SUBMISSION TO:	Coronor Gordon Matenga
REGARDING:	**Cyclist Road Safety**
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ATTENTION:	Jennifer Chalklen
ADDRESS:	Coronial Services Unit, 219 Collingwood Street, Hamilton

SUBMISSION AUTHORISED BY	Mike Noon General Manager, Motoring Affairs New Zealand Automobile Association Incorporated P.O Box 1 Wellington
SUBMISSION AUTHOR	Peter King
AUTHOR E-MAIL	pking@aa.co.nz
AUTHOR PHONE	(04) 931 9982

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The New Zealand Automobile Association welcomes this opportunity to submit to the coroner's investigation into cyclist safety.

The NZ AA particularly wishes to record its condolences to the families of Antony Chapman, Mary-Jane Bishop, Kay Wolfe, Mark Ferguson, Wilhelm Muller, Patricia Fraser, Rex Dalzell And Benjamin Lawless.

About the AA

The NZ AA is an incorporated society with 1.3 million Members. Originally founded in 1903 as an automobile users advocacy group today it represents the interests of road users who collectively pay over $2 billion in taxes each year through fuel excise, road user charges, registration fees, ACC levies, and GST. The NZAA's advocacy and policy work mainly focuses on protecting the freedom of choice and rights of motorists, keeping the cost of motoring fair and reasonable, while enhancing the safety of all road users.

The NZ AA is a partner in the UN Decade of Action for Road Safety, working with other agencies to save five million lives and prevent 100 million injuries by 2010. NZ AA supports evidence-based policy.

About this submission

The AA is closely involved in road safety policy and research. Its motivation in presenting this submission is to bring before the court some of the latest and most authoritative cycle safety research. It is also concerned that cycling safety be seen within a context of overall road safety. This is because in focusing on road safety for cyclists it would be theoretically possible to create a perverse negative safety outcome for other road users.

Executive Summary

Every death on the road is an unnecessary tragedy. Last year there were 284 such tragedies, nine of them cyclists. In this context cycle road safety is less of a problem than other road safety problems.

In recent years there have been a number of extremely insightful studies into cyclist road safety. These make use of new data gathering techniques and analysis. As a result many of the causes of cyclist crashes are identified. The problem of eliminating those causes however persists because the economic, behavioural and environmental factors underlying those causes are not readily changed. No amount of wishing will create money that does not exist and reprioritisation of existing expenditure may have perverse safety outcomes.

On the simplest level the AA believes cycling can be made safer but it will require education, investment, research and development by local authorities and NZTA, a measure of enforcement of existing road rules by Police and it will also require more focus on educating road users about their responsibilities for collective road safety.

The AA commends the NZTA “Model Communities” programme for its emphasis on integrated routes for cycling. It also commends the role of sports cycling groups for taking a proactive approach to sports cyclist safety.

Researchers findings:

1. Cyclist conspicuity through lights and hi-viz decreases collision rates
2. Head injury is a serious risk and helmets help to reduce this
3. Most vehicle-cycle crashes occur when motorists are at fault
4. Motor vehicle speed has an effect on cyclist injury
5. Cyclist speed is also linked to crash involvement and injury

AA View

Cycling is a minority transport activity by any measure. This does not mean it should be unsafe but it does mean that giving cyclists greater priority may have perverse safety outcomes.

Motorists are deemed at-fault in most cyclist crashes. Motorists are not used to cyclists because they are not common. Motorists respond best to high levels of consistency.

1. Cycle helmet law saves lives
2. High visibility is desirable
3. All road users should follow road rules and these should be enforced consistently
4. High-risk drivers who lose their licences may drink and ride. This should be policed.
5. Continuous cycle routes are best for cyclists and motorists
6. In many countries (e.g. Germany) cyclists share space with pedestrians. Cycle lanes behind parked cars may well be preferable to cycle lanes on the road.
7. Cyclist routes should not be on high speed roads and Expressways should be designated Motorways.
8. Cyclist sports bodies should be encouraged to plan routes and events with Police and local authorities.
9. Truck-cyclist interactions seem to be unduly problematic and mutual education may help.

New Zealand Road Safety

1.0 Road safety is cultural

Road safety in any country is generally a reflection of the kind of society it is. For example while New Zealand and the Republic of Ireland have similar sized populations New Zealand has significantly more licensed drivers (mostly female). New Zealand is also ethnically more diverse than many European nations being more like the United States than, for example, Nordic nations. This means that New Zealand road safety concerns are unique to New Zealand's culture.

1.1 New Zealand settlements were built around the car

Most New Zealand settlements are less than two hundred years old. Roads were originally built for horse-drawn coaches and it wasn't until the 1920s that the number of motor vehicles on them made regulation necessary. At this time New Zealand's population was less than 1.5 million. Today it is closing with 4.5 million. Unlike Europe, but like Australia, Canada, and the United States, New Zealand has therefore grown and developed around the motor car as the primary form of family transportation.

1.2 Poor observation is the most common crash cause

Road safety concerns in New Zealand have traditionally focused on alcohol and speed, but the Crash Analysis System shows that the proportion of crashes due to these causes has steadily declined from half in the 1990s to a third in this decade. "Poor observation" is the most commonly coded crash cause by New Zealand Police according to the Crash Analysis System. Certainly in the past two years the sudden decline in fatalities has largely been due to fewer alcohol and speed related crashes. In effect the battle against criminally irresponsible road users is gradually being won. What this is leaving are crashes where very rarely generally law-abiding drivers make mistakes when in charge of a two-tonne piece of powerful machinery with tragic consequences

1.3 Crashes are rare

According to figures from the Ministry of Transport's Transport Indicator Monitoring Framework every year 3.2 million licensed drivers make 3189 million trips by car and drive just under 40 billion kilometres or 9145km per person per year. There are 10,500 injury crashes per year so the population risk of an injury crash is one every 300,000 trips. Given that some people make themselves more accident prone (e.g. by speeding and drink-driving) involvement in injury crashes of any kind is extremely rare and unusual in most people's experience.

1.4 Cycling is not widespread

Cycling is not a major transport mode in New Zealand. The mode's share of trips is 1.4% of all trips. The total estimated distance travelled per year is 335 million kilometres over 86 million trip legs suggesting an average trip of 4km. Not surprisingly cyclists are not a high proportion of road user casualties (as they are, for example, in the Netherlands).Typically cyclists are less than three percent of all road fatalities and six percent of injuries. In recent years this proportion has increased only because the overall crash total has decreased dramatically while cycle crashes have remained the same. While the rate of cyclist injury is disproportionate the numbers are relatively small

2. Cycling Safety Facts

2.0 Source of information

The AA is happy to defer to the Ministry of Transport's data on cycle crashes. This is available from Ministry of Transport 2011 Cycle Crash Facts: http://www.transport.govt.nz/research/Documents/Cyclist-crash-statistics-2011-(1).pdf. The following is a summary of those findings.

2.1 Hospitalisation rates

Between 2006 and 2010, over 1,500 cyclists required hospitalisation due to injuries received from crashes involving motor vehicles on public roads in New Zealand. An average of over 300 cyclists per year required hospitalisation. In the same 2006–2010 period, 49 cyclists died in crashes involving motor vehicles on public roads. On average, approximately ten cyclists die each year. An additional 2,115 cyclists were hospitalised in 2010 for incidents not involving a motor vehicle, including both on and off road. 76 percent of all hospitalised cyclists, and 73 percent of cyclists involved in police- reported crashes, are male

2.2 Where cyclists are injured

Over half all cyclist **fatalities** occur on the open road, due to the high impact speeds associated with crashes on the open road. Over half of all cyclist **casualties** occur on major urban roads (typically busy arterials)

Approximately nine in every ten reported cyclist **casualties** (2006–2010) occurred on urban roads (roads with a speed limit of 70km/h or less).

2.3 Importance of helmets

About three-quarters of all cycling deaths are caused by head injuries.

Cycle helmets reduce the risk of brain injury by up to 88 percent and the risk of facial injury by up to 65 percent for cyclists of all ages.

According to the results of the national cycle helmet survey, in 2010 the national Cycle helmet wearing rate across all age groups in New Zealand was 93 percent

2.4 Most cyclist road crashes are due to inattentive motorists

In the cases where the vehicle drivers are found to have primary responsibility in a crash involving a cyclist, 61 percent of the drivers in fatal or injury crashes failed to give way or stop and 59 percent did not see the other party. Fourteen percent were inattentive or their attention was diverted. This rises to 41 percent of the at-fault drivers in fatal crashes involving cyclists being inattentive or their attention being diverted.

2.5 2011 Cyclist fatality themes from the Crash Analysis System

Of the nine cyclists killed in 2011 only one was wearing reflective clothing. Four were killed by trucks. In five cases the cyclist turned suddenly and went under the vehicle. One rider was drunk. One was killed observing all road rules in a cyclist lane (by a truck). One was killed when overtaking a parked truck on the shoulder and was collected by another truck.

3. Recent Research Findings

3.0 Recommended Research Papers

The AA wishes to draw the Court's attention to three recent research papers. These are:

1. Monash Alfred Cyclist Crash Study (MACCS) - July 2012
2. Monash Naturalistic cycling study: identifying risk factors for on-road commuter cyclists - December 2010
3. NZ Transport Agency research report 389: Cycle Safety: Reducing the Crash Risk - October 2009

For the court's convenience a summary is included in this report along with web site addresses where these can be downloaded from.

All three papers confirm that the fundamental problem faced by cyclists is incursions into their safety zone by motor vehicle drivers. Various solutions are proposed to avoid this.

3.1 Minimising Collisions

The papers suggest collisions could be reduced by:

- Conspicuity (cycle lighting and hi-visibility clothing)
- Safe speeds for motorists *and* cyclists
- Consistent lanes or paths for cyclists
- Adequate use of indicators by drivers
- Adequate use of mirrors by drivers

3.2 Minimising Injury

The papers suggest injury could be reduced by

- Helmet use by cyclists
- Safe speeds for motorists *and* cyclists

4. Motorist Responsibility For Reducing Cycle Injuries

4.0 Transgressions and penalties

Most motorists do not want to cause a crash which endangers a cyclist. That said, video evidence collected by Monash University suggests most motorists operate on a “law of the jungle” approach to road interactions that favours speed and size.

New Zealand Land Transport (Offences and Penalties) Regulations 1999 3.10(1-5) makes failing to signal an intention to stop or turn an offence, with a penalty of up to $150. Failure to drive as near as practicable to the left of the roadway, or to drive in a special vehicle lane has the same penalty. While these penalties are intended to address the “law of the jungle” they are only influential if they are enforced.

4.1 Enforcement

The New Zealand Police Road Safety Strategy 2011-2015 (https://www.police.govt.nz/sites/default/files/resources/strategic/road-policing-strategic-plan-2011-2015.pdf) prioritises Police effort on:

- High risk drivers and driving
- Alcohol and drugged driving
- Speed
- Driver licences
- Heavy vehicle fleet
- Restraints
- Motorcyclists

The AA supports the Police focus on high-risk driver behaviour but notes this does not give much scope to policing issues relating to cycling, which has low casualties. Taking Police resource from other priorities to focus on cycling may well increase overall casualty rates. Therefore policing motorist incursions into cyclist space while not impossible is not a priority. This type of policing may best be automated using video surveillance on cycling lanes.

4.2 Distraction

Another important issue for motorists is the combination of low cyclist conspicuity and stressful driving distractions. This often occurs at intersections. The Ministry of Transport identifies the following common situations.

- Collisions at a right angle, typically when both parties involved are moving straight through an intersection.
- Vehicle turning in front of the cyclist, typically at an intersection.

In most cases the motorist fails to notice or register the cyclist as a moving hazard as they contend with motorised traffic which represents a greater threat to themselves. Only increased cyclist conspicuity and improved road design can prevent these crashes.

4.3 Driver education improves driving but cannot prevent occasional lapses

While studies have suggested driver education responses to improve road safety there is little evidence this stops extremely rare and unintended accidents from happening. Driver education can improve the habits and attitudes of drivers in a general sense but even the best driver can have a lapse of attention with serious consequences for vulnerable road users. It is important that driver education is not seen as a cure for accidents in and of itself but as a part of improving the overall safety and efficiency of the transport system.

4.3 Cyclists as a de-facto traffic signal

There does seem to be a suggestion that an increase in the rate of cycling increases driver awareness of cyclists as a hazard. These studies note the number of casualties per cycled kilometre reduces the more cyclists use a road. This may well be true but the cost is still a net increase in cycling casualties. Nations with high cycling rates also have high cycling crash involvement and casualties. This is inevitable as a two-tonne automobile simply provides the human body with a good deal more protection than a bicycle.

Some road controlling authorities have suggested encouraging mixed use (un-delineated roads for pedestrians, cyclists and vehicles) roads as a means to reduce traffic speeds on arterials. The AA does not support the use of vulnerable road users as a traffic calming device.

4.4 Truck drivers

Truck drivers seem to have particular difficulty in recognising cyclists as a hazard. This is possibly perceptual because they are seated in a high cab and cyclists (and pedestrians) do not appear to present any risk to them. Mutual education of cyclists and truck drivers could have limited benefit.

5. Cyclists Responsibility For Reducing Cycle Injuries

5.0 Cyclists do not always ride sensibly

Cyclists do not want to be killed or injured. That said cyclists can behave in a manner which contradicts this. Examples include:

- Riding drunk
- Riding without a helmet
- Riding in inconspicuous clothing or without lights in poor light or darkness
- Riding in breach of road rules (eg Red light jumping, or without keeping left)
- Riding too fast for the conditions.

All of which are reported in the Crash Analysis System. It is as impossible to prevent irresponsible or stupid use of a bicycle as it is to prevent irresponsible or stupid use of a motor vehicle. While it would be preferable if everyone was safety conscious all the time, the fact is the degree of safety consciousness in the community varies considerably. A safe system approach recognises this and attempts to reduce harm regardless of the user.

5.1 Helmets and visibility matter

Both Monash studies make clear the importance of helmet wearing and cyclist visibility. The Monash studies also suggests that high cyclist speeds (about 40km/h or more) requiring effort by the rider reduces the riders ability to react to sudden changes in circumstances.

The AA supports cycle helmet use, high visibility and conformance to road rules by all road users. That said it must be noted there is a significant difference between adult sports cyclists, commuter cyclists, mountain-bikers and child cyclists. Education for these groups should be appropriate.

5.2 Enforcement of cycling regulations

In general New Zealand Land Transport (Offences and Penalties) Regulations 1999 penalties for cyclists are $55. Anecdotal evidence suggests these road rules are not enforced particularly aggressively either.

5.3 Actions by sports cyclist groups

Work by Bike NZ suggests that sports cyclist safety can be enhanced by joining organised and managed training rides. The AA supports the development of sports cyclist specific initiatives operated jointly by rider's representatives, Police and local authorities.

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6. Road Controlling Authorities Responsibility For Reducing Cyclist Injuries

6.0 Inconsistency of cycle lanes and paths

The constant refrain of all studies in the cited research (see Appendix) is that cyclist lane and path provision are inadequate. Cycling facilities are not continuous and cyclists are faced with facilities which come and go at random. This provides no useful guidance to either cyclists or motorists. In some situations the lack of consistency is itself a significant source of risk to cyclists.

6.1 Funding

The problem with providing a consistent cycling environment effectively comes down to money. Many local authorities in New Zealand simply do not have the money to spare on minority concerns like cycling while meeting the need to provide adequate services such as general roads, water, sewerage and waste disposal.

The NZTA “model communities” initiative has been a useful joint development and has shown that modest sums of money spent on cycling facilities can have benefits. The AA supports evaluation of this initiative to determine the benefits of integrated cycling facilities in New Zealand towns and cities.

5.2 Placement of cycle lanes on arterials

Given that the average occupancy of motor vehicles in New Zealand is 1.6 we can be certain that driver-side doors opening into cycle lanes is a risk where cycle lanes are placed outside parking. Passenger side doors opening into a cycle lane is both less likely and less dangerous for all concerned. Surveys by Canterbury University (Glen Koorey) and the AA suggest this arrangement is preferable with both cyclists and motorists alike.

Images courtesy of Dr Glen Koorey, Canterbury University.

5.3 Speed Management

The issue of speed limits is currently under review by Speed Limits New Zealand. In the AA’s view speed limits should reflect road purpose and a proper hierarchy of roads. Ideally cyclists would have off-road facilities rather than share high speed traffic corridors. The AA believes NZTA should designate some Expressways as Motorways and proper provision of cycle paths be made to accommodate cyclists away from high speed roads. This is well supported by AA Members, most of whom support cycling but do not ride themselves.

On high speed arterial routes off-road or behind parked car lanes are preferable for both cyclists and motorists. Driveway collisions are a risk for footpath based cycle paths. That said in Germany most cycle paths are shared with the footpath. Local Government should recognise

that high speed vulnerable road users and low speed vulnerable road users should be segregated from each other and motorised traffic.

Low speed roads (eg to 30km) are an option for communities where through-traffic is limited. The AA opposes any suggestion that the general urban limit should be dropped from 50km/h although an urban road hierarchy with 60km/h arterials and low speed feeder streets may be a sensible option in some places. Local Government could provide mixed cyclist and pedestrian cuttings linking low speed roads to provide off-arterial routes suitable for cyclists.

7. References

7.0 MACCS

Title: Monash Alfred Cyclist Crash Study (MACCS)

Authors: Biegler P, Newstead S, Johnson M, Taylor J, Mitra B, Bullen S

Date : July 2012

ISBN: 0732623812

Pages: 61

Source: http://www.monash.edu.au/miri/research/reports/muarc311.pdf

Abstract

Current primary data sources on mechanisms of Victorian bicycle crashes lack sufficient detail to draw clear conclusions on crash causation. Nor are these data adequate to link specific crash mechanisms to characteristic injury outcomes. The Monash Alfred Cycle Crash Study (MACCS) aimed to redress these data deficiencies through piloting an in depth crash investigation study focused on cyclists.

In-depth data were collected from 158 patients presenting to The Alfred and Sandringham Hospital Emergency Departments who were riders of bicycles involved in a crash. Information collected covered pre-crash factors pertaining to environment and cyclist/driver behaviour, crash mechanism, and injury outcomes from hospital records. Analyses of these data provide insight on crash causation and associated injury burdens which can inform the development, prioritisation and targeting of effective countermeasures.

Findings

Bicycle light use and cloudy weather conditions were significantly associated with crash injury severity, with failure to use lights and the presence of cloudy weather associated with higher injury severity. Head injury risk was associated with bicycle speed before the crash, with higher bicycle speeds associated with greater head injury risk. Helmet use was also associated with lower head injury risk.

Results of the multivariate analyses suggest a number of areas of focus for improving rider safety.

1. Increased bike light use by cyclists riding both on and off-road may have benefits in reducing crash severity.
2. Off-road cyclists need to be conscious of environmental factors to avoid single vehicle (bicycle) crashes.
3. Benefit may also follow a review of the maintenance and physical design of off-road cycling facilities, for example, bike paths, to improve safety.
4. Skills for on-road cyclists need to focus on reading and adapting to the traffic environment to avoid crashes with other road users.
5. Additional education of drivers of motorised vehicles about road rules and other measures that encourage safe cyclist interactions may also prove beneficial.

6. This aim would also be furthered by provision of road designs that assist safe driver-rider interaction.
7. The utility of helmets in protecting against head injury is also a critical area of focus.

7.1 Monash Naturalistic Cycling Study

Title: Naturalistic cycling study: identifying risk factors for on-road commuter cyclists

Authors: Marilyn Johnson, Judith Charlton, Jennifer Oxley, Stuart Newstead

Date: 4 December 2010

Pages: 9

Source: http://btawa.org.au/wp-content/uploads/2010/12/4-HelmetCam-results.pdf

Abstract

The study aim was to identify risk factors for collisions/near-collisions involving on-road commuter cyclists and drivers. A naturalistic cycling study was conducted in Melbourne, Australia, with cyclists wearing helmet-mounted video cameras. Video recordings captured cyclists' perspective of the road and traffic behaviours including head checks, reactions and manoeuvres. The 100-car naturalistic driving study analysis technique was adapted for data analysis and events were classified by severity: collision, near-collision and incident. Participants were adult cyclists and each filmed 12 hours of commuter cycling trips over a 4-week period. In total, 127 hours and 38 minutes were analysed for 13 participants, 54 events were identified: 2 collisions, 6 near-collisions and 46 incidents. Prior to events, 88.9% of cyclists travelled in a safe/legal manner. Sideswipe was the most frequent event type (40.7%). Most events occurred at an intersection/intersection-related location (70.3%). The vehicle driver was judged at fault in the majority of events (87.0%) and no post-event driver reaction was observed (83.3%). Cross tabulations revealed significant associations between event severity and: cyclist reaction, cyclist post-event manoeuvre, pre-event driver behaviour, other vehicle involved, driver reaction, visual obstruction, cyclist head check (left), event type and vehicle location ($p<0.05$). Frequent head checks suggest cyclists had high situational awareness and their reactive behaviour to driver actions led to successful avoidance of collisions/near-collisions. Findings will contribute to the development of effective countermeasures to reduce cyclist trauma.

Findings

Drivers were deemed at fault in the majority of events. In a small number of events, the cyclist did not react before the event which suggests they did not have time to react or did not see the vehicle. These findings suggest that events are more likely to be attributed to a lack of awareness by drivers rather than cyclist inattention.

The majority of events involved drivers' lane change behaviour (sideswipe/left turn-related). Drivers' lane change behaviour appeared to be motivated by a gap in the adjacent vehicle lane. At times, this resulted in a sudden lane change and often drivers did not indicate (signal), despite the Australian Road Rule that all drivers must indicate for at least 5 seconds prior to turning left or right. Drivers did not appear to be aware of the cyclist travelling alongside or behind them

Cyclists' capacity to affect a response manoeuvre is likely to be influenced by their travel speed. Participants were not fitted with a speedometer or global positioning system (GPS), so travel speed could not be validated. However, cyclists frequently checked their trip computer when riding and the digital readout was occasionally recorded on the video and showed speeds in

excess of 40km/h. It is likely that such speeds contribute to cyclists' ability to successfully manoeuvre around a vehicle that makes a sudden change in course. Further research is needed to determine the importance of cyclist travel speeds and available time for collision avoidance manoeuvres, particularly among male cyclists whose observed speeds were higher than for female cyclists.

Cyclists also need to take responsibility for their safety, by riding safely and legally and maximising their conspicuity. Conspicuity relates to the visibility of the cyclist by wearing light, reflective clothing and use of front and rear bike lights of sufficient luminance. Also, cyclists need to ensure their position on the road maximises their conspicuity and avoid riding in drivers' blind spots.

Lastly, it is important to consider the role of the road infrastructure and cycling facilities in cyclist safety. A bicycle lane was present in less than half of the observed events and across all event severities. The cycling lanes observed were disjointed and often ended abruptly, frequently where the road narrowed, without a viable option for the cyclist who then either continued in the lane along the kerbside, directly competing with vehicular traffic for space, or rode (illegally) on the footpath. A review of existing cycling facilities is also required to improve continuity and provide intuitive end-point options to ensure the road space afforded to cyclists is identifiable. A comprehensive education campaign to ensure cycling facilities are understood by all road users is needed.

7.2 NZTA Research Report 389

Title: NZ Transport Agency research report 389: Cycle Safety: Reducing the Crash Risk

Authors: Shane Turner, Shane Binder, Aaron Roozenburg

Date: October 2009

Pages: 104

Source: http://www.nzta.govt.nz/resources/research/reports/389/docs/389.pdf

Abstract:

Cycling is a sustainable mode of travel and an alternative to motor vehicle trips, particularly for shorter trips. However, the risk of crashing while cycling is typically higher than while travelling in a motor vehicle. To create a safer environment for cyclists, traffic engineers and transport planners can select a number of safety countermeasures. These include changes to the road layout, such as reducing traffic volumes and speeds; installing cycling lanes and paths; and conducting enforcement and education programmes focused on drivers and cyclists.

The crash benefits to cyclists of reducing traffic volumes and speeds, and constructing cycle lanes and intersection treatments have been investigated during 2006 and quantified based on overseas research and data collected within Christchurch, Palmerston North and Nelson. It was found that cycle lane facilities provided a reduction in cycle crashes of around 10%. No suitable New Zealand data is available on the safety of cycle paths and speed reduction measures, so the discussion focuses on international research findings.

Selected Findings

The presence of a flush (or painted) median reduces cycle related crashes for mid-blocks (by 37%), particularly where turning traffic is present (52%), according to the models. This is likely to be a result of the extra space that cyclists and motor vehicles have to take evasive action if potential for a collision arises.

The absence of parking is a key factor for models looking at all mid-block crashes. The overall reduction is 75%, indicating that parking does have a major effect on crash rates. Routes that have low parking usage rates (ie where a parking lane is marked but the proportion of parking spaces that are used is low) have crash rates between 30% and 120% higher than sections with average parking rates, although this was a less crucial factor (these models are provided in appendix A). This could be because cyclists use the parking shoulder for most of their trip but then have to pull out into the traffic lane to go around parked cars. This movement may catch motor vehicle drivers unawares, leading to a potential conflict.

The presence of a cycle lane does not feature as a key discrete variable for the mid-block sections, where the presence of a flush median and/or ‘no parking’ appear to be more important variables. However, crash prediction models have been developed that include the presence of a cycle lane (see appendix A) and it was found that crash rates were typically 20 to 30% higher on those routes with cycle lanes. This did not compare well with overseas research, which typically shows a reduction in all crashes. A before-and-after study found that a 10% reduction in all crashes was found at those sites that have had cycle lanes installed. The difference is likely to be the result of an increase in cyclists as a result of the cycle lane going in compared

with untreated sites (we only had ‘after’ cycle counts) and a bias toward treating routes which had a history of cycle crashes. Even the crash reduction of 10% seems low compared to overseas research; this may be caused by the increase in cyclists and because some of the older cycle lanes included in the study are below standard, particularly in terms of width.

The Danish Ministry of Transport recommends that a desirable speed for vehicles where cyclists and vehicles use the same traffic lanes is less than 40km/h. This is supported by a number of other overseas studies. A Bicycle Federation of America report (1993) found that when vehicles travelling at 32km/h strike pedestrians and cyclists, only about 5% are killed and most injuries are slight. At 48km/h, 45% are killed and many are seriously injured. When cars travel at 64km/h, 85% of pedestrians and cyclists are killed. Cross and Fisher (1977) found that more than half of all cycle fatalities occurred on roads with posted speed limits greater than 35mph (56km/h) even though less than 20% of all collisions occurred on roads with higher speeds