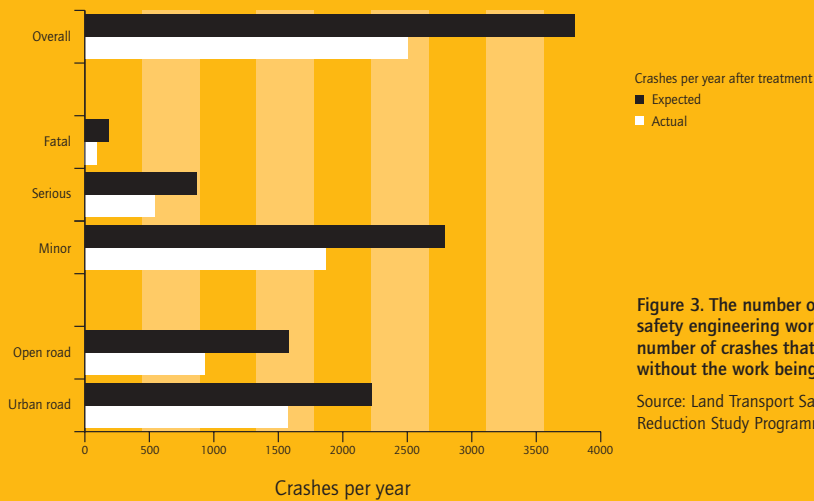


Figure 3. The number of crashes after low cost safety engineering work is compared with the number of crashes that would have been expected without the work being carried out.

Source: Land Transport Safety Authority Joint Crash Reduction Study Programme.

Our past progress has been built on:

- ambitious vision and targets
- engineering, education and enforcement programmes that use world's best practice in an integrated and mutually supportive effort
- multi-agency road safety partnerships
- broadening responsibility for road safety programmes to include local partners and stakeholders
- intensive public education advertising to support important safety initiatives
- sustainable funding sources and rigorously justified investment
- monitoring and measuring our performance through evaluation and peer review of programmes after implementation.

¹ Refer *Road Safety Strategy 2010: A consultation document*, and *Safety directions* working papers 6 and 7 (See Appendix 3).

Past success – education and enforcement

Education and enforcement efforts have also contributed to our progress (see Figure 4).

Other highlights over the past decade have included:

- a major reduction in alcohol-related deaths from 318 in 1990 to 102 in 2002
- a 25 percent reduction since 1999 in unlicensed and disqualified drivers involved in crashes.

Maintaining this progress also depends on central and local government and communities taking the kind of actions that will keep up momentum and consolidate our gains. For example, in 2000 the government introduced the Highway Patrol, a move that had an immediate and positive effect. In each year between 1996 and 1999, an average of 515 people were killed on our roads (the lowest figure was 501 in 1998). Having an additional 225 Police officers on the road led to a 24 percent reduction in fatal crashes on New Zealand’s state highways between 1999 and 2002. Total road deaths fell to 462 in 2000, 455 in 2001 and 404 in 2002.

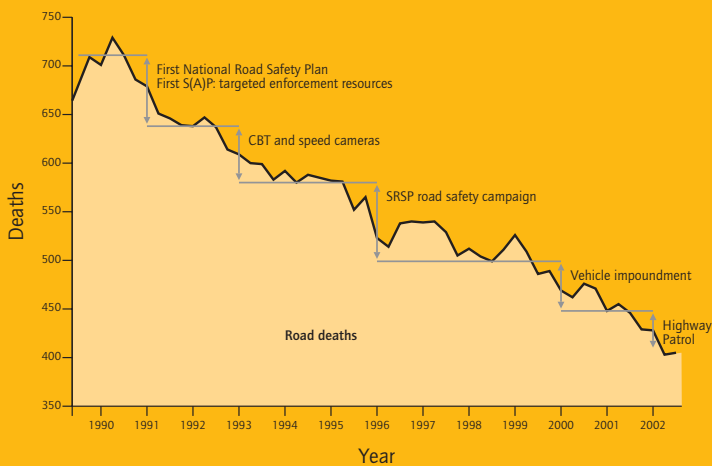


Figure 4. Major enforcement and education interventions, and casualty reductions 1990–2002.
Source: Land Transport Safety Authority
Note: S(A)P is the Safety (Administration) Programme, otherwise known as the New Zealand Road Safety Programme; CBT refers to compulsory breath testing; SRSP refers to the Supplementary Road Safety Programme which introduced a hard-hitting advertising campaign in support of targeted enforcement.



Where we are now

In 2002, road crashes caused 404 deaths and 6,670 hospitalisations, at an estimated social cost of around \$3 billion (in June 2002 prices).²

This performance is not as good as that of some other countries. For example, in 2001³ New Zealand had 11.8 deaths per 100,000 population compared with 8.9 in Australia and 6.0 in the United Kingdom. We have been catching up fast (see Figure 5) but the current level of deaths and injuries remains unacceptable.

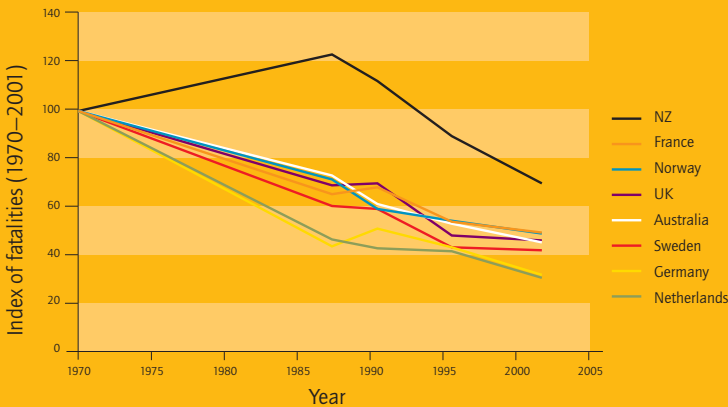


Figure 5. Road trauma: international comparisons indexed to 1970.
Source: International Road Traffic and Accident Database, Bundesanstalt für Strassenwesen, Germany

Part of a broader set of government goals

This road safety strategy connects with wider government goals through the New Zealand Transport Strategy.

The government’s transport vision is that ‘by 2010, New Zealand will have an affordable, integrated, safe, responsive and sustainable transport system’. Within an overall sustainable development framework, we have established five objectives that, if achieved, will enable transport to play a major part in helping New Zealand benefit from the available economic, social and environmental opportunities.

These objectives are:

- assisting economic development
- assisting safety and personal security
- improving access and mobility
- protecting and promoting public health
- ensuring environmental sustainability.

Each one needs to be considered and progressed together or in parallel with the others, rather than in isolation.

² The social cost of a crash is the measure of all costs that the crash inflicts on the community – on road users, emergency service providers and others. It includes not just the costs of material losses (such as medical treatment and property damage) but also pain and suffering.

³ 2001 is the latest year for which a full set of international comparisons is available.

Theme: Integrating safety into the transport system

A more systemic approach to transport management should build safety in, not add safety on. Safety should be considered in all transport decisions and designed into our infrastructure. This means our road network should be designed, and our land-use planning done, in a way that challenges the acceptability of road deaths and serious injuries, and accommodates the safety needs of all users – pedestrians, cyclists, public transport users and motorists.



Current thinking on road safety already reflects this integrated approach. For example, improving pedestrian and cyclist safety by reducing vehicle speeds and providing better facilities (as promoted in this strategy) will:

- assist safety and personal security
- address access and mobility issues for non-motorised users
- address public health issues through better exercise opportunities
- address environmental sustainability by supporting non-polluting modes of transport.

In the same way, speed management will support the achievement of energy efficiency and conservation goals, and successfully managing the demand for car and public transport use will support safety goals.

The New Zealand Transport Strategy identifies transport's contribution to the following government strategies: Growing an Innovative New Zealand, the New Zealand Tourism Strategy, the New Zealand Health and Disability Strategies, the Positive Ageing Strategy and the National Energy Efficiency and Conservation Strategy.

As well as contributing to a range of broader government goals, *Road Safety to 2010* will directly contribute to two other government strategies:

- Injury prevention: the New Zealand Injury Prevention Strategy's vision is 'a safe New Zealand – becoming injury free'. The strategy identifies road crashes as one of six priority areas and *Road Safety to 2010* as the avenue for addressing it.
- Crime reduction: one of the Crime Reduction Strategy's priority goals is 'to reduce serious traffic offending'. This will be addressed through *Road Safety to 2010*.

The successful implementation of *Road Safety to 2010* will continue to rely on the joint efforts of the road safety partnership, in particular the member agencies of the National Road Safety Committee and the National Road Safety Advisory Group.⁴ The National Road Safety Advisory Group consists of representatives from all member organisations of the National Road Safety Committee, as well as representatives from the Ministry of Justice, Ministry of Health, Te Puni Kokiri, Ministry of Pacific Island Affairs, Ministry of Youth Affairs, New Zealand Automobile Association, Energy Efficiency and Conservation Authority, Cycle Support New Zealand, Alcohol Advisory Council, School Trustees' Association, and a road safety co-ordinators' representative.

⁴ See section on Co-ordination, page18

ROAD SAFETY OUTCOMES IN NEW ZEALAND

This strategy uses an 'outcomes management' framework that links what we do (outputs) to what we are trying to achieve (outcomes), and focuses attention on providing the safest possible road network for New Zealanders. We have established goals for social cost (see page 12), deaths and hospitalisations to 2010. Intermediate, user group and regional outcomes for 2010 will be set as new programmes are put in place during the next decade. This approach will enable us to fine-tune the strategy as it proceeds.

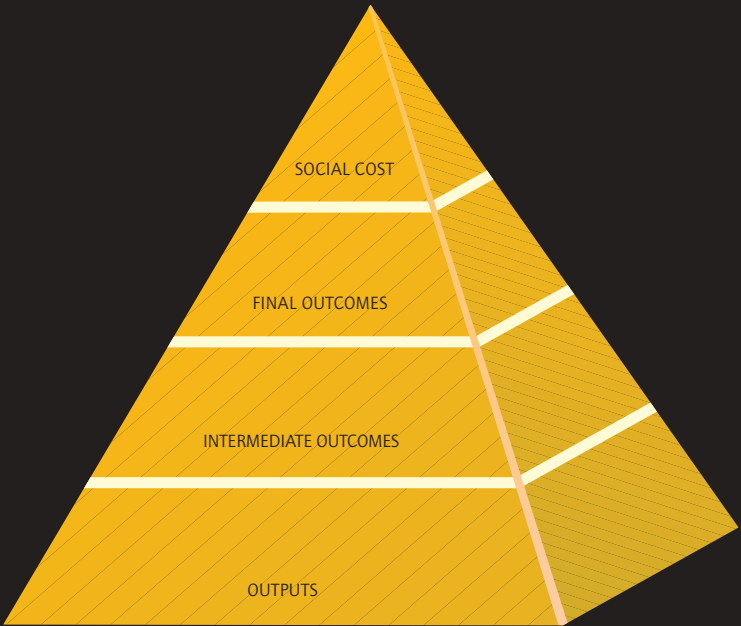


Figure 6. Outcome hierarchy. Outputs are associated as much as possible with intermediate outcomes (alcohol, speed, restraints) which are necessary to achieve final outcomes (reductions in deaths and hospitalisations). Social cost represents the total burden of injury, and can be broken down by user groups and regions

Overall outcomes

Social cost, deaths and hospitalisations provide an overall picture of our current road safety performance and the performance we are seeking in 2010.

		2004 not exceeding	2010 not exceeding
SOCIAL COST ¹	\$ billion	2.75	2.15
	cents per vehicle-km	6.7	4.4
	\$ per person	700	650
	\$ per vehicle	1,020	945
DEATHS ²	Total	400	300
	Rate per billion vehicle-km	9.9	6.1
	Rate per 100,000 persons	10.2	7.3
	Rate per 10,000 vehicles	1.5	1.1
HOSPITALISATIONS ³	Total	5,870	4,500
	Rate per billion vehicle-km	140	90
	Rate per 100,000 persons	150	110
	Rate per 10,000 vehicles	22	16
	Hospitalisations for more than 1 day	2,750	2,200
	Hospitalisations for more than 3 days	1,750	1,400

¹ This excludes the cost of crashes resulting only in property damage because the data are unreliable and the cost is relatively small. Social costs are expressed in June 2001 prices.

² Deaths are injuries that result in death within 30 days of the crash.

³ Hospitalisations are the number of hospital admissions reported by the New Zealand Health Information Service. Along with deaths, the numbers of people hospitalised for more than one day and more than three days have been included as measures of more serious injuries.

Intermediate outcomes

Our intermediate outcome targets will show how we are doing in three priority areas – speed management, drink-driving and the use of restraints. New safety initiatives, in particular targeting those who speed and drink-drive, will enable us to set 2010 outcomes for these priorities as implementation of the strategy progresses.

			2004 not exceeding
SPEED (open road)	Mean	km/h	99
	85th percentile	km/h	107
SPEED (urban road)	Mean	km/h	55.2
	85th percentile	km/h	61
ALCOHOL	Driver deaths with excess alcohol	number % of all driver deaths	48 21%
			2004 at least
RESTRAINTS	Vehicle occupants wearing safety belts	% (front)	92%
		% (back)	75%
	Children (under 15) restrained	%	90%

User-group outcomes

We have singled out the social cost borne by two particular user groups – pedestrians and cyclists – because they have particular safety requirements. As part of the early work of this strategy, we will be developing a comprehensive safety framework for pedestrians and cyclists. Further work on defining safety outcomes for these road users will be a part of this development. The safety framework will be associated with a broader strategy being developed by government to increase walking and cycling.

The walking and cycling initiatives in the 2003 Implementation Schedule released with this strategy are oriented towards research or strategic development and are intended to provide the basis for future initiatives. When specific safety initiatives are determined, we will be able to forecast future safety gains for pedestrians and cyclists.

		2004 Deaths plus hospitalisations not exceeding
PEDESTRIANS	Total	700
	More than 1 day's hospitalisation	390
	More than 3 days' hospitalisation	290
PEDESTRIANS PER MILLION HOURS TRAVELLED	Total	3.1
	More than 1 day's hospitalisation	1.7
	More than 3 days' hospitalisation	1.3
CYCLISTS	Total	270
	More than 1 day's hospitalisation	130
	More than 3 days' hospitalisation	90
CYCLISTS PER 100 MILLION KM CYCLED	Total	100
	More than 1 day's hospitalisation	50
	More than 3 days' hospitalisation	35

Regional outcomes

The regional outcomes provide a focus for regional land transport strategies, and will help gauge the effectiveness of regional and local road safety work.

2010 regional outcomes will be set as the strategy progresses. For these outcomes it is best to consider the total number of deaths and hospitalisations.

	2004 Deaths plus hospitalisations not exceeding	2004 Deaths plus hospitalisations of more than 1 day not exceeding	2004 Deaths plus hospitalisations of more than 3 days not exceeding
NORTHLAND	440	200	120
AUCKLAND	2,120	840	600
WAIKATO	740	420	320
BAY OF PLENTY	490	270	160
GISBORNE	70	40	30
HAWKE'S BAY	250	140	100
TARANAKI	120	70	50
MANAWATU-WANGANUI	390	240	160
WELLINGTON	320	200	120
NELSON-MARLBOROUGH	140	80	50
WEST COAST	90	40	20
CANTERBURY	700	380	260
OTAGO	250	150	100
SOUTHLAND	150	100	60

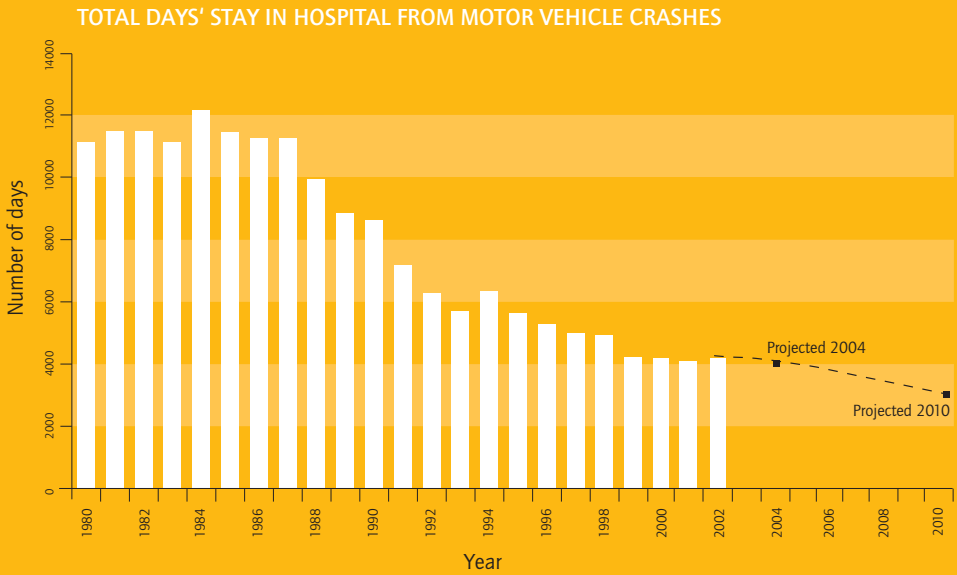


Figure 7. Achieving our 2010 goals will reduce pressure on health costs.
Source: Land Transport Safety Authority and New Zealand Health Information Service

Theme: Devolving safety management

Different regions and communities face different road safety issues. This national *Road Safety to 2010* strategy will be supported during the decade by dynamic regional and local strategies that integrate safety into day-to-day transport management and contribute to a safer New Zealand. Central government will provide strong support and guidance, and local government will assume greater safety management responsibilities. For example, safety management systems are being piloted with a number of road controlling authorities in partnership with the Land Transport Safety Authority and Transfund New Zealand. Guidelines and crash analysis tools are being provided to support regional government in their contribution to the achievement of national and regional road safety outcomes through their regional land transport strategies.





TO 2004

The government has agreed to a comprehensive set of actions for the period to June 2004. These are set out in the 2003 Implementation Schedule included with this document, which describes what needs to be achieved, and when, in order to build on the considerable work already done. This package will contribute to efforts to reduce deaths and hospitalisations to no more than 400 deaths annually and 5,870 hospitalisations annually by 2004.

IMPLEMENTATION

Highlights of the plan include:

- implementing voluntary high-quality safety management systems, initially in about 20 road controlling authorities, to ensure road users enjoy the safest possible road environment
- setting performance measures for the road network, evaluating the safety gains resulting from all roading investment, and making the Crash Analysis System available online for all relevant roading managers
- developing innovative, low-cost safety engineering solutions on the state highway network by trialling installation of median cable barriers to separate traffic flow and clearance of roadside hazards
- working with local authorities to review road safety processes, and developing planning guidelines to help in devolving road safety strategy onto a regional footing
- continuing the current road policing strategies and providing additional resources to target heavy vehicle safety, complete the implementation of rural compulsory breath testing programmes, and increase the policing of Auckland's motorway system
- upgrading Police capability through additional equipment including booze buses, marked and unmarked road policing vehicles, laser speed detectors and radar (to update the Police radar stock)
- developing the 'safe routes' approach to promoting a safer road environment for pedestrians and cyclists in high-risk communities
- developing a comprehensive framework to improve safety for pedestrians and cyclists, in association with a broader national strategy for walking and cycling
- widening road safety advertising beyond speeding, drink-driving and safety belts to include a 'failure to give way' programme targeting high-risk intersection behaviour
- implementing a 'novice driver' pilot programme to test potential changes to the graduated driver licensing system for novice drivers, and encouraging parents and caregivers to help novice drivers gain more and better experience
- expanding the RoadSense – Ata Haere programme for primary and intermediate schools, which integrates road safety education into the everyday curriculum
- reinvesting in the Community Road Safety Programme, which takes road safety to all New Zealanders.

This package will take us to where we want to be in 2004, and lay the groundwork for our 2010 road safety goals. Subsequent implementation schedules will include details of how we will continue to tackle our major road safety problems. New measures will target drink-driving, speeding and serious repeat offending on the roads while we will also continue to improve the safety of the road infrastructure.

Co-ordination

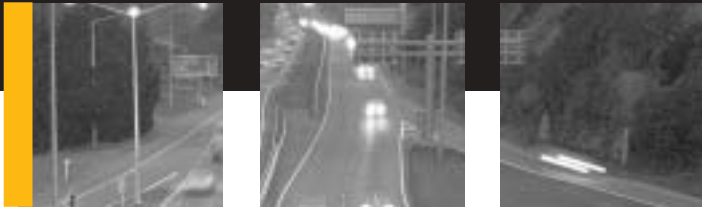
The implementation of this strategy will be overseen by the Minister of Transport and monitored by the National Road Safety Committee, which comprises the chief executives of:

- the Accident Compensation Corporation – preventing and managing motor vehicle injury through the Motor Vehicle Account, funding specific road safety initiatives, and leading implementation of the New Zealand Injury Prevention Strategy
- the Land Transport Safety Authority – regulating and managing road safety, including administering the New Zealand Road Safety Programme, which funds and manages road policing, and safety education and strategic services
- Local Government New Zealand – representing 12 regional council areas and 74 territorial and local authorities, whose regional land transport strategies integrate safety into regional transport planning, and local land transport programmes manage the safety maintenance and improvement of local road networks
- Ministry of Transport – leading policy advice to government and preparing and managing road safety legislation
- New Zealand Police – policing New Zealand’s road network, funded and managed through the New Zealand Road Safety Programme
- Transfund New Zealand – managing the National Land Transport Programme, which funds network safety maintenance and improvement on state highways and local roads, as well as walking and cycling projects, public transport and alternatives to roading, and regional development
- Transit New Zealand – managing the safety maintenance and improvement of the state highway network through the State Highway Programme.



Theme: Communicating within partnerships

Continuous improvement depends on continual discussion and co-ordination between the various road safety interests. Effective communication within road safety partnerships helps everyone understand their role in achieving road safety goals. For example, it is up to the road controlling authorities to provide roads that can be safely used; it is up to each of us to use the roads safely; and it is up to the Police to take action against those who do not stick to the rules.



Member agencies of the National Road Safety Advisory Group, which include other government and non-government agencies with road safety interests, will be involved in particular initiatives and will meet to discuss the strategy’s progress.

Wider community and business interests will also need to play their part. At regional and local levels, local government will oversee co-ordination through regional land transport committees and road safety co-ordinating groups.

Funding

The strategy will be funded from the National Land Transport Fund.

The fund has two main purposes: it funds the New Zealand Road Safety Programme, which the Land Transport Safety Authority manages and through which funding is allocated for road policing, education and support services. It also provides funding for the operation and maintenance of the road network and regional transport services through the National Land Transport Programme, managed by Transfund New Zealand.

Ratepayers will continue to make a considerable contribution to local road improvements. Other government sectors (such as health) and community interests will also provide funding support.

Theme: Making the best use of resources

Effective road safety management depends on careful research, rigorous analysis and actions based on strong, proven evidence. By researching the ‘risk profiles’ of different roads, vehicles, communities and road users, we can establish the best actions for a given situation. Analytical tools help make sure those actions are appropriate and targeted where they will have the most impact. Regularly monitoring and evaluating the results allows us to make useful adjustments.



Analysis

Analytical tools will be continually refined so that resources go to the right places. The tools will allow future resource levels to be accurately set, ensuring the best achievable safety performance. As far as possible, the analytical tools developed for national decision-making will be made available to regions and communities throughout New Zealand.

Legislation

Legislation (as Rules or Acts of Parliament) provides an important entry point for most road safety activity. This strategy will enable us to do the forward planning that is needed for potential future legislation changes – for example, to the speed or alcohol enforcement regimes.

Monitoring and review

Improved data collection and analysis will enable us to monitor progress towards our road safety targets regularly and well. We will also be able to assess changes in community attitudes to road safety, and in the effectiveness of programme management and operation.

The strategy will be reviewed soon after its implementation to find out how we can best maintain momentum and build on our performance gains. After that, full evaluations will be done every two years.



ROAD SAFETY PRIORITIES FOR ACTION

The actions taken to improve road safety, known as interventions, can be grouped according to whether they affect the road, the vehicle or the road user. They can govern who and what uses the network, or relate to the design and operation of the network itself.

However they are categorised, interventions set standards and rules for safety (including guidelines and the adoption of best practice measures, for example, improved skid resistance), or ensure compliance with those standards and rules. To get compliance, we first need education to ensure that people understand the standards and rules. Enforcement is aimed at those who do not comply, and we can use performance assessment to provide incentives for compliance in the transport industry.

The strategy's key priority areas for action involve:

- engineering safer roads
- reducing speed
- combating drink-driving
- dealing with serious offenders
- encouraging the use of safety belts
- improving safety for pedestrians and cyclists
- improving the vehicle fleet
- new and better targeted education initiatives.

Many of these priority areas have already been the subject of thorough research and analysis. Where possible, researchers in New Zealand and overseas have quantified the benefits of measures designed to improve safety in these areas.

The priority areas are the basis for our strategic targets. They will remain 'live' during the entire strategy, and will be regularly monitored and evaluated to ensure we use the most effective mix of interventions. As the strategy progresses, we may enhance initiatives that prove successful, or introduce promising new ones.

Engineering better roads

Engineering better and safer roads can not only prevent some crashes happening, but also improve people's chances of escaping serious injury or death when a crash does happen.

However, engineering can never be a total solution for road safety. The cost would be prohibitive, especially on New Zealand's extensive rural network where traffic is sparse. That said, we must keep working on improving our road infrastructure.

The network is already being progressively upgraded. For example, recent analysis of the Joint Crash Reduction Programme shows a 50 percent drop in fatal crashes and a 34 percent drop in injury crashes at 2,366 sites after low-cost engineering improvements were made. Transit New Zealand has an annual programme to monitor how skid resistant the road surface is, and makes improvements annually where necessary. The skid resistance measurement programme has resulted in the improved skid resistance of the state highway network, with an average 29 percent reduction in wet-skid crashes at the treated sites since implementation in 1995.

Within the time frame of this strategy, Transit New Zealand will deliver over 130 safety-related projects. Of those, projects over \$3 million are summarised in Appendix 2. Transit is developing and trialling a roadside hazard management programme to decrease injury should a vehicle leave the highway, and is also trialling the installation of median cable barriers on rural two-lane highways in passing lane sections, to decrease the incidence of head-on crashes. Minor works such as resurfacing roads, clearing vegetation, improving road markings, signage, and visibility at intersections can have a huge impact on safety. The integrated traffic management system operating in Auckland will assist the Police and emergency services in responding more quickly when crashes do happen.

It will become increasingly important to target safety engineering improvements effectively over the next decade. For example, although major urban roads and state highways comprise only 14 percent of the network length, they together account for 60 percent of the social cost of road crashes. Together with motorways, these roads are the most cost-effective for making safety improvements. Many busy roads are safer for each individual driver because they are built to a higher standard. Conversely, a low traffic road may need treatment and therefore be risky. But it may be difficult to justify expensive upgrading when there is little traffic. We need to target roads with both high risk and high cost density in order to make most efficient use of our road safety engineering dollars. On some roads, enforcement may be the answer.

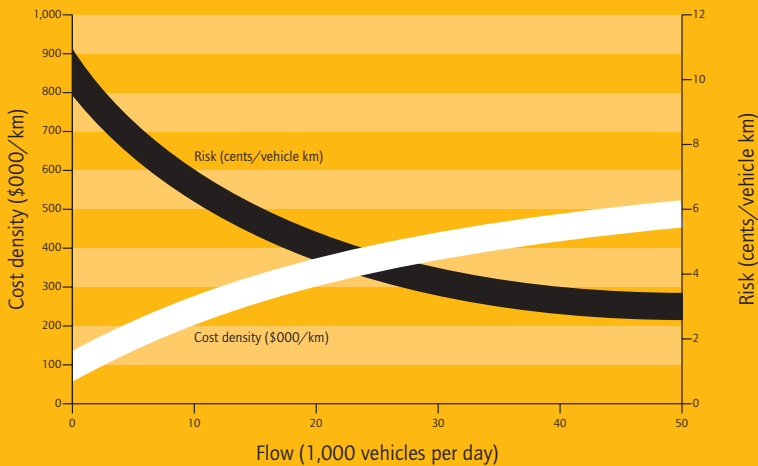


Figure 8. Relationship between cost density and risk versus traffic flow
Source: Land Transport Safety Authority

Road controlling authorities will have to consider trade-offs between improving the safety of their infrastructure and enforcing safer behaviour. This is because both road engineering and enforcement relate to the design and operation of the network, and can therefore be directed to where the danger lies. For instance, if an unsafe stretch of road is too costly to re-engineer, using enforcement instead to lower vehicle operating speeds can achieve a similar safety outcome.

During the course of the 1990s, roading and vehicle improvements contributed on average about 20 percent of the total safety benefits achieved in road safety. Thirty-five percent of the state highway overall capital programmes have been based on safety benefits. Over the next few years there will be a stronger focus on safely designing and managing the road network. Considerable effort is now going into establishing performance measures for the roads themselves and 'risk profiling' the network to provide a systematic picture of what needs attention. We are also working with road controlling authorities to develop safety management systems for their road networks, to ensure that safety is designed in, rather than added on later, and to explore the question of accountability for the safety of their networks. Safety engineering programmes will continue to provide considerable potential to improve crash rates. For example crash rates on wet roads can be reduced by improving skid resistance properties of roads. Innovative trials including roadside hazard mitigation, and the use of wire rope median barriers in narrow median strips, will provide useful information on low-cost engineering treatments.

Theme: Accommodating human error

Road user behaviour contributes to most crashes, but we cannot focus entirely on trying to change people's driving habits — the road itself and the vehicle must also be made safer. We recognise that, whatever we do to make road users more alert, law abiding and competent, some will still make mistakes. Vehicle design and construction increasingly protects drivers and passengers from crashes and injuries. We must also work on designing and operating a road network that better accommodates human error.



Reducing speed

Excessive speed contributes to about 30 percent of fatal crashes, and it increases injury severity in crashes with other causes. The better the road, the higher the speed that can be travelled safely on it. Because of New Zealand's largely two-way, two-lane, undivided rural network, if we are to improve safety, we need to address either infrastructural investment or vehicle operating speeds.

Reducing actual vehicle speeds is one of the most effective ways of reducing road trauma. Lower speed tolerances and the highly visible Highway Patrol have already resulted in reduced average traffic speeds. Road design can also contribute effectively to lower speeds, particularly in urban areas.

A one percent decrease in mean speed has been shown to reduce deaths by four percent and injuries by two percent (see Figure 9). It follows that the fall in the rural mean speed from 102.2 km/h in 1998 to 99.1 km/h in 2002 has translated into a safer road environment for everyone. Our highways have never been safer.

There are signs of hope in our efforts to curb speeding. Fewer New Zealanders (15–20 percent) now believe that there is not much chance of a crash if they are careful when speeding. There is strong support for speed cameras and speed limit enforcement as ways to reduce road deaths and injuries⁵. But too many people still travel too fast, and ignore the lethal impact of speed, with devastating consequences for drivers and their passengers, as well as for pedestrians and cyclists. Nine percent of rural drivers exceed 110 km/h and 15 percent of urban traffic is travelling at more than 60 km/h. A pedestrian hit by a vehicle travelling at 60 km/h has only a 10 percent chance of surviving, compared with a 35 percent chance at 50 km/h and a 95 percent chance at 30 km/h⁶.

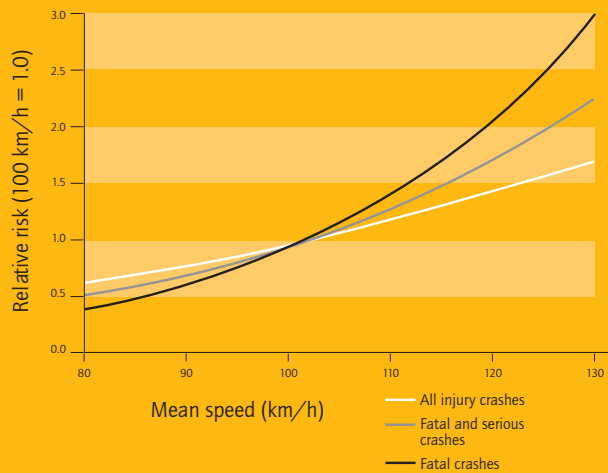


Figure 9. A one percent decrease in mean speed causes deaths to decline by four percent and injuries by two percent.

Source: Nillsson, G (1982). *The effects of speed limits on traffic accidents in Sweden*. VTI Sartryk, 68, 1–10

We need a comprehensive effort targeting inappropriate and excessive speed if we are to achieve the 2010 goals. Developing a New Zealand approach to reducing speed will include consideration of a range of measures designed to persuade people to lower their driving speed on both rural and urban roads, and to achieving a change of culture that makes speeding as unacceptable as drink-driving.

⁵ Land Transport Safety Authority 2002 Survey of public attitudes.

⁶ Ashton, S J (1982) *Vehicle design and pedestrian injuries*.

Combating drink-driving

Drink-driving deaths declined dramatically during the 1990s, from 318 in 1990 to 115 in 2000. This major public health success story is the result of compulsory breath testing, reinforced by targeted advertising and a massive community response to the needless harm caused by drink-driving. Tougher sanctions have also been introduced, with mandatory licence suspensions for high-end offenders and stiffer penalties reserved for repeat offenders.

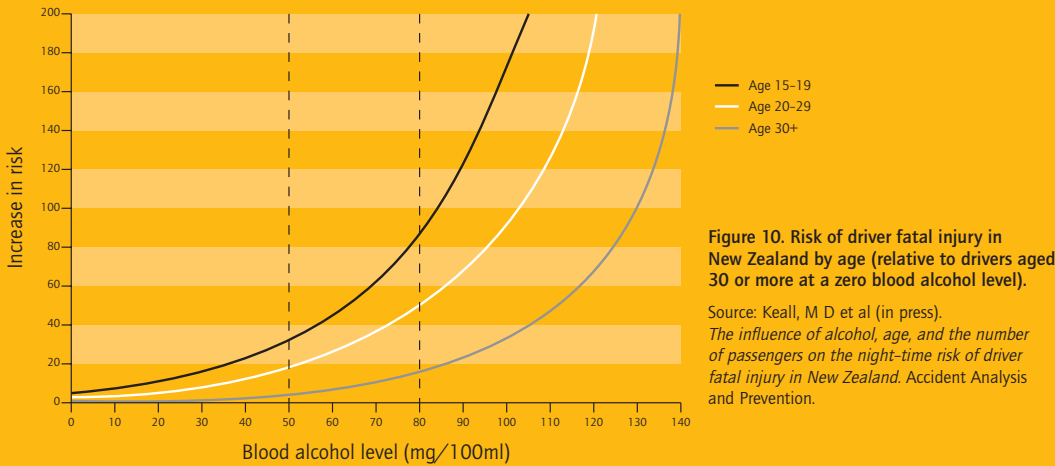


Figure 10. Risk of driver fatal injury in New Zealand by age (relative to drivers aged 30 or more at a zero blood alcohol level).

Source: Keall, M D et al (in press). *The influence of alcohol, age, and the number of passengers on the night-time risk of driver fatal injury in New Zealand*. Accident Analysis and Prevention.

Current programmes will continue, but for all their success, over 100 people were still killed and 450 seriously injured in alcohol-related crashes in 2002.

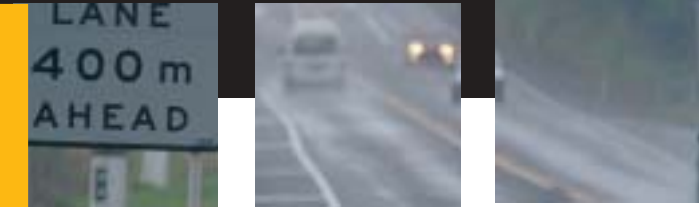
Excess alcohol consumption has a serious impact on the community and is a proven danger on the road. This is particularly true for young drivers. New Zealand research shows that a 15–19 year old driver at the current legal youth limit (30 mg/100 ml) is 15 times more likely to die in a night-time road crash than a sober driver aged 30 years or older. For a driver aged 20–29 years at the current legal adult limit (80 mg/100 ml), the risk is 50 times that of a sober driver aged 30 or older (See Figure 10).

The risks of a fatal crash while driving at the current legal limit are alarmingly high. This is not surprising, considering that the average male would need to consume about six standard drinks without food in 90 minutes to reach the current adult blood alcohol limit of 80 mg/100 ml. The evidence from other jurisdictions that have lowered their limit is that this reduces the number of alcohol-related crashes, including the number of crashes caused by drivers with very high blood alcohol levels.

We cannot afford to be complacent about our past success, and work is underway on the options for minimising alcohol-related harm.

Theme: Improving road user behaviour

We have made much progress in improving road user behaviour. We will continue these efforts through education and by enforcing safety standards and holding irresponsible road users to account. Education shows people how to use the roads safely and tries to persuade them to change unsafe behaviour, while effective enforcement and appropriate penalties help deter people from potentially dangerous behaviour.



Dealing with serious offending

Serious traffic offenders are a high-risk group of people who drive very dangerously, offending repeatedly at high speed and/or at high alcohol levels, or who drive while disqualified or unlicensed. Although they do not make up a large group in terms of their actual numbers, these drivers are at fault in a disproportionate number of crashes. Serious repeat drink-drivers, for example, have been found to be three times more likely to be involved in an injury crash than normal drivers, and 1.3 times more likely than other convicted drink-drivers.

Thankfully, there have been notable successes in recent years. Since their introduction in 1999, roadside licence suspension and vehicle impoundment have contributed to a 38 percent reduction in disqualified driving offences detected by the Police, and a 25 percent reduction in unlicensed and disqualified drivers involved in crashes.

Work will need to continue across the transport, justice and health sectors, and at a community level, to rehabilitate repeat traffic offenders and find ways to make them change their driving behaviour. Work is also being done on assessing how well administrative penalties (that is, those not involving the court system) are aligned with the safety risk that irresponsible drivers pose. Further measures may be necessary, with immediate stiff penalties and immobilisation the key to deterring these offenders. We are determined to come down hard on serious and repeat offenders.

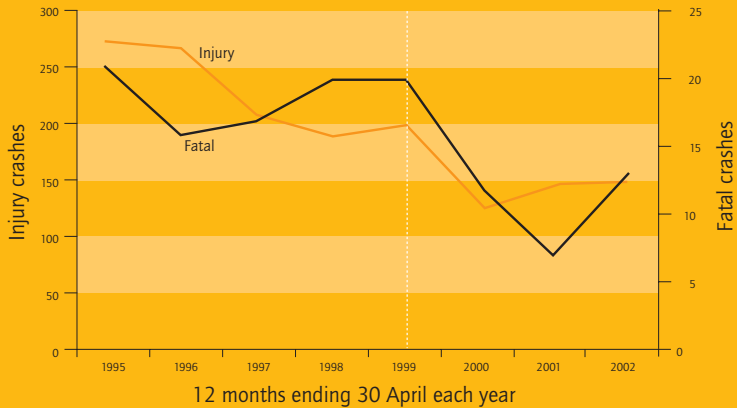


Figure 11. Since the introduction of roadside vehicle impoundment and mandatory carriage of photo driver licences in May 1999, there has been a marked decline in the number of disqualified drivers involved in fatal and injury crashes. But there is still room for improvement.

Source: Land Transport Safety Authority data (Crash Analysis System)

Encouraging the use of safety belts

Safety belts are highly effective in saving lives and preventing injury. People who do not buckle up have a significantly higher chance of dying in a crash (see Figure 12).

New Zealand has a relatively high rate of safety belt use, with the best recent improvements being an increase in back seat belt wearing rates from 58 percent in 1996-98 to 80 percent in 2002. This is the result of: national and community campaigns targeting both adult and child use of appropriate restraints; enforcement; and fines for non-wearers.

However, the rate of safety belt use could be further improved. The 2003 survey of front safety belt use by adults found eight percent of drivers and front seat passengers were unrestrained, a figure which has remained unchanged since 2001. Improvements can be made through increased enforcement, supported by education to persuade those who don't wear them of their advantages and to remind wearers of the need to use them at all times.

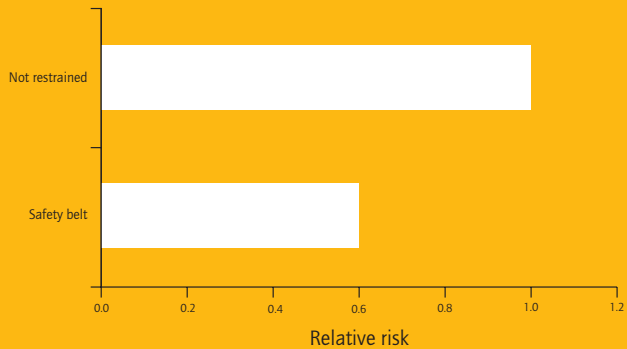


Figure 12. Safety belts reduce the risk of fatal injury by around 40 percent. The risk is further reduced when they are combined with airbags.

Source: Evans, L (1991). *Traffic safety and the driver*. Van Nostrand Reinhold, New York



Improving safety for pedestrians and cyclists

Together, pedestrians and cyclists account for around 14 percent of all road deaths and more than a third of deaths on our urban roads.

We need to focus more on ensuring our road environments, particularly in urban areas, are safer for pedestrians and cyclists as well as for motor vehicle users.

Work is underway on a strategic framework for pedestrian and cyclist safety, developing standards and guidelines for road network design, and improving data-gathering and research capability. It is important to reduce vehicle speeds in built-up areas and educate all road users about the needs of pedestrians and cyclists. Meanwhile, a safe routes programme is also being developed for communities where pedestrians and cyclists are at high risk of injury, extending the existing Safe Routes to School approach to incorporate all ages.

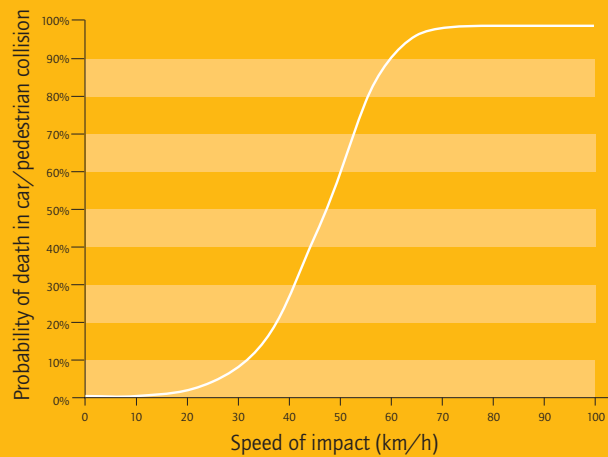


Figure 13. At impact speeds over 30 km/h, pedestrians and cyclists risk sustaining life-threatening injuries. At 60 km/h, death is virtually certain.

Source: Data generated using Ashton's 1982 formula, cited in Pasanen, E and Salmivaara, H (1993). Driving speeds and pedestrian safety in the city of Helsinki. *Traffic Engineering and Control*, June 1993

Improving the vehicle fleet

Vehicle safety features make a difference in a crash – people who are involved in a crash are half as likely to be killed or seriously injured as they were 30 years ago.

Along with a competitive vehicle market, consumers today have access to relatively cheap, safe vehicles. Over time, these vehicles tend to become more affordable to groups overrepresented in crash statistics. However, vehicle safety can be introduced more quickly. For example, we have sped up the introduction of frontal impact standards to the fleet by prohibiting imports of vehicles that do not comply.

The need to improve consumer awareness of vehicle safety is a key component of this strategy.

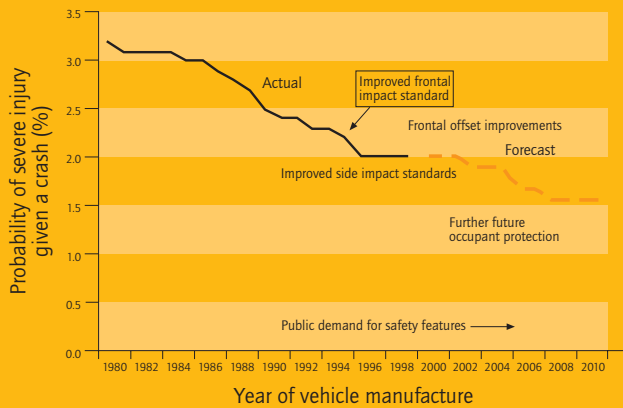


Figure 14. A car made in 2000 is far safer in a crash than one made in 1980, thanks to a range of built-in safety features. We expect vehicles to continue becoming safer.

Sources: Monash University Accident Research Centre (actual); Land Transport Safety Authority (forecast)

Other priorities

- Meeting the needs of young and novice drivers: New Zealand has led the world in establishing a graduated driver licensing system, and the Land Transport Safety Authority will trial and evaluate a new system for assessing novice drivers' abilities.
- Addressing the needs of older drivers: work will continue on better ways to assess older drivers' abilities, and on ways to help them make an informed decision on whether to retire from driving should that become necessary.
- Improving road safety for Maori and Pacific peoples: Maori and Pacific peoples will be encouraged to develop their own programmes addressing the road safety problems that affect their communities.
- Improving heavy vehicle safety: legislation introduced in 2002 aims to make heavy vehicles safer and more stable. Once applied throughout the fleet, the new standards should result in significant safety improvements, especially for logging trucks. We will continue to focus on ways to improve heavy vehicle safety, consistent with the New Zealand Transport Strategy, through an inter-agency Heavy Vehicle Safety Strategy.
- Reducing driving fatigue: new fatigue rules make compliance for commercial drivers less time consuming, and better target the enforcement of maximum hours of operation. Alternative fatigue management programmes will be offered as an option for transport operators.
- Integrating road safety education: primary school pupils take part in the RoadSense programme as part of their day-to-day curriculum, laying the foundations for a new attitude to road safety.
- Boosting road safety advertising: this includes a new campaign to tackle unsafe behaviour at intersections.
- Improving the skills of road users: road user skills education has expanded to include hazard recognition skills, and the accumulation of driving experience before gaining a full driver licence.
- Facilitating community development: in the 13 years since its inception, the Community Road Safety Programme has been a notable success in building community involvement and enthusiasm for road safety.
- Trauma management: improved systems for treating crash victims from roadside to hospital will save lives, help prevent serious consequences of injury and facilitate recovery.
- Improving safety for motorcyclists: targeted research, and trials of community-based projects and new approaches to licensing and training will allow effective motorcycle injury prevention programmes to be developed.

Next steps

The core road safety priorities will continue to revolve around how safely the road is engineered, how effectively we educate road users and how well we enforce safe driving behaviour. But over time each significant improvement in road safety will be more difficult to achieve. Our road safety priorities for action through to 2010 are set out above, but road safety agencies will continue to look across the spectrum for new ways to reduce deaths and hospitalisations on our roads.

The activities of the past few years, and the combined efforts of the central and local agencies involved in road safety, have given excellent results. However, there is no doubt that these activities alone will yield diminishing returns. If we are to achieve the goals for 2010, we will need to implement new activities in engineering, education and enforcement. Development work is well underway to enable the government to decide how to make our roads safer during the middle phase of this strategy. Announcements will be made on specific measures to target our road safety priorities in the months following the release of this document.

ROAD SAFETY TO 2010

Road Safety to 2010 was developed using a strongly analytical and evidence-based approach, and incorporating extensive consultation. The first step involved evaluating New Zealand's existing road safety programme to find out what was working and where there was room for improvement. The National Road Safety Committee also identified successful interventions in other countries. In all, they investigated and considered some 20 potential interventions, taking the New Zealand context into account.

Appendix 1 DEVELOPING

Analytical tools, including computer models, were also used to predict the safety benefits we could realistically achieve from these interventions, and estimated the cost of implementing them. This work led us to propose a realistic, achievable goal using different combinations of the 20 interventions. The National Road Safety Committee then developed three scenarios to achieve the goal, all backed up by education but using different approaches and mixes of interventions.

These were:

- an enforcement option
- an engineering option
- a mixed option combining both enforcement and engineering interventions.

The three months of extensive consultation⁷ that followed revealed that:

- most respondents strongly endorsed the proposed goal. Where they did not, they wanted more safety, not less
- there was broad support for the mixed option, with an emphasis on getting drivers to comply with existing and proposed road rules – to 'hit offending drivers hard' and consistently. Respondents said this should be backed up by a long-term programme of road safety education, along with targeted engineering projects to improve network safety
- respondents were concerned at the cost of road improvements. Most respondents wanted any additional cost to be covered by taxes already levied on road users, but they accepted that, if this were not possible, road users should pay through a system of user charges
- respondents felt regional targets would foster 'ownership' of the strategy, and that having cyclist and pedestrian targets would ensure their safety needs were considered. Maori and Pacific peoples generally sought more attention for their communities, but not separate targets.

After taking the consultation findings into account and incorporating the new direction for transport in the New Zealand Transport Strategy, we developed an initial package of interventions that would add value to the existing road safety programme. The strategy will be regularly reviewed and evaluated throughout its life, enabling further refinements and enhancements as we work towards achieving New Zealand's road safety goals for the decade.

⁷ *Road Safety Strategy 2010: A consultation document*. National Road Safety Committee, 2000.

THE ENVIRONMENT

This strategy's mixed approach to road safety includes improving the road environment.

This appendix looks in more depth at New Zealand's road network and the types of safety engineering initiatives that can reduce road trauma. Specific activities are outlined in the 2003 Implementation Schedule included with this strategy.

Road safety engineering must be tailored to the road environment. In this strategy, we distinguish between five road environments, each with different types of crashes and demanding a different mix of engineering treatment.

Appendix 2 IMPROVING ROAD

Length

New Zealand has just over 90,000 km of public roads. The bulk of the network (72 percent, or around 65,000 km) consists of minor open roads. Most of the rest is made up of state highways (11 percent) and minor urban roads (14 percent). Major urban roads make up 2.6 percent and motorways 0.4 percent.

Traffic volume

New Zealand's roads carry about 37 billion vehicle kilometres of traffic every year ('vehicle kilometres travelled' is the sum of kilometres travelled by all motor vehicles in each year. It is a measure of mobility and thus also exposure to risk.) State highways and major urban roads each carry about 30 percent of this traffic, minor open roads 15 percent, minor urban roads 14 percent and motorways 10 percent.

Social cost

The social cost of a crash is the measure of all costs that the crash inflicts on the community – on road users, emergency service providers and others. It includes not just the costs of material losses (such as medical treatment and property damage) but also pain and suffering.

Crashes on the road network cost the community about \$3 billion every year. State highways account for more than 42 percent of this, minor open roads

for 24 percent, major urban roads for 19 percent, and minor urban roads and motorways make up the remaining 15 percent.

Risk

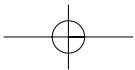
Risk is defined as the social cost per vehicle kilometre travelled. Roads with high risk do not necessarily produce a high level of road trauma because traffic may be very light, but they do expose individual users to a greater danger of injury.

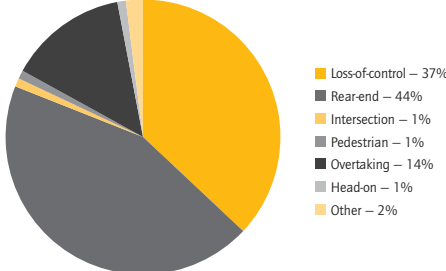
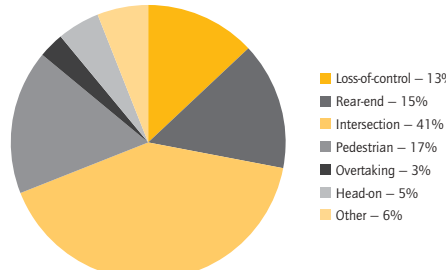
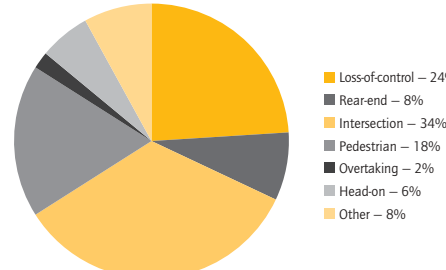
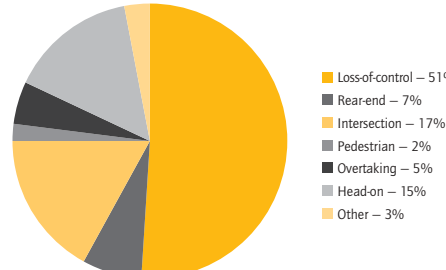
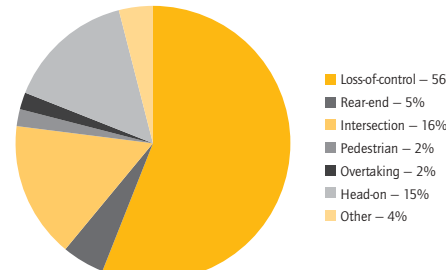
State highways and minor open roads are the most risky roads for crashes involving motor vehicles. For each kilometre travelled on these roads, there is a 50 percent higher chance of crashing than on the network as a whole, and three times more than on motorways. Major and minor urban roads are about half as risky as state highways and minor open roads.

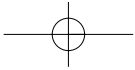
Cost density

Cost density is defined as the social cost per kilometre of road. Roads with high cost density do not necessarily expose individual users to a greater danger of injury, but they do produce a high level of road trauma because there is more traffic.

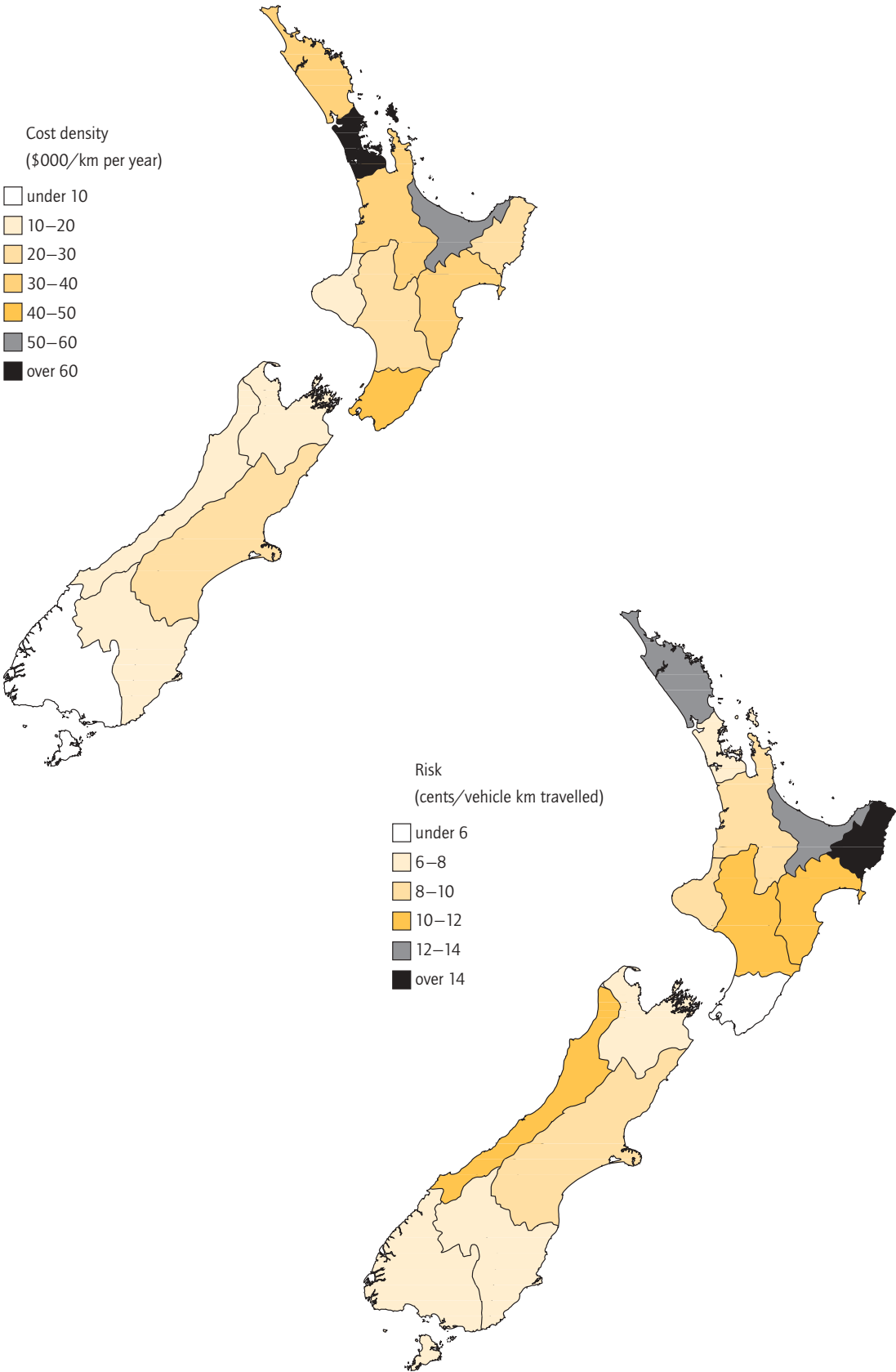
Cost density is about 10 times higher on motorways and 10 times higher on major urban roads than over the network as a whole. This means that every kilometre of these roads produces on average 10 times as much social cost as the network as a whole.



ROAD TYPE	SUMMARY STATISTICS	CRASH PROFILE (FATAL AND REPORTED INJURY)	SAFETY MEASURES TO IMPROVE THE ROAD	
 MOTORWAY	MOTORWAY Length: 365 km Traffic volume: 3,500 million vehicle kilometres Social cost: \$120 million Risk: 3.4 cents per vehicle kilometre travelled Cost density: \$329 per kilometre per year		LOSS-OF-CONTROL SAFETY MEASURES COULD INCLUDE: - constructing sealed shoulders against the median and outside edge - providing physical median barriers - providing roadside clear zones - providing audible edgelines - ensuring adequate crossfall and drainage - improving lighting - providing crash cushions where lanes diverge.	REAR-END CRASH SAFETY MEASURES COULD INCLUDE: - improving skid resistance (higher minimum standard and improved testing) - improving speed management - improving warning and traffic information systems.
 MAJOR URBAN ROAD	MAJOR URBAN ROAD Length: 2,353 km Traffic volume: 11,015 million vehicle kilometres Social cost: \$558 million Risk: 5.1 cents per vehicle kilometre travelled Cost density: \$237 per kilometre per year		INTERSECTION SAFETY MEASURES COULD INCLUDE: controlling all intersections by means of traffic signals, Stop or Give Way signs, or with roundabouts of a consistent design that is friendly to cyclists and pedestrians, along with frequent use of median islands, improving lighting, and increasing the visibility and clarity of markings and signs in and around intersections.	PEDESTRIAN AND CYCLIST SAFETY MEASURES COULD INCLUDE: - providing median refuges and reducing crossing distances where pedestrians are numerous - providing traffic signals for pedestrian crossings on four-lane roads - planning and treating pedestrian and cycling networks - providing new cycle lanes and improving existing ones.
 MINOR URBAN ROAD	MINOR URBAN ROAD Length: 12,519 Traffic volume: 5,074 million vehicle kilometres Social cost: \$327 million Risk: 6.5 cents per vehicle kilometre travelled Cost density: \$26 per kilometre per year		SPEED-REDUCTION MEASURES COULD INCLUDE: - traffic calming devices such as curb extensions, pedestrian platforms and speed humps. INTERSECTION SAFETY MEASURES COULD INCLUDE: - controlling cross-roads - controlling busy T- and Y-junctions with signs, or with roundabouts of a consistent design that is friendly to cyclists and pedestrians - improving lighting to a consistent standard.	PEDESTRIAN AND CYCLIST SAFETY MEASURES COULD INCLUDE: - improving lighting at pedestrian crossings to a consistent standard - reducing roadway width at pedestrian crossings. LOSS-OF-CONTROL SAFETY MEASURES COULD INCLUDE: - signing and delineating all curves with a design speed below 50 km/h.
 STATE HIGHWAY	STATE HIGHWAY Length: 10,114 km Traffic volume: 10,968 million vehicle kilometres Social cost: \$1,229 million Risk: 11.2 cents per vehicle kilometre travelled Cost density: \$122 per kilometre per year		LOSS-OF-CONTROL SAFETY MEASURES COULD INCLUDE: - treating hazardous horizontal curves - creating more forgiving roadsides by sealing shoulders - removing hazards and reducing slopes - no single-lane and short narrow bridges. HEAD-ON AND OVERTAKING SAFETY MEASURES COULD INCLUDE: - four-laning plus medians where traffic warrants - widening sealed shoulders - providing roadside clear zones - providing more passing lanes.	INTERSECTION SAFETY MEASURES COULD INCLUDE: - controlling all side-roads - providing turn bays where needed - eliminating (or, if impractical, providing hazard signs for) traffic signals in 100 km/h zones - improving visibility to consistent standards by means of lighting and signage.
 MINOR OPEN ROAD	MINOR OPEN ROAD Length: 66,391 km Traffic volume: 5,429 million vehicle kilometres Social cost: \$713 million Risk: 13.1 cents per vehicle kilometre travelled Cost density: \$11 per kilometre per year		LOSS-OF-CONTROL SAFETY MEASURES COULD INCLUDE: - use of appropriate edgeline treatment and installing edge-marker posts in accordance with approved practice - constructing sealed shoulders wherever traffic volumes warrant - providing advisory speed signs on all curves where speed should be reduced by 15 km/h or more.	HEAD-ON AND OVERTAKING SAFETY MEASURES COULD INCLUDE: - extending centreline delineation on all sealed roads in accordance with approved practice - improving visibility wherever practicable. INTERSECTION SAFETY MEASURES COULD INCLUDE: - controlling all intersections - providing advance warning signs where appropriate.



These maps show cost density and risk on our road network by region.



Transit New Zealand safety projects over \$3 million

Within the 2010 strategy's timeframe, approximately 20 percent of the predicted total benefits of the capital works budget will be safety related. This includes the following projects over \$3 million, and an additional 120 projects below that level.

PROJECT NAME	EARLIEST START DATE	CONSTRUCTION COST (\$000)
SH1 Longswamp to Rangiriri	03/04	\$6,500
SH2 Mangatawhiri deviation	04/05	\$23,000
SH1 Normanby realignment	03/04	\$6,600
SH2 Domain Road intersection	03/04	\$4,200
SH1 Tumai – Waikouaiti realignment	04/05	\$4,300
SH5 Tapapa curves realignment	03/04	\$7,600
SH2 Rimutaka corner easing (Muldoon's)	06/07	\$4,700
SH3 Mangaone Hill four laning	04/05	\$4,400
SH1 Katetoke/Oakleigh Streets intersection	04/05	\$3,500
SH1 Hihitahi Bluffs realignment	04/05	\$12,400
SH2 Maramarua deviation	07/08	\$15,000



Appendix 3
OTHER
RESOURCES

New Zealand Transport Strategy

www.beehive.govt.nz/nzts

Road Safety to 2010 is part of a broader transport strategy for New Zealand. The New Zealand Transport Strategy sets out the government's vision, principles and objectives for transport for this decade and helps guide our road safety approach.

Road Safety Strategy 2010: A consultation document

www.ltsa.govt.nz/publications/docs/2010Strategy.pdf

In 2000 the National Road Safety Committee produced the *Road Safety Strategy 2010: A consultation document*. It explains the road safety issues that have shaped the proposed strategy, and serves as the main source of information for participants in the consultation process.

Working Paper 6: Predicting and costing road safety outcomes

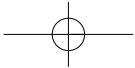
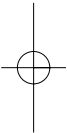
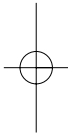
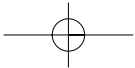
www.ltsa.govt.nz/publications/docs/SDWP6.pdf

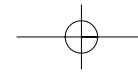
This is the sixth in a series of technical working papers that form part of the Land Transport Safety Authority's *Safety directions* development programme. It describes procedures for predicting and costing road safety outcomes, in particular those used to set and cost the targets for this strategy.

Working Paper 7: Estimated effects of interventions on road safety outcomes to 2010

www.ltsa.govt.nz/publications/docs/SDWP7.pdf

This is the seventh in a series of technical working papers that form part of the Land Transport Safety Authority's *Safety directions* development programme. It describes how the specific interventions selected for this strategy affect road safety outcomes.





ROAD SAFETY TO 2010

