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CONSTRUCTION PRACTICES PLAY LEAD ROLE IN CHIP LOSS

Research has confirmed earlier findings that it is construction practices, not seal design, that is most influential in mitigating chip loss on curves.

The original aim of the research, carried out by Opus Central Laboratories, was to optimise the performance of chipseal surfaces on high-stress curves by developing a process for categorising the severity of such sites. Designers could use the process to work out the probability of chip loss on particular sections of road, and from there select an appropriate surface to minimise the chance of it happening.

However, findings that no one type of chipseal was more prone to chip loss than another, and that even at very high lateral accelerations the stress created in chipseals was not enough to lead to chip loss, made the research team look elsewhere for causes.

Peter Cenek of Opus Central Laboratories says, 'Our initial focus was on confirming the link between chip loss on curves and high stress. We tested tyre forces on 13 road sections where there was chip loss in the wheel paths. But while we found that chip loss can occur when cornering vehicles create high shear stress on the

chipseal surface, we didn't find any evidence to support the inverse assumption, namely that high shear stress automatically leads to chip loss.

'This led to the question of whether the stress applied by cornering vehicles was sufficient in itself to lead to failure of the bitumen binder, leading in turn to chip loss, or whether there had to be some other factor at play before chip loss occurred.'

This became the team's second strand of enquiry. Using a 2D finite element model of chipseal, they studied whether the stress levels from typical wheel loadings on tight corners was sufficiently large to cause the bond between sealing chip and bitumen to fail.

Stresses were applied that corresponded to lateral accelerations of 0.5g, which is up to five times the lateral acceleration normally encountered during cornering. It was found that, although high levels of stress were generated in small areas of the bitumen, these were unlikely to be the cause of bitumen failure leading to chip loss.

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As a result, the team turned its attention to the NZ Transport Agency's road assessment and maintenance management database (RAMM) in an attempt to obtain a more accurate picture of factors leading to chip loss.

Peter says, 'We were particularly interested in the variable used in the database called scabbing, which refers to areas of carriageway that have lost more than 10% of their sealing chip. By studying the correlation between scabbing and other variables stored in the database, we were able to confirm that the horizontal curvature of a section of road is a poor predictor of chip loss. In fact, the strongest correlation to emerge from the database was with NZTA administrative region, in that some regions are more likely to experience chip loss on curves than others.'

The team used further statistical modelling to develop and test several hypotheses relating to chip loss, reinforcing the finding that there were regional differences in the factors driving chip loss. In some regions, factors such as traffic levels, curve geometry and seal-related variables could provide good predictors of potential chip loss, but these did not hold true for all regions. Possible explanations included the differing climates, chipseal properties and construction practices found, and used, in the various regions.

Peter says, 'Taken overall, the research found that there were two principal factors influencing chip loss as a result of cornering vehicles, namely the bitumen in the seal failing as a consequence of

the vehicle-induced stress, and packing and embedding of the surface layer chips.

'The latter factor was by far the dominant one, supporting previous research findings that it is construction practices, not seal design, that have the greatest influence on, and scope to mitigate, chip loss.'

Using controlled trafficking to bed in chips after sealing was singled out by the team as an important practice to maximise chip retention, leading to a recommendation that road controlling authorities should take steps to ensure this happens.

Other recommendations to reduce chip loss included using smaller chip sizes to reduce stress in the bitumen (although this had to be balanced against increasing the potential for flushing) and, on tight curves (those with a horizontal radius of less than 200m), ensuring that the curve's superelevation (camber) is at the recommended design level for the curve radius since this helps to minimise the stress applied by a cornering vehicle.

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High-stress corners, NZ Transport Agency research report 466

Available online at www.nzta.govt.nz/resources/research/reports/466

ATTITUDE AND DESTINATIONS SHAPE INNER-CITY TRANSPORT

Inner-city living has come under the microscope in recent research, revealing a complex relationship between people's attitudes to where they live and their preferred modes of travel.

It is widely considered that encouraging people to live in intensified residential areas will provide transport and other benefits, including reduced personal car use and ownership, and greater use of environmentally friendly transport options, such as walking and cycling.

Research by Pinnacle Research and Policy has borne this out, examining the impact that urban intensification in Auckland and Wellington has had on people's travel behaviour, choice of travel mode and vehicle ownership.

It has also discovered a strong relationship between travel behaviour and where people prefer to (as opposed to actually) live, suggesting that it is attitudes, rather than their built environment, that is the strongest determinant of how people choose to get around.

URBAN INTENSIFICATION IN NEW ZEALAND

The inner-city populations of New Zealand's largest cities have grown significantly over the past 15 years, partially as a result of urban planning that encourages intensification and integrates land use and transport.

While there has been some New Zealand research into this trend, the studies have not, by and large, tackled the question of whether urban intensification has an impact on people's travel behaviour and choice of travel mode.

Carolyn O'Fallon of Pinnacle Research says, 'Although we had evidence through previous research that people valued inner-city living for its proximity to work, services and facilities, we didn't know much about the people who actually chose to live in these intensified areas.



'In the study we surveyed inner-city and non-inner-city residents in Auckland and Wellington, combining their responses with secondary data and literature review findings, to paint a clearer picture of who these people are and whether their travel behaviour is different than it would be if they lived elsewhere. We were also interested in how committed respondents were to their inner-city or suburban lifestyles, and how people's attitudes to where they lived affected how they chose to get around.'

MORE WALKING, FEWER CARS

A core finding from the research was that people who live in the inner city are more likely to walk, and less likely to drive, than people who live elsewhere in the city. This holds true regardless of the purpose of the trip, be it work, study or shopping.



Carolyn says, 'We surmised that this was because there were more potential destinations within walking distance in the inner city than elsewhere, and that people who live centrally valued this proximity. Interestingly, there was no notable difference between the amount of walking and cycling that inner-city residents took part in for recreation or fitness reasons, and that done by residents elsewhere.'

A related finding was that inner-city households own fewer cars. Although the research recorded slightly higher levels of car ownership than those returned by the 2006 Census, there were still fewer cars owned per household, per adult and by age group than elsewhere in the city.

What is more, the fewer cars inner-city residents had, the more they walked, with people from zero car households walking nearly twice as much as those from households with a vehicle.

Carolyn says, 'We concluded that it's not the density of inner-city areas alone that encourages people to walk or cycle, rather than drive. Instead it's the combination of density with the mix of activities and destinations available in an area, and how accessible these destinations are, that influences people's travel behaviour and whether or not they own a car.'

THE IMPACT OF ATTITUDE

Residents' preferences and attitudes also significantly influenced how they chose to get around. The research distinguished between those who lived in the suburbs but would prefer to live in the inner city (dissonant suburbanites), those who preferred to live, and did live, in the suburbs (true suburbanites), and their counterparts in the inner city (dissonant and true urbanites), as well as environmentally minded pro-green travellers and committed drivers.

The interesting factor to emerge was that population segments who shared a preference for inner-city living or environmental attitudes to transport (namely dissonant suburbanites, true urbanites and pro-green travellers) all exhibited the same travel behaviours and car ownership patterns as those residents who actually lived in the inner city. This held true regardless of where people lived.

Carolyn says, 'It could be said that people's attitudes are a more important determinant of their chosen travel mode than the built environment they live in. However, built environments facilitate residents to demonstrate their favoured travel and vehicle ownership behaviours.'

THE IMPLICATIONS FOR POLICY

The study found that the inner-city areas of both Auckland and Wellington were highly accessible and conducive to walking, especially when compared with surrounding suburbs. People who

lived in these areas walked more and drove less than when they lived in the suburbs.

With the health, social, economic and environmental benefits of encouraging more active and environmentally friendly modes of transport well-established, the suggestion is that planners and policy makers should focus less on increasing density in central city areas and more on creating neighbourhoods with high levels of destination accessibility (eg more retail, educational, recreational, entertainment and workplace destinations).

This recommendation is backed up by the research finding that there are proportionately more dissonant suburbanites than dissonant urbanites, suggesting a latent demand for residential areas with suitable housing types and greater destination accessibility. Increased use of environmentally friendly transport would be a fortunate by-product of people choosing to move to these areas.

QUESTIONING HOW INNER-CITY LIVING AFFECTS TRANSPORT BEHAVIOUR

The research asked:

- How would people's travel behaviour differ if they lived in the suburbs?
- Does inner-city living affect people's car ownership and use?
- Are people who live in the inner city more 'self-selected' (in terms of their attitudes, lifestyle aspirations and life stage) than those who live in the suburbs?
- Would they choose to live in the suburbs in the future, and if so, why would they shift?
- Do people live where they work and play?
- Do inner-city residents use public transport?
- What other reasons are there for living in the central city?
- Do different types of inner-city developments (eg apartment blocks, low-rise developments with inner-city gardens) have different impacts on transport use?

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Living in intensified urban environments: residential self-selection and travel behaviour, NZ Transport Agency research report 468

Available online at www.nzta.govt.nz/resources/research/reports/468

ASSESSING TRANSPORT'S LIFETIME IMPACT

A recent study by Landcare Research has looked into the lifetime environmental liabilities of road and rail-based transport services.

The study used whole-of-life thinking to establish a baseline for the environmental liabilities of transporting passengers and freight on New Zealand's road and rail networks. Establishing a baseline provides a benchmark against which future proposals can be evaluated using selected indicators.

The project originally identified four indicators to look at, but for practical reasons this proved not possible.

Christine Harper of Landcare Research managed the research project and says, 'Initially we intended to look at the total life cycle energy consumption, greenhouse gas emissions, stormwater contamination and costs of the various transport options. However, the commercially sensitive nature of the costs of building and maintaining transport infrastructure meant that the information we needed was not available. The data on stormwater also proved inadequate for a detailed assessment.'

In the end, the study focused on greenhouse gas emissions, total energy demand and the quantity of contaminants delivered to water bodies by road infrastructure. Current construction and maintenance practices were used for the assessments, as were the current vehicle fleet and rolling stock.

THE NEED FOR A BASELINE

To make good decisions about land transport, decision makers need to be able to accurately evaluate the whole-of-life costs of proposals, including impacts (both positive and negative) in areas beyond their direct responsibility.

These impacts (known as externalities) are recognised in current evaluation methods included in the NZ Transport Agency's *Economic evaluation manual* for land transport projects. However, many are either poorly quantified or unknown, and the methods for including them in evaluations are rudimentary.

This is the case for all of the externalities covered by the research project, even though all are potentially significant in environmental terms.

A good example is New Zealand's international commitment to reducing greenhouse gas emissions (an issue of particular importance for the transport sector, which contributes nearly one-fifth of the nation's emissions each year). Being able to account for the whole-of-life greenhouse gas emissions of particular types of transport projects will enable decision makers to pursue projects that support government policy and help achieve targets.

Having a quantified baseline will also help achieve national strategies and the National Infrastructure Plan 2010, which envisages infrastructure investment based on whole-of-life costs (among other things).

A LOCAL APPROACH

One of the first steps of the study was to compile an inventory of resources used, and emissions released, by road and rail infrastructure across various life cycle stages: construction, maintenance and operation. Demolition and disposal was not taken into account, as this is relatively rare for large infrastructure.

Research lead Nalanie Mithraratne says that the inventory was, in fact, a particularly important part of the study.

'One of our main purposes was to generate New Zealand-specific transport data. The importance of this was borne out in the study, where it emerged that results derived from the local data were drastically different from those derived from European data. In future, it is essential that any attempts to quantify the impact of transport policies or actions should be based on New Zealand data.'

Specific areas for further research to build the reliability of local data are recommended in the research report.

THE IMPORTANCE OF CONSTRUCTION

The assessments found that, for road pavements, the type of construction used significantly altered the road's lifetime energy use and greenhouse gas emissions.

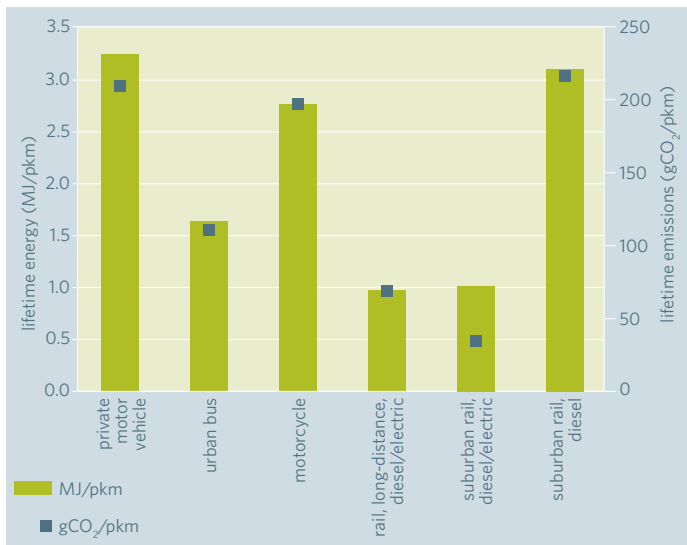
This was significant, given that one-third of the country's total road network currently has a loose surface. Roads with loose surfaces have high maintenance needs (and also high tyre-pavement resistance and lower traffic speeds, leading to higher fuel use), which boost their energy use and emissions in the long term to four times that of roads with sealed wearing courses.

Sealing the currently unsealed lengths of the road network is therefore an effective way to significantly reduce resource use associated with road infrastructure. Unbound granular

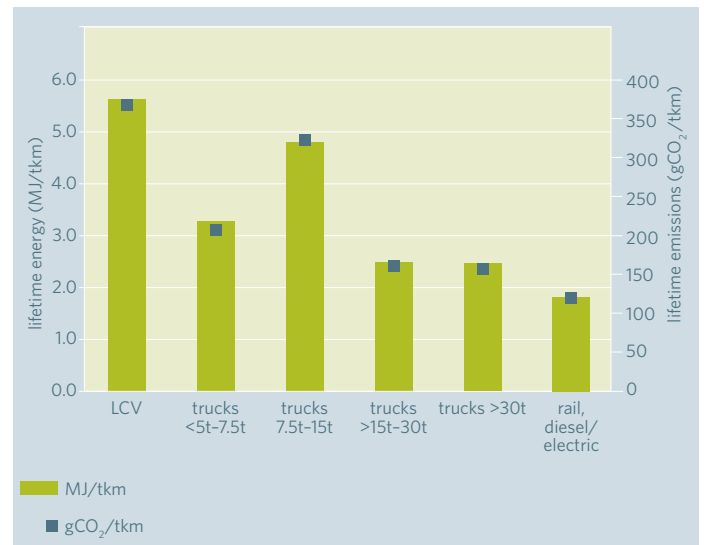


Michael Kilgour

COMPARISON OF LIFETIME ENERGY AND EMISSIONS FROM PASSENGER TRANSPORT BY ROAD AND RAIL



COMPARISON OF LIFETIME ENERGY AND EMISSIONS FROM FREIGHT TRANSPORT BY ROAD AND RAIL



pavement systems, with a sealed wearing course, provided an environmentally friendly option.

The terrain that roads are built on also contributes to their impact, with significant increases in energy use and emissions for hilly terrain, as opposed to flat terrain. As a result, the report recommends that more durable pavement construction types, with lower maintenance needs, are selected for roads in hilly areas.

THE BENEFITS OF RAIL

With respect to rail, the study found that the steel rails used to construct railway tracks accounted for nearly half of their lifetime greenhouse gas emission and energy use. The current practice of sourcing steel rails from China had a significant impact, and the report recommended that a local source of steel, with lower carbon emissions, should be sourced for future infrastructure projects.

Using rail for passenger and freight transport leads to greater reductions in both energy use and emissions, when compared with all the different modes of road transport, especially when electrified rail is used for suburban passenger transport (as opposed to diesel rail).

For road-based passenger transport services, fuel use was particularly influential, and using smaller lighter vehicles and increasing vehicle occupancy would noticeably reduce the impact of trips.

For road-based freight services, however, the choice of vehicle and infrastructure was just as influential as fuel use. The highest energy and emissions intensity was calculated for light commercial vehicles, with intensity decreasing as truck size increases (intensity for a light vehicle is over twice that of a large truck).

Nalanie says, ‘There were limitations around the data we had available for road-based services, and we’ve recommended that further research be carried out into long distance and suburban bus services, and freight movements nationwide, including the freight vehicle fleet composition and average fuel use.

‘We’d also like to be able to fill other holes in the data we had available for the assessments, in particular the costs of constructing, maintaining and operating transport infrastructure in New Zealand. Having this data available would improve the reliability, scope and usefulness of the assessments.’



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Lifetime liabilities of land transport using road and rail infrastructure,
NZ Transport Agency research report 462

Available online at www.nzta.govt.nz/resources/research/reports/462

MULTIGRADE BITUMENS PUT TO THE TEST

A study to evaluate the potential benefits of using multigrade bitumens for chipsealing found that, although they were straightforward to use, they provided no material advantage in terms of bitumen tracking or chip retention (at slow traffic speeds) compared with standard binders with similar penetration.

The study was carried out by Opus Central Laboratories between 2009 and 2011, and examined the potential for multigrade bitumens to improve the performance of chipseals on New Zealand roads. A particular focus was on those aspects of performance that could be expected to improve through multigrade bitumen use, namely chip retention, and bitumen pick-up and tracking by vehicle tyres.

Multigrade bitumens are produced by chemically modifying standard bitumens and have been widely, and successfully, used internationally in asphalt mixtures. Compared with standard bitumens, multigrade ones have low temperature sensitivity, suggesting that high-temperature seal performance (when used in chipsealing) should be enhanced. However, before the current study little research was available to test this contention.

Phil Herrington of Opus Central Laboratories says, 'Multigrade bitumens are not currently manufactured or supplied in New Zealand, and are not covered by our national bitumen specification. Internationally, multigrades cost more than standard grades, which will prevent them replacing standard bitumens in many applications. They do, however, cost substantially less than polymer-modified bitumens, so if their high-temperature properties resulted in better seal performance, they might have offered a cost-competitive alternative in that regard. It was this possibility we were interested in exploring.'

HOT WEATHER PROBLEMS

Binder pick-up and tracking in hot weather is a major problem for road controlling authorities in New Zealand, who can face complaints and claims for property damage from ratepayers as a result. The problem is particularly common for new seals, where soft binders can lead to chip roll-over. Bitumen bleeding and tracking is also a problem on state highways, where it reduces skid resistance. Additionally, chip loss during high summer is not uncommon on both highways and local roads.

In an effort to understand how these problems might be addressed through using multigrade bitumens, the study compared:

- the adhesion to tyres (tracking) of multigrade, standard and polymer-modified bitumens
- the seal cohesion properties (chip retention) of multigrade, standard and polymer-modified bitumens at high road temperatures (60°C).

A field trial was also set up to test the ease of, and any issues with, constructing chipseals using multigrade bitumens.

THE BINDERS STUDIED

Eleven binders were studied in the research, including three standard penetration grade bitumens (manufactured according to NZTA M/1 specification), two multigrade bitumens (which were sourced from Australia and are typical of the grades commonly used there), three polymer-modified bitumens (styrene-butadiene-styrene - SBS, styrene-butadiene rubber - SBR, and ethylene vinyl acetate - EVA) and one mastic (to reflect the fact that fine aggregate particles are always present in binders in the field). A road-sample bitumen was also tested, as was the multigrade bitumen used in the field trial.

BINDERS TESTED IN THIS STUDY

Binder	Description
180/200	Penetration grade (NZTA 2007)
80/100	Penetration grade (NZTA 2007)
40/50	Penetration grade (NZTA 2007)
M500/170	Multigrade (AP-T41/06) (Austroads 2006)
M1000/320	Multigrade (AP-T41/06) (Austroads 2006)
SBS modified	3.75% SBS copolymer in 80/100 grade bitumen
SBR modified	4.5% SBR in 80/100 bitumen
EVA modified	5.0% EVA polymer in 180/200 bitumen
Mastic	10% crushed greywacke aggregate fines (passing a 0.075mm sieve) in 180/200 bitumen
Road	From a five-year-old chipseal on State Highway 5 (Titiokura). Sampled at the scene of a road closure triggered by seal bleed in 2008
Multigrade construction trial bitumen	Multigrade bitumen used in construction trial (before addition of kerosene)



Pendulum apparatus for measuring seal cohesion (specimen in place)

Bitumen-tyre adhesion temperatures for the various binders were measured using a rolling wheel apparatus. The wheel was travelling at 1.6km/h and its tyre temperature maintained as 25°C.

Bitumen test films were constructed on heated aluminium trays. For all the binders, adhesion was found to occur at a well-defined temperature (rather than over a span of temperatures) and these temperatures were unexpectedly low, ranging from 33.3°C to 54°C.

There was poor correlation between the binders' softening point and their adhesion temperature (contrary to what had been expected). A good linear relationship between the log of the binder penetration at 25°C and the log of the adhesion temperature was obtained; however, subsequent measurements at higher tyre speeds did not correlate as well.

To test seal cohesion, seals were constructed on steel plates using grade 3 greywacke chips. A pendulum apparatus instrumented with an optical encoder was used to measure the cohesive energy of the bitumens under impact at 60°C.

The highest cohesive energy was measured for the SBR modified bitumen, while the lowest was for the 180/200 penetration grade bitumen. Both of the multigrade bitumens tested returned similar results to the standard 80/100 bitumen under the conditions used.

Phil says, 'In both of the tests, the results for the multigrade bitumens were similar to standard bitumens with similar penetration.

The anticipated advantages of the multigrades were associated with their reduced temperature sensitivity as indicated by viscosity measured at 60°C and 135°C, but as it turned out that reduced sensitivity had no significant effect on the performance-related properties we measured.

'It is important to note, however, that for the adhesion tests, the findings were based on slow tyre speeds. We're currently verifying whether these results hold for tyres moving at higher speeds. Likewise, the chip retention testing was carried out at low loading rates compared with those you'd generally find in traffic.'

The field trial confirmed that sealing with multigrade bitumen is straightforward and can occur without significant modifications to existing practices. The main differences are that higher spraying temperatures are required and a limited choice of adhesion agents can be used, as most diamine-type agents are not compatible with multigrade bitumens.

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Multigrade bitumen for chipsealing applications,
NZ Transport Agency research report 460

Available online at www.nzta.govt.nz/resources/research/reports/460

GETTING TO THE POINT WITH SPEED

Point-to-point speed cameras are already widely used overseas. Lessons learned from these international experiences will help smooth the technology's implementation here in New Zealand.

Point-to-point (P2P) speed cameras are used for average speed enforcement, by measuring the speed of vehicles as they enter and exit enforcement corridors and then calculating the vehicles' average speed.

They have been successfully used overseas, where their installation has led to substantial reductions in fatal and serious-injury crash rates.

New Zealand does not currently have an average speeding offence, and P2P cameras have yet to be used here. However, there is a recognised need to reduce the number of fatalities occurring on New Zealand's roads, and lessening the incidence of speeding at crash black spots is one way to do this.

As a result, the Ministry of Transport included an investigation into P2P cameras in its 2010-20 Safer Journeys strategy, and the NZ Transport Agency has made this a safety research priority for 2010-12.

The investigation has been carried out by AECOM NZ, with the resulting research report outlining positive potential uses of P2P technologies in New Zealand, provided the lessons learned from overseas experiences are taken on board.

HOW WE CURRENTLY MEASURE SPEED

Speed enforcement in New Zealand currently uses a combination of fixed spot speed cameras (56 mountings using 12 cameras), mobile speed camera vans (using 43 cameras) and police officer detected infringements. Legislation and enforcement procedures and systems support these approaches, with enforcement having particular implications for the Land Transport Act 1998, the Public Records Act 2005 and the Privacy Act 1993. Infringements are adjudicated on and issued by the Police Infringement Bureau.

HOW AVERAGE SPEED ENFORCEMENT WORKS

Average speed enforcement using P2P cameras works along similar lines worldwide.

Cameras take time-stamped images of all vehicles as they enter and leave the enforcement corridor, and store them locally for a predetermined period. Automatic number plate recognition software identifies vehicles and provides a data read-out of their number plates. Enforcement corridors are of known length, enabling a vehicle's average speed along to be calculated by dividing the distance between the camera points by the time taken to travel it.

ISSUES IDENTIFIED OVERSEAS

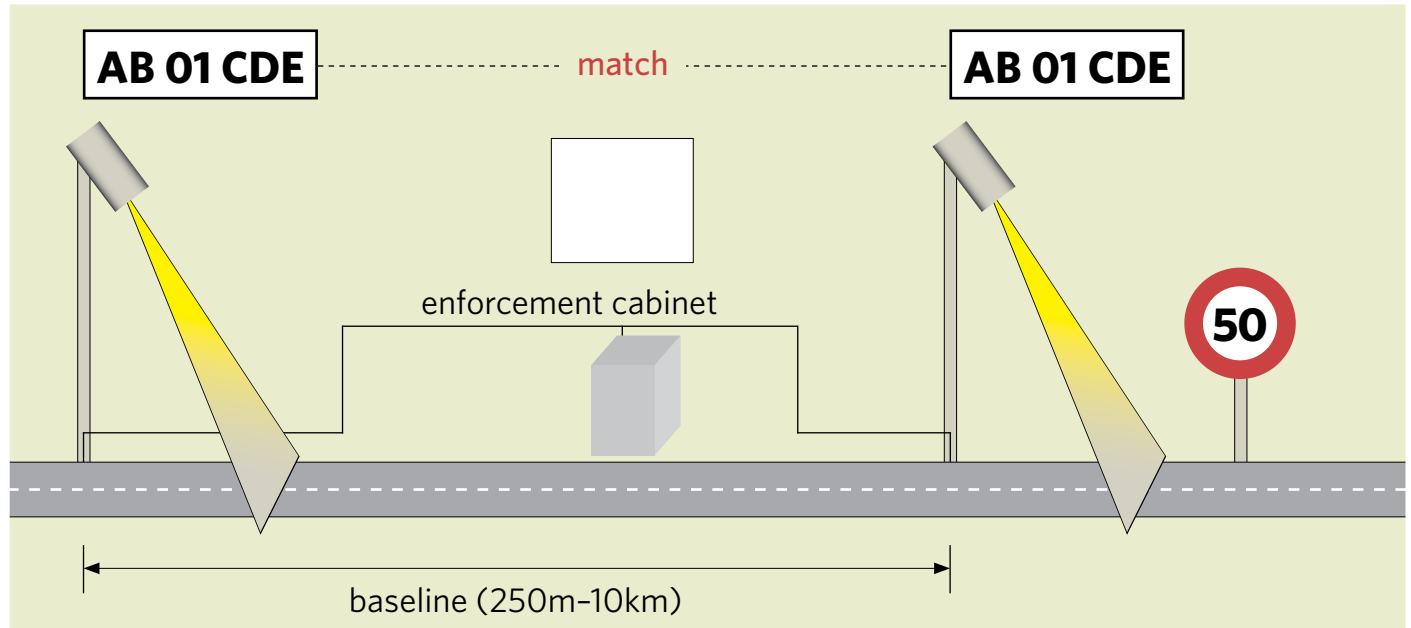
Average speed technologies were introduced overseas in 2001 and are now used in the United Kingdom, Europe and Australia. In all areas where they have been introduced, there have been reductions in fatal and serious injury crashes, and greater compliance with speed limits.

In some areas, these impacts have been substantial. For example, on a motorway in south-west Scotland that was previously prone to high-speed crashes, fatal crashes fell by 46%, serious injury crashes by 37% and all crashes by 19%, over the three years since P2P cameras were introduced.

There have, however, been some issues with the technology's introduction and use overseas, and it is these lessons that New Zealand can learn from if average speed enforcement is introduced here.

Various P2P systems are available and the full report on the investigation examines how these have performed overseas and their suitability for New Zealand conditions.

POINT-TO-POINT SPEED CAMERA ENFORCEMENT SCHEMATIC



Source: VYSIONICS (formerly Speed Check Services)

How the systems are installed also affects their effectiveness, with different set-ups identifying more vehicles than others. However, as Rob Napier of AECOM explains, capture rate (the proportion of vehicles successfully identified) is not the only factor to consider when deciding how cameras should be installed.

Rob says, 'The international research suggests that a high capture rate is important to build the cameras' credibility as an enforcement tool. However, there's evidence that where cameras are installed overtly, they are effective in causing drivers to slow down in the enforcement zone, which is a positive outcome when the road is a high-crash area.'

Camera configurations with the highest capture rates were found to be those where the cameras were located directly above the traffic lanes, with one camera installed per lane. Vehicle detector loops that triggered the camera to photograph vehicles as they entered and left the enforcement corridor, and infrared illuminators for night-time identification, also boosted the technology's effectiveness.

SELECTING THE BEST SITES

Another important factor affecting capture rates is where cameras are located within the road network. Major highways with a history of crashes and casualties are an obvious criterion for site selection. Others include traffic volumes, the length of the zone, and the speed, number and nature of intersections within it.

Part of the investigation involved using these criteria to identify 11 potential sites in New Zealand where P2P cameras could be introduced, with three of the top-ranking of these sites selected for further investigation.

Rob says, 'Average speed enforcement systems have proved effective overseas for reducing speeds and crash rates, and our investigations suggested we could expect similar benefits from installing the systems here.'

'We're suggesting a phased implementation at the three test sites identified in the research, which would allow the cameras to be tested in local conditions and a case to be developed for how best to introduce them into New Zealand. Phased implementation would also let the police take the necessary steps to have P2P cameras recognised as legal surveillance devices.'

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Investigation into the use of point-to-point speed cameras,
 NZ Transport Agency research report 465

Available online at www.nzta.govt.nz/resources/research/reports/465



NEW RESEARCH REPORTS

Supply chain innovation: New Zealand logistics and innovation

Research report 494

L Spanjaard and R Warburton - Deloitte, Australia

Freely available online at www.nzta.govt.nz/resources/research/reports/494

This research was undertaken in New Zealand and Australia during 2012, to identify opportunities for, and barriers to, innovation in the freight and logistics component of selected export supply chains. The research was undertaken in two phases, the first being a desktop review of similar studies completed in New Zealand and overseas. Three export sectors (forestry, meat and wine) were then chosen for more in-depth analysis. The second phase of the research incorporated a number of face-to-face discussions with a sample group of sector participants and industry peak bodies.

The desktop research and the discussions with industry participants were used to identify a number of key trends in innovation common across all sectors. These included collaboration between industry participants, use of information technology, increased transparency and control of supply chains, new transport technologies, supply chain restructuring to generate cost savings, leveraging international relationships to generate economies of scale and realisation of the benefits of like industries clustered in the same location.



National mapping of integrated transport and land use

Research report 490

Andy Haigh - Beca Infrastructure Limited

Helen Lane - NZ Transport Agency

Freely available online at www.nzta.govt.nz/resources/research/reports/490

The NZ Transport Agency (NZTA) is charged with taking an integrated approach to land transport planning. Our Integrated Planning Strategy sets out how we can invest in land transport activities that support appropriate land-use patterns and connect major cities and ports. We aim to achieve the lowest possible long-term transport costs for firms and households through effective planning and design.

This research collated geospatial information to enable the NZTA to better understand how transport networks, land-use information, demographic and key environmental constraints interact. The collated data was loaded into the Spatial Viewer system and will now be analysed and checked for 'hot spots' that require prioritisation of effort. These hot spots may be areas with significant change pressures such as population growth.

In particular, this work will help ensure that when undertaking long-term integrated planning work (ie feasibility work), land-use planning, transport planning and investment decisions are addressed together and not separately.

Scoping approach and measuring the impact of indexing unit cost parameters in cost-benefit analysis

Research report 492

C Parker - NZ Institute of Economic Research (NZIER)

Freely available online at www.nzta.govt.nz/resources/research/reports/492

This study assessed the feasibility and materiality of allowing for real-price changes in economic appraisals over the course of a transport project's appraisal period. The research found that time indexing unit cost parameters in transport cost-benefit analysis is feasible, and that benefit-cost ratios increase materially for the majority of project categories, but not for all. The report considers some of the issues involved, identifies the relative effects of various assumptions, and provides recommendations.

Obtaining NZTA research reports

All research reports published since 2005 are available free of cost for downloading from the NZTA's website - www.nzta.govt.nz/planning/programming/research.html.

PDF scans of research reports published prior to 2005 are available by emailing research@nzta.govt.nz.

NZ BRIDGES 2012 CONFERENCE

Coming to you next month, be sure to register for Conferenz's 2012 NZ Bridges Conference.

With a programme specifically tailored for New Zealand's bridge professionals and with NZTA endorsement, 'the conference is essential for anybody involved in the New Zealand bridge industry. It is a conference that comes at a crucial time, and provides a unique opportunity for the New Zealand bridge community to come together to learn, grow and enjoy each other's company. The NZTA strongly urges everybody to attend' (Barry Wright, National Structures Manager, NZTA).

Engage with leading industry experts including the NZTA, KiwiRail, Beca, Downer, ARRB Group, Fulton Hogan, HERA, NZ Steel, and the Universities of Auckland and Canterbury. With a keynote presentation from Nigel Priestley on the displacement-based approach to seismic design, get up to date with the latest developments, innovations and regulations affecting the industry, including:

- the NZTA's *Bridge manual*
- seismic performance and design initiatives
- high-productivity motor vehicle (HPMV) rules and their impact on bridges
- funding, asset management and maintenance
- design, construction and sustainability.

Brought to you for the very first time, the conference will take place on Monday 29 October and Tuesday 30 October, at the Amora Hotel in Wellington. For more details and to register for the conference, visit the Conferenz website at www.conferenz.co.nz/nzbridges.

Following the conference on Wednesday 31 October, NZCS will be providing a half-day workshop on 'Seismic assessment of existing bridges: lessons learnt from Canterbury earthquakes'. Running from 9am to 1pm, the NZCS workshop is separately bookable but will be offered at a considerable discount to those who attend the NZ Bridges 2012 Conference. Held directly opposite the conference venue at the Wellington Convention Centre, more workshop information and registration details is available at www.concretesociety.org.nz.



The NZTA has another quarterly newsletter you might be interested in.

Exchange is the Public Transport Leadership Forum's quarterly e-newsletter. It informs transport sector leaders and rail, bus and ferry operators across New Zealand about the forum's vision, synergies and planned initiatives to improve the effectiveness of public transport in New Zealand.

For more information about this newsletter, go to www.nzta.govt.nz/about/newsletters.

A NOTE FOR READERS

NZTA research newsletter

NZTA research is published quarterly by the NZ Transport Agency (NZTA). Its purpose is to report the results of research funded through the NZTA's Research Programme, to act as a forum for passing on national and international information, and to aid collaboration between all those involved. For information about the NZTA's Research Programme, see www.nzta.govt.nz/planning/programming/research.

Advertisements of forthcoming conferences and workshops, that are within the newsletter's field of interest, may be published free of charge when space permits.

Contributed articles are also welcome, should not exceed 1000 words and are to be emailed to research@nzta.govt.nz. Illustrations must be of high quality. *NZTA research* reserves the right to edit, abridge or decline any article.

Published articles may be reproduced and reference made to any part of this publication, provided appropriate credit is given.

Enquiries on articles should be made to the authors of research reports whose details are listed at the end of the articles. Otherwise all general correspondence, queries related to conference notices, and requests for additions or amendments to the mailing list, should be made to research@nzta.govt.nz.

Editions of this newsletter, *NZTA research*, are available in hard copy or on the NZTA website at www.nzta.govt.nz/resources/nzta-research/. Back editions are available online only.

Disclaimer

The views expressed in *NZTA research* are the outcome of research and should not be regarded as being the opinion, responsibility or policy of the NZTA or of any agency of the New Zealand Government.

Email alerts of newly published research reports

Email notification is provided when new NZTA research reports are published on the NZTA's website at www.nzta.govt.nz/planning/programming/research.html. Please email research@nzta.govt.nz if you would like to receive these email alerts.

Do we have your correct details?

We would like to hear from you at research@nzta.govt.nz if you wish to update your name or address details, or to alter the number of hard copies of *NZTA research* you'd like to receive.

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