Issue 28 June 2015

ISSN 1174-0523 (print) ISSN 1174-0566 (online)

NZTA research

NZ TRANSPORT AGENCY
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MEASURING THE PLACE FUNCTION OF MAJOR URBAN ROADS

Roads have dual, and at times competing, functions: as links, based on their capacity to enable movement of people and vehicles, and as places, based on being a destination in their own right. Both are crucial, and increasingly the need to support and value the place function of roads, as part of road design, is being recognised in New Zealand transport policy and planning.

However, although the means of measuring the link performance of roads – through traffic volumes, composition and speed data – is well established for New Zealand roads, the ability to measure their place function is much less so. There is an historical basis for this imbalance, stemming from the rapid increases in vehicle-based mobility throughout the 20th century. These increases led to road design being driven by demand and capacity considerations, with the result that roads tended to grow wider as populations increased. The place function of roads was, by comparison, not a primary concern.

It is only in recent years that the negative economic, social and environmental impacts of this exclusive focus on the link function of roads has come to be understood, and documents such as *NZS4404:2010 Land development and subdivision infrastructure* have begun to promote and include road assessment factors related to place, liveability and urban design.

However, uncertainties remain around how to best measure the place function of roads. These need to be resolved if policy is to be implemented, and the link and place functions of roads effectively balanced. Defining what is meant by place function, and clarifying how its performance can be measured, will also enable transparency in communicating how the competing objectives for land transport (such as mobility and liveability) are accommodated.

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The aim of this research, therefore, was to identify performance measures for the place function of state highways and arterial roads in an urban context. Matters taken into account in the process included the historical context; current approaches to road design and planning in New Zealand, and how place function contributes to these; and how place function is considered in academic literature, regulations and guidance documents.

From these, potential indicators for measuring place function were identified and analysed according to their relevance and availability. Suitable indicators were then pulled into a framework tool, which transport planners and other practitioners can use to undertake desktop reviews of the quantitative, transport-specific aspects of place.

In line with the project's aims, the research did not result in a measurement framework defining level of service for place, or giving an indication of what quantitative indicators mean in terms of 'good' or 'bad' place performance. As the research team states in the report, '...place is a complex construct. Although there are quantitative variables that can provide insight into likely or relative place performance, the whole will always be greater than the sum of these discrete parts'.

Rather, the tool provides an initial indication of the relative place performance of a road section in terms of transport metrics. In particular, the framework is a useful tool to help planners and practitioners:

- understand the existing place performance of streets within a network
- identify whether or not a site-specific, qualitative assessment is warranted
- identify place performance detriments for particular streets as a whole
- determine the relative ease of improving place performance, based on different performance measures.

Figure 1 summarises the potential measures of place function identified through the research. Some of these are derived from the reviewed literature, and others are readily accessible, but not explicitly derived from the literature.

The figure highlights that there is some overlap between measures traditionally used to understand a road's link function, and those that might describe place function. The more a measure relates to how people actually use a road as place, the more significant the measure is.

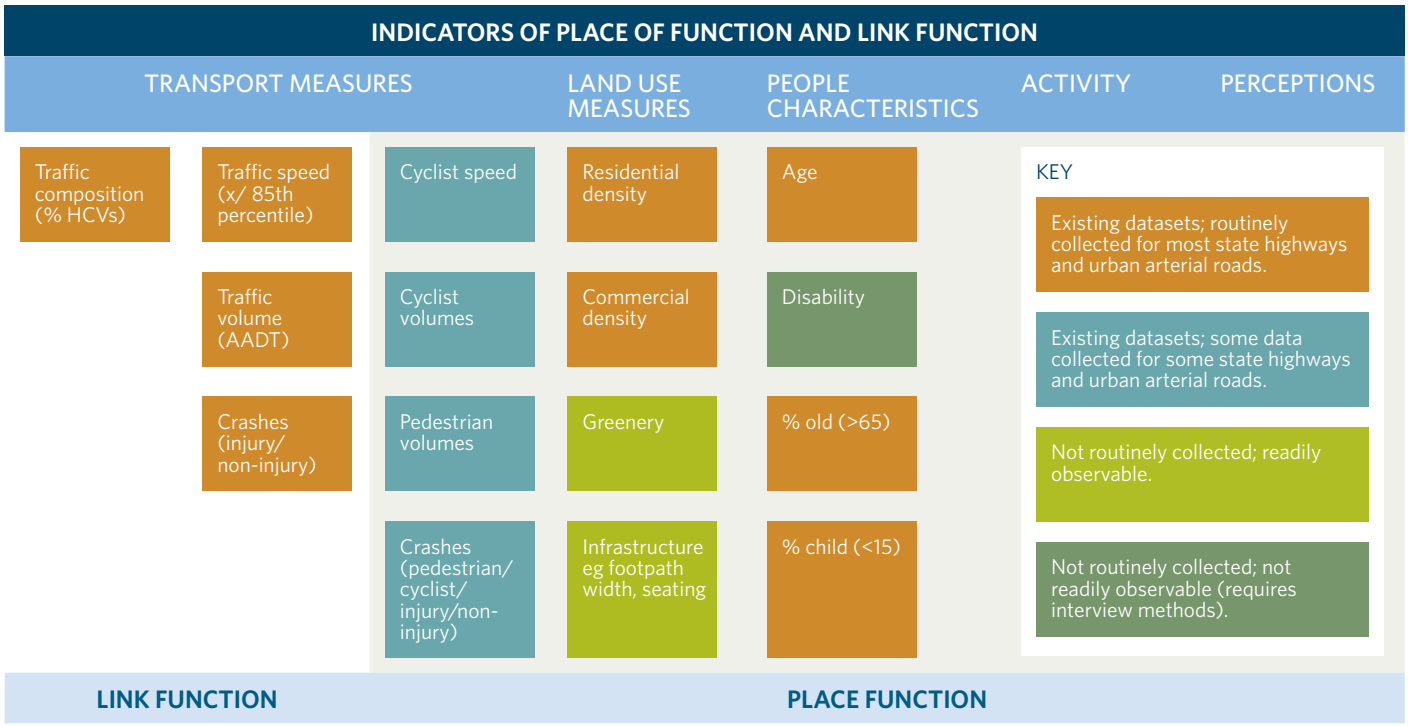

Figure 1 Indicators of place performance

DEFINING LINK AND PLACE

One of the study's initial tasks was to derive definitions, from the literature, of the link and place functions of New Zealand urban and state highway roads.

Link function is the performance of a street in terms of its use as a movement corridor. It is measured by structure (capacity and designation for different movement modes), and by the extent and nature of movement (traffic volume and speed by mode), including rules and restrictions governing movement. Performance can be measured in situ (actual movement performance) or appraised according to the desired link function of a street within a network.

Place function is the performance of a street in terms of its use as a destination. Place function is measured by structure (physical space and land use context); the extent and nature of activity taking place (including rules and restrictions governing this activity); and the number and nature of users of the street. Performance can be measured in situ (actual place performance) or assessed according to the desired place function of a street within an urban area.

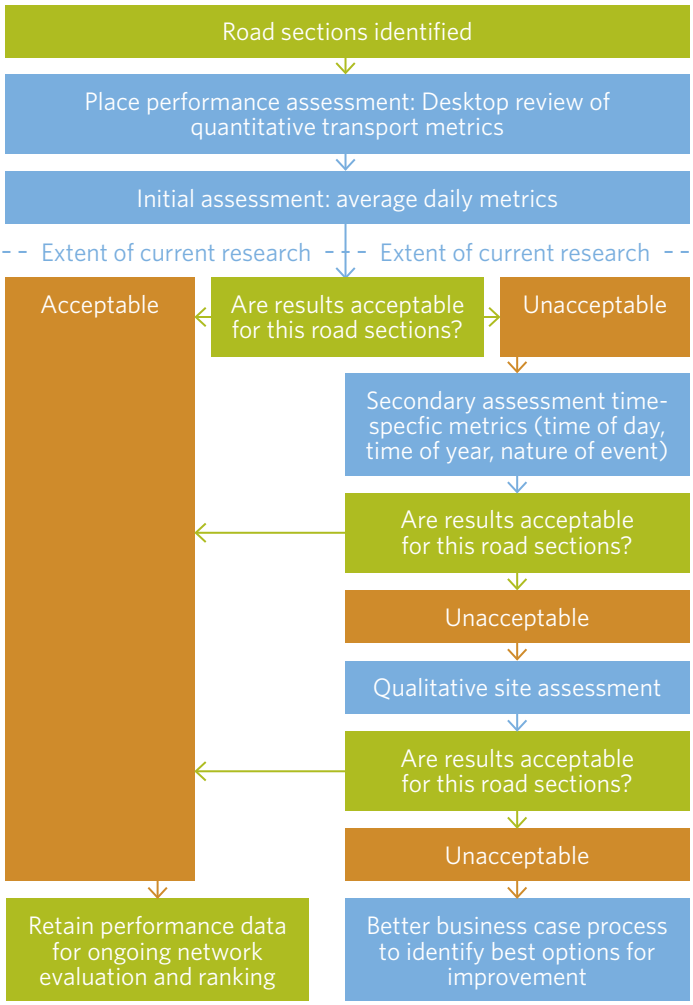

Figure 2 Place evaluation process including quantitative assessment as initial desktop study

The research team recommend that the measures defined in their report should be used, as an initial desktop study, as part of a broader place evaluation process. This process is shown in figure 2. Following this process will enable practitioners carrying out the performance assessment to take into account other factors (such as time of day or year, or one-off or occasional events) that might affect the place performance of a particular road section.

They also recommend that the performance measures be pulled together into a performance matrix.

For the purposes of the study, the matrix was trialled with three case study street sections: Dominion Road in Auckland; Normanby Road in Paeroa; and Greenwood Street in Hamilton. The case studies demonstrated that while some measures of place (such as traffic volumes and infrastructure) are readily available, others (such as the average time people spend on the road section) will require specific data collection. The case studies also confirmed that the matrix would benefit from further refinement through its application to a wider variety of sites.

Performance indicators and measures for the place function of state highways and arterial roads in urban contexts, NZ Transport Agency research report 567

Available online at **www.nzta.govt.nz/resources/research/reports/567**

BETTER BUS INFRASTRUCTURE: AN INTEGRATED APPRAISAL AND EVALUATION FRAMEWORK FOR THE NEW ZEALAND CONTEXT

Many cities and towns in New Zealand aspire to providing a better bus infrastructure. But how can this be achieved in an effective, efficient and safe way?

The December 2014 NZ Transport Agency report, *Benefits and delivery risks for bus infrastructure schemes*, considers the delivery of different types of bus infrastructure, including stops, interchanges and priority measures.

In the report, MRCagney, Ian Wallis Associates and Coalesce Consulting present an appraisal and evaluation framework designed to help approved organisations understand the primary benefits and risks of different types of bus infrastructure schemes. The report suggests a combination of multi-criteria analysis and cost-benefit analysis is useful for assessing proposed bus infrastructure projects.

At the heart of the framework is an appraisal summary table, or AST, which summarises the main impacts of bus infrastructure schemes. The AST is designed to provide an overview of the expected benefits, costs and risks relating to a project. The AST is suitable for both before (ex-ante) appraisal and after (ex-post) evaluations, and for integrating risk management considerations into project appraisal from the outset.

The AST was applied to five bus infrastructure case studies in New Zealand. Researchers found that targeted and well-designed bus infrastructure schemes were able to deliver significant benefits.

The application of the AST found that bus priority measures on Dominion Road in Auckland, for example, were particularly effective, with an estimated ex-post benefit-cost ratio in excess of 6.0. The excellent performance of this scheme was attributed to its ability to deliver substantial travel-time and reliability benefits for modest costs.

Several bus interchanges were also evaluated. Tauranga's downtown bus interchange was found to be particularly effective. Other interchanges, such as New Lynn in Auckland, performed more modestly. In this case, however, the operational benefits of the scheme are only likely to be fully realised once pending major network changes are implemented. This highlights the need for an integrated approach to the planning of bus infrastructure and networks.

The research identified how a more consistent approach to appraisal and evaluation would help to improve decision making by providing more consistent information to decision makers and the communities they represent. Researchers recommended recording a wider range of data in future to ascertain whether the goals of a project were met.

The researchers note the 'success of a project is generally defined by an absence of complaints or accidents following the upgrade, rather than its implications for the efficiency and effectiveness of the bus network.' The research suggests that

a more integrated approach to bus infrastructure and services is required to fully realise the benefits of investment, especially with regard to bus interchanges.

The proposed AST has already been usefully applied to the evaluation of a new city centre bus interchange in Dunedin.

Researchers also identified opportunities for central government to streamline regulatory processes relating to the delivery of bus infrastructure.

'One potential improvement would be to include in district plans more permissive zoning overlays that reduce the consenting requirements for developing bus infrastructure in locations the [regional public transport plan] identifies as being of strategic importance to the public transport network,' the report suggests.

Another improvement would be to remove the Local Government Act 2002 public consultation requirements for establishing 'transport shelters', which could instead be managed under more appropriate Resource Management Act 1991 processes.

The report notes that bus infrastructure projects often have some unique risks not found with other transport infrastructure investment, such as the removal of car-parking. These risks tend to vary according to the type of environment involved and over time.

From the case studies, researchers found that public opinion was considered the key risk to be managed in public transport infrastructure projects.

However, some risks such as public perception of the need for the project, could sometimes diminish as their cumulative, integrated network-wide benefits became more apparent to stakeholders. This suggests that some degree of fortitude is required when delivering bus infrastructure.

'Identifying "typical" risks for different sized bus-based public transport projects earlier in the project lifecycle, and developing simple methods for addressing these risks present will help avoid known pitfalls of bus infrastructure schemes and ultimately allow such projects to be delivered more efficiently,' the report adds.

In particular, the case studies also revealed that potential retail impacts should also be considered in the planning and consultation phase of the project. 'Our research shows that public transport infrastructure schemes can have significant impacts on local retail, both positive and negative – with the latter being a particular issue during construction.'

The New Lynn interchange, for example, was found to have generally positive retail impacts, with a significant increase in retail spending after construction of the interchange was complete. In Wellington's Manners Mall, however, retail spending dropped following the installation of bus lanes, while the rest of the region showed growth.

'This indicates concerns raised by the retail sector prior to the project were valid, although more analysis is needed to assess the extent of how the changes in retail type have impacted on total spend.'

Proactive management of these risks is likely to support greater public understanding of the infrastructure schemes. The report suggests public transport infrastructure projects commit to analysing electronic payment data at fine spatial scales and over time to ensure the impacts of schemes on the retail sector are better understood.

The researchers also recommend that the proposed framework be considered for use in ex-post evaluation of the impacts of larger schemes to help validate assumptions and modelling methods.

Further application and refinement of the framework should ensure more systematic recording of the quantitative and qualitative benefits and risks of public transport infrastructure projects.

'The Transport Agency and approved organisations could partner to apply and refine the appraisal framework developed in this research. This would provide insight into its relative merits for a wider range of bus infrastructure projects.'

The report says aspects of the appraisal framework, methodology and associated guidance are suitable for incorporation into future revisions of the Economic evaluation manual and the development of Guidelines for public transport infrastructure and facilities.

A review of literature notes there has been limited research into the distributional impacts of bus infrastructure schemes and the researchers also recommend further research be done in this area.

Benefits and delivery risks for bus infrastructure schemes, NZ Transport Agency research report 561

Available online at **www.nzta.govt.nz/resources/research/reports/561**

DRIVERS' ATTITUDES TO SAFER SPEEDS MIXED

Research into likely public acceptance of, and compliance with, reduced speed limits has found good support for lower limits among drivers in some environments, provided they are advised of the reasons for slowing down.

The research, conducted by MWH Ltd, Monash University and Beca Ltd, aimed to understand how effective education, enforcement, and engineering and other perceptual changes to roads and road environments were in gaining acceptance of and compliance with lower speed limits.

It looked at speed limit changes in both rural and urban New Zealand environments, and took a four-pronged approach, examining:

- the case for lower speeds – based on research and studies, here and overseas
- actual compliance with lowered limits – in areas where reduced speed limits have already been introduced
- acceptance – among drivers, of the need for lower speeds
- effectiveness – of engineering, education and enforcement measures, in conjunction with lower limits, to reduce speeds.

THE CASE FOR LOWER SPEEDS

The study found considerable research supporting the road safety benefits of reduced speed limits. In particular, it is now well established that there is an increased likelihood of fatal and serious crashes at higher speeds. Safer roads and roadside infrastructure improvements, such as median barriers, can also minimise this increase in risk.

In New Zealand, the desire to reduce travel speeds has been accepted at a policy level through the adoption of a Safe System approach to road safety. The Ministry of Transport's Safer journeys: New Zealand's road safety strategy 2010–2020 specifies that achieving a road network with safer speeds, or one where the travel speeds are unlikely to cause fatal or serious crashes, is one of the four crucial elements that make up the Safe System approach.

Safer speeds are a priority because speed affects the outcome of every crash. The severity of injuries resulting from a crash is directly related to the speed of impact – whether or not speeding was a factor in the crash.

Travel speeds that support both safety and economic productivity are among the agreed long-term, cross-sector goals as part of the 2013–15 Safer Journeys Action Plan and the Safer Speeds Programme, and speed limits are one tool to manage speeds to levels that are safe and appropriate for the road function design, safety and use.

At present, it appears that much of New Zealand's road network is not safe at its posted speed limits. This is particularly the case for lower classification roads over winding terrain and with low traffic volumes. Upgrading these roads to a level where they are safe at the current speeds is not an economically viable option. This means that New Zealand will need to rely on other low-cost speed management interventions in order to improve road safety on these roads.

Internationally, there has been very little research on driver acceptance of, and compliance with, reduced speed limits. In general, the European research showed widespread acceptance of the benefits of speed limit reductions, although the studies tended to focus on drivers' attitudes to and compliance with existing standard speed limits, rather than the reduced ones that were the subject of the current study.

In Australia, two surveys looked specifically at drivers' acceptance of lower speeds on some categories of roads, both recording that acceptance was likely to be higher where justification had been provided for the changes.

In order to understand the level of driver acceptance and compliance in the New Zealand context, the research team looked at before and after studies for areas where speed limit reductions had already been implemented. This was complemented by an online survey about drivers' attitudes to reduced speeds, and an assessment of the experiences of three different local authorities that had implemented engineering, education and enforcement measures to support reduced speed limits in their areas.

ACCEPTANCE AND COMPLIANCE IN NEW ZEALAND

The current level of compliance with reduced speed limits was assessed by looking at the results of before and after studies carried out by various road controlling authorities across New Zealand. The assessment considered a range of different speed limit changes on urban and rural roads, with different levels of traffic volume, alignment and roadside environments.

In general, the studies found better compliance with reduced limits on winding hilly or mountainous roads, shopping streets and around schools, and on rural or open roads where reductions were modest (for example, from 100km/h to 90km/h, rather than a more pronounced reduction to 80km/h).

There was less acceptance of reduced speed limits in residential streets and on straight flat rural roads, even those with a history of high crash rates.

A couple of studies found considerable compliance with speed limit reductions on high-speed, high-volume and high-crash-rate state highways. This was likely to be due, at least in part, to heightened levels of police enforcement for the new limits, given the high historical crash rates on the roads in question.

A study of the impacts of reduced speed limits, to 40km/h, in urban Hamilton found that low-cost engineering improvements were needed to achieve the reductions, as speed limit signs and markings were insufficient on their own to change driver behaviour. The study also found that, despite extensive public information campaigns, public opposition to the speed restrictions grew over time, an experience that was reflected in Hastings in relation to reduced limits on rural roads.

To gauge public acceptance of reduced speeds, the research team conducted an online survey to collect information about drivers' attitudes, with the results then compared with other relevant surveys from overseas. The survey was relatively small (239 responses) and so the results, although interesting, should be interpreted with some caution.

Overall, the results showed most respondents agreed that New Zealand roads would be safer if everyone drove at slower speeds. There was also a high degree of understanding of the link between travel speeds and fatal or serious crashes. Female respondents showed stronger support for safer speeds than males.

The survey also looked at how willing drivers would be to accept reduced speeds. Support varied, depending on the nature of the environment where a lower speed was proposed. In shopping areas, 40km/h speed limits were more likely to be supported than on residential streets. The lowest level of support was for reducing the speed limit on rural roads from 100km/h to 80km/h.

Interestingly, the survey also found that drivers would be more likely to slow down if the reasons for the reduced speeds were explained and displayed; a result that reinforced the findings from Australian studies. For example, just under half the respondents said they would slow down if a sign stating 'safer speeds' was posted to explain the reason for the speed limit reduction. If additional information, such as 'school', 'high crash site' or 'busy shopping street' was also given, even more respondents said they would slow down.

With respect to the measures used to encourage slower speeds, the research team looked at the success (or otherwise) of various engineering measures that have been used, in association with speed limit reductions, around New Zealand. In urban areas, the analysis showed that on wider roads engineering measures, such as traffic calming, are much more effective at reducing operating speeds than speed limit signs and markings used alone.

Local authorities reported mixed responses, however, to consultation and media campaigns associated with speed limit reductions. The degree of opposition from the public appeared to be linked to the existing levels of public acceptance of the safety benefits of lower speeds. A couple of authorities found that, despite extensive education programmes, there was still a large section of the community that did not seem to understand the safety benefits that could flow from lower speeds.

Another area the study sought to look at was the impact that enforcement (including speed cameras and police patrols) had on compliance with reduced speed limits. Insufficient data was available, however, to fully understand the impacts. Further research would help shed light in this.

Safer speeds: public acceptance and compliance, NZ Transport Agency research report 563

Available online at **www.nzta.govt.nz/resources/research/reports/563**

INVESTIGATING NEW APPROACHES TO TRANSPORT APPRAISALS

A NZ Transport Agency funded research project investigated the use of the gross value added (GVA) method to assess transport projects.

Unlike the current cost-benefit appraisal approach, the GVA method has the potential to measure the changes in aggregate economic activity that occurs throughout the economy, or within regions, rather than just within the transport market.

In recent years, especially since the financial crisis, concern has been expressed that decision makers might be more interested in the question: What will be the impact of an investment project on the economy, that is, on gross domestic product (GDP) or the similar GVA?

This is especially the case when regional benefits and costs are of interest, rather than the benefits and costs to society as a whole. The GVA method has the potential to disentangle how the benefits and costs in the transport market become dispersed throughout the economy.

In recent years, the GVA approach has been used in the UK and the US to investigate the impact of transport investment. The common feature of the models used is that the dependent variable is some change in economic activity, be it GDP, GVA, income or employment.

For the purpose of this research, the focus was on the UK GVA models. These models evolved out of an interest in regional investment. They can take many forms, but the form that has gained widespread attention is the reduced form equation of wages or GVA or employment density against economic mass.

The US also applies a similar model developed by B Alstadt, G Weisbrod and D Cutler in their 2012 paper 'Relationship of transportation access and connectivity to local economic outcomes'[1] for middle-stage planning purposes, a model that was picked up in this research study.

EXPLORING THE GVA APPROACH

Having examined the various GVA approaches used overseas, the project selected a two-stage model – designed to demonstrate the accessibility effects that transport initiatives would have on GDP – to explore further. The model chosen had been applied in the US and was easily adapted to data readily available in New Zealand (including people attributes at a territorial authority level). The model enabled investigation of nearby access, and also connectivity to people and ports that are not necessarily nearby.

The research team derived the model coefficients using 2001 and 2006 Census data from across the 72 territorial authority areas of New Zealand. They then applied the estimated access elasticities to a proposed additional Waitemata Harbour crossing case study, in order to derive estimates of what the effects on GDP would be if the crossing went ahead.

The results were broadly consistent with those returned in similar studies overseas. While industry GDP effects were identified and there were insights into spatial effects as well, the simple model used was unable to indicate a likely spatial distribution of GDP and employment gains and losses. However, the model provided an alternative measure to the agglomeration effects methodology detailed in the NZ Transport Agency's (2013) Economic evaluation manual – confirming that the order of magnitude for the GDP effects is likely to be large.

One finding of the model that was not put to the test very well in the case study was the prospect of GDP gains from a wider connectivity. An additional harbour crossing appeared to do little to enhance travel to and from the outer reaches of Auckland. However, the model, which was estimated across New Zealand, did point to the existence of a 'delivery zone' productivity effect from the new crossing.

This additional measured effect suggests that the GVA model could be useful when a two to three-hour drive time could be reduced significantly by a transport intervention. If the time savings are over shorter distances, then the agglomeration methodology currently detailed in the Economic evaluation manual is likely to capture the effects that would otherwise be picked up within a GVA model.

The GVA model also extended the current Economic evaluation manual approach in two further ways.

First, the elasticities derived before taking into account people effects provided a useful indicator of the potential productivity gains that could be achieved if not only accessibility were to change, but the mix of people skills and occupations were also to adapt. This adaptation could either be by re-sorting employees, or by providing additional training for current employees. In the case of the additional harbour crossing, the model estimated that an extra $105 million in present value was the potential GDP gain should people attributes re-align as well as access improve.

Second, the employment information provided some insights into possible spatial redistribution of activity, and warned that employment would both increase and decrease within industries and places as a result of the improved accessibility although the model did not predict exactly what these changes would be.

Overall, the research team concluded that the GVA model derived for New Zealand required more work before it would be suitable for quick transport appraisals. However, what the model did provide was a useful and readily available means of exploring the possible scenarios around a major transport intervention. So, for the additional Waitemata Harbour crossing project, for example, it could be used alongside existing land use transport interaction models to explore the alternative scenarios of population and employment projections that are likely to result if the project goes ahead.

The research report suggests ways the GVA model could be improved for future use in New Zealand. It also sets out the pros and cons of the GVA methodology that emerged from the research, and the types of situations that would and would not suit a GVA analysis: these are summarised in the tables below.

PROS	CONS
• The GVA model captures some of the wider benefits of transport investments that are not captured in the traditional CBA, notably those stemming from agglomeration and from wider connectivity. • Furthermore, once estimated, the model can be easily applied to give a measure of GVA or GDP. For reasons discussed in chapter 5, CBA does not give this measure. GDP and GVA are of direct interest to policymakers. • Different models can be used to compare how GDP will alter if person composition is allowed to change with accessibility (the people-based effect and the place-based effect). • Scenario testing with the models can provide a guide to the spatial composition of effects (but does not actually forecast these effects). • The model brings focus on issues to do with the transmission of benefits, eg is time of day important? • The model produces estimates of changes in productivity by industry that could be incorporated into a general equilibrium model that, in turn, would be able to more closely estimate spatial effects.	• The GVA approach is not consistently defined across different studies. Likewise density measures also differ across studies. These inconsistencies reduce the ability to compare model outcomes and calibrate model parameters. • The model and access variables as currently defined have econometric shortcomings that reduce credibility in the results. • The model parameters have been estimated from data that has evolved in a different way from the intention of the model (ie the data is about population change while the application of the model is about travel time change). • Frictions and constraints are not represented in the model (we assume accessibility gains are passed directly through into the economy). • The GVA model does not track which resources (labour) in which locations and in which industries that might initially be displaced by higher productivity are eventually re-employed. • The GVA model omits welfare effects that are not part of GDP, eg savings in leisure travel time.

Table 1 Pros and cons of GVA methodology

GVA SUITABLE FOR	GVA NOT SUITABLE FOR
• Inter-urban projects where accessibility beyond the already measured agglomeration effect is expected. • Projects where the spatial distribution of economic effects are important – the GVA approach cannot forecast these changes but the scenario testing can highlight potential redistribution. • Strategic analysis of large projects where a quick overview of effects can be estimated and what-if questions can be explored – in the US this type of approach is used as 'middle stage' analysis with a 'late stage' analysis possibly using a more sophisticated modelling tool.	• Projects which are likely to lead to small time savings for a large volume of traffic – the current appraisal methods can already measure the components that a GVA would also pick up. • An off-the-shelf toolbox for final BCR calculation.

Table 2 Situations that would suit or not suit a GVA analysis

[1] Alstadt, B, G Weisbrod and D Cutler (2012) Relationship of transportation access and connectivity to local economic outcomes. Transportation Research Record: Journal of the Transportation Research Board 2297, no.1: 154–162.

Assessing new approaches to estimating the economic impact of transport interventions using the gross value added approach, NZ Transport Agency research report 566

Available online at **www.nzta.govt.nz/resources/research/reports/566**

PARK AND RIDE OPTION WORTH THE INVESTMENT

Parking spaces for those wishing to park at a bus or train station and then take public transport cost about $15,000 a space, but are worth it for the benefits gained.

A new research report by TDG and Ian Wallis Associates, *Economic benefits of park and ride*, looks at the costs and benefits of five park and ride (P&R) systems already operating in Auckland and Wellington, to determine the economic and financial benefits of providing further spaces. The P&R sites chosen are on Auckland's Northern Busway (Albany and Constellation Drive) and at Wellington's Petone, Waterloo and Porirua sites on the rail network.

The research sought to understand the benefits to the highway system and local arterials of P&R systems, in terms of such things as decongestion, safety benefits and reduced vehicle operating costs. It found the greatest cost in providing P&R spaces was for the land and construction, which amounted to an annualised cost of $1,000 a space a year and corresponded to a total capital cost of around $15,000 a space. The annual operating and maintenance cost at P&R sites was $450 a space.

The case studies showed that increasing P&R capacity gave high returns.

'These relatively high returns are not unexpected, given that P&R schemes are targeted at car owners and encourage mode switching at times and in situations where public transport offers an attractive alternative and decongestion benefits are likely to be maximised,' says the research report, which was published in December 2014.

The aim of the research was to provide a focus for the development, testing and fine-tuning of the appraisal methodology, to demonstrate the methodology and to provide estimates of economic and financial performance.

'The appraisal results for the five case study sites indicated that investment in P&R at these locations would be well worthwhile from an economic and financial perspective,' says the report.

Current P&R users at the five sites were surveyed to see how the market would respond to the provision of more P&R spaces and to what extent car drivers would switch to P&R to travel to the CBD.

The number of potential new P&R users and the benefits to both existing and new P&R users were estimated from the on-road parking at each site, the benefits to users, such as a shorter journey time, and the potential use of on-street parking.

The calculated number of new public transport users was used to estimate the effect on public transport operating costs, existing public transport user costs and public transport fare revenues.

Based on the survey, a 'diversion rate' was developed. For every 100 P&R users in Auckland, 34 would be diverted from using their cars, 33 from using on-street parks and 16 from using a direct bus service. In Wellington, 41 in every 100 P&R users would be diverted from using on-street parks, but only 12 from driving their own car. The freeing up of on-street parking for other purposes would provide social benefits.

'There was a distinct difference between Wellington (where the public transport service is well established and P&R appears to be primarily an alternative to other public-transport-based options) and Auckland where P&R on the relatively new Northern Busway appears to be attracting a higher proportion of former car drivers.'

Researchers developed a method for estimating 'decongestion' benefits, which was corridor and time-of-day specific, was simple to calculate and did not require separate transport model runs.

P&R benefits varied between the two cities, with road decongestion accounting for about 80% of total benefits for the two Auckland case studies. Road decongestion accounted for only 11% to 23% of the total benefits in Wellington, where most of the benefits (80% to 92%) of the service were to the P&R users themselves.

The net costs to the public transport authority of providing more spaces were relatively small, as were any benefits to existing public transport users through service frequency changes.

'Road users were the major recipient of economic benefits (relating to decongestion), while the road authority would not incur significant costs.'

Researchers recommended that in future authorities should consider post- implementation market research where significant new or expanded P&R facilities were introduced, with particular focus on changes in travel patterns and mode choice. These results could then be applied to refine future P&R appraisals.

The report looked at methods for the economic and financial appraisal of P&R investments.

A methodology was developed for assessing the effects of investment in further P&R spaces on demand and modal choice. This could be used to determine capital and operating costs, benefits to public transport users, benefits and costs to public transport operators and decongestion benefits to road users.

Application of this economic and financial appraisal methodology to the five case studies found that all the schemes were performing relatively well in terms of the benefit-cost ratio for the government.

They showed that the capital costs were relatively modest and the schemes were specifically targeted to reduce road traffic volumes and congestion at times and in locations where congestion was relatively high and good public transport alternatives were available at low cost.

The report suggested that Auckland Transport, the Greater Wellington Regional Council and other regional or local authorities should use the same P&R appraisal methodology to determine the demand, economic and financial implications of providing additional P&R spaces at specific sites. It would also be useful in the appraisal of charging for P&R spaces.

A funding allocation framework was developed and applied to the case studies that considered how to divide the costs for any P&R investment project between the various parties concerned, such as the road, public transport and P&R authorities.

'The key concept underlying this framework was that the various parties should contribute funding (to worthwhile projects) in the proportions to which they, and their users, benefit.'

The report recommended that Auckland Transport and the Greater Wellington Regional Council should consider better modelling of P&R relative to alternative modes, as part of the next major update of the Auckland and Wellington strategic models.

Specific procedures for demand modelling and economic appraisal of P&R expansion initiatives, based on the report's methodology, should be incorporated in the NZ Transport Agency's *Economic evaluation manual or the Planning and investment knowledge base*.

Further work could also be done on methods to assess decongestion and road crash benefits associated with small changes in traffic volumes, and to incorporate this into the evaluation manual or the knowledge base.

Economic benefits of park and ride, NZ Transport Agency research report 562

Available online at **www.nzta.govt.nz/resources/research/reports/562**

NEW RESEARCH REPORTS

Travel time saving assessment

NZ Transport Agency research report 570

Available online at www.nzta.govt.nz/resources/research/reports/570

This research report covers the following aspects (from New Zealand and international perspectives) relating to the valuation of travel time savings for use in the economic appraisal of transport initiatives:

- The relative importance of travel time savings in the appraisal of the overall benefits of transport initiatives.
- Primary market research on how the behavioural valuation of travel time savings varies with the size of the time saving and the duration of the trip; and comparisons of these results with international market research findings and appraisal practices.
- The case for adjustment of behavioural values of time savings (for application in economic appraisals) to compensate for any income differences (eg by mode); the effectiveness of 'equity' (equal values) approaches as a means of adjustment; and the merits of alternative adjustment approaches.

The report makes recommendations that have implications for economic appraisal practices in the transport sector in New Zealand and, potentially, internationally.

OBTAINING TRANSPORT AGENCY RESEARCH REPORTS

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

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

A NOTE FOR READERS

NZTA research newsletter

The *NZTA research* newsletter is published quarterly by the NZ Transport Agency. Its purpose is to profile research funded through the Transport Agency'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 Transport Agency's Research Programme, see www.nzta.govt.nz/planning/programming/research.html.

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

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

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.

Disclaimer

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

Availability of *NZTA research*

The current edition of the *NZTA research* newsletter is available in hard copy or on the Transport Agency website, along with all previous editions of the newsletter, at www.nzta.govt.nz/resources/nzta-research/.

Email alerts of newly published research reports

Email notifications are provided when new issues of the *NZTA research* newsletter are published. Notification is also provided when new Transport Agency research reports are published on the Transport Agency'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:

- add or update names, email or address details
- receive the *NZTA research* newsletter in hard copy format
- receive email notification of the publication of the *NZTA research* newsletter and research reports
- alter the number of *NZTA research* newsletter hard copies you receive.

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DID YOU KNOW...

That there is a spreadsheet on the Transport Agency website listing all published Transport Agency research reports?

The spreadsheet is searchable by several criteria and can be found at **www.nzta.govt.nz/planning/programming/research.html.**

The spreadsheet has two worksheets; the first worksheet lists research reports with associated key words and the second lists research reports with the report abstracts.

NZ TRANSPORT AGENCY WAKA KOTAHI

New Zealand Government