ISSN 1176-841X July 2006

Land Transport NZ
Ikiiki Whenua Aotearoa

road safety issues

Auckland motorways

Land Transport New Zealand has prepared this road safety issues report. It is based on reported crash data and trends for the 2001–2005 period. The intent of the report is to highlight the key road safety issues and be a resource to identify possible ways to reduce the number of road deaths and injuries on Auckland motorways.

Information in this report covers the northern (in North Shore City), southern (to state highway (SH) 2), south-western and north-western motorways together with SHs 20, 20A and 20B. The number of injury crashes reported in 2005 was slightly higher than 2004, which was the previous highest recorded year in the last 10-year period.

The following table shows the distribution of crashes over the network for the period 2001–2005.

Motorway	Fatal	Injury
SH 1	20	1,400
SH 16	6	366
SH 20	1	234
SH 20A	3	47
SH 20A	0	4
Local roads	3	515

Note: Local road crashes above and in the social cost graph are those on ramps and at the junctions of motorway ramps and local authority roads.

Major road safety issues

Auckland motorways

- Fatal and serious crashes
- Rear-end crashes
- Lane changing crashes
- Failure to give way crashes

Nationally

- Speed
- Alcohol
- Failure to give way
- Restraints

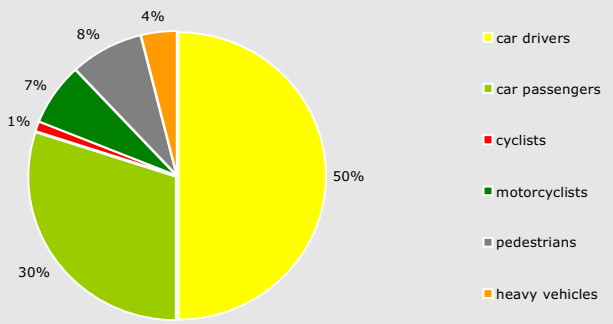
2005 road trauma for Auckland motorways

Deaths	3
Serious casualties	52
Minor casualties	728

Fatal crashes	3
Serious injury crashes	42
Minor injury crashes	533
Non-injury crashes	2,189

Fatal and serious casualties

User type 2001–2005



Estimated social cost of crashes*

Social cost ($ million)

* The estimated social cost includes loss of life or life quality (estimated by the amount New Zealanders are prepared to pay to reduce their risk of fatal or non-fatal injury), loss of output due to injuries, medical and rehabilitation costs, legal and court costs, and property damage. These costs are expressed at June 2005 prices.

Overview

The five-year trend for both injury crashes and minor casualties sustained in these crashes on the Auckland motorway network is upward. However, over the past four years, the number of fatal and serious crashes and casualties has reduced. This relates to improvements in vehicle safety features along with some progress being made in getting people to wear safety belts and correctly use child restraints.

The traffic volume has also increased over this period. As an example (from the Transit NZ website), the average daily trip count on the harbour bridge has increased from 150,000 to 166,000. At the Manukau interchange, the increase has been from 59,000 to 65,000 vehicles per day.

Crash and casualty trend 2001–2005

Main characteristics of the injury crashes in this period are shown in the table below.

2001–2005 injury crashes	
Characteristic	Percentage of injury crashes
Rear-end crashes	51%
Loss of control on bend crashes	13%
Overtaking crashes	12%
Crossing turning crashes	11%
Loss of control on straight road crashes	11%
Poor observation a factor	35%
Incorrect lane/position a factor	29%

Issues discussed in this report are:

- rear–end crashes, due to their high occurrence
- fatal and serious crashes were selected due to the *Road Safety to 2010 Strategy* and the high volume/ high speed environment
- lane–changing crashes as represented by the overtaking crashes in the table above
- crossing/turning crashes are examined under the section titled failure to give way crashes.

The most common factors at the bottom of the table become evident for each issue as it is explored.

Fatal and serious crashes

The horizontal and vertical separation of traffic on the motorways makes them the safest road type in terms of the number of casualties per vehicle kilometres travelled. However, the sheer volume of activity on the Auckland motorway network, coupled with the high-speed off-peak environment, means that numerous fatal and serious injury crashes still occur.

There were three fatal crashes on the Auckland network in 2005 – the lowest in the last five years, but bringing the five-year total to 33. Three people died and 50 others were seriously injured. The government has set road safety targets to be reached by the year 2010. These targets aim at reducing the road toll to no more than 300 deaths per year nationally.

While fatal and serious crashes only make up a small percentage of the total number of injury crashes on the motorway network, they represent over 60 percent of the social cost.

2001–2005 injury crashes			
	Fatal	Serious	Approximate length
SH 16	0	4	18.6 km
SH 1N	1	19	69 km
SH 20	0	6	17 km
SH 20A	1	2	4.4 km
On/off ramps	1	10	

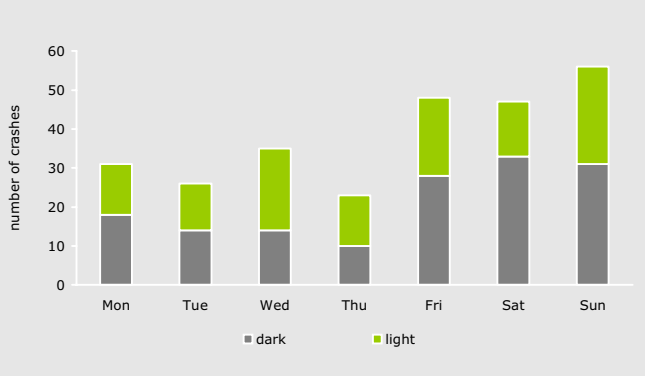
Analysis of the fatal and serious casualty crashes occurring on the motorways shows that loss of control crashes accounted for 39 percent of all fatal and serious crashes. Rear-end crashes account for a further 23 percent and are discussed in the next section.

The most commonly reported driver factors contributing to fatal and serious crashes were alcohol (30 percent) closely followed by poor observation (27 percent), and excessive speed (21 percent). Lack of adequate concentration on the driving task or the impairment of driver reactions by alcohol combined with the high speeds that can be attained on motorways can have very serious consequences.

There are studies that attribute the use of a cell phone to poorer performance in the driving task. A University of Utah study found that drivers were slower to react and brake, citing the reactions of a 20 year old driving while using a cell phone similar to that of a 70 year old person.

Over half (56 percent) of the fatal and serious crashes occurred during the hours of darkness when the motorway can be less congested, and driving speeds are higher. At this time there are other factors like fatigue, reduced visibility, alcohol use, and glare from headlights that are also likely to increase the crash risk.

Day of week and light conditions 2001–2005

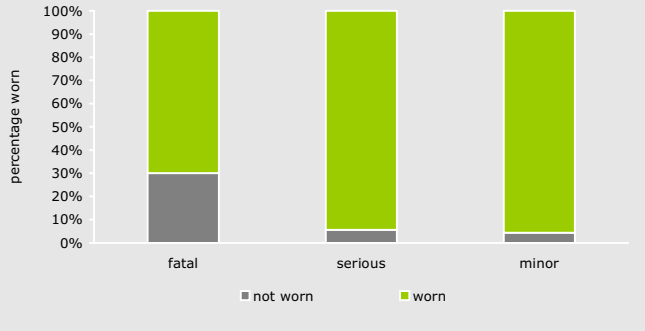


There was also a clear over-representation of these crashes occurring in the weekend period (6 pm Friday to 6 am Monday) as depicted in the above graph. It could be beneficial to ensure that the allocation of enforcement staff is sufficient during the high-risk times identified.

The following graph shows the safety belt wearing status and injury sustained by people involved in crashes on the motorways between 2001 and 2005. These crashes were all severe enough to cause fatal or serious injuries to at least one person. However, injuries incurred by all involved and the relationship to whether a safety belt was worn is evident. The less severe the injury, the higher the safety belt wearing rate.

The information used for this graph excludes cases where a safety belt was not available (for example, on a motorcycle), or when the attending officer wasn't certain or unable to complete the safety belt information. This means we know the safety belt wearing status in 59 percent of cases for fatalities, 25 percent for serious injuries, and 29 percent for minor injuries. Although we only have a portion of the data, it does mean that what we do have is robust.

Safety belt wearing rate



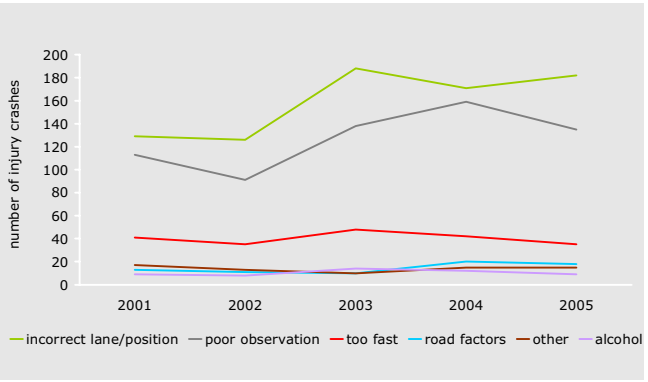
Sixty two percent of the 269 drivers killed or injured in the fatal and serious crashes were male. The two main driver age groups for males were 20–24 and 30–34 year olds. Just under half (48 percent) of the 155 passengers killed or injured in these crashes were female.

Rear-end crashes

Rear–end crashes continue to be the predominant crash type on the Auckland motorway network. In addition to the injury and property damage caused, these crashes also incur a hugely disproportionate disruption to the functioning of the network, especially in heavy traffic conditions. Often they can result in further crashes as congestion builds. When considering the total number of reported injury crashes on the motorways, the number of rear-end crashes shows an increasing trend over the past five years, such that the 2005 figure is 41 percent higher than in 2001.

2001–2005 rear-end injury crashes			
	Fatal	Serious	Minor
2001	0	11	205
2002	1	17	196
2003	1	11	282
2004	1	6	285
2005	1	12	292

Rear-end crash factors 2001–2005



Driver factors play a significant role in crashes of this type. The number of crashes involving poor observation, which includes drivers being distracted, has increased over the five years, though it did drop last year. In this case poor observation is failure to notice the car in front slowing or driver's attention being diverted for various reasons. Being in the incorrect lane or position is predominantly following too close in this instance. These two factors coupled together result in:

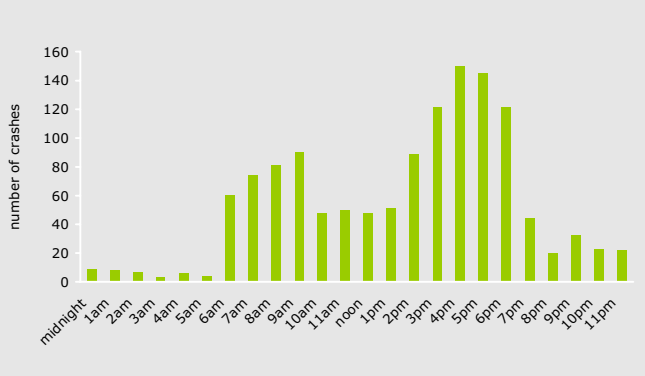
- a driver having their attention diverted and not realising immediately when they will need to slow
- the driver having even less time to avoid a collision once they do notice, due to the decreased following distance.

Therefore paying attention more fully to the driving task has the potential to greatly reduce rear-end crashes. This would be aided by minimising distracting and performance inhibiting behaviours like cell phone use, texting or eating while driving.

Research indicates that conversing on a cell phone is less safe than conversing with a passenger in the vehicle, (due to the non-verbal communication and having a second pair of eyes available).

When examining the times that these crashes occurred, the Friday evening period between 3 pm and 6 pm was extremely over-represented (132 injury crashes compared with an average of 23 for all three hour periods throughout the week). The morning and evening peak is illustrated in the following graph.

Rear-end injury crash times 2001–2005



Almost twice as many crashes occurred in the evening peak hour between 5 pm and 6 pm compared with the morning peak period. The weekend peak period occurs around midday.

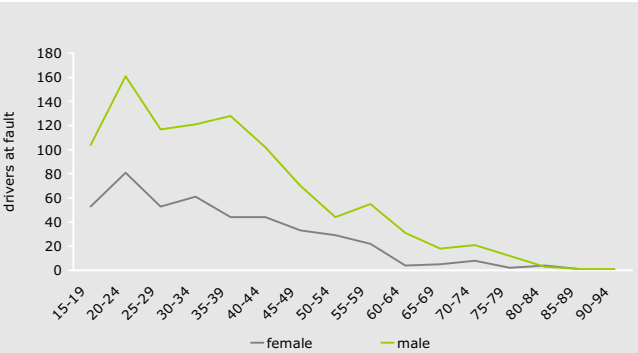
Of the 1,770 people injured as a result of rear-end crashes over the last five years, four were killed, 67 received serious injuries and 1,699 sustained minor injuries.

Rear-end injury crashes 2001–2005		
People involved	Female	Male
Driver	1,258	2,323
Passenger	208	86
Other	0	4

Of the 3,581 drivers involved in the 1,321 crashes, 1,450 were deemed to be at least partially at-fault. The age and gender of these drivers is plotted below. Points that stand out are:

- 3,581 drivers and 1,321 crashes means on average nearly three cars involved per crash. This is a reflection of the nose to tail characteristic of this type of crash, which can cascade along a queue of vehicles.
- 2,131 drivers were deemed to have no fault attributed to them. Again well over one per crash.

Rear-end crash culpable drivers 2001–2005

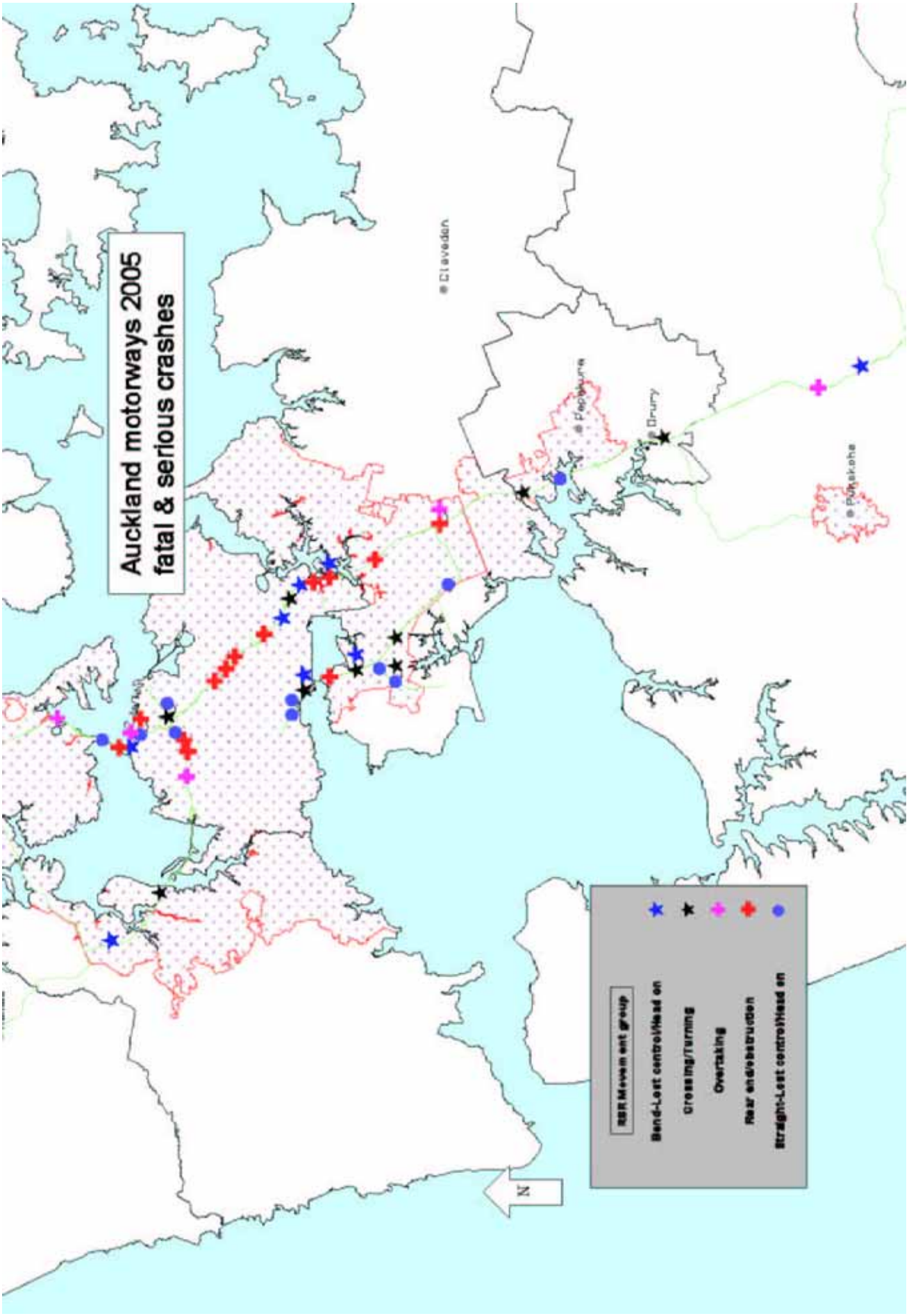


The preceding graph shows that although there is a peak of culpable drivers in the 20-24 year age bracket, the numbers are quite high through to age 44, and then only drop off slowly to about age 64. So rear-end crashes are not solely a problem with younger drivers.

The breakdown of drivers considered to be at-fault by vehicle type in rear-end injury crashes last year is shown in the table below.

	Car/ taxi	M/cycle	SUV/ van	Truck/ bus
Number of drivers involved	670	6	141	43
At-fault drivers	258	3	56	22
Percentage at fault	39%	50%	40%	51%

Over the past five years, 35 percent of all rear-end crashes occurred in the wet. This compares with 32 percent for all state highways in New Zealand. So while the rate is higher, emphasising the need for greater care and following distance due to decreased grip levels, it is not markedly so.


Auckland motorways 2005
fatal & serious crashes
Clevedon
Drury
Pukekohe
N

Lane changing crashes

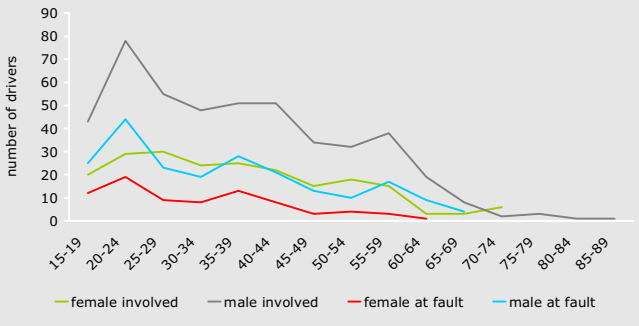
Lane changing, including entering motorways from on ramps and exiting at off ramps, is also responsible for 312 injury crashes on the motorway network. The number of crashes in this category has been increasing since 2002, with a large step upward in 2005, 102 versus 78 in 2004.

Crash factors	Occurrences
Did not see or look for another party until too late	129
Failed to signal in time	54
Alcohol or drugs	42
Too fast for conditions	40
Loss of control	40
In line of traffic	27
Sudden action	26
Inattention: failure to notice	24

Referring to the above table, failure to ascertain that the way was clear for a lane change is by far the most prevalent factor in these crashes. Commonsense would dictate that checking that there was a space to move in to was a prerequisite for making a lane change. The second factor is failure to indicate, and this is a legal requirement before making a lane change manoeuvre.

The individual factors referred to above are grouped together to form factor groupings mentioned elsewhere in this report. Most common are poor observation (in half of the lane changing crashes), and poor handling (26 percent). Poor observation is a grouping of inattention and attention diverted factors, poor handling a grouping of loss of control (not due to road or vehicle fault), failure to signal and not using the vehicle controls correctly. Both of these issues concern the behaviour and actions of drivers, hence educating drivers to safely and correctly perform lane changing movements would be beneficial.

Drivers involved in lane changing crashes



When considering the age and gender of those involved in lane changing crashes, although there is a peak for 20–24 year old males, the problem is not restricted to younger drivers. In most cases about half of those involved are deemed to be at least partially at fault.

A breakdown by vehicle type is shown below.

- Larger vehicles (bus, truck and SUV) have higher at-fault rates than cars and vans. As well as having bigger dimensions, these vehicles generally would not handle and respond as well as a car.
- Professional drivers in taxis were at fault in all three crashes in which they were involved.
- Motorcycle riders were also culpable in a lot of cases. Speed was a factor more often in motorcycle lane changing crashes than for other vehicle types.

	Drivers involved	Drivers at fault	% at fault
Bus	8	6	75%
Car/station wagon	516	220	43%
Motorcycle	27	19	70%
School bus	1	0	0%
SUV	10	6	60%
Taxi	3	3	100%
Truck	106	62	58%
Van or utility	53	23	43%

Failure to give way crashes

Failure to give way was a factor in 269 of the 2,600 injury crashes that occurred on the Auckland motorway network between 2001 and 2005. Two people died and a further 46 suffered serious injuries. These crashes were predominantly crossing/turning crashes, as depicted by the black stars on the map earlier in this publication. The main intersections involved and some points to note were:

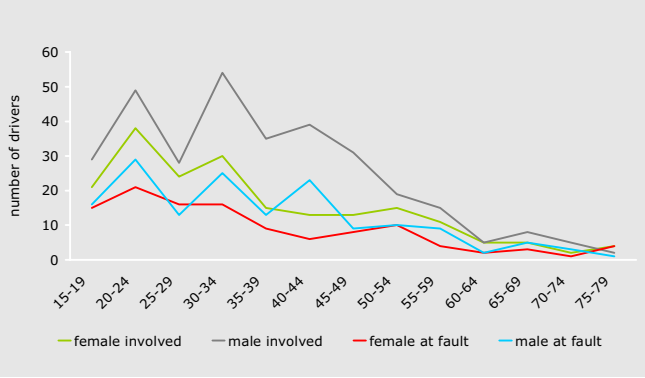
- Great South Road and Spartan Road – an increasing five-year trend from one to three injury crashes between 2001 and 2005
- Fanshawe Street and Beaumont Street – four crashes resulted in serious injuries, one involved a pedestrian, one a cyclist
- SH 20A and Kirkbride Road – three crashes involved serious injuries
- Symonds Street and Karangahape Road – two crashes involved pedestrians, two involved cyclists.

SH 22 and Drury on ramp northbound – 43 percent were in the wet, 43 percent were at night. Both figures were higher than usual for all state highways in New Zealand:

- SH 22 and Drury off ramp southbound – one of the six crashes resulted in fatal injuries
- Mt Wellington highway and Mt Wellington off-ramp northbound – of the six crashes, four resulted in serious injuries
- Onewa Road and Onewa off-ramp northbound – of the six crashes, three were serious injury crashes
- SH 20A and Ihumatao Road – four of the six crashes occurred in the dark.

Failure to give way was a factor in all of these crashes, the next most common factor was poor observation at 54 percent. This was a recurrent lead factor in all issues discussed in this report.

Drivers in failure to give way crashes 2001–2005



The graph above demonstrates that failure to give way crashes are by no means a problem of youth. Culpable driver numbers were quite high well into the middle age brackets.

The differing percentage of the culpability by licence status is worthy of note. This is shown in the table below.

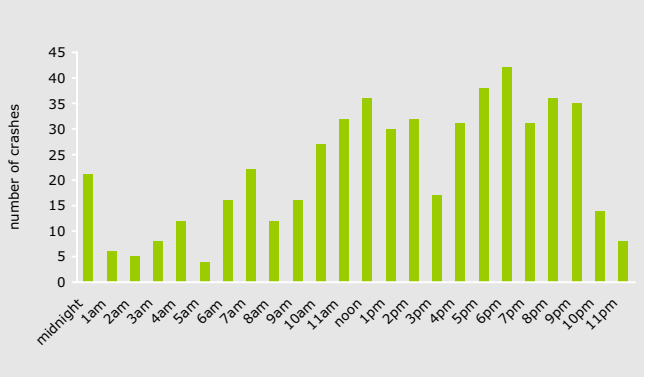
Licence status	Drivers involved	Drivers at fault	% at fault
Full	351	165	47%
Restricted/learner	103	66	64%
Overseas	18	13	72%
Never/disqualified/ expired	29	23	79%
Unknown	36	20	56%

Considering the licence status of drivers in failure to give way injury crashes:

- The restricted/learner licence grouping above contains 41 learner licence holders, where there should be a person who has held a full licence for at least two years sitting beside them (and legally deemed to be in control of the vehicle).
- Eight with a restricted licence crashed outside of the hours 5 am to 10 pm when the same condition of needing a full licence holder in the passenger seat applies.
- There were a further 29 drivers involved who were either disqualified, never licensed or driving on an expired licence.

This means that 78 of the 573 drivers involved were not appropriately licensed to be on the road. We have no information about the licence status of the passengers in these learner and restricted licensed driver crashes. However, it seems reasonable to assume that proper supervision by a full licence holder would help ensure that novice drivers gave way at an intersection.

Injury crashes by time of day 2001–2005



These crashes seem to build over the day, reaching a peak at about 7 pm, although the crash numbers remain quite high from around 11 am through to 9 pm.

Other facts about failure to give way injury crashes on the motorway system are:

- 41 percent of crashes occurred in the dark. This was higher than the 33 percent that happen on all state highways across New Zealand
- 42 percent of the culpable drivers were female, compared with 33 percent for all state highways in New Zealand. Generally, females drive about 37 percent of the vehicle kilometres in New Zealand, (according to the *Household Travel Survey 2003–2004**).

* Available from the Ministry of Transport website.

Reproducing this information

Where to get more information

For more specific information relating to road crashes on Auckland motorways, please refer to the 2001 to 2005 Road Safety Data Report, the Ministry of Transport's Crash Analysis System or contact the office listed below.

Contacts

Land Transport New Zealand

Partnership Manager Northern
Peter Kippenberger

Manager Programmes
Brian McSwigan
See contact details at the bottom of the page.

Auckland Regional Transport Authority

Road Safety Coordinator
Andrew Bell
Private Bag 92 236
Auckland
Phone 09 379 4422

Transit New Zealand

Regional Manager
Richard Hancy
PO Box 1459
Auckland
Phone 09 368 2000

New Zealand Police

David Walker
28 Sulphur Beach Road
Northcote Point
North Shore
Phone 09 419 0056

Land Transport NZ
Ikiiki Whenua Aotearoa

Auckland Office
Level 6, 1 Queen Street
Private Bag 106-602
Auckland

Telephone 09 969 9813
Fax 09 069 9813

www.landtransport.govt.nz